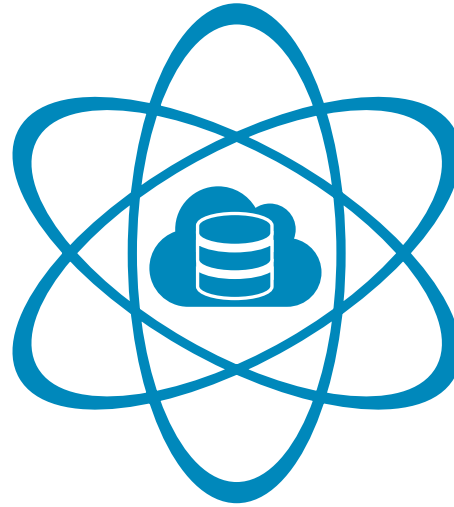




Info Slide Set for Thesis Candidates



- **Alle Materialien** dieser Präsentation unterliegen dem **Urheberrecht** – auch ohne ausdrückliche Kennzeichnung.
- Sie dürfen **ausschließlich** zum **persönlichen Gebrauch** im Rahmen dieser Veranstaltung verwendet werden.
- Eine **Weitergabe**, Veröffentlichung oder sonstige **Verbreitung** der Materialien ist ausdrücklich **untersagt**.
 - Insbesondere das **Hochladen in** Systeme Dritter – einschließlich öffentlicher Cloud-Dienste und mobiler Apps – auf Basis **generativer KI** oder großer Sprachmodelle (LLMs) **ist ausdrücklich untersagt**.
- **Eigene Aufzeichnungen** (Video, Foto, Ton) der Präsentation sind **nicht gestattet**.



■ Getting started

- Slide sections: '**First** steps', '**Choosing a** topic', '**Restrictions**'
- Exposé: Slide sections '**Checklist: Title of your** thesis' ⚠

■ Registration:

- Slide section '**Checklist before registering your thesis**' ⚠
- Slide section "**General** Information" (including details on **publication date** and **submission deadline**)

■ Work in progress:

- Slide section: '**Checklist before the main writing phase**'
- Slide section "**Checklist before the** reviews"

■ Submission:

- Slide section "**Further notes and** guidelines"
- Slide section: '**Checklist before submitting your** work' ⚠
- Slide section "**Checklist for submitting your source code**" ⚠

■ Defence:

- Slide section "**Checklist before the defence of your** thesis" ⚠





1. Set of information slides for those interested in writing a final thesis:
 - Theses_00_Intro.pdf
2. Writing **requirements!**? [Requirements for beginners / basics]:
 - **Theses_20_ReqTips.pdf** (similar to modules with module work in my course)
3. Tools: **git** / IDE / Installations [git for beginners / Basics]:
 - **Theses_21_gitTips.pdf** (similar to modules with module projects under my supervision)
4. **Software Architecture** / Technical Report [Architecture for Beginners / Basics]:
 - **Final_Theses_22_ArchTips.pdf** (similar to modules with module assignments in my course)
5. **Big Data and Cloud Computing Handbook for AI**:
 - **Theses_30_BDCC4AI-Handbook.pdf** (beyond the BCN or BDCC modules)
6. **Guidance on carrying out final projects** (aka **a collection of tips**)
 - <https://cyberlytics.eu/theses/guide/> (including **elementary mistakes**)
7. **Supplementary guidance on final projects in English**
 - <https://cyberlytics.eu/theses/guide4EN/>





<https://www.finance-magazin.de/cfo/gehalt/managergehalter-durch-transparenz-erschlagen-152945/>



TOO MUCH INFORMATION



In theory, you should already be familiar with EVERYTHING in this set of slides from school or previous modules!

In theory, this is just a refresher...

https://www.wtssl.com/?product_id=91652354_33





www.oth-aw.de/cpn



c.neumann@oth-aw.de



(CyberPetaNeuron@gmail.com for Google Docs etc.)



[0x2876154614C62D0A](#)



[Building G, Room 030](#) (Kaiser-Wilhelm-Ring 23, 92224 Amberg)



[+49 9621 482-3647](tel:+4996214823647)



Dr.-Ing., Dipl.-Inf.



scholar.google.de/citations?user=CGWWa5AAAAAJ



<https://www.researchgate.net/profile/Christoph-Neumann-8>



bbb.oth-aw.de/rooms/neu-raf-bvj-4n2/join (BBB Home Room)



47c4@oth-aw.de (for invitations via Microsoft Teams)



github.com/cyberlytics



gitlab.com/cyberlytics



www.cyberlytics.eu/ (Researcher profile)



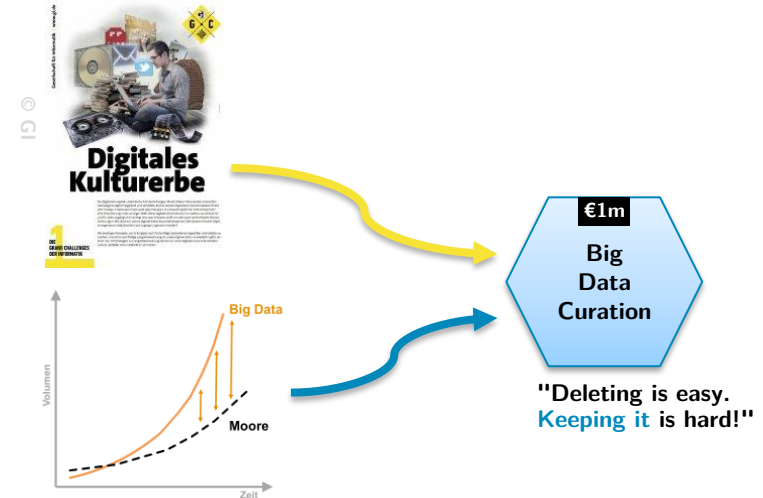
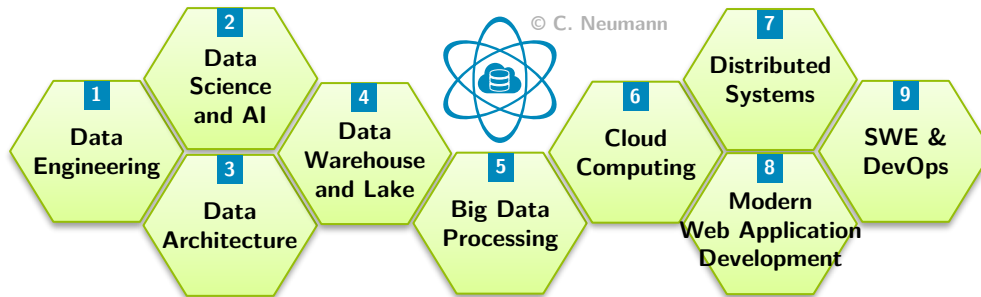
www.cpnatwork.de/ (Consultant profile)



Cyber = Cloud
Peta = Big Data
Neuron = AI
CPN = Christoph P. Neumann

also:
Cyber = Cloud
Lytics = Big Data





And other research interests...

FAU



Since 2021

PhD thesis awarded **top marks**

Nomination for the
GI Dissertation Prize
by FAU



© Schoenes Shirt



Two awards for
the **best course**
from the Faculty of Technology

sd&m EXASOL e@sy Credit®



Roles: Software Architect / Project Manager / Data Architect / Agile Coach

iapm
INTERNATIONAL ASSOCIATION OF
PROJECT MANAGERS



OTH Amberg-Weiden **Scientist Rankings** based on Scholar o
Top 5 of all registered lecturers at OTH-AW (as at 1 October 2024)

https://adscientificindex.com/i10-index-ranking/?ft_university=6641



Set of information slides for final-year dissertations

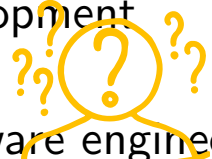
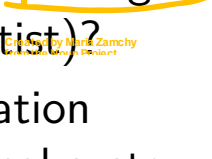
Getting started



1. **Ask yourself: German or English?**
 - In favour of German: generally easier [What was your last German mark?]
 - **In favour of English:** Important for jobs at international companies and for academic careers [What was your last English mark?]
2. **Read my collection of tips:** <https://cyberlytics.eu/theses/guide/>
 - Sections on **drafting**, **organisation** and **academic writing** (especially 'beginner's mistakes')
3. **Ask yourself: Word or LaTeX?**
 - Pros of Word: Spell check, plug-ins such as Grammarly, and much more.
 - **Pros of LaTeX:** Robust layout handling of changes, especially in the final stages, and much more.
4. **For external theses, clarify: No confidentiality clauses!** (in my case, neither as first examiner nor as second examiner)
 - Also: **No NDAs with professors** – their confidentiality is guaranteed by university legislation
5. **For theses involving software prototypes: Choose a concise name for your software**
 - If necessary, use tools such as [namelix.com](https://www.namelix.com). Do this now! As early as possible.
 - Why? The name will define your Git repository; it may appear in the title of your thesis, and much more.
6. **Ask yourself: should you opt for a traditional or progressive AI assessment model?**
7. **Write an exposé** (it is only with the exposé that the project has evolved from an idea into a proper topic)
 - There are good guides online (Google!) for writing an exposé, as well as illustrative material from me
 - Example guide: <https://www.scribbr.de/aufbau-und-gliederung/expose-bachelorarbeit/>
8. **Please fill in my online form now at the latest:** <https://forms.gle/SrAkeVdRtd1Vmkbo8>
 - The form also includes a question regarding the planning of our regular fortnightly meetings
9. **With the cooperation partner: arrange a coordination meeting between the three of us** (~'kick-off')
10. **Present your proposal to the second examiner** (alternatively, do this after point 10, with a draft outline)
11. **Search Google for 'Preparing for your Bachelor's thesis'** (or similar)
 - Alternatively: Get hold of the concise [guide by Deiniger et al.](https://amzn.to/37wKapC): <https://amzn.to/37wKapC> (advertisement)
12. **Write a first draft outline** (if not already included in the synopsis)
 - See the collection of guidelines, section on 'General structure' by Prof. Neumann
13. **Complete the EMI forms, set the submission date, and register via the Dean's Office**

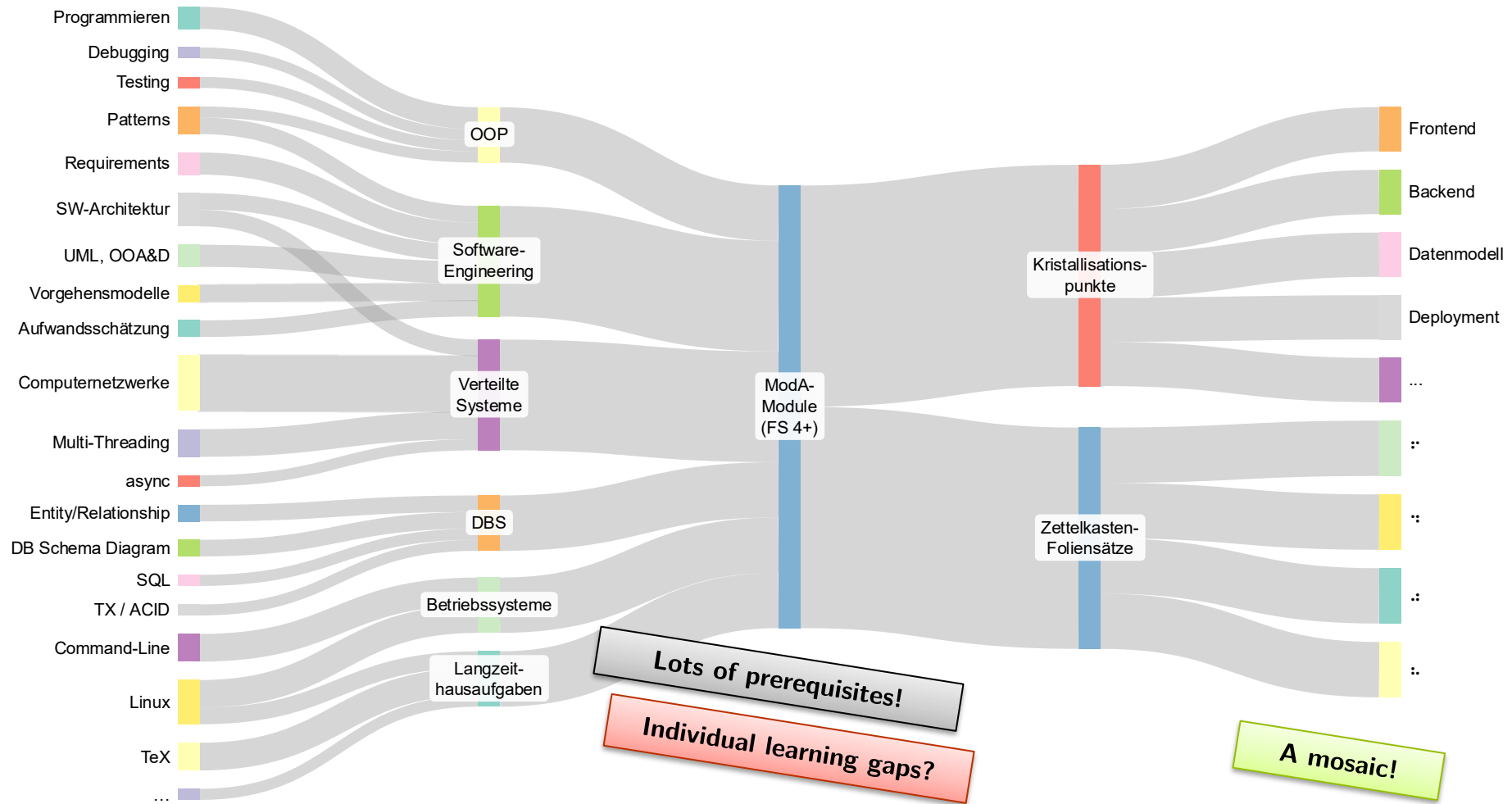




- Particularly if I am to set the topic, there are additional questions you should answer in advance:
 1. Is it more of an applied project, for example involving the development a **software prototype**, or a **literature-based thesis**? 
 2. Focus on **computer science** (with the aim of becoming a software engineer) or **artificial intelligence** (with a view to becoming a data scientist)? 
 3. Balance between **customer focus** (business architecture/application architecture) and **technical focus** (technical architecture, physical system architecture)?
 4. Application context: more **business-oriented** vs. **embedded** IT systems?
 5. Focus more on **full-stack** vs. **front-end** vs. **back-end**?
 6. Focus on **Big Data** vs. **Cloud Computing**?
 - Further drill-down into Big Data:
 - **Data engineering** (including DBS, DWH, NewSQL, NoSQL) versus **data science** (analytics, BI, data mining, AI)?
 - Traditional **on-premises data architecture** vs. **cloud-native data architecture**?
 - Further drill-down into cloud computing:
 - **Sales cloud** vs. **cloud-native**?
 - Traditional, **syntactic web** vs. **semantic web**?



7. If applicable: Which subset of my research interests? [see later slide!]





**Bachelor's
degree**

Please send me your ...

1. **German mark** [from your most recent school report, e.g. A-level mark]
2. **English mark** [from your most recent school report, e.g. A-level mark]
3. School **research project** [if you wrote one]
4. **Work placement report** [provided this is not subject to a confidentiality clause]
 - Completely independent of the company / field of work
5. Selected **presentation**
 - Designed by you in the past, on any topic of your choice
6. A brief **list of** the **modules** you have attended
 - Due to prior knowledge, specifically relating to my field of study

■ Why?

- I would like to get to know your **writing style** and your level of proficiency with regard to **formatting** and **typography**
- It's always also about the issue of **varied prior knowledge**





Master's

(If I supervised your
Bachelor's thesis, this is
irrelevant...)

Please send me your ...

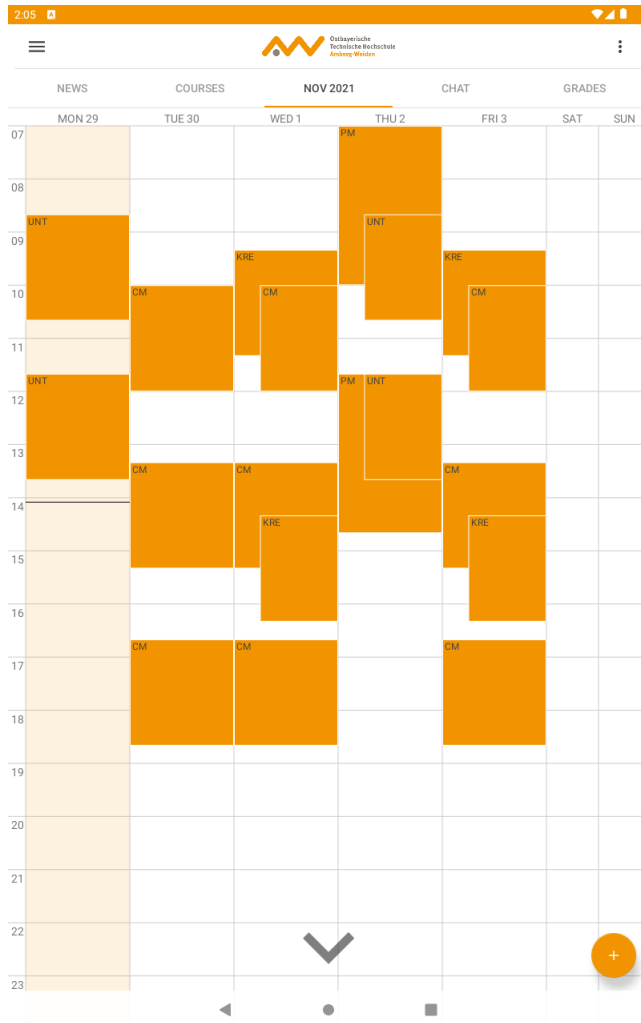
1. **German mark** [from your most recent school report, e.g. A-level mark]
2. **English mark** [from your most recent school report, e.g. A-level result]
3. **Bachelor's thesis** [provided it is not subject to a publication restriction]
 - Regardless of the topic you worked on
4. [if applicable, a **publication** of your own, for example if you your Bachelor's thesis...]
5. Selected **presentation**
 - The obvious choice would be the presentation on your Bachelor's thesis
6. A brief **list of** the **modules** you have attended
 - Regarding prior knowledge, specifically relating to my field of teaching

■ Why?

- I would also like to assess the **quality of your Bachelor's thesis** here, so that I can provide more targeted guidance on your Master's thesis if necessary
 - You may tell me the mark you achieved for your Bachelor's thesis, but you do not have to



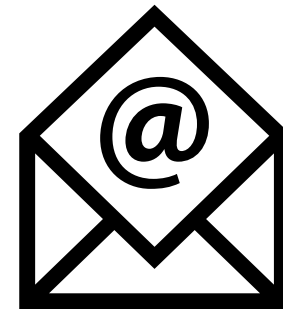
IMPORTANT



■ OTH-AW app

- Based on **Studio**
- <https://www.oth-aw.de/studieren-und-leben/services/oth-aw-app/>
- <https://play.google.com/store/apps/details?id=de.hawaw.hawmobil>

Why?





“**Individual appointments** such as initial consultation,
① pre-defence reviews and defences with me
exclusively during the **lecture term**
or, in exceptional cases, during the examination period!

So no preliminary meetings, pre-exam reviews or defences during the period that is {free of lectures and exams},
i.e. roughly from mid-February to mid-March (1m)
and from the beginning of August to the end of September (2m)

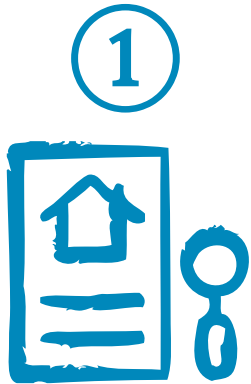
② “**Regular** meetings,
exclusively during the **lecture term!**”

Prof. Dr.-Ing. Christoph P. Neumann

meetings between the end of the lecture term (end of January) and the start of the lecture term (mid-March) (~1½ m)
and between the end of the teaching term (mid-July) and the start of the teaching term (end of September) (~2½ m)

③ **Why?** Too many exams, committees, appointment panels, steering groups, deadlines, block courses such as
t-specific teaching methodology meetings and so on. Individual appointments during the exam period or when there are no lectures.





①
**‘For my own topics,
!
Instead, you must submit
the synopsis you have prepared.’**

Prof. Dr.-Ing. Christoph P. Neumann

In the past, I used to draw up all my own **research topics** in writing in advance.

As a result, students often found these assignments easier
than initiating a topic in collaboration with an industry partner.

However, the results of the assessment showed that it is essential from the outset that you take
responsibility for your topic in writing! I have therefore **discontinued the practice of setting my own written
topics.**

Your proposal is an **essential preparatory exercise**
through which you demonstrate that you can formulate **(academic) research questions**
and have **understood the broad scope of the task.**





‘I can help **a company and you **NOT** assist with the initial drafting of a company-specific topic or provide advice!’**

Prof. Dr.-Ing. Christoph P. Neumann

IMPORTANT: Thesis topics are, **by law**, assigned **exclusively by professors**.

At universities of applied sciences, however, it is often possible to undertake company-sponsored topics as bachelor's theses, provided they are **reasonably challenging or innovative** – i.e. going beyond the scope of a working student role – **but this is the company's responsibility**. This is a **significant concession** on the part of us university of applied sciences professors; incidentally, such **flexibility** is rarely found at universities, where students generally work on topics set by the department.

If you have a **first draft**, I can help **polish** it up, but I cannot assist with self-discovery or brainstorming!
If you're contacting me about **supervision**, **please** provide **a reasonably concrete outline of the task**.

If you are unable to identify a topic within the company: I'd be happy to send you a list of my available topics!





A very effective recipe!

Worth noting: A **GPT-4o** is a much stricter reviewer than GPT-4-turbo!

Model 1
(cf. Neumann's two-model selection)

You are a university professor of computer science, **assessing a student's exposé for a bachelor's thesis**. The exposé outlines the research topic, objectives, methodology and expected outcomes. Please write a professional review that includes:

1. General impression: Clarity, relevance and coherence of the exposé.
2. Topic assessment: Is the research question clear, well-defined and appropriate for a bachelor's thesis?
3. Structure and organisation: Does the proposal follow a logical and academic structure (introduction, problem statement, methodology, timeline, references)?
4. Methodological soundness: Are the proposed methods suitable for answering the research question?
5. Language and style: Is the language academic and appropriate?
6. Feasibility and scope: Is the project realistic and manageable within the given timeframe?
7. **Suggestions for improvement: In what areas could the student improve the exposé?**

Write the review in the same language as the exposé and in a tone appropriate for university-level academic feedback. **You are permitted to criticise the work presented.**

As an appendix to the draft review, **provide detailed comments**: Give in-depth, line-by-line or section-specific feedback, referring to equations, figures or sections where applicable. **List all typographical errors**; list errors in the bibliography; list areas for improvement regarding grammar and language.





Model 2
(cf. Neumann's two-model selection)

Imagine you are a German university student studying computer science who is preparing an exposé for your bachelor's thesis. The topic is: “[Insert Thesis Topic]”.

Write a structured draft exposé in [English]|[German] that includes the following sections:

1. Working Title
2. Motivation and Problem Statement
3. Research Questions: One main research question and possibly sub-questions.
4. Objectives: Describe the aims of the thesis.
5. Methodology: Outline the planned methods, tools and approach.
6. Structure of the Thesis: A proposed table of contents or main sections.
7. Preliminary Bibliography: List at least 5 academic or technical references.
8. Timeline: Suggest a rough schedule for the bachelor's thesis (3–4 months).

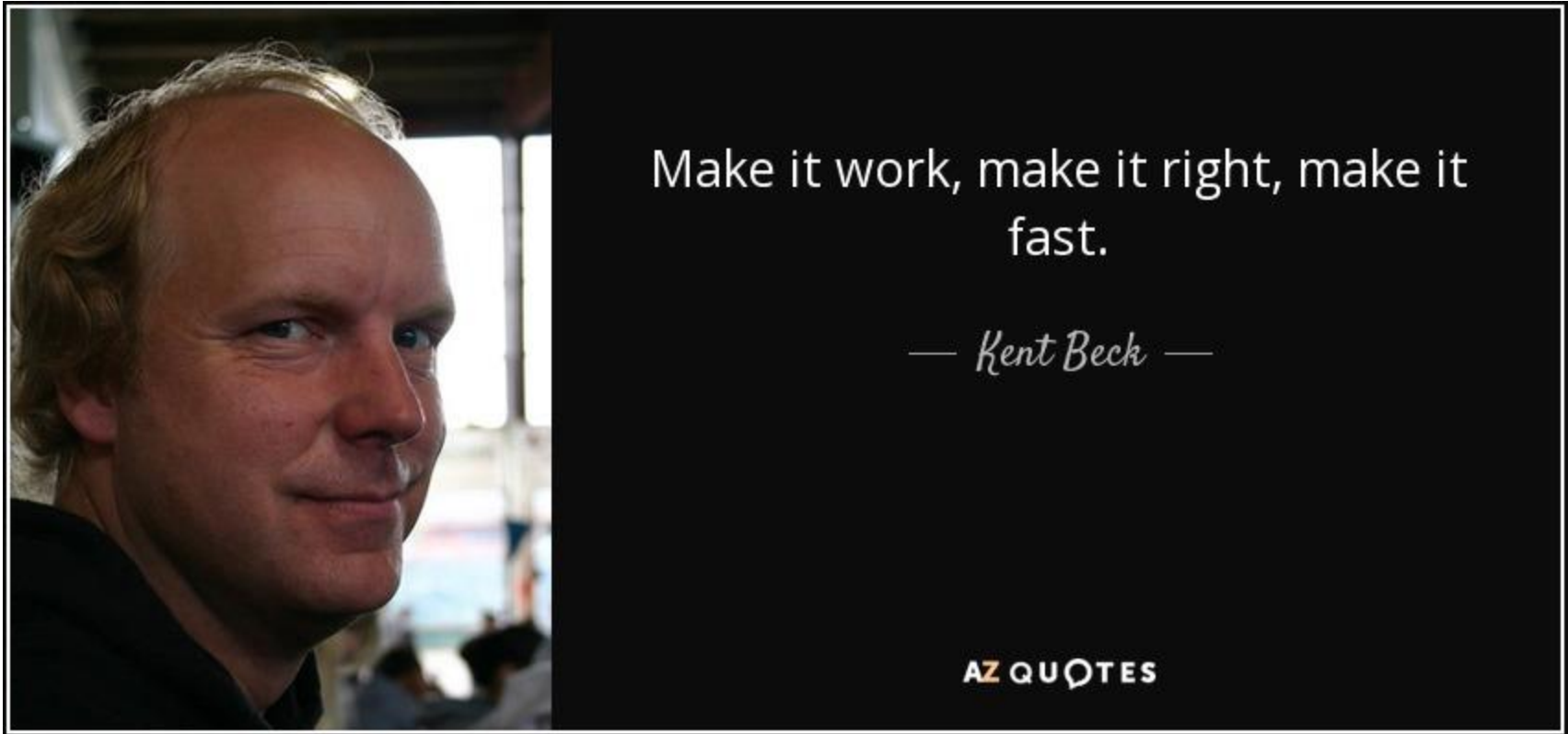
The exposé should be written in a formal academic style and be approximately 2–3 pages in length.

Just an example!





Crucial: **an anti-procrastination mindset**



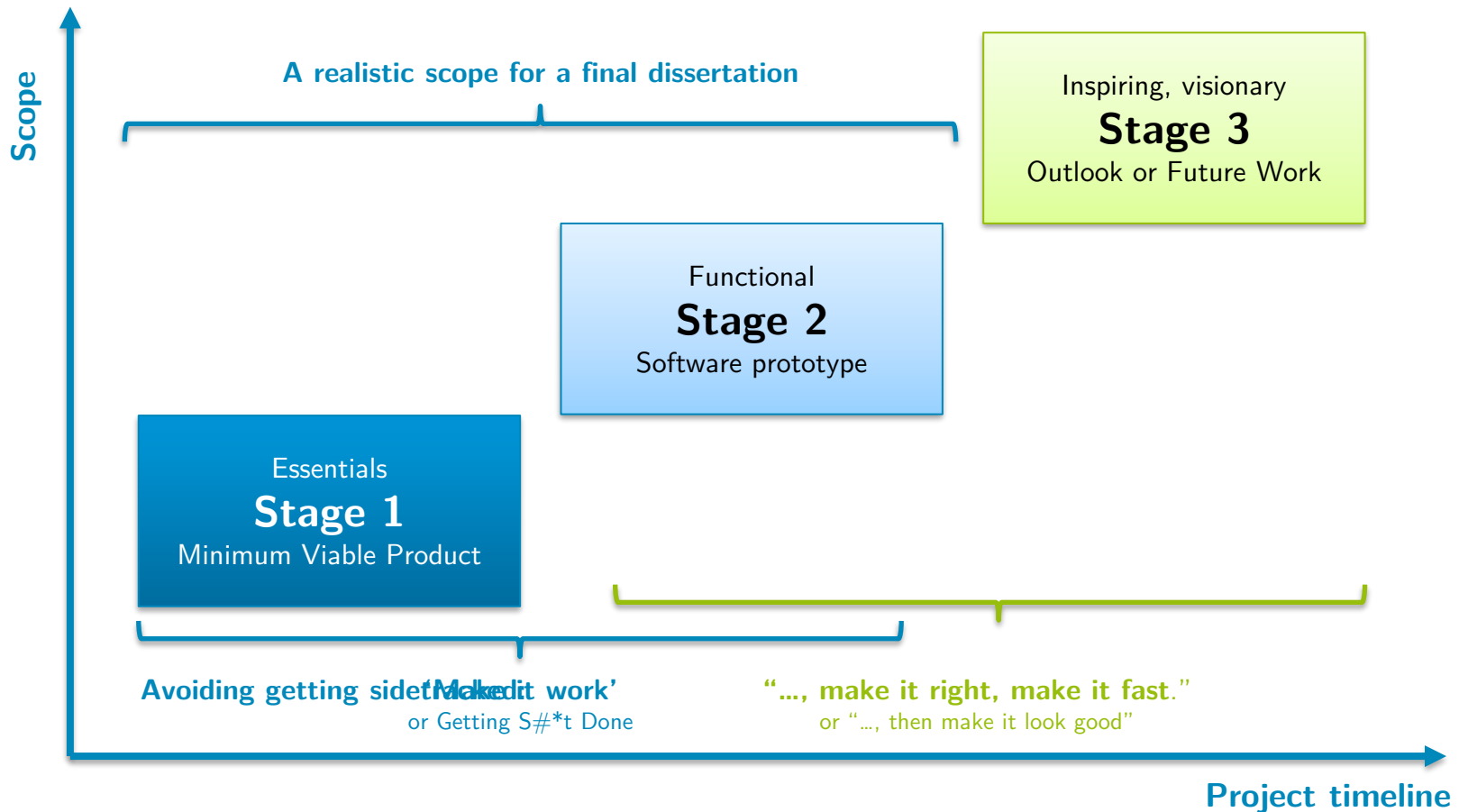
Similar: “Make it work, then make it pretty”

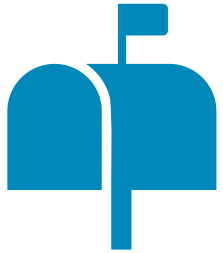
= **Avoid getting bogged down** = **“Don’t let perfect be the enemy of good”**



Three stages of development for software prototypes

22





Created by scott desmond

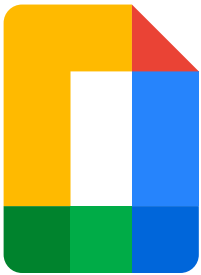
‘If you’re going to leave something in my postbox, it would be a good idea to by email!’

Prof. Dr.-Ing. Christoph P. Neumann

Checking one’s own postbox without further notice is a form of polling and, as I receive very little post, I only do so irregularly.

This applies not only during the non-lecture period but also, in particular, during the lecture period: Please bear in mind that I have very packed daily schedules, particularly during the lecture period, which do not systematically include checking my postbox.





“If you share a document with me via **Google Docs**, please use:

CyberPetaNeuron@gmail.com

(instead of `c.neumann@oth-aw.de`)!”

Prof. Dr.-Ing. Christoph P. Neumann

I hope you are able to work out for yourself how to link the abbreviation
C.P.N. with both my name and my field of teaching 😊





‘The final dissertation at the university in Computer Science/AI is (primarily) NOT an engineering-style execution of a software development project!’

Prof. Dr.-Ing. Christoph P. Neumann

More on this later. Preview: It is about (scientific) research questions and your software implementation is usually merely an evaluation of the proposed solutions.

PLEASE NOTE: The engineering-based execution of software development projects is very important and is the subject of various modules, particularly during the practical semester! The ability to do this is a fundamental prerequisite and must not be lacking in the final thesis either; it remains, in the context of this self-evident requirement, merely a secondary criterion for success.





Basic skills	Consultancy competence Common Sense // Common Sense (GMV)	Scientific approach	Scientific
Programming / Results-Orientation	Active listening / Identifying requirements	Literature research / State of the Art	Originality / Contribution
80-20 Pareto principle / Avoiding getting bogged down	Analytical thinking / logical reasoning	Methods (of the Field)	Difficulty Level
Confident decision- Ability	Structured approach / Completeness	Evaluation / Rigor Cycle	Advancement of the Field
	Clarity of the presentation	Style and form	
 It won't work without it	 It's the GMV that's the problem it often comes down to	 see assessment criteria	 completely different league





IMPORTANT

- The **proportion** of the thesis that is your own work (i.e. what you have done yourself) should account for **at least 50 per cent of all pages**
 - In most cases, it is not the practical work but the written thesis that is responsible for a lower mark
- 'Completeness' → Guidance on: '**What level of depth and breadth?**'
 - **The aim of the written paper is** to explain the topic in detail to another person with your level of knowledge ('peer' → e.g. a fellow student in the same semester) without that person needing further reading material to understand it
 - The written assignment should be just the right length so that the reader can read through it comfortably **without** becoming **bored** or feeling **overwhelmed**
- **Clarity of presentation**
 - 'A picture is worth a thousand words' → Use **illustrations/sketches**, **tables**, **diagrams** and **graphical modelling** to explain concepts
 - **Figures** should have a **legend** and a short **caption**
 - Diagrams, i.e. plots, must always also include **axis labels**
- **A thesis is not a diary**
 - Do not write chronologically; do not dwell on how difficult something is throughout the text (remain objective)
- **An academic paper is not a user manual or a Wikipedia article**
 - Techniques for configuring, launching or operating programmes belong in the Appendix, if at all





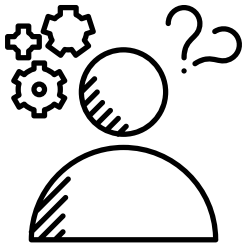
■ The so-called '**engineering** approach' → Characteristics:

1. Measurability and evaluability
2. Traceability
3. Abstraction and modelling
4. Prioritisation
5. Think first, then act
6. ...

Be a good engineer and a good consultant, and then you'll already have an almost scientific approach to your work ✓

Many substandard theses **do NOT**
in the strict sense **because of their academic quality**
but on much more fundamental characteristics ⚡





Created by hunotika
from the Noun Project

‘The term **“research questions”**, in the narrower sense,

often refers to questions of a broader scope: spanning several years or involving multiple people!

For example, through doctoral theses or DFG, BMBF or EU-funded research projects.

It is best **to avoid** this weighty term **in bachelor’s theses**, so as not to

.
So, for example, simply refer to **‘research questions’**.”

Prof. Dr.-Ing. Christoph P. Neumann

Give your questions scientific **depth through** their **subject matter or content**.
And **not** by **labelling** the questions as ‘scientific’ or ‘research questions’.

From a professor’s perspective, Bachelor’s and Master’s theses are clearly part of teaching – naturally aimed at honing academic expertise – and often amount to only **minor** research that is rarely worthy of publication. (cf. ‘Jugend forscht’).

There are exceptions (e.g. to be found among the ‘1.0’ Master’s theses).



Mini reference calculation using bachelor's theses as an example

30



De jure workload:

12 ECTS = 360 hours = 45 days

Max. duration: **5 months** (gross)

Plus my own observation/rule of thumb:

Hands-on work vs. writing for bachelor's theses in a ratio of **3:2**





25 : 25 : 25 : 25

28 days: 7d 7d 7d 7d plus 17 days

Research , Implementation familiarisation	Technical Concept Concept	Technical Design Design	Programme Design	Letter ≥ 50 pages

WARNING: With a workload of 3 days per week, the 'Research/Familiarisation' phase will be almost over after 2 weeks (= **1 regular meeting cycle** with me). Even a single week of **procrastination** could therefore throw you off track in some respects. It's better to plan **your holiday weeks** in advance and otherwise stay on the ball! **An anti-procrastination mindset** is crucial!

15% : 15% : 15% : 15% 38%





Variation

17 : 17 : 33 : 33

28d:

4½d

4½d

9½d

9½d

plus 17d

Research Technical Technical Programme
che, editing Concept Conceptual ming
integration Design Design

Writing
≥ 50 pages

10% : 10% : 21% : 21%

38%





Variation

33 : 33 : 17 : 17

28d:

9½d

9½d

4½d

4½d

plus 17d

Research , Implementation
familiarisation
Technical Concept
Technical Design
Programme Design

Letter
≥ 50 pages

21% : 21% : 10% : 10%

38%





Variation

33 : **67** : 0 : 0

28 days:

9d

19d

~~0d~~

~~0d~~

plus 17 days

Research , Implementation processing
Technical Concept Design
Technical Design
Programme Design

Letter
≥ 50 pages

21% : **41%** : 0% : 0%

38%

WARNING: This concept must then be presented **in a methodical**, systematic and comprehensive manner and be underpinned by **academic sources**. This **is too much to expect of** the average student.





- **‘Big Data’ and ‘Cloud Computing’ are the two core aspects / key concepts of my field of teaching**
 - The addition ‘for AI’ is only secondary for me; for example, administratively speaking, my teaching is assigned to the AI degree programmes at OTH-AW... and, of course, I also integrate AI topics into my lectures, but please do not let that mislead you regarding the following statement:
- **The true AI experts at OTH-AW and the EMI Faculty are:**
 1. Prof. Ulrich Schäfer
 2. Prof. Gerald Pirkel
 3. Prof. Dominikus Heckmann
 4. Prof. Tatyana Ivanovska
 5. Prof. Christian Bergler
 6. Prof. Patrick Levi
 7. Prof. Fabian Brunner

}

Former
postdocs
at DFKI

Topics with a focus on AI:
LLMs,
classification models,
Predictive maintenance,
...

(I'd be happy to act as a second exam)

 - (So I'll be getting to the topic of ‘AI’ in eighth place at the earliest!)





Moodle-Lernplattform | OTH Amberg-Weiden

[Dashboard](#) / [Kurse](#) / [Suchen](#) / cyberlytics Kurse suchen [Start](#)

Suchergebnisse: 1

 **CyberLytics-Abschlussarbeiten** 

Trainer/in: **Christoph Neumann**

Der übergreifende Projektname aller meiner Forschungsaktivitäten ist **CyberLytics**. Alle durch mich betreuten Abschlussarbeiten sind automatisch – und ungeachtet des Themas der Abschlussarbeit – dem übergeordneten Forschungsprojekt **CyberLytics** zugeordnet.

Kursbereich: **Semesterübergreifend**

Kurse suchen [Start](#) 

- **Moodle course for all my final-year students**
 - Moodle **course name**:
CyberLytics Theses
 - Direct link:
<https://moodle.oth-aw.de/course/view.php?id=3147>
 - Self-enrolment!
Password: "secret"
 - If you're simply interested, not need to join just yet – only when you're ready to commit! (For example, once you've written an outline.)



Varying levels of prior knowledge regarding my Bachelor's modules?

37



IMPORTANT

Database systems **DBS**  Prof. Neumann → **KI-2/IK-3/MI-2**

Programming for AI 3: Java **PK3**  Prof. Neumann → **AI-3/IK-4**

Algorithms and Data Structures **AUD**  Prof. Neumann → **AI-3/IK-4/GI-3**

Big Data, Cloud & NoSQL **BCN**  Prof. Neumann → **KI-4/IK-5 | MI-6/II-6**

Web Application Development **WAE**  Prof. Neumann → **MI-6 | KI-6/IK-5/II-6/GI-6**

Are there any gaps my modules?
BDCC4AI
handbook! (on Moodle)



Varying levels of prior knowledge regarding my Master's modules?

38



IMPORTANT

Big Data Technology **BDT**  Prof. Neumannann → **MKI-1** | IA/MAPR

Cloud computing technology **CCT**  Prof. Neumann → **MKI-2** | IA/MAPR

Previously / Historical:

Semantic Web Technology **SWT**  Prof. Neumann → MKI-2 | IA/MAPR

Are there any gaps
my modules?
BDCC4AI
handbook! (on
Moodle)





prompt

Let me ~~google~~ that for you:



Act as a professor of computer science,
giving a lecture on **academic writing**.

List **the** most **common mistakes**

for each of these topics:

**title, abstract, introduction, background, related work,
methods, results, discussion, future work, conclusion.**

And what are **the common mistakes** in:

**bibliography, figures, tables, abbreviations,
language, style, formatting,
capitalisation rules, grammar, typos.**

Important!





Startseite Dashboard Meine Kurse Kurs beantragen (nur Dozierende) Bearbeiten

Document Title	Size	Upload Date	Description
Prof. Neumann: Hinweise zu Anforderungsmanagement und Schätzverfahren	1.5 MB	27.12.2023 10:58	Notbuch. Lesen! (User Stories, Satzschablone, Akzeptanzkriterien, User Story Splitting, Use Cases, ...)
Prof. Neumann: Hinweise zu git	1.1 MB	14.02.2022 10:01	
Prof. Neumann: Hinweise zu Software-Architektur und Architekturdokumentation	1.2 MB	14.02.2022 10:01	
Prof. Neumann: Notbuch BDCC4AI = Handzettel-Sammlung zum Lehrgebiet Big Data und Cloud Computing für KI [WICHTIG]	33.2 MB	18.12.2023 10:50	Zu meinem Lehrgebiet eine sehr umfangreiche aber dennoch handselektierte Foliensammlung aus diversen Modulen und Vorlesungseinheiten von mir. Geballtes Wissen! ["Notbuch"]

Now split into individual chapters...





- **Find out about the publications I have written myself on your subject area.**
 - You should also cite these in your thesis later on
 - See slide ‘**List of publications: Christoph P. Neumann**’
 - <https://dblp.uni-trier.de/pid/19/7400.html?view=bibtex>
- **Examples**
 - **Database systems / RDBMS**
 - Semantics of a runtime-adaptable transaction manager
 - Integration of distributed and heterogeneous configuration management databases
 - **Cloud / Web / Distributed Systems**
 - Security Challenges for AI Applications Based on Cloud or Fog Computing
 - FoodFresh: Multi-chain design for an inter-institutional food supply chain network
 - Distributed case handling
 - **AI**
 - OXDBS: Extension of a native XML database system with validation via consistency checking of OWL-DL ontologies
 - Security Challenges for Cloud or Fog Computing-Based AI Applications
 - **Note:** Please also cite your own **TechReps** – for example, from my module assignments – provided they have been published, as evidence of your prior experience relevant to your final dissertation





Please cite 2–3 publications by your principal supervisor in your thesis:

[The bib-keys as per the file cpn_all_all.bib, which is available on Moodle.]

- **Cloud:** PANP23seccloudfogai
- **Distributed systems:** Neumann2013dissBook, NeWL12offsync, NeRL12deus, NRDL09deus, MeNe04testejb, FDI+10esmmog, WaNe12alphaoffsync
- **Pub/Sub systems:** Neumann2013dissBook, NeRL12deus, NRDL09deus, FDI+10esmmog
- **Blockchain:** StNe23foodfresh, StNe24kosmosis
- **Content management:** Neumann2013dissBook, NRDL09deus
- **Database systems/RDBMS:** ILN+09semrttx, JBN+10fcmdb, IND+09lzataV
- **XML Database Systems:** NeFL10oxdbS
- **Version Control Systems:** Neumann2013dissBook, NeHL12hydra
- **Evolutionary Information Systems:** Neumann2013dissBook, NSWL11alphaadaptive
- **Workflow Management:** Neumann2013dissBook, NeLe09alphaflow, NeLe09dmps
- **Rule-based systems:** ToNe11alphaprops
- **Knowledge-intensive processes:** Neumann2013dissBook, NeLe12adhocCoop, NeLe10alphaUC, NeLe09alphaflow, NeLe09dmps
- **AI:** PANP23seccloudfogai, LeNe24vocattllm
- **Medical Informatics:** Neumann2013dissBook, NeLe12adhocCoop, NeLe10alphaUC, NeLe09alphaflow, NeLe09dmps, NeLe12alphaFlow, LNR+11egr
- **Component-based Systems/JEE/EJB:** MeNe04testejb, neumann2004sa
- **OWL-DL/Semantic Validation:** NeFL10oxdbS
- **Test bench/QS/QA:** MeNe04testejb, neumann2004sa
- **Automotive:** neumann2005da
- **MMOG:** FDI+10esmmog

Alternative to my BibTeX file for BibTeX entries: <https://dblp.uni-trier.de/pid/19/7400.html?view=bibtex>
however, the bib-keys are different there...





- I only supervise topics if the necessary **foundational knowledge** are demonstrably your **strong points**!
- "Proof"? A mark in a subject-relevant module that has been tested in exams
- **Examples**
 - Topic: "... web application/cloud application ..."
➔ What mark did you achieve, for example, in **Computer Networks** / **SWE1**?
 - Topic: "... data integration | data modelling ..."
➔ What mark, for example, in **DBS**?
 - Topic: "... Design and ... application/architecture ..."
➔ What grade, for example, in **SWE1**?
 - Topic: "... Data Science ..."
➔ What grade, for example, in **Machine Learning 1** / **Mathematics 2** / **Stochastics**?
 - Topic: "... Docker|Kubernetes ..." | "... Validation of real-time capability ..."
➔ What grade, for example, in **Operating Systems** / **Computer Networks**?
 - Topic: "... Route Optimisation ..." | "... Blockchain ..."
➔ What grade, for example, in **AUD** / **Maths 2**?





- I will only supervise topics if the necessary **fundamentals** have demonstrably been **applied** in a rudimentary **practical manner** beforehand!



- "Proof"? A mark in a recent module where the subject matter has been successfully covered!
- No need for a miracle beforehand, but a mark **close to 0% simply won't do**.

■ Examples

- Topic: "... web application/cloud application ..."
→ What mark, for example, in **WAE/BCN/MUC/.../PRX/BT/.../CCT?**
- Topic: "... data integration | data modelling ..."
→ What mark, for example, in **DAT/BDT/.../PRX/BT/.../BDT?**
- Topic: "... Design and ... application/architecture ..."
→ What mark, for example, in **WAE/BCN/.../PRX/KPG/BT/.../BDT/CCT?**
- Topic: "... Data Science ..."
→ What mark, for example, in **ML2/.../PRX/IRN/BT/.../MAL/DRL/NLP?**
- Topic: "... Docker|Kubernetes ..."
→ What mark, for example, in **BCN/.../PRX/BT/.../CCT?**

BT = Bachelor's Thesis





As I know from my ModA: "A grade of 1.0 must be achievable for a student with the required entry qualification within the intended workload."

BUT the following also applies:

"Unfortunately, given its sheer workload, the dissertation cannot be used to catch up on foundational knowledge!"

**"The final project is designed to build on strengths,
not to compensate for weaknesses or shortcomings!"**

Prof. Dr.-Ing. Christoph P. Neumann

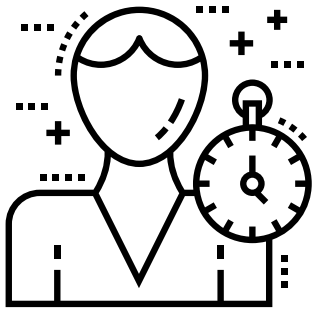
I do NOT support a fundamental reorientation of your areas of specialisation through your final thesis. Because that is too difficult. The amount of prior knowledge required in my fields of expertise is simply too vast.

Take web applications, for example:

What is MVC? What is MVC on the web? What is client/server? What is an RPC? What is an n-tier architecture? What is front-end/back-end? What is middleware? What is the persistence tier? What is JSON or XML? How do I visualise a high-level architecture? How do I visualise a data schema? What is UML? What are user stories? etc.

You might manage to 'tinker' your way into a functional web application, but in my experience, **WITHOUT** proven prior knowledge, you will most likely NOT be able to articulate this professionally (and, in parts, scientifically) in a final dissertation! (at least NOT within the intended workload)





Created by ProSymbols
from the Noun Project

**‘You are, with regard to
your final-year project
project manager with
overall responsibility!’**

Prof. Dr.-Ing. Christoph P. Neumann

Your primary examiner is your stakeholder!

The second examiner and external supervisor are your stakeholders!

You are also the chief architect and lead programmer!





‘Questions demonstrate curiosity and interest. But questions also reveal the limits of one’s expertise! Questions must be open-ended!’

Prof. Dr.-Ing. Christoph P. Neumann

So-called **‘silly’** questions are simply those that fall well below the average level of competence expected of a peer group!

It is only in nursery, primary school and the early years of secondary school that there are no ‘silly questions’.

Among academics, only **questions that are relevant** and have a high degree of contextual legitimacy leave a positive impression.

PLEASE NOTE: However, if you are stuck on a task, you **MUST** ask someone for help as soon as possible!

If you fail to **seek help in good time** – for example, out of misplaced shame – this is, so to speak, a character flaw!

Be confident in acknowledging the limits of your expertise! But don’t get on the nerves of those around you in the process!

Be professional: Spend at least three minutes doing your own research.





lmgty

RTFM!
READ THE FU*KING MANUAL

~~Shall I Google that for you?~~
~~Shall I prompt that for you?~~

Only ask your supervisor questions that you have already tried to answer yourself using Google or an LLM!

The same applies in industry, for example to team leaders and colleagues!

Avoid being what's known as a 'high-maintenance' employee (although this issue is just one aspect of that).





<https://forms.gle/SrAkeVdRtd1Vmkbo8>

Registrierung von Abschlussarbeiten
Prof. Christoph P. Neumann / OTH Amberg-Weiden

cyberpetaneuron@gmail.com (nicht freigegeben)
[Konto wechseln](#)

*** Erforderlich**

Ihr Vorname und Nachname? *

(bspw. Christoph Neumann)

Meine Antwort

Ihre OTH E-Mail-Adresse? *

Meine Antwort

- **When registering, simply leave any fields that do not apply blank!**
 - For example, questions about the company if you're writing your dissertation without being affiliated with a company...
- **The form distinguishes between required and optional fields.**
 - Mandatory fields are marked with a red asterisk ("*")





IMPORTANT

<https://forms.gle/SrAkeVdRtd1Vmkbo8>



Send



Registrierung von Abschlussarbeiten

Prof. Christoph P. Neumann / OTH Amberg-Weiden

cyberpetaneuron@gmail.com (nicht freigegeben)
[Konto wechseln](#)



* Erforderlich

Ihr Vorname und Nachname? *

(bspw. Christoph Neumann)

Meine Antwort

Ihre OTH E-Mail-Adresse? *

Meine Antwort

Registrierung von Abschlussarbeiten

Ihre Antwort wurde gesendet.

[Antwort bearbeiten](#)

PLEASE NOTE: Make sure you save this unassuming link for later!!

Unfortunately, I **cannot** generate this link for you, nor can I amend any form content on your behalf. *sic*

If the link is lost and we want to change something, then I would have to delete the form and you would need to fill it in again. *sic*

Please let me know by email once you've done so!
Google Forms does not notify me automatically. *sic*



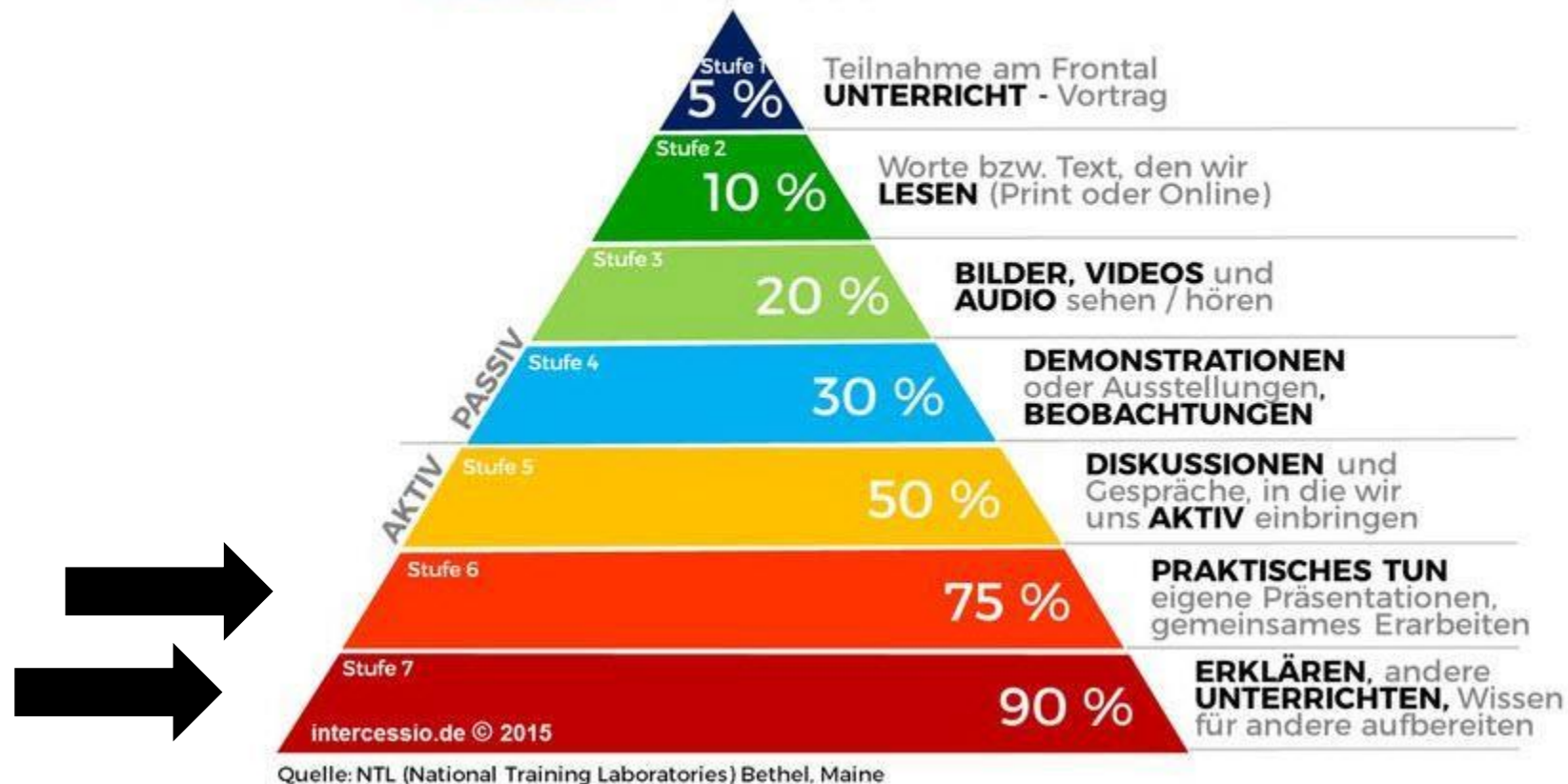
Final-year projects in the context of the learning pyramid

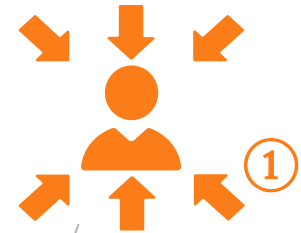
51



LERN PYRAMIDE

Durchschnittliche **RETENTION RATE** eines Trainingsteilnehmers





■ Prof. Dr.-Ing. Christoph P. Neumann

- ➔ ■ **Getting started:** <https://www.oth-aw.de/neumann/theses-prep/>
(→ Contains **links** to most other sources!)
- **My assessment criteria:** <https://cyberlytics.eu/theses/criteria/>
- **My collection of tips:** <https://cyberlytics.eu/theses/guide/>
- **Contributor Agreement:** <https://cyberlytics.eu/theses/agreement/>
- **Illustrative material:** <https://moodle.oth-aw.de/course/view.php?id=3147>
 - (Password for 7z files: “geheim”)
- **Tools:** <https://github.com/cyberlytics/awesome-thesis-tools>
 - You should definitely visit this page for references to **free tools** for dissertations!





- Face-to-face meetings take place in my office: [Building G, Room 030](#)
- If BBB is preferred or required due to the pandemic (and unless otherwise agreed), we will meet **during the initial phase** in my **BBB Home Room**: <https://bbb.oth-aw.de/rooms/neu-raf-bvj-4n2/join>
 - It's much like a **consultation hour**, regardless of the day or time.
 - But the Home-Room is only for use as long as no fixed meeting has been arranged! See below.
- My Home-Room also applies (unless otherwise agreed) to any meetings held in conjunction with the partner organisation
 - Alternatively, upon invitation, I also use the partner company's external infrastructure, whether Teams, Zoom, Jitsi or similar; but as mentioned, unless otherwise agreed, my BBB Home-Room is automatically used, and you may – and indeed should – share its link!
 - For meetings via Microsoft **Teams** (sometimes preferred by partner organisations), please ensure you use 47c4@oth-aw.de for Teams invitations (instead of c.neumann@oth-aw.de)
- Once your work is up and running and we have agreed on a **regular meeting schedule**, we will no longer meet in my BBB Home Room but in the **BBB CyberLytics Room** (should BBB be requested or become necessary due to the pandemic)
 - <https://bbb.oth-aw.de/rooms/neu-u4c-axj-jzz/join> (access code in the Moodle course)

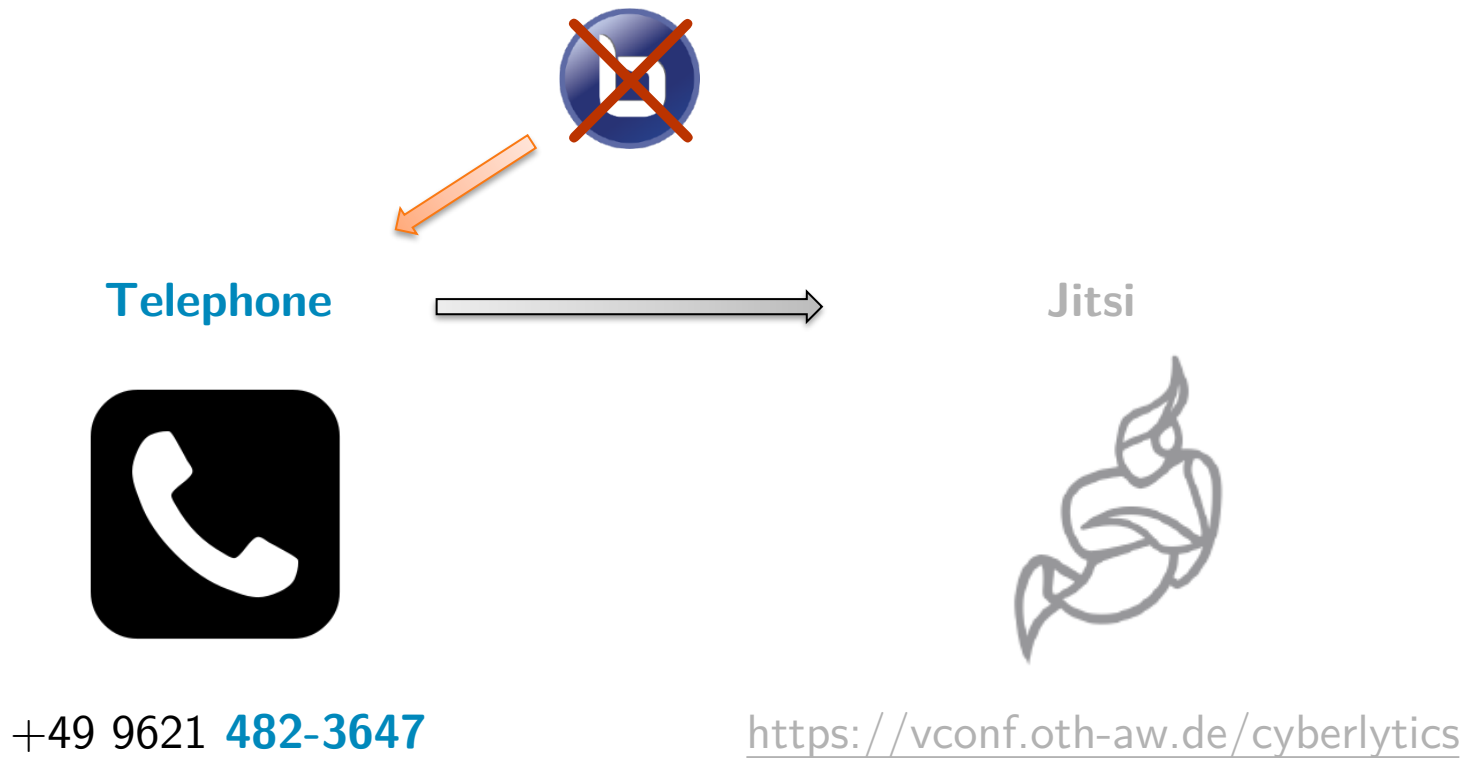


①



②





Mac user? Screen sharing in BBB requires system authorisation beforehand

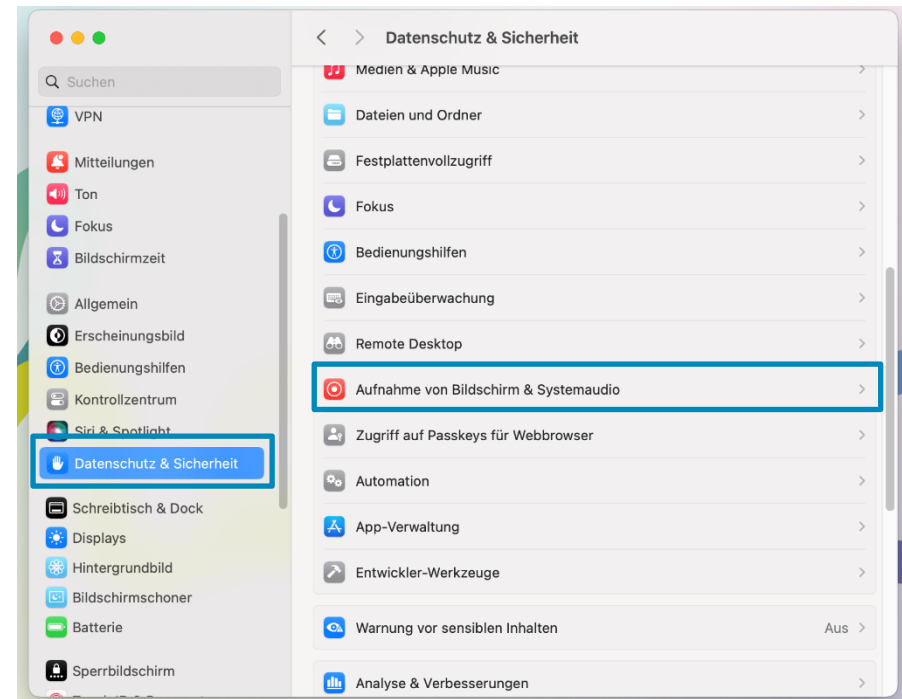
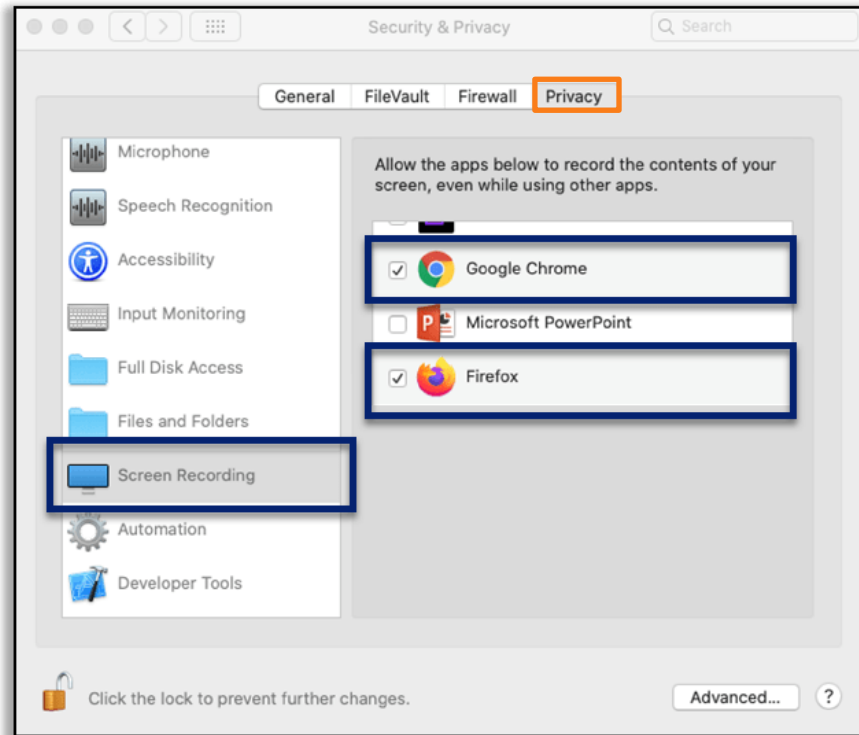
55



Older versions of macOS:



Newer macOS:

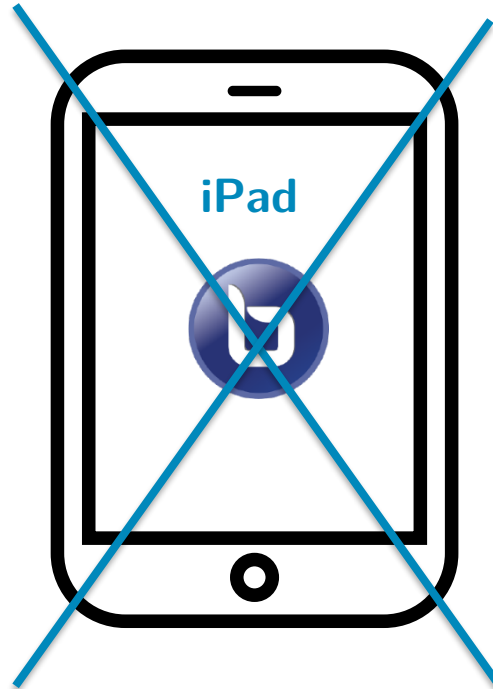


However, you must close the browser first!



iPad users? Screen sharing in BBB doesn't seem to work on iPads ☹️

56



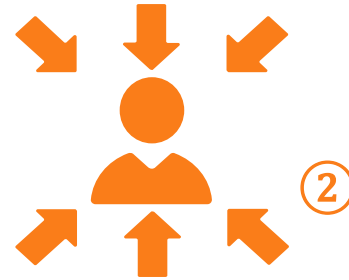


- Please make your presence known when you enter the BBB room!
- Especially if I'm still working with a fellow student!
 - We might be fully engrossed in what we're doing and not notice you!
 - We're probably in the middle of a lively discussion and haven't even looked at the clock!
 - No need for false politeness! It's polite enough if you wait another minute (whilst you're here!) until we've finished.



Created by Adrien Coquet
from Noun Project





■ OTH Amberg-Weiden

- **Official:** [https://www.google.com/search?q=OTH-AW+EMI+Downloads+Bachelor's thesis+Master's thesis](https://www.google.com/search?q=OTH-AW+EMI+Downloads+Bachelor's+thesis+Master's+thesis) (Our website is being redesigned too often 🤖)

➡ ■ Important **forms**

- **Semi-official:** Guide 'Writing a Thesis'

- ➡
- A draft is currently available as part of the materials for [the Bachelor's seminar](#)
 - So please enrol as a Moodle course participant and have a look, even if you are not yet actively taking part in the course – if necessary, do so early enough to request enrolment in the previous semester's course!
 - (This guide overlaps in parts with my 'collection of tips'. But that hardly matters. My tips overlap just as much with Deiniger's book, or with other relevant guides.)

- **Semi-official:** LaTeX template 'Writing a thesis'
<https://www.oth-aw.de/latex/> (Incidentally, you are free to choose your own citation style!)





Only about a third of these (i.e. approx. 40 per annum) are from the **AI** or **Computer Science** degree programmes!

Absolventen der Fakultät EMI



Absolventen: **49**



Bachelor: **75,5%**



Master: **24,5%**

[Zum Deckblatt](#)

Stand: 01.06.2021 | SoSe 2021



Studiendauer BA: **8,3**



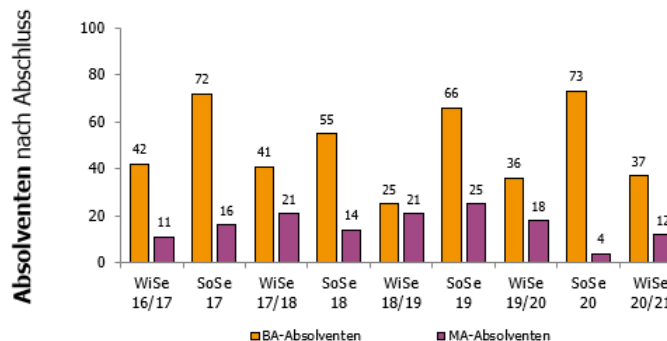
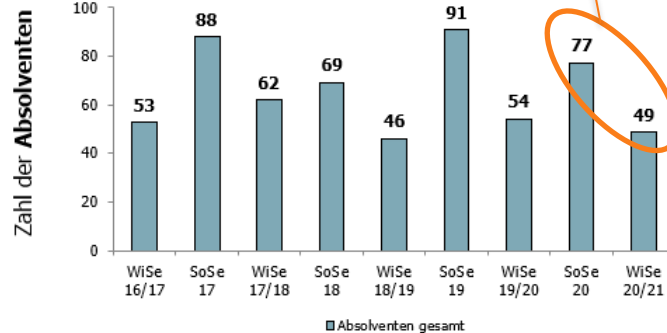
Abschlussnote BA: **1,9**



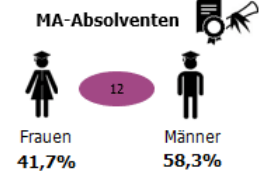
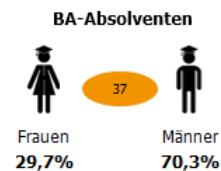
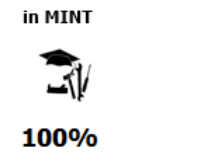
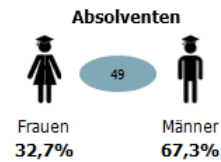
Studiendauer MA: **6,1**



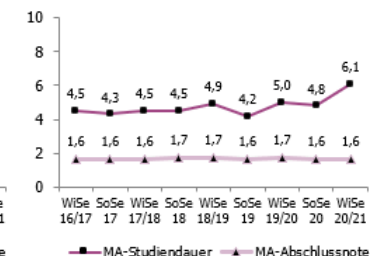
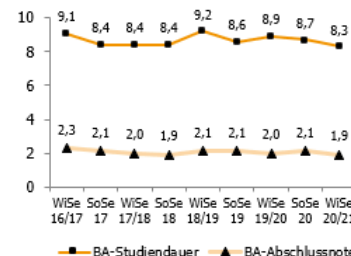
Abschlussnote MA: **1,6**



Absolventen gesamt



durchschnittl. Studiendauer und Abschlussnote





⑤ **‘I do not supervise more than
five final theses
at the same time as first examiner.’**

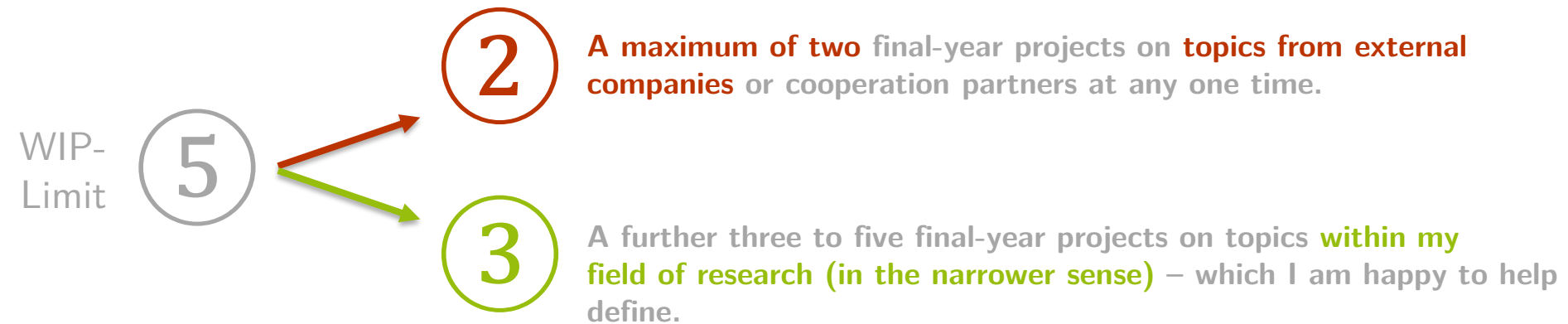
Prof. Dr.-Ing. Christoph P. Neumann

(This generally corresponds to 1 to 2 LVS of teaching per semester)

(Marcus Deininger et al.: “A supervisor should never supervise so many theses at the same time, that the supervision of individual theses suffers as a result.”)

(This would usually cover around a quarter of all ‘Computer Science/AI’ graduates, so don’t worry!)





Prof. Dr.-Ing. Christoph P. Neumann

Thesis topics are assigned by professors, not by companies. It is purely a matter of courtesy that we approve final theses proposed by external companies. I could easily advocate a zero-tolerance policy in this category and assign/supervise only theses based on my own research topics.

This also applies to dual study programmes! There is no reason why dual students should write their final thesis on a topic chosen by your company; that is simply peer pressure, because apart from the work placement semester, all modules – including the final thesis – are purely a matter for the university.



Time slots for fortnightly voting sessions

(2 x 5 students, alternating weekly) (as of the 2023/24 winter semester)

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**In person
or via BBB**

	Mon	Tue	Wed	Thu	Fri
09:30 – 10:00					
10:00 – 10:30					
10.30 – 11.00					
11:00 – 11:30					
11.30 – 12.00					
12:00 – 12:30					
12:30 – 13:00					
13:00 – 13:30					
1.30 pm – 2.00 pm					
14:00 – 14:30					
2.30 pm – 3.00 pm					
15:00 – 15:30					



Plagiarism



1. Plagiarism

- Mark verbatim **copies** as quotations and cite the source
- Also cite sources for **paraphrased material**
- It used to be common practice to copy texts you had written yourself without marking them as such; nowadays, however, **(self-)citations** are becoming more common and are sometimes required
 - Typical scenario: Publication as lead author → Later inclusion of the text in a bachelor's thesis, master's thesis or doctoral thesis?
 - If the **synopsis** was written with the help of third parties, it is now better to cite them; it is better to incorporate the content in paraphrased form rather than as a verbatim copy
 - Exception: If you wrote the synopsis without assistance, then in my opinion you can include it without attribution and as a verbatim copy! Reason: In my view, the synopsis is then regarded as an early draft version of the subsequent thesis, and thus (retrospectively) as the same document.

2. Restriction notices

- (see later sections)





Plagiarism := “The verbatim and conceptual appropriation of another person’s intellectual property without appropriate acknowledgement”

Position paper by higher education associations on good academic practice

Taken from the presentation “Citation and Plagiarism in Academia” by Armin Talke (2013)

https://staatsbibliothek-berlin.de/fileadmin/user_upload/zentrale_Seiten/katalogsystem_wd/dokumente/e-day/e13_Zitat_Plagate_PPT.pdf





**‘Academic consequences of plagiarism?
Recommendation from the German Rectors’
Conference: **Plagiarism as serious misconduct.**
If proven, academic degrees and teaching
qualifications may be revoked;
and measures under labour, civil, criminal or
administrative law may also follow.’**

Armin Talke (2013): Quotation and Plagiarism in Academia

https://staatsbibliothek-berlin.de/fileadmin/user_upload/zentrale_Seiten/katalogsystem_wd/dokumente/e-day/e13_Zitat_Plagate_PPT.pdf





■ Once again: Plagiarism is not permitted!

■ Classic forms of plagiarism

- Tools for lecturers? E.g. **Plagiarism Checker X**, or similar (e.g. <https://www.guru99.com/best-plagiarism-checker.html>)
- **Open question:** Are **LLMs/chatbots** just a harmless tool similar to an advanced grammar checker (including help with phrasing, style tools, etc.) or are they a form of high-tech plagiarism? We'll be looking at this topic in more detail later...!



Created by Lars Meier toberens
from the Noun Project

■ Software plagiarism

- Tools for lecturers? E.g. **JPlag**, or similar.
- Any code section **of ≥30 lines** must, when compared via JPlag against relevant code references
- Recommendation: It is best to avoid using **TabNine**, **GitHub Copilot**, etc., as there is a relatively high risk of indirect, classic software plagiarism.



■ The anti-plagiarism rules apply to all submitted texts!

- E.g. dissertation, presentation, source code, ...





<https://gutenplag.fandom.com/de/wiki/PlagiatsKategorien>

GutenPlag Wiki

ERKUNDEN ÜBER INTERESSANTE SEITEN ADMINISTRATIVES COMMUNITY

in: PlagiatsKategorien, PlagiatsKategorien/Whitelist, Wiki

PlagiatsKategorien

QUELLTEXT ANZEIGEN

Bisher gefundene kritische Textstellen lassen sich in verschiedene Plagiatshärtegrade unterteilen (Vorschläge teilweise von weberwu). Desweiteren ist eine Kategorisierung nach **Quelle** möglich (Hilfe erbeten).<- Mein Eindruck ist, dass inzwischen (fast?) alle Seiten nach "Quelle" kategorisiert wurden. Hier sind **alle** Fragmente.

Die Plagiatskategorien sind zum Teil an die Plagiatskategorien von *Weber-Wulff und Wohnsdorf* angelehnt.^[1]

Inhaltsverzeichnis [Verbergen]

1. Komplettplagiat
2. Verschleierung
3. Übersetzungsplagiat
4. Strukturplagiat
5. Alibi-Fußnote
 - 5.1 Bauernopfer
 - 5.2 Verschärftes Bauernopfer
6. Weitere Kategorien
 - 6.1 Halbsatzflickerei
 - 6.2 Shake & Paste
 - 6.3 Kopiertes Zitat
 - 6.4 Unbekannte Quelle
 - 6.5 Verdachtsmomente
 - 6.6 Möglicherweise übernommene Rechtschreibfehler
 - 6.7 Eigenplagiat
 - 6.8 Kein Plagiat
7. Fußnoten

Debora Weber-Wulff; Gabriele Wohnsdorf:
Strategies for combating plagiarism
In: Information – Science & Practice
(2-2006 / Issue 57), pp. 90–98.





Berlin Administrative Court, from a judgement:

[<https://openjur.de/u/2382819.html>]



Created by DaniPolshin
from the Noun Project

- “Ultimately, the doctoral candidate must be required to **identify, without exception**, every train of thought and every footnote **that** does **not** originate **from their own intellectual work** but from the work of another, as well as all text passages taken verbatim or similar **passages** from other works. In particular, they must also clearly mark indirect, paraphrased reproductions of third-party text (paraphrases) in such a way that the **reader knows at every point who is speaking to whom.**”
- Taken from “Court demands evidence for every quoted sentence” by Jochen Zenthöfer on 11 January 2022 on FAZ.net:

<https://www.faz.net/aktuell/karriere-hochschule/doktorarbeiten-gericht-verlangt-beleg-nach-jedem-uebernommenen-satz-17726419.html>



The use of AI in higher education



https://www.hochschule-bayern.de/fileadmin/daten/Positionspapiere/KI-Leitlinie_Hochschule-Bayern-19052025.pdf



KI-Leitlinie Hochschulelehre

Inhalt

Einführung	1
Fragen und Antworten zur KI-Leitlinie	2
Warum brauchen Hochschulen eine Leitlinie zum Umgang mit KI?	2
Welche Ziele werden mit der Leitlinie verfolgt?	2
Ist die Leitlinie hochschulrechtlich verbindlich?	3
An welche Hochschulakteurinnen und Hochschulakteure richtet sich die Leitlinie?	3
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https://www.stmfh.bayern.de/digitalisierung/ki/KI-Leitfaden_Behoerden_2025.pdf

Bayerische Staatsregierung



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KI-Richtlinie

OTH Amberg-Weiden

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OTH-AW AI Guidelines:

- (3) Transparenz und Nachvollziehbarkeit: Die Nutzung von KI-Systemen muss offengelegt, dokumentiert und zitiert werden. Forschungsergebnisse müssen auch für Dritte nachvollziehbar und überprüfbar bleiben.
- (4) Integrität und Fairness: Die Nutzung von KI darf nicht zur Täuschung über den Ursprung wissenschaftlicher Leistungen führen.

Zulässige Einsatzfelder von KI-Werkzeugen

KI kann, unter der Voraussetzung ihren Einsatz transparent zu dokumentieren (Schwartzmann et al., 2024, S.163), insbesondere in folgenden Kontexten genutzt werden:

- (1) Forschungsvorbereitung, etwa zur Ideengenerierung.
- (2) Literatur- und Informationsrecherche, z. B. semantische Suchmaschinen, Recommender-Systeme oder KI-basierte Datenbanken.
- (3) Unterstützung bei der Formulierung, z. B. sprachliche oder stilistische Optimierung, Übersetzung, Strukturierung oder Korrekturvorschläge.
- (4) Deep Research und Wissensmanagement, um umfangreiche Datensätze oder Publikationen effizient zu verarbeiten.
- (5) Auswertung von Mess- und Forschungsdaten, etwa zur Mustererkennung, Simulation oder statistischen Analyse.
- (6) Qualitätssicherung, etwa durch automatisierte Plausibilitätsprüfungen, Code-Validierung oder Textkohärenzanalysen.
- (7) Produktivitätssteigerung bei Routineaufgaben in Forschung und Textarbeit, insbesondere bei organisatorischen, formalen oder administrativen Tätigkeiten ohne eigenständige inhaltliche Bewertung, etwa zur:
 - a) Formatierung und formalen Anpassung von Dokumenten gemäß vorgegebenen Standards (z. B. Layout, Zitierstil, Tabellenformat),
 - b) Erstellung, Strukturierung oder Konsolidierung von Literatur- und Materialverzeichnissen,
 - c) Transkription von Audio- oder Videomaterial als Arbeitsgrundlage (mit anschließender Prüfung und Analyse),
 - d) Zusammenführung, Sortierung oder Standardisierung von Datenbeständen (z. B. Dublettenabgleich, Formatangleichung),
 - e) Erstellung von Ablaufplänen, Checklisten oder Zeitplänen für wiederkehrende Arbeitsprozesse,
 - f) Generierung standardisierter administrativer Textbausteine ohne wissenschaftliche Wertung (z. B. organisatorische Mitteilungen),

Schwartzmann et al., 2024: *The use of AI at universities – a legal perspective*, *Ordnung der Wissenschaft*, 3, 161–168.

Rolf Schwartzmann, Sonja Kurth und Moritz Köhler

Der Einsatz von KI an Hochschulen – eine rechtliche Betrachtung

I. Einleitung

Künstliche Intelligenz (KI) ist in aller Munde, nicht zuletzt aufgrund der jüngst von der EU beschlossenen Verordnung zur Festlegung harmonisierter Vorschriften für künstliche Intelligenz (KI-VO). Damit versucht sich die EU an einem ausdifferenzierten Regelwerk hinsichtlich des Inverkehrbringens und der Verwendung von KI-Systemen.

Dass der Einsatz von KI tiefgreifende Änderungen in der Arbeitswelt, aber auch in anderen Bereichen wie der Kunst- und Kulturszene mit sich bringen wird, ist inzwischen offenkundig. Ein weiterer Bereich, der durch KI-Systeme vor Herausforderungen gestellt wird, ist der Hochschulbetrieb: KI verändert Forschung und Lehre, wie sie bislang praktiziert wurden.¹ Eine Studie des Digitalverbandes Bitkom fand heraus, dass zwei Drittel aller Studierenden ChatGPT kennen und in der Vergangenheit bereits genutzt haben.² Unter Schülerinnen und Schülern sind es laut einer repräsentativen Befragung von 14-20-Jährigen in Deutschland bereits 74%, die KI-Systeme zum Lernen, im Unterricht oder für Hausaufgaben nutzen.³ Die Relevanz von KI an Hochschulen wird also in Zukunft wohl noch steigen.

Diese Zahlen werfen eine Vielzahl rechtlicher Fragen auf: Welche gesetzlichen Regelungen befassen sich mit dem Einsatz von KI im Hochschulbereich? Welche Probleme werden adressiert, welche offengelassen? Und: Besteht noch weiterer Regelungsbedarf?

Dieser Beitrag untersucht die derzeitige Rechtslage und gibt einen Ausblick hinsichtlich möglicher weiterer rechtlicher Entwicklungen. Dazu wird eine differenzierende Betrachtung vorgenommen: Untersucht wird der Einsatz von KI-Systemen sowohl auf Studierenden- (dazu II.) als auch auf Hochschulebene (dazu III.). Es sollen prüfungsrechtliche sowie datenschutzrechtliche Aspekte in den Blick genommen werden. Besonderes Augenmerk soll dabei auf die KI-VO der EU gelegt werden.

In einem Fazit werden Handlungsempfehlungen für Hochschulen und deren Angehörige ausgesprochen (dazu IV.).

II. Einsatz von KI auf Studierendenseite

Auf Studierendenseite kommt der Einsatz von künstlicher Intelligenz in mehreren Bereichen in Betracht: Zum einen kann KI beim eigenständigen Lernen bzw. der Prüfungsvorbereitung unterstützen. Da es Studierenden selbst überlassen ist, wie sie Lehrveranstaltungen vor- bzw. nacharbeiten und sich auf Prüfungen vorbereiten, ergeben sich hierbei keine großen rechtlichen Probleme.

Ungleich mehr Raum für juristische Erörterung bietet der Einsatz von KI-Systemen beim Ablegen von Prüfungen, z.B. Klausuren, Referaten oder Hausarbeiten.

1. Rechtlicher Rahmen

Wenig überraschend enthalten die deutschen Landeshochschulgesetze bislang keine Regelungen zum Einsatz von KI-Systemen durch Studierende in Prüfungen. Auch in der KI-VO der EU spielt diese Konstellation keine Rolle. Folglich obliegt es den Hochschulen selbst, in Prüfungs- und Studienordnungen Regelungen zum Einsatz von KI bei Prüfungsleistungen zu erlassen. Solche spezifischen Regelungen finden sich längst nicht in allen Prüfungsordnungen.⁴

Wo Spezialgesetze fehlen, muss grundsätzlich auf generelle Regelungen zurückgegriffen werden, hier auf allgemeines Prüfungsrecht. Demnach liegt eine Täuschungshandlung vor, wenn eine selbständige und reguläre Prüfungsleistung vorgespiegelt wird, obwohl unerlaubte oder nicht offen gelegte Hilfen genutzt wurden.⁵

2. Übertragung des allgemeinen Prüfungsrechts auf den KI-Einsatz

Bei Präsenzprüfungen zieht das Verbot zur Nutzung unzulässiger technischer Hilfsmittel, unter das eindeutig

¹ Vgl. zur Thematik des Podcast „Von Schummel zu Chance - KI an der Hochschule“, Prof. Dr. Rolf Schwartzmann im Gespräch mit Lisa Becker und Ursula Kals, FA.Z. Beruf & Chance v. 10.6.2024, abrufbar auf allen gängigen Plattformen.

² Bitkom, Pressemitteilung v. 21.3.2024, <https://www.bitkom.org/Presse/Presseinformation/So-digital-sind-Deutschlands-Hochschulstudierende>, (zuletzt abgerufen am 22.05.2024).

³ Vodafone Stiftung, Pressemitteilung v. 13.3.2024, <https://www.vodafone-stiftung.de/jugendstudie-kaestliche-intelligenz-zuletzt-abgerufen-am-22.05.2024>.

⁴ Bitkom, Pressemitteilung v. 21.3.2024, <https://www.bitkom.org/Presse/Presseinformation/So-digital-sind-Deutschlands-Hochschulstudierende>, (zuletzt abgerufen am 22.05.2024).

⁵ Fischer/Jeremias/Dietrich, Prüfungsrecht, 8. Aufl. 2022, Rn. 123.





<https://www.acm.org/publications/policies/new-acm-policy-on-authorship>

ACM Policy on Authorship

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...

Generative AI tools and technologies, such as ChatGPT, may not be listed as authors of an ACM published Work. The use of generative AI tools and technologies to create content is permitted but must be fully disclosed in the Work. For example, the authors could include the following statement in the **Acknowledgements section** of the Work: ChatGPT was utilized to generate sections of this Work, including text, tables, graphs, code, data, citations, etc.). If you are uncertain about the need to disclose the use of a particular tool, err on the side of caution, and include a disclosure in the acknowledgements section of the Work.



The use of LLMs for dissertations



INPUT Provider (**Learning Tutor**)

Let me put it this way: <https://www.perplexity.ai/search?q=%s>

Yes ✓

(Beware of hallucinations)

OUTPUT Provider (**Ghost Writer**)

No ⚡ (Yes?)

Pocket
calculator
analogy

Are we
societally
ready for that?





Initial dilemma: Later in your professional life, you should make use of **AI tools**. However, in final theses, **your own academic contribution** and your own prompting efforts become intermingled with **the AI's external output**. It is also worth noting that **final theses are not online articles**!



Before you start editing, **choose** one of the two working models or assessment models:

Model 1

Model 2

**AI traditionalists
Model**

**Style, too, is
a personal contribution.**

AI ghostwriters are off-limits!

**Expectations regarding
the quality of students' work
remain as usual.**

**AI-Progressive
Model**

**Prompting, vibe coding and
vibe testing are your own work.**

All AI tools are permitted!

Using bots/LLMs
reduces **the workload**, so
expectations regarding
the **quality** of the student's **results**

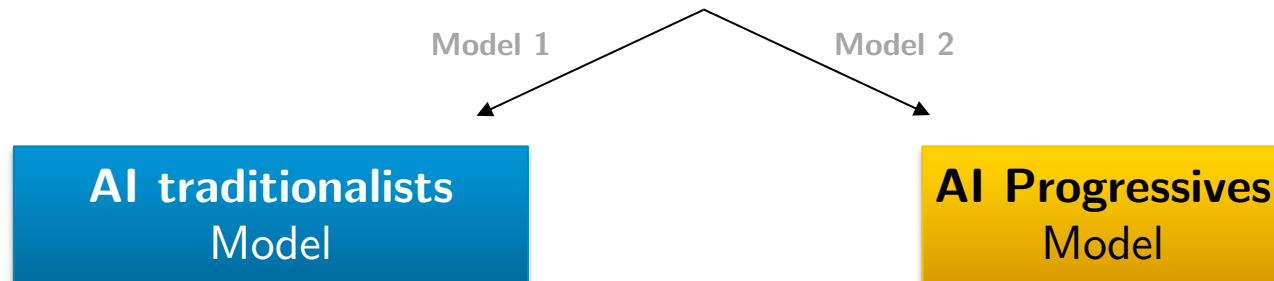
That's perfectly fair! I can't
with people who only ride a bicycle.

Outlook: In a few years' time, I'll force everyone to drive a Lamborghini.
Then there'll be no choice; society will be running on Model 2. It won't be long now!





Assessment model = assignment model
'Lecturer's perspective' 'Student view'



Choosing: **How?**

Determined by the absence (Model 1) or presence (Model 2) of an **'Acknowledgements'** section in your paper.

Where? At the end, after the 'Results' or 'Summary' section.

(**Template?** See slide on ACM Policy on Authorship)

Choosing: **When?**

Ideally, **before** you start working on it!

(Legally, no later than the submission deadline, so it is possible **at the very last minute.**)





Model 1

- Once again: Plagiarism of any kind is not permitted!

- Traditional forms of plagiarism

- Lecturer tools? E.g. **Plagiarism Checker X**, or similar
(e.g. <https://www.guru99.com/best-plagiarism-checker.html>)

- AI plagiarism / high-tech plagiarism

- Tools for lecturers? E.g. **GPTZero**, **GPTKit** or **Sapling**, etc.
(e.g. <https://wordlift.io/blog/en/best-plagiarism-checkers-for-ai-generated-content/>)
- Any **500 to 5,000-character** excerpt from your texts must, for example, achieve a **perplexity score greater than 30** in GPTZero (or equivalent thresholds in comparable tools)
- Important: In the unlikely event that your personal style resembles that of chatbots, I expect you to have realised this yourself before starting the work and to still manage to demonstrate a sufficiently academic and individual style. If you fail to do so, you will still fail. There is very little scope for excuses.
- No ~~ChatGPT~~, ~~Bard~~, etc., and for presentations, no ~~TimeAI~~, etc.

- Software plagiarism

- Lecturer's tools? E.g. **JPlag**, or similar.
- Any code section **of ≥ 30 lines** must be checked using JPlag against relevant code references
- No ~~TabNine~~, ~~GitHub Copilot~~, etc.

- The anti-plagiarism rules apply to all submitted texts!

- E.g. dissertation, presentation, source code, ...



Created by Lars Meierthofer
for the NLP Project





- Should AI be used to improve writing



Model 1

- **Style** is also **an original contribution**.

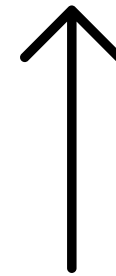
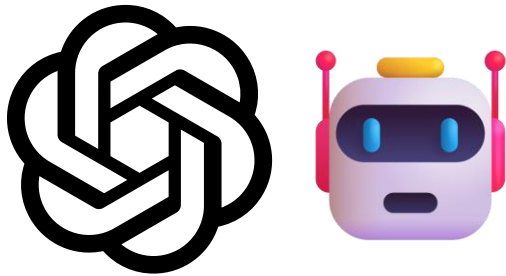
- Style is a separate category in my criteria list!
 - I very much hope for your sake that, during semesters 1 to 6 of your Bachelor's degree (hopefully only in situations where grades weren't at stake!), you made extensive use of AI to improve your personal writing style and, so to speak, let the AI train you as a personal coach! In final theses, you must set your AI assistants aside and demonstrate the extent of your abilities as an individual achievement!
 - A reminder on plagiarism: "The **literal and conceptual appropriation of another person's intellectual property** without appropriate attribution".

- Use **only spelling and grammar tools**!

- Yes, even the use of grammar tools contradicts the strict definition of plagiarism, but it is tolerated because the extent (= significance of the assistance provided for the thesis) plays a role in determining its acceptability.
 - Note: If human reviewers were to intervene in your work to the same significant extent as an AI writing assistant typically does, you might, in case of doubt, also face an accusation of plagiarism regarding your reviewers! Therefore, do NOT treat AI tools in the same way as reviewers! A completely different scale!
 - (In the coming years, we are bound to see landmark court rulings on this matter...)

- **Do not** use **chatbots as a style guide** in your thesis to have your wording revised. This constitutes **plagiarism**!





**Students are
all doing it**

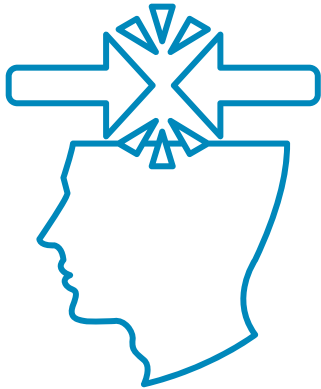
despite what we might say

**The level of
competence**

that you must demonstrate

just keeps rising

= Model 2



“I [...] believe that **paradox** is a profound measure of **truth**.”

Siona van Dijk





Model 2

■ Basic assumptions of Model 2:

- The quality of theses has improved over the past decades thanks to research tools such as Google Scholar and automatic spell-checking and grammar correction; the **use of LLMs** for text generation **is** simply **a continuation of this trend**.
- In your thesis, use **chatbots as a stylistic aid** to have your wording revised.
- With this expanded toolkit reducing your workload, the **result** must be **better whilst making full use of the available resources**.
- (One consequence of Model 2, in the future, could also be that we do away with the production of fully drafted text documents altogether. At some point, we will teach prompting in dedicated modules, and then AI-driven text generation might no longer be a specific learning objective in its own right. A careful reading of my assessment criteria shows, however, that this would only eliminate a small part of the assessment, and the other performance dimensions would then be given correspondingly greater weight in final theses.)

■ Implications of Model 2:

- For reasons of **fairness and the principle of equal treatment**, you will be **assessed more strictly** when using AI tools.
- (**No Cheating:** If you choose Model 1 and then secretly use LLMs, this constitutes cheating. Make your choice as early as possible and accept the consequences in a responsible manner.)





Model 2

■ Once again: Plagiarism is not permitted!

■ Classic forms of plagiarism



Created by Lars Meinertshausen
from the Noun Project

- Tools for lecturers? E.g. **Plagiarism Checker X**, or similar (e.g. <https://www.guru99.com/best-plagiarism-checker.html>)
- **Exception: LLMs/chatbots** are permitted as text-generation **tools**! Nevertheless, **please** ensure that you **not** to **indirectly** produce **a case of traditional plagiarism**! Admittedly, the risk is relatively low in computer science, but if it does happen, ignorance or incompetence will not protect you from punishment! You always bear **overall responsibility**!

■ Software plagiarism

- Lecturer tools? E.g. **JPlag**, or similar.
- Any code section **of ≥ 30 lines** must, when compared via JPlag against relevant code references
- Recommendation: It is best to avoid using TabNine, GitHub Copilot, etc., due to the risk of **indirect, classic software plagiarism**.



■ The anti-plagiarism rules apply to all submitted texts!

- E.g. dissertation, presentation, source code, ...





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Template 2

Generative AI tools and technologies, such as ChatGPT, may not be listed as authors of an ACM published Work. The use of generative AI tools and technologies to create content is permitted but must be fully disclosed in the Work. For example, the authors could include the following statement in the **Acknowledgements section** of the Work: ChatGPT was utilized to generate sections of this Work, including text, tables, graphs, code, data, citations, etc.). If you are uncertain about the need to disclose the use of a particular tool, err on the side of caution, and include a disclosure in the acknowledgements section of the Work.

Notes:

These acknowledgements are usually placed after the abstract as the final section before the Appendix or backmatter. (Under no circumstances as a footnote!)
In theses, the section heading 'Acknowledgements' must always be in the plural!
*In American English (**en-US**), omit the 'e' after the 'g'.*

Copy template:

Acknowledgements

ChatGPT was used to generate sections of this work, including text, tables, graphs, code, data, citations, etc.



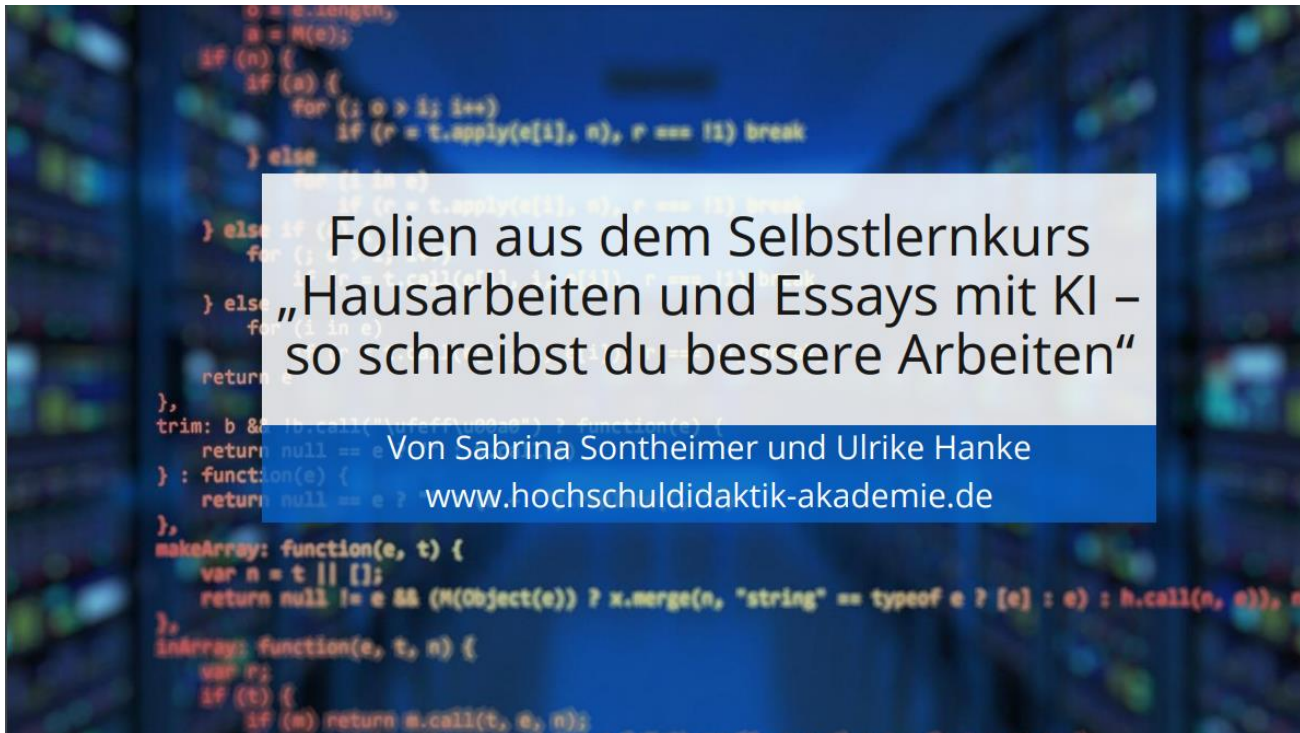
Self-study course: ‘Term papers and essays with AI – how to write better papers’

87



Model 2

<https://hochschuldidaktik-akademie.de/hausarbeiten-und-essays-mit-ki-so-schreibst-du-bessere-arbeiten/>



https://hochschuldidaktik-akademie.de/wp-content/uploads/2024/06/0_gesamtfoliensatz.pdf





From “Beyond the Hype: A Comprehensive Review of Current Trends in Generative AI Research, Teaching Practices, and Tools” by Prather et al., 2024. [arXiv:2412.14732v1]

1. Resist using GenAI

- Do not use GenAI tools as a novice programmer; for example, “Please take the time to learn to think algorithmically yourself. Try to solve the problem on yourself”, “Learn the basics of programming without GenAI.”

2. Use GenAI sparingly

- Use GenAI, but only rarely; for example, “learn to work without it as much as you can”, “There’s value in not needing it”, “Don’t rely on it too heavily.”

3. Use GenAI critically

- Use GenAI tools, but always take a critical view of the output: “Use it to get started, but you still need to go through the code you write to understand it.”, “Use it to learn languages (explain what existing code is doing) but be aware that it’s far from perfect.”

4. Become proficient in using GenAI

- Use GenAI tools to boost your productivity; for example, “Start using it early and get comfortable with using it to code faster.”

Model 1

Model 2





Models 1 &
2

■ Citing artificial intelligence?

- Treat **chatbots as tertiary sources**! And as such, they are **NOT citable** in academic theses.
 - Regardless of whether you wish to or are permitted to use AI as a text-generation tool and for stylistic enhancement (i.e. Model 2) or not (i.e. Model 1)
- Consequently, **chatbot quotations**, even **when the prompt is specified**, are **academic theses are NOT permitted!**
 - Theses are not online articles,
in which such an approach might be acceptable.

■ Model 1 Classification:

- According to a traditionalist interpretation, the following applies to the use of AI tools:
AI for inspiration: Yes. Copying text: No.
- This is not a double standard; rather, this duality has historical and methodological roots → cf. the approach to **Wikipedia: Reading: Yes.**

Quoting: No.

Set of information slides for final theses

On the same basis as above: Wikipedia is tertiary literature





Models 1 &
2

■ Citing artificial intelligence?

- Treat **chatbots as tertiary sources**! And as such, they are **NOT citable** in academic theses.
 - Regardless of whether you wish to or are permitted to use AI as a text-generation tool and for stylistic enhancement (i.e. Model 2) or not (i.e. Model 1)
- Consequently, **chatbot quotations**, even **when the prompt is specified**, are **academic theses are NOT permitted!**
 - Theses are not online articles,
in which such an approach might be acceptable.

■ Model 2 Classification:

- In Model 2, and in accordance with the OTH-AW's AI guidelines, you **should nevertheless list** your **prompts**, not as a traditional reference, but **as a disclosure of your working method**.
- Technically, this can be done either (1) as **a list of prompts** in the appendix or (2) as **footnotes** in the main text (but NOT as a reference list entry)

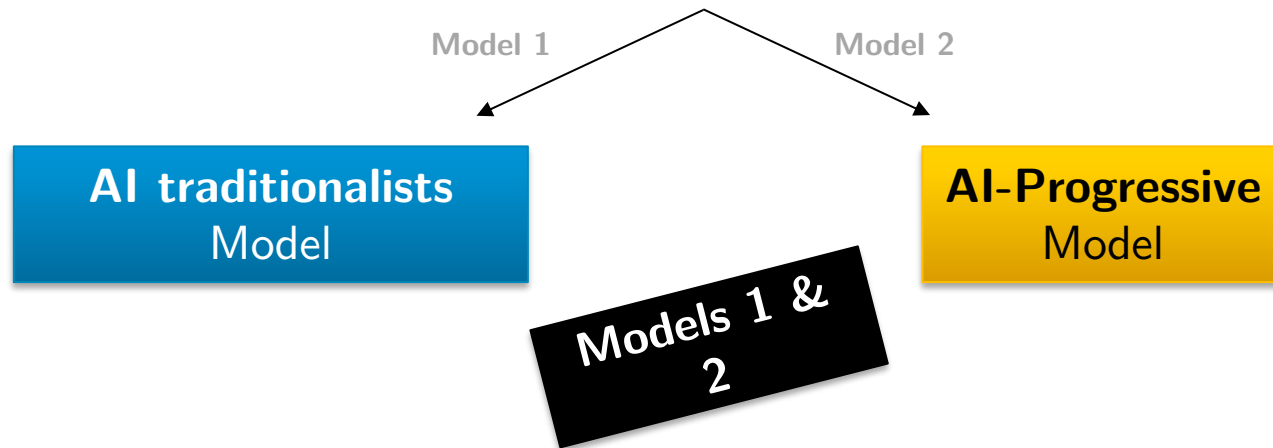




Assessment model = Processing model

'Lecturer's view'

'Student view'



Just for the sake of completeness:

During the **oral defence** of your final thesis, you must **under no circumstances** use **LLMs** to answer questions from the examiners or the audience. This applies even in the progressive assessment model/examination model.

This goes without saying. But guess what happened at a German university in 2024... Phew!





→ In my Moodle course CLBTMT:

Theses_37_
Prompting_Handbook.pdf



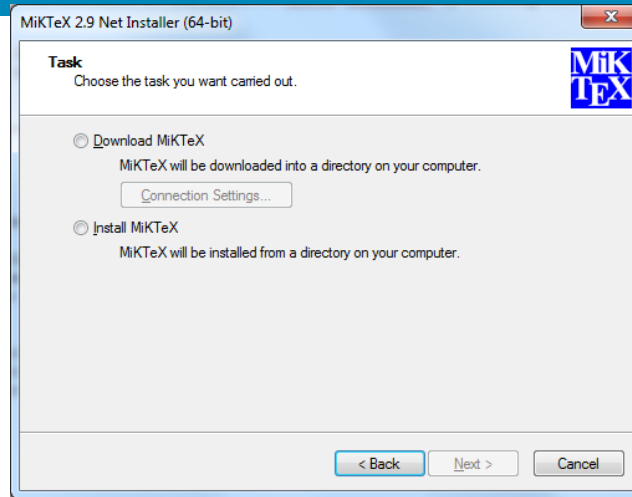
Technical infrastructure for academic writing

**Questions to ask an
external supervisor**



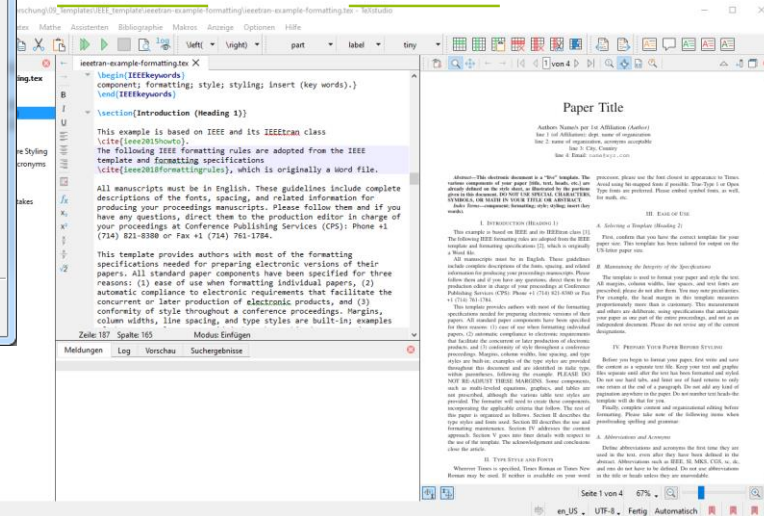
LaTeX Installation?

(La)TeX = **pdf_latex**
 BibTeX = **bib_latex/biber**
 Auto-Build = **latexmk**



Windows:
MiKTeX +
TeXstudio

Linux:
TeX Live +
TeXstudio



Guidelines on cloud usage?

Richtlinie
 Cloud-Nutzung
 V2 (intern)

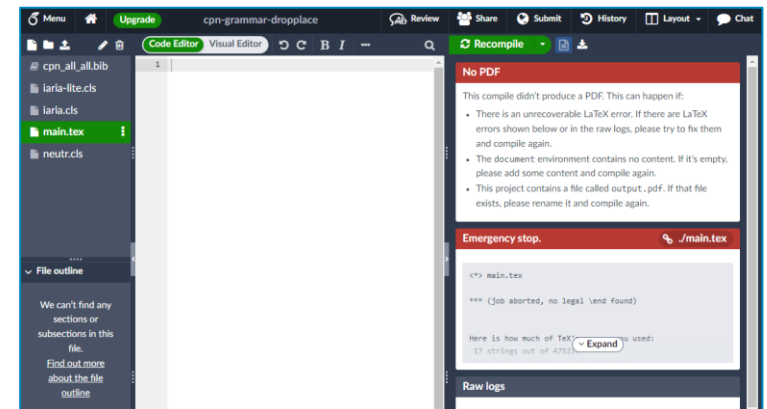


Richtlinie Cloud-Nutzung an der OTH Amberg-Weiden

1 Einleitung

Diese Richtlinie beinhaltet grundsätzliche Regelungen für alle Hochschulangehörige der OTH Amberg-Weiden (OTH-AW), die im Rahmen ihrer Tätigkeit öffentliche, externe Cloud-Dienste (sogenannte Public Clouds) zur Datenspeicherung (außerhalb der Hochschule!) nutzen wollen. Sie soll der Sensibilisierung dienen, informiert über allgemeine Risiken und hilft bei der Klärung der Frage, in welchen Fällen, unter welchen Bedingungen und mit welchen Maßnahmen solche Cloud-Dienste wie z. B. Microsoft OneDrive, Google Drive, Apple iCloud, Dropbox genutzt werden dürfen.

Overleaf? (=LaTeX in the cloud)



Technical infrastructure for academic writing: Any known obstacles?

95



- **Hardware:**

- Are students allowed to connect their **personal laptops** (which almost $>96\%$ of students) **onto the company network?** (usually: 'No'!)
- Are students provided with a **work computer?**
- What are the company's **policies** regarding the use of **cloud applications?**

- **Tools for academic writing**

- **LaTeX:**

- Are students allowed **to install software** on their work computer?
→ Windows: MikTeX + TeXstudio / Linux: LiveTeX + TeXstudio
 - Are students permitted to use the **Overleaf** cloud-based LaTeX environment?
→ <https://www.overleaf.com>

- **Drawings:**

- **Cloudcraft** → <https://www.cloudcraft.co>
 - **Diagrams.net** (formerly draw.io) → <https://app.diagrams.net>



Neumann's long-term homework
assignments
from the bachelor's semesters

ReCap: Fundamental homework assignment, 1st semester of the Bachelor's degree

97



Ostbayerische
Technische Hochschule
Amberg-Weiden

Studiengänge und
Bildungsangebote

Inform
und E

Loslegen ›

Infos für Erstsemester

- › Starthilfe
- › Studienstart
- › BewerberInnen-Tag
- › Infos zur Studienfinanzierung für Erstsemester
- › Fit-ins-Studium
- › Erstsemesterbegrüßung
- › Mentoring-Programme
- › Kontakt

Starthilfe –
Wissenswertes zur
Hochschule auf einen
Griff!



Vide

o

1. **SPO read**



2. **Module handbook read**



ReCap: Long-term homework assignment during the second semester of the Bachelor's degree

98



1. Learn to **type with all ten fingers** ✓
 - (it's best not to start with a QWERTZ/QUERTY-based 10-finger system at this stage, but to learn Dvorak [EN] or Neo [DE] straight away)
 - Check out my Tools page for typing tutor software

2. **Basic knowledge of tools** ✓
 - Free learning resources: The Missing Semester of Your CS Education (MIT)



ReCap: Long-term homework assignment during the third semester of the Bachelor's degree

99



1. Learn **Git**

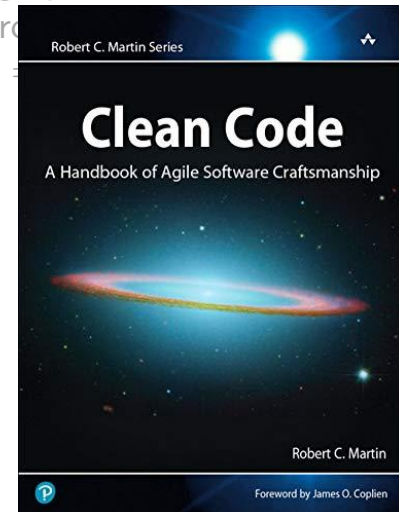


- Free learning resources: [About Git](#) | [Learn Git](#) | [Git it](#) | [Oh My Git!](#)
- Lecture video on [Version Control \(git\)](#) at MIT from the series [The Missing Semester of Your CS Education](#)
- Git cheat sheet: e.g. [Git Tricks](#)
- Git branching model: e.g. [gitflow](#)

2. How can I **become** a very good programmer?



1. By reading the book '**Clean Code**'
2. By reading code and emulating it
3. By contributing to FOSS projects
4. By doing more of my **own programming**
5. Through self-criticism
6. Through peer reviews and the feedback they provide (Peers)



ReCap: Long-term homework assignment during the 6th (or 4th) semester of the Bachelor's degree

100



1. Learn TeX



- Syntax:

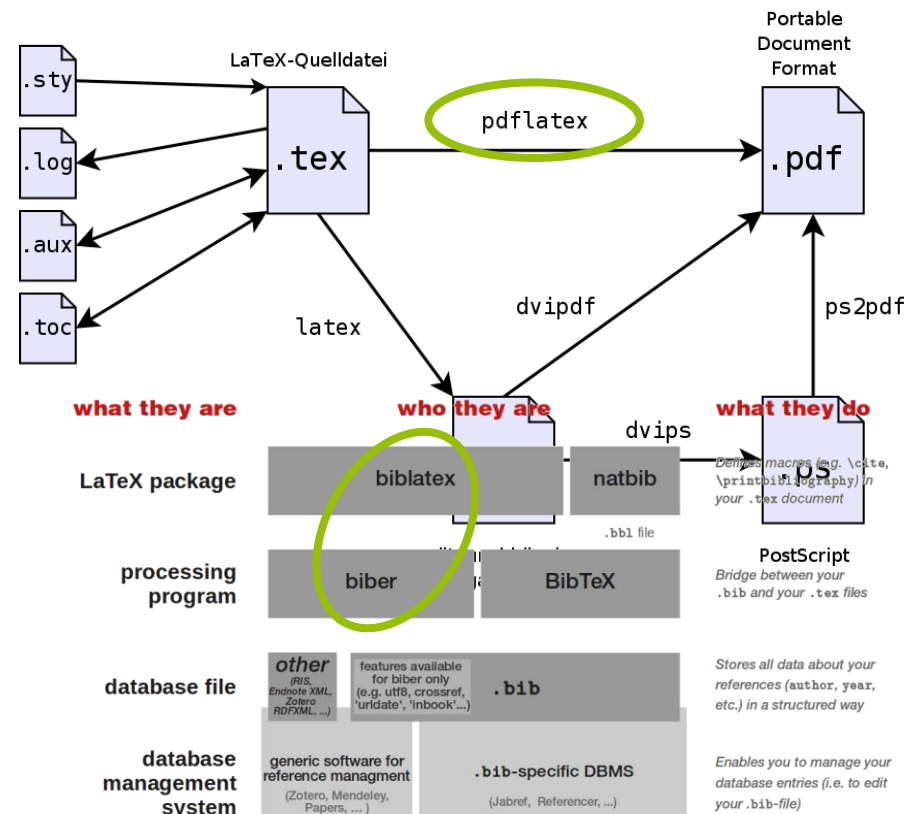
 - **LaTeX**

- Tools:

 - **pdflatex**

 - **biblatex** via **biber**

(And do you know the difference between biblatex/biber and the classic **bibtex**/**natbib**? You'll find further information and references.)

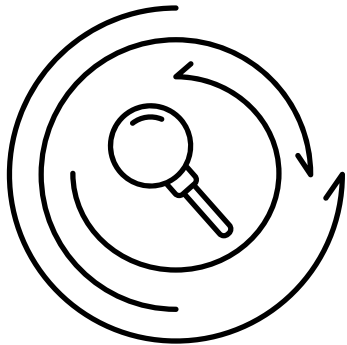




- **LaTeX + spelling/grammar?**
 - **Overleaf**
 - Cloud LaTeX editor: <https://www.overleaf.com/>
 - **Browser**
 - 'any'
 - **LanguageTool** (as a browser extension, including **integration with Overleaf**)
 - Homepage: <https://languagetool.org/de>
 - **Browser extensions**: <https://languagetool.org/de/services#browsers>
- **Why this combination?** LanguageTool is a powerful tool and is integrated better in the browser + Overleaf than in any other editor!
- **The only challenge:**
 - For the entire thesis, this might exceed the limit of the free version of Overleaf. It depends. Sometimes it does, sometimes it doesn't. But this only applies to compiling TeX to PDF! You can still use the browser with the LanguageTool-Overleaf integration purely as a tool for checking spelling and grammar from time to time...



Choosing a topic



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from the Noun Project

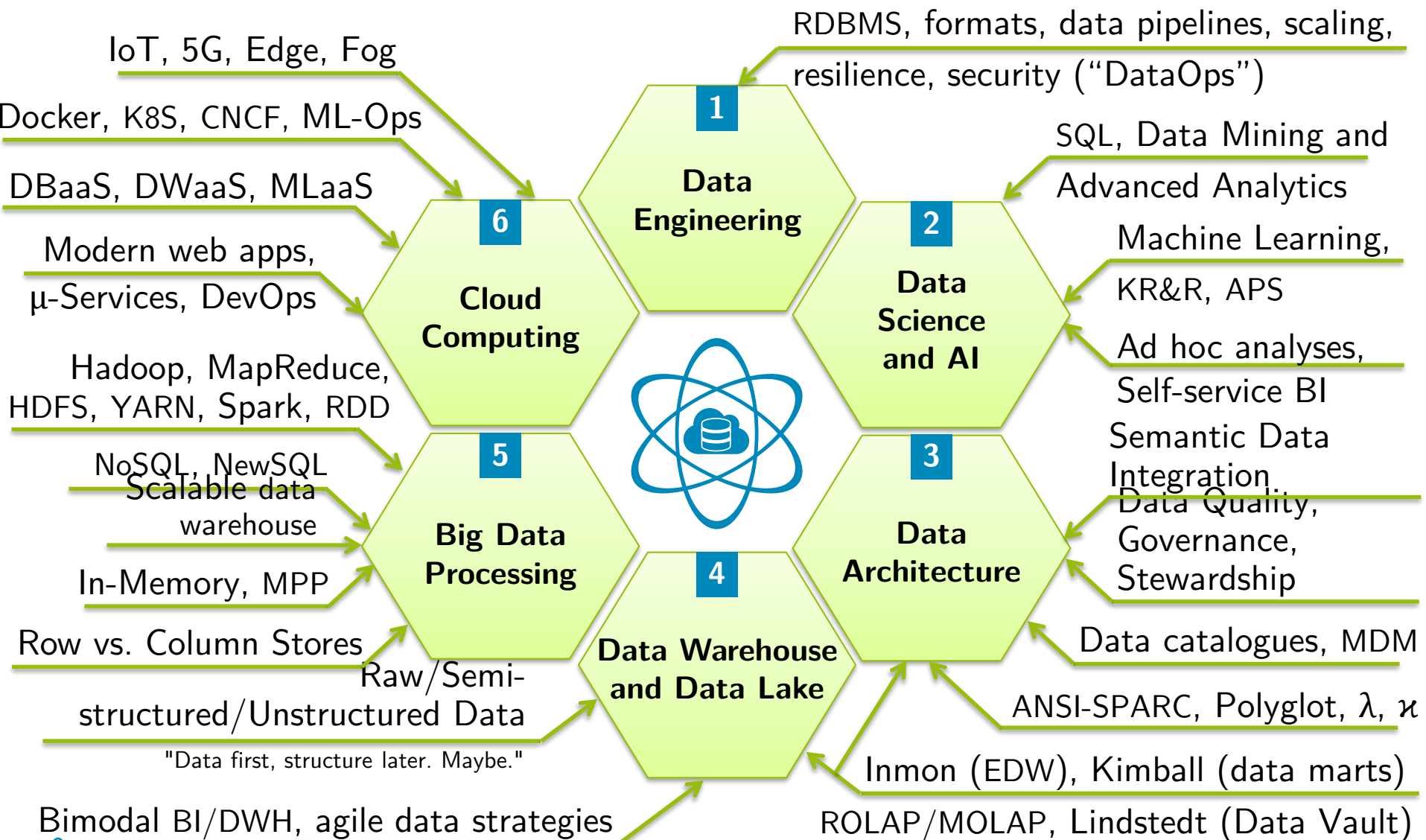
**‘I can only supervise your thesis
as your first supervisor only
if you can establish points of contact
with my teaching area or my research
topics.’**

Prof. Dr.-Ing. Christoph P. Neumann

(I will not supervise your thesis as **your first examiner** simply because you find me likeable.)

(This condition does not apply to the role of **second examiner**; in
this case, you need only take into account my stance on
restrictions.)







Big Data

- Distributed storage and processing of large volumes of data (NewSQL, NoSQL)
- Data architecture, data engineering
- Data exploration, advanced analytics
- Semantic data integration
- Data catalogues / metadata management, data governance / data stewardship
- Query log analysis
- Automated anonymisation
- Implementation of scalable algorithms (MapReduce, Spark)
- Implementation of scalable data warehouses (Exasol, SAP HANA) and data lakes (Hadoop)
- and much more

Cloud computing

- Development of cloud-based architectures, Software engineering for distributed systems
- Modern web application development, Microservices, DevOps
- Cloud-native components (Docker, CNCF, Kubernetes, Envoy/Istio, Prometheus)
- Practical use of private (OpenStack) and public clouds (AWS, Azure, GCP, etc.)
- Minimising latency
- Interoperability in multi-cloud environments
- Implementation of scalable cloud data warehouses (Snowflake)
- Serverless, WebAssembly (WASM), Rust
- IoT, edge, fog
- Web3, dApps, smart contracts, NFTs
- and much more

All final-year projects will be published. No publication restrictions!





**“If you haven’t chosen a topic yet
, speak to the company
from your work placement semester and/o
have a look on my website
under ‘Partnerships’ to find the companies
and contact persons, as well as their
areas of interest and specialisms!”**



Created by Kamin Ginkaew

Prof. Dr.-Ing. Christoph P. Neumann

<https://www.oth-aw.de/neumann/partners/>



(This list is not exhaustive)



- **Data analysis/predictions in general**
(Excluding big data or cloud-related work)
 - Prof. Brunner
- **Testing/Quality Assurance in general**
(Excluding Big Data, cloud computing or AI)
 - Prof. Rebholz
- **Blockchains from a cryptographic perspective**
 - Prof. Loebenberger



Created by Arafat Uddin

- **Subject-specific topics in medical informatics**
 - Prof. Ivanovska?
 - Weiden: Prof. Steffen Hamm?
- **Subject-specific topics in manufacturing automation, electrical engineering or mechanical engineering**
 - Prof. Höß, Prof. Söllner, Prof. Zatocil, ...?

However, I would be happy to act **as a second examiner** for you in this regard





1. **Big Data Curation:** AI-supported methods to ensure that relevant data remains reliably available in the future, for research and reuse. Because 'Deleting is easy. **Preserving** is hard!'
2. **Green Big Processing:** Cost-optimised methods to ensure relevance and cost-effectiveness for mass data processing in the **cloud**
3. Massively parallel programming of AI methods
4. Integrated machine learning in database systems
5. Scalable data architectures in the cloud on modern and evolving hardware infrastructures
6. Intelligent algorithms, scalable data architectures and agile data integration with NewSQL and NoSQL systems



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from the Noun Project





THE DATA SCIENCE HIERARCHY OF NEEDS

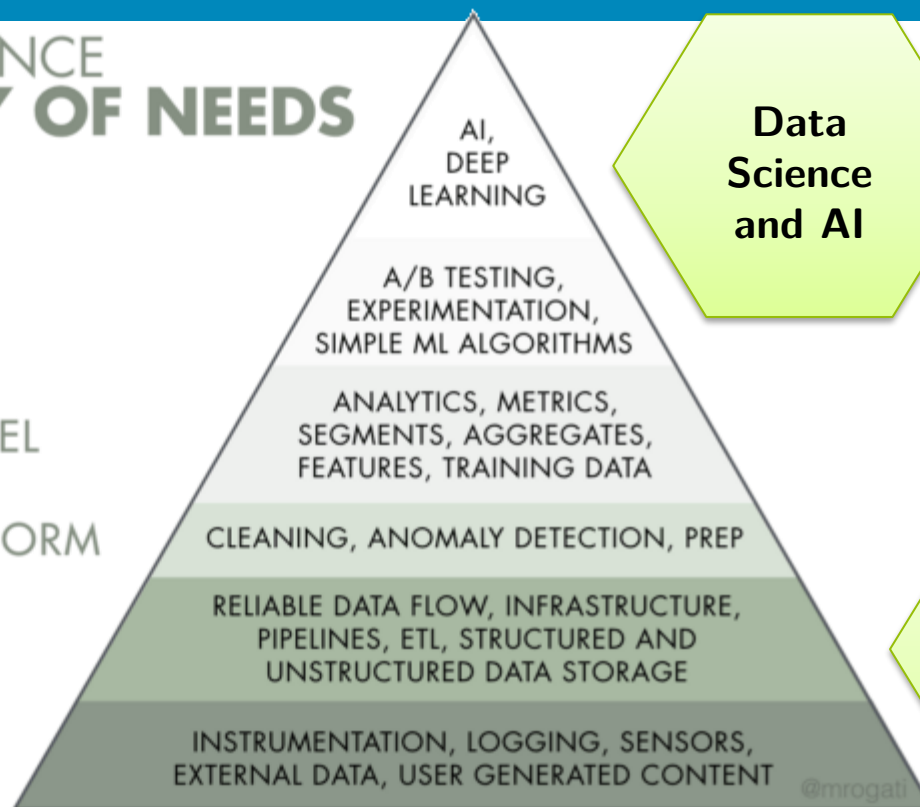
LEARN/OPTIMIZE

AGGREGATE/LABEL

EXPLORE/TRANSFORM

MOVE/STORE

COLLECT



**Data
Science
and AI**

**Data
Engineering**

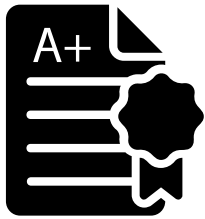
**Data
Architecture**

**Data Warehouse
and Data Lake**

**Big Data
Processing**

**Cloud
Computing**





Created by Vectors
Point

‘There are presumably some colleagues for whom it might be less effort to achieve a “very good”.’

Prof. Dr.-Ing. Christoph P. Neumann

This is mainly because, for quite a few of my colleagues, simply completing an engineering-style software development project and a satisfied industry partner are sufficient for the top mark.

I am making this as transparent as possible, as you may have observed from my modules—where I set **modular assignments**—that I take a generous approach to marking for precisely this kind of engineering-standard performance. I stand by this, because you generally show great commitment to the modular assignments there, within the bounds of fair workload expectations. But a **final dissertation goes beyond simply a ‘large module assignment completed’** individually...

A mark of **‘good (+)’** or **‘good’** is a **perfectly normal mark**. To achieve better marks, parts of the thesis must either be considered compulsory reading for other software developers or administrative staff at the partner company, or the first or second examiner should subsequently feel inclined to recommend parts of the thesis to other professors as a reference or as an introduction to the topic. If, in all honesty, your result is merely ‘shelf-filler’, then a ‘Good’ mark is entirely appropriate.

Around 20 per cent of my final-year projects are graded ‘1.0’ and, cumulatively, around 33 per cent fall into the ‘very good’ category.





<https://cyberlytics.eu/theses/criteria/>

Beurteilung von Abschlussarbeiten

Prof. Dr.-Ing. Christoph P. Neumann

(Nach einer Vorlage von Prof. Dr. Klaus Meyer-Wegener)

Verfahren

Bei der Beurteilung von Bachelorarbeiten, Masterarbeiten und Dissertationen wird die Arbeit unter fünf Aspekten einzeln bewertet, die jedoch nicht gleichgewichtig sind. Die unterschiedlichen Gewichte werden dadurch berücksichtigt, dass für die einzelnen Aspekte verschieden hohe Punktzahlen zur Verfügung stehen.

Aspekt	Punktzahl		Dissertation
	Bachelorarbeit	Masterarbeit	
Schwierigkeitsgrad	0 ... 6	0 ... 6	0 ... 7
Originalität	0 ... 7	0 ... 8	0 ... 10
Wiss. Arbeitstechnik	0 ... 10	0 ... 10	0 ... 7
Stil	0 ... 4	0 ... 4	0 ... 4
Form	0 ... 4	0 ... 3	0 ... 3
Summe	0 ... 31	0 ... 31	0 ... 31

In den Hinweisen zu den einzelnen Aspekten (Nr. 1 – 5) ist **jeweils** zunächst ein **Standard** definiert, dem eine **mittlere Punktzahl** entspricht. Dann folgen Gesichtspunkte, die eine Erhöhung (+, ++) oder eine Erniedrigung (–, –) dieser Punktzahl rechtfertigen können. Dabei kennzeichnet ++ (–) Gesichtspunkte, die bei Vorliegen entsprechender Umstände auch einfach oder doppelt berücksichtigt werden können. Die Gesamtpunktzahl ergibt sich durch Addition der einzelnen Punktzahlen.

Für **Bachelorarbeiten** und **Masterarbeiten** gibt es ein wichtiges **Metakriterium für die Notenstufe „sehr gut“** (1,0 und 1,3): ① **Sind die Ergebnisse der Arbeit wissenschaftlich, international publizierbar?** Alternative Form dieses Kriteriums für angewandte Themen: ② **Wird der Erstprüfer oder Zweitprüfer die Arbeit anderen Professoren als Referenz bzw. als Einstieg in das Thema empfehlen?** Und noch eine dritte, abgeschwächte alternative Form: ③ **Wird die Arbeit im Kooperationsunternehmen zur Pflichtlektüre für andere Software-Entwickler oder Sachbearbeiter** (im Kontext des Themenfeldes; bspw. zur Einarbeitung neuer Mitarbeiter für das Themenfeld)? Signifikante Einschränkungen oder Zweifel an

2. Schöpferische Originalität

Bei der Beurteilung der schöpferischen Originalität ist nicht nur festzustellen, inwieweit der Bearbeiter der Anleitung und Führung durch den Betreuer bedarf. Es ist vielmehr selbstverständlich, dass der Bearbeiter Initiative entwickelt, d.h. aus eigenem Antrieb Schwierigkeiten aufgreift und mit dem Betreuer diskutiert. Im Fall einer Kooperation mit einem Unternehmen wird eine grundsätzliche Zufriedenheit des Unternehmens mit den Arbeitsergebnissen vorausgesetzt (Mittlere Punktzahl: 4 Punkte).

Einzelhinweise zur schöpferischen Originalität:

- ++ (M21) Ein bisher ungelöstes Problem wurde gelöst oder ein grundsätzlich neuer Lösungsweg für ein bereits gelöstes Problem angegeben.
- ++ (M22) Eine für die Aufgabenstellung untypische Programmmethoden- oder Beweistechnik wurde entwickelt.
- + (M23) Die Aufgabe und die darin enthaltenen Herausforderungen werden durch den Bearbeiter als beispielhaft begriffen und der Bearbeiter vermag es – durch Argumentation – die Aufgabe einer höheren Fragestellung unterzuordnen.
- + (M24) Durch den Bearbeiter werden grundsätzliche Fragen oder konkrete Vorgänge methodisch in ihren Ursachen erforscht, begründet und in einen Sinnzusammenhang gebracht (sowie durch Literaturrecherche belegt, dass die gleiche schöpferische und forschende Arbeit nicht bereits durch Dritte geleistet wurde).
- + (M25) Während der Arbeit sich ergebende / andeutende Probleme wurden erkannt und verfolgt, auch wenn sie nicht unmittelbar zur Aufgabenstellung gehörten.
- + (M26) Die Abschlussarbeit als Schriftstück (nicht als Quellcode, hierzu dient M33) und die darin enthaltenen Erkenntnisse können als Grundlage für weitere Abschlussarbeiten dienen (und selbstverständlich ist das in der Arbeit sorgfältig argumentiert).
- (M27) Der Bearbeiter geht sich ergebenden Schwierigkeiten aus dem Weg.
- (M28) Die Initiativen und Lösungsvorschläge des Bearbeiters sind bezgl. ihrer Durchführbarkeit nicht durchdacht.
- (M29) Der Bearbeiter lässt es an eigener Initiative mangeln und bewegt sich ausschließlich in den durch den Betreuer vorgezeichneten Bahnen.





From a purely legal perspective, this does NOT directly to higher education institutions! Nevertheless, it serves as a **reference for managing your expectations.**

- Pursuant to the resolution of the Conference of Ministers of Education dated 3 October 1968, the following definitions, which remain valid to this day, form the basis for school marks:

very good (1)	The mark 'very good' should be awarded when the pupil's performance meets the requirements to a particularly high standard.
good (2)	The mark 'good' should be awarded when the performance fully meets the requirements.
Satisfactory (3)	The mark 'satisfactory' should be awarded when the performance generally meets the requirements.
Pass (4)	The mark 'sufficient' should be awarded when the performance, whilst showing shortcomings, still meets the requirements on the whole.
Poor (5)	The mark 'poor' should be awarded when the performance does not meet the requirements , but demonstrates that the necessary basic knowledge is present and that the shortcomings can be remedied in the foreseeable future.
Inadequate (6)	The mark 'unsatisfactory' should be awarded when the performance does not meet the requirements and even the basic knowledge is so patchy that the shortcomings cannot be remedied within the foreseeable future.



The original text of the KMK resolution of 3 October 1968 is not directly available as a freely accessible digital document, but is primarily held in archives or listed as a bibliographic reference. The resolution is, for example, catalogued in the Federal Archives under the reference number BArch B 304/3125 in connection with school matters.





- **1.0** }
 - ① Are the results of the thesis **of a scientific standard suitable for international publication?**
 - ② Would the first or second examiner recommend the paper to other professors as a reference or as an introduction to the topic?
 - ③ Will the thesis **become required reading** for others **within the partner company?**
(users/administrative staff, software architects/developers, stakeholders/decision-makers, ...)
 - **1.3** }
 - **1.7** }
 - ① A somewhat mixed read. Only **occasional 'wow' moments**.
 - ② **Related work** is available, along with clear and unambiguous **requirements specifications**
 - ③ Use of **formal notations** from computer science/AI, as well as existing **automated regression tests**
 - ④ The **source code** meets **engineering requirements** = 'Under the bonnet, the software prototype isn't **a botched job**'!
 - **2.0** }
 - ① **Not very impressive**, but suitable for a Master's degree
 - ② E.g. **'How I Did It'** projects
 - ③ **Absence** of **elementary errors** (!)
 - **2.3** }
- 2.5: Master's admission threshold!
- **2.7**
 - ① **Elementary errors** present
 - ② Does your work raise **doubts** about **scientific methods, initiative** or **an engineering approach**?
→ 'Under the bonnet, the prototype is **a botched job**', i.e. with clear qualitative **shortcomings**? A factor leading to a lower mark!
 - ③ Does your work show **clear** signs of being **superficial, uncritical** or **ill-considered**?
 - **3.0** }
 - ① **Are there gaps** in the **fundamentals** in some areas?
 - ② **A lack of substance** in some parts (possibly due to procrastination)?
[Among other things, a rule of thumb for assessing substance: "The **proportion** of the work **you have done yourself** – that is, **you have done** – should account for **at least 50 per cent of all pages**"]
 - **3.3** }
 - **3.7** }
 - ① **Significant shortcomings** in the **fundamentals**? (But **the necessary basic knowledge** has nevertheless been demonstrated.)
 - ② **Significant shortcomings** in **scope, content** or **form**? (But **the minimum requirements** are still met.)
 - **4.0** }
 - (Note: **Parts of the problem have nevertheless been solved independently** and the PDF is **not a complete mess**, otherwise it would be a 5.0!)
- ⑥ Does your **Bachelor's thesis** **still** demonstrate **beyond doubt** the ability to "work **independently** on a problem from the relevant subject area within a specified timeframe, **using academic methods**"?
(Joint structural guidelines of the federal states / Resolution of the Standing Conference of the Ministers of Education and Cultural Affairs:
https://www.kmk.org/fileadmin/veroeffentlichungen_beschluesse/2003/2003_10_10-Laendergemeinsame-Strukturvorgaben.pdf)
- "in particular extent"
- "Requirements fully meets"
- "generally meets the requirements"
- "Defects, but in the whole [...] still meets the requirements"





■ The ‘Unforgivable Ones’:

1. Significant **elementary errors** in the thesis

- (see collection of tips: <https://cyberlytics.eu/theses/guide/>, section: Elementary errors)

2. A poorly compiled **bibliography**

- (including more than 50% online sources; fewer than 2 pages; major formatting errors)

3. **Copy-and-paste programming** or spaghetti code

4. Hardly any **visualisations** apart from screenshots and half-hearted tables

- (Recommendation: architectural overview; data flow and artefacts; relationships should not as a table but rather as a diagram; JSON structures, for example, as UML; ...)

This list is a greatly simplified version of the criteria used to assess my final-year projects. It is intended as a simplified reference/checklist for you.





- The 'deficient' ones:

- 5. A thesis heavily influenced by the 'How I did it' approach

- (Further details on this will be provided on a later slide)

- 6. Lack of related work (deficient for BT only | downright unforgivable for MT)

- (Do not confuse related work with foundational work!)

- 7. Poor, fragmented or perfunctory requirements specification

- (e.g. user stories without acceptance criteria; see DoR)
 - (Avoid bloated CRUD-based acceptance criteria)
 - (Significant requirements are added later under 'Technical Implementation' and are clearly not explicitly recognised as requirements.)
 - (Food for thought: Perhaps your user stories aren't user stories at all. Could they be epics instead?)
 - (You may deliver a requirements analysis purely at the epics level, provided these are presented effectively. And: there is no obligation to carry out a Scrum requirements analysis!)

- 8. Absence of any automated unit tests (this also applies to front-end work)

- (i.e. 0% test coverage)

This is a greatly simplified version of the criteria used to assess my final-year theses. It is intended as a simplified reference/checklist for you.





■ Avoid 'How I did it' theses! ⚡

- Instead? **IMRaD!** = Introduction (and Idea), Methods, Results, and Discussion
(Further reading: <https://en.wikipedia.org/wiki/IMRAD>)
 - From a different perspective: Instead of 'How I did it', a '**How to do it**' [of general interest!]
- Outline templates based on common **frameworks for architecture management** and descriptions (**arc42**, **V-Modell XT**, etc.) are **NOT authoritative** (or only for certain parts)
 - Learning how to produce arc42 documents is **very important** for your future careers in industry, **but** in my view, this is a task to be undertaken as part of the exercises/module assignments in software engineering modules or alongside project modules, and where applicable (on a smaller scale) also as part of module assignments for any modules in later semesters
 - So you should still be familiar with them! They are also useful for **parts** of your thesis.
- **Bachelor's theses prepare students for Master's theses, which in turn prepare them for doctoral theses**
 - In my view, a final dissertation at university should therefore **not** be a mere combination of a **technical concept** and an **IT concept**, nor should it be **merely** system documentation
 - **IMPORTANT:** The **reference bachelor's thesis from the bachelor's seminar** – by Thomas Altmann – devotes 40 out of 60 pages to Chapter 5, 'Technical Implementation', i.e. $\frac{2}{3}$ of the thesis ⚡. It has a bibliography of just 1½ pages ⚡. The software prototype is very good. However, for the most part, it is **unfortunately** a '**How I did it**' thesis ⚡. This counter-example thesis **lacks 1) a methods, state-of-the-art or literature review chapter and 2) an evaluation chapter** → Of the **IMRaD structure**, almost only I and R are addressed here ⚡





■ The 'annoying' ones:

9. Unclear or misunderstood **motivation** on the part of the client
 - (And the argument 'without restrictions or censorship' is no excuse!)
10. Vague **evaluation/discussion**
 - (e.g. lack of before-and-after comparisons, incomplete assessment of the original requirements, failure to highlight limitations, ...)
11. **A significant discrepancy** between the methods researched and those applied or between the results and the claims made in the title of the work
 - (often linked to the above-mentioned incomplete consideration in the evaluation, resulting in less convincing recommendations for action)
12. Evident **gaps in understanding** regarding textbook knowledge/module content
 - (do have a look at my '**BDCC4AI**' **mark book** as a PDF via Moodle)
13. AI / Data Science dissertations in which the reader is ultimately is left to make sense of a **jumble of figures** on their own

This list is a greatly simplified version of the criteria used to assess of my final-year projects. It is intended as a simplified reference/checklist for you.





- **Minimum requirements for presentations:**
 - ALL criteria must be met; alternatively, meeting one threshold is sufficient for a 5.0



1. **If fewer than 80% of the net slides are 'wall-of-text' slides ✓**
2. **Of the average presentation time of 25 minutes, is spent speaking ✓**
3. **Free from plagiarism ✓**

- **Definition:**



- **Net slides** := Excluding title pages, section separators and appendices
Set of information slides for final theses



<https://thenounproject.com/browse/icons/term/free/>

<https://thenounproject.com/search/icons/?q=%s>

 **Noun Project** [Home](#) [Icons](#) [Photos](#) [API](#) [Tools](#) [...](#)

[Pricing](#) [Log In](#)

The World's Most Diverse and Extensive Free Icon Collection

Search nearly 10 million icon 

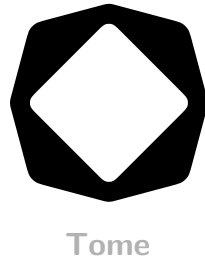
Icon search in The Noun Project via EN:

- Ziele = goals
- Task = task
- Concept = concept
- ...
- Conclusion = conclusion
- Contribution = contribution
- Success = success





GAMMA

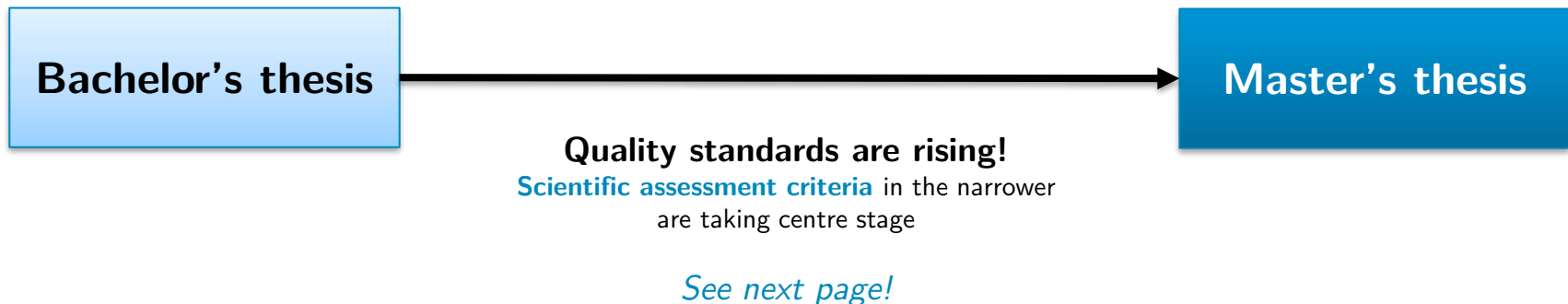


I know **EXACTLY** what quality to expect from an AI-generated presentation!

This level of competence results in a FAIL!

You must (by far) exceed this standard!



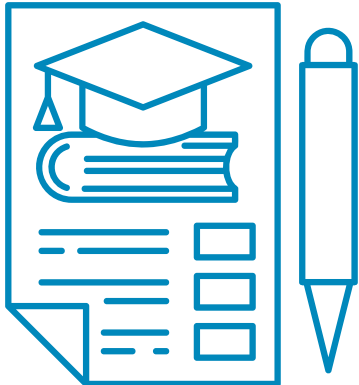


Informal additional note on the Master's level:
On the slides above showing indicators/hurdles,
for Bachelor's theses, adjust the reference mark by 0.3 levels in each case
to achieve a classification at Master's level.





- Based on the ACM guidelines for peer reviewers/reviewers:

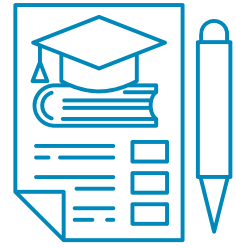


1. What are the **major contributions** of the thesis?
2. How **innovative** is the research presented?
3. Is the submission significantly different from or **better than** previously published material?
4. What are its **strengths** and **weaknesses**?
5. Is the work **technically sound**?
6. Is the **analysis adequate**?
7. Is the subject covered **in full**?
8. Does the thesis cite and use **appropriate references**?
9. Is the **length appropriate for the contribution**?
10. Is the **quality of the presentation** adequate?
11. Is it **well written**?





- Derived from the IEEE guidelines for peer reviewers/reviewers:
 - Consider the thesis's overall **merits** and **shortcomings**.
 - Consider the **strength** of the thesis content.
 - Does the literature review provide sufficient **background** and **justification** for the work?
 - Review the theoretical and experimental **depth**, the strength of the analysis, the quality of **the supporting data and the results**. Is there sufficient **benchmarking** and **validation**? Are the **conclusions supported** by the data and analysis? Is the **flow** of information logical? Does this paper contain enough information to enable the experiments to be **reproduced**? If not, comment on what additional or supplementary information is required.
 - Are there any **major technical flaws**?
 - Consider the **presentation** and **organisation**.
 - Consider aspects such as the paper's **structure**, **language**, writing **style**, the quality of **figures and tables**, **typographical errors** and **formatting**.
- (See IEEE Access, 'What makes a good quality review?')





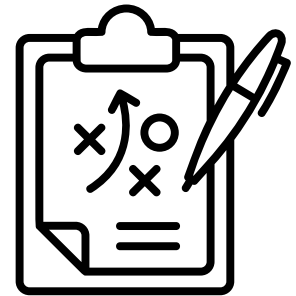
<https://cyberlytics.eu/theses/criteria/>

Aspect	Expectations: Master's vs. Bachelor's
Level of difficulty	A higher level of subject knowledge (beyond standard lecture content) is more likely to be expected [M14]
Originality	Greater independent contribution: initiative, new approaches, 'fundamentally new solutions' [M21/M22, particularly via MT]
Academic research skills	A more mature approach to the literature, comparison, differentiation, critical discussion, interpretation [M31–M33]
Meta-criterion 'Very Good'	Suitability for publication or recommendation as a reference – this meta-criterion applies to both Master's AND Bachelor's theses , but is more easily achieved in practice by Master's theses





- **There are also completely different approaches to marking, which are also used by colleagues at the EMI Faculty:**
 - Grading method X:
 - Three sub-marks
 1. Originality
 2. Presentation
 3. Company feedback
 - Only one integer sub-mark per aspect
 - Final mark calculated as an equally weighted average of the three sub-marks
 - Method variant Y:
 - ...



Created by Sfahrudin
from the Noun Project



Created by Gan Khoo Lay
From the Noun Project

"You are
in principle, but their expertise should
justifiable or comprehensible."

Prof. Dr.-Ing. Christoph P. Neumann

Ultimately, I leave the final decision on this matter to the second examiner themselves.
You approach them independently, usually with the synopsis.





Created by Gan Khoo Lay
from the Noun Project

"If I, as the designated first examiner, am clearly less suitable than a prospective second examiner, then you must go to him or her!
I can't recommend this to you, simply because of unpleasant experiences in other examinations
for your own protection, unless you change the topic..."

Prof. Dr.-Ing. Christoph P. Neumann

Sometimes a shift in topic only becomes apparent during the examination.

This can be problematic → In that case, engage in active stakeholder management with the second examiner!

Obvious: Second examiners with a high level of subject-matter expertise may well be the most critical readers and assessors.





- **Computer Science/AI has an above-average drop-out rate**
 - **As a result, however, it is generally only students who are actually suited to writing a final dissertation in Computer Science/AI ✓**
 - The language axis ‘excellent work’ – ‘deficient/poor work’ corresponds generally only to a single grading scale (1.0) ‘very good’ – ‘satisfactory’ (2.7) and therefore usually no longer covers the entire grading spectrum
 - Grades ranging from 3.0 to 4.0 are therefore very rare in final dissertations in computer science/AI (writer’s block, health issues, family crises, ...)
 - A grade of 5.0 is therefore also extremely rare in computer science/AI
- **Nevertheless, some of you may be asking yourselves this question:**
 - **“What happens if I fail my final dissertation?”**
 - **You are allowed two attempts at your final dissertation!**

(However, please always check with the Student Office or Examinations Office for details where necessary...)



(This list is not exhaustive)



Computer Science	Subject area(s)	Further areas of overlap
Brunner , Fabian	Data Analytics	Data Science, Data Engineering
Roth , Christian	IT Security and Computer Networks	DevSecOps, Blockchains, Privacy
Schäfer , Ulrich	Media Informatics, Mobile Computing	Web Engineering, Mobile-first, PWAs
Rebholz , Sandra	Software Engineering	Software Architectures, Testing/Quality Assurance, DevOps
Pösl , Josef	Programming, Distributed Systems	Distributed Systems, Database Systems
Meiller , Dieter	Media Informatics	Web Engineering, Visual Analytics
Ivanovska , Tatyana	Artificial Visual Intelligence	Image Processing, Medical Informatics
Frey , Martin	Digital Media Design and Production	UI/UX, web front-ends
AI	Subject area(s)	Other areas of interest
Bergler , Christian	Deep Learning	Generative AI, RAG systems
Heckmann , Dominikus	HMI, AI, information ethics (+ DKFI staff)	Logic/Inference, Semantic Web, AI, Ethics
Pirkl , Gerald	Embedded intelligence (+ DKFI staff)	RAG systems, time series analysis
Levi , Patrick	Machine learning for industrial applications	AI security, privacy, predictive maintenance
Brunner , Fabian	Data Analytics	Predictive Models, Predictive Maintenance
Schäfer , Ulrich	Media Informatics (+ DKFI staff)	Natural Language Processing, Generative AI
Nierhoff , Thomas	Intelligent Mobile Systems	Reinforcement Learning, Mobile Robotics



(This list is not exhaustive)



Areas of connection beyond core computer science/AI (selection of examples):

Prinz, Alexander [EMI]	Electric, connected, automated mobility	E-mobility, driver assistance systems, radar systems
Peterhänsel, Alexander [EMI]	Visual computing	Media technology, applied computer graphics
Lederer, Matthias [WEBIS]	Business Informatics	Process Management
Pitzl, Christoph [WEBIS]	Digital Logistics	Operations Research
Schnieder, Christian [WEBIS]	Business Informatics	Analytics & Data Management
Geigenfeind, Thomas [WIG]	Data Science	Data Science, Machine Learning
Götz, Theresa [WIG]	Health Data Analytics	Data Science, Machine Learning
Hamm, Steffen [WIG]	Healthcare Management	Medical Informatics
Rothgang, Eva [WIG]	Digital Process Chains	Medical Informatics
Veschgini, Kambis [WIG]	Mathematics and Information Technology for Business Engineering and Health	Data stream systems

<https://www.oth-aw.de/hochschule/ueber-uns/personen/professorinnen-professoren/>

Disclaimer:

Any professor of Computer Science or AI is always eligible to act as a second examiner without restriction!

This is because a second examiner from the field of computer science or AI already has a sufficient connection to the subject matter through computer science alone.

A professor from another faculty at OTH Amberg-Weiden is also welcome to act as a second examiner; this is officially permitted.

Note: **You are generally free to choose your own second examiner.** You should approach them yourself, usually with your thesis proposal.





**As a second examiner, you
no teaching load!**

(So you are not a second supervisor)

Only the first examiner receives a one-off teaching load of 0.2 SWS (BT) or 0.4 SWS (MT) for a final thesis.
Therefore, the **second examiner** is exclusively an examiner and **not a supervisor**.

In particular, they are not a preliminary reviewer of your PDF! As for active stakeholder management
, however, nobody usually stops you from asking for a consultation appointment...





As first examiner
and second examiner

I would
always
provide a
printed copy

Print version?

PDF?

CD/DVD?

Neumann, Christoph

⚠ Yes!

✓ That too!

As a **ZIP file**, via **Moodle**
upload

My colleagues are free to change their minds at any time, so you'll need to second examiner **again**, but you can **plan ahead** based on this list:

As a second examiner

Print version?

PDF?

CD/DVD?

Aßmuth, Andreas

?

?

?

Brunner, Fabian

⚠ Yes!

—

—

Heckmann, Dominikus

—

✓ That's enough.

Ivanovska, Tatyana

?

?

Loebenberger, Daniel

⚠ Yes!

—

Meiller, Dieter

?

?

?

Pirkl, Gerald

—

✓ That's enough.

—

Pösl, Josef

⚠ Yes!

—

⚠ Burn your own CD/DVD!

Schäfer, Ulrich

—

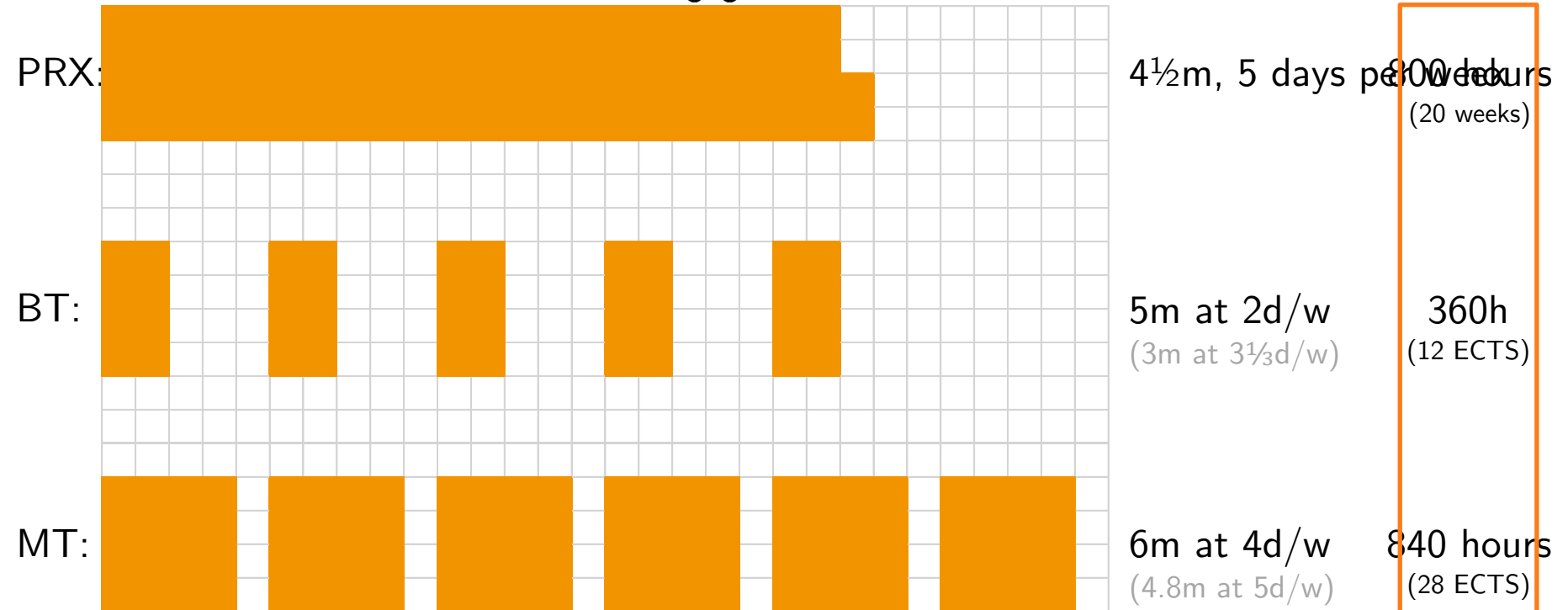
✓ That's enough.

—

Ask your second examiner
whether they would like a printed
copy
(and a CD, if applicable)!
Please feel free to CC me in your enquiry
email.

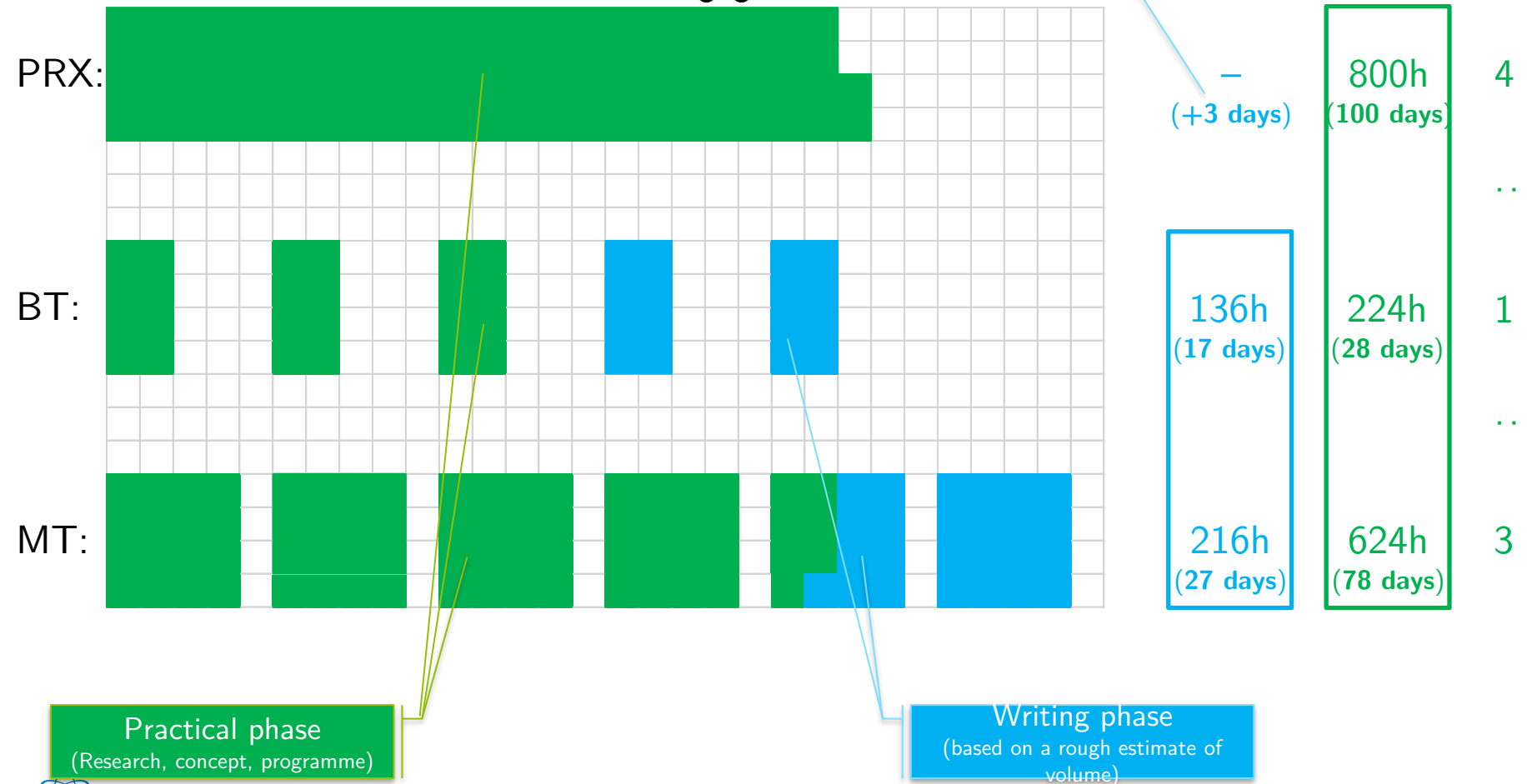
(And: Of course, this is only the preference of colleagues in the role of **second examiner**. Their preference as first examiner may be different...)







Report





‘Your Bachelor’s thesis can have significantly less substance than an internship at a reputable company!’

Prof. Dr.-Ing. Christoph P. Neumann

However, it is usually only in your Bachelor’s thesis that you demonstrate your qualities as a one-man army!



Sample invoices: Bachelor's thesis



Bachelor's
degree

- **ASPO / SPO guidelines**
 - Bachelor's thesis: **12 ECTS** (360 hours) with a completion period of **5 months**
 - Second examiner / Two professors
 - Marking period: **8 weeks** (ASPO, Section 27, paragraph 5, sentence 6)
 - Please note **the formal requirements** for final theses: www.oth-aw.de
» Studying and Living » Formalities » Course Structure » Theses
- **Extensions (particularly in the 7th semester following the standard period of study)**
 - Weekly workload: $12 \text{ ECTS} / 30 \text{ ECTS} = 0.4 = \mathbf{40\%}$
 - Regular working days: $40\% \times 40\text{h/w} = 16\text{h/w} = \mathbf{2d/w}$ (**Any less is not possible!**)
 - Cross-check: $360\text{h} / 16\text{h/w} = 22.5\text{w} \triangleq \mathbf{5 \text{ months}}$ at 40% ✓ (**It cannot take any longer!**)
 - Working days: $360 \text{ hours} / 8 \text{ hours/day} \triangleq \mathbf{45 \text{ days}}$ at 100%
- **Reduced working hours (Is this possible for you? Uncompleted modules/part-time job?)**
 - Over **4 months** (18.0 weeks)? **50%** required $\triangleq \mathbf{2\frac{1}{2} \text{ days per week}}$ = 20.0 hours per week ($\triangleq \mathbf{45 \text{ days}}$)
 - To **3m** (13.5w)? **66%** required $\triangleq \mathbf{3\frac{1}{3} \text{ d/w}}$ = 26.7h/w ($\triangleq \mathbf{45 \text{ d}}$)
 - On **2m** (9.0w)? **100%** required $\triangleq \mathbf{5 \text{ d/w}}$ = 40.0h/w ($\triangleq \mathbf{45 \text{ d}}$)





Bachelor's
degree

■ Bachelor's theses

- Net length: roughly 50 to 60 pages (net := excluding the title page and appendix)
- Rough rule of thumb for writing: approx. 3 pages per day (all-inclusive := reviews, polishing, ...)
- $50S / 3S/d = 16.6d$

1. Bachelor's theses (reference model: 5 m at 2 d/w)

- 16.6 days $\triangleq$ 8 to 9 weeks at 40% $\approx$ 2 months' part-time work on the writing phase
- So that leaves time beforehand for research, planning and programming?
28 days = 14 weeks $\approx$ 3 part-time months for the practical phase
- Ratio: approx. 3:2

2. Bachelor's theses (reference model: 3 months at 3 1/3 days per week)

- 16.6 days $\triangleq$ 5 weeks at 66% $\approx$ 1 1/2 part-time months for the writing phase
- So how much time is left before that for research, design and programming?
28 days = 8.5 weeks $\approx$ 1 1/2 part-time months of practical work





NOTE!

■ Ideally, implement and write in PARALLEL!

- It is better NOT to carry out implementation and writing sequentially in phases.
- CAUTION: Unfortunately, many students ultimately fail to manage this weekly parallel approach... (for purely internal psychosocial reasons, or due to a lack of self-organisation)

■ How?

- Simply apply a ratio of approx. **3:2** to your weekly working hours!
- A purely theoretical reference calculation:

1. Bachelor's theses (reference model: 5 m at 2 d/w)

- Research, design, programming: $3/(3+2) * 2$ days per week = **1½ days per week**
- Writing: $2/(3+2) * 2$ days per week = **4/5 days per week**

2. Bachelor's theses (reference model: 3 months at 3½ days per week)

- Research, design, programming: $3/(3+2) * 3½$ d/w = **2 d/w**
- Writing: $2/(3+2) * 3½$ d/w = **1½ d/w**





Worth noting: A **GPT-5** is a stricter reviewer than GPT-5 Turbo!

Bachelor's
degree

INPUT Provider (Learning Tutor) Yes ✓

Act as a German computer science professor reviewing a **software prototype for a Bachelor's thesis**.

The attached source code represents the student's individual contribution, extracted via git blame. It is not self-contained; **do not attempt to compile or run tests**.

Context & Scope:

- Student workload: 120+ hours
- Expected size: 2,500 effective lines of code (eLoC)
- Minimum threshold: 1,250 eLoC (fail if below this)
- Exceeding expectations: 4000+ eLoC (if quality is high)
- Quality takes precedence over quantity. Craftsmanship is paramount; bonus points are awarded for high originality.

Please provide your assessment using the following structure:

1. Suggested final mark: [German university scale: 1.0 to 5.0], placed at the very top.
2. Code summary: Exactly two sentences explaining what the code does.
3. Aspect-by-Aspect Grading & Feedback: Grade (1.0–5.0) and bullet points for:
 - Functionality & Testing
 - Readability, Structure & Coding Standards
 - Code organisation, modularity & design patterns
 - Error handling and edge case coverage
 - Efficiency, scalability and absence of copy-paste
 - Documentation (comments on public interfaces/classes) and absence of compiler warnings
4. GenAI Detection: **Note any indicators of unverified LLM-generated code.**

Output the review directly, **balancing rigorous academic standards with constructive feedback**.





‘A word of warning for those who do not keep a running record from the outset and start writing late:

The **‘3 pages a day’ figure** is a **total-cost** and **post-mortem** statistic.

During a ‘late main writing push’, you should aim for **4 pages a day**, so that you’ll still have time later for reviews and polishing later on...”

Prof. Dr.-Ing. Christoph P. Neumann



**‘If you know or suspect
that you’re a slow writer
(fewer than 3 or 4 pages a day)
then you need to plan differently!’**

Prof. Dr.-Ing. Christoph P. Neumann

How? Well, by writing as you go along right from the start – which makes sense anyway!
– Mr Obvious





**‘You should (in the context of a Bachelor's the
prepare a **publication**,
if not actually aim for one!’**



Prof. Dr.-Ing. Christoph P. Neumann

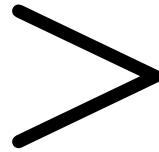


Which language to use for academic publications and, if applicable, your dissertation

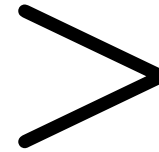
145



en-US



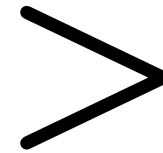
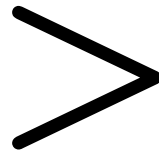
en-GB



de-DE

When studying computer science, please completely disregard the fact that your school teachers always taught you British English!





en-US

en-GB

de-DE





en-US



“To be, or...”

double
quotation marks

66/99

top/top

en-UK



‘To be, or...’

single
inverted commas

6/9

de-DE



“To be or...”

99/66

bottom/top

Places commas and full stops
inside the quotation marks!

... text “bataille.”

Place commas and (unquoted) full stops
outside the quotation marks!

... text ‘bataille’.

«it depends»

<https://www.thepunctuationguide.com/british-versus-american-style.html>



**Primary quotation marks
in European languages
(used in print)**





Preliminary stages



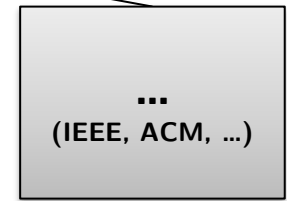
Int'l + Peer-reviewed



<https://www.oth-aw.de/hochschule/media-library/research-report/>



See below under
Master's theses



IEEE, 4–6 pages



L^AT_EX



Self-published: arXiv/zenodo/cyberlytics

No deadline

Open Access / Free Culture



max. 5 pages



Published by OTH-AW

Confirmation of acceptance: **mid-June**

Submission: early **September**

(Copyright remains with the authors)

IEEE, 4–6 pages



L^AT_EX / W



Various publishers

Various deadlines

Various copyright releases





https://info.arxiv.org/help/submit_pdf.html → TeX required in addition to PDF

<https://info.arxiv.org/help/faq/mistakes.html>



**“Do not use subdirectories
in the TeX project!**

Keep everything flat: images, bib files,
etc.!

No embarrassing comments in TeX!”





IEEE layout (cs-techrep, ...)

FoodFresh: Multi-Chain Design for an Inter-Institutional Food Supply Chain Network

Technical Reports: CL-20YY-NN, June 2023

Philipp Stangl and Christoph P. Neumann 
Department of Electrical Engineering, Media and Computer Science
Ostbayerische Technische Hochschule Amberg-Weiden
Amberg, Germany
Email: {p.stangl | c.neumann}@eth-aw.de

Abstract—We consider the problem of supply chain data visibility in a blockchain-enabled supply chain network. Existing methods typically record transactions happening in a supply chain on a single blockchain and are limited in their ability to deal with different levels of data visibility. To address this limitation, we present FoodFresh – a multi-chain consortium where organizations store immutable data on their blockchains. A decentralized hub coordinates the cross-chain exchange of digital assets among the heterogeneous blockchains. Mechanisms for enabling blockchain interoperability help preserve the benefits of independent sovereign blockchains while allowing for sharing of data across blockchain boundaries.

Index Terms—blockchain; consortium; supply chain network; controlled transparency; interoperability.

I. INTRODUCTION

The food industry comprises companies dedicated to manufacturing and processing raw materials and semi-finished products from agriculture, forestry, and fishing. In recent years, food supply chains have progressed from shorter, independent to more unified, coherent relationships among supply chain participants [1]. Developing long-term, and collaborative relationships requires evolutionary technological solutions to simultaneously retain a competitive edge.

Blockchain technology is considered a way to increase supply chain visibility, support fraud detection and provide supply chain optimization. Current applications of blockchain technology in food supply chain management, e.g., IBM Food Trust [2], rely mainly on a single distributed ledger. The implications on supply chain networks are twofold: (i) organizations participating in multiple supply chains must share their data on multiple blockchains, and (ii) participants may see information originally not intended for them because all participants can view every transaction on a distributed ledger.

In this paper, we propose FoodFresh – a multi-chain approach for inter-institutional supply chain networks, allowing organizations to store immutable data on their blockchain. A decentralized hub coordinates the cross-chain communication among the heterogeneous blockchains. The hub further ensures that all parties comply with the overarching rules of the consortium.

The remainder of the paper is organized as follows: in Section II, a selection of related work is presented. Subsequently, an overview of the relevant technology is given in Section III.

Next, Section IV-A discusses our proposal with the design rationale. We conclude the paper in Section V, followed by the references at the end.

II. RELATED WORK

Recently, various solutions for blockchain-enabled supply chains have been proposed. For instance, Longo *et al.* have presented a software connector to connect an Ethereum-like public blockchain with an enterprise information system [3]. The software connector allows companies to share information with their partners with different levels of visibility. Schulz and Freund [4] have proposed a blockchain-enabled distributed supply chain. Their main idea is a network-centric design, which incorporates domain-specific blockchains for handling specific business processes and a hub or main blockchain that connects the blockchains to communicate with each other.

Polkadot uses a hybrid consensus model, separating block production (Blind Assignment of Blockchain Extension (BABE)) from finality (GHOST-based Recursive Ancestor Deriving Prefix Agreement (GRANDPA)). This allows for blocks to be rapidly produced and finalized at a slower pace without risking slower transaction speeds or stalling. Polkadot provides cross-chain communication with arbitrary data. Parachains communicate through the Cross-Chain Message Passing (XCMP) protocol, a queuing communication mechanism based on a Merkle tree. XCMP is designed to communicate arbitrary messages between parachains. Messages are sent together with the next parachain block (short: parabolic), while the relay chain blocks include only the proof of postage. All messages must be processed in proper order, for which a chain of Merkle proofs is used. However, XCMP is still under development. Therefore, the stop-gap protocol is Horizontal Relay-routed Message Passing (HRMP). As soon as XCMP is fully developed, it can replace HRMP. The primary difference between the two is the data stored on the relay chain. In HRMP, the relay chain stores the full message with its payload. XCMP, on the other hand, will only store a reference to the payload. The target parachain will be responsible for decoding the message payload.

From the perspective of inter-institutional supply chains, FoodFresh extends our previous work on inter-institutional cooperation [5]–[8] that was focused on healthcare, in which

OTH research report layout

Simon Liebl, M.Eng.
Prof. Dr. Andreas Abmuth
Prof. Matthias Söllner

Security für eingebettete Systeme in kritischen Infrastrukturen: Ergebnisse und Erkenntnisse

Zusammenfassung

Im Zuge des industriellen Internet der Dinge werden Sensoren und Aktoren netzwerkfähig und intelligenter. Die vergrößerte Angriffsfläche führt jedoch zu einem erhöhten Risiko von Cyberangriffen auf industrielle Kontrollsysteme. Vor allem in kritischen Infrastrukturen kann dies zur Gefahr für Mensch und Umwelt werden. In diesem Bericht wird das Forschungsprojekt „ISEC“ vorgestellt, dessen Ziel die Entwicklung von Security-Lösungen für leistungsschwache industrielle eingebettete Systeme ist. Es werden Ergebnisse aus den Bereichen Bedrohungsanalyse, Physical Unclonable Functions und Kryptografie präsentiert und eine Auswahl gewonnener Erkenntnisse beschrieben.

Abstract

As the industrial Internet of Things progresses, sensors and actuators become network-enabled and smarter. However, the increasing attack surface leads to a higher risk of cyberattacks on industrial control systems. This may endanger people and the environment, especially for systems in critical infrastructures. This report presents the research project “ISEC”, which aims to develop security solutions for low-power industrial embedded systems. The results from the threat analysis, the evaluation of Physical Unclonable Functions and cryptographic solutions are presented and a few findings described.

1 Einleitung

Das Internet der Dinge (engl. Internet of Things, IoT) hat Einzug in das industrielle Umfeld gehalten, um auch dort Lösungen zur Effizienzsteigerung oder Minimierung des Energieverbrauchs realisieren zu können. Um die Daten auch auf der untersten Ebene eines industriellen Kontrollsystems, den Sensoren und Aktoren, analysieren zu können, werden diese Geräte netzwerkfähig und intelligenter.

Durch das so entstehende industrielle Internet der Dinge (IIoT) nimmt die Angriffsfläche auf die ehemals isolierten und meist proprietären Systeme stark zu. Es müssen deswegen auf allen Ebenen Geräte und Systeme abgesichert werden, um Angriffe zu verhindern. Vor allem in den sog. kritischen Infrastrukturen [1], wie Energie, Gesundheit und Transport und Verkehr, könnte ein erfolgreicher Angriff zu katastrophalen Konsequenzen für Mensch, Umwelt und Gesellschaft führen. Bei der Umsetzung von Security-Maßnahmen auf Geräten wie Sensoren und

Aktoren gibt es jedoch einige Herausforderungen, wie zum Beispiel geringe Rechen- und Speicherkapazitäten, Echtzeitfähigkeit und lange Produktlebensdauer, die in diesem Projekt bewältigt werden sollen.

2 Projektübersicht

Im Projekt „Intelligente Security für elektrische Stellantriebe und Stromrichter in kritischen Infrastrukturen (ISEC)“ forscht die OTH Amberg-Weiden gemeinsam mit den beiden Industriepartnern SIPOS Aktorik GmbH und Grass Power Electronics GmbH an Security-Lösungen speziell für eingebettete Systeme mit geringen Ressourcen. Die Produkte beider Firmen werden den zuvor beschriebenen kritischen Infrastrukturen zugeordnet. Die elektrischen Stellantriebe für Industriearmaturen der SIPOS Aktorik GmbH werden beispielsweise in Kraftwerken, Kläranlagen und Pumpwerken eingesetzt und sind somit in den Sektoren Energie und Wasser angesiedelt. Grass Power Electronics GmbH entwickelt leistungselektronische

An OTH research report is also of the TechRep type (!)



Academic ranking focusing on computer science/AI

152

(Excluding academic journals; more on this below; including proprietary metrics such as the impact factor)



ICSE	VLDB	ICDE	KDD	...	Peer-reviewed	International	Ranking (CS CORE GLS)	A++/A+	A/A-	B/B-	C	Work in Progress		
BPM	...							A*	A	B	C			
DEBS	...													
IDEAS	ISPA	WETICE	...											
IARIA	...				DOI?	National	Unranked	NC						
BTW	COMPUTER SCIENCE		MuC	...										
OTH Applied Research Conference														
arXiv	(arXiv DOI only)									NO peer review	International	Endorsements + Presenter Quality Control	NO Scientific Quality Control	Technical Report
ResearchGate	(RG-DOI only)			Zenodo										
OTH Research Newsletter														
c't	iX	Developers	IT Spectrum	...	NO DOI	Non-scientific								
Wikipedia	Blogs	InfoQ	DZone	...										

@INPROCEEDINGS

@TECHREP

@MISC





IMPORTANT

DE

Ostbayerische Technische Hochschule Amberg-Weiden
Fakultät Elektrotechnik, Medien und Informatik

EN

Ostbayerische Technische Hochschule Amberg-Weiden
Department of Electrical Engineering, Media and Computer Science

Erläuterungen:

- Der Name unsere Hochschule wird nicht übersetzt. (Als Hochschule sind wir zwar eine University of Applied Sciences, denn das ist ein feststehender Begriff für unseren Hochschultyp, aber das macht uns namentlich nicht zur Technical University of Applied Sciences Amberg-Weiden)
- Die offizielle Übersetzung der Fakultäten (Organisationseinheiten der Hochschule) lautet bei uns „Department of ...“. Hintergrund ist, dass in einigen Ländern unter dem Begriff Faculty das gesamte akademische Kollegium einer Universitätseinheit subsummiert wird, nicht die Organisationseinheit.

Source and template:

<https://www.oth-aw.de/neumann/onboarding/#uebersetzungshilfen>

**But please do NOT think of translating the title of your thesis, if you plan to write your thesis in English!
Even English-language Bachelor's and Master's theses have a German-language title page.
This note is intended solely for the submission of academic publications!**





- Ranking tier of **IARIA** conferences?

C-rank (possibly **UNRANKED**, depending on the list)

International + Peer-reviewed

- Ranking tier of **the OTH Research Report and Technical Reports?**
Non-peer-reviewed / Non-international

- More ambitious? A+/A/...?**

- (see sections '**Academic Publishing**' and '**Conference Ranking Tiers**'!)

- Software engineering** conferences:

<https://taoxie.cs.illinois.edu/seconferences.htm>

- Artificial intelligence** conferences:

<https://github.com/lixin4ever/Conference-Acceptance-Rate>

- (However, you should mentally prepare yourself for your submission to be **REJECTED** here...)





Example for 2026, for all IARIA co-located conferences in Nice, 5–9 July:

- **Submitted: ~310**
 - (all, duplicates, withdrawn before peer review, off-topic, etc.)
[effort was spent on all of these as a first pre-screening]
- **Entering the peer-review process: ~270**
 - (following a second pre-screening, AI-generated, etc.)
- **Accepted: 89**
 - (peer reviews sent; at least 3–10 emails per accepted paper)
- **Registered: 55 (60 not yet finalised) ← FUNDING?!**
 - (each undergoing a third screening for cross-validation, sometimes involving 2–3 rounds)
- **Overall** (as of 9 June):
 - **Acceptance rate:** 270 reviewed, 89 accepted → **33%**
 - 310 received and processed, 55 accepted and registered → **18 %**





Example for 2026, for all IARIA co-located conferences in Nice, 5–9 July:

- **Submitted: ~310**
 - (all, duplicates, withdrawn before peer review, off-topic, etc.)
[effort was spent on all of these as a first pre-screening]
- **Entering the peer-review process: ~270**
 - (following a second pre-screening, AI-generated, etc.)
- **Accepted: 89**
 - (peer reviews sent; at least 3–10 emails per accepted paper)
- **Registered: 55** (60 not yet finalised) ← **Funding / Scheduling conflicts / Visa**
 - (each undergoing a third screening for cross-validation, sometimes involving 2–3 rounds)

Overall (as of 9 June):

- **Acceptance rate:** 89 / 270 → **33%** (scientific rigour)
- **Registered-to-Submitted rate:** 55 / 310 → **18 %** (editors' sunk cost)





“Even the **preliminary stages** can be achieved, with very little effort (it couldn't be any less)
a **genuine publication!**”

The need to **condense** the material
it **will sharpen** your own thesis!”

Prof. Dr.-Ing. Christoph P. Neumann





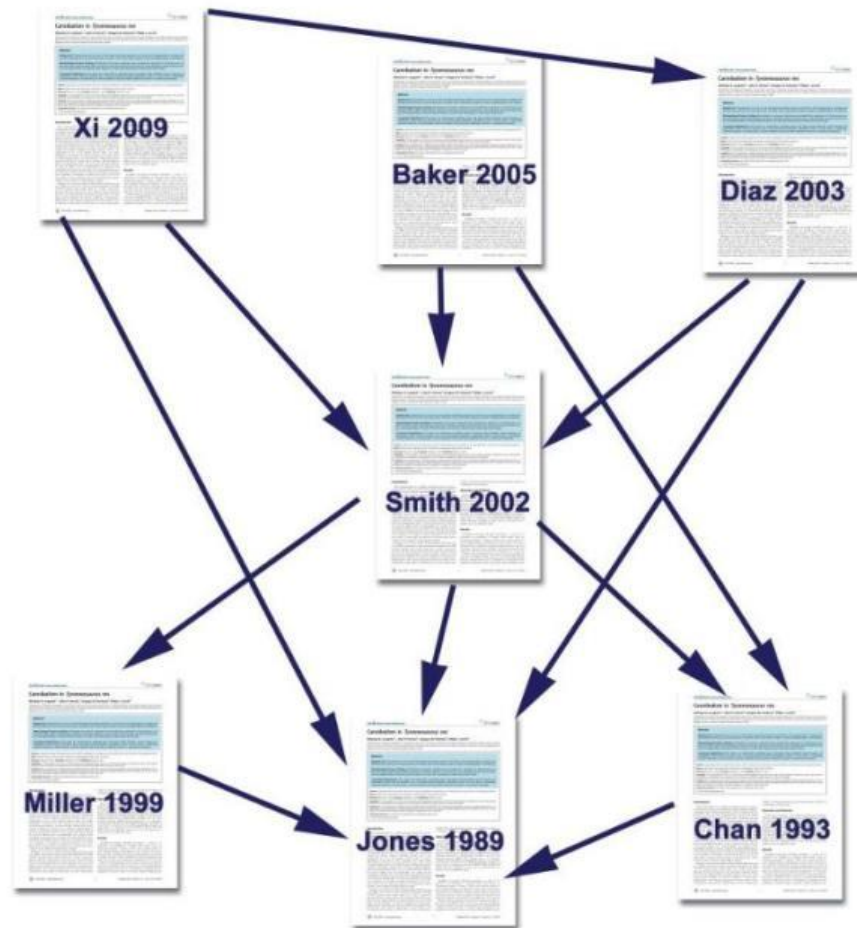
IMPORTANT

- **In your thesis, please cite (where applicable):**
 1. your own **OTH research report**
 - (in BibTeX as **TECHREP**)
 2. Any relevant **technical reports from module projects**, provided these have been made publicly available on ResearchGate, arXiv.org or similar platforms
 - (in BibTeX as **TECHREP**)
 3. Your **own academic publications**, e.g. **IARIA**
 - (in BibTeX, usually as **INPROCEEDINGS** for conference papers such as IARIA)
 4. As well as **other relevant publications by your primary supervisor**, see the section of the slides entitled ‘Further notes and guidelines’ and the slide “List of publications: Christoph P. Neumann”
- Use the package `\usepackage[shortcuts]{extdash}` for separable hyphens via `\-/`, for example for “Ostbayerische Technische Hochschule Amberg\-/Weiden”
- If applicable, add “**accepted for publication**”
 - If, for example, the OTH research report or a publication has not yet been published at the time of submission of your final thesis





"Research does not take place in a vacuum –
researchers build on and expand upon previous knowledge"



IMPORTANT:

Papers often appear in **Google Scholar** only if they are cited by other sources!
Self-citations are also effective for this purpose.





en-US



en-UK



de-DE



Note the difference
between US and UK styles when

using citations:

... text text [x].

... text text. [x] ...

... text text [x].



Can
be
!

**In computer science, please completely ignore the fact that your school teachers
always taught you British English!**

Once again: I recommend you use US English!



Sample invoices: Master's thesis



Master's

■ SPO guidelines

- Master's thesis: 28 ECTS (840 hours) with a duration of 6 months
- Second examiner / Two professors
- Marking period: 8 weeks (ASPO, Section 27, paragraph 5, sentence 6)
- Please note the formal requirements for final theses: www.oth-aw.de
» Studying and Living » Formalities » Course Structure » Theses
- Supplementary guidance from Prof. Frenzel:
<https://www.oth-aw.de/frenzel/de/abschlussarbeiten/>

■ Extensions (particularly in the 3rd Master's semester following the standard period of study)

- Weekly commitment: $28/30 = 93\%$ → Is this feasible for you? Part-time job?
- $840 \text{ h} / 8 \text{ h/d} = 105 \text{ full-time working days}$ (an average of 21.75 working days per month)
- $840 \text{ h} / 5 \text{ d/w} = 40 \text{ h/w commitment} \rightarrow 21 \text{ weeks} \approx 4.8 \text{ months at } 100\%$

■ Variations (part-time job!?)

- At just 4 days per week = 32 hours per week commitment → 26 part-time weeks ≈ 6 months ✓ at 80%
- If only 3 days per week = 24 hours per week commitment → 35 part-time weeks ≈ 8 months ⚡ at 60%
- Hardly possible: ~~2½ days a week = 20 hours a week~~ → 42 part-time weeks ≈ 9.7 months ⚡ at 50%





Master's degree

■ Master's theses

- Net length: roughly 80 to 90 pages (**net** := excluding the title page and appendix)
- Rough rule of thumb for writing output: approx. 3 pages per day (**all-inclusive** := reviews, polishing, ...)
- $80\text{S} / 3\text{S/d} = 26.6\text{d}$

1. Master's theses (reference model: 5 full-time months at 5 days per week)

- $26.6\text{ days} \triangleq 5.5\text{ weeks at } 100\% \approx 1\frac{1}{4}\text{ full-time months of writing}$
- So how much time is left before that **for research, conceptualisation and programming?**
 $78\text{d} = 15.5\text{ weeks} \approx 3\frac{3}{4}\text{ full-time months for the practical phase}$
- Ratio: approx. **3:1**



2. 6 months at 80% →

Set of information slides for final theses

4.5 months : 1.5 months

3

8 months at 60% →

6 months : 2 months



‘The outcome of your Master’s thesis can have up to three times as much substance as your Bachelor’s thesis!’
... with only 1.6 times as many pages! ...

Prof. Dr.-Ing. Christoph P. Neumann

Unless, of course, you put in extra work or overtime on your Bachelor’s thesis – for whatever reason...





Worth noting: A **GPT-5** is a stricter reviewer than GPT-5 Turbo!

Master

Act as a German computer science professor reviewing a **Master's thesis software prototype**. The attached source code represents the student's individual contribution, extracted via git blame. It is not self-contained; **do not attempt to compile or run tests**.

Context & Scope:

- Student workload: 300+ hours (**major engineering/research component of a Master's thesis**)
- Expected size: 4,000 to 5,000 effective lines of code (eLoC)
- Minimum threshold: 2,500 eLoC (failure if below this, unless extreme algorithmic complexity compensates)
- Exceeding expectations: 6,000+ eLoC (if quality and architectural integrity are high)
- Quality and scientific depth take strict precedence over quantity. High originality and algorithmic innovation earn bonus points.

Please provide your assessment using the following structure:

1. Suggested final mark: [German university scale: 1.0 to 5.0], placed at the very top.
2. Code Summary: Exactly two sentences explaining the core architecture and purpose.
3. Aspect-by-Aspect Grading & Feedback: Grade (1.0–5.0) and bullet points for:
 - Scientific Value & Originality (**innovation, algorithmic complexity, or novel application**)
 - Architectural Design & Modularity (**design patterns, scalability, system boundaries**)
 - Functionality & Testing (**substantial quality control, including security considerations**)
 - Readability, Code Hygiene & Standards (**clean code principles, idiomatic language use**)
 - Robustness & Edge Cases (**advanced error handling, concurrency, resource safety**)
 - Efficiency & Performance (**optimisations, absence of copy-paste/anti-patterns**)
4. GenAI Verification: **Note any indicators of unverified LLM-generated code.**

Output the review directly, **applying rigorous, master's-level academic and software engineering standards**.

INPUT Provider (Learning Tutor) Yes ✓





**“Try to write and submit a scientific publication
(international and peer-reviewed)
and submit it!”**

Prof. Dr.-Ing. Christoph P. Neumann

The conference or workshop should be peer-reviewed.
It doesn't necessarily have to be **ACCEPTED**; the attempt itself and the feedback received from the reviewers
already count!

It doesn't necessarily have to be international, but it is, of course, recommended.
In computer science: **American English**! Not British English.





<http://www.iaria.org/conferences.html>

#1

2023 Conference Schedule

[2023](#) [2022](#) [2021](#) [2020](#) [2019](#) [2018](#) [2017](#) [2016](#) [2015](#) [2014](#) [2013](#) [2012](#) [2011](#) [2010](#) [2009](#)

InfoSys 2023 Congress
March 13, 2023 to March 17, 2023 - Barcelona, Spain

- **ICNS 2023**, The Nineteenth International Conference on Networking and Services
- **ICAS 2023**, The Nineteenth International Conference on Autonomic and Autonomous Systems
- **ENERGY 2023**, The Thirteenth International Conference on Smart Grids, Green Communications and IT Energy-aware Technologies
- **WEB 2023**, The Eleventh International Conference on Building and Exploring Web Based Environments
- **DBKOA 2023**, The Fifteenth International Conference on Advances in Databases, Knowledge, and Data Applications
- **SIGNAL 2023**, The Eighth International Conference on Advances in Signal, Image and Video Processing
- **BIOTECHNO 2023**, The Fifteenth International Conference on Bioinformatics, Biocomputational Systems and Biotechnologies

InfoWare 2023 Congress
March 13, 2023 to March 17, 2023 - Barcelona, Spain

- **ICCGI 2023**, The Eighteenth International Multi-Conference on Computing in the Global Information Technology
- **ICWMC 2023**, The Nineteenth International Conference on Wireless and Mobile Communications
- **VEHICULAR 2023**, The Twelfth International Conference on Advances in Vehicular Systems, Technologies and Applications
- **INTERNET 2023**, The Fifteenth International Conference on Evolving Internet
- **COLLA 2023**, The Thirteenth International Conference on Advanced Collaborative Networks, Systems and Applications
- **INTELLI 2023**, The Twelfth International Conference on Intelligent Systems and Applications
- **VISUAL 2023**, The Eighth International Conference on Applications and Systems of Visual Paradigms
- **HUSO 2023**, The Ninth International Conference on Human and Social Analytics
- **BRAININFO 2023**, The Eighth International Conference on Neuroscience and Cognitive Brain Information

NexComm 2023 Congress
April 24, 2023 to April 28, 2023 - Venice, Italy

- **ICDT 2023**, The Eighteenth International Conference on Digital Telecommunications
- **SPACOMM 2023**, The Fifteenth International Conference on Advances in Satellite and Space Communications
- **ICN 2023**, The Twenty-Second International Conference on Networks
- **ICONS 2023**, The Eighteenth International Conference on Systems
- **MEDIA 2023**, The Fifteenth International Conference on Advances in Multimedia
- **PESARO 2023**, The Thirteenth International Conference on Performance, Safety and Robustness in Complex Systems and Applications
- **CTRQ 2023**, The Sixteenth International Conference on Communication Theory, Reliability, and Quality of Service
- **ALLDATA 2023**, The Ninth International Conference on Big Data, Small Data, Linked Data and Open Data
- **SOFTENG 2023**, The Ninth International Conference on Advances and Trends in Software Engineering

DigitalWorld 2023 Congress
April 24, 2023 to April 28, 2023 - Venice, Italy

- **ICDS 2023**, The Seventeenth International Conference on Digital Society
- **ACHI 2023**, The Sixteenth International Conference on Advances in Computer-Human Interactions
- **GEOProcessing 2023**, The Fifteenth International Conference on Advanced Geographic Information Systems, Applications, and Services
- **eTELEMED 2023**, The Fifteenth International Conference on eHealth, Telemedicine, and Social Medicine
- **eLML 2023**, The Fifteenth International Conference on Mobile, Hybrid, and On-line Learning
- **eKNOW 2023**, The Fifteenth International Conference on Information, Process, and Knowledge Management

and much more

Examples / Classification:

- **Cloud computing**
 - [CLOUDCOMPUTING \[I'm on the committee!\]](#)
 - <https://www.iaria.org/conferences2023/FUTURECOMPUTING23.html>
- **Big Data / DBMS**
 - <https://www.iaria.org/conferences2023/ALLDATA23.html>
 - <https://www.iaria.org/conferences2023/DBKDA23.html>
- **AI/ML**
 - [IoTAI \[I'm on the committee!\]](#)
 - <https://www.iaria.org/conferences2023/eKNOW23.html>
 - <https://www.iaria.org/conferences2023/COGNITIVE23.html>
 - <https://www.iaria.org/conferences2023/PREDICTIONSOLUTIONS23.html>
 - <https://www.iaria.org/conferences2024/GPTMB24.html>
- **Green Computing**
 - <https://www.iaria.org/conferences2023/GREEN23.html>
- **Suitable for practically any topic:**
 - <https://www.iaria.org/conferences2023/IARIACongress23.html>
 - Submission: August / Notification: mid-September
 - Advantage: For many Master's theses, the reviewers' feedback is available before you submit your thesis (often around October)

[Decisions on further narrowing down the selection are based more on **submission** and **notification dates** in the context of your thesis timetable than on additional content-related criteria!]





<http://www.iaria.org/conferences.html>

#2

DataSys 2023 Congress

June 26, 2023 to June 30, 2023 - Nice, Saint-Laurent-du-Var, France

- **AICT 2023**, The Nineteenth Advanced International Conference on Telecommunications
- **ICIW 2023**, The Eighteenth International Conference on Internet and Web Applications and Services
- **ICIMP 2023**, The Eighteenth International Conference on Internet Monitoring and Protection
- **SMART 2023**, The Twelfth International Conference on Smart Cities, Systems, Devices and Technologies
- **IMMM 2023**, The Thirteenth International Conference on Advances in Information Mining and Management
- **INFOCOMP 2023**, The Thirteenth International Conference on Advanced Communications and Computation
- **MOBILITY 2023**, The Thirteenth International Conference on Mobile Services, Resources, and Users
- **SEWID 2023**, The Ninth International Conference on Smart Portable, Wearable, Implantable and Disability-oriented Devices and Systems
- **ACCSE 2023**, The Eighth International Conference on Advances in Computation, Communications and Services

ComputationWorld 2023 Congress

June 26, 2023 to June 30, 2023 - Nice, Saint-Laurent-du-Var, France

- **SERVICE COMPUTATION 2023**, The Fifteenth International Conference on Advanced Service Computing
- **CLOUD COMPUTING 2023**, The Fourteenth International Conference on Cloud Computing, GRIDs, and Virtualization
- **FUTURE COMPUTING 2023**, The Fifteenth International Conference on Future Computational Technologies and Applications
- **COGNITIVE 2023**, The Fifteenth International Conference on Advanced Cognitive Technologies and Applications
- **ADAPTIVE 2023**, The Fifteenth International Conference on Adaptive and Self-Adaptive Systems and Applications
- **CONTENT 2023**, The Fifteenth International Conference on Creative Content Technologies
- **PATTERNS 2023**, The Fifteenth International Conference on Pervasive Patterns and Applications
- **COMPUTATION TOOLS 2023**, The Fourteenth International Conference on Computational Logics, Algebras, Programming, Tools, and Benchmarking
- **BUSTECH 2023**, The Thirteenth International Conference on Business Intelligence and Technology

NetWare 2023 Congress

September 25, 2023 to September 29, 2023 - Porto, Portugal

- **SENSORCOMM 2023**, The Seventeenth International Conference on Sensor Technologies and Applications
- **SENSORDEVICES 2023**, The Fourteenth International Conference on Sensor Device Technologies and Applications
- **SECURWARE 2023**, The Seventeenth International Conference on Emerging Security Information, Systems and Technologies
- **AFIN 2023**, The Fifteenth International Conference on Advances in Future Internet
- **ADNICS 2023**, The Sixteenth International Conference on Advances in Circuits, Electronics and Micro-electronics
- **ICQNM 2023**, The Seventeenth International Conference on Quantum, Nano/Bio, and Micro Technologies
- **FASSI 2023**, The Ninth International Conference on Fundamentals and Advances in Software Systems Integration
- **GREEN 2023**, The Eighth International Conference on Green Communications, Computing and Technologies

NexTech 2023 Congress

September 25, 2023 to September 29, 2023 - Porto, Portugal

- **UBICOMM 2023**, The Seventeenth International Conference on Mobile Ubiquitous Computing, Systems, Services and Technologies
- **ADVCOMP 2023**, The Seventeenth International Conference on Advanced Engineering Computing and Applications in Sciences
- **SEMAPRO 2023**, The Seventeenth International Conference on Advances in Semantic Processing
- **AMBIENT 2023**, The Thirteenth International Conference on Ambient Computing, Applications, Services and Technologies

and much more

Examples / Classification:

Software Engineering

- <https://www.iaria.org/conferences2023/ICSEA23.html>
- <https://www.iaria.org/conferences2023/MODERNSYSTEMS23.html>
- <https://www.iaria.org/conferences2023/SOFTENG23.html>
- <https://www.iaria.org/conferences2023/ICCGI23.html>

Web applications

- <https://www.iaria.org/conferences2023/WEB23.html>
- <https://www.iaria.org/conferences2023/ICIW23.html>
- **CLOUD COMPUTING [I'm on the committee!]**
- <https://www.iaria.org/conferences2023/ICCGI23.html>

IoT

- **IoTAI [I'm on the committee!]**

Privacy / Security / Blockchain

- **CROSS-SEC [I'm on the committee!]**
- <https://www.iaria.org/conferences2023/SECURWARE23.html>
- <https://www.iaria.org/conferences2023/CLOUDCOMPUTING23.html>
- <https://www.iaria.org/conferences2024/DBKDA24.html>
- <https://www.iaria.org/conferences2023/SOFTENG23.html>
- <https://www.iaria.org/conferences2023/ICSEA23.html>

...





Regular Papers (up to 6-10 page article -6 pages covered by the regular registration, max 4 extra pages allowed at additional cost-) (oral presentation)
These contributions could be academic or industrial research, survey, white, implementation-oriented, architecture-oriented, white papers, etc. They will be included in the proceedings, posted in the free-access [ThinkMind digital library](#) and sent for indexing. Please submit the contributions following the instructions for the regular submissions using the "Submit a Paper" button and selecting the appropriate contribution type. 12-14 presentation slides are suggested.

Short papers (work in progress) (up to 4 pages long) (oral presentation)
Work-in-progress contributions are welcome. These contributions represent partial achievements of longer-term projects. They could be academic or industrial research, survey, white, implementation-oriented, architecture-oriented, white papers, etc. Please submit the contributions following the instructions for the regular submissions using the "Submit a Paper" button and selecting the contribution type as work in progress. Contributors must follow the conference deadlines, describing early research and novel skeleton ideas in the areas of the conference topics. The work will be published in the conference proceedings, posted in the free-access [ThinkMind digital library](#) and sent for indexing. For more details, see the [Work in Progress](#) explanation page. 12-14 presentation slides are suggested.

Ideas contributions (2 pages long) (oral presentation)
This category is dedicated to new ideas in their very early stage. Idea contributions are expression of yet to be developed approaches, with pros/cons, not yet consolidated. Ideas contributions are intended for a debate and audience feedback. Please submit the contributions following the instructions for the regular submissions using the "Submit a Paper" button and selecting the contribution type as idea. Contributors must follow the conference deadlines, describing early research and novel skeleton ideas in the areas of the conference topics. The work will be published in the conference proceedings, posted in the free-access [ThinkMind digital library](#) and sent for indexing. For more details, see the [Ideas](#) explanation page. 12-14 presentation slides are suggested.

Extended abstracts (2 pages long) (oral presentation)
Extended abstracts summarize a long potential publication with noticeable results. It is intended for sharing yet to be written, or further on intended for a journal publication. Please submit the contributions following the instructions for the regular submissions using the "Submit a Paper" button and selecting the contribution type as Extended abstract. Contributors must follow the conference deadlines, describing early research and novel skeleton ideas in the areas of the conference topics. The work will be published in the conference proceedings, posted in the free-access [ThinkMind digital library](#) and sent for indexing. 12-14 presentation slides are suggested.

Posters (paper-based, two pages long) (oral presentation)
Posters are intended for ongoing research projects, concrete realizations, or industrial applications/projects presentations. The poster may be presented during sessions reserved for posters, or mixed with presentation of articles of similar topic. A two-page paper summarizes a presentation intended to be a POSTER. This allows an author to summarize a series of results and expose them via a big number of figures, graphics and tables. Please submit the contributions following the instructions for the regular submissions using the "Submit a Paper" button and selecting the contribution type as Poster Two Pages. Contributors must follow the conference deadlines, describing early research and novel skeleton ideas in the areas of the conference topics. The work will be published in the conference proceedings, posted in the free-access [ThinkMind digital library](#) and sent for indexing. 8-10 presentation slides are suggested. Also a big Poster is suitable, used for live discussions with the attendees, in addition to the oral presentation.

Posters (slide-based, only) (oral presentation)
Posters are intended for ongoing research projects, concrete realizations, or industrial applications/projects presentations. The poster may be presented during sessions reserved for posters, or mixed with presentation of articles of similar topic. The slides must have comprehensive comments. This type of contribution only requires a 8-10 slide-deck. Please submit the contributions following the instructions for the regular submissions using the "Submit a Paper" button and selecting the contribution type as Poster (slide-only). The slide-deck will be posted, post-event, on [www.iaria.org](#). 8-10 presentation slides are suggested. Also a big Poster is suitable, used for live discussions with the attendees, additionally to the oral presentation.

Presentations (slide-based, only) (oral presentation)
These contributions represent technical marketing/industrial/business/positioning presentations. This type of contribution only requires a 12-14 slide-deck. Please submit the contributions following the submission instructions by using the "Submit a Paper" button and selecting the contribution type as Presentation (slide-only). The slide-deck will be posted, post-event, on [www.iaria.org](#). 12-14 presentation slides are suggested.

Demos (two pages) [posted on [www.iaria.org](#)]
Demos represent special contributions where a tool, an implementation of an application, or a freshly implemented system is presented in its alpha/beta version. It might also be intended for those new application to gather the attendee opinion. A two-page summary for a demo is intended to be. It would be scheduled in special time spots, to ensure a maximum attendance from the participants. Please submit the contributions following the submission instructions by using the "Submit a Paper" button and selecting the contribution type as Demos. The Demos paper will be posted, post-event, on [www.iaria.org](#).

Further IARIA guidelines:

- **Regular papers (6 pages), short papers (4 pages), extended abstracts (2 pages), posters (2 pages), demos (2 pages)**
 - Short Papers: <https://www.iaria.org/workinprogress.html>
 - Ideas (≈ Extended Abstracts): <https://www.iaria.org/ideas.html>
- **Hybrid conferences! Options:**
 1. On-site (available)
 2. **Remote** .pdf slide presentations (mandatory)
 3. **Remote** pre-recorded videos (optional, suitable)
- **PDFs published via thinkmind.org**
 - E.g. <http://www.thinkmind.org/index.php?view=event&event=CLOUD+COMPUTING>

For example:

<https://www.iaria.org/conferences2023/CfPCLOUDCOMPUTING23.html>



Set of information slides for final-year projects



CTAN

Comprehensive TeX Archive Network

Cover

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Location: CTAN Packages iaria

iaria – Write documents for the IARIA publications

This package contains templates for the creation of documents for IARIA publications (International Academy, Research, and Industry Association) and implements the specifications for the IARIA citation style.

Sources

Documentation

Version

Licenses

Copyright

Maintainer

Contained in

Topics

See also

/macros/latex/contrib/iaria

README

Package documentation

0.1

The LaTeX Project Public License 1.3c

2024 Christoph P. Neumann

Christoph P. Neumann

TeX Live as iaria

MikTeX as iaria

Publisher

iaria-lite

Announcements

2024-03-22 New on CTAN: iaria

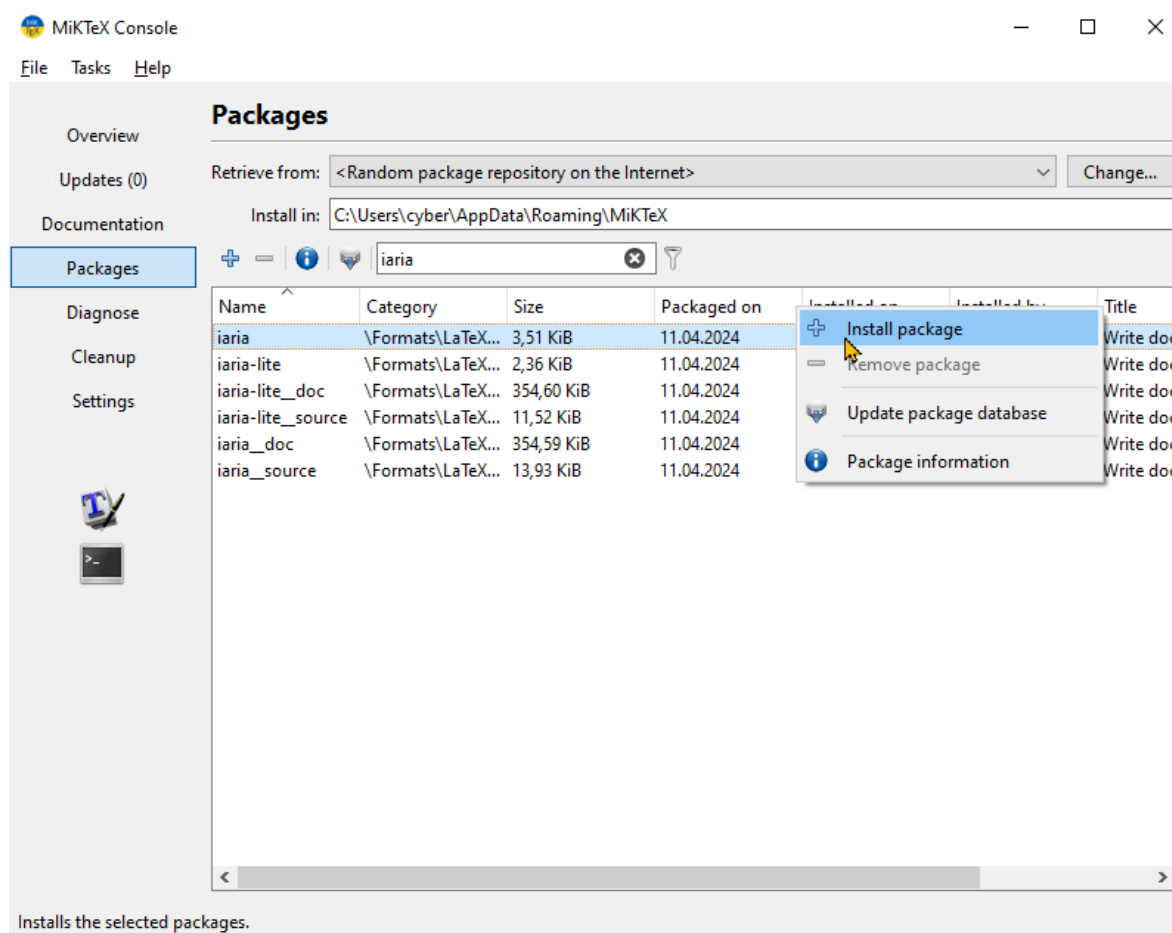
more

Download

the contents of this package in one zip archive (288.7k).

<https://ctan.org/pkg/iaria>





TeX Live:
tlmgr install iaria





```
\documentclass[conference,flushend]{iaria} % (based on IEEEtran.cls)
% The iaria.cls class loads biblatex/biber with the correct IARIA settings
% as well as a set of common packages (times, inputenc[utf8], fontenc[T1],
% graphicx, xcolor, url, orcidlink, hyperref, extdash[shortcuts])
\addbibresource{xampl.bib} % (xampl file provided by the BibTeX base files)
\title{Minimal Working Example of an IARIA Paper}
\author{
  \IEEEauthorblockN{%
    Jane Smith and John Doe\,,\, \orcidlink{0000-0002-1175-2668}}
  \IEEEauthorblockA{%
    Department of Computer Science\\
    University of ...\\
    City, Country\\
    e-mail: {\tt$\lbrace$j.smith\,,\,j.doe$\rbrace$@example.org}}
}
\begin{document}
\maketitle
\begin{abstract}
This paper is a minimal working example.
\end{abstract}
\begin{IEEEkeywords}
minimal; MWE; IARIA.
\end{IEEEkeywords}

\section{Introduction}
Here we go \cite{article-full}.

\printbibliography
\end{document}
```

Minimal Working Example of an IARIA Paper

Jane Smith and John Doe 
Department of Computer Science
University of ...
City, Country
e-mail: {j.smith | j.doe}@example.org

Abstract—This paper is a minimal working example.
Keywords—minimal; MWE; IARIA.

I. INTRODUCTION

Here we go [1].

REFERENCES

- [1] L. A. Aamport, “The gnats and gnus document preparation system,” *G-Animal’s Journal*, vol. 41, no. 7, pp. 73+, Jul. 1986, This is a full ARTICLE entry.





IEEEtran_HOWTO.pdf :

If there are more than three authors and/or the text is too wide to fit across the page, use an alternate long format:

```
\author{\IEEEauthorblockN{Michael Shell\IEEEauthorrefmark{1}, Homer Simpson\IEEEauthorrefmark{2}, James Kirk\IEEEauthorrefmark{3}, Montgomery Scott\IEEEauthorrefmark{3} and Eldon Tyrell\IEEEauthorrefmark{4}}\IEEEauthorblockA{\IEEEauthorrefmark{1}School of Electrical and Computer Engineering\\Georgia Institute of Technology, Atlanta, Georgia 30332--0250\\Email: mshell@ece.gatech.edu}\IEEEauthorblockA{\IEEEauthorrefmark{2}Twentieth Century Fox, Springfield, USA\\Email: homer@thesimpsons.com}}
```

```
\author{\IEEEauthorblockN{\sim\[-0.3ex]Jane Smith\IEEEauthorrefmark{1},John Doe\IEEEauthorrefmark{2},\orcidlink{0000-0002-1175-2668},Fred Bloggs\IEEEauthorrefmark{2},Joe Shmoe\IEEEauthorrefmark{1}}\sim\[-0.3ex]~}\IEEEauthorblockA{\IEEEauthorrefmark{1}%Department of Computer Science and Software Engineering\\Important University of Famous City, City1, Country1\\e-mail: {\tt$\lbrace$j.smith\,,\j.shmoe$\rbrace$@example.edu}}\IEEEauthorblockA{\IEEEauthorrefmark{2}%Department of Electrical and Information Technology Engineering\\Grand University of Prominent City, City2, Country2\\e-mail: {\tt$\lbrace$j.doe\,,f.bloggs$\rbrace$@example.net}}}
```

Minimal Working Example of an IARIA Paper with Shared Affiliation

Jane Smith*, John Doe[†], Fred Bloggs[†], Joe Shmoe*

*Department of Computer Science and Software Engineering
Important University of Famous City, City1, Country1
e-mail: {j.smith | j.shmoe}@example.edu

[†]Department of Electrical and Information Technology Engineering
Grand University of Prominent City, City2, Country2
e-mail: {j.doe | f.bloggs}@example.net





The `\caption` command provided by LaTeX has a design flaw:

The command does not recognise whether it is placed at the start or the end of the figure or table.

For TABLES, place the `\caption` command ABOVE the tabular environment!

For FIGURES, place the `\caption` command BELOW the `includegraphics` command!
(Which is usually done by most authors and editors by default, anyway.)

The textual positioning of the commands is important in this case.





<https://www.overleaf.com/latex/templates/iaria/hxyjztwvpjkh>
<https://www.overleaf.com/latex/templates?q=IARIA>



Features & Benefits ▾ Templates Plans & Pricing Help ▾ Projects Account ▾

IARIA

Open as Template View Source View PDF

Author

Christoph P. Neumann

Last

2 days ago

Updated

License

Creative Commons CC BY 4.0

Abstract

The template demonstrates a minimal working example of a paper for IARIA conference (International Academy, Research, and Industry Association). It applies the iaria LaTeX class (<https://ctan.org/pkg/iaria>). The class also includes the implementation of the IARIA citation style.

Tags

Conference Paper

Minimal Working Example of an IARIA Paper

Jane Smith and John Doe 
Department of Computer Science
University of ...
City, Country
e-mail: {j.smith | j.doe}@example.org

Abstract—This paper is a minimal working example.
Keywords—minimal, MWE, IARIA.

I. INTRODUCTION

Here we go [1].

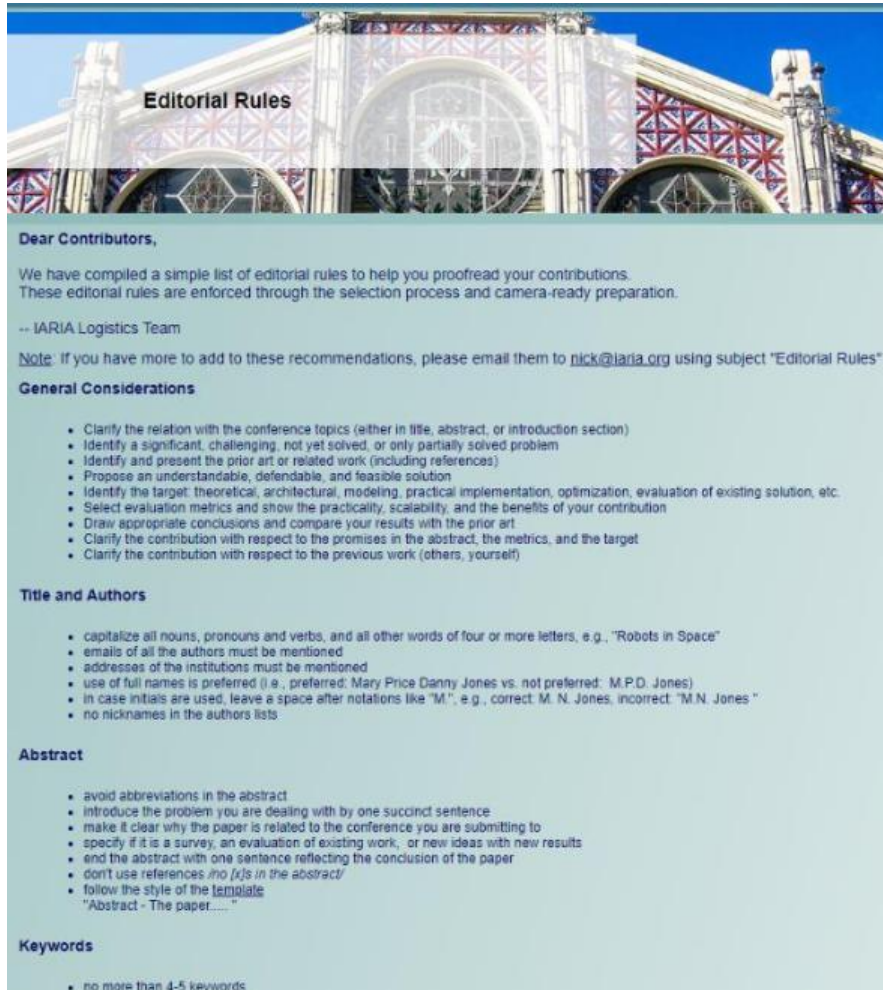
REFERENCES

[1] L. A. Aarport, "The guts and gears document preparation system," *G-Archipel's Journal*, vol. 41, no. 7, pp. 734, Jul. 1986. This is a full ARTICLE entry.





<https://www.iaria.org/editorialrules.html>



- Please read the **IARIA Editorial Rules** carefully
 - Basic mistakes
 - US vs. UK styles (My recommendation: US)
 - ...
- The guidelines there are practically all **universally applicable** and not specific to IARIA
- IARIA is **beginner-friendly**, which is why this list is provided



Before submitting your application, make sure you've also factored in the commitment that comes with it



- ☐ **Conference/workshop name?** _____
- ☐ **Location?** _____
- ☐ **Submission deadline?** _____
- ☐ **Notification date?** _____
- ☐ **Registration deadline?** _____
- ☐ **Camera-ready deadline?** _____
- ☐ **Conference dates?** From: _____ To: _____
 - ☐ Travel dates? From: _____ To: _____
 - ☐ Check the academic calendar? _____
 - ☐ Check personal calendar? _____
- ☐ **Budget clarification?** _____
 - ☐ Registration fee? _____
 - ☐ Any late registration fees? _____
 - ☐ Flight/train booking cost? _____
 - ☐ Hotel booking cost? _____
 - ☐ **Personal advance payment pending OTH travel expense claim?** _____



Readability of the charts ⚡

Solution: Two-column charts!

181



One column:



Abbildung 4. Schematische Visualisierung des Deploymentprozesses

E. Cloud Deployment

Das Projekt nutzt AWS für die Bereitstellung im Cloud-Umfeld.

E. Tailwind.css und Vite

Für das Styling der Benutzeroberfläche wird Tailwind.css [11] verwendet, welches effizientes und responsives Design durch Utility-first CSS-Klassen ermöglicht. Vite wird als Build-Tool und Entwicklungsserver eingesetzt, um schnelle Wiederaufbauprozesse und eine optimierte Entwicklungsperformance zu gewährleisten.

F. Axios

Axios wird als HTTP-Client genutzt, um Kommunikation zwischen dem Frontend und dem Backend zu ermöglichen. Es unterstützt das Projekt durch die einfache Handhabung von

```
\begin{figure}[htbp!]
...
\end{figure}
```

Both columns:

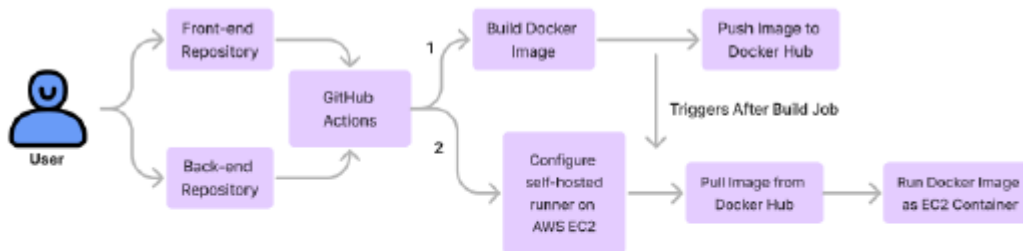


Abbildung 4. Schematische Visualisierung des Deploymentprozesses

Start der Container auf dem EC2-Server.

E. Cloud Deployment

Das Projekt nutzt AWS für die Bereitstellung im Cloud-Umfeld.

D. Infrastruktur und TypeScript

TypeScript wird im gesamten Projekt verwendet, um die Typsicherheit zu verbessern und die Entwicklung zu vereinfachen. Es hilft besonders bei der Definition von Datenmodellen und

```
\begin{figure*}[htbp!]
...
\end{figure*}
```

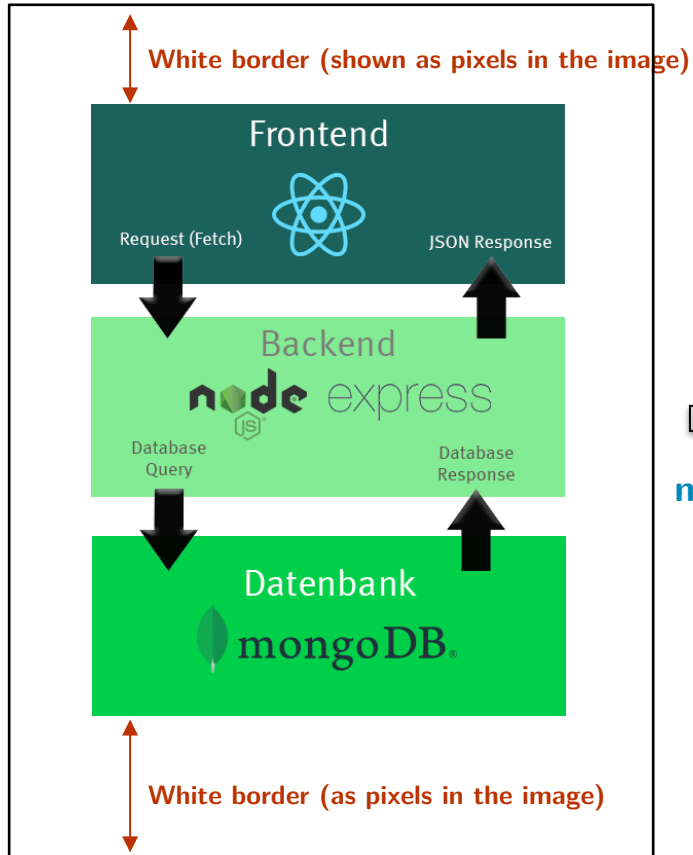




choco install imagemagick -y



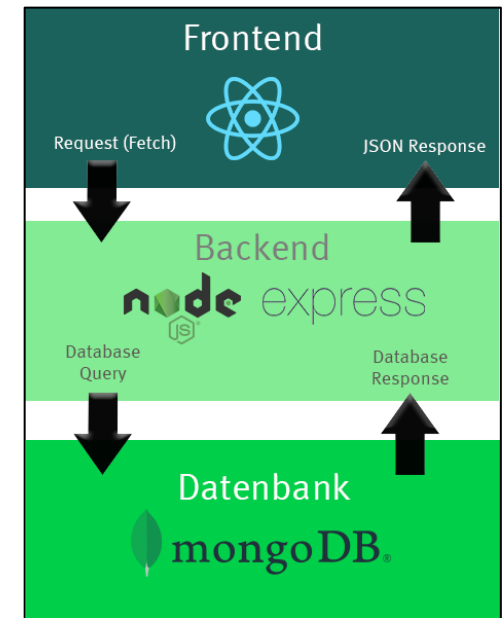
Command-line tool!



magick mogrify -trim "x.png"

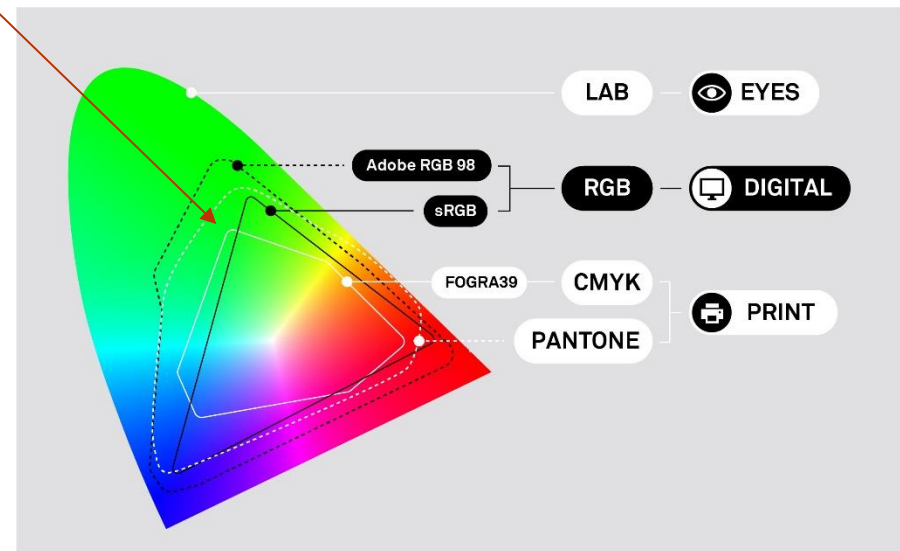
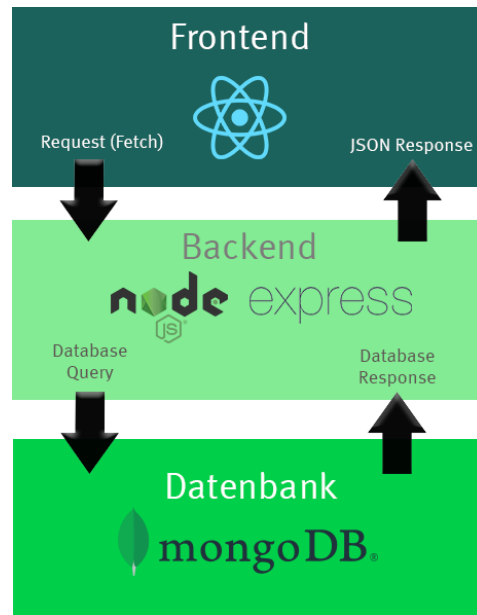
([magick CLI documentation](#))

([trim-the-AutoCrop](#))





Green ⚡



Why?

Digital/Online (RGB) vs. **Print (CMYK)**!

Green still looks good in RGB, but many shades of green are often problematic when printed!





Repeat!

DE

Ostbayerische Technische Hochschule Amberg-Weiden
Fakultät Elektrotechnik, Medien und Informatik

EN

Ostbayerische Technische Hochschule Amberg-Weiden
Department of Electrical Engineering, Media and Computer Science

Erläuterungen:

- Der Name unsere Hochschule wird nicht übersetzt. (Als Hochschule sind wir zwar eine University of Applied Sciences, denn das ist ein feststehender Begriff für unseren Hochschultyp, aber das macht uns namentlich nicht zur Technical University of Applied Sciences Amberg-Weiden)
- Die offizielle Übersetzung der Fakultäten (Organisationseinheiten der Hochschule) lautet bei uns „Department of ...“. Hintergrund ist, dass in einigen Ländern unter dem Begriff Faculty das gesamte akademische Kollegium einer Universitätseinheit subsummiert wird, nicht die Organisationseinheit.

Source and template:

<https://www.oth-aw.de/neumann/onboarding/#uebersetzungshilfen>



Bachelor's seminar vs. defence



- **To successfully complete the Bachelor's seminar (3 ECTS), you must give a presentation as part of the seminar**
 - Presentations typically last 10–15 minutes
 - This is followed by a discussion session in which the audience asks questions. This exchange amongst researchers is often referred to as a colloquium
 - In the Bachelor's seminar, the audience consists of the professor leading the seminar and the other participants
 - The first examiner and the second examiner are not involved
 - There is no mark awarded here; the outcome is simply a pass or a fail
 - The Bachelor's seminar is offered every semester
 - Naturally, the presentation does not always take place at the end of the thesis, but sometimes at the beginning or in the middle, as you may well have already completed your studies and deregistered by the following semester
 - The module handbooks sometimes refer to this as the 'final presentation'; whilst this is not entirely incorrect, it may be misleading. In addition to the presentation in the Bachelor's seminar, you will give a further presentation to the examiners as part of your defence after submitting your thesis → next slide





- **In order to successfully complete your Bachelor's thesis (12 ECTS), you must defend it orally**
 - The presentation of your Bachelor's thesis is the first part of the defence, during which you present your research and its key findings
 - The presentation typically lasts 20–30 minutes (25 minutes ± 5)
 - This is followed by a discussion session (approx. 10–15 minutes), during which the audience asks questions
 - The audience consists of the first examiner and the second examiner and, where applicable, the external supervisors
 - The aim of the defence is to demonstrate that you have fully grasped the topic and can apply the knowledge you have acquired accordingly
 - A significant proportion of the preparatory work, in terms of workload, should ideally have already been completed as part of the Bachelor's seminar
 - The presentation may be taken into account in the final dissertation mark

My personal assessment criteria do not explicitly include the presentation in the assessment framework. Instead, the presentation may influence all five aspects of the assessment framework. I would like to reiterate that my individual comments do not claim to be exhaustive, and there is space in the assessment forms for criteria outside the list of assessment criteria. As a rule, the quality of the presentation is on a par with that of the thesis itself; nevertheless, take the defence seriously, as it is both an opportunity and a risk. The weighting given to the presentation in the mark proposals of other professors at the OTH (e.g. as a second examiner) is at their discretion; if necessary, enquire about this at an early stage, for example when presenting your topic via your exposé.





- **If your final thesis is being carried out in collaboration with a company, it is customary for you to present your work there as well**
 - For medium-sized companies, I recommend giving a separate presentation at the company, to as large an internal audience as possible.
 - It is entirely conceivable that you might give your presentation at the company even before submitting your thesis and before your defence! **This is useful for a prompt recruitment into the company.** You should make yourself visible within the company some time before the end of your thesis, particularly to senior management and/or the executive board. Sometimes the management board may first need to be creative in allocating posts or even, if necessary, consult the supervisory board or the owners; do not underestimate the time this will take on the company's part. Even your external supervisors at the operational level may be too naive or inexperienced in this regard, **so you yourself should take the initiative in good time.**
 - If it is a small company, its **staff** are **welcome to attend the defence session directly**, which makes a third presentation unnecessary. The question of employment following the thesis is also generally less of a concern in such cases.



General Information



■ Before starting work

- Preparation → **synopsis** before starting work
- In the case of industry collaborations: an outline **before** the first meeting between the principal supervisor, the industry supervisor and the student, to serve as **a basis for discussion**
- There are useful **guides** online for writing an exposé (Google!)
e.g. <https://www.scribbr.de/aufbau-und-gliederung/expose-bachelorarbeit/>
- Illustrative material can be downloaded as a 7z archive from the Moodle course
 - Password: “geheim” (Please treat this as confidential; for your use only!)

■ Official issue date from the Examinations Office vs. safety buffer

- Once the forms have been submitted to the Examinations Office, the 5-month processing period begins from the **issue date**! **The processing period cannot usually be extended.**

■ Recommendation

- **Safety margin**: **Issue date** approx. **1 month after the start of induction**
- Of course: Submission is possible **from 1 month before the official submission date**





Important!

- On the EMI form, the professor **must not shorten** the processing time (as this would be regarded as **a potential disadvantage** for you)
- The form **must** clearly show, using bachelor's theses as an example, that there are **5 months between the date of issue and the submission date**.
 - However, if the student submits their work earlier, this is perfectly acceptable!
 - To be precise: the processing time for Bachelor's theses is **5 months (DD-1.MM+5.)** and **6 months** for Master's theses (**DD-1.MM+6.**).
- The dates must not fall on a **weekend** or a **public holiday**!
 - So please do not choose a Saturday either
- Students must register their theses in **PRIMUSS** before submitting the registration forms to the EMI Dean's Office.
 - The Student Office attaches great importance to
 - **Spelling!** The topic of the assignment **will be copied verbatim onto the certificate** and should, if possible, contain no spelling mistakes





Important!

- You will also need the form **Confirmation of Fulfilment of Admission Requirements**, which **Ms Reichenwallner** will complete for you at **the Student Office**.
 - In the EMI ZIP: “Confirmation of Fulfilment of Admission Requirements.doc”
 - You do NOT need four copies of this; ONE copy is sufficient!
- Please ensure that you do not submit it too early, as the following also applies:
“The actual **processing time** should be **at least 3 months!**”
 - The Dean’s Office/Student Services/Examinations Office will always calculate the actual processing time from the official issue date
 - If you will be spending more than $40\% = 2\text{d/w}$ working on your dissertation and this shortens the processing period, we will calculate the buffer month from the unofficial start of the actual processing period and will then need to ensure that the official issue/submission date aligns in such a way that we comply with the “at least 3 months from the issue date” requirement. That’s fine.



Why is $5m \equiv DD-1.MM+5$?

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Important!

August 2023

Mo	Di	Mi	Do	Fr	Sa	So
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

~~A week?~~ Wrong!
Eight days!!

How long does
this holiday last?

August 2023

Mo	Di	Mi	Do	Fr	Sa	So
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

That's a **one-week** holiday.
“DD+7-1”, because **the first day is included**.
(A week has $+7-1 = 6$ nights...)

Is that clear now? Bachelor's theses last **exactly 5 months!** And the first
day,

the issue date, is already included, just like with a holiday:

Submission deadline $\equiv DD-1.MM+5.YYYY$





Important!

The issue date must also
fall on a working day.

No weekends! No public holidays!

02. (a Tuesday ✓)

Ausgabedatum: ~~1~~ November 2021
All Saints' Day

(a Thursday)

Abgabetermin: 31 March 2022

Kandidatin / Kandidat (Unterschrift)

Verteiler: Dekanat
Aufgabensteller
Kandidatin/Kandidat
Prüfungsamt

Aufgabensteller (Unterschrift)





Important!

First, the issue date!
As this may also affect
the submission deadline may also change.

02. $5m = DD-1.MM+5.$  (a Friday ✓)
01/04/2022

Ausgabedatum: ~~1~~ November 2021

Abgabetermin: ~~31~~ March 2022
Implicitly

Kandidatin / Kandidat (Unterschrift)

Verteiler: Dekanat
Aufgabensteller
Kandidatin/Kandidat
Prüfungsamt

Aufgabensteller (Unterschrift)





Repeat!
(cf. holiday analogy)

**Starting point for
the next slide!**

$$5m = \text{DD-1.MM}+5.$$

Ausgabedatum: 21.09.2021

(hopefully
hopefully
already
understood)
20.
Abgabetermin: ~~21.02.2021~~

Kandidatin / Kandidat (Unterschrift)

Aufgabensteller (Unterschrift)

Verteiler: Dekanat
Aufgabensteller
Kandidatin/Kandidat
Prüfungsamt



The deadline must fall on a working day

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Important!

Please also bear in mind public holidays!
e.g. Good Friday!

DD-- until the next working day

18 Friday ✓

5m = DD-1.MM+5.

~~20.~~ Sunday ✗

Ausgabedatum: 21.09.2021

Abgabetermin: ~~21.~~02.2021

Kandidatin / Kandidat (Unterschrift)

Aufgabensteller (Unterschrift)

Verteiler: Dekanat
Aufgabensteller
Kandidatin/Kandidat
Prüfungsamt





IMPORTANT!
You must master this!

This **scenario combines** both of the previous ones:

It's **a year later** than in the All Saints' Day example from earlier! Although the start date needs to be brought forward, but when moving from 2022 to 2023, the deadline does not shift to 1 April because that would be a Saturday.

So it remains Friday 31 March 2023, and the **processing period is shortened by one day**.

If this calculation confuses you, then perhaps you're not yet mentally ready for a dissertation 🤔

02. $5m = DD - 1.MM + 5. DD - 2.MM + 5. = 5m - 1d$ A Friday ✓
31 March 2023

Ausgabedatum: ~~1 November 2022~~
All Saints' Day

Abgabetermin: 31 March 2023
On 1 April?
(would be a Saturday ✗)

Kandidatin / Kandidat (Unterschrift)

Aufgabensteller (Unterschrift)

Verteiler: Dekanat
Aufgabensteller
Kandidatin/Kandidat
Prüfungsamt

Your dissertation will take **exactly** X months (deadline := $DD - 1.MM + X.$),
unless public holidays or weekends fall in between.





Please also check your study deadlines in
your PRIMUSS transcript!

(I CANNOT see your PRIMUSS transcript!)

**Make sure that your submission deadline
does not fall after a PRIMUSS deadline
for the completion of your entire degree!**

These are rare cases! Nevertheless: you bear full responsibility!
Even the Examinations Office will not reject your registration
in such cases, but you must still submit your work on time, in
accordance with your degree completion deadline!
Do not be lulled into a false sense of security by simply
registering.





- In accordance with Section 49(1) of the Bavarian Higher Education Act (BayHSchG), the **final examination** must be '**passed**'. Whilst this wording may initially sound very open-ended, it has been strictly defined by the Bavarian State Ministry of Science and the Arts.
- **The Ministry's wording:**
 - "The examination semester may not be brought forward if the overall examination result is not announced until after the start of the following semester. This is because the final examination is only 'passed' within the meaning of Article 49(1) of the Bavarian Higher Education Act (BayHSchG) once both of the following conditions have been met:
 - Firstly, the formal confirmation by the competent examination body that the final examination has been passed
 - Secondly, notification that the final examination has been passed.
 - Regarding the announcement of the overall examination result: the issue of the final certificate is only decisive if the overall examination result has not already been determined in some other form."
- The **overall examination result is announced by the Student Office**, as we are able to inform students of their final grade average.
 - We notify students of the overall result **electronically**; the date on which the degree certificate is handed over is therefore not decisive.
- **As the announcement of the overall examination result constitutes an administrative act (a sovereign measure, with direct legal effect externally, etc.), the so-called 'four-day presumption' must also be observed (Section 41(2), second sentence, of the Administrative Procedure Act (VwVfG)).**
 - "An administrative act transmitted electronically within Germany or abroad is deemed to have been notified on the third day after dispatch"; for us, this means that your final examination results must be received by the Student Office no later than 3 days before the start of the new semester.
- **The exact dates would therefore be:**
 - For the winter semester: received by **27 September** at the latest.
 - For the summer semester: must be received by **11 March** at the latest.
- **Conclusion: Any marks received by the Student Office after these deadlines cannot be taken into account for the 'previous' semesters; this means that students must re-register for a further semester.**
 - Note from C. Neumann: The **Chair of the Examination Board** (VdPK) must sign the assessment form before it can be sent to the Student Office. The time taken for **internal mail** to be forwarded from the first examiner to the VdPK, and from the VdPK to the Student Office, must also be taken into account where necessary.





https://www.oth-aw.de/files/oth-aw/Services/Schreibwerkstatt/Leitfaden_Fair_Formuliert.pdf

Wieso? Weshalb? Warum?

3

fair formuliert

4

1. Sichtbarmachen des Geschlechts

4

1.1 Ansprache von Frauen oder Männern

4

1.1.1 Weiblicher oder männlicher Artikel

4

1.1.2 Weibliches oder männliches Attribut

4

1.1.3 Geschlechtsspezifische Endsilben

5

1.1.4 Wörter mit geschlechtstragender Bedeutung

5

1.2. Ansprache von Frauen und Männern

5

1.2.1 Kurzform

5

1.2.2 Verkürzte Paarform

6

1.2.3 Vollständige Paarbildung

6

1.2.4 Symmetrische Benennung von Männern und Frauen

6

1.2.5 Anrede in ungleich gemischten Gruppen

6

1.2.6 Anschreiben an Ehepaare, Familien, Lebensgemeinschaften

7

1.2.7 Einladungen

7

1.2.8 Stellenausschreibungen

7

2. Neutralisieren des Geschlechts

8

2.1 Geschlechtsneutrale Personenbezeichnung (Neutralwörter)

8

2.2 Geschlechtsneutrale Ausdrücke und Abstraktionen

8

2.3 Genderneutraler Plural

9

2.4 Substantivierung

9

2.5 Substantive mit den Endungen

9

-kraft, -person, -berechtigte, -ung, -hilfe, -teil

- You are under **no obligation** to use gender-neutral language in your thesis!
- Please do, however, **read** at least the section **‘Why? What for? How come?’**
 - Afterwards, make your own informed decision
 - In **English**, too, gender-neutral language is a topic in its own right!
- **Alternative sources**
 - https://www.oth-regensburg.de/fileadmin/media/study/services_and_advice/equal_opportunities/pdf/Gender_Guidelines_Online.pdf
 - <https://geschicktgender.de>





Further reading: <https://www.hs-worms.de/datenschutz-im-studium/datenschutz-studierende/> ⚠

A summary of a legal opinion issued by CBH Lawyers for Worms University of Applied Sciences on 22 January 2021. Quoted from this:

- In the context of academic theses, **the data controllers** within the meaning of **the GDPR** are **the students themselves**, and not the university.
 - As the thesis – in contrast to commissioned research – is produced as an independent and self-directed academic endeavour, the students determine the purposes and means of data processing.
- The **public-law examination relationship** between the students and the University **does not**, in principle, give rise to **any data protection liability on the part of the University** for the personal data processed by the students whilst working on the examination assignment
 - **provided that the university does not dictate the purpose and means of data processing** and the students do not act on the university's instructions. It should therefore be noted that, particularly when a student is required to produce an independent academic piece of work, this also encompasses the selection and means of data processing, such as the preparation, design and conduct of a survey.





Exposé

Checkliste: Exposé schreiben

0 / 10

- ☐ Thema, Fragestellung und Zielsetzungen sind klar.
- ☐ Zeitplan und Deadlines sind aufgestellt.
- ☐ Du hast einen prägnanten und passenden Arbeitstitel.
- ☐ Dein Deckblatt und die Formatierung des Dokuments entsprechen den Kriterien deiner Uni.
- ☐ Zusammenfassung, Problemstellung und Zielsetzung sind deutlich definiert.
- ☐ Du hast den Forschungsstand präsentiert und dein Konzept enthält Fragestellung, Hypothesen und Methodik.
- ☐ Die vorläufige Gliederung ist enthalten.
- ☐ Deine Motivation und die Vorarbeiten sind dargelegt.
- ☐ Du hast entsprechend den von deiner Uni gewünschten Standards zitiert und die Quellen angegeben.
- ☐ (Bei Stipendiantrag) Dein Exposé enthält eine Kostenplanung, die den Förderkriterien entspricht.

- In my Moodle course, you'll even find a **Word template** I've created **for exposés**
 - (based on the guide referenced here)



Workload notes

relating to the above 12 or 28 ECTS

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Not included in this workload:

- **Introduction to academic writing**
 - Subject of the **Bachelor's seminar!**
 - Possible prior preparation through the subject-specific project at grammar schools, etc.
- **Familiarisation with my guidelines**
 - Ideally, these will not be necessary
- **Introduction to LaTeX / BibTeX**
 - → **Bachelor's seminar!** Word may be used if necessary
- **Familiarisation with English grammar and stylistic issues**
 - German, if necessary
- **Writing the synopsis**
 - Max. 1–2 days

Forms part of the workload:

- **Taking the lead in managing the registration/submission process**
- **Drafting the outline**
- **Meetings with the first examiner**
- **Usually a one-off presentation with the second examiner, for example during their office hours**
- **Literature review**
- **Concept development**
- **usually also implementation of a software prototype**
- **Writing the final thesis**
- **Review of the final thesis**





- **Regular meetings with the principal examiner**
 - Recommendation: Fixed meetings every two weeks, **25 minutes each**
 - Any missed appointments will not be rescheduled but will be cancelled without replacement
 - **No meetings** during the period that is **{free of lectures and exams}**, i.e. roughly from **mid-February to mid-March** (1m) and from **the start of August to the end of September** (2m)

**“Neither the primary examiner
nor
the supervisor has the task
to carry you to the finish line.”**

Prof. Dr.-Ing. Christoph P. Neumann

The **supervision sessions are not intended for quality assurance!** Therefore, do not expect the regular supervision sessions to provide you with all the necessary guidance to achieve a ‘very good’ grade.





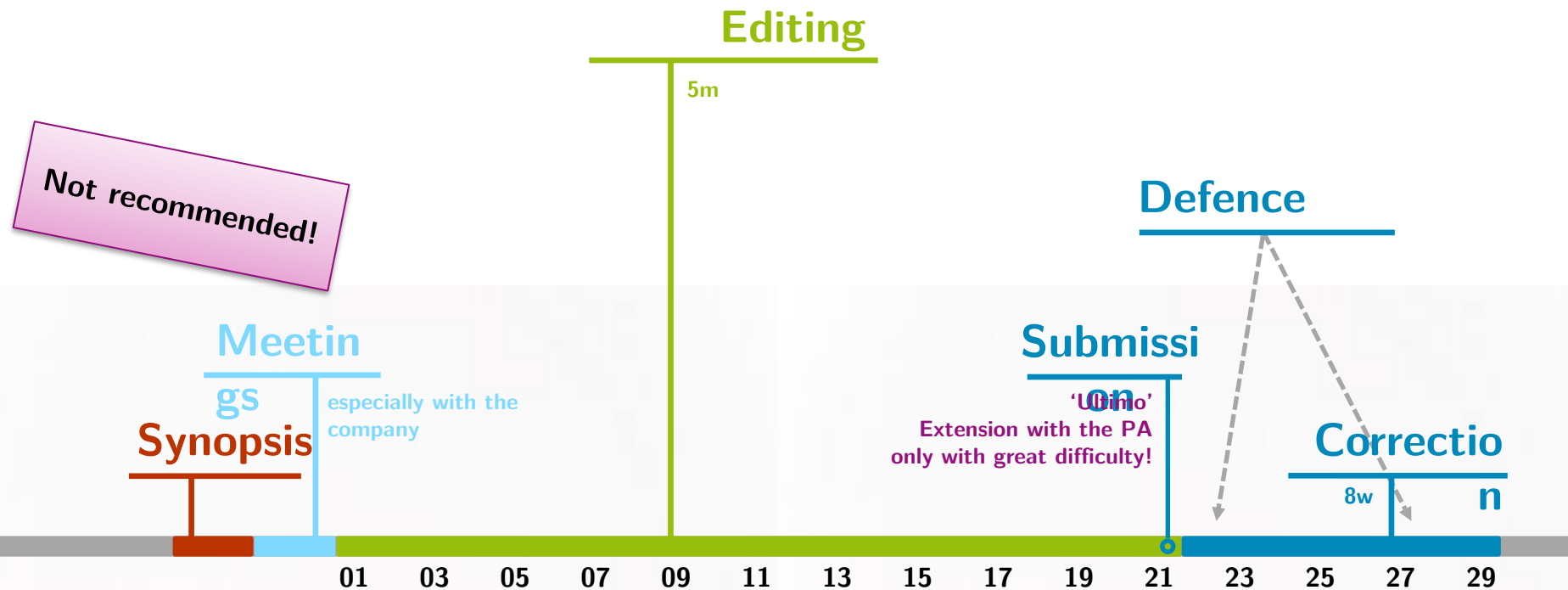
Important!

- **Background information:** Time that is {free of lectures + free of exams}?
 - Roughly from **mid-February to mid-March** (1m) and from **early August to late September** (2m)
- **PLEASE NOTE #1:** During this period, which is {free of lectures and exams}, the **Dean's Office** is generally **not staffed on a regular basis!** Theses may only be submitted there by prior **appointment!**
 - During this period, there is also a special procedure – subject to individual assessment – which the Dean's Office may suggest to you: you email your thesis to the first and second examiners by the deadline, and the Dean's Office then accepts the thesis retrospectively a few days later, on the agreed date.
 - Naturally, I fully support this arrangement; I welcome such a flexible approach.
- **PLEASE NOTE #2:** During this period, which is {free of lectures and exams}, **I will not be conducting any preparatory work or thesis defences**
 - All forms of thesis preparation (topic selection, synopsis reviews, initial coordination meeting with the partner company, etc.) and the defence will take place with me exclusively during the lecture term or the examination period



From the perspective of a Bachelor's thesis in the 7th semester
Or from the perspective of a Master's thesis in the 3rd semester

A rough timetable





During their Bachelor's degree, many students naively plan to submit their request to the first examiner only at the start of their final semester, just 5½ months before the semester deadline

Not recommended!

Editing

5m

Thesis
defence

4-day fiction

Submissi
on

Marking

VdPK &
internal
post

VL & PR
free period

Semester deadline

Meetin
g

Synopsi
s

VL & PR-free
period

Bachelor's:
Master's:

15
July

15
August

1
September

1
October

1
November

1
December

1
January

1
February

1
March

1
April

1
May

1
June

1
July

1
August

1
September

1
October

1
November

Submission to the first examiner: 35 weeks $\approx$ 8 months before the semester

the desired end of the

Start of processing: 31 weeks $\approx$ 7 months before

the desired semester cut-off date

This is still right in the middle of the exam period or the lecture period of the penultimate semester!

(Note: It is also possible to attend the Bachelor's seminar in advance during the 6th semester, and this is advisable in this scenario)



Scenarios for registration and submission: A multi-dimensional, heuristic optimisation problem

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Implications of the issue date; including **advantages** and **disadvantages**, as well as **notes** and **comments** at a macro level

24 Sample scenarios for the submission day; covering the whole calendar year

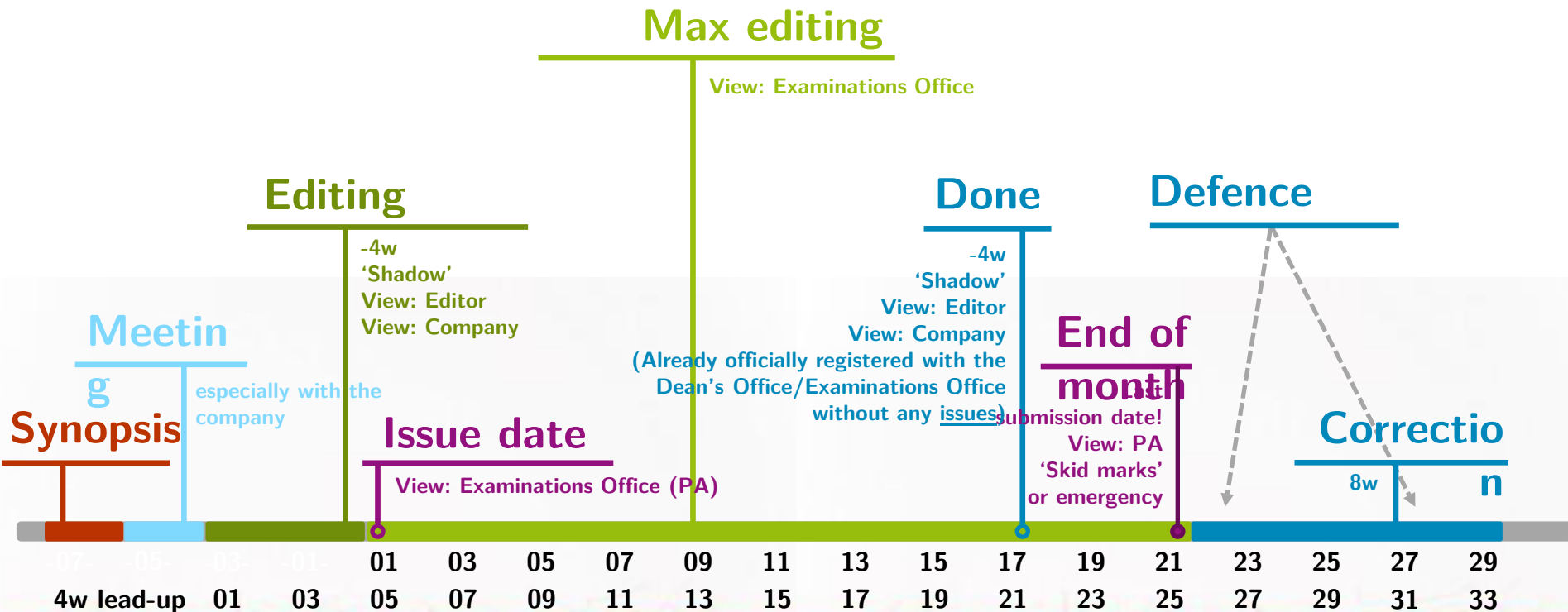
Ausgabetag	Letzter Abgabetermin	Späteste Benotung	Anmerkung/Risiken
01.01.2023	31.05.2023	26.07.2023	Anbahnung im Dezember / Bearbeitung zwischen den Semestern
15.01.2023	14.06.2023	09.08.2023	Anbahnung im Dezember / Bearbeitung zwischen den Semestern
01.02.2023	30.06.2023	25.08.2023	(Anbahnung ggf. im Prüfungszeitraum des Vorsemesters)
15.02.2023	14.07.2023	08.09.2023	(Anbahnung ggf. im Prüfungszeitraum des Vorsemesters)
01.03.2023	31.07.2023	25.09.2023	Anbahnung muss vor dem 15.2. erfolgen! (Verteidigungstermin finden)
15.03.2023	14.08.2023	09.10.2023	Abgabe in der Zeit {VL-frei+PR-frei}, Vorab-Review knapp (Anbahnung vor 15.2.!)
01.04.2023	31.08.2023	26.10.2023	Abgabe in der Zeit {VL-frei+PR-frei}, i.d.R. kein Vorab-Review
15.04.2023	14.09.2023	09.11.2023	Abgabe in der Zeit {VL-frei+PR-frei}, i.d.R. kein Vorab-Review
01.05.2023	30.09.2023	25.11.2023	Abgabe in der Zeit {VL-frei+PR-frei}, i.d.R. kein Vorab-Review
15.05.2023	14.10.2023	09.12.2023	Vorab-Review knapp (Anbahnung im VL-Zeitraum des Vorsemesters)
01.06.2023	31.10.2023	26.12.2023	(Anbahnung ggf. im VL-Zeitraum des Vorsemesters)
15.06.2023	14.11.2023	09.01.2024	(Anbahnung ggf. im VL-Zeitraum des Vorsemesters)
01.07.2023	30.11.2023	25.01.2024	(Anbahnung ggf. im VL-Zeitraum des Vorsemesters)
15.07.2023	14.12.2023	08.02.2024	(Anbahnung im Prüfungszeitraum des Vorsemesters)
01.08.2023	31.12.2023	25.02.2024	Abgabetag schwierig
15.08.2023	14.01.2024	10.03.2024	Vorab-Review problematisch (Anbahnung vor 31.7.!)
01.09.2023	31.01.2024	27.03.2024	Anbahnung muss vor 31.7. erfolgen! (also während PR-Zeit)
15.09.2023	14.02.2024	10.04.2024	Anbahnung muss vor 31.7. erfolgen! (also während PR-Zeit)
01.10.2023	29.02.2024	25.04.2024	Abgabe in der Zeit {VL-frei+PR-frei}, Vorab-Review knapp (Anbahnung vor 31.7.!)
15.10.2023	14.03.2024	09.05.2024	Abgabe in der Zeit {VL-frei+PR-frei}, i.d.R. kein Vorab-Review (Anbahnung knapp)
01.11.2023	31.03.2024	26.05.2024	Vorab-Review knapp
15.11.2023	14.04.2024	09.06.2024	(Allerdings keine Regelstudienzeit) (Bearbeitung zwischen den Semestern)
01.12.2023	30.04.2024	25.06.2024	(Allerdings keine Regelstudienzeit) (Bearbeitung zwischen den Semestern)
15.12.2023	14.05.2024	09.07.2024	(Allerdings keine Regelstudienzeit) (Bearbeitung zwischen den Semestern)

These are just examples!
You can start whenever you like!



From the perspective of a Bachelor's thesis in the 7th semester
Or from the perspective of a Master's thesis in the 3rd semester

Timetable with a buffer month





Maximum
processing time

Please note the semester deadlines!

Processing

Completed

Thesis defenc

4-day fiction

Semester boundary.....

Meeting

Submission
date

Time free of VL & PR

End of
month

Correctio

VL & PR
Time

15

15

1

1.9

1

1

9

1.1

1.3

11

Enquiry to the first examiner: week 39 $\approx$ 9 months before

the desired semester deadline

Start of processing: 35 weeks $\approx$ **8 months** before

the desired semester deadline

Still in the middle of the final third of the penultimate semester!

(Note: It is also possible to attend the Bachelor's seminar in advance during the 6th semester, and this is advisable in this scenario)





Bachelor's degree only

If you wish to follow the standard duration of study!

Still in the middle of the exam period or the lecture period of the penultimate semester!

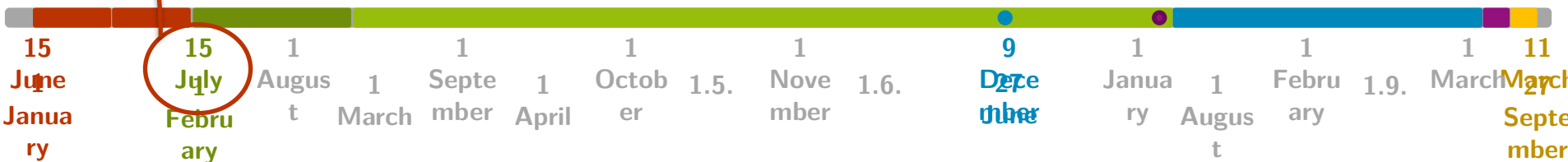
Shortening the timetable?

~~Both examiners mark more quickly. Students save themselves a buffer month.~~

Key strategy:

During the lecture-free period, set aside more than 2 days a week for the dissertation! Then the duration might drop from 5 months to 4 or 3 months?

(Does not apply to Master's theses.)



Scenarios for registration and submission: A multi-dimensional, heuristic optimisation problem

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Implications of the submission date; including **advantages** and **disadvantages**, as well as macro-level **notes** and **comments**

24 Sample scenarios for the submission date; covering the whole calendar year

Arbeits- beginn	Ausgabetag	Ziel- Abgabe	Letzter Abgabetermin	Späteste Benotung	Anmerkung/Risiken
01.01.2023	01.02.2023	31.05.2023	30.06.2023	25.08.2023	Anbahnung im Dezember / Bearbeitung zwischen den Semestern
15.01.2023	15.02.2023	14.06.2023	14.07.2023	08.09.2023	Anbahnung im Dezember / Bearbeitung zwischen den Semestern
01.02.2023	01.03.2023	30.06.2023	31.07.2023	25.09.2023	Verteidigungstermin in {VL-frei+PR-frei} (Anbahnung im Prüfungszeitraum des Vorsemesters)
15.02.2023	15.03.2023	14.07.2023	14.08.2023	09.10.2023	Abgabe ggf. in der Zeit {VL-frei+PR-frei}, Vorab-Review knapp (keine Regelstudienzeit)
01.03.2023	01.04.2023	31.07.2023	31.08.2023	26.10.2023	Abgabe ggf. in der Zeit {VL-frei+PR-frei}, ggf. Vorab-Review knapp
15.03.2023	15.04.2023	14.08.2023	14.09.2023	09.11.2023	Abgabe in der Zeit {VL-frei+PR-frei}, i.d.R. kein Vorab-Review
01.04.2023	01.05.2023	31.08.2023	30.09.2023	25.11.2023	Abgabe in der Zeit {VL-frei+PR-frei}, i.d.R. kein Vorab-Review
15.04.2023	15.05.2023	14.09.2023	14.10.2023	09.12.2023	Vorab-Review bei Zielabgabe problematisch, selbst bei Ultimo noch knapp
01.05.2023	01.06.2023	30.09.2023	31.10.2023	26.12.2023	Vorab-Review bei Zielabgabe problematisch
15.05.2023	15.06.2023	14.10.2023	14.11.2023	09.01.2024	(Vorab-Review bei Zielabgabe knapp)(Anbahnung im VL-Zeitraum des Vorsemesters)
01.06.2023	01.07.2023	31.10.2023	30.11.2023	25.01.2024	(Anbahnung im VL-Zeitraum des Vorsemesters)
15.06.2023	15.07.2023	14.11.2023	14.12.2023	08.02.2024	(Anbahnung im VL-Zeitraum des Vorsemesters)
01.07.2023	01.08.2023	30.11.2023	31.12.2023	25.02.2024	Ultimo in den Ferien, Puffermonat ggf. ad absurdum (Anbahnung im VL-Zeitraum des Vorsemesters)
15.07.2023	15.08.2023	14.12.2023	14.01.2024	10.03.2024	Vorab-Review problematisch (Anbahnung ggf. im Prüfungszeitraum des Vorsemesters)
01.08.2023	01.09.2023	31.12.2023	31.01.2024	27.03.2024	Vorab-Review bei Zielabgabe knapp
15.08.2023	15.09.2023	14.01.2024	14.02.2024	10.04.2024	Anbahnung muss vor dem 31.7. erfolgen! Vorab-Review bei Zielabgabe problematisch
01.09.2023	01.10.2023	31.01.2024	29.02.2024	25.04.2024	Abgabe in der Zeit {VL-frei+PR-frei}, Vorab-Review ggf. knapp (Anbahnung vor dem 31.7.!)
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01.10.2023	01.11.2023	29.02.2024	31.03.2024	26.05.2024	Anbahnung vor dem 31.7.! Vorab-Review problematisch, Ultimo risikoreich
15.10.2023	15.11.2023	14.03.2024	14.04.2024	09.06.2024	Anbahnung knapp
01.11.2023	01.12.2023	31.03.2024	30.04.2024	25.06.2024	(Vorab-Review bei Zielabgabe knapp) (Allerdings keine Regelstudienzeit)
15.11.2023	15.12.2023	14.04.2024	14.05.2024	09.07.2024	(Allerdings keine Regelstudienzeit) (Bearbeitung zwischen den Semestern)
01.12.2023	01.01.2024	30.04.2024	31.05.2024	26.07.2024	(Allerdings keine Regelstudienzeit) (Bearbeitung zwischen den Semestern)
15.12.2023	15.01.2024	14.05.2024	14.06.2024	09.08.2024	(Allerdings keine Regelstudienzeit) (Bearbeitung zwischen den Semestern)

These are just
examples!
You can start whenever
you like!





- **The EMI graduation ceremony often takes place on 1 July**
 - For all graduates who are due to receive their certificates on this date, the very latest deadline for submitting their final thesis mark to the Student Office is **17 June**
 - (Internal note: Assessment forms can be submitted to the Dean's Office as usual; there is no fast-track option via the VdPK)





“Draw up your own own rough outline!”

Prof. Dr.-Ing. Christoph P. Neumann

All my preliminary calculations above are intended merely as an example and simply illustrate important planning aspects. Draw up your own plan (only as ROUGH as the diagrams on my slides above; in other words, you do NOT yet need a project plan with detailed content planning such as a breakdown into work packages):

When drawing up your rough plan, simply take into account **the modules** you still need to complete, your **part-time job** and your **holiday plans**. Make sure you have a good rest before entering the world of work! You should also start roughly planning now for **the peer review** of your thesis by fellow students (see my collection of tips) at the end of the writing phase.

The most important thing is to honestly **determine** the regular **weekly working hours** you'll devote to your thesis, as this is your greatest influence on the duration of the project. Naturally, your plan may well include months with varying levels of intensity.

From a business and industry perspective, it is also quite common for you to start applying for jobs after (or even well before) submitting your thesis or final presentation – even without your final certificate or transcript, but with your work effectively complete – by submitting your academic transcript. The certificate and transcript can then be submitted later.

So do consider whether and how you wish to start **looking for a job** even before submitting your final thesis!

You should therefore also allow for the time you'll need to prepare your application documents, research jobs and draft several cover letters.





‘Will anyone later take into account the number of semesters you’ve spent? Hardly!’

Prof. Dr.-Ing. Christoph P. Neumann

De jure withdrawal from the university does not usually appear on your CV. Even in subsequent job applications, it is usually ‘overwritten’ by your **start date at your first employer.**

Remaining an official student in the following semester, after submitting your dissertation, can be worthwhile because of the various benefits associated with this status (swimming pools, student software licences from Microsoft/Adobe/JetBrains/etc., hardware offers from Unimall/Apple/Lenovo/etc., and much more).



Limits of administrative flexibility



- **‘Retrospective registration’ is generally NOT permitted in Bavaria**
 - At least not as standard practice
 - ‘Retroactive registration’ = start date in the past

 - **Basic principle**
 - Under the Bavarian Higher Education Act, the following applies:
 - Exams must be registered in the proper manner.
 - Deadlines and procedures are set out in the examination regulations.
 - The **period for working** on a final thesis **formally begins** with the registration or **allocation** of the topic
 - as defined by the date on the topic allocation form; this does not refer to any informal allocation or to dates stated in synopses
- A **‘start date in the past’** would distort the formal processing time and is therefore **fundamentally problematic**.





In practice, there are **three scenarios**:

1. Strictly formal (**standard case**)

- The Examinations Office does not accept retrospective start dates
- Reason: **Equal treatment** + **legal certainty**

2. Cases of goodwill (rare)

- If it is only a matter of a **single week** (e.g. due to obtaining forms, signatures, etc.) or if there is an obvious **administrative error**
- If the delay is more than one week: cases of goodwill are generally only permitted if **documented** in the examination file and with the formal approval of **the examination board**

3. Problematic / risky (✗)

- **'Informal** start' of the work + subsequent retrospective registration
- May be regarded as **a breach of the examination regulations!**





- **From a legal perspective, the processing time is almost always a maximum deadline**
 - (= 5 months for Bachelor's theses and 6 months for Master's theses)
- **In practice, this is not a problem at all:**
 - Students submit their work as soon as they have finished
 - The Examinations Office records the actual submission date
 - The marking process begins earlier
- **A plausible lower monthly limit, assuming 6 days a week at 10 hours per day:**
 - Bachelor's thesis: $360 \text{ h} / (60 \text{ h/w}) = 6 \text{ weeks} = 1.5 \text{ months}$
 - Master's thesis: $840 \text{ h} / (60 \text{ h/w}) = 14 \text{ w} = 3.5 \text{ months}$
- **It does not matter whether the thesis is submitted** (Master's in brackets) ...
 - after 1.5 (or 3.5) months (plausible lower monthly limits!)
 - after 4 (or 5) months (with an unused buffer month!)
 - or only shortly before the deadline or on the day of the deadline (last minute!)





Don't dawdle for no reason with your registration!

There are cases where the paperwork gets held up due to **blatant** procrastination and to such an extent that cannot be made up for by early submission. **Don't let this happen to you!**

The **buffer month** is there for a reason and is safeguarded by **submitting your work moderately early**.

Another point to bear in mind: **approach your first examiner in good time during the initial phase!**

If they are unavailable to assist with the formalities during the VL-free period,
then your processing phase may be delayed...



Further information and guidelines



- **Sample theses as illustrative material**

- Theses that I have supervised and which have been awarded a grade of 'very good' (1.0 | 1.3) can be downloaded as a 7z file from the Moodle course for illustrative purposes (this also includes my own doctoral thesis)
 - Password: 'geheim' (This serves only as a secondary security measure)
 - Please treat this as confidential at all times; for your use only!

- **Please cite 2–3 publications by your primary supervisor in your final thesis:**

- You can find the list of publications as **a BibTeX (.bib) file** from me **on Moodle**
- **Of course, only** if thematically relevant; however, on the next slide you will find examples covering a **wide range of possible references**





- **Distributed systems:** Neumann2013dissBook, NeWL12offsync, NeRL12deus, NRDL09deus, MeNe04testejb, FDI+10esmmog, WaNe12alphaoffsync
- **Pub/Sub systems:** Neumann2013dissBook, NeRL12deus, NRDL09deus, FDI+10esmmog
- **Content Management:** Neumann2013dissBook, NRDL09deus
- **Database systems/RDBMS:** ILN+09semrttx, JBN+10fcmdb, IND+09lzatav
- XML databases: NeFL10oxdb
- **Version Control Systems:** Neumann2013dissBook, NeHL12hydra
- **Evolutionary Information Systems:** Neumann2013dissBook, NSWL11alphaadaptive
- **Workflow Management:** Neumann2013dissBook, NeLe09alphaflow, NeLe09dmps
- **Rule-based systems:** ToNe11alphaprops
- **Knowledge-intensive processes:** Neumann2013dissBook, NeLe12adhocCoop, NeLe10alphaUC, NeLe09alphaflow, NeLe09dmps
- **Medical Informatics:** Neumann2013dissBook, NeLe12adhocCoop, NeLe10alphaUC, NeLe09alphaflow, NeLe09dmps, NeLe12alphaFlow, LNR+11egr
- **Component-based Systems/JEE/EJB:** MeNe04testejb, neumann2004sa
- **OWL-DL/Semantic Validation:** NeFL10oxdb
- **Test bench/QS/QA:** MeNe04testejb, neumann2004sa
- **Automotive:** neumann2005da
- **MMOG:** FDI+10esmmog





■ Private preliminary peer review

- Before my preliminary review, have your thesis **private pre-pre-review** to ensure it meets the highest standards twice over (!)
- Be sure to read my **collection of tips** (**theses-guide-CPN.pdf**) be sure to read the
 1. section '**Pre-correction / Preliminary** Review'
 - , involving, amongst others, **two (!) fellow students**
 - You must **brief** your **reviewers** (!) in order to get useful feedback!
 - Timetable
 - ...
 2. Section: '**Beginner's** mistakes'
 - I've already mentioned this section quite a few times here in the slides...



Collection of guidelines = PDF "Guidelines on the completion of final-year projects"

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Hinweise zur Durchführung von Abschlussarbeiten

(Generiert mittels pandoc per Markdown-Original)

Prof. Dr.-Ing. Christoph P. Neumann

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<https://cyberlytics.eu/theses/guide/>

theses-guide-CPN.pdf





<https://cyberlytics.eu/theses/guide/>

Selbstkorrektur / Checkliste

- Wurden alle **Kindergartenfehler** (s. unten) ausgebügelt?
- Ist das Literaturverzeichnis mind. 3 Seiten lang?
 - Bei Bachelorarbeiten ist das ein absolutes Minimum - es sollte eigentlich umfangreicher sein
 - Bei Masterarbeiten sollte das Literaturverzeichnis deutlich umfangreicher sein

Vorkorrektur / Vorab-Review

- Es gibt KEINE Vorkorrektur durch den Erstprüfer oder Zweitprüfer
- Einzelne Abschnitte können dem Erstprüfer dennoch zum Vorab-Review vorgelegt werden, allerdings in Summe nicht mehr als 10 Seiten (also 20% von geplanten 50 Seiten)
- **WICHTIG:** bereits während ihr schreibt: erklärt die Arbeit / Fragestellung / Konzepte euren Freunden und reflektiert daran, welche Aspekte bei der Beschreibung besonders relevant sind
- Das Vorab-Review ist ein nicht-garantiertes (Betreuer!) Angebot, das auch freiwillig (Student!) angenommen wird.
 - (übergebt mir eure Fassung einfach als PDF per Mail; der Ausdruck der Vorfassung soll euch nichts kosten daher mach ich das selbst)
- Ich limitiere die Review-Zeit auf 6h pro Abschlussarbeit (damit sind Reviews von 10 Seiten problemlos abbildbar)
 - Die Qualität und Lesbarkeit beeinflusst stark den Aufwand des Reviews
 - Ihr könnt unfertige Kapitel rausnehmen, müsst das aber nicht
 - Bitte Leseanweisungen/Prioritäten geben

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- Die Vorfassung muss allerspätestens zwei Wochen vor offizieller Abgabe zum Vorab-Review durch den Erstprüfer vorgelegt werden.
 - Idealerweise wird das Angebot für ein Vorab-Review deutlich früher in Anspruch genommen.
 - Eine Woche brauche ich um es mir terminlich einzutakten.
 - Eine Woche braucht der Student um Änderungen noch einpflegen zu können und um die Anmerkungen/Erkenntnisse auf die anderen Teile der Arbeit zu übertragen
 - Die Initiative liegt seitens des Studenten (dass die Vorkorrektur durchgeführt wird): Wenn die Vorfassung zu spät bei mir ankommt (bspw. erst eine Woche vor Abgabe) lehne ich ein Vorab-Review und -Feedback auch ab.
- **Wichtig I:** Bitte vor Überreichung einer Vorfassung unbedingt nochmal den Abschnitt **“Kindergartenfehler”** (s. unten) durchgehen und diese vermeiden!
- **Wichtig II:** Vorher dafür sorgen, dass alles was ich lesen soll schon von einem Freund/Bekannten vorkorrigiert wurde!

Wissenschaftliches Schreiben

Lesen Sie sich die folgenden Hinweise dreimal durch: vor Beginn der Arbeit, vor Beginn der Schreibphase und vor Ihrer Abgabe!

Vermeidbare Fehler (aka **“Kindergartenfehler”**)

- Falscher Einsatz von “das” und “dass”

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- Schwankender Numerus, also eine Mischung von Einzahl und Mehrzahl
- Lange und falsch gebaute Sätze (Aussagen gehören in Hauptsätze; Nebensätze dienen der Präzisierung und Verknüpfung)
- Fehlende Kommata vor oder nach Relativsätzen und erweiterten Infinitiven; es darf nicht passieren, dass es wegen falscher Interpunktion mühsam ist einen Text zu lesen
- Bitte Grundkenntnisse der Textverarbeitung in TeX oder Word aneignen! (Bsp.: In *.tex-Dokumenten trennt man Absätze mit Leerzeilen voneinander! Sie müssen in LaTeX nach einem Punkt, welcher der Abkürzung dient, das Leerzeichen escapen, sonst glaubt LaTeX, dass es sich um ein Satzende handelt und macht ein sichtbar falsches Spacing! etc. pp.)
- Einführen von Abkürzungen, nicht vorhanden oder nicht einheitlich
- Bilder:
 - Bilder, Tabellen, Codelistings, etc. die im Text nicht beschrieben werden? Gehen gar nicht!
 - * Man spricht auch von benötigter *textueller Verankerung* der Bilder/Tabellen/Codelistings/...
 - * Bilder et al. sind essentiell, müssen aber dennoch textuell beschrieben werden (!!)
 - * Die Beschreibung der Bilder muss derart vollständig sein, dass die Arbeit auch verständlich wäre, wenn man alle Bilder entfernt (!)
 - * Machen Sie das. Immer. Fragen Sie mich erst gar nicht nach Ausnahmen!
 - Bei Bildern ist es günstig, wenn die Verankerung und Teile der Beschreibung vor dem Bild stehen
 - Aussagekräftige Bildunterschriften verwenden
 - Wenn Sie Abbildungen mitten in einer Seite platziert, dann müssen diese immer zwischen zwei Absätzen stehen (sie dürfen einen Absatz nicht “brechen”)
 - Schlechte Qualität der Bilder (weil Screenshots oder aus dem Netz oder unpassende Schriftart, die im Kontext der Arbeit negativ hervorsteht.) Lösung: Selber nachzeichnen! Fei echt. (Alternative zum nachzeichnen: Professionelle Bildbearbeitung, bspw. mittels Krita, zur Ent-





- **Preliminary marking:** There is **NO preliminary marking** (in the sense of the entire thesis)
- **Preliminary review / preliminary feedback**
 - Individual sections may be submitted for a **section-by-section preliminary review**, but the total must not exceed **10 pages [BT]** or **16 pages [MT]**
 - Additionally limited to **a maximum of 6 hours'** review time, which is usually sufficient
 - Following your private pre-pre-peer review by two fellow students
 - After checking your work for basic errors
 - Please send me a PDF and provide me with **reading instructions**:
 - Page by page using **Acrobat Reader's 'Print Range' function** (e.g. '4, 7, 15–21, 56')
 - PDF slimmed down: delete pages from PDFs for free using **CubePDF Utility** (<https://www.cube-soft.jp/cubepdfutility/>)
 - **No advance reviews** during the **{VL-free + exam-free}** period, i.e. roughly from **mid-February to mid-March** (1m) and from **early August to late September** (2m)
 - **Recommendation:** ALWAYS provide me with at least **one page** of your **bibliography** to read – plus nine pages of the main text
 - (= My voluntary offer → **DO NOT** ask **the second examiner** for a preliminary review.)





- **Don't wait until the preliminary review to get my feedback on your text!**
 - **Show me your outline and diagrams as early as possible and repeatedly during our regular meetings**
(e.g. UML diagrams for the architecture, ...)
 - You are welcome to bring the **current version of your PDF** to the regular meetings **as often as you like**
 - However, if you make the mistake of not writing early on and throughout the drafting process, there will be surprisingly few regular meetings towards the end – particularly for bachelor's theses...



Created by Adrien Coquet
from Noun Project

Restriction notes



says:

① No NDAs!



1. No NDAs with professors – their confidentiality is guaranteed by higher education legislation.
2. Furthermore, an NDA in the student's contract must not preclude the publication of the thesis!

② No confidentiality clauses!



③ Everything will be published

(This refers to the PDF file! Open Access.)





says:



**Software
Prototype**

Open Source



Thesis
(plus publication, if applicable)

Creative Commons





says:



Software
Prototype

mostly closed source ✓



Thesis
(plus publication, if applicable)

Creative Commons
(Again: NO restrictions!)





Important!

- In the broadest sense, all theses supervised by me should be **open access**
 - All theses will be **published!**
 - There are **no embargoes** on theses supervised by me
 - In my view, the greatest **harm** caused by publication restrictions is **borne by the students** (Incidentally, I was affected by this myself in 2005 and am speaking from personal experience)
 - Consequence: In consultation between the company and the student, all relevant references to companies, individuals, products or trade secrets will be either generalised or anonymised, so that the thesis and the insights it provides can be made available to the public
 - **IMPORTANT:** Make the company aware of this requirement **as early as possible!** This applies in particular to large corporations such as Audi/Siemens/... as well as start-ups! This can be a **deal-breaker** (see following slides). I **make no exceptions**.
(However, if necessary, you are welcome to look for another primary supervisor if the need arises.
My overview of potential second supervisors is also helpful in this regard.)
 - A company may enter into a **non-disclosure agreement** with the student, provided that the publication of the thesis itself is excluded
 - **IMPORTANT:** Make sure you actually read through any contract you have to check this!
- No NDAs with professors – their confidentiality is guaranteed by university legislation





■ Companies without restrictions:

- Audi AG
- Siemens AG
- Siemens Healthcare
- DATEV
- BHS Corrugated
- Mühlbauer GmbH & Co. KG
- Krones AG
- ...

■ **In fact, almost all of them!**

■ Companies only with a restriction:

1. **Deprag** Schulz GmbH & Co. KG
- [So I am **NOT** eligible to act as first or second examiner.]





- Companies where NDAs are not an issue for professors:
 - Audi AG
 - Siemens AG
 - Siemens Healthcare
 - DATEV
 - BHS Corrugated
 - Mühlbauer GmbH & Co. KG
 - Krones AG
 - Deprag Schulz GmbH & Co. KG
 - ...
 - **In fact, almost all of them!**

- Companies that require professors to sign NDAs:
 1. **Independent-minded Siemens department heads**
(e.g. SI EP EMS R&D TI)
 - [So I am **NOT** eligible to act as first or second examiner.]





ZUR DISKUSSION GESTELLT / SPERRVERMERKE BEI ABSCHLUSSARBEITEN }

Sperrvermerke bei Abschlussarbeiten

Ein Kommentar. Weshalb Sperrvermerke kritisch hinterfragt werden sollten.

Nane Kratzke

Einleitung

Stein des Anstoßes für diesen Beitrag war eine der letzten Bachelorarbeiten, die ich unlängst betreut habe. Sie hat aber letztlich nur ein sich stetig füllendes „Fass zum Überlaufen“ gebracht. Ich bin Professor für Informatik an der Fachhochschule Lübeck und zugleich Studiengangsleiter des Studiengangs Informatik/Softwaretechnik. Um es gleich vorwegzunehmen, ich schreibe hier nicht im Namen der Fachhochschule Lübeck, nicht in Funktion der Studiengangsleitung Informatik, noch in sonst einer durch die Fachhochschule Lübeck mir zugewiesenen Aufgabe. Ich schreibe hier meine ganz persönliche Meinung!

Ich betreue – wie viele meiner Kollegen an anderen Hochschulen – Bachelor- und Masterarbeiten, die in kleinen oder mittleren Unternehmen geschrieben werden. So auch diese. Eine Arbeit für ein Unternehmen, welches unter anderem interessante Fragestellungen ressourcenschonender Bewässerung bearbeitet und innovative Lösungen hierfür entwickelt und anbietet. Für dieses Unternehmen sollte eine bestehende App für Smartphones weiterentwickelt werden, mittels derer man solarbetriebene Pumpen steuern und überwachen kann.

Weder die Fachhochschule Lübeck noch das Unternehmen soll an den Pranger gestellt werden, daher ist insbesondere Name und Ort dieses Unternehmens nicht von Belang. Unternehmen und Fachhochschule sind bitte als Beispiele zu verstehen. Der gleiche Sachverhalt passiert an vielen Hochschulen, Tag für Tag. Der Missstand, den ich hier ankreiden möchte, liegt auch nicht bei den Unternehmen. Er liegt bei uns. Er liegt bei denen, die Abschlussarbeiten an Hochschulen und Universitäten betreuen und allzu nachsichtig mit der

Vergabe von Sperrvermerken sind. Und das sind meiner Erfahrung nach viele Hochschullehrer, mich eingeschlossen.

Bei fraglicher Abschlussarbeit stand zu keinem Zeitpunkt der Betreuung die Vergabe eines generellen Sperrvermerks zur Diskussion. Kurz vor Abgabe tauchte der Sperrvermerk auf einmal wie selbstverständlich auf. Kommentarlos, nicht abgestimmt. Die Irritation war groß, als ich diesen „doch üblichen“ Formalismus hinterfragte.

An der Fachhochschule Lübeck haben wir Vordrucke, und die diesbezügliche Standardformulierung lautet:

Ich versichere, dass ich die Arbeit selbstständig, ohne fremde Hilfe verfasst habe. Bei der Abfassung der Arbeit sind nur die angegebenen Quellen benutzt worden. Wörtlich oder dem Sinne nach entnommene Stellen sind als solche gekennzeichnet. Ich bin damit einverstanden, dass meine Arbeit veröffentlicht wird, insbesondere dass die Arbeit Dritten zur Einsichtnahme vorgelegt oder Kopien der Arbeit zur Weitergabe an Dritte angefertigt werden. (Standarderklärung, Fachhochschule Lübeck, Fachbereich Elektrotechnik und Informatik)

Bei Abschlussarbeiten in Unternehmen, wird der Passus: „Ich bin damit einverstanden, dass meine Arbeit veröffentlicht wird“ meiner Erfahrung nach regelmäßig durch pauschale Sperrvermerke ersetzt, die sich sinngemäß darauf berufen, dass die Ar-

DOI 10.1007/s00287-015-0888-7
© Springer-Verlag Berlin Heidelberg 2015
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Märkischer Weg 239, 23562 Lübeck
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informatik_spektrum_38_5_2015 409

■ Prof. Nane Kratzke on the subject of **blanket restrictions**

- <https://dx.doi.org/10.1007/s00287-015-0888-7>
- <https://link.springer.com/content/pdf/10.1007/s00287-015-0888-7.pdf>
- Plus the version published on ResearchGate

■ Key points:

- A request for confidentiality and publication are not mutually exclusive
- Blanket publication restrictions harm to science (knowledge as a unique selling point)
- Academic approach to knowledge (sharing knowledge)
- Theses as a showcase for students (including awards, PhD scholarships)
- University re-accreditation processes

■ Furthermore:

- Theses are formally primarily teaching-oriented (with academic rigour)
- Often a cost-effective means of recruiting staff
- I was personally affected by this in 2005 and judge this from my own experience
- Confidentiality clauses = a competitive advantage over other companies! Companies are permitted to conduct confidential research, but not when public funds are involved





Nicht-wirtschaftliche Tätigkeiten	- Forschungsk Kooperationen, sofern eine der folgenden Bedingung nach dem Unionsrahmen erfüllt ist: - Unternehmen tragen sämtliche Kosten - Forschungsergebnisse ohne Rechte des geistigen Eigentums werden weit verbreitet - Aus der Tätigkeit von Forschungseinrichtungen/-infrastrukturen entstandene Rechte des geistigen Eigentums werden den jeweiligen Einrichtungen/Infrastrukturen zugeordnet - Ergebende Rechte des geistigen Eigentums und verbundene Zugangsrechte werden den Kooperationspartnern angemessen ihrer Arbeit/Beiträgen/Interessen zugewiesen - Forschungseinrichtungen/-infrastrukturen erhalten ein marktübliches Entgelt bei Zuweisung der sich aus ihren Tätigkeiten ergebenden Rechten des geistigen Eigentums & Zugangsrechten an beteiligte Unternehmen - Verbreitung der Forschungsergebnisse auf nichtausschließender und nichtdiskriminierender Basis (z.B. durch Lehre, frei zugängliche Datenbanken, allgemein zugängliche Veröffentlichungen oder offene Software) - Wissenstransfer (z.B. Lizenzierung, Gründung von Spin-offs oder andere Formen des Managements von der Hochschule geschaffenen Wissens), soweit es entweder durch die Hochschule oder gemeinsam mit anderen Forschungseinrichtungen/-infrastrukturen oder in deren Auftrag durchgeführt wird und sofern die Einnahmen aus diesen Tätigkeiten in die primären Tätigkeiten der Hochschule reinvestiert werden.
Wirtschaftliche Tätigkeiten	- Auftragsforschung für den privatwirtschaftlichen Bereich - Auftragsforschung für den öffentlichen Bereich - Erbringung von Forschungsdienstleistungen für Unternehmen (auch für Industriepartner in öffentlich-rechtlich geförderten Verbundprojekten als Unterauftragspartner) - Vermietung von Forschungsinfrastruktur an Unternehmen (z.B. Ausrüstung, Laboratorien) - Verbreitung der Forschungsergebnisse soweit diskriminierend (z.B. Verkauf der Forschungsergebnisse) - Wissenstransfer (Lizenzierung als Ergebnis von Auftragsarbeiten, Lizenzierung als Exklusivvergabe oder Lizenzierung des von der Hochschule geschaffenen Wissens), sofern ohne Reinvestition in die primäre Tätigkeit der Hochschule

■ All final theses are **published!**

- There are **no restrictions** for a thesis under my supervision

■ Consequences:

1. In consultation between the company and the student, relevant references to **individuals** (GDPR), companies, products or trade secrets will be either **generalised or anonymised**, so that the thesis and the insights it provides can be made available to the public
2. If necessary, a company may, for example, enter into a **non-disclosure agreement** with the student via **their employment contract**, provided that the **publication of the thesis document** (≅ 'PDF') itself is **excluded**

■ Note:

- There is no NDA with **professors**; their **confidentiality** is sufficiently guaranteed **by higher education legislation**

■ Alternative?

- Classification as **an economic activity**, although this would then require, as a legal necessity, compensation to the university for the research service **at market price** (or full costs plus a profit margin). **A restriction notice is then possible.**





■ Keep **confidential**:

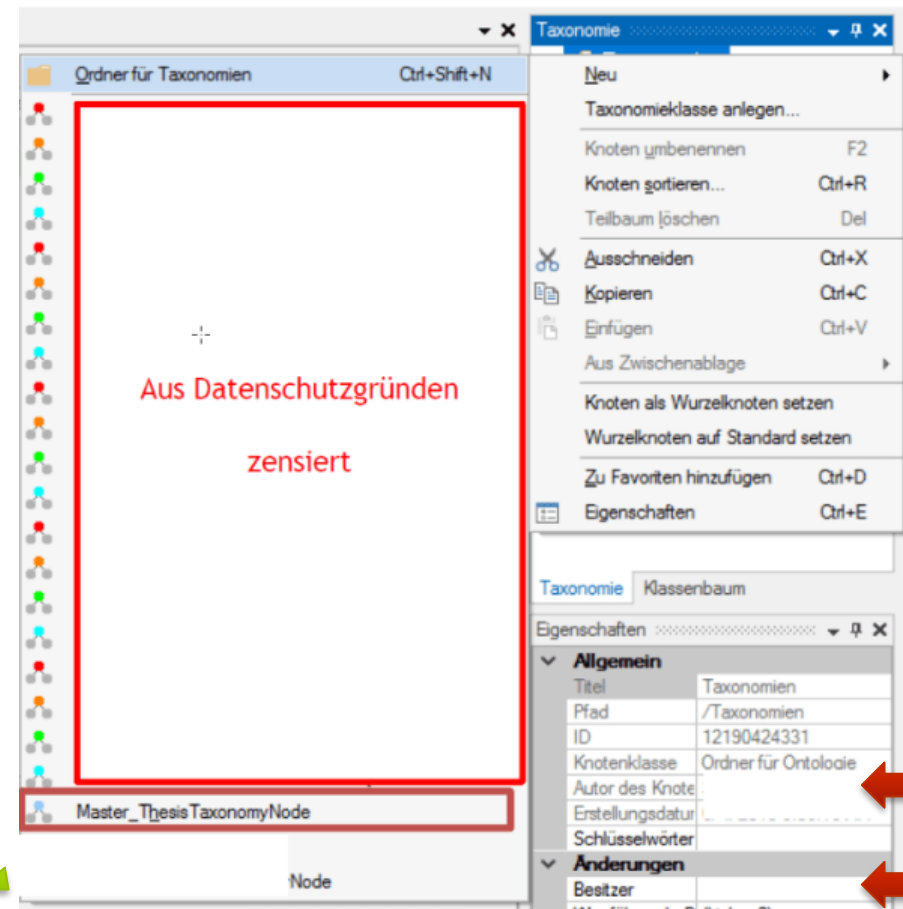
- **Code** (however, an excerpted copy is required for first and second markers for marking purposes; only the students' contributions; representative)
- (Last resort: produce two different versions of the PDF?)

■ **Pseudonymisation / Generalisation**

- Trade secrets
- Product names & company names
- Strategic framework considerations
- Confidential information
- ...

■ **Anonymisation / Masking**

- **Sample data**
(individuals, clients, projects, ...)





<https://www.oth-aw.de/neumann/theses/#abgeschlossen>

Professorinnen und Professoren • Neumann • **Abschlussarbeiten: Showcase**



ABSCHLUSSARBEITEN: SHOWCASE

Hier veröffentliche ich ausschließlich Abschlussarbeiten bei denen ich Erstprüfer bzw. primärer Betreuer war. Der „(★)” ist eine besondere Empfehlung von mir.

OTH AMBERG-WEIDEN

23. Rebecca Kietzer: **Konzeption und prototypische Umsetzung einer internen Webanwendung zur Auftragserstellung als Modernisierungsmaßnahme.** Bachelorarbeit, Ostbayerische Technische Hochschule Amberg-Weiden, Juli 2024. [PDF] [10.5281/zenodo.14518581]
 - Kooperationsunternehmen: **codecentric**
22. Amirhossein Hassannezhad: **Entwurf und Implementierung eines personalisierbaren Dashboards zur webbasierten Visualisierung von Qualitätsdaten aus der Elektronikfertigung.** Bachelorarbeit, Ostbayerische Technische Hochschule Amberg-Weiden, Mai 2024. [PDF] [10.5281/zenodo.14518579]
 - Kooperationsunternehmen: **Siemens AG**
21. Philipp Stangl (★): **Design and Implementation of an Incremental Knowledge Graph Construction Pipeline for Investigating Crypto Asset Fraud.** Masterarbeit, Ostbayerische Technische Hochschule Amberg-Weiden, April 2024. [PDF] [10.5281/zenodo.14518573]



CyberLytics topics: Open source



- All thesis topics advertised by me are automatically assigned (regardless of the exact topic of the thesis) to the overarching **CyberLytics** research project
 - And will, where applicable, be published under this banner
- Applies **only** to topics **advertised by me personally**:
 1. Please send an **explicit rejection**, if applicable, no later than **2 weeks** after initial contact!
 - No confirmation received? The topic may be offered to other students...
 2. For theses involving **prototype implementations**, (in addition to the university's formal requirements) the signing a **CyberLytics Contributor Agreement** is mandatory!
 - This is derived from the **Open Source Research Group's Contributor Agreement 1.0**
 - (**Excluded from this**, of course, are software development services relating to licensed software products from an industry partner. To reiterate: **all software contributions in repositories within partner companies are excluded from this!**)





- **The Contributor Agreement is not a licence and does not does not automatically make your work open-source software!**
 - It creates something like a **virtual organisation** comprising all students under my supervision, thereby avoiding disputes over reuse (internal perspective), regardless of the licence under which the work is published (external perspective)
 - The **rights you assign to the university** are of little benefit to your fellow students or to me! (Professors do not legally represent the university per se.)
- **FOSS is created because all CyberLytics sub-projects are generally published as follows:**
 - On **GitHub** in a **public** repository (or several)
 - Initially created by me on GitHub, under 'cyberlytics', with the name chosen by you (see 'Getting Started'!) chosen name: **cyberlytics/'CatchyName'**
 - Licence selection possible per repository → recommendations via <https://choosealicense.com/>
 - Usually under the **MIT Licence** or **Apache Licence 2.0** (the latter, for example, due to CNCF)
 - Once your final thesis has been marked, you can clone the repository and continue to use **your work commercially** (for which the MIT Licence is recommended) **or freely**





Choose an open source license

An open source license protects contributors and users. Businesses and savvy developers won't touch a project without this protection.

{ Which of the following best describes your situation? }



**I need to work in a
community.**

Use the **license preferred by the community** you're contributing to or depending on. Your project will fit right in.

If you have a dependency that doesn't have a license, ask its maintainers to **add a license**.



**I want it simple and
permissive.**

The **MIT License** is short and to the point. It lets people do almost anything they want with your project, like making and distributing closed source versions.

Babel, **.NET**, and **Rails** use the MIT License.



**I care about sharing
improvements.**

The **GNU GPLv3** also lets people do almost anything they want with your project, *except* distributing closed source versions.

Ansible, **Bash**, and **GIMP** use the GNU GPLv3.

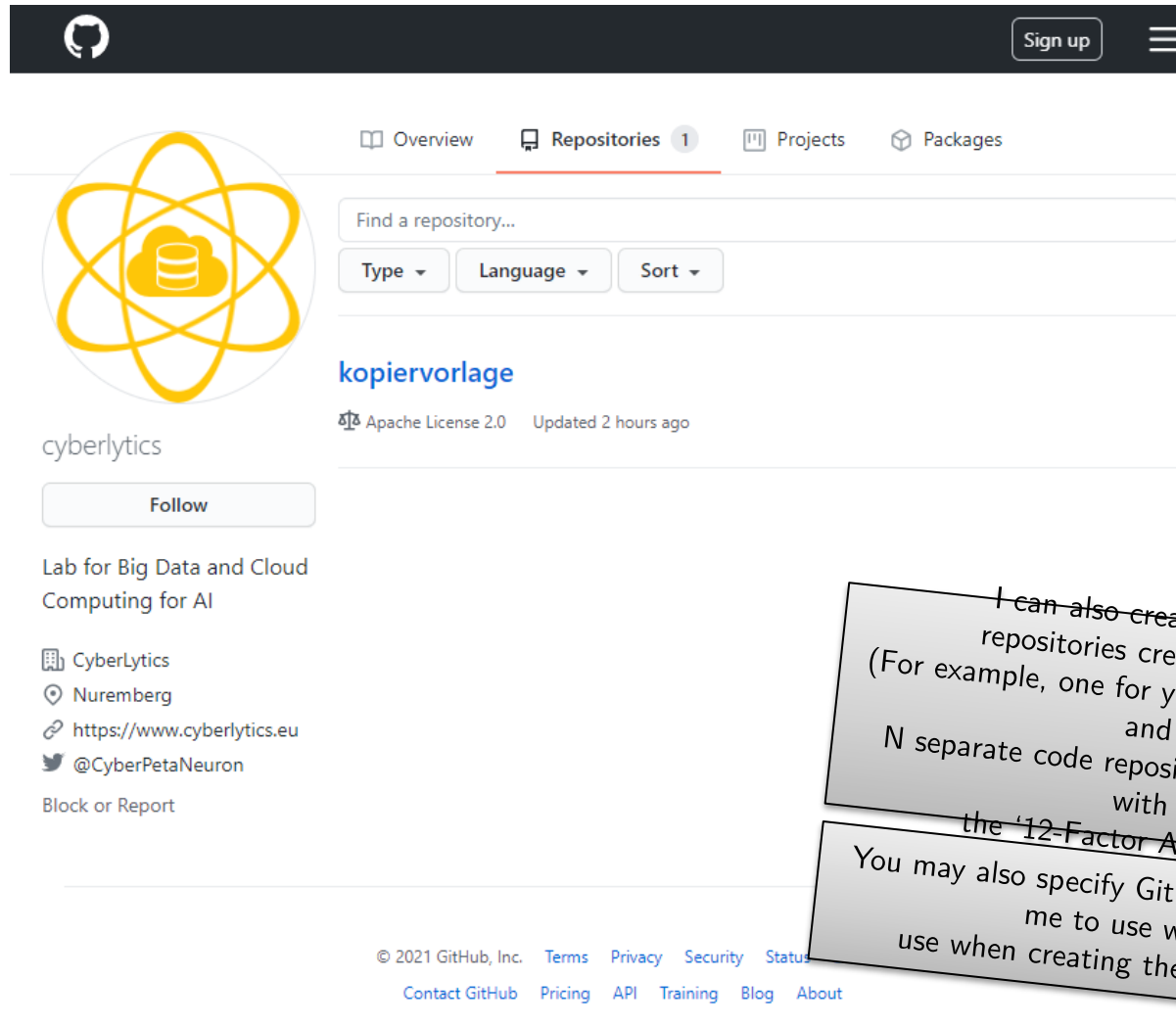
Cloud/CNCF? Apache Licence 2.0

Default? MIT Licence





<https://github.com/cyberlytics?tab=repositories>



The image shows a screenshot of a GitHub repository page for the user 'cyberlytics'. The repository is named 'kopiervorlage' and is licensed under Apache License 2.0. The page includes a search bar, filters for Type, Language, and Sort, and a 'Follow' button. The repository description is 'Lab for Big Data and Cloud Computing for AI'. The page also features a sidebar with the Cyberlytics logo, location (Nuremberg), website (https://www.cyberlytics.eu), and Twitter handle (@CyberPetaNeuron). The footer contains copyright information and links to Terms, Privacy, Security, Status, Contact GitHub, Pricing, API, Training, Blog, and About.

cyberlytics

Follow

Lab for Big Data and Cloud Computing for AI

CyberLytics
Nuremberg
<https://www.cyberlytics.eu>
@CyberPetaNeuron
Block or Report

Overview Repositories 1 Projects Packages

Find a repository...

Type Language Sort

kopiervorlage

Apache License 2.0 Updated 2 hours ago

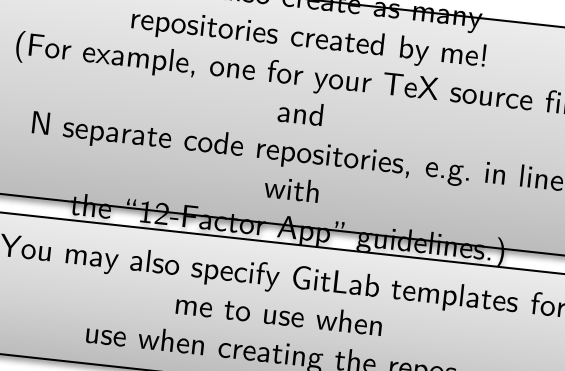
© 2021 GitHub, Inc. Terms Privacy Security Status
Contact GitHub Pricing API Training Blog About



I can also create as many repositories created by me! (For example, one for your TeX source files and N separate code repositories, e.g. in line with the '12-Factor App' rules.)

You may also specify GitHub templates for me to use when use when creating the repositories.





I can also create as many
repositories created by me!
(For example, one for your TeX source files
and
N separate code repositories, e.g. in line
with
the “12-Factor App” guidelines.)

You may also specify GitLab templates for
me to use when
use when creating the repos.





“Working on a Git repository I have created serves also serves as a simplified declaration of acceptance: this allows me to produce a version of the practical part of your final thesis that is eligible for a ‘4.0’!

This applies regardless of the subsequent submission on CD (or as a ZIP file via Moodle).

The same applies to your written paper, if it forms part of the repository.

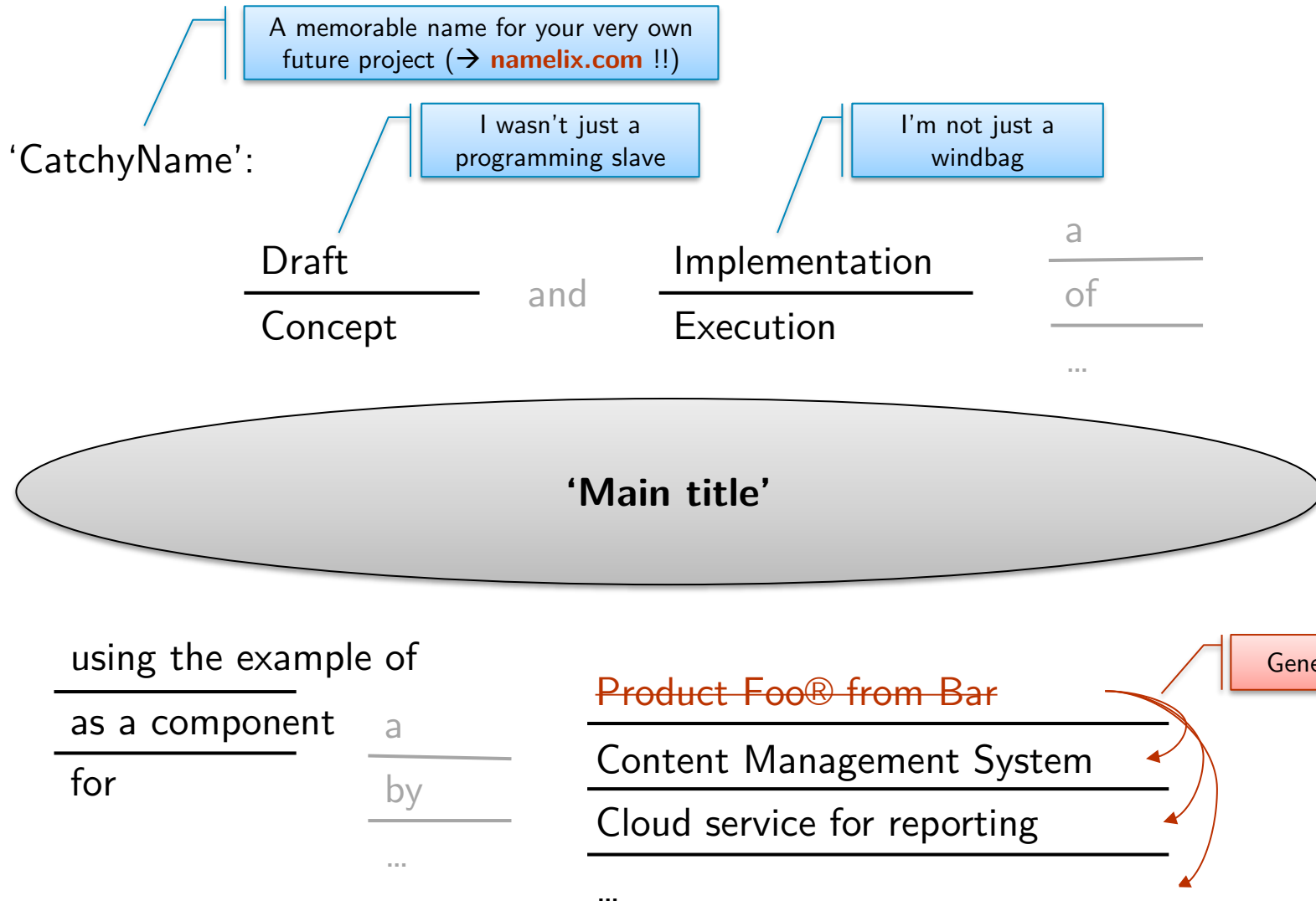
Prof. Dr.-Ing. Christoph P. Neumann

This usually means I can sign the confirmation of acceptance at the end almost at any time without hesitation.”

Accordingly, when a university manages its own repositories (e.g. at an industry partner), the issue of CD/ZIP submission makes the sequence of signatures towards the end of the thesis more cumbersome...



Checklist: Title of your thesis

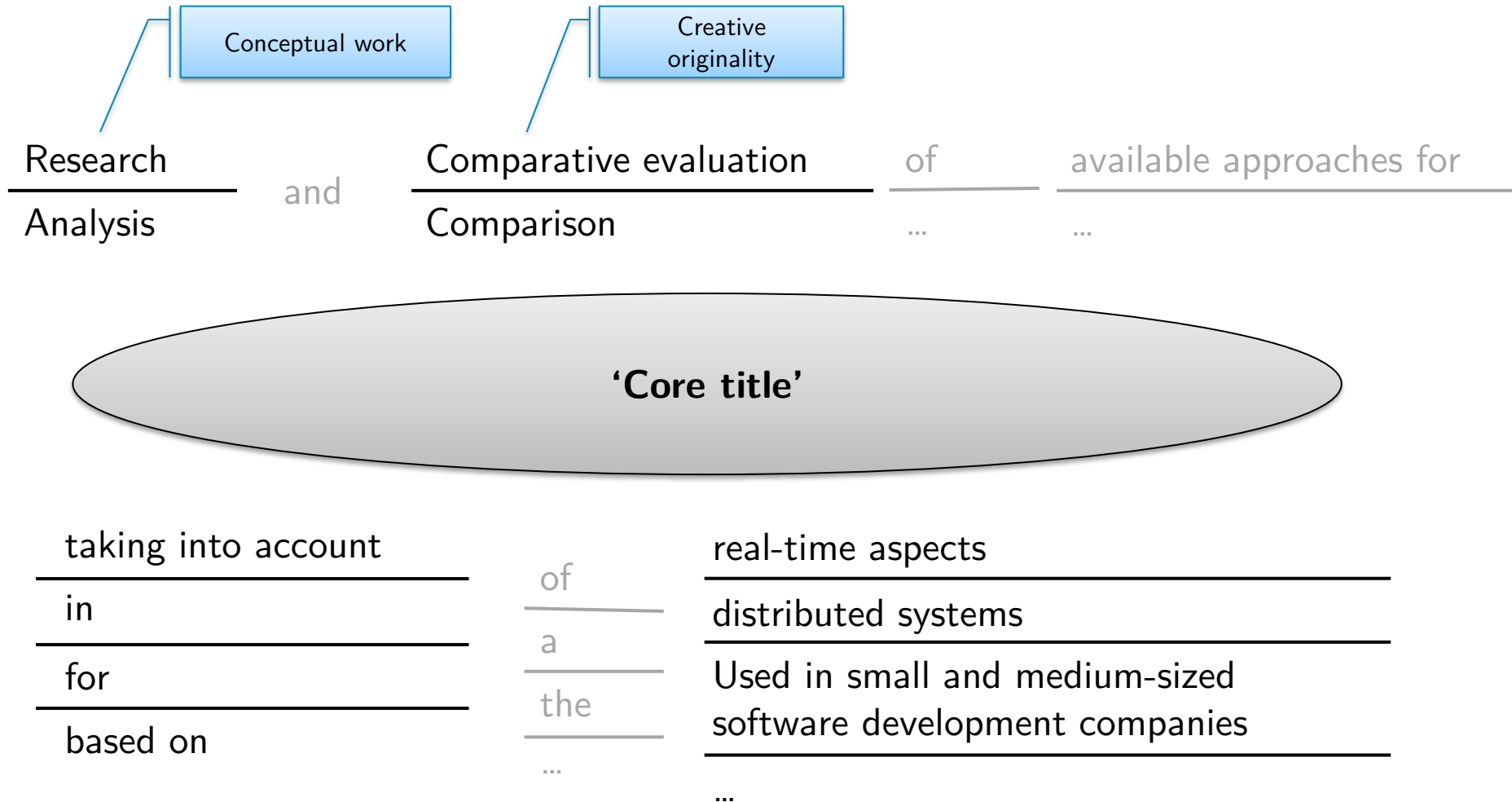




■ List of famous publications with similarly structured titles:

- Dynamo: Amazon's Highly Available Key-Value Store
- MapReduce: Simplified Data Processing on Large Clusters
- BigTable: A Distributed Storage System for Structured Data
- Cassandra: A Decentralised Structured Storage System
- Kafka: A Distributed Messaging System for Log Processing
- FoundationDB: A Distributed, Unbundled, Transactional Key-Value Store
- Amazon Aurora: Design Considerations for High-Throughput Cloud-Native Relational Databases
- Spanner: Google's Globally-Distributed Database
- ShardManager: A Generic Shard Management Framework for Geo-distributed Applications
- Apache Flink: Stream and Batch Processing in a Single Engine
- Zanzibar: Google's Consistent, Global Authorisation System
- Monarch: Google's Planet-Scale In-Memory Time Series Database
- Thrift: Scalable cross-language services implementation
- Bitcoin: A Peer-to-Peer Electronic Cash System
- WTF: The 'Who to Follow' Service at Twitter
- MyRocks: LSM-Tree Database Storage Engine Serving Facebook's Social Graph







Important!

- In **English**, the following applies to the title:
All important words are capitalised!

- Follow the **Chicago Manual of Style (CMOS)**
- **Tool:** <https://capitalizemytitle.com/style/Chicago/> ★ **OR** <https://titlecaseconverter.com/>

- **Specific CMOS rules for titles:**

1. Always capitalise the first and last words of titles and subtitles.
2. Always capitalise 'major' words (nouns, pronouns, verbs, adjectives, adverbs, and some conjunctions).
3. Write the conjunctions and, but, for, or and nor in lower case.
4. Write the articles 'the', 'a' and 'an' in lower case.
5. Prepositions, regardless of length, are written in lower case unless they are stressed, used adverbially or adjectivally, or used as conjunctions.
6. Write the words 'to' and 'as' with a lower-case 't'.
7. Write the second part of Latin species names in lower case.



**Please capitalise the following sentence as a title
in accordance with the rules of the Chicago Manual of Style:
'YourTitleDraft'**





- **IARIA rules on titles:**

- "capitalise all nouns, pronouns and verbs, and all other words of four or more letters"
 - e.g., "Robots in Space"



Please capitalise the following sentence as a title in accordance with the rule “capitalise all nouns, pronouns and verbs, and all other words of four or more letters”:
«YourTitleDraft»

- **Further guidance on headings in general**

- https://en.wikipedia.org/wiki/Title_case
- <https://www.scribbr.de/bachelorarbeit-englisch/grossschreibung-von-ueberschriften-im-englischen/>
 - (Treat the title as a ‘Level 0’ heading → always use the so-called ‘Up Style’)





Created by Adrien Coquet
from Noun Project

- **Premises:**
 - Formally speaking, the title is essentially the most important part of your thesis.
 - Once you have entered a title in PRIMUSS, it is virtually impossible to change it afterwards
- **WARNING:**
Do not enter a title into the PRIMUSS system until the title has been included on the registration form for the Dean's Office, reviewed by me and signed off!
 - **CMOS rules for English titles!** ⚠



Jump-start



1. Clarify the relationship with the conference topics (either in the title, abstract or introduction)
2. Identify a significant, **challenging**, as yet unsolved, or only partially solved **problem**
3. Identify and present the **prior art** or **related work** (including references)
4. Propose a comprehensible, defensible and **feasible solution**
5. Identify the **focus**: theoretical, architectural, modelling, practical implementation, optimisation, evaluation of existing solutions, etc.
6. Select **evaluation** metrics and demonstrate the practicality, scalability and **benefits of your contribution**
7. Draw appropriate **conclusions** and **compare** your results with those of the prior art
8. **Clarify** the **contribution** in relation to **the promises** made in the abstract, the metrics and the target
9. **Clarify** the **contribution** in relation to **previous work (by others or yourself)**

← For theses, replace 'conference topics' with the primary examiner's research interests

Source: IARIA editorial guidelines





- It is “**Related Work**” and not “~~Related~~ Works”
- It is “**Conclusion**” and not “Conclusions”
- When used (usually in the middle of a sentence), ‘i.e.’ and ‘e.g.’ are flanked by **commas**
- “**Conclusion**” must reiterate the achievements outlined in the “Abstract”
 - **Note: many submissions fail on this point!**
- All **claims** made by the author **must be substantiated**
- Imported **figures**, even if enhanced, must have their source specified as a **reference**
- Diagrams must be explained (**‘what’**) and interpreted (**‘why’**)
- Beware of the possessive **'s** → Use it only with nouns referring to people, groups of people, company names, countries and animals – and nothing else! In scientific papers, the **''s''** will usually be incorrect and you will usually need to use the preposition **“of”** instead.





Eine Abschlussarbeit verfassen

Version 0.96, OTH-AW, Fakultät EMI

3. Dezember 2020

Zusammenfassung

Das vorliegende Dokument soll Sie dabei unterstützen, häufige Fehler beim Anfertigen Ihrer Abschlussarbeit zu vermeiden. Es adressiert weniger die technischen, sondern vor allem die organisatorischen, inhaltlichen, strukturellen und sprachlichen Aspekte. Es ist als Ergänzung und Konkretisierung des Merkblatts für Bachelorarbeiten gedacht, das auf der Webseite der Hochschule (Link weiter unten) gemeinsam mit den Anmeldeformularen zu Download bereit steht.

Dieses Dokument basiert – mit freundlicher Genehmigung – auf einer Zusammenstellung von Prof. Dr. Christian Baun, Frankfurt University of Applied Sciences, Fachbereich Informatik und Ingenieurwissenschaften [2], und wurde von mir an die Regelungen und Gepflogenheiten unserer Hochschule angepasst sowie mit Ergänzungen und Korrekturen meiner Kollegen Andreas Aßmuth, Dominikus Heckmann, Kurt Hoffmann, Josef Pösl und Klaus Grüger angereichert und verbessert – Vielen Dank dafür!

Weitere Anregungen und Korrekturwünsche werden gerne entgegen genommen.

Ulrich Schäfer

*In the Moodle materials
for the **Bachelor's seminar!**
(e.g. 'EI/II/MI Bachelor's Seminar Summer
Semester 2021')*





Hinweise zur Durchführung von Abschlussarbeiten

(Generiert mittels pandoc per Markdown-Original)

Prof. Dr.-Ing. Christoph P. Neumann

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**Recommended if I am your first examiner.
Entirely optional if I am only your second supervisor.**

Childish mistakes





Deiningering et al.:

Marcus Deiningering · Horst Lichter · Jochen Lüdke

Compact!
(approx. 100 pages
for approx. €14)

Studienarbeiten

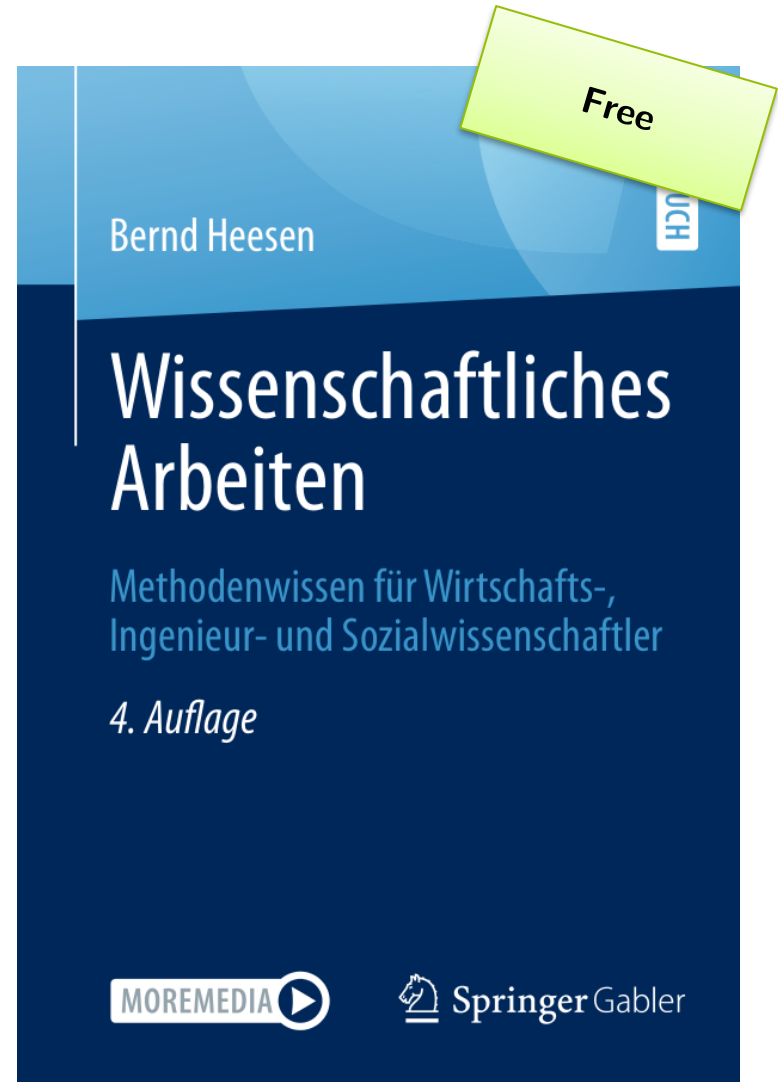
Ein Leitfaden zur
Erstellung, Durchführung
und Präsentation

wissenschaftlicher
Abschlussarbeiten

am Beispiel Informatik

v/dlf

6. AUFLAGE

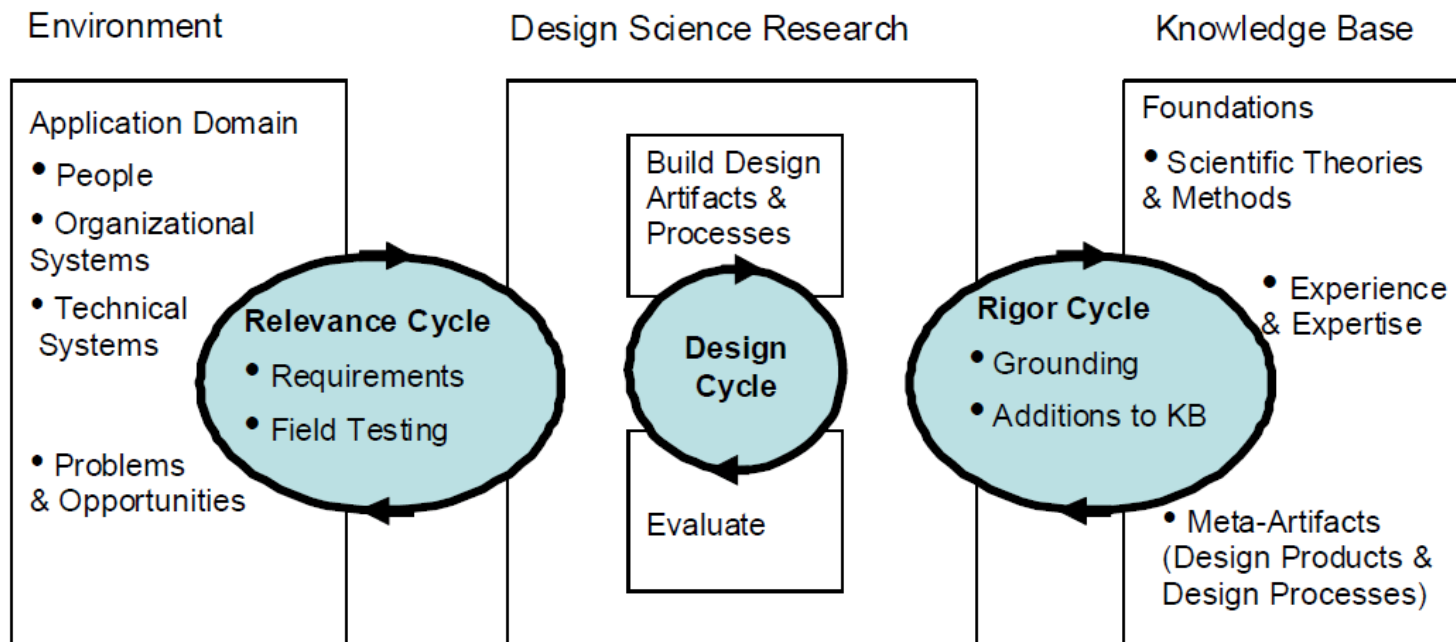


<https://link.springer.com/book/10.1007/978-3-662-62548-4>





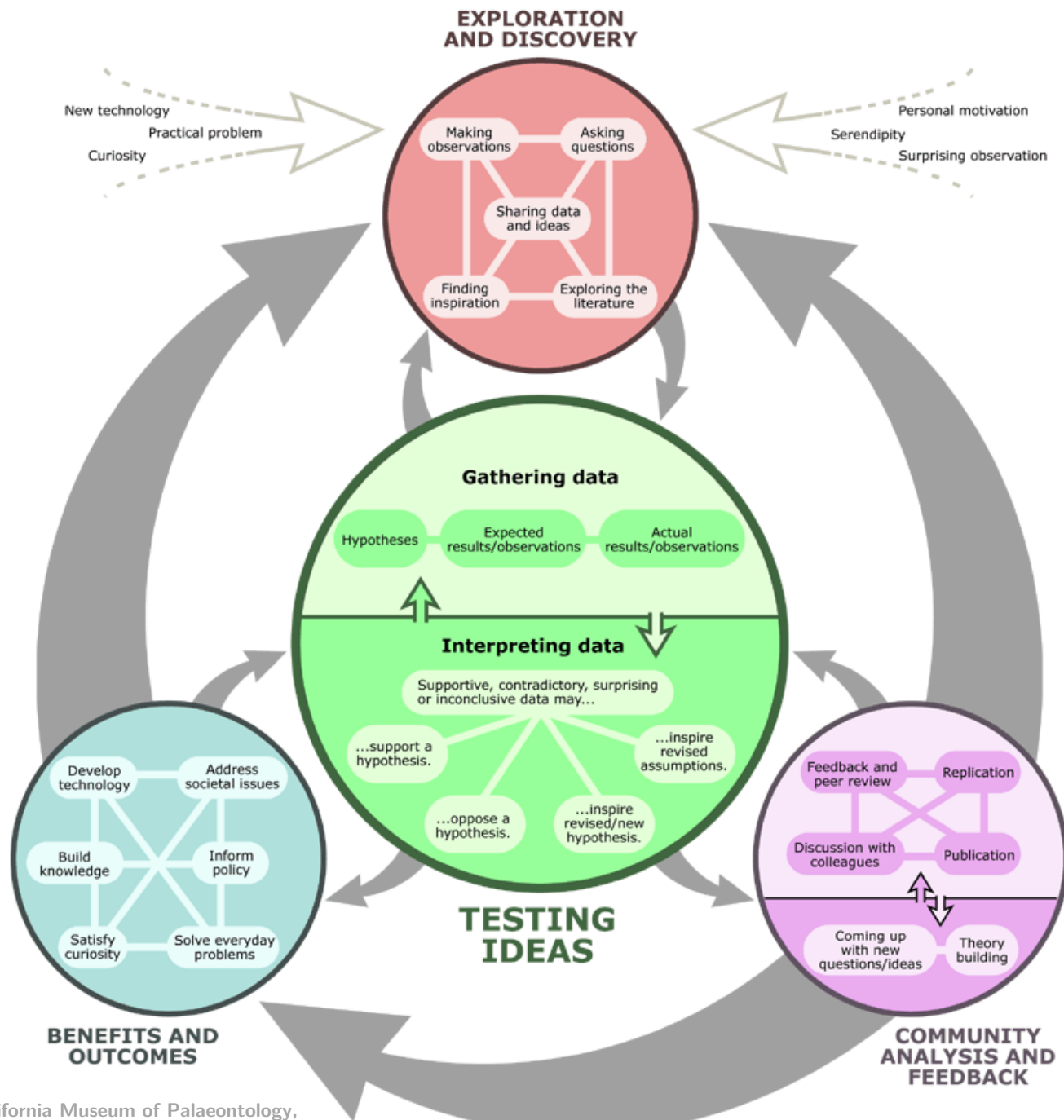
- For general information on the scientific approach, please read Alan R. Hevner's (2007) article "[A three-cycle view of design science research](https://community.mis.temple.edu/seminars/files/2009/10/Hevner-SJIS.pdf)" from the *Scandinavian Journal of Information Systems* 19(2), 4.



<https://community.mis.temple.edu/seminars/files/2009/10/Hevner-SJIS.pdf>



Science





**“Science is easy:
You build it, you evaluate it.”**

Prof. Dr.-Ing. Christoph P. Neumann

Based on the DevOps principle: “You build it, you run it”.







- **Apart from the Deininger booklet, there are of course various alternatives:**
 - Balzert, H., Schröder, M., & Schäfer, C. (2011): *Academic Writing*. Springer.
 - Disterer, G. (2009): *Writing Student Research Projects*. Springer.
<https://doi.org/10.1007/978-3-540-88912-0>
 - Franck, N., Stary, J. (2013): *The Techniques of Academic Writing*. Schöningh.
 - Karmasin, M., Ribing, R. (2017): *The Structure of Academic Papers*. Facultas.
 - Kornmeier, M. (2018): *Academic Writing Made Easy: For Bachelor's, Master's and PhD Theses*. Haupt Verlag.
 - Sandberg, B. (2017): *Academic Writing from Figures to Citations: A Textbook and Workbook for Bachelor's, Master's and PhD Students*.
 - and many more.





NOTE!

- **Document your work as you go along, not just at the last minute**
 - Experience shows that four weeks are not enough to produce a proper thesis
- **Write the introduction early on**
 - This shows whether you have understood the assignment
 - It also helps clarify what you don't need to do
- **Draw up a plan and document it**
 - Steps and deadlines; coordinate with your external supervisor, then inform your first examiner
- **Search for and evaluate the literature**
 - **Academic literature!** Cite it properly! You shouldn't repeat what others have already done, but rather make use of it
 - **Secondary literature is generally not suitable for citation as evidence in academic work;** you must identify primary sources
 - LMGTFY: <https://www.google.com/search?q=tertiärliteratur>
- **Justify design decisions / list and evaluate alternatives**





- The aim is to achieve a **gain in IT-related knowledge** that is **comprehensible to every reader** (the infamous academic ‘contribution’, aka ‘Where’s the beef?’)
 - PLEASE NOTE: In calls for proposals, we often assign specific tasks rather than academic **research questions** — to keep the objective as concrete as possible and ensure that the researcher does not lose their way within the subject area; nevertheless, every researcher must demonstrate (= provide appropriate arguments in their thesis) that they understand the task and the problems it contains as exemplary, and are able to place the task within the context of a broader research question
- In the case of prototypical implementations, the paper must, above all, present the **software design** (subsystem structures, interrelationships, responsibilities, interfaces, data structures, etc.)
 - and focus less on the construction (= implementation; in particular, ‘private’ code, helper classes, etc. do not generally belong in the text of the thesis)





‘Visualisation is essentially a craft that can be learnt any particular drawing skills.’

Professor Dr Martin Lehner
Vice-Rector for Teaching at the Technikum Wien University of Applied Sciences





- Dependencies on third-party **libraries** are traceable
- **Build** environment is traceable
- **Code quality**: modularisation, decoupling of software components, configurability, use of design patterns
 - No **copy-and-paste programming** (checked using the **CPD** tool)
 - No 'spaghetti code' (if necessary, read the book *Clean Code*!)
 - Further details on code quality on the next slide
- Regular checks of test code **coverage**, **code style**, **code metrics** and the completeness of **programming documentation**
 - Is **the programming documentation** complete?: Carefully maintained exported subsystem interfaces; subsystem-internal **public interfaces** are at least **briefly commented**; references to other classes (as class members) document the interaction (the purpose, the collaboration) between the two classes
 - Minimum **standard for test** classes/anti-negligence: exported subsystem interfaces (= 'Surface API') are tested with at least one call





- **The code is executable.**
 - The **README.md** file, written in Markdown format, documents the requirements for the build environment and runtime environment, as well as the steps required to build and run the project.
 - The build and run processes are largely **automated**.
 - **All** artefacts are checked into Git! The software project can be built and run independently and without errors **by third parties**.
- **The code meets the technical requirements!**
- **The code meets engineering requirements → The code is:**
 - Clearly **structured**, easy to read, **comprehensible** and adequately **commented**.
 - Elegant, **efficient** and, where available, utilises existing library functions from the chosen programming language.
 - **Compiles** without warnings.
 - Static code analyser (such as **PMD**) shows no significant programming errors.
- **There are a sufficient number of software tests.**
 - The software tests are automated.
 - **Code coverage** is measurable (!) and is at **least 50%**.

00%: Gross negligence
20%: Negligent
50%: Down-to-earth
80%: Committed
>90%: TDD-style





- **This covers the first steps in the implementation process.**
 - Usually, one or more **libraries** etc. that you **are unfamiliar** with are involved
- **I don't usually have to teach this to anyone...**
 - Look for **documentation**, **tutorials**, **how-to guides** and **cheat sheets** yourself
 - Don't forget to look out for **books**
 - Don't forget to look out for an **FAQ page**
- **...but why do I actually have to explain this so often:**
 - Find out what support options a project or product offers!
 - **Mailing list** (e.g. user list vs. developer list)
 - **Forum** (e.g. user forum vs. developer forum)
 - **Issue tracker** (for bugs; you can also use it for questions if you're polite and there are no alternative ways to get in touch)
 - Send an **email** to the listed lead developers if you have any questions – **seriously!**
 - Don't forget that you can also ask questions on **StackOverflow**
 - **Further Reading:** <http://www.catb.org/esr/faqs/smart-questions.html> (!)
as well as <https://stackoverflow.com/help/how-to-ask> (!)
 - Make use of these options and don't get bogged down in your own mental basement when you encounter problems or in endless Googling! (And don't get too dependent on your supervisors or, later on, your line managers.)





Deep Dive



Getting Started

architektur SPICKER

Übersichten für die konzeptionelle Seite der Softwareentwicklung

1

IN DIESER AUSGABE

- Welche Zutaten gehören in einen Architekturüberblick?
- Welche Formen bewahren sich in welchen Situationen?
- Wie fertigen Sie einen an?

Der Architekturüberblick

Ein Architekturüberblick macht die zentralen Lösungsansätze Ihrer Softwarearchitektur in kompakter Form nachvollziehbar.

Herausforderungen

- Team- oder Projektmitgliedern (z.B. Entwicklern) fehlt ein Überblick über Lösungsansätze auf hoher Ebene, um fokussiert zu arbeiten
- Neue Teammitglieder, die mitentwickeln wollen, finden sich in der Architektur nicht zurecht
- Entscheider und andere Stakeholder haben Unsicherheiten oder geringes Vertrauen in die Lösung
- Teamfremde Kollegen sind an Lösungsansätzen interessiert, finden aber keine oder sehr detaillierte Informationen, die Ihnen einen schnellen Überblick schwierig machen

Inhalte eines Architekturüberblicks

Arbeiten Sie Kleinteile! Fertigen Sie unabhängige „Zutaten“ an, die sie zu unterschiedlichen Formen rekombinieren, und bei Bedarf iterativ verfeinern.

Formen

Je nach Zielgruppe und Kommunikationsweg sind für einen Architekturüberblick sehr unterschiedliche Formen denkbar.

- Architekturwand: Jedermann zugänglicher, großformatiger, modularer Aushang an einer Wand im Projektraum
- Architekturflyer oder -poster: Kleines Handout, z.B. DIN A4 beidseitig bedruckt, 2-3x gefaltet, oder größer produziert (z.B. DIN A1) als Plakat zur weiten Verbreitung
- Architekturportal im Wiki: Einstiegsseite(n) im Wiki, die Interessierte durch die Inhalte führen
- Prägnantes Dokument: Strukturierter Text, angereichert mit Illustrationen, Umfang maximal 20 Seiten
- Foliensatz: 10-15 Folien zur Unterstützung einer Präsentation der Architektur
- Video: Aufzeichnung eines Überblicks in Ton und Bild, evtl. kombiniert mit Foliensatz

Zutaten

Was gehört rein? Die Zutaten dieser Abbildung sind auf der nächsten Seite beschrieben. Keine Sorge, Sie brauchen i.d.R. nicht alle.

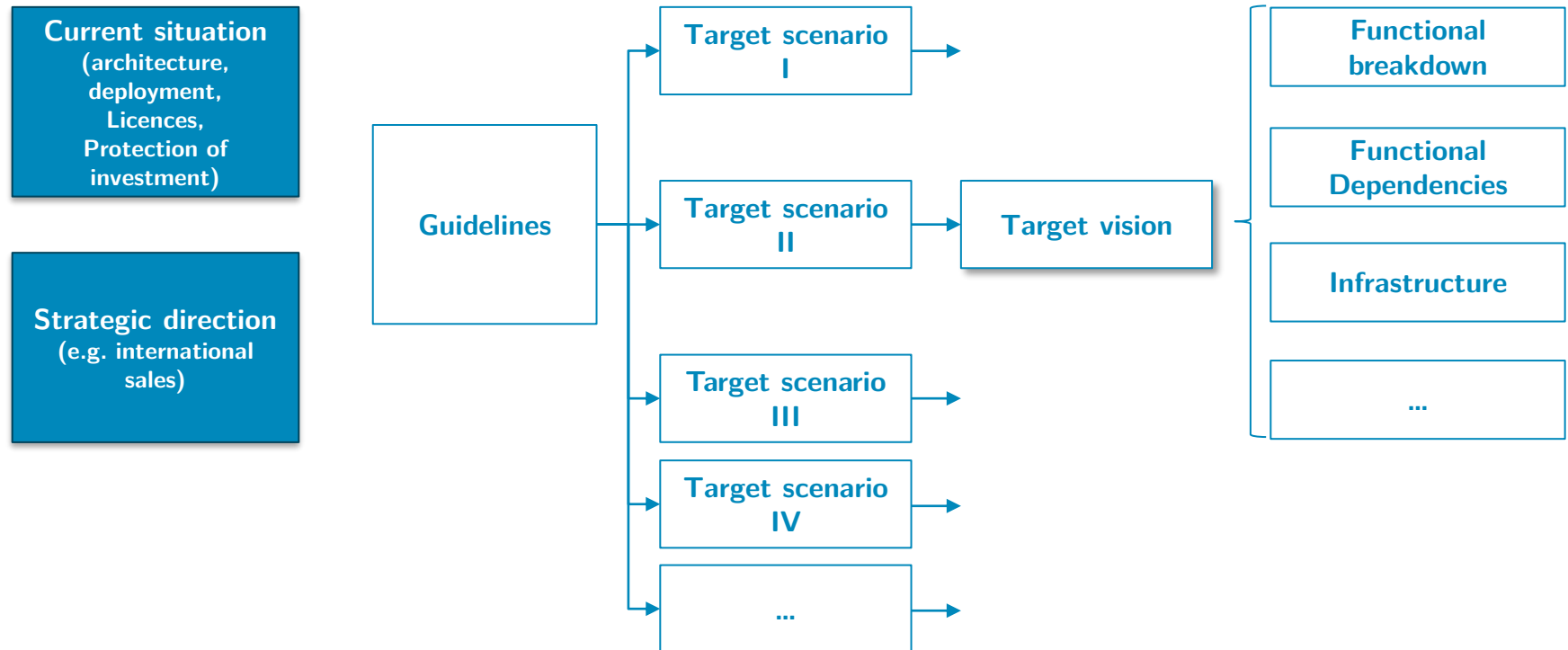
Problemstellung	Lösungsstrategie	Lösungsdetails
- Mission Statement - Einflussfaktoren - Architekturziele - Randbedingungen - Risiken - Kontextabgrenzung	- Lösungsstrategie - Architekturprinzipien - Überblicksbild	- Architektur-entscheidungen - Sichten* - Struktur - Verhalten - Verteilung - Übergeordnete Konzepte

Abbildung 1: Überblick über wichtige Zutaten

<http://architektur-spicker.de>

1





Agility in strategy projects? → **Concurrent engineering!**

(i.e. working on all phases in parallel until all content blocks are firmly populated with content)

Note:

1. Scenario: 'Carry on as before' (Caution: only seemingly trivial)
- N. Scenario: 'Hybrid' (Caution: only seemingly trivial)

Consequently: Even with just two serious future options, at least four target scenarios worth considering.





Important!

- **In essence:**
 1. Do not make statements or assert things without being able to **justify** or **cite** them!
 2. An **outline** is the foundation of a good thesis!
 - **How do I learn these and other basic principles of academic writing?**
 - Through **term papers** at secondary school, etc., where applicable
 - Through **term papers/seminar papers/etc.** during your degree
 - Through the **Bachelor's seminar**
 - Preparation by reading **guides** such as the one by Deiniger et al.
- BUT above all:**
1. By **reading academic publications** in the subject area
 2. By **emulating** the methodology, style and structure
 3. Through **your own writing**
 4. Through **self-criticism**
 5. Through **peer reviews** as feedback

- (In the case of student dissertations, your peers are primarily student reviewers, usually from among your fellow students)





An awesome list that covers everything:

<https://github.com/macoj/phd>





1. Plagiarism

- See the separate section 'Plagiarism'

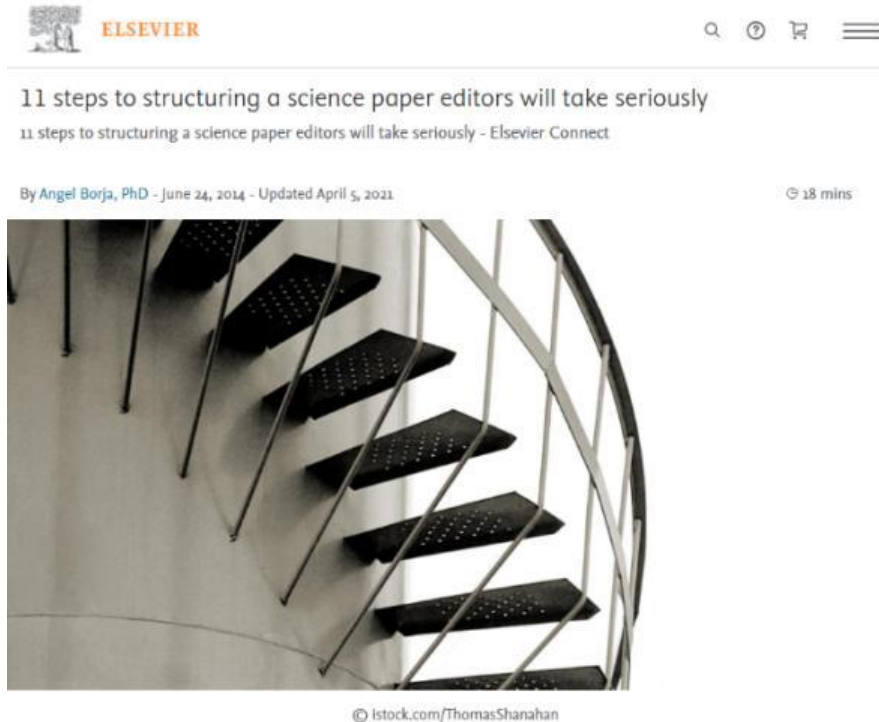
2. Restrictions

- In my view, the now blanket and widespread practice of keeping students' final theses confidential is unscientific – a practice that is particularly rife in large corporations because it is convenient
 - Note: Companies are, of course, entitled to keep scientific findings confidential! Those produced by their own staff, that is! But, in my view, hardly ever in collaboration with universities.
- Supervising final theses is primarily a means of recruiting staff
 - It is a very cost-effective means to this end! Compared to the alternatives. On top of that, seeking to eliminate the 'cost' of publication is brazen!





Please
note!



Editor's note: This 2014 post conveys the advice of a researcher sharing his experience and does not represent Elsevier's policy. However, in response to your feedback, we worked with him to update this post so it reflects our practices. For example, since it was published, we have worked extensively with

- From the well-known publisher **Elsevier**
 - Author: Angel Borja, PhD
- Comprehensive!
 - Based on **IMRaD** (similar to IMRE)
 - <https://en.wikipedia.org/wiki/IMRAD>
- Linked in the CyberLytics Moodle

<https://www.elsevier.com/connect/11-steps-to-structuring-a-science-paper-editors-will-take-seriously>

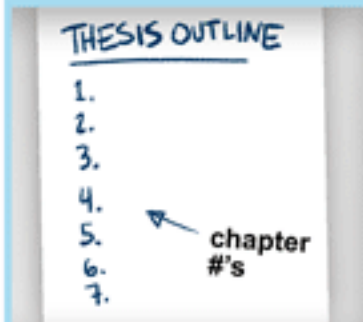




WRITING YOUR THESIS OUTLINE

NOTHING SAYS "I'M ALMOST DONE" TO YOUR ADVISOR/
SPOUSE/PARENTS LIKE PRETENDING YOU HAVE A PLAN

STEP 1 Aim for a respectable number of chapters:



5 = "That's IT??"
6-7 = "Not bad"
8+ = "Are you crazy??"

STEP 2 Fill in the "freebies":

THESIS OUTLINE

1. INTRODUCTION
2. LIT REVIEW
3. METHODOLOGY
- 4.
- 5.
- 6.
7. CONCLUSIONS

You're half way done!

STEP 3 Make up titles for the "meat" chapters:

2. LIT REVIEW
3. METHODOLOGY
4. (THAT STUFF YOU DID YOUR FIRST YEAR)
5. (STUFF YOU'RE SUPPOSED TO BE DOING NOW)
6. (MAKE STUFF UP)
7. CONCLUSIONS

(It'll be years before you actually have to work on that later chapter, and by then your thesis topic will have changed anyway)

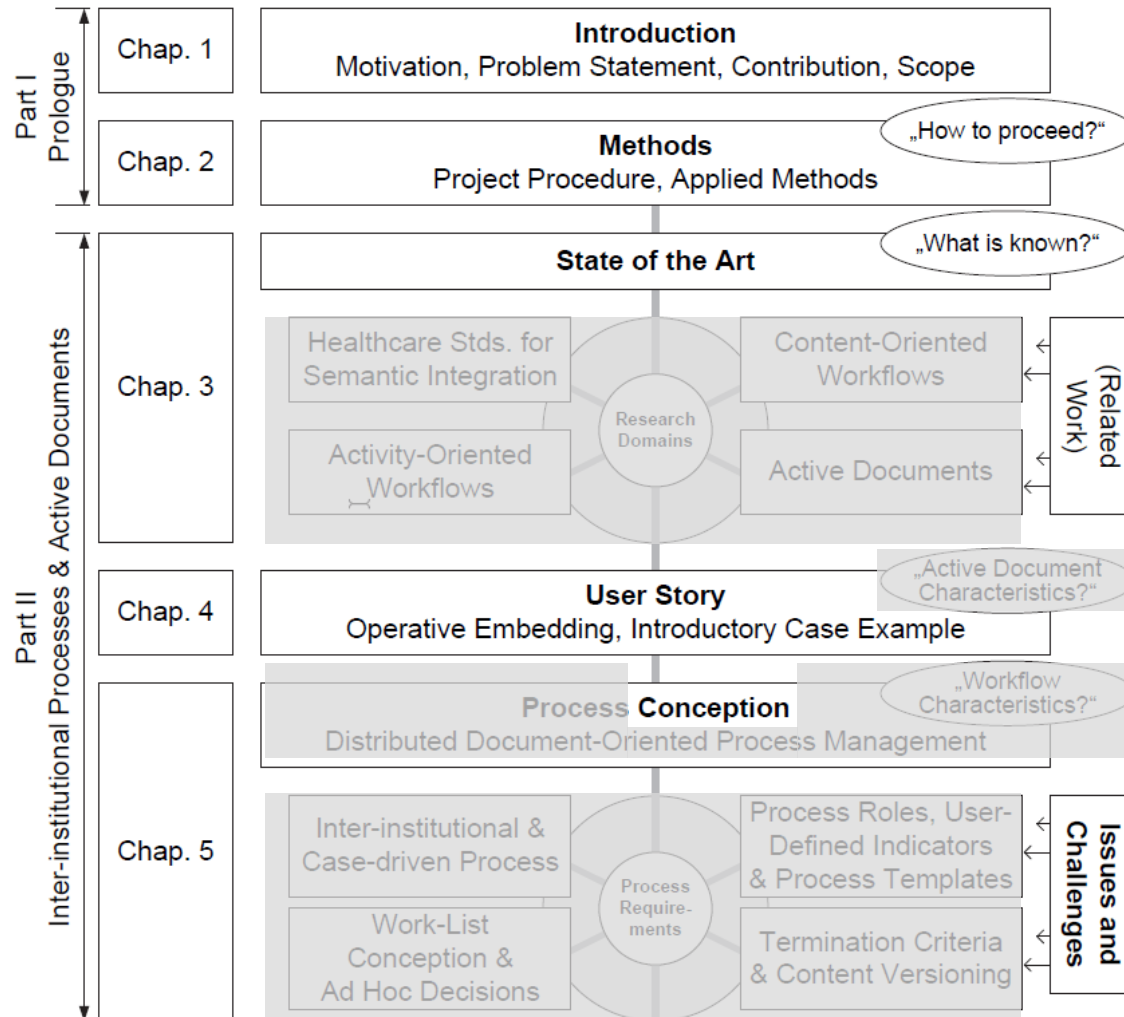
STEP 4 Voilà! You just bought yourself another two years



JORGE CHAM © 2006

www.phdcomics.com

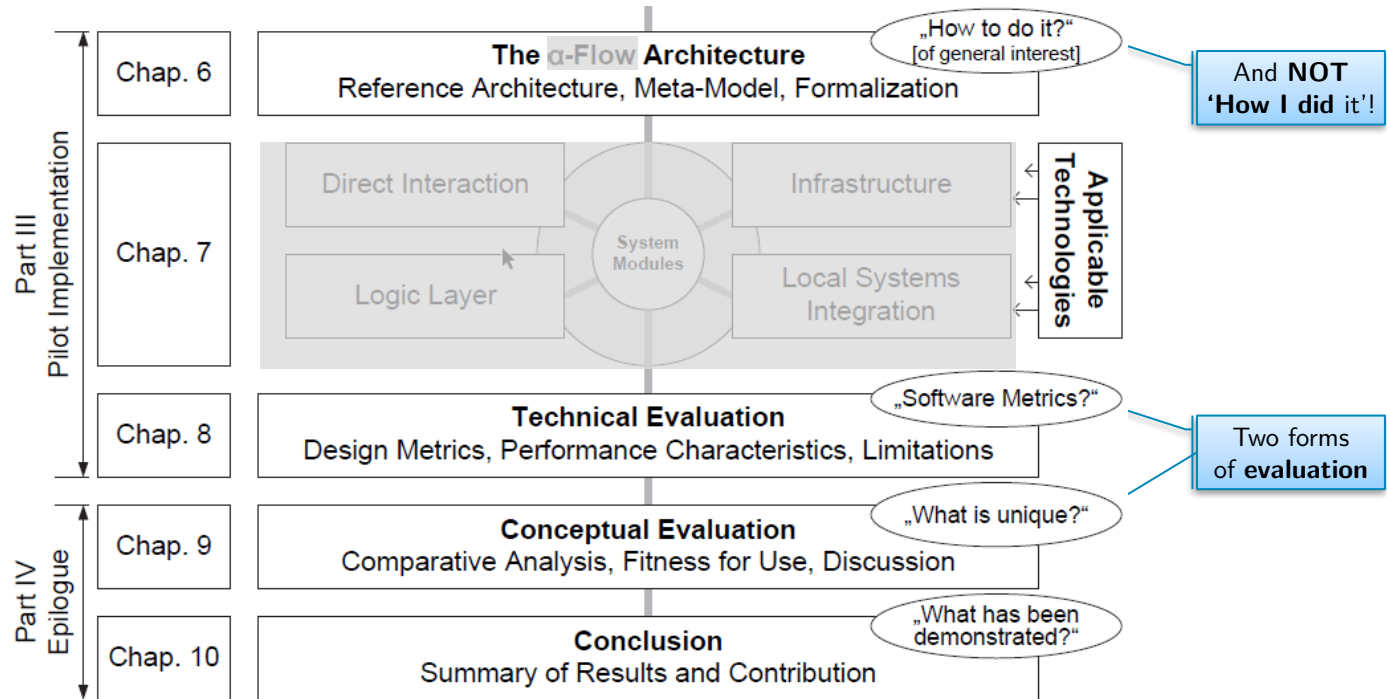




Sections not generally applicable

Please have a look at the [table of contents of my dissertation](https://www.cyberlytics.eu/pdf/ChristophNeumannDissertation/) if necessary
<https://www.cyberlytics.eu/pdf/ChristophNeumannDissertation/>





BUT:

Please read, in particular, the 'IMRE' section
in my collection of guidelines
(<https://cyberlytics.eu/theses/guide/>) as well as
“A three-cycle view of design science research”
by Alan R. Hevner, published in 2017.





“The question ‘How do I structure t
is off limits! Otherwise, I’d be
be doing your work for you.”

Prof. Dr.-Ing. Christoph P. Neumann

The question “Does this outline of mine seem well thought-out and sensible to you?” is, however, a legitimate one...





- **Level of detail:**

Try to limit yourself to 3 levels of outline!

- It is best to avoid a fourth level of outline (“4.5.2.1”)
[my own doctoral thesis does not use this level of detail either]
- And do not include a quasi-fourth level of structure such as ‘Parts’ (Roman numerals I, II, ...) at the top,
as found in my PhD thesis; bachelor’s and master’s theses do not have the necessary scope for this

- **Rule of thumb: “A numbered subheading should cover roughly one page; otherwise, a separate subchapter is generally not required.”**

- ...If necessary, you can also further subdivide a section of text using unnumbered headings, as you may be familiar with from journalistic articles, to keep the number of heading levels manageable...
[You’ll also find such sections with unnumbered headings in my dissertation, should you find a practical example helpful]





- **Raster graphics: File formats**
 - <https://www.geeksforgeeks.org/techtips/image-formats/>
- **Raster graphics vs. vector graphics**
 - <https://www.geeksforgeeks.org/computer-graphics/vector-vs-raster-graphics/>
- **Print resolution: PPI vs DPI**
 - <https://www.shutterstock.com/blog/ppi-vs-dpi-resolution-guide>
- **RGB vs. CMYK (+ Introduction to Colour Management for Printing)**
 - <https://www.clipstudio.net/how-to-draw/archives/156866>





pdflatex:

```
\includegraphics[width=...]{file}
```

Adobe Photoshop

Krita

Darktable

pixlr.com

webp

tiff

gif

jpg

png

Photos

Raster graphics

Drawings (200–300 dpi?!)

MS PowerPoint

cloudcraft.co

diagrams.net = draw.io

MS Visio

Adobe Illustrator

Gravit Designer

Affinity Designer

...

PlantUML

pdf

Drawings (scalable ✓)

Vector graphics

svg

eps

vsdx

ai

wmf

emf

Inkscape







- What exactly is the **‘Methodology’** chapter all about?
 - In the methodology section, you explain how you carried out your research and how you arrived at your results. This covers **methods specific to your field**, i.e. particularly computer science/AI or research methods in general.
 - This is **not** the same as the **‘structure of the thesis’**
 - LMGTFY: <https://www.google.com/search?q=abschlussarbeiten+methodik+kapitel>
 - Examples of methodology: <https://goitsystems.de/index.php/forschungsmethoden.html> and [https://de.wikipedia.org/wiki/Methode_\(software_engineering\)](https://de.wikipedia.org/wiki/Methode_(software_engineering))
 - If you are working in the field of data science or AI, this is also where you should provide details of the **data source** (“How was the data obtained and made available for the thesis?”)





- **What exactly are **requirements** again?**
 - Apply the knowledge you've gained from the 'SWE1' and 'SWE2' modules!
 - Read my document '**Requirements Management and Estimation** Methods' in the Moodle course (the content should be familiar to you from my modules with module-based assignments such as BDCC, WAE, BCN, SWT...)
 - If SWE1/SWE2 was not compulsory in your curriculum:
Read, for example, Helmut Balzert's "**Textbook of Software** Engineering"

- **Do not confuse the objectives of the assignment with the requirements**
 - **The objectives** of the project are usually set out in Chapter 1: **Make a wish!**
 - **Requirements appear** from Chapter 3 at the earliest: **software design!**
 - Tables are generally NOT a suitable means of presenting lists of requirements in final theses
 - Use Cases: Not just a name and a UML diagram! **Description Template!!**
 - User stories: Please note my **Definition of Ready (DoR)** → p.t.o.



Note!



1. Has the user story **template** been applied correctly (or is the 'BECAUSE' clause mistakenly missing)?
2. Is the technical content of the sentence template **clearly understandable** to everyone involved (rather than being unnecessarily vague)?
3. Is the technical content of the sentence template **concise enough** (rather than incorrectly combining two requirements – for example, using 'and' or 'or' as an anti-pattern in the sentence template)?
4. Does every user story have ≥ 4 **acceptance criteria** (rather than mistakenly omitting the acceptance criteria)?
5. Do the acceptance criteria serve exclusively to **refine** the business content of the sentence template (or, mistakenly, to extend the business scope)?
6. Do the acceptance criteria specify the **input** and **output structures** precisely and unambiguously (rather than remaining vague, as is incorrect)?
7. Do the acceptance criteria specify concrete **test requirements**? (**Test cases**, click paths, ...)
8. Do the AKs specify where the developer is to obtain the **test data** from and how comprehensive it should be?
9. Have consistently **numbered** formats been used at all levels in the user specifications and acceptance criteria (rather than, mistakenly, unnumbered bullet-point lists)?
10. Are the acceptance criteria **understood in the same way** by everyone involved? (External





Note!

■ Why?

- **The cheat sheet actually explains everything.**

The rest is GMV
(= common sense)

- Any further references? [lmgtfy](#)

■ Cheat Sheet:

- <https://agileforall.com/wp-content/uploads/2009/10/Story-Splitting-Cheat-Sheet.pdf>

Humanizing Work

Story Splitting Cheat Sheet

The INVEST Model

Stories should be: Independent, Negotiable, Valuable, Estimable, Small, and Testable.

Patterns for Splitting Stories

Workflow Steps

As a content manager, I can publish a news story to the corporate website.

...I can publish a news story directly to the corporate website.
...I can publish a news story with editor review.
...I can publish a news story with legal review.

Business Rule Variations

As a user, I can search for flights with flexible dates.

...as "n days between x and y."
...as "a weekend in December."
...as "± n days of x and y."

Major Effort

As a user, I can pay for my flight with VISA, MasterCard, Diners Club, or American Express.

...I can pay with one credit card type (of VISA, MC, DC, AMEX).
...I can pay with all four credit card types (VISA, MC, DC, AMEX).

Simple/Complex

As a user, I can search for flights between two destinations.

...specifying a max number of stops.
...including nearby airports.
...using flexible dates.
...etc.

Variations in Data

As a content manager, I can create news stories.

...in English.
...in Japanese.
...in Arabic.
...etc.

Data Entry Methods

As a user, I can search for flights between two destinations.

...using simple date input.
...with a fancy calendar UI.

Defer Performance

As a user, I can search for flights between two destinations.

...(slow - just get it done, show a "searching" animation).
...(in under 5 seconds).

Operations (e.g. CRUD)

As a user, I can manage my account.

...I can sign up for an account.
...I can edit my account settings.
...I can cancel my account.

Break Out a Spike

As a user, I can pay by credit card.

Investigate credit card processing.
Implement credit card processing (as one or more stories).

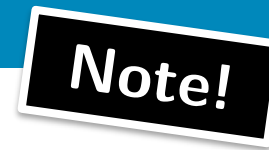




“Perhaps your **user stories** aren’t
not user stories at all! But **epics**? ... 

Prof. Dr.-Ing. Christoph P. Neumann





- See **Theses_20_ReqTips.pdf**

- The ultimate checklist for good requirements: **INVEST**
- Template** for detailed **use cases**
- EBP** test
- Boss** test
- (And just as an extra, a UML use case diagram)



Use Case Name	Start with a verb
Scope	The system under design
Level	'user-goal' or 'subfunction'
Primary actor	Requests the system to provide its service
Stakeholders and Interests	Who is interested in this use case, and what do they want?
Preconditions	What must be true at the start
Success Guarantee	What must be true upon successful completion
Main Success Scenario	A typical, unconditional 'happy path' scenario for success
Extensions	Alternative scenarios of success or failure
Special Requirements	Related non-functional requirements
List of technology and data variations	Varying I/O methods and data formats
Frequency of occurrence	Influences investigation, testing and the timing of implementation
Miscellaneous	Such as outstanding issues

- Non-functional: FURPS**

- Functional
- Usability
- Reliability
- Performance
- Maintainability





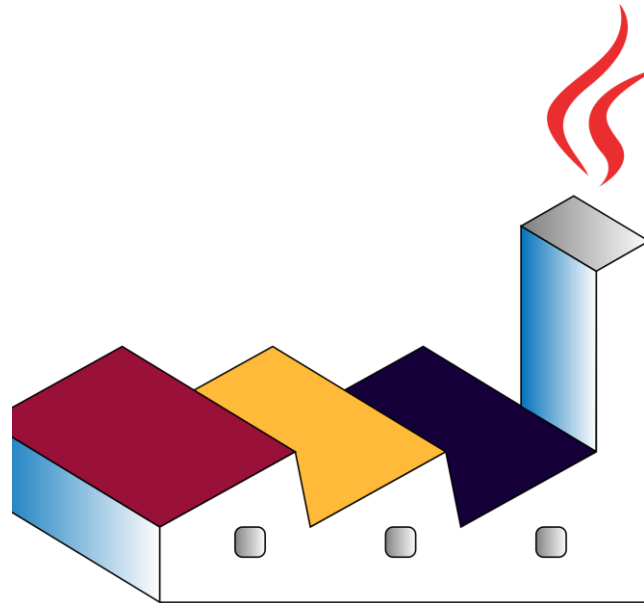
- What exactly is **software architecture** again?
[for final-year projects involving software prototypes]
 - Once again: Apply the knowledge you've gained from the 'SWE1' and 'SWE2' modules!
 - Read my document "**Notes on Software Architecture and Architecture Documentation**" in the Moodle course (the content of which should look familiar to you from my modules involving module assignments)
 - → see **Final_Projects_22_ArchTips.pdf**
 - If SWE1/SWE2 were not compulsory in your curriculum:
Read, for example, Helmut Balzert's ***Textbook of Software Engineering***
 - Read **at least** Stefan Zörner's article "**Architecture without Frills – Your Solution on a Beer Mat**" by Stefan Zörner:
 - <https://www.informatik-aktuell.de/entwicklung/methoden/architektur-ohne-firlefanzen-ihre-loesung-auf-einem-bierdeckel.html>



Modelling & Architecture: Tools?!

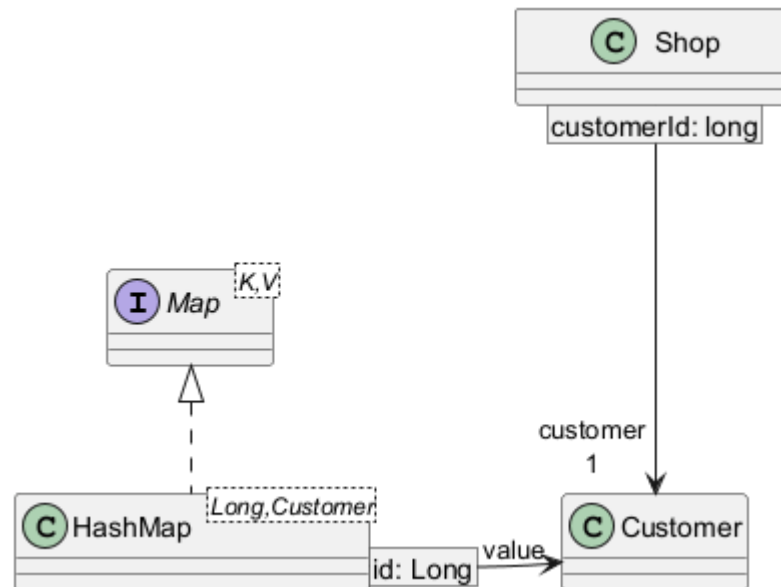
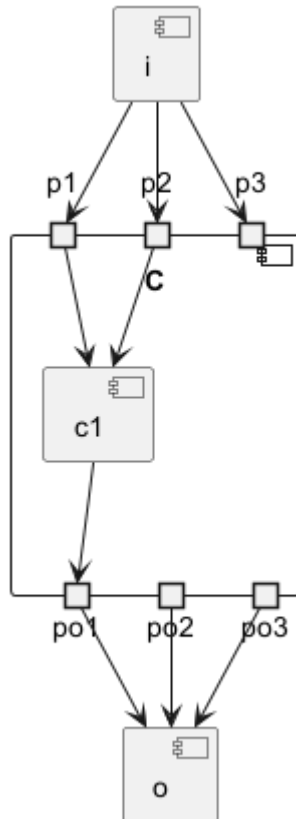


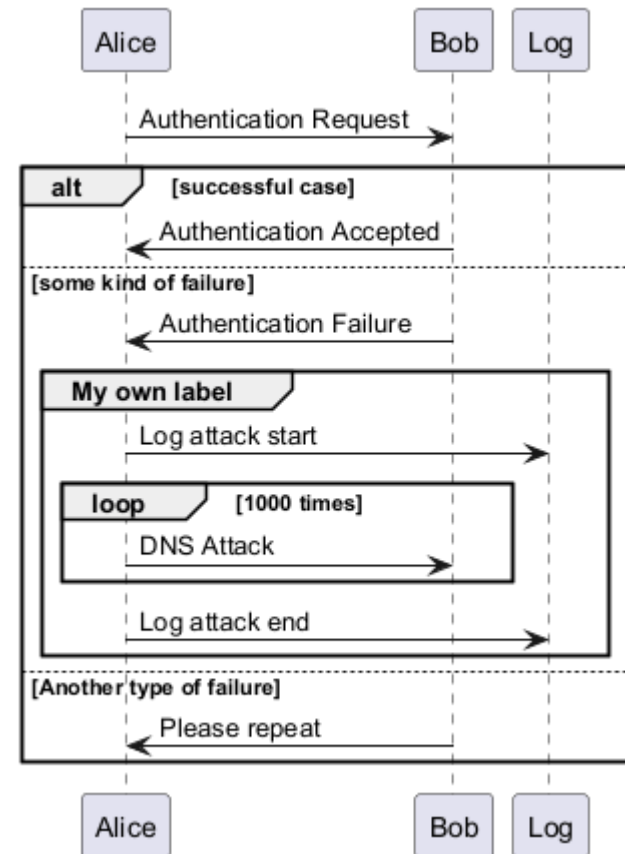
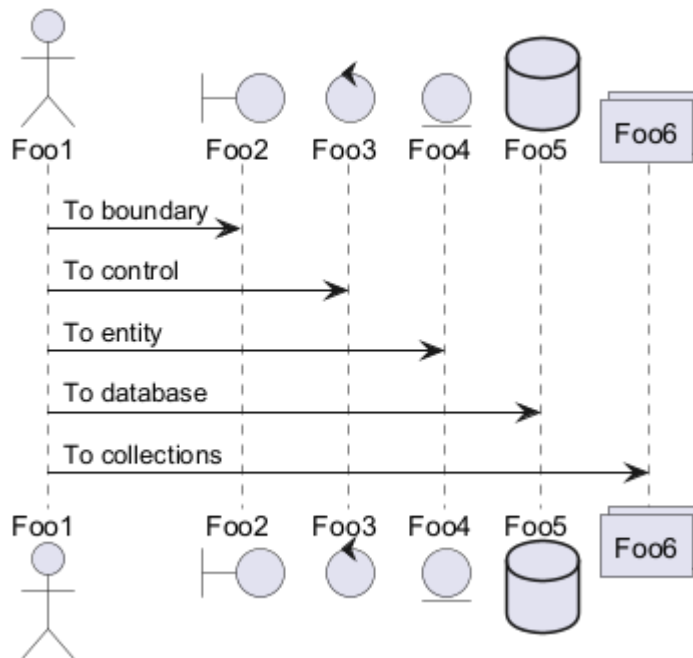
One-stop shop:



PlantUML

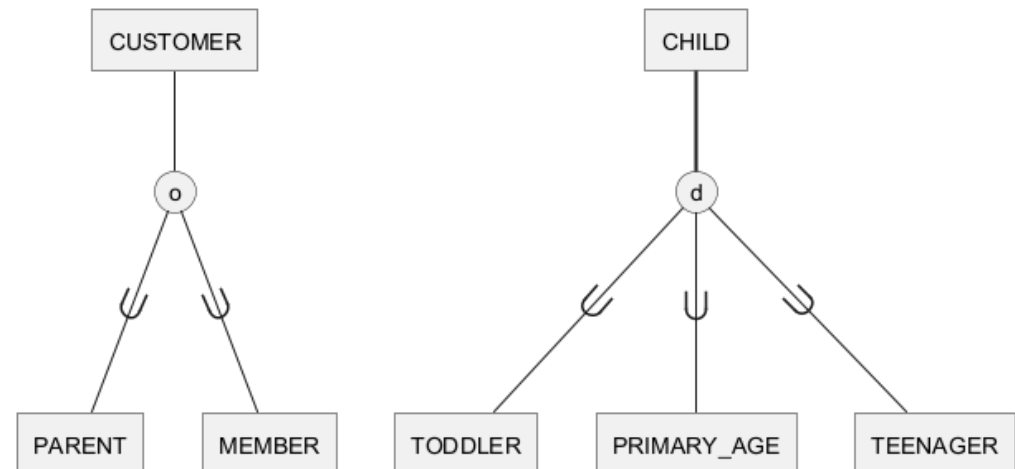
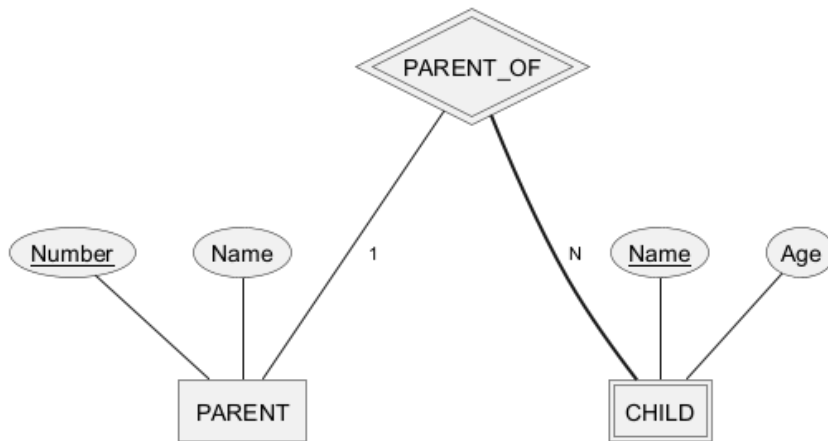


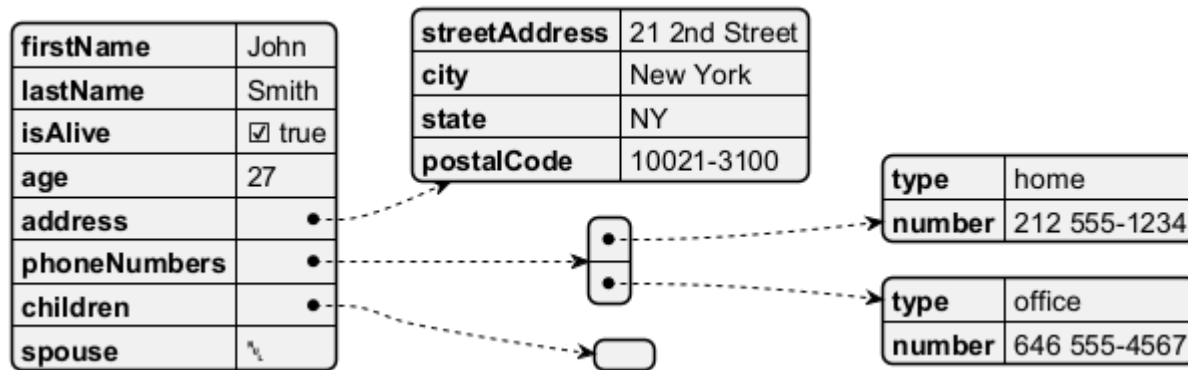




PlantUML: Entity/Relationship (E/R) diagrams and EER diagrams, including inheritance

300







General ☐ Fullscreen ☐ Behavior ☐ Saving ☐

Open image in: Smart Mode ▼

☒ Smooth images when zoomed

☒ Confirm image deletion

☐ Show hidden images

Close

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General ☐ Fullscreen ☐ Behavior ☐ Saving ☐

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☒ Smooth images when zoomed

☒ Confirm image deletion

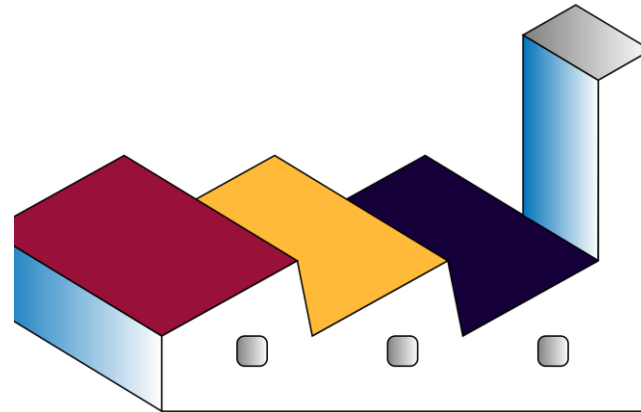
☐ Show hidden images

Close





that again for you to sing along to:



PlantUML, seriously!





For everything PlantUML can't do:

<https://github.com/cyberlytics>

[/awesome-software-engineering-tools](#)
[#modelling--architecture](#)

Visual Paradigm (UML/SysML/...), **Archimate** (TOGAF),
Camunda (BPML), **ChartDB** (RDBMS), **Swagger** (REST), ...



**Technical architectural renderings:
Best in class?!**



1. [Dynamo](#): Amazon's Highly Available Key-Value Store
2. [GFS](#): The Google File System
3. [MapReduce](#): Simplified Data Processing on Large Clusters
4. [Memcache](#): Scaling Memcache at Facebook
5. [BigTable](#): A Distributed Storage System for Structured Data
6. [Kubernetes](#): Large-scale cluster management at Google with Borg
7. [Cassandra](#): A decentralised structured storage system
8. [Transformer](#): Attention Is All You Need
9. [Kafka](#): A Distributed Messaging System for Log Processing
10. [FoundationDB](#): A Distributed, Unbundled, Transactional Key-Value Store
11. [Aurora](#): Design Considerations for High-Throughput Cloud-Native Relational Databases
12. [Spanner](#): Google's Globally-Distributed Database





13. [ShardManager](#): A Generic Shard Management Framework for Geo-distributed Applications
14. [Dapper](#): A Large-Scale Distributed Systems Tracing Infrastructure
15. [Flink](#): Stream and Batch Processing in a Single Engine
16. [Vector Databases](#): A Comprehensive Survey of Vector Databases – Storage and Retrieval Techniques, Challenges
17. [Zanzibar](#): Google's Consistent, Global Authorisation System
18. [Monarch](#): Google's Planet-Scale In-Memory Time Series Database
19. [Thrift](#): Scalable Cross-Language Services Implementation
20. [Bitcoin](#): A Peer-to-Peer Electronic Cash System
21. [WTF](#): The 'Who to Follow' Service at Twitter
22. [MyRocks](#): LSM-Tree Database Storage Engine Serving Facebook's Social Graph
23. [Structured Programming](#): The 'Go To' Statement Considered Harmful
24. [Raft](#): In Search of an Understandable Consensus Algorithm
25. [Lamport Clocks](#): Time Clocks and the Ordering of Events in Distributed Systems





①

Awesome Historical Computer Science articles

②

List of Important Publications in Computer Science



Citation guidelines

Literature and Bibliography



- **Demonstrate that you are familiar with the relevant publication platforms (journals, conferences)!**
 - Read the section 'How to Conduct a Literature Review' in my [collection of tips!](#)
- **Tools**
 - Google Scholar : <https://scholar.google.com/>
 - ResearchGate : <https://www.researchgate.net/>
 - CiteSeer : <https://citeseerx.ist.psu.edu/index>
- **Three primary sources in computer science**
 - Springer : <https://link.springer.com/>
 - ACM : <https://dl.acm.org/>
 - IEEE : <https://ieeexplore.ieee.org/Xplore/home.jsp>
- **Search by author**
 - CSAAuthors : <https://www.csauthors.net/>
 - ResearchGate (as above)
 - Publish or Perish as a free Windows desktop application: <https://harzing.com/resources/publish-or-perish>
- **Avoid c't, heise, Wikipedia and other secondary sources (such as most bachelor's and master's theses)! Go straight to the original sources!**
- **Don't forget books! (Use Amazon as a search engine → then head to the library!)**





“Get into the habit of searching via Google Scholar, rather than using Google Search! Especially in the first few weeks!”

Prof. Dr.-Ing. Christoph P. Neumann

You might even want to change your default browser!
If necessary, install a separate browser just for working on your bachelor's thesis.

Doing so will have a noticeable impact on the quality
of your reference list. Otherwise, you'll just end up with lots of internet sources...





Worth noting: The '**enshittification**' of **Google Search** is deliberate and not negligence:
<https://www.wheresyoured.at/the-men-who-killed-google/>
(even startpage.com and the like won't help against this)

~~<https://www.google.com/search?q=%s>~~



<https://scholar.google.com/scholar?q=%s>

<https://www.perplexity.ai/search?q=%s>

(ideally with **Academic Mode** enabled)





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Journals & Magazines

State-of-the-art Techniques for
Techniques for

Publisher: **IEEE**

H. M. Hashemian

126

Paper

Citations

9767

Full

Text Views

Published: 2017

Online and remote machine condition monitoring and

p.t.o. →

Set of information slides for final-year projects



- **Tip 1 (IMPORTANT):**

- Carry out your research via **your university's network (VPN)** ⚠

- **Background:**

- The university library enters into agreements with publishers, literature databases, electronic journals and various e-book portals
- Access (e.g. Springer, IEEE, ACM) is usually IP-based, so please use the VPN as **described by the university library**

- **Tip 2 (IMPORTANT):**

- Ask the lead author by **email** ⚠ or via **ResearchGate** ⚠ for a (preprint) version. Go for it!

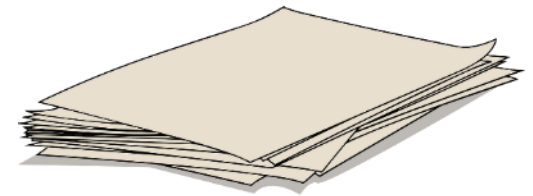
- **Tip 3 (OPTIONAL):**

- If necessary, use **anti-paywall** tools
- I've listed some on my Tools page in the Literature Search section
- Many authors are permitted to, and do, make author PDFs available for free on their websites (as I do), so tools such as unpaywall.org can also build up databases of free download alternatives for academic publications





**“Save a copy
of the publications you’ve researched
locally!”**



Prof. Dr.-Ing. Christoph P. Neumann

Literature management tools (such as JabRef, Zotero, etc.) assist you by allowing you to attaching the PDF to the bibliography entry.





Note!

How to Read a Paper

Version of February 17, 2016

S. Keshav
David R. Cheriton School of Computer Science, University of Waterloo
Waterloo, ON, Canada
keshav@uwaterloo.ca

ABSTRACT

Researchers spend a great deal of time reading research papers. However, this skill is rarely taught, leading to much wasted effort. This article outlines a practical and efficient *three-pass method* for reading research papers. I also describe how to use this method to do a literature survey.

1. INTRODUCTION

Researchers must read papers for several reasons: to review them for a conference or a class, to keep current in their field, or for a literature survey of a new field. A typical researcher will likely spend hundreds of hours every year reading papers.

Learning to efficiently read a paper is a critical but rarely taught skill. Beginning graduate students, therefore, must learn on their own using trial and error. Students waste much effort in the process and are frequently driven to frustration.

For many years I have used a simple 'three-pass' approach to prevent me from drowning in the details of a paper before getting a bird's-eye-view. It allows me to estimate the amount of time required to review a set of papers. Moreover, I can adjust the depth of paper evaluation depending on my needs and how much time I have. This paper describes the approach and its use in doing a literature survey.

2. THE THREE-PASS APPROACH

The key idea is that you should read the paper in up to three passes, instead of starting at the beginning and plowing your way to the end. Each pass accomplishes specific goals and builds upon the previous pass: The *first* pass gives you a general idea about the paper. The *second* pass lets you grasp the paper's content, but not its details. The *third* pass helps you understand the paper in depth.

2.1 The first pass

The first pass is a quick scan to get a bird's-eye view of the paper. You can also decide whether you need to do any more passes. This pass should take about five to ten minutes and consists of the following steps:

- ➡ 1. Carefully read the title, abstract, and introduction
- ➡ 2. Read the section and sub-section headings, but ignore everything else
3. Glance at the mathematical content (if any) to determine the underlying theoretical foundations

- ➡ 4. Read the conclusions
- ➡ 5. Glance over the references, mentally ticking off the ones you've already read
- ➡ At the end of the first pass, you should be able to answer the *five Cs*:

1. *Category*: What type of paper is this? A measurement paper? An analysis of an existing system? A description of a research prototype?
2. *Context*: Which other papers is it related to? Which theoretical bases were used to analyze the problem?
3. *Correctness*: Do the assumptions appear to be valid?
4. *Contributions*: What are the paper's main contributions?
5. *Clarity*: Is the paper well written?

Using this information, you may choose not to read further (and not print it out, thus saving trees). This could be because the paper doesn't interest you, or you don't know enough about the area to understand the paper, or that the authors make invalid assumptions. The first pass is adequate for papers that aren't in your research area, but may someday prove relevant.

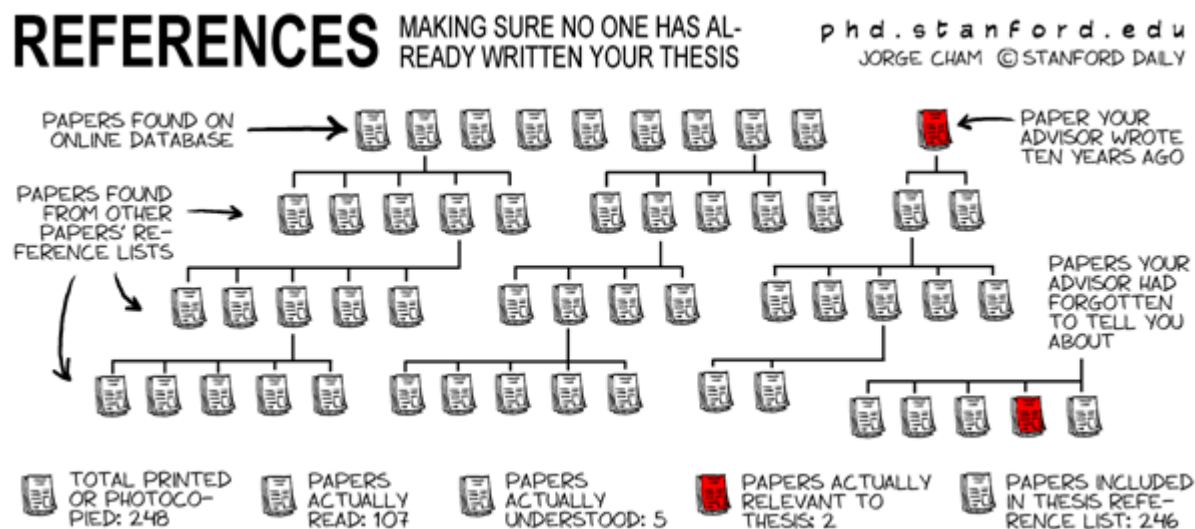
Incidentally, when you write a paper, you can expect most reviewers (and readers) to make only one pass over it. Take care to choose coherent section and sub-section titles and to write concise and comprehensive abstracts. If a reviewer cannot understand the gist after one pass, the paper will likely be rejected; if a reader cannot understand the highlights of the paper after five minutes, the paper will likely never be read. For these reasons, a 'graphical abstract' that summarizes a paper with a single well-chosen figure is an excellent idea and can be increasingly found in scientific journals.

2.2 The second pass

In the second pass, read the paper with greater care, but ignore details such as proofs. It helps to jot down the key points, or to make comments in the margins, as you read. Dominik Grusemann from Uni Augsburg suggests that you "note down terms you didn't understand, or questions you may want to ask the author." If you are acting as a paper referee, these comments will help you when you are writing your review, and to back up your review during the program committee meeting.

- From **Stanford University**
- Only **2 pages**
- **Read this paper!!**
 - Linked in the CyberLytics Moodle
- **Key message:**
 - (On first reading) **Do NOT read the publications in the order in which they are structured!!**







■ Citation Metrics:

1. Metrics **by journal** or **conference** → (classic) **Impact Factor**:
https://en.wikipedia.org/wiki/Impact_factor ★
 2. Metrics **by author** → **h-index**, **g-index**, ...:
https://en.wikipedia.org/wiki/Author-level_metrics ★
<http://www.harzing.com/pophelp/metrics.htm>
http://www.harzing.com/pop_hindex.htm
- 'ISI Web of Science' (<-> Impact Factor) versus 'Google Scholar':
http://www.harzing.com/pop_gs.htm and its extended version:
<http://www.int-res.com/articles/esep2008/8/e008p061.pdf>





- **Jorge E. Hirsch in 2005:**
 - “An index to quantify an individual’s scientific research output”
- **Aims to measure the cumulative impact of a researcher’s output**
 - By examining the number of citations their work has received
- **A scientist has index h**
 - if h of his N_p papers have at least h citations each,
 - and the remaining $(N_p - h)$ papers have at most h citations each.





- **Leo Egghe in 2006:**
 - ‘Theory and practice of the g-index’
- **Aims to reduce the influence of “one-hit wonders”**
- (The set of articles should be regarded as ranked in descending order of the number of citations they have received, in order to interpret the following definition:)
- **The g-index is the (unique) largest number such that the top g articles received (collectively) at least g^2 citations**





- **Sidiropoulos, Katsaros and Manolopoulos in 2006:**
 - 'Generalised h-index for revealing latent facts in citation networks'
- **Adds an age-related weighting to each cited article**
 - Giving less weight to older articles
- **The weighting is parameterised:**
 - **Example** (Sidiropoulos et al: $\Gamma=4$, $\Delta=1$):
An article published in the current year counts four times in terms of citations.
For an article published 4 years ago, its citations count only once.
For an article published 6 years ago, its citations count as $4/6$ times, ...



- **Pablo D. Batista et al. in 2006:**
 - “Is it possible to compare researchers with different scientific interests?”
- **Aims to reduce the effects of co-authorship**
- **Batista et al. (h_{-1}):**
 - Divide the standard h-index by the average number of authors in the articles that contribute to the h-index
- **Alternative to “Publish or Perish” ($h_{l,norm}$):**
 - First **normalise** the number of citations for each paper by dividing the number of citations by the number of authors for that paper.
 - Calculates $h_{l,norm}$ as the h-index of the normalised citation counts.





choco install publishorperish -y

Harzing's Publish or Perish

File Edit View Help

Citation analysis

- Author impact analysis
- Journal impact analysis
- General citation search
- Multi-query center

Program maintenance

- Check for updates

Help resources

- About Publish or Perish
- Help contents
- What's new
- Version information

Author impact analysis

Perform a citation analysis for one or more authors

Query

Author's name:

Exclude these names:

Year of publication between: and:

☒ Biology, Life Sciences, Environmental Science
☒ Business, Administration, Finance, Economics
☒ Chemistry and Materials Science
☒ Engineering, Computer Science, Mathematics
☒ Medicine, Pharmacology, Veterinary Science
☒ Physics, Astronomy, Planetary Science
☒ Social Sciences, Arts, Humanities

Results

Papers:	8	Cites/paper:	2.38	h-index:	3	AWCR:	5.08
Citations:	19	Cites/author:	8.50	g-index:	4	AW-index:	2.25
Years:	5	Papers/author:	4.67	hc-index:	3	AWCRpA:	2.34
Cites/year:	3.80	Authors/paper:	2.25	hI-index:	1.50		
				hI,norm:	2		

Cites	Authors	Title	Year	Publication	Publisher
☒ 7	M Meyerhofer, C Neumann	TESTEJB-A Measurement Framework for EJBs	2004	Edited by Ivica Crnkovic, Ju...	Springer
☒ 3	R Aigner, H Berthold, E Franz, S ...	COMQUAD	2003	Informatik-Forschung und E...	Springer
☒ 3	M Meyerhofer, K Meyer-Wegener	Estimating Non-functional Properties of Compone...	2005	Electronic Notes in Theoretic...	Elsevier
☒ 3	M Meyerhöfer, F Lauterwald	Towards Platform-Independent Component Meas...	2005	Tenth International Worksh...	research.microsoft.com
☒ 2	S Zschaler, M Meyerhofer	Explicit Modelling of QoS-Dependencies	2003	Proceedings of the 1st Inter...	www-st.inf.tu-dresden.de
☒ 1	M Meyerhöfer, B Volz	EJBMProf-A Memory Profiling Framework for E...	2005	Component-Based Software...	Springer
☒ 0	M Meyerhöfer	TestEJB: response time measurement and call de...	2007	Proceedings of the 1st work...	portal.acm.org
☒ 0	M Meyerhöfer	Institut für Mathematische Maschinen und Daten...		informatik.uni-erlangen.de	

2.1.2747

Copy statistics
Copy results
Check all
Check selection
Uncheck all
Uncheck 0 cites
Uncheck selection
Help





“The citation style (format) is freely selectable by you at the EMI.”

Prof. Dr.-Ing. Christoph P. Neumann

The EMI Faculty's LaTeX template uses the numerical IEEE style.

I would certainly recommend this to you; another common alternative is **APA**.
But ultimately, the choice is yours. The main thing is to be consistent.

With BibTeX (or BibLaTeX + Biber), it's very difficult to get the formatting wrong.
Manually managed reference lists can sometimes be a challenge.

CAUTION regarding Word: The IEEE citation style incorrectly generates the English 'p.'/'pp.' instead of 'S.' for German works, and it is extremely difficult to get Word to stop doing this. You're therefore **better off** using **the APA style in Word**, which, in my opinion, behaves correctly in this respect. Of course, this may change at any time, so it's up to you to check. Warning: **DO NOT WRITE YOUR REFERENCE LIST BY HAND!** Some of your fellow students have done this and, at a certain point, came to deeply regret it.

Not by hand!





■ Software support

- **JabRef** [FOSS] [Alver&Batada] <http://jabref.sourceforge.net/>
- **Zotero** <https://www.zotero.org/>
- EndNote [Thomson] <http://www.endnote.com/>
- ReferenceManager/RefMan [Thomson] <http://www.refman.com/>
- Citavi <http://www.citavi.com>

■ Determining the type of publication

- Article (journal article)
- In-proceedings (conference paper)
- Doctoral thesis, book, book chapter
- Websites

■ Unique identifiability

- 'Required Fields'!
- URL, date
- DOI





- **PDF**
 - Save (!)

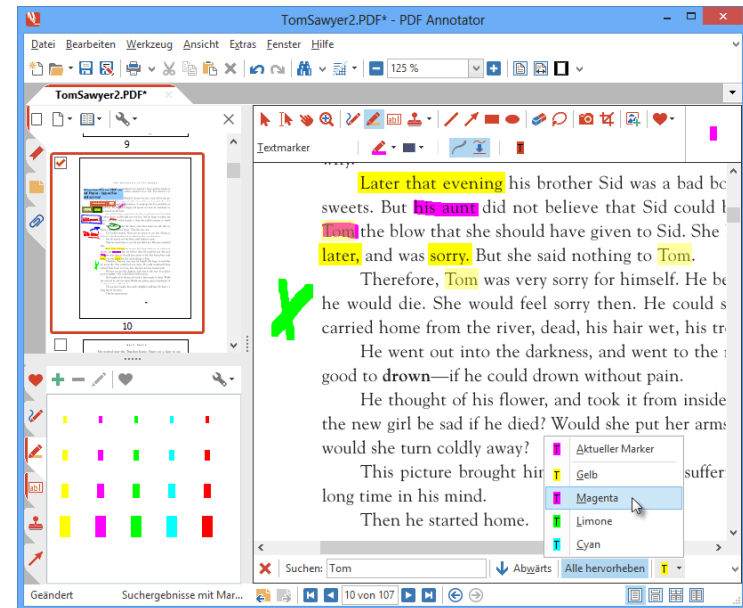
- **Book/journal (in print)**
 - Photocopy (!) and file away (!)

- **Online articles/websites**
 - Save page (!), stored on your hard drive
 - With date (!), in the file name
 - (later biblatex → **url** + **urldate**)





<https://pxhere.com/en/photo/759968>





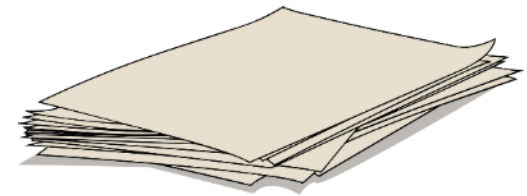
<https://www.pexels.com/de-de/foto/licht-verwischen-stapel-bunt-9277357/>



SQ3R



PQ4R





- **SQ3R method**

- Related to the PQ4R method ...

- **PQ4R method**

- Preview : Get an overview ... and write it down!
- Questions : Formulate questions ... and write them down!
- Read : Read the text and highlight key points; answer your own questions
- Reflect : Evaluate ideas, compare with what you already know,
find examples / counter-examples
- Recite : Summarise the text in your own words ... and write it down!
- Review : Have the questions been clarified? How does it fit into the wider context? Any criticisms? ... and write them down!





<https://www.officio.de/bueroartikel/han-karteikasten.19505E.html>



Wooden index card box, DIN A5 landscape

Zotero Annotated Bibliography





- **Bibliography management tool**

- **BibTeX file**

- Structured publication data
- Identification via keys

- **For TeX/LaTeX documents**

- Can be cited using `\cite{}`
- Is incorporated during the compilation process

- <http://www.bibtex.org/>

.bib file:

```
@article{lin1973,  
  author = "Shen Lin and Brian W. Kernighan",  
  title = "An Effective Heuristic Algorithm for the  
  Travelling-Salesman Problem",  
  journal = "Operations Research",  
  volume = 21,  
  year = 1973,  
  pages = "498-516" }
```

.tex file:

As presented in `\cite{lin1973}`, the following algorithm...





```
\begin{thebibliography}{0}  
  \bibitem{phaser}Phaser [Online] \url{https://phaser.io/} (visited on Jun. 28, 2022)  
  \bibitem{node}Node.js [Online] \url{https://nodejs.org/en/} (visited on Jun. 28, 2022)  
  \bibitem{jest}Jest [Online] \url{https://jestjs.io/} (visited on Jun. 28, 2022)  
  \bibitem{rooms}Game-Rooms [Online] \url{https://socket.io/docs/v4/rooms/} (visited on Jun. 28, 2022)  
  \bibitem{docker}Docker [Online] \url{https://www.docker.com/} (visited on Jun. 28, 2022)  
  \bibitem{socketio}Socket.io [Online] \url{https://socket.io/} (visited on Jun. 28, 2022)  
  \bibitem{aaa}Arrange/Act/Assert-Pattern [Online] \url  
  {https://java-design-patterns.com/patterns/arrange-act-assert/} (visited on Jun. 28, 2022)  
\end{thebibliography}
```

**Generate a bibliography list using .bib entries.
DO NOT create the \bibitem list yourself!**





- **BibTeX-based literature database**
 - ‘GUI for BibTeX files’
 - Java-based
 - For Windows, Linux and Mac
- **“Convenient” import**
 - from most literature databases (Copy & Paste)

<https://www.jabref.org/>





Bibliography management software for Mac, Windows and Linux:

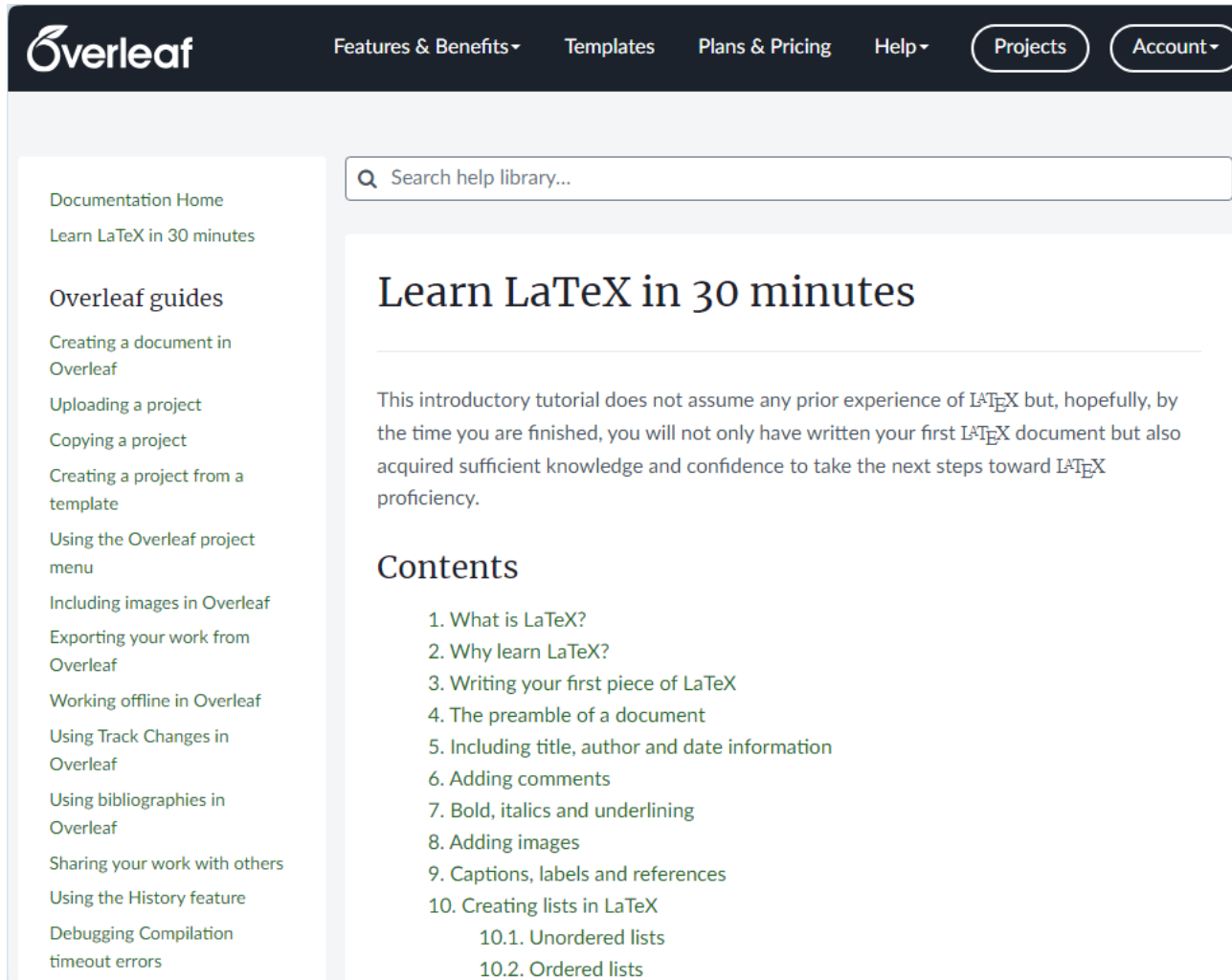
The screenshot displays the Zotero application window. On the left is a sidebar with a file tree under 'My Library' and 'Group Libraries'. The main pane shows a list of items with columns for Title, Creator, and Year. The item 'Circulation of Medicine in the Early Modern Atlantic World' by Cook and Walker (2013) is selected. On the right, the 'Info' tab provides detailed metadata for this item.

Title	Creator	Year
Guerre, maladie, empire. Les services de santé militaires en ...	Zaugg	2016
Officiers de santé et soignantes créoles face à la fièvre jaune	Nobi	2016
The Emergence of Tropical Medicine in France	Osborne	2014
Colonial Disease, Translation, and Enlightenment: Franco-Brit...	Charters	2014
Trading in Drugs through Philadelphia in the Eighteenth Centu...	Wilson	2013
The Medicines Trade in the Portuguese Atlantic World: Acquisi...	Walker	2013
Leprosy and Slavery in Suriname: Godfried Schilling and the Fr...	Snelders	2013
Medical Experimentation and Race in the Eighteenth-century ...	Schiebinger	2013
The Circulation of Bodily Knowledge in the Seventeenth-centu...	Gómez	2013
Circulation of Medicine in the Early Modern Atlantic World	Cook and Walker	2013
Synthesis of scholarship on "medicines" to restore focus o...		
Full Text PDF		
Colonial Medical Encounters in the Nineteenth Century: The Fr...	Thoral	2012
Networks in Tropical Medicine: Internationalism, Colonialism, a...	Neill	2012
Early Clinical Features of Dengue Virus Infection in Nicaraguan...	Biswas et al.	2012
Medicine in an age of commerce and empire: Britain and its tr...	Harrison	2010
Finding the "Ideal Diet": Nutrition, Culture, and Dietary Practic...	Neill	2009
Battles of the Self: War and Subjectivity in Early Modern France	Pichichero	2008
The Experiments of Ramón M. Termeyer SJ on the Electric Eel ...	de Asúa	2008
Psychiatry and Empire	Mahone and Vaughan	2007
Medicine and the Market in England and Its Colonies, C.1450-...	Jenner and Wallis	2007
Matters of exchange: commerce, medicine, and science in the...	Cook	2007
A Horrible Tragedy in the French Atlantic	Rothschild	2006
"Neither of meat nor drink, but what the Doctor alloweth": ...	Chakrabarti	2006
Transnationalism in the colonies: Cooperation, rivalry, and rac...	Neill	2005
Variolation, Vaccination and Popular Resistance in Early Coloni...	Brimnes	2004
"Syphilis, Opiomania, and Pederasty": Colonial Constructions ...	Proschan	2003
Choosing Scientific Patrimony: Sir Ronald Ross, Alphonse Lav...	Guillemin	2002
Madness and Colonization: Psychiatry in the British and Frenc...	Keller	2001
The Colonial Machine: French Science and Colonization in the ...	McClellan and Rego...	2000
From medical astrology to medical astronomy: sol-lunar and pl...	Harrison	2000
Disease and Empire: The Health of European Troops in the Co...	Bynum	2000
Climate & Constitution: Health, Race, Environment and Bri...	Harrison	1999

Info	Notes	Tags	Related
Item Type	Journal Article		
Title	Circulation of Medicine in the Early Modern Atlantic World		
Author	Cook, Harold J.		
Author	Walker, Timothy D.		
Abstract	The search for powerful drugs has caused people and commodities to move around the globe for many centuries, as it still does...		
Publication	Social History of Medicine		
Volume	26		
Issue	3		
Pages	337-351		
Date	2013/08/01 y m d		
Series			
Series Title			
Series Text			
Journal Abbr	Soc Hist Med		
Language	en		
DOI	10.1093/shm/hkt013		
ISSN	0951-631X		
Short Title			
URL	https://academic.oup.com/shm/article/26/3...		
Accessed	1/24/2018, 10:17:12 AM		
Archive			
Loc. in Archive			
Library Catalog			
Call Number			
Rights			
Extra			
Date Added	1/24/2018, 10:17:12 AM		
Modified	1/24/2018, 11:50:15 AM		

<https://www.zotero.org/>





The screenshot shows the Overleaf website interface. At the top is a dark navigation bar with the Overleaf logo and links for Features & Benefits, Templates, Plans & Pricing, Help, Projects, and Account. Below this is a search bar labeled 'Search help library...'. On the left is a sidebar with a list of guides, including 'Documentation Home', 'Learn LaTeX in 30 minutes', and various other tutorials. The main content area displays the 'Learn LaTeX in 30 minutes' tutorial page, which includes an introductory paragraph and a table of contents.

Overleaf

Features & Benefits ▾ Templates Plans & Pricing Help ▾ Projects Account ▾

Documentation Home

Learn LaTeX in 30 minutes

Overleaf guides

- Creating a document in Overleaf
- Uploading a project
- Copying a project
- Creating a project from a template
- Using the Overleaf project menu
- Including images in Overleaf
- Exporting your work from Overleaf
- Working offline in Overleaf
- Using Track Changes in Overleaf
- Using bibliographies in Overleaf
- Sharing your work with others
- Using the History feature
- Debugging Compilation timeout errors

Search help library...

Learn LaTeX in 30 minutes

This introductory tutorial does not assume any prior experience of $\text{L}^{\text{A}}\text{T}_{\text{E}}\text{X}$ but, hopefully, by the time you are finished, you will not only have written your first $\text{L}^{\text{A}}\text{T}_{\text{E}}\text{X}$ document but also acquired sufficient knowledge and confidence to take the next steps toward $\text{L}^{\text{A}}\text{T}_{\text{E}}\text{X}$ proficiency.

Contents

1. What is LaTeX?
2. Why learn LaTeX?
3. Writing your first piece of LaTeX
4. The preamble of a document
5. Including title, author and date information
6. Adding comments
7. Bold, italics and underlining
8. Adding images
9. Captions, labels and references
10. Creating lists in LaTeX
 - 10.1. Unordered lists
 - 10.2. Ordered lists

https://www.overleaf.com/learn/latex/Learn_LaTeX_in_30_minutes





`` and " for English
 " and " for German
 \enquote{..} for all with csquotes →

Formatting Information
 An introduction to typesetting with L^AT_EX

- Home
- Credits
- Foreword
- Preface
- Introduction
- Writing documents
 - Basic structures
 - Plugins and support
 - Lists, tables, figures
 - Textual tools
 - Layouts and fonts
 - Programmability
 - Conversion
- Installation
- Commands and errors
- User Groups
- ASCII characters
- GNU Free
- Documentation
- License

Section 1.8: Quotation marks

Previous section

Next section

If you are using X_YL^AT_EX and UTF-8, you can use your operating system's curly 'open-quote' and 'close-quote' characters.

Otherwise, use the ``` key (grave-accent or 'backtick') for the opening quote, and the `'` (apostrophe) key for the closing quote, doubled if you want double quotes; L^AT_EX will automatically typeset these as real quotes:

```
He said, ``I'm just going out.''
```

He said, "I'm just going out."

This ensures you get real left-hand (opening) and right-hand (closing) 'curly quotes', usually shaped like tiny ⁶⁶ and ⁹⁹ characters, or as symmetrically-balanced strokes in sans-serif or script typefaces.

DO NOT use the unidirectional typewriter single-quote `'` key (apostrophe) or double-quote `"` key (quotes) for opening quotes: L^AT_EX treats these as closing quotes only.

<https://latex.silmaril.ie/formattinginformation/quotes.html>

<https://tex.stackexchange.com/tags/csquotes/info>

`{csquotes}` is a package for making context-sensitive inline and display quotations.

`csquotes` is a package for making context-sensitive inline and display quotations. To understand the benefits of `csquotes`, a comparison with how quotations are made without `csquotes` is telling.

With LaTeX inline quotations are written such as

```
``quote''
```

for double quotation marks or as

```
'quote'
```

for single quotation marks. If a document with such quotes is going to be modified to use another quotation style, every single quote mark will have to be replaced.

With `csquotes` inline quotations are written using

```
\enquote{quote}
```

or

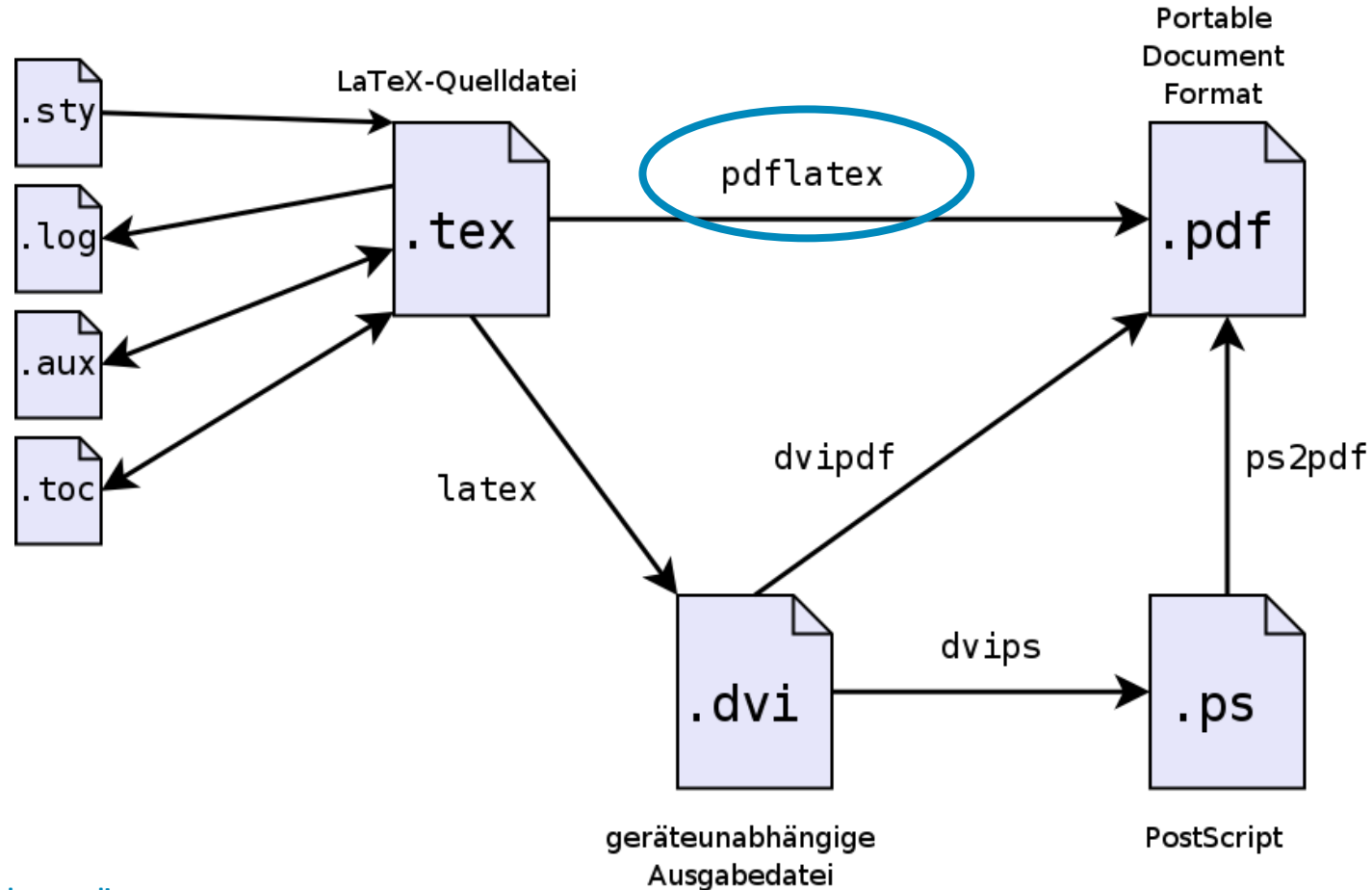
```
\enquote*{quote}
```

to force single quotation marks. `\enquote` inserts appropriate quotations marks according to the language of the document (it knows `babel` and `polyglossia`). Also if `\enquote` is nested, such as `\enquote{quote {quote quote}}`, `csquotes` inserts appropriate quotation marks.

Often quotations are used to write citations. To ease this, `csquotes` integrates with citations packages such as `biblatex`.

For further arguments of the benefits of `csquotes`, see [What's the advantage of using csquotes over using an editor's auto-replacement for "?"](#)





Further reading:

https://de.overleaf.com/learn/latex/Articles/The_TeX_family_tree%3A_LaTeX%2C_pdfTeX%2C_XeTeX%2C_LuaTeX_and_ConTeXt





what they are

who they are

what they do

LaTeX package

biblatex

≠

natbib

Defines macros (e.g. `\cite`, `\printbibliography`) in your `.tex` document

processing program

biber

≠

BibTeX

.bbl file

Bridge between your `.bib` and your `.tex` files

database file

other

(RIS, Endnote XML, Zotero RDFXML, ...)

features available for biber only (e.g. utf8, crossref, 'urldate', 'inbook'...)

.bib

= "bibtex" in the broadest sense

Stores all data about your references (author, year, etc.) in a structured way

database management system

generic software for reference management (Zotero, Mendeley, Papers, ...)

.bib-specific DBMS

(Jabref, Referencer, ...)

Enables you to manage your database entries (i.e. to edit your `.bib`-file)

<https://tex.stackexchange.com/questions/25701/bibtex-vs-biber-and-biblatex-vs-natbib>



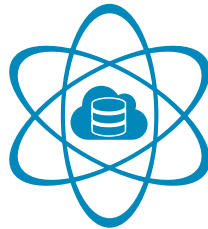


IEEEtran.cls



iarial.cls

(technically by me)



cs-techrep.cls

(my ModA template)

bibtex/biber

Note: Also referred to as '**bibtex**' in the broadest sense.
In practice, however, it is a new version with breaking changes!

The types/attributes of the bib entries are modern and
comparable/identical to the thesis ✓

For example: `\usepackage[style=ieee,backend=biber]{bibtex}`



ACMart.cls



bibtex/natbib

bibtex in the narrower technical sense,
as **natbib** is loaded implicitly ☹

bib entry types/attributes are legacy/classic
and therefore **significantly different**
from biblatex/biber and the thesis ⚡

Recommended ⚠ : Switch to biblatex/biber!

```
\documentclass[sigconf,natbib=false]{acmart}
\usepackage[style=ACM-Reference-Format,
            backend=biber,sorting=none]{bibtex}
\addbibresource{yourfile.bib}
```



- For **arXiv-only** papers, use **@MISC** rather than **@TechReport**:
 - (You can easily obtain the BibTeX entries on the arXiv page via the relevant '[Export BibTeX Citation](#)' link!)

```
@MISC{google2017transformer,  
  title={Attention Is All You Need},  
  author={Ashish Vaswani and Noam Shazeer and  
    Niki Parmar and Jakob Uszkoreit and  
    Llion Jones and Aidan N. Gomez and  
    Lukasz Kaiser and Illia Polosukhin},  
  year={2017},  
  eprint={1706.03762v4},  
  archivePrefix={arXiv},  
  primaryClass={cs.CL}  
}
```





Citing Standards

How to cite an industry standard varies depending on the style manual required by each journal or discipline. There is no such thing as a separate style guide just for industry standards. ANSI recommends using the *Chicago Manual of Style* for citations. Style manuals do not usually mention how to cite standards, specifically, but they should be treated similar to a book, journal, or book series depending on the situation. *Chicago Manual of Style* section 14.249 (on "Pamphlets and the Like") says that "[d]ata on author and publisher may not fit the normal pattern, but sufficient information should be given to identify the document." If a standard is published within a journal or other book series, cite it similar to a journal article or a book chapter.

Make sure you provide enough information that anyone interested in further information can track down the original document. Citations should include some clue that it is a standard, the issuing agency (or publication name), standard number, and standard title (at a minimum). Most style guides also prefer a publication date if it is not obvious from the standard number.

Note that a specific standard can be reprinted, altered/reissued by a number of different standards organizations- **you need to cite the specific version that you used**. For example, API Standard 2543 was also issued as ANSI Z11.172-1965 and ASTM D1086-1964. Some versions retain the original pagination and others have completely different pagination, so if you quote from a page in the standard the only way for someone to find that specific quoted data is with the version of the standard you used.

Examples of best practices in citations for industry standards:

British Standards Institution. *Code of Practice for Noise and Vibration Control on Construction and Open Sites - Part 2: Vibration*. BS 5228-2:2009.

"Headlamp Design Guidelines for Mature Drivers," SAE J1606-1997, in *SAE Ground Vehicle Lighting Standards Manual*, 2002 edition, Warrendale, PA: Society of Automotive Engineers, 2002, p. 104.

Information Technology - Programming Languages - Fortran. Draft International Standard ISO/IEC 1539-1:2010 (E). Accessed February 4, 2013. <ftp://ftp.nag.co.uk/sc22wg5/n1801-n1850/n1830.pdf>

Keyboarding Speed Tests (formerly known as 'Typing Speed Tests'). AS 2708-2001. Sydney, N.S.W.: Standards Australia International.

Safety Code and Requirements for Dry Martinis. ANSI Standard K100.1-1974 (R1984).

<https://instr.iastate.libguides.com/standards/citing>

■ With biblatex/biber or bibtex:

■ Reference:

<https://tex.stackexchange.com/questions/42501/cite-a-standard-specification-or-data-sheet-from-a-company-institution-but-with>

■ Use @MANUAL

■ Note:

- The number field would not appear when using the @MANUAL entry type with `\bibliographystyle{IEEEtran}`.

A workaround for this, however, is to use the Address field for the component number, as this places the component number in the correct position and with the correct text styling in accordance with the [**"IEEE Citation Guidelines"**](#).





- **BibTeX** (e.g. minimal stack using classic BibTeX)

```
@misc{hadoop,  
  author = {{Apache Software Foundation}},  
  title  = {Hadoop (version 0.20.2)},  
  year   = {2010},  
  url    = {https://hadoop.apache.org},  
}
```

- **LaTeX package: biblatex** (recommended backend for biblatex: biber instead of bibtex)

```
@software{hadoop,  
  author = {{Apache Software Foundation}},  
  title  = {Hadoop},  
  url    = {https://hadoop.apache.org},  
  version = {0.20.2},  
  date   = {19 February 2010},  
}
```

- Web article “What to do to switch to biblatex?”

<https://tex.stackexchange.com/questions/5091/what-to-do-to-switch-to-biblatex>





Spot the mistakes in this image!

Literatur

- [1] C. Legner und B. Otto, „Stammdaten-Management,“ *Das Wirtschaftsstudium (WISU)*, Jg. 236, Nr. 4, S. 562–568, 2007, Publisher: Lange.
- [2] W. Mahnke, S.-H. Leitner und M. Damm, *OPC unified architecture*. Berlin: Springer, 2009, 339 S., OCLC: ocn268784080, ISBN: 978-3-540-68898-3.
- [3] „Using Nodeset Files to Exchange Information – OPC Connect.“ (Apr. 2017), Adresse: <https://opccconnect.opcfoundation.org/2017/04/using-nodeset-files-to-exchange-information/> (besucht am 05.04.2023).
- [4] F. Pauker, „OPC UA Informationsmodellierung für Cyber-Physical Production Systems,“ Diss., Technische Universität Wien, Wien, Apr. 2019, 148 S.
- [5] P. Ghavami, *Big data management: data governance principles for big data analytics*, 1. Aufl. Boston: DE GRUYTER, 2020, ISBN: 978-3-11-066291-7.
- [6] R. Drath, Hrsg., *AutomationML: a practical guide*, De gruyter textbook, Boston: De Gruyter Oldenbourg, 2021, 275 S., ISBN: 978-3-11-074622-8.
- [7] O. Foundation, *OPC unified architecture part 8: Data access release 1.05.00*, 12. Okt. 2021.
- [8] M. Pech, J. Vrchota und J. Bednář, „Predictive Maintenance and Intelligent Sensors in Smart Factory: Review,“ *Sensors*, Jg. 21, Nr. 4, 2021, ISSN: 1424-8220. DOI: 10.3390/s21041470. Adresse: <https://www.mdpi.com/1424-8220/21/4/1470>.
- [9] M. T. Delgado, „Eclipse semantic modeling framework (ESMF),“ projects.eclipse.org. (6. Dez. 2022), Adresse: <https://projects.eclipse.org/projects/dt.esmf> (besucht am 26.03.2023).
- [10] R. Drath, *AutomationML: das lehrbuch für studium und praxis* (De Gruyter Studium). Berlin ; Boston: De Gruyter Oldenbourg, 2022, 271 S., ISBN: 978-3-11-078293-6.
- [11] O. Foundation, *OPC unified architecture part 3: Address space model release 1.05.02*, 1. Nov. 2022.
- [12] O. Foundation, *OPC unified architecture part 5: Information model release 1.05.02*, 1. Nov. 2022.
- [13] O. Foundation, *OPC unified architecture part 6: Mappings release 1.05.01*, 21. Feb. 2022.
- [14] „Aspect :: Bosch Semantic Stack Documentation.“ (), Adresse: <https://docs.bosch-semantic-stack.com/concepts/aspect.html> (besucht am 08.04.2023).
- [15] „Aspect Model Editor UI overview :: OMP - SDS WG continues in Eclipse Semantic Modeling Framework (ESMF).“ (), Adresse: <https://openmanufacturingplatform.github.io/sds-documentation/ame-guide/4.2.1/ui-overview.html> (besucht am 31.03.2023).
- [16] „Aspects :: OMP - SDS WG continues in Eclipse Semantic Modeling Framework (ESMF).“ (), Adresse: <https://openmanufacturingplatform.github.io/sds-documentation/bamm-specification/2.0.0/modeling-guidelines.html> (besucht am 31.03.2023).
- [17] „Characteristics and Constraints :: OMP - SDS WG continues in Eclipse Semantic Modeling Framework (ESMF).“ (), Adresse: <https://openmanufacturingplatform.github.io/sds-documentation/bamm-specification/2.0.0/characteristics.html> (besucht am 30.03.2023).
- [18] „Concepts :: Bosch Semantic Stack Documentation.“ (), Adresse: <https://docs.bosch-semantic-stack.com/concepts/index.html> (besucht am 19.04.2023).
- [19] „Data Types :: OMP - SDS WG continues in Eclipse Semantic Modeling Framework (ESMF).“ (), Adresse: <https://openmanufacturingplatform.github.io/sds-documentation/bamm-specification/2.0.0/datatypes.html> (besucht am 30.03.2023).
- [20] „Documents - OPC Foundation.“ (), Adresse: <https://opcfoundation.org/developer-tools/documents/?wg=1&type=Specification> (besucht am 10.04.2023).
- [21] „GitHub - AutomationML/AutomationMLEditor,“ GitHub. (), Adresse: <https://github.com/AutomationML/AutomationMLEditor> (besucht am 10.04.2023).
- [22] „GitHub - FreeOpcUa/opcuamodeler: GUI to create OPC UA models and export them as XML.“ (), Adresse: <https://github.com/FreeOpcUa/opcuamodeler> (besucht am 20.04.2023).
- [23] „GitHub - model-UA/papyrus-opcuaplugin: Eclipse Papyrus Plugin for OPC-UA transformation.“ (), Adresse: <https://github.com/model-UA/papyrus-opcuaplugin> (besucht am 20.04.2023).
- [24] „GitHub - OPCFoundation/UA-ModelCompiler: ModelCompiler converts XML files into C# and ANSI C.“ (), Adresse: <https://github.com/OPCFoundation/UA-ModelCompiler> (besucht am 20.04.2023).
- [25] „How to create custom OPC UA Information Models • OPC UA rocks.“ (), Adresse: <https://opcu.rocks/custom-information-models/> (besucht am 20.04.2023).
- [26] „Introduction :: OMP - SDS WG continues in Eclipse Semantic Modeling Framework (ESMF).“ (), Adresse: <https://openmanufacturingplatform.github.io/sds-documentation/bamm-specification/2.0.0/index.html> (besucht am 25.03.2023).
- [27] „Introduction :: OMP - SDS WG continues in Eclipse Semantic Modeling Framework (ESMF).“ (), Adresse: <https://openmanufacturingplatform.github.io/sds-documentation/ame-guide/4.2.1/introduction.html> (besucht am 31.03.2023).
- [28] „Known issues :: OMP - SDS WG continues in Eclipse Semantic Modeling Framework (ESMF).“ (), Adresse: <https://openmanufacturingplatform.github.io/sds-documentation/ame-guide/4.2.1/known-issues.html> (besucht am 19.04.2023).



IMPORTANT

This list is by no means exhaustive!

(Zotero was used here.)

"A fool with a tool is still a fool!"

Literatur

Missing authors

- [1] C. Legner und B. Otto, „Stammdaten-Management,“ *Das Wirtschaftsstudium (WISU)*, Jg. 236, Nr. 4, S. 562–568, 2007, Publisher: Lange.
- [2] W. Mahnke, S.-H. Leitner und M. Damm, *OPC unified architecture*. Berlin: Springer, 2009, 339 S., OCLC: ocn268784080, ISBN: 978-3-540-68898-3.
- [3] „Using Nodeset Files to Exchange Information – OPC Connect.“ (Apr. 2017), Adresse: <https://opconnect.opcfoundation.org/2017/04/using-nodeset-files-to-exchange-information/> (besucht am 05.04.2023).
- [4] F. Pauker, „OPC UA Informationsmodellierung für Cyber-Physical Production Systems,“ Diss., Technische Universität Wien, Wien, Apr. 2019, 148 S.
- [5] P. Ghavami, *Big data management: data governance principles for big data analytics*, 1. Aufl. Boston: DE GRUYTER, 2020, ISBN: 978-3-11-066291-7.
- [6] R. Drath, Hrsg., *AutomationML: a practical guide*, De gruyter textbook, Boston: De Gruyter Oldenbourg, 2021, 275 S., ISBN: 978-3-11-074622-8.
- [7] O. Foundation, *OPC unified architecture part 8: Data access release 1.05.00*, 12. Okt. 2021.
- [8] M. Pech, J. Vrchota und J. Bednář, „Predictive Maintenance and Intelligent Sensors in Smart Factory: Review,“ *Sensors*, Jg. 21, Nr. 4, 2021, ISSN: 1424-8220, DOI: 10.3390/s21041470. Adresse: <https://www.mdpi.com/1424-8220/21/4/1470>.
- [9] M. T. Delgado, „Eclipse semantic modeling framework (ESMF),“ *projects.eclipse.org*, (6. Dez. 2022), Adresse: <https://projects.eclipse.org/projects/dt.esmf> (besucht am 26.03.2023).
- [10] R. Drath, *AutomationML: das lehrbuch für studium und praxis* (De Gruyter Studium). Berlin ; Boston: De Gruyter Oldenbourg, 2022, 271 S., ISBN: 978-3-11-078293-6.
- [11] O. Foundation, *OPC unified architecture part 3: Address space model release 1.05.02*, 7. Nov. 2022.
- [12] O. Foundation, *OPC unified architecture part 5: Information model release 1.05.02*, 7. Nov. 2022.
- [13] O. Foundation, *OPC unified architecture part 6: Mappings release 1.05.01*, 21. Feb. 2022.
- [14] „Aspect :: Bosch Semantic Stack Documentation.“ (0. Adresse: <https://docs.bosch-semantic-stack.com/concepts/aspect.html> (besucht am 08.04.2023).
- [15] „Aspect Model Editor UI overview :: OMP - SDS WG continues in Eclipse Semantic Modeling Framework (ESMF).“ (0. Adresse: <https://openmanufacturingplatform.github.io/sds-documentation/ame-guide/4.2.1/ui-overview.html> (besucht am 31.03.2023).

Tools! None
References!
Better at the front than as a footnote.

Instead of BibTeX, it's better to use BibLaTeX plus biburllsetup (if necessary, biburllucpenalty plus biburllcpenalty)

Missing authors

- [16] „Aspects :: OMP - SDS WG continues in Eclipse Semantic Modeling Framework (ESMF).“ (0. Adresse: <https://openmanufacturingplatform.github.io/sds-documentation/bamm-specification/2.0.0/modeling-guidelines.html> (besucht am 31.03.2023).
- [17] „Characteristics and Constraints :: OMP - SDS WG continues in Eclipse Semantic Modeling Framework (ESMF).“ (0. Adresse: <https://openmanufacturingplatform.github.io/sds-documentation/bamm-specification/2.0.0/characteristics.html> (besucht am 30.03.2023).
- [18] „Concepts :: Bosch Semantic Stack Documentation.“ (0. Adresse: <https://docs.bosch-semantic-stack.com/concepts/index.html> (besucht am 19.04.2023).
- [19] „Data Types :: OMP - SDS WG continues in Eclipse Semantic Modeling Framework (ESMF).“ (0. Adresse: <https://openmanufacturingplatform.github.io/sds-documentation/bamm-specification/2.0.0/datatypes.html> (besucht am 30.03.2023).
- [20] „Documents - OPC Foundation.“ (0. Adresse: <https://opcfoundation.org/developer-tools/documents/?wg=rttype=Specification> (besucht am 10.04.2023).
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- [22] „GitHub - FreeOpcUa/opcuamodeler: GUI to create OPC UA models and export them as XML.“ (0. Adresse: <https://github.com/FreeOpcUa/opcuamodeler> (besucht am 20.04.2023).
- [23] „GitHub - model-UA/papyrus-opcuaplugin: Eclipse Papyrus Plugin for OPC-UA transformation.“ (0. Adresse: <https://github.com/model-UA/papyrus-opcuaplugin> (besucht am 20.04.2023).
- [24] „GitHub - OPCFoundation/UA-ModelCompiler: ModelCompiler converts XML files into C# and ANSI C.“ (0. Adresse: <https://github.com/OPCFoundation/UA-ModelCompiler> (besucht am 20.04.2023).
- [25] „How to create custom OPC UA Information Models • OPC UA rocks.“ (0. Adresse: <https://opcu.rocks/custom-information-models/> (besucht am 20.04.2023).
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- [27] „Introduction :: OMP - SDS WG continues in Eclipse Semantic Modeling Framework (ESMF).“ (0. Adresse: <https://openmanufacturingplatform.github.io/sds-documentation/ame-guide/4.2.1/introduction.html> (besucht am 31.03.2023).
- [28] „Known issues :: OMP - SDS WG continues in Eclipse Semantic Modeling Framework (ESMF).“ (0. Adresse: <https://openmanufacturingplatform.github.io/sds-documentation/ame-guide/4.2.1/known-issues.html> (besucht am 19.04.2023).

Don't just TeX warnings!

wtf





“Using a reference management tool does not in any way guarantee the accuracy of your bibliography entries! Once again:



A fool with a tool is still a fool!”

Prof. Dr.-Ing. Christoph P. Neumann





Bachelor's
degree

**‘Bachelor’s theses should
be no shorter than 3 pages for the b
’
.’**

Prof. Dr.-Ing. Christoph P. Neumann

At least half of these should be **genuine academic publications or books**
and not purely online sources.

See my ‘Collection of Guidelines’





Master's

**‘Master’s theses should
be no shorter than 4 pages for the b
’
■**

Prof. Dr.-Ing. Christoph P. Neumann

As with bachelor’s theses, **at least half** of these should be **genuine academic publications** or books, and not purely online sources.





Important
!

- In bib files, I always use '`\-/`' for a **separable hyphen**!
 - To ensure that compound words are split correctly, see <https://stackoverflow.com/questions/2193307/how-do-i-get-latex-to-hyphenate-a-word-that-contains-a-dash>

`\useackage[shortcuts]{extdash}`

`\-/`

Example:



`institution = {East Bavarian University of Applied Sciences Amberg\-/Weiden},`





INCORRECT:

- In [1], ... event listening ...
- In [2], ... responding to commands ...
- In [3], ... opening modals ...

Bibliography

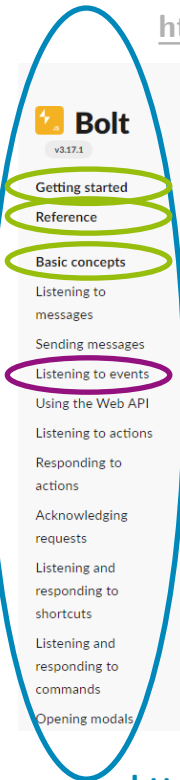
- [1] slack.dev: "Bolt – Listening to events". ...
URL <https://slack.dev/bolt-js/concepts#event-listening>
- [2] slack.dev: "Bolt – Listening and resp..."
URL <https://slack.dev/bolt-js/concepts#commands>
- [3] slack.dev: "Bolt – Opening modals". ...
URL <https://slack.dev/bolt-js/concepts#creating-modals>

CORRECT:

- In [1], section "listening to events", ...
- In [1], section "listening and responding to commands", ...
- In [1], section "opening modals", ...

Bibliography

- [1] slack.dev: "Bolt for JavaScript". ...
URL <https://slack.dev/bolt-js/>



~~<https://slack.dev/bolt-js/concepts#event-listening>~~

Listening to events

You can listen to any Events API event using the `event()` method after subscribing to it in your app configuration. This allows your app to take action when something happens in Slack, like a user reacting to a message or joining a channel.

The `event()` method requires an `eventType` of type string.

► Filtering on message subtypes

```
1 const welcomeChannelId = 'C12345';
2
3 // When a user joins the team, send a me
4 app.event('team_join', async ({ event, c
5   try {
6     // Call chat.postMessage with the bu
7     const result = await client.chat.pos
8       channel: welcomeChannelId,
9       text: 'Welcome to the team, <@$ev
10   });
11   logger.info(result);
12 }
13 catch (error) {
14   logger.error(error);
15 }
16 };
```

<https://slack.dev/bolt-js/>



Like a **single book**, so to speak,
with **chapters** and **sections**!





- Observation: Bolt is a **product**!
- Follow-up question: “What if I have **several** products or cloud services **from the same provider** in my thesis?”
→ **Then treat each product individually! Treat each service individually!**
- Examples:
 - RDS/Aurora: <https://docs.aws.amazon.com/rds/>
 - DynamoDB: <https://docs.aws.amazon.com/dynamodb/>
 - Redshift: <https://docs.aws.amazon.com/redshift/>
 - Cognito: <https://docs.aws.amazon.com/cognito/>
- List **each of** these **individually in the bibliography!**
(The previous slide is ONLY about this: do not include any individual subpages!)
- **DO NOT** generalise to the entire provider and **DO NOT** use only the root URL <https://docs.aws.amazon.com/>. This would be equivalent to citing a collection of books and is not appropriate.





‘Don’t blow the importance of a single logical internet source with composite subpages into too many separate references in the bibliography!’

Prof. Dr.-Ing. Christoph P. Neumann

Example: The Docker or Kubernetes documentation.

Think of this as a book or document, with sections that are manifested here not as paper pages but as individual sub-webpages. Would you go through a book and list all the chapters individually as sources?

Hardly!

With standard sources, you would use page numbers or section references.

With online sources, page numbers are obviously not possible, so include the specific section details in your running text together with a single source reference.

You can also add the exact URL to the section details via a footnote.

The main thing is that the bibliography generally contains only **one entry per logical document as a whole**.





“Academic journals (also known as journals) are not to be confused with journalistic specialist publications (also known as consumer magazines or specialist magazines) such as c’t, iX, etc.! A C O M P L E T E L Y D I F F E R E N T

Prof. Dr.-Ing. Christoph P. Neumann

If you don’t know what scientific journals are, then the separate “..._EXT” set of slides (“For the researchers amongst you”) is the place to start!





FAQ: Internet sources should only be cited with 'last accessed on' if no publication date is visible on the website.

■ Internet sources

■ Good:

- Authorities
 - Individuals: Martin Fowler, Robert C. Martin, ...
 - Open source organisations: <https://opensource.com/resources/organizations>
- Technical specifications (OMG, W3C, OSGi, IETF RFCs, OASIS, ...)
 - Getting started/Overview:
https://www.w3.org/WoT/IG/wiki/How_does_W3C_compare_to_other_organizations
- Framework documentation
 - The primary source of documentation, provided by the vendor or FOSS project

■ Poor:

- Blogs
- Wikipedia or tertiary sources (such as other bachelor's and master's theses)
- Journalistic online articles by organisations or individuals with unknown quality assurance





**‘Naturally, you should cite not quote from Wikipedia. But if I catch you haven’t even familiarised yourself familiar with the relevant Wikipedia articles on your subject areaafter four weeks, then that’s a problem!!
Read: Yes! Understand: Yes! Cite: No, but rather identify primary sources!’**

Prof. Dr.-Ing. Christoph P. Neumann

For example, a dissertation entitled “... Real-time analyses in Kubernetes ...”:
https://en.wikipedia.org/wiki/Real-time_testing
https://en.wikipedia.org/wiki/Real-time_computing





‘Naturally, you should cite not cite **chatbots, not even with the prompt specified as is currently common in non-academic articles is currently common. Chatbots are not primary or secondary sources. They are them as **a tertiary source**, like Wikipedia. Of course, you can still use chatbots from time to time for inspiration! Read: Yes! Understand: Yes! **Cite: No, but find primary sources instead!’****

Prof. Dr.-Ing. Christoph P. Neumann





■ Secondary literature

- LMGTFY: <https://www.google.com/search?q=tertiärliteratur>
- Secondary sources are generally not suitable for citation as evidence in academic work
- In particular, avoid 1) most Bachelor's and Master's theses, 2) all encyclopaedias such as Wikipedia, 3) most blogs, and 4) chatbots
- Blog posts are permissible only if this form of publication constitutes the primary means of publication or documentation relating to a renowned authority, technology or project
- You should also only cite dissertations and postdoctoral theses for their original research approaches and results (primary) – and not sections in which foundational concepts are summarised (secondary/tertiary)

■ Sources that have **not** undergone academic peer review

- are initially suspected of being of poor quality
- For example, technical reports or preprints, such as those from arXiv.org, as well as, of course, theses, Wikipedia, blogs, chatbots, ...

■ As a general rule: **EVERYTHING** is citable (even telephone calls and conversations)

- BUT: for academic references, always use the highest-quality source available!
- (this means that technical reports and preprints are sometimes indirectly citable)





Sources:

**citation-
format**



**citation-
worthy**

Virtually everything
can be cited!

(Even personal conversations, emails
and internal/confidential documents)

You must learn
is something you'll have to learn!

(Generally not suitable for citation:
Internet sources, technical reports,
Bachelor's/Master's theses,
encyclopaedias/secondary literature, ...,
emails, conversations)



The difference between primary literature, secondary literature and tertiary literature

358



LMGTFY: <https://www.google.com/search?q=tertiärliteratur>

	Beispiel Primärquelle	Beispiel Sekundärquelle	Beispiel Tertiärquelle
BEISPIEL	„Der Handschuh“ von Friedrich Schiller	„Schiller-Bibliographie 1975-1985“ von Bärwinkel et al.	„Schiller, Friedrich“ in Deutsche biographische Enzyklopädie von Vierhaus (Hrsg.)
QUELLEN-ANGABE	Schiller, Friedrich (1798): <i>Musen-Almanach für das Jahr 1798</i> , S. 41–43, Tübingen: J. G. Cotta.	Bärwinkel, Roland; Lopatina, N. I.; Lopatina, Natalja & Mühlpfordt, Günther (1989): <i>Schiller-Bibliographie 1975-1985</i> , Zentralbibliothek der Deutschen Klassik 1989, Berlin u. a.: Aufbau-Verlag.	Vierhaus, Rudolf (2007): <i>Deutsche biographische Enzyklopädie</i> (2., überarb. und erw. Ausg.), Band 8 (Poethen – Schlüter), hrsg. von Rudolf Vierhaus, S. 859 f., München: K. G. Saur.
DEFINITION	Rohdaten; ursprüngliche Informationsquellen, bevor sie ausgewertet wurden.	Quellen, die Primärdaten analysieren oder interpretieren.	Quellen, die Daten zu einem bestimmten Thema zusammenstellen.
MERKMALE	Beobachtungen aus erster Hand, zeitgenössische Darstellungen von Ereignissen, zeitgenössische Sichtweisen.	Interpretationen von Informationen, die nach dem Ereignis geschrieben wurden, bieten eine Überprüfung oder Kritik.	Sammlungen oder Verzeichnisse von Primär- und Sekundärquellen, Nachschlagewerke, Suchtools für Quellen.
KATEGORIEN	Interviews, Reden, Studien, Tagebücher, Geburtsurkunden, Paper, zeitgenössische Zeitungsartikel	Biografien, Zeitschriftenartikel, Lehrbücher, Kommentare, Leitartikel, Literaturkritiken.	Enzyklopädien, Bibliografien, Zusammenfassungen, Indizes, Literaturübersichten, Bibliothekskataloge, Datenbanken. Plus: chatbots

<https://www.acad-write.com/ratgeber/tipps/primaer-sekundaer-tertiaerliteratur/>





SEKUNDÄRQUELLEN KÖNNEN ZU PRIMÄRQUELLEN WERDEN

Ob eine Quelle primär oder sekundär ist, hängt auch vom **Thema** der **Bachelorarbeit**, **Masterarbeit** usw. ab. Wenn eine literarische Abhandlung (z. B. über Erbkönig), die im Veröffentlichungsjahr eine Sekundärliteratur war, nach vielen Jahren im Rahmen einer wissenschaftlichen Arbeit mit der **Forschungsfrage** „*Wie war die Rezeption der Leser von Erbkönig in DDR-Zeit?*“ als Quelle herangezogen wird, so ist diese Quelle als Primärliteratur zu werten.

Unterschied Primärzitat und Sekundärzitat

Primärzitat

Beim Primärzitat wird **direkt aus einer Originalquelle zitiert**.

Sekundärzitat

Beim Sekundärzitat wird **indirekt aus einer Quelle zitiert**, d. h. das Zitat wird nicht aus der Originalquelle zitiert, sondern aus einer anderen Quelle (Sekundärliteratur), die die Originalquelle zitiert. Sekundärzitate sind somit Zitate **aus "zweiter Hand"** und werden mit **"zitiert nach"** gekennzeichnet. Aufgrund der fehlenden Überprüfbarkeit des Zitats sollte **möglichst auf Sekundärzitate verzichtet** werden. Bei fehlendem Zugang zur Originalquelle oder wenn die Originalquelle verloren gegangen ist, ist die Nutzung eines Sekundärzitats legitim.



**Correction marks and nursery school
mistakes**



Correction symbols in accordance with DIN 16 511 Custom correction symbols

Falsches Zeichen	I F L	Wortreihenfolge	□
Zeichendreher	Π		
Falsches Wort	H		
Absatz	J		
		zu viel Zeilenabstand	→
Wort zusammen	C	zu wenig Zeilenabstand	←
Deleatur-Zeichen	M	fehlende Zeile	
Absätze verbinden	~	Wortabstand zu groß	↑
		Wortabstand zu klein	↓
		Korrektur rückgängig	

Symbol	Meaning
R	Spelling
Gr	Grammar
A	Expression
Fs	Technical language errors
Bg	Reason missing/incorrect
Q	Source citation missing/incorrect
Lg	Logic
W	Repetition
f	false
uk	unclear
ul	illegible (especially graphics)
ug	inaccurate
uv	incomplete
FvH	Falls from the sky





1. Introduction

Global supply chains have been imposed to the biggest challenges due to the tragic spread of coronavirus since the end of year 2019. Its impact was immense as it uncovered supply chain vulnerabilities most businesses were unaware of. World spread forced isolation was a necessity, which inevitably led to long term changes: shifting to more flexible and resilient business models. Priority was given to speed of decision-making, greatly facilitated by specialized IT solutions. Business leaders are more than ever responsible for sustainable operations, satisfied customers and wellbeing of their employees. Recent Accenture research has shown that 75 % of fortune 1000 companies experienced a negative to severe impact of COVID-19 on its performance [1]. It also indicates the growing cost of supply chains and operations, which commonly account for the largest part of all costs.

Labor shortages, short-term changes and demand changes are most challenging in the field of OR. The analysis of requirements and current business processes should result in recommendations for consistent and adaptive planning. In our case we see a big potential of improving the way the current scheduling is being planned. This can be achieved after a comprehensive analysis of current processes and comparison of existing successful solutions for the similar problem.

The optimization problem of operational planning and scheduling has been studied since 1930 and first formulated as a TSP, which served as a starting point for further complex problem formulations in various fields of Mathematics, Computer Science etc. The main idea is to define the shortest path, which goes through all the nodes once and terminates in the start node. Since Karp in 1972 has proven the TSP to be NP-hard, the research around it has started to evolve, resulting in new algorithmic approaches. Another problem, considered as a generalization of TSP, is called VRP and compared to TSP, generates multiple routes.

You must always introduce your abbreviations properly within the running text!

A list of abbreviations at the start of the main text (as not shown in this specific example) is no excuse for this!

Those marked with a blue dotted line are possible exceptions ('NP-hard' is well known beyond the field of computer science), but the scope for exceptions is very narrow.





<https://cyberlytics.eu/theses/guide/>

Selbstkorrektur / Checkliste

- Wurden alle **Kindergartenfehler** (s. unten) ausgebügelt?!
- Ist das Literaturverzeichnis mind. 3 Seiten lang?
 - Bei Bachelorarbeiten ist das ein absolutes Minimum - es sollte eigentlich umfangreicher sein
 - Bei Masterarbeiten sollte das Literaturverzeichnis deutlich umfangreicher sein

Vorkorrektur / Vorab-Review

- Es gibt KEINE Vorkorrektur durch den Erstprüfer oder Zweitprüfer
- Einzelne Abschnitte können dem Erstprüfer dennoch zum Vorab-Review vorgelegt werden, allerdings in Summe nicht mehr als 10 Seiten (also 20% von geplanten 50 Seiten)
- **WICHTIG:** bereits während ihr schreibt: erklärt die Arbeit / Fragestellung / Konzepte euren Freunden und reflektiert daran, welche Aspekte bei der Beschreibung besonders relevant sind
- Das Vorab-Review ist ein nicht-garantiertes (Betreuer!) Angebot, das auch freiwillig (Student!) angenommen wird.
 - (übergebt mir eure Fassung einfach als PDF per Mail; der Ausdruck der Vorfassung soll euch nichts kosten daher mach ich das selbst)
- Ich limitiere die Review-Zeit auf 6h pro Abschlussarbeit (damit sind Reviews von 10 Seiten problemlos abbildbar)
 - Die Qualität und Lesbarkeit beeinflusst stark den Aufwand des Reviews
 - Ihr könnt unfertige Kapitel rausnehmen, müsst das aber nicht
 - Bitte Leseanweisungen/Prioritäten geben

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- Die Vorfassung muss allerspätestens zwei Wochen vor offizieller Abgabe zum Vorab-Review durch den Erstprüfer vorgelegt werden.
 - Idealerweise wird das Angebot für ein Vorab-Review deutlich früher in Anspruch genommen.
 - Eine Woche brauche ich um es mir terminlich einzutakten.
 - Eine Woche braucht der Student um Änderungen noch einpflegen zu können und um die Anmerkungen/Erkenntnisse auf die anderen Teile der Arbeit zu übertragen
 - Die Initiative liegt seitens des Studenten (dass die Vorkorrektur durchgeführt wird): Wenn die Vorfassung zu spät bei mir ankommt (bspw. erst eine Woche vor Abgabe) lehne ich ein Vorab-Review und -Feedback auch ab.
- **Wichtig I:** Bitte vor Überreichung einer Vorfassung unbedingt nochmal den Abschnitt **“Kindergartenfehler”** (s. unten) durchgehen und diese vermeiden!
- **Wichtig II:** Vorher dafür sorgen, dass alles was ich lesen soll schon von einem Freund/Bekannten vorkorrigiert wurde!

Wissenschaftliches Schreiben

Lesen Sie sich die folgenden Hinweise dreimal durch: vor Beginn der Arbeit, vor Beginn der Schreibphase und vor Ihrer Abgabe!

Vermeidbare Fehler (aka **“Kindergartenfehler”**)

- Falscher Einsatz von “das” und “dass”

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- Schwankender Numerus, also eine Mischung von Einzahl und Mehrzahl
- Lange und falsch gebaute Sätze (Aussagen gehören in Hauptsätze; Nebensätze dienen der Präzisierung und Verknüpfung)
- Fehlende Kommata vor oder nach Relativsätzen und erweiterten Infinitiven; es darf nicht passieren, dass es wegen falscher Interpunktion mühsam ist einen Text zu lesen
- Bitte Grundkenntnisse der Textverarbeitung in TeX oder Word aneignen! (Bsp.: In *.tex-Dokumenten trennt man Absätze mit Leerzeilen voneinander! Sie müssen in LaTeX nach einem Punkt, welcher der Abkürzung dient, das Leerzeichen escapen, sonst glaubt LaTeX, dass es sich um ein Satzende handelt und macht ein sichtbar falsches Spacing! etc. pp.)
- Einführen von Abkürzungen, nicht vorhanden oder nicht einheitlich
- Bilder:
 - Bilder, Tabellen, Codelistings, etc. die im Text nicht beschrieben werden? Gehen gar nicht!
 - * Man spricht auch von benötigter *textueller Verankerung* der Bilder/Tabellen/Codelistings/...
 - * Bilder et al. sind essentiell, müssen aber dennoch textuell beschrieben werden (!!)
 - * Die Beschreibung der Bilder muss derart vollständig sein, dass die Arbeit auch verständlich wäre, wenn man alle Bilder entfernt (!)
 - * Machen Sie das. Immer. Fragen Sie mich erst gar nicht nach Ausnahmen!
 - Bei Bildern ist es günstig, wenn die Verankerung und Teile der Beschreibung vor dem Bild stehen
 - Aussagekräftige Bildunterschriften verwenden
 - Wenn Sie Abbildungen mitten in einer Seite platziert, dann müssen diese immer zwischen zwei Absätzen stehen (sie dürfen einen Absatz nicht “brechen”)
 - Schlechte Qualität der Bilder (weil Screenshots oder aus dem Netz oder unpassende Schriftart, die im Kontext der Arbeit negativ hervorsteht.) Lösung: Selber nachzeichnen! Fei echt. (Alternative zum nachzeichnen: Professionelle Bildbearbeitung, bspw. mittels Krita, zur Ent-



Special Topic

Stylistic issues



% **Standard** LaTeX

```
\begin{itemize}  
\item Keyword one  
\item Keyword two  
\end{itemize}
```

Ausgabe:

- Stichwort eins
- Stichwort zwei



```
\usepackage{paralist}  
% ...  
\begin{compactitem}  
\item Bullet point 1  
\item Bullet point 2  
\end{compactitem}
```

Ausgabe:

- Stichpunkt 1
- Stichpunkt 2



Created by kasminah
from the Noun Project

Bullet points



% **Standard** LaTeX

```
\begin{enumerate}[(i)]  
\item Bullet point 1  
\item Bullet point 2  
\end{enumerate}
```

Ausgabe:

- (i) Stichpunkt 1
- (ii) Stichpunkt 2



```
\usepackage{paralist}  
% ...
```

```
\begin{compactenum}[(i)]  
\item Bullet point 1  
\item Bullet point 2  
\end{compactenum}
```

Ausgabe:

- (i) Stichpunkt 1
- (ii) Stichpunkt 2



Created by kasminah
from the Noun Project

Numbered lists

Negative example

This would have been much more concise and better with Paralist!
(Due to a lack of visual density, it also gives the false impression of being lacking in substance.)

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5. The number of provided check-ups (maximum 16 per day) depends on the customer, if more is desired, days of service on the customer site are extended.
6. Customer and service provider negotiate the dates and number of service days.
7. After the agreement is met, the service provider starts to plan the resources amount required for a service provision.

Each point in more detail:

- The B2B customer (from here - customer) is the initiator of the call. This can be an existing customer, or a customer interested through referral marketing. The call is made without a specific rule. Following types are possible:
 - The customer is not new, and the location is already in the DB / list;
 - The customer is not new, and the location is not in the DB / list.
- The customer names a location that can provide necessary rooms, parking space, etc.;
- Depending on the number of check-ups, a compromise for the number of days on the customer site is found;
- The service provider can either reject or accept the proposal. Nevertheless, he always tries to take the customer's wishes into account;
- The service provider can either give initial approval (and make an agreement at the second contact) or cancel if there is not enough time or resources for planning before the assignment;
- The priority in planning generally remains the profit from services offered - this should cover the costs;
- As resources; workforce (coaches), equipment (software, materials, etc.), time (enough time between the assignments themselves).

Factors that can hinder the route planning and are not included in the formulation of the current problem, as they drastically increase the overall complexity:

- Missing data
 - Number of checkup days are not / cannot be pre-planned for all customers;
- Sudden events
 - External factors
 - customer cancels checkup at short notice;
 - customer wants a checkup, but the time does not fit;
 - Internal factors
 - Employee / driver (coach) is absent due to illness (before or during the assignment);
 - Car is out of order;
 - Equipment (hardware) is out of order;
 - Materials are out;

- the speed of the vehicle used in calculations depends on the road, weather, and other relevant conditions;
- each start-depot can be serviced with different vehicles;
- returning back to the depot depends on the employee workload capacity;
- customer can be visited more than once, if the service cannot be fully performed, depending on the employee workload capacity;
- one vehicle is assigned to one driver;
- if a driver is not able to serve customers, reassign its vehicle to another driver;
- the transportation cost of each vehicle depends on the traveled distance;
- vehicle fixed costs such as amortization are included in the equation;
- time window limitations are defined according to each customer demand;
- in the real-world distance between 2 nodes is often asymmetric;
- the number of vehicles, depots and customers are given but can dynamically change:
 - initial number of vehicles: 7;
 - initial number of start depots: 7;
 - initial number of hardware equipment needed to serve a customer: 7;
 - initial number of total customer locations: 154.

Time windows, that are also present for the stakeholder:

- time windows are proposed by customers and compromised together with the service provider;
- the period of time during which a service can be started, e.g., accept service hours only from 8 to 10 o'clock;
- duration of each customer visit equals to the booked service units;
- work break should also be included and planned;
- non-productive time windows not related to work should be minimized.

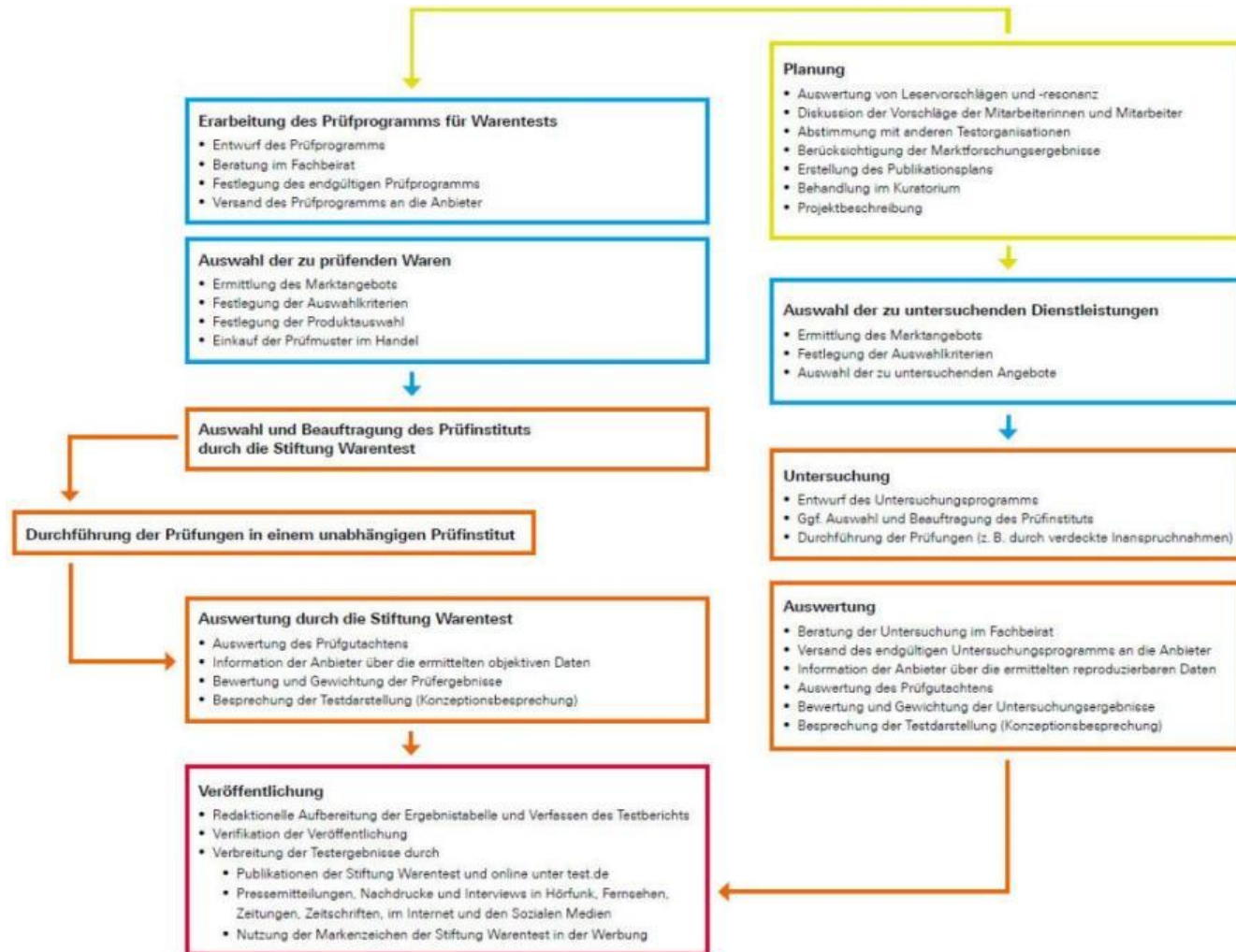
As VRP with time windows is hard to solve when containing anything bigger than 100-150 nodes, we have decided not to include them into the current problem definition.

In the table below we define some variable costs which are used in some of the scenarios outlined later. The total cost per km is reduced to a fixed constant variable per km, excluding the maintenance cost. This is set for the vehicle type Caddy with an average consumption of 7 liters / 100 km of fuel "Super" [11]. Cost accuracy can be later enhanced by obtaining real-time fuel prices, for example from the website "Tankerkönig" with the data from more than 14000 gas stations, yet this is out of scope for the stated problem.



Special Feature

Product Test





Wie testet und bewertet die Stiftung Warentest?

Fast alle Deutschen kennen die Stiftung Warentest und die meisten von ihnen vertrauen den Testergebnissen.

- Aber wie kommen diese zustande?
- Nach welchen Kriterien werden Produkte für einen Test ausgewählt?
- Wie werden diese beschafft?
- Wer macht die eigentlichen Prüfungen, und wie werden die Messergebnisse bewertet?

In diesem Artikel erklären wir Schritt für Schritt, wie eine Untersuchung der Stiftung Warentest abläuft und welche Überlegungen dabei eine Rolle spielen.

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© Stiftung Warentest | Bereich Untersuchungen | Mai 2021

Famous:

+++,+,O,-,-

+++,+,O,-,-

Also today:

+++,+,O,Θ,-

BUT NOT:

~~Possible, Possibly possible, Not possible~~

~~5,4,3,2,1~~





++,+,O,-,---

Scale for these assessments
to **be** specified
specify **individually!**

In other words:

Key
of the symbols in your table





2. Die Testkonzeption

Hat das Kuratorium den Themenvorschlag nicht abgelehnt, setzen sich Redakteur, Wissenschaftler und Marktanalytiker zusammen und planen den Test. Dabei stehen folgende Fragen im Vordergrund: Welches Marktsegment soll geprüft werden? Wie viele Waren oder Dienstleistungsangebote werden in den Test einbezogen? Was sind die Kernpunkte des Untersuchungsprogramms? Und was wird die Untersuchung kosten?

Für die Auswahl des Segments und die konkreten Produkte spielen die ermittelten Marktzahlen eine große Rolle. Je häufiger ein Produkt verkauft wird, desto eher wird es in einen Test einbezogen. Die marktführenden Produkte sind in der Regel immer dabei. Aber auch technische Neuheiten werden bevorzugt ausgewählt. So gab es zu den ersten klappbaren Smartphones schnell Testergebnisse. Aber auch der Anteil an Bio- und fair gehandelten Produkten im Testfeld ist meist etwas höher als deren tatsächliche Marktbedeutung, da die Stiftung dazu viele Nachfragen erreichen. Gerade in Warentests ist die Anzahl der Testplätze begrenzt; deshalb können regionale Produkte oder solche von kleineren Herstellern häufig nicht berücksichtigt werden. Anders sieht die Situation bei vielen Finanzdienstleistungen aus: Hier wird häufig eine sogenannte Vollerhebung durchgeführt. Das heißt, dass alle auf dem Markt angebotenen Produkte (z. B. Investmentfonds oder Krankenversicherungen) in den Test einbezogen werden. Teilweise werden allerdings „Eingangshürden“ definiert, zum Beispiel ein Mindestleistungsumfang bei einer privaten Krankenversicherung.

Anschließend entwirft der zuständige Projektleiter der Stiftung ein Testdesign. Er oder sie hat in der Regel eine einschlägige wissenschaftliche Hochschulausbildung, ist also beispielsweise Lebensmittelchemiker, Sportingenieur, Sozialwissenschaftler, Jurist oder Wirtschaftswissenschaftler. Der Projektleiter nimmt in dieser Phase auch schon Kontakt mit Prüfinstituten und anderen Sachverständigen auf und bespricht mit ihnen, welche Inhalte das Untersuchungsprogramm haben sollte. In vielen Fällen bilden die einschlägige Normung und rechtliche Vorgaben einen Teil des Prüfprogramms. Das ist aber häufig nicht ausreichend. Für viele Prüfpunkte gibt es keine passenden Normen (z. B. Handhabungsprüfungen), und für wieder andere Prüfungen sind die Normen nicht oder nicht mehr praxistgerecht (z. B. Betriebsfestigkeit von Fahrrädern). Es kommt auch vor, dass es noch gar keine definierten Anforderungen an die Qualität eines Produkts gibt, zum Beispiel bei einigen Dienstleistungen. In diesen Fällen geht die Stiftung Warentest in ihren Prüfanforderungen über das Normenwerk hinaus, wendet andere Verfahren an oder entwickelt mit Experten die jeweiligen Qualitätsanforderungen. Dabei orientiert sich die Stiftung, wo immer möglich, an freiwilligen Qualitätsstandards (z. B. in Gütezeichen) oder anderen wissenschaftlichen Erkenntnissen (z. B. des Bundesinstituts für Risikobewertung (BfR)). Bei Warentests führt dieses Vorgehen immer wieder zu Diskussionen, weil manche Verfahren nur von einigen wenigen Labors angeboten werden oder nicht allen Anbietern ausreichend bekannt sind.

Schon Mitte der 1980er Jahre hat der Bundesgerichtshof jedoch entschieden, dass dieses Vorgehen zulässig ist, ja dass die Stiftung Warentest in Sicherheitsfragen geradezu gefordert ist, die Angemessenheit von DIN-Normen aus Verbrauchersicht zu hinterfragen und auf vorhandene Mängel in der Öffentlichkeit hinzuweisen. Aber auch über Rechtsnormen darf die Stiftung hinausgehen und insbesondere bei den Anforderungen an die Produktsicherheit im Interesse des Verbraucherschutzes strengere Anforderungen zu Grunde legen. Der

- **First, the test design and the test criteria. Then the testing.**
 - **Not:** “How I did it!” and then “How I felt!” (⚡)
- **The rating scale (+,+,+,O,-,-) should be relative to the market segment.**
 - In the case of final-year projects, there may be only a few ‘products’ undergoing comparative evaluation. This is problematic. ⚡
 - Then, rather than just evaluating them relative to one another, also look for objectifiable **minimum requirements** and **best-in-class benchmarks** within the broader market segment, and specify these as **benchmarks** in the thesis
 - **Quantify** where possible (!)
 - It is better to reconsider extreme ratings in terms of proportionality!





mit „mangelhaft“ zu bewerten. So würden unter Umständen aus kleinen Qualitätsunterschieden große Notendifferenzen. Deshalb steht hier immer die Frage nach der Relevanz für den Verbraucher im Vordergrund, die möglichst mit objektiven Kriterien ermittelt wird. Wenn alle Produkte in einer Testdisziplin eine ähnliche Qualität aufweisen, dann bekommen sie auch eine ähnliche Note. Andererseits ist ein wesentliches Ziel von vergleichenden Tests, Verbrauchern die Qualitätsunterschiede der Produkte am Markt auch mit unterschiedlichen Noten anschaulich zu machen. Im Einzelfall kann das eine Gratwanderung sein, die vom Projektleiter viel Fingerspitzengefühl erfordert.

Sind nun die einzelnen Messwerte und übrigen Ergebnisse bewertet, erfolgt im nächsten Schritt die Zusammenfassung der Urteile. Jedes einzelne Urteil erhält dabei eine unterschiedlich starke Gewichtung, die sich aus der Relevanz der entsprechenden Eigenschaft ergibt. Die Stiftung Warentest unterscheidet dabei zwischen Qualitätsurteil, Gruppenurteilen und Einzelurteilen, die in einer Testtabelle zusammengefasst werden. In ihr finden sich Einzelurteile, die als Symbole $++$, $+$, $\circ$, $\ominus$, $-$ ausgewiesen werden. Die Gruppenurteile beschreiben einzelne Prüfkategorien wie z. B. Handhabung und sind in der Tabelle gelb unterlegt. Das Gruppenurteil besteht aus einer Note, ergänzt um eine Dezimalzahl (z. B. „gut (2,3)“). Die Gesamtnote ist das test- oder Finanztest-Qualitätsurteil (z. B. „GUT (1,7)“). Auch wenn in der Tabelle bei den Einzelurteilen nur ganze Notenstufen und bei den Gruppen- und Qualitätsurteilen nur Zehntelnotenstufen gezeigt werden, wird im Hintergrund stufenlos gerechnet. So kommt es manchmal zu der Situation, dass ein Produkt auf den ersten Blick bessere Einzelurteile hat als ein anderes, das Gruppenurteil aber schlechter ausfällt. Keine Sorge, die Stiftung verrechnet sich an dieser Stelle nicht.

Nachdem nun alle einzelnen Urteile eine Gewichtung erhalten haben und über mehrere Zwischenschritte zu einem Qualitätsurteil zusammengefasst wurden, ist die Bewertung aber noch nicht abgeschlossen. Unter bestimmten Umständen nimmt die Stiftung auch sogenannte Abwertungen vor. Was verbirgt sich dahinter? Bei der Bewertung der Gesamtqualität geht die Stiftung davon aus, dass Schwächen einzelner Eigenschaften nur in begrenztem Umfang durch Stärken in anderen Eigenschaften kompensiert werden können. Würden keine Abwertungseffekte vorgesehen, wäre rechnerisch eine sehr weitgehende Kompensation möglich, was aber nicht den Erwartungen der Verbraucher an die Produktqualität entsprechen dürfte. Ein Beispiel: Eine Waschmaschine, die sehr wenig Energie verbraucht („sehr gut“), aber die Wäsche nicht sauber wäscht („mangelhaft“), würde ohne Abwertungseffekt mit der Gesamtbewertung „befriedigend“ den Test verlassen. Erst eine Abwertung bewirkt, dass die schwache Leistung in der Hauptfunktion sich auch entsprechend auf das Qualitätsurteil auswirkt. Die typische Formulierung „Das test-Qualitätsurteil kann nicht besser als das Urteil für Waschen sein“, beschreibt diesen Abwertungseffekt.

Wenn sehr viele Einzelprüfpunkte untersucht werden, sorgen Abwertungen dafür, dass Produktunterschiede nicht „weggemittelt“ werden. Auch dazu ein Beispiel: In Handhabungsprüfungen werden meistens mehrere dutzend Einzelnoten ermittelt, die die verschiedenen Handhabungsaspekte beschreiben. Wenn nur eine dieser Noten schlecht ausgefallen ist, würde das beim Zusammenrechnen kaum ins Gewicht fallen. Wenn aber diese Eigenschaft für den täglichen Gebrauch von großer Relevanz ist (z. B. das Einfüllen von Wasser in eine Kaffeemaschine), dann gewährleistet der Abwertungseffekt, dass das Urteil für die Handhabung nicht zu gut ausfällt.

- **Weighting (!) between the criteria is possible and sensible**
 - Don't forget
- **Deductions are possible**





Utility analysis

Also known as the point-value method or point-scoring method as well as the weighted sum model (WSM), weighted linear combination (WLC) or simple additive weighting (SAW)

Introduction:

<https://de.wikipedia.org/wiki/Nutzwertanalyse>

https://en.wikipedia.org/wiki/Weighted_sum_model

See Anja Stricker's bachelor's thesis (2022):

Nutzwertanalyse

Um die Entscheidungsfindung über die Wahl von geeigneten Alarmierungsmethoden zu vereinfachen, kann eine Nutzwertanalyse aufgestellt werden. Die Nutzwertanalyse dient der systematischen Entscheidungsvorbereitung durch Bewertung und Auswahl optimaler Alternativen und eignet sich besonders, wenn der Gesamtnutzen aus unterschiedlichen Teilnutzen zusammengesetzt ist [12, S. 43].

Mit der zuvor erstellten Tabelle 4.1 kann für jede Spalte eine eigene Nutzwertanalyse erstellt werden. Durch Betrachtung der einzelnen Attribute kann eine Kennzahl gebildet werden, welche den Nutzen einer Methode darstellt [12, S. 43]. Die Formel für die Berechnung des Gesamtwertes einer Methode lautet:

$$v(a) = \sum_{r=1}^m w_r v_r(a_r) \quad (4.1)$$

Dabei steht w_r für die Gewichtung und $v_r(a_r)$ für die Bewertung der Ausprägung a_r . Eine Bewertung kann von 0,0 bis 1,0 vergeben werden. Je höher der Wert, desto besser ist die Bewertung.

[12] Managing with Method: Tools for Individual Solutions.
Springer-Verlag, 2013. <https://link.springer.com/book/10.1007/978-3-663-05929-5>



Special Topic

Embarrassing moments



Ostbayerische Technische Hochschule Amberg-Weiden
Fakultät Elektro- und Informationstechnik

Studiengang Industrie-4.0-Inforamtik

Bachelorarbeit

von

Ostbayerische Technische Hochschule Amberg-Weiden
Fakultät Elektrotechnik, Medien und Informatik

Studiengang Medianinformatik

Bachelorarbeit

von

Find
the **mistake**
in both images!



Check
your
cover page!

... **the names** and
titles of your examiners...
... Date and **year** ...

Phew!

Have **someone**
third person to proofread it, s
isn't too close to the subject t



Issue $\triangleq$ Registration

FAQ: Checklist before submitting your thesis



**Important
!**

Hochschule • Fakultäten

Elektrotechnik, Medien und Informatik

Stadium Hochschule International Weiterbildung Forschung

Jetzt bewerben

Fakultät EMI

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Veranstaltungen

Forschung

Downloads

› Stundenpläne, Studienpläne/SPOs

› Abschlusssarbeiten: Formblätter & Vorlagen

› Fotos Absolventenverabschiedung

Personen

ABSCHLUSSARBEITEN: FORMBLÄTTER & VORLAGEN

Formblätter und Richtlinien zur Erstellung der Bachelor- bzw. Masterarbeit

- Bachelorarbeit
- Masterarbeit

LaTeX-Vorlage für eine Bachelor-/Masterarbeit an der Fakultät EMI

- LaTeX-Vorlage

FOTOS ABSOLVENTENVERABSCHIEDUNG

Absolventenverabschiedung

CHAT

ZIP file!

[https://www.google.com/search?q=OTH-AW+EMI+Downloads+Bachelor's thesis+Master's thesis](https://www.google.com/search?q=OTH-AW+EMI+Downloads+Bachelor's+thesis+Master's+thesis)

Why isn't there a direct link on oth-aw.de?

Our website is being redesigned too often 🤖





Bachelor's Thesis.doc:

**OTH
Amberg-Weiden**
Elektrotechnik, Medien
und Informatik

Ausgabe des Themas der Bachelorarbeit
(zu § 12 der Allgemeinen Prüfungsordnung der Ostbayerischen Technischen Hochschule Amberg-Weiden)

Studiengang:

Kandidat/Kandidatin der Bachelorarbeit: Semester:

Aufgabensteller/Betreuer:

Zweitprüfer: 

Die Bachelorarbeit wird außerhalb der Hochschule durchgeführt bei der Firma/
Einrichtung:

Betreuer in der Firma/Einrichtung:

Telefon:

Titel der Bachelorarbeit

Deutscher Titel:

Englischer Titel:

Beschreibung der Aufgabenstellung: 

The **second examiner** is now
is now required at the time of registrati
of your thesis!

(Previously, this role had to be confirmed by the time
acceptance $\triangleq$ submission...)

By the student!

Write: **'see synopsis'**





Confirmation of fulfilment of the Admission Requirements (New).doc



Bestätigung der Erfüllung der Zulassungsvoraussetzungen zur Anmeldung der Bachelorarbeit

Frau/Herr:.....

Studiengang/ Semestergruppe:.....

- ☐ Hat die Zulassungsvoraussetzung zur Anmeldung der Bachelorarbeit nach § 9 der jeweiligen SPO erfüllt.
- ☐ Die Zulassungsvoraussetzungen wurden noch nicht erfüllt, es fehlen noch folgende Nachweise:

From the Student Office!

- Dieses Formblatt ist vor der Anmeldung dem betreuenden Professor vorzulegen und zusammen mit dem Anmeldeformular zur Bachelorarbeit wieder im Dekanat abzugeben!
- Die Abschlussarbeit ist vom Studierenden auch im PRIMUSS-Portal **online** einzutragen und anzumelden.

Registration for external Bachelor's thesis.doc



Anmeldung einer externen Bachelorarbeit

An den Dekan
der Fakultät Elektrotechnik, Medien und Informatik
Ostbayerische Technische Hochschule Amberg - Weiden
Kaiser - Wilhelm - Ring 23

92224 Amberg

Datum:

Wir beabsichtigen, in unserem Hause

Firma/Behörde/Abteilung

Anschrift

in Zusammenarbeit mit der Studentin / dem Studenten
eine Bachelorarbeit durchführen zu lassen.

Der Titel der Arbeit

wurde mit dem F...
abgestimmt

Die Betreuung ...

Frau / Herr

Abteilung

Telefon / Fax - Nummer

Das Merkblatt „Externe Bachelorarbeiten“ haben wir zur Kenntnis genommen. Wir verpflichten uns, diese Richtlinien einzuhalten.

Für die Firma/ Behörde (Stempel/ Unterschrift) Betreuer in der Firma/ Behörde (Unterschrift)

From the external company!

Only upon my request should you enter this in PRIMUSS!





- The most important element in the EMI ZIP file:
 - [EMI_Information_Sheet_Theses_AH_20220704.pdf](#)
 - ➔ **READ** THIS! Among other things, this document describes **the registration procedure**
- To register your thesis, you will need the so-called **submission form**:
 - Using a Bachelor's thesis as an example:
 1. [Submission-Bachelor-Thesis.doc](#)
 - (including, amongst other things, **the title of the thesis**, **the issue date** and **the submission deadline**)
 - **English title**: Please observe the CMOS rules for English capitalisation (see slide 'English title of the thesis')
 2. [Confirmation of fulfilment of admission requirements \(new\).doc](#)
 - (Do not complete this yourself. Request it **from the Student Office in advance!**)
 - In the event that the final dissertation is carried out in collaboration with a partner company (so-called "external Bachelor's thesis"):
 3. [Registration for external Bachelor's thesis.doc](#)
 - This form must be **signed by the partner company!**
 - (including the business address and contact details of the external supervisor)



Important!



- Useful resources from this slide set regarding the submission form:
 - Slide section 'Basic Information' → regarding the issue date and submission deadline
 - (as well as the sections 'Basic Timetable' and 'Timetable with a Buffer Month')
 - Slide section 'Checklist: Title of your thesis' → regarding the title of the thesis
 - Single slide 'English Title of the Thesis' → regarding the English title of the thesis

Final notes:

1. Sign the submission form and scan it
 - Please use a scanner, NOT a mobile phone! → No scanner? Send a draft via photo for me to review, but then have it printed, signed and placed in my postbox via the Dean's Office (and I will scan it)
2. Now email the two or three artefacts to the first examiner
3. If you receive a copy of an email sent by the first examiner – containing your





...on “Registration for external ...thesis.doc”:

Nach rechtlicher Prüfung und Rücksprache mit dem Rechtsreferat kann ich Ihnen folgendes mitteilen:

Ein eingescanntes Formular zur Ausgabe einer Abschlussarbeit bzw. der Abnahme einer Abschlussarbeit kann angenommen werden, wenn die Kommunikation ausschließlich über die OTH E-Mail-Adressen stattfindet. Die Formulare können somit unterzeichnet, eingescannt und via OTH E-Mail-Adresse an die Dekanate weitergegeben werden. Die Formulare dürfen nur von den BetreuerInnen (Angehörige der OTH Amberg-Weiden) an die Dekanate weitergegeben werden und nicht über die jeweiligen Studierenden, da sonst nicht gewährleistet werden kann, dass die Unterschrift vom Betreuer getätigt worden ist.

Das Vorgehen zur Ausgabe einer Abschlussarbeit muss somit wie folgt aussehen:

1. Der Student unterzeichnet das Formular zur Ausgabe der Abschlussarbeit scannt diese ein und sendet es via OTH-E-Mail-Adresse an den Betreuer
2. Der Betreuer druckt das Formular zur Ausgabe der Abschlussarbeit aus und unterzeichnet dieses, scannt es ein und sendet es an das jeweilige Dekanat via OTH-E-Mail-Adresse

Das Vorgehen zur Abnahme der Abschlussarbeit muss somit wie folgt aussehen:

1. Der Betreuer unterzeichnet das Formular Abnahmebestätigung Bachelorarbeit, scannt es ein und sendet dieses via OTH-E-Mail-Adresse an den Studierenden
2. Der Studierende druckt es aus, unterzeichnet es, scannt es ein und sendet es via OTH-E-Mail-Adresse an den Betreuer zurück
3. Der Betreuer leitet es per OTH-E-Mail-Adresse an das jeweilige Dekanat weiter.

Bezüglich der Anmeldung einer externen Abschlussarbeit ist eine Überprüfung der qualifizierten digitalen Signatur der Firmen notwendig.
Die Überprüfung dieser qualifizierten Signaturen werden im Studienbüro stattfinden.

Please note that for external submissions of final theses (= “External Master’s Thesis Submission.doc”), which are submitted **paperlessly** and entirely electronically, it is absolutely essential that this form bears a **qualified digital signature** from the company.

ALTERNATIVE: If this **is not available, an ORIGINAL with an ORIGINAL SIGNATURE is still** required (please email me a scan and have the original placed in my pigeonhole via the Dean’s Office). In short: **paper always works.**



Special Topic

Procrastination and writer's block



■ Anti-procrastination

- Examples of tools on my website

<https://github.com/cyberlytics/awesome-thesis-tools/#anti-procrastination>

■ Tools:

- Printable [weekly planners](#)
- **Burndown charts**
(X: working days, Y: number of pages)
 - [Printable HTML](#) | [PDF](#)
- (€): [Chess clock](#)
- **Pomodoro**: [Tomato timers](#)
 - Quasi-Pomodoro: [Boxing interval timer](#)
 - Physical: (€) [Time cube](#)

■ Psychosocial counselling

- At OTH Amberg-Weiden
- Free of charge and strictly confidential
- Anonymous if desired

<https://www.oth-aw.de/hochschule/services/health-and-sport/mental-health-and-relaxation/>

Please Google it if the OTH-AW link stops working again later due to website changes
sigh

- **"The fear of blank page"**





Psychological counselling

 verena.goedrich@studentenwerk-oberfranken.de

 +49 (0921) 5559-16

Counselling and support

... when you're under personal strain
... in crises and conflict situations
... when feeling overwhelmed, depressed
or anxiety



University pastoral care

 ch.weber@oth-aw.de
m.lommer@oth-aw.de

 **Amberg** Library/RZ 102
Weiden Main Building Co10

Counselling and support

...in times of crisis or if you
simply need someone to
listen





Student and Career Service



Amberg MB/UT Eo7
Weiden Main Building Co11



Advice and support

- ... with organising your studies
- ... with learning difficulties
- ... with time management and self-management
- ... with funding your studies and much more



Student at Risk

University-wide monitoring system for...

monitoring individual study progress



... identifying
students at risk of dropping out



... raising awareness at an early stage of
the availability of counselling
and support services



... early (preventative)
counselling / support /
encouragement



... increased
academic success!





<https://www.scribbr.com/research-paper/paragraph-structure/>



Scribbr

Proofreading & Editing ▾

Plagiarism Checker

Citation Tools ▾

Knowledge Base

Search...



Academic Paragraph Structure | Step-by-Step Guide & Examples

Published on October 25, 2022 by Shona McCombes. Revised on March 27, 2023.

Essay

How to write an essay

+ Types of essays

1

The body

Writing the body

Paragraph structure

Topic sentences

Transition sentences

The conclusion

Revision process

Essay example

Checklist

Interesting topics

Nouns and pronouns

College essay

Working with sources

IEEE

Commonly confused words

Academic writing is structured around paragraphs. The number, length, and content of your paragraphs will vary depending on the type of writing—but each paragraph must be:

- ✓ **Unified:** all the sentences relate to one central point or idea.
- ✓ **Coherent:** the sentences are logically organized and clearly connected.
- ✓ **Relevant:** the paragraph supports the overall theme and purpose of the paper.

To walk you through the process of writing strong paragraphs, we'll use an example from our [interactive essay](#) about the history of the Braille reading system. With each step, we will gradually build up the structure of a paragraph.



Click to enlarge

Table of contents

1. Step 1: Identify the paragraph's purpose
2. Step 2: Show why the paragraph is relevant
3. Step 3: Give evidence
4. Step 4: Explain or interpret the evidence
5. Step 5: Conclude the paragraph
6. Step 6: Read through the whole paragraph
7. When to start a new paragraph

Overcoming writer's "fear of the blank page".
→ Finding a starting point!!



BEFORE you start writing!

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<https://pxhere.com/en/photo/759968>



<https://www.officio.de/bueroartikel/han-karteikasten.19505E.html>



How to get started?
→ **Start writing your own summaries!**
This helps overcome writer's
"fear of the blank page".



Stress-free?

**Late. 8 weeks before
the deadline:**

Read this section again

FAQ:
Checklist before the peak writing period



- **List of abbreviations? A good idea!**
 - (It's even mentioned in the assessment criteria)
 - This refers to abbreviations from your subject area or from computer science/AI
 - Disclaimer: Please do NOT get the idea of including standard Duden abbreviations here – such as 'u.a.', 'bspw.', 'etc.', ...
 - Even with a list of abbreviations, you must introduce your abbreviations clearly in the text, even if you place the list at the beginning of your thesis
- **Glossary? Not essential!**
 - But promise me that you'll keep a glossary in future projects, as a means of facilitating communication between project participants with different educational backgrounds
 - (Eric Evans' 'Ubiquitous Language' in DDD is essentially a glossary 2.0!)
- **Page count '50' for bachelor's theses: "Would 47 do?"**
Try not to go below 50.
 - That's why I also refer to "50 to 60" pages (in these slides, at the start)
 - If necessary, move content from the appendix to the main body of the thesis





- **Dates** on the cover page, declaration, etc.: The actual day you hand it in to the Dean's Office or the official submission date? Either is fine!
 - If in doubt, especially if it's only a matter of a few days rather than a whole (buffer) month, then stick to the official submission date everywhere! Regardless of when it was printed or signed.
 - (This is different from signatures on contracts → A better analogy is employment references: these are also always dated on the last day of employment, regardless of when they were drafted, printed or actually signed.)





IMPORTANT

- ✓ **Requirements and user roles**
 - [including UML use-case diagram]
- ✓ **High-level architecture: Architecture overview** ★ (← **EVERYONE needs this!!**)
 - [including **free-form** or **UML** component, distribution or composition structure diagrams, as well as SysML, ArchiMate, etc., where applicable]
- ✓ **Detailed architecture: Processes** ★ (← **almost everyone needs this**)
 - [including **UML sequence diagram**, **BPMN**, ...]
- ✓ **Implementation: Modularisation and OOD** ★ (← **almost everyone needs this**)
 - [including **UML component diagrams** or **class diagrams**]
- ✓ **Implementation: Algorithms**
 - [including programme flowchart (**PAP** / DIN 66001) or structograms = **Nassi-Shneiderman** diagrams]
- ✓ **Database: conceptual schema**
 - [Entity-Relationship diagram or UML class diagram]
- ✓ **Database: logical relational schema** ★ (← **almost everyone needs this**)
 - [**Database diagram** or **UML class diagram**]



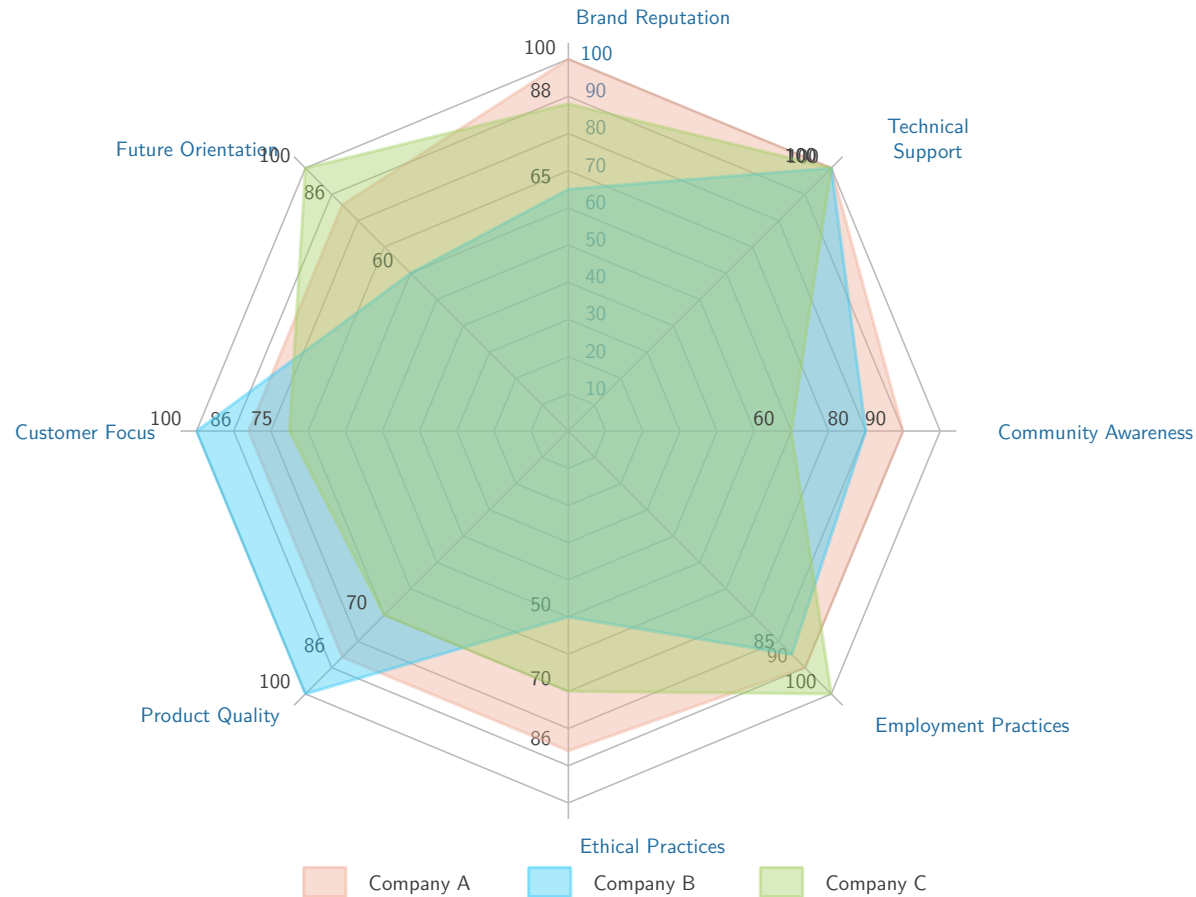


- **Product-Feature Matrix** ★
 - See also: [Stiftung Warentest!](#)
 - Examples on Google Images: [Competitive Matrix](#), [Feature Comparison Cart](#)
- **Utility Analysis (NWA)** [[Wiki](#)] ★
- **Network diagram / Kiviat diagram** [[Wiki](#)] ★
 - English: “**Radar** Chart” / “**Polar** Chart” (!)
 - Important: [re-ordering](#)
- ...
- **Harvey Balls** [[Wiki](#)] ★
 - ○◐◑◒◓, plus [example](#)
- **Mind maps** [[Wiki](#)]
- **Venn diagram / set diagram** [[Wiki](#)]
 - [Examples](#)
- ...



Example: Network diagram / Kiviat diagram

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Source: <https://www.edrawsoft.com/spider-chart-solutions.php>



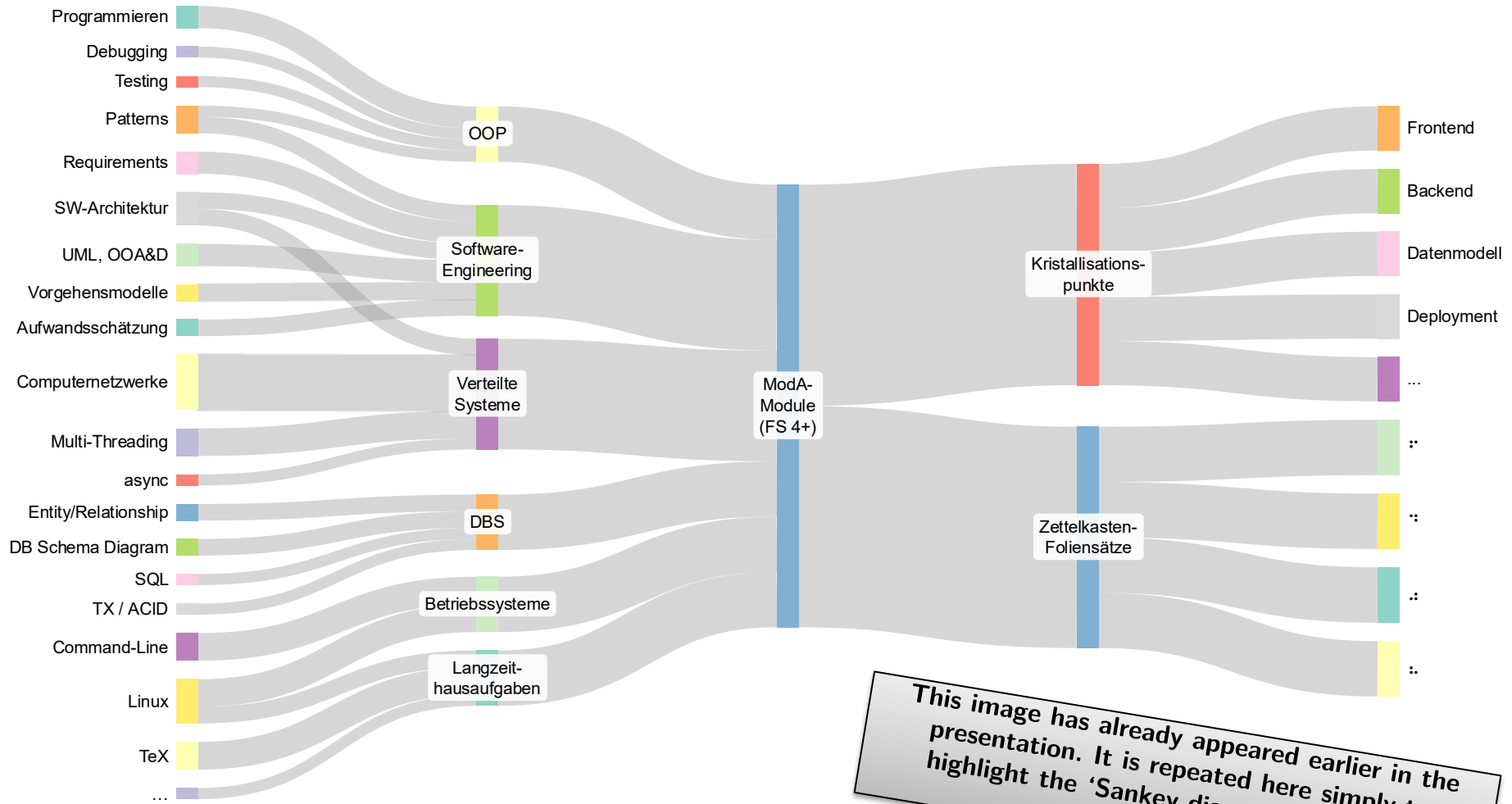


- **Organisational chart / Hierarchy diagram** [\[Wiki\]](#) ★
- **Tree diagram** [\[Wiki\]](#) or **dendrogram** [\[Wiki\]](#)
- **Decision trees** [\[Wiki\]](#)
- **Cause-and-effect diagram / Ishikawa diagram** [\[Wiki\]](#) ★
 - English: “**fishbone** diagram” (!)
 - used, amongst other things, for root cause analysis in quality management scenarios
- **Sankey diagram** [\[Wiki\]](#)
 - English: ⊃ “alluvial diagrams” [\[Wiki\]](#)
 - Tool: SankeyMATIC ★ and available as a Flourish template ★
- **Gantt chart** [\[Wiki\]](#)
- **Morphological box / Zwicky box** [\[Wiki\]](#)
- **Funnel plot** [\[Wiki\]](#)
- ...



Example: Sankey diagram ($\supset$ alluvial diagrams)

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This image has already appeared earlier in the presentation. It is repeated here simply to highlight the 'Sankey diagram' or 'alluvial diagrams' type.

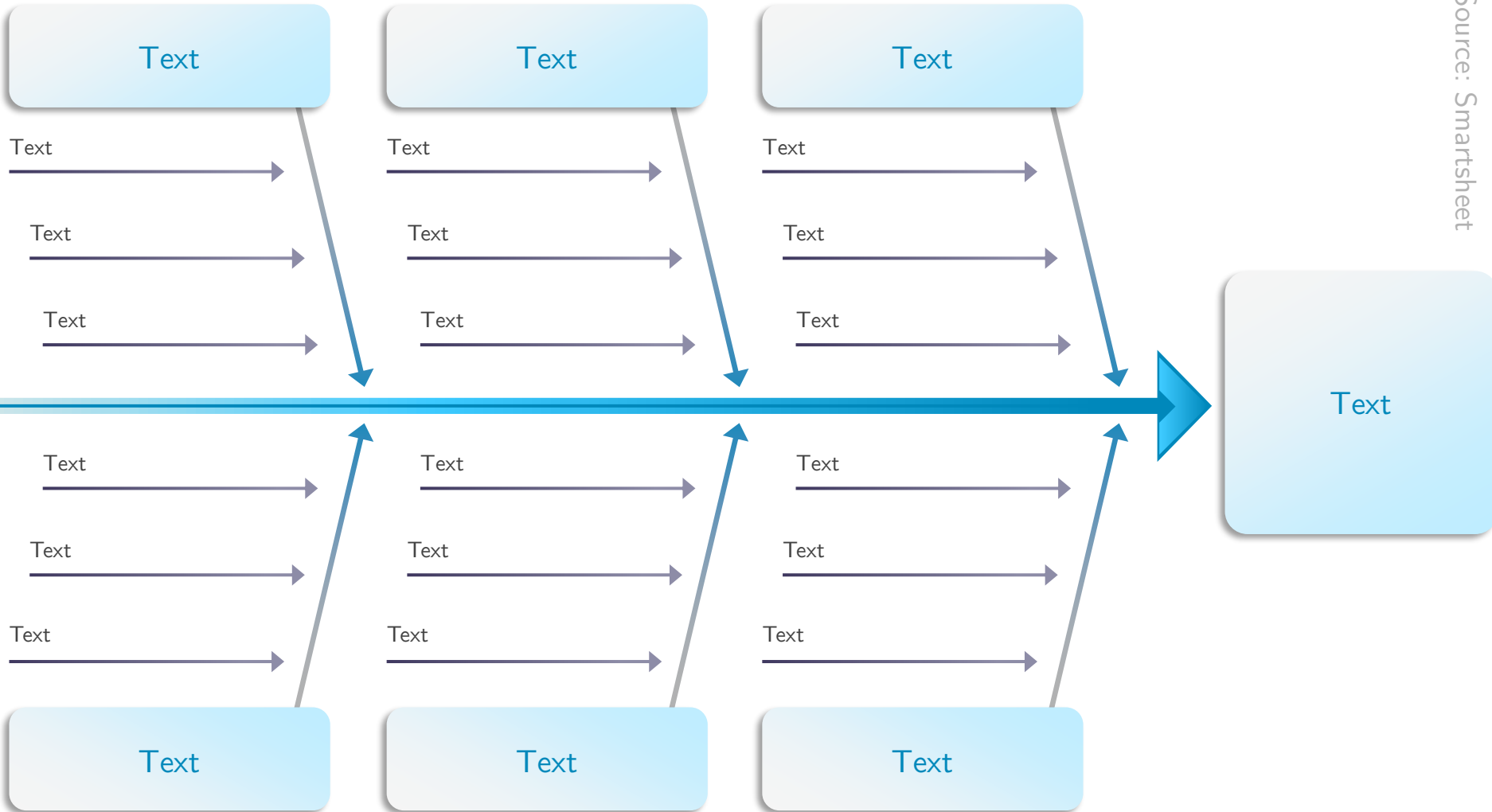


Example: Ishikawa diagram

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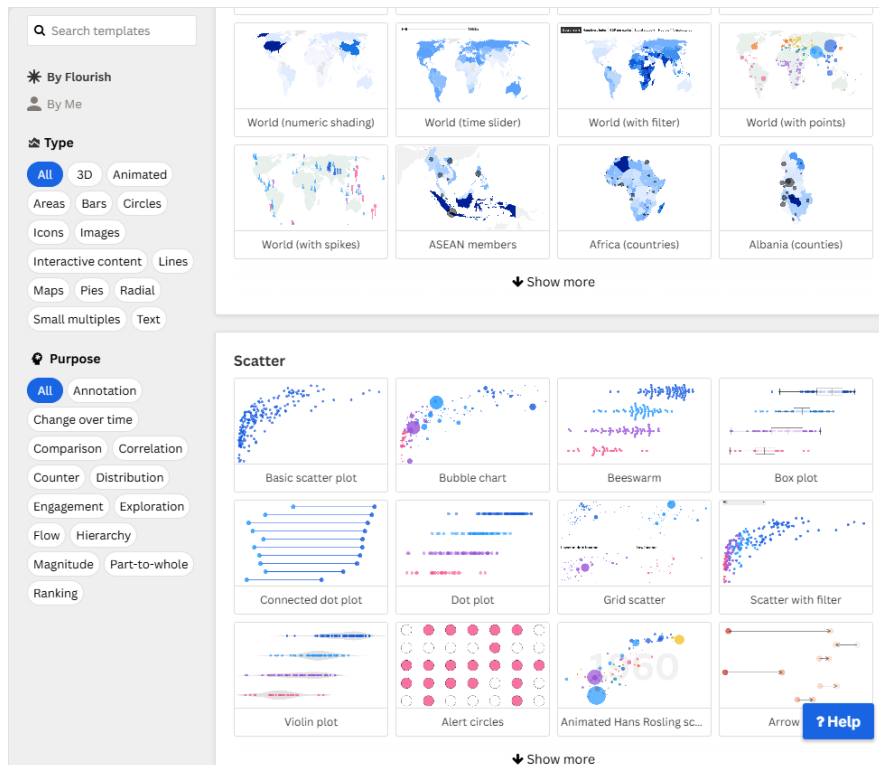
Source: Smartsheet





- **Portfolio analysis / Product-market matrix**
 - Examples: [BCG](#), [McKinsey](#), [Ansoff Matrix](#)
- **Quadrant diagram**
 - E.g. [SWOT](#) or [PEST analysis](#)
- ...
- **Matrix diagram** [[Wiki](#)]
- **Multi-level pie chart** [[Wiki](#)]
 - An extension of pie charts for hierarchical representation
- ...
- **Take the initiative yourself!**
 - Find/select suitable chart types!
- **Also: Visual Complexity**
 - Usually a bit too 'fancy' for final-year projects, but have a look for inspiration!





<https://flourish.studio/>

<https://app.flourish.studio/templates>





Important!

- Include **the official title** ('Prof.') and **the exact doctoral degrees** ("Dr.-Ing.") of your **first and second examiners** correctly in formal contexts
 - A formal context includes, amongst other things, the title page, but also any page with a form-like structure, for example containing lines such as 'Examiner:', 'Assignment setter:' or 'Supervisor:'
 - You can usually find the exact title on their websites
 - In formal contexts, please cite me, for example, as **"Prof. Dr.-Ing. Christoph P. Neumann"** (even if the "P." is sometimes missing on my website, because I have no control over the source from which it may be generated... and although cyberlytics.eu only lists "Dr." instead of "Dr.-Ing." ...)
 - When comparing individuals, do not be **misled** by the fact that hyphens after a doctoral title sometimes appear and sometimes do not, that a professor may sometimes lack a doctoral title, or by the inconsistent use of upper and lower case for doctoral degrees → **Stoically** rely on the spelling used on the respective university's homepage
 - Additional source: [https://de.wikipedia.org/wiki/Liste_akademischer_Grade_\(Germany\)](https://de.wikipedia.org/wiki/Liste_akademischer_Grade_(Germany))
 - **Master's, Bachelor's or Diplom degrees** (and similar) **are NOT listed!**
 - Therefore, particularly in the case of an **external supervisor**, list **only** one academic degree if they have obtained a **doctoral degree**!





Important!

- In the header section of the 'Summary' form you will find these two lines in particular:
 - "Student (surname, first name):"
 - "Carried out at (company/public authority/university):"
 - "Supervisor at company/authority:"
- ➔ Please cross out as appropriate!
 - E.g.: Student working on a topic in collaboration with a company
 - "Student (surname, first name):"
 - "Carried out at (company):"
 - "Supervisor at the company:"
 - Example: Student working on a topic without a partner company
 - "Student (surname, first name):"
 - "Carried out at (university):"
 - "~~Supervisor at company/public body:~~" = i.e. you may delete the entire line!





- Are **the abstract** (at the front) **and the summary** (in the final chapter) identical in terms of text and content? **No!**
 - The 'abstract' is a teaser. The 'summary' chapter is a post-mortem presentation of the results of your thesis.
 - You should not mistake either the 'Abstract' or the 'Summary' for a (tedious) 'structure of the thesis'
- **Abstract (at the front): in German only, or also in English?**
 - Case 1 = **Thesis in German**: Strictly speaking, a German 'Abstract' is sufficient. (Only the title must be in both German and English.) However, it still makes sense to include an 'Abstract' in both German and English!
 - Case 2 = **Thesis in English**: The 'Abstract' must be provided in both German and English.





■ **IMPORTANT NOTE** regarding **the summary** (as defined in the final chapter):



- The second examiner and all trained readers will read this **first!** (I, too, make a point of reading it before anything else!)
- (Please also read the relevant point in the **assessment criteria!**)
- It must tie in closely with the introduction/rationale/objectives!
BUT: It should be readable **out of context!** Do not assume that the reader has, for example, read your introduction. In particular, ensure **there are no grammatical or spelling errors** here – so make sure to use Word or Grammarly for this section at the very least!



■ **The next most important section for making a first impression – after the summary – is? Your reference list!**

- Ensure **consistency** in the details provided for sources of the same type
- Ensure your entries are **complete** – and I really am talking about even the most basic details here, such as the author (!!!) and the year (!!)
- Do not rely on bibliography entries copied from the internet – any omissions in these will not be accepted as an excuse later on
- Also take note of the **reference list tips** in the ‘Beginner’s Mistakes’ section of my **collection of tips!** (<https://cyberlytics.eu/theses/guide/>)





Important!

“Please read through my collection ‘Guidance on theses’ once more, in particular the entire section on kindergarten mistakes.”

Prof. Dr.-Ing. Christoph P. Neumann





Worth mentioning: GPT-5 is a much stricter reviewer than GPT-5-Turbo!

Bachelor's

You are the author, carrying out a **self-assessment of your Bachelor's thesis** in Computer Science. **Adopt the voice of a university professor** or external examiner and write a professional, constructive assessment of the written report and the software prototype. Write the assessment **in the same language as the thesis**.

1. General impression: Clarity, relevance and coherence of the thesis. Does the thesis convincingly communicate the purpose and relevance of the prototype?
2. Topic assessment: Are the problem described and the proposed software solution clear and well-justified? Is the scope appropriate for a 50-page bachelor's thesis?
3. Structure and organisation: Does the thesis follow a logical and academic structure (abstract, introduction, problem statement, related work, domain analysis or business analysis, functional requirements and acceptance criteria, architecture description, implementation, testing & deployment, evaluation, discussion, future work, conclusion, references)?
4. Functional requirements: Assess them for clarity, completeness, testability and acceptance criteria. If any are missing or incomplete: explicitly state which critical requirements are missing and propose a minimal set of user stories and acceptance criteria appropriate to the project's stated scope.
5. Software architecture and design: Is the architecture explained clearly, e.g. using diagrams (components, interactions, deployment)? Are the architectural decisions justified and relevant to the problem statement?
6. Engineering aspects: Are testing strategies described adequately (unit, integration, system tests)? Has deployment been considered (runtime environment, CI/CD, containerisation, cloud, etc., depending on the prototype)? Have maintainability, extensibility and usability been addressed?
7. Results and evaluation: Does the report discuss the prototype's strengths and limitations? Are evaluation criteria (e.g., fitness for use, performance, reliability) clearly presented and supported by evidence?
8. Language and style: Is the language clear, academic and technically precise? Are diagrams, tables and figures labelled and referenced correctly?
9. **Suggestions for improvement: Provide constructive feedback on areas where the thesis could be improved: clarity of requirements, clarity of architecture, use of diagrams, justification of design decisions, inclusion of testing and deployment details, critical evaluation, or academic writing style.**

Write the review in the language in which the exposé was written and in a tone appropriate for university-level academic feedback. **You are permitted to criticise the work presented.**

As an appendix to the draft review, **provide detailed comments**: Give in-depth, line-by-line or section-specific feedback, referring to equations, figures or sections where applicable.

For each comment, use this template:

[Location] Section title — page X, paragraph Y (or line range) — Severity: {major|moderate|minor}

Issue: brief description.

Recommendation: specific fix (exact wording or steps).

Highlight missing or unclear aspects: unclear requirements, missing acceptance criteria, testing strategy not specified, deployment environment missing, architectural trade-offs not justified. **List all typos, formatting issues, or grammatical errors. Point out bibliography issues**: missing references to tools, frameworks, or standards; incomplete citation style. **Suggest improvements to clarity and style**, e.g., improving diagram captions and ensuring greater consistency in terminology.



Self-Review





Repeat

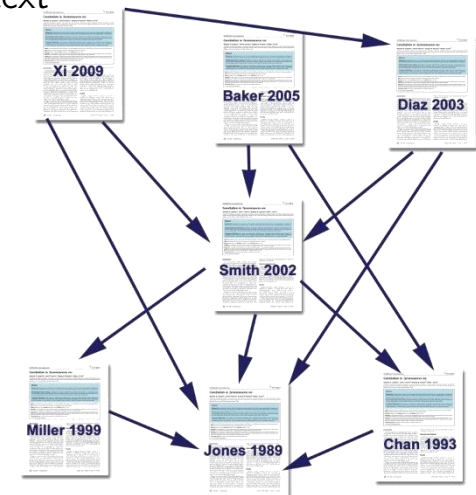
- **LaTeX + spelling/grammar?**
 - **Overleaf**
 - Cloud LaTeX editor: <https://www.overleaf.com/>
 - **Browser**
 - 'any'
 - **LanguageTool** (as a browser extension, including **integration with Overleaf**)
 - Homepage: <https://languagetool.org/de>
 - **Browser extensions:** <https://languagetool.org/de/services#browsers>
- **Why this combination?** LanguageTool is a powerful tool, and it's integrated better in no other editor than in a browser + Overleaf!
- **The only challenge:**
 - For the entire thesis, this might exceed the limits of the free version of Overleaf. It depends. Sometimes it does, sometimes it doesn't. But this only applies to compiling TeX to PDF! You can still use the browser with the LanguageTool-Overleaf integration purely as a tool for checking spelling and grammar from time to time...





IMPORTANT

- ✓ **Have you cited your technical reports from module assignments?**
 - If these have been made publicly available on ResearchGate or similar platforms
 - For example, cleverly included somewhere in the introduction via a general reference: “I have previous experience in software design (see [..][..]).”
- ✓ **Have you written an OTH research report [DE]?**
 - **Word**, max. 5 pages / OTH template in Moodle: “**Publish #3: Non-Int'l**, Non-Peer-Rev'd”
 - (And cited in your final thesis? With the addition “accepted for publication”)
- ✓ **Have you summarised your final thesis as a Technical Report [en-US]?**
 - LaTeX (or Word), 4–6 pages; e.g. LaTeX class cs-techrep (derived from IEEE)
 - Flat file hierarchy (no subdirectories, due to arXiv.org requirements)
 - **cs-techrep** template in Moodle: “**Publish: #2: Int'l**, Non-Peer-Rev'd”
 - The use of generative AI as a summariser is permissible in this context



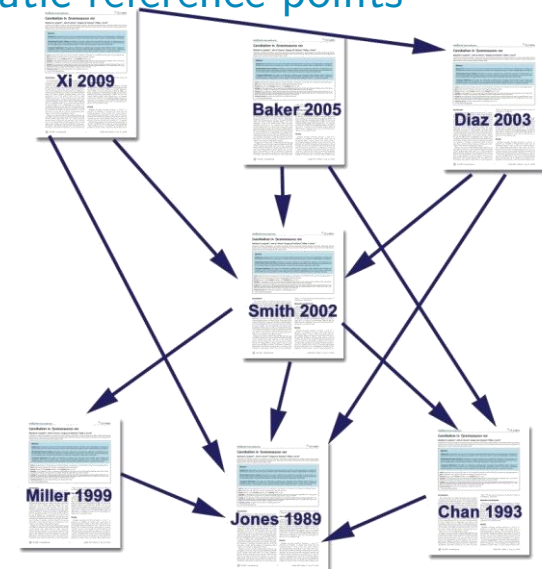
IMPORTANT

✓ Have you cited any publications by your primary supervisor?

- Lists to be included on the slide '**List of publications: Christoph P. Neumann**' in the slide section 'Further information and guidelines'
- You can find the publication list as a **BibTeX (.bib) file** that I have provided **on Moodle**
- If thematically feasible → though this is almost always possible if you generalise to higher-level categories: 1) Database systems / RDBMS 2) Cloud / Web / Distributed systems or 3) AI / Data Science
- In Moodle, you will find a **list of possible thematic reference points**

Bib templates:

<https://dblp.uni-trier.de/pid/19/7400.html?view=bibtex>





IMPORTANT

East Bavarian University of Applied Sciences Amberg\-/Weiden

✓ Use the **extdash** package

- Use `\useackage[shortcuts]{extdash}` for **separable hyphens** via `\-/`
- Can be used throughout the thesis, but **is** sometimes **crucial for a stylish bibliography**; requires the manual use of `"\-/"` instead of `"-"` (**in the .tex and .bib files**)



Stress-free?

**4 weeks before the
deadline:**

Initiate peer reviews

Receipt $\triangleq$ Delivery

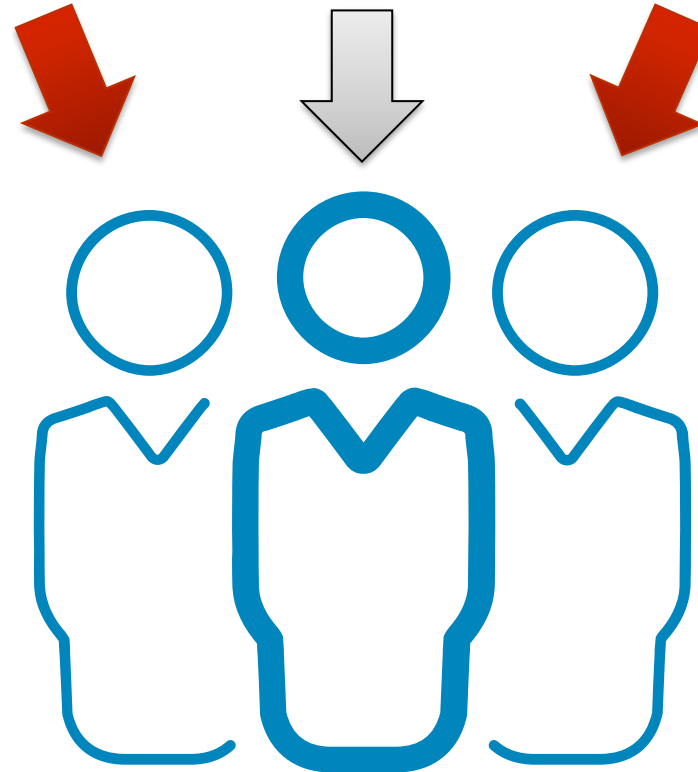
FAQ:
Checklist before the reviews



Reviewer 1 (!)

You

Reviewer 2 (!)

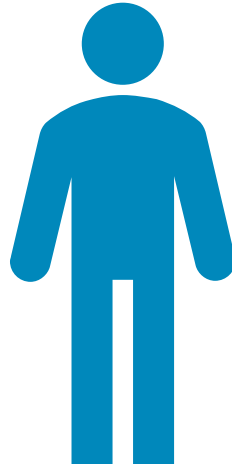


Your reviewers should **NOT** be primarily **concerned with spelling and grammar...** (!)
You need someone who **will critically analyse** your work in terms of its **CONTENT** and **STRUCTURE**!
And you (!) must make this clear to your reviewers!!





First examiner



Second examiner (!)



The second examiner often has a more objective view of the thesis's weaknesses!

You should not expect a preliminary review from them! BUT: do look at the thesis at least once from the second examiner's perspective! Perhaps arrange a half-hour appointment during their office hours well in advance of the defence to outline your findings and manage expectations. Do not take this aspect of the marking process lightly. (I won't be encouraging you individually on this point → **You have been warned!**)



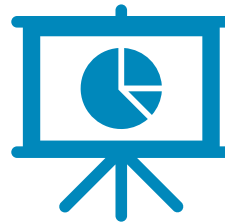


Title of your thesis



Important!

Result



Make sure you consider in good time whether your findings do justice to the title of your thesis!

As a last resort, if there has been a significant discrepancy: we can officially change the title of your thesis at the last minute via the marking form (and, of course, on the cover page of your thesis, weeks in advance).

This should be avoided, but it is not strictly forbidden. (Should you deem this necessary, it is generally strongly recommended that you actively manage expectations with regard to the second examiner well in advance of your defence...)





Worth mentioning: GPT-5 is a much stricter reviewer than GPT-5-Turbo!

You are the author conducting a **self-assessment of your Bachelor's thesis** in Computer Science. **Adopt the voice of a university professor** or external examiner and write a professional, constructive review of the written report and the software prototype. Write the review in the same language as the thesis.

1. General impression: Clarity, relevance and coherence of the thesis. Does the thesis convincingly communicate the purpose and relevance of the prototype?
2. Topic assessment: Are the problem described and the proposed software solution clear and well-justified? Is the scope appropriate for a 50-page bachelor's thesis?
3. Structure and organisation: Does the thesis follow a logical and academic structure (abstract, introduction, problem statement, related work, domain analysis or business analysis, functional requirements and acceptance criteria, architecture description, implementation, testing & deployment, evaluation, discussion, future work, conclusion, references)?
4. Functional requirements: Assess them for clarity, completeness, testability and acceptance criteria. If any are missing or incomplete: explicitly state which critical requirements are missing and propose a minimal set of user stories and acceptance criteria appropriate to the project's stated scope.
5. Software architecture and design: Is the architecture explained clearly, e.g. using diagrams (components, interactions, deployment)? Are the architectural decisions justified and relevant to the problem statement?
6. Engineering aspects: Are testing strategies described adequately (unit, integration, system tests)? Has deployment been considered (runtime environment, CI/CD, containerisation, cloud, etc., depending on the prototype)? Have maintainability, extensibility and usability been addressed?
7. Results and evaluation: Does the report discuss the prototype's strengths and limitations? Are evaluation criteria (e.g., fitness for use, performance, reliability) clearly presented and supported by evidence?
8. Language and style: Is the language clear, academic and technically precise? Are diagrams, tables and figures labelled and referenced correctly?
9. **Suggestions for improvement: Provide constructive feedback on areas where the thesis could be improved: clarity of requirements, clarity of architecture, use of diagrams, justification of design decisions, inclusion of testing and deployment details, critical evaluation, or academic writing style.**

Write the review in the same language as the exposé and in a tone appropriate for university-level academic feedback. **You are permitted to criticise the work presented.**

As an appendix to the draft review, **provide detailed comments**: Give in-depth, line-by-line or section-specific feedback, referring to equations, figures or sections where applicable.

For each comment, use this template:

[Location] Section title — page X, paragraph Y (or line range) — Severity: {major|moderate|minor}

Issue: brief description.

Recommendation: specific fix (exact wording or steps).

Highlight missing or unclear aspects: unclear requirements, missing acceptance criteria, testing strategy not specified, deployment environment missing, architectural trade-offs not justified. **List all typos, formatting issues or grammatical errors.** **Point out bibliography issues**: missing references to tools, frameworks or standards; incomplete citation style. **Suggest improvements to clarity and style**, e.g. improving diagram captions and ensuring greater consistency in terminology.





- See the '**Further information and guidelines**' section of the slides
 - Tip: Search for 'CubePDF' (more specifically: CubePDF Utility), as this is the easiest way to find the relevant slide



Special Topic

FAQ: Extension of deadline



■ Notes:

- Try to avoid needing a deadline extension (e.g. by allowing for a **buffer** month...!)
- If you do need a deadline extension, the easiest way is to cite a **period of illness**, supported by a **doctor's certificate**
- Extensions on the grounds of **Mi Mi Mi** ("I haven't had access to the industry partner or received any data for a long time..." , "My external supervisor was ill / cancelled meetings with me..." , "I was disorganised / procrastinated...") are problematic, as all **of** this is **your responsibility** → An extension would (indirectly) put better-organised / more persistent / more committed fellow students at a **disadvantage**

■ Practical implementation

- In the EMI ZIP archive (where the information sheet is also located), you'll find the file '**Application for an extension of the processing time.docx**'
- I will sign it for you before you submit your application, because:
- You submit the application to the **Examination Board**, and they will make the decision!
- Therefore: Please send the form signed by both you and me (with any attachments, such as a medical certificate) to **Prof. Alfred Höß** in his capacity as Chair of the Examination Board
- **Please do not under any circumstances wait until two days before the deadline,**

unless you have suddenly fallen ill!



Receipt $\triangleq$ Delivery

FAQ:
Checklist before submitting your work



Important!

**Ostbayerische Technische Hochschule
Amberg - Weiden**



Fakultät Elektrotechnik, Medien und Informatik

Annahmebestätigung Bachelorarbeit

An das Dekanat (4 Exemplare,
in Maschinenschrift ausgefüllt)

Eingang: _____

Ich habe heute von der Studentin/dem Studenten
(Name, Vorname, Matr.-Nr.): «EINFÜGEN», «EINFÜGEN», «EINFÜGEN»
Studiengang: «EINFÜGEN»

Bei Erfüllung der Voraussetzungen möchte ich folgende Vertiefungsrichtung im Zeugnis eingetragen
haben (trifft nur für EI-Studierende zu):

☐ AUT

☐ CPS

☐ ENT

☐ IKT

Semester: «EINFÜGEN»

eine Bachelorarbeit mit dem Titel:

Deutscher Titel: «EINFÜGEN»

Englischer Titel: «EINFÜGEN»

angenommen.

Ausgabetermin war: «EINFÜGEN»

Letzter Abgabetermin: «EINFÜGEN»

Ich bestätige die Annahme des
praktischen Teils der Bachelorarbeit:

öffentliche Auslage:

falls nein: nichtöffentliche Auslage bei:

Aufgabensteller:

Aufgabensteller (Unterschrift):

Bestätigung (Unterschrift)
der Studentin/des Studenten:

Compare it with my scan of the registration form!
I may have had to make a few minor corrections
back then.

Ja ☐
Nein ☐

Nicht erforderlich ☐

Ja ☐
Nein ☐

Prof.:
Zeitraum:|

Prof.: «EINFÜGEN»

**Including your
signature!**

Verteiler: Dekanat Aufgabensteller Student/Studentin
Studentenamt
(sofern Bafög erhalten und Masterstudiengang angestrebt)

- Please fill in the '**Confirmation of Submission**' form in advance as soon as you wish to submit your work

1. Complete the form in Word (**ten fields**)
2. Check all the details
3. Print
4. **Sign it**
5. Scan it and email it to me
 - Or bring the original to me
6. Wait! I'll sign it once you've handed in your work





Important!

- **Submission to the first examiner**

- (Since 2022: Submissions are no longer made to the Dean's Office!)

1. The deadline is based on the electronic submission of the **PDF** (primarily via **Moodle upload**, or by email if necessary) 
 - (Incidentally, you do NOT need to sign the PDF digitally or in any other way)

2. Please send me the pre-filled '**Confirmation of Acceptance**' form and I'll send it back to you signed 

- **In any case, please also send your external supervisor your final thesis (a PDF sent by email is usually sufficient)**

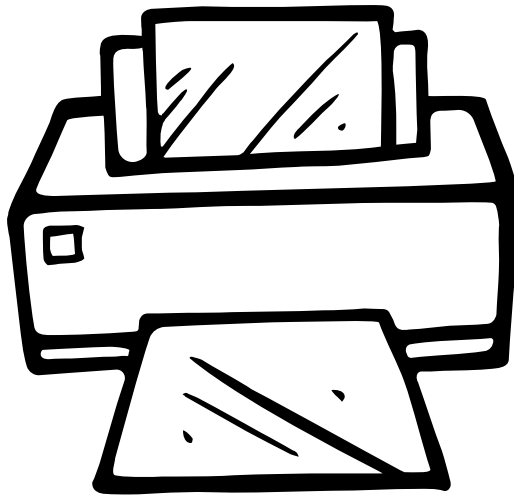




Important!

- **Submission of 1 (for me) to 2 (second examiner?)**
Printed copies can be submitted **at your leisure afterwards**
 - (Have you **asked** your **second examiner** if they want a printed copy!?)
 - Please **sign** my printed copy (!)
- **How to submit? Via the Dean's Office into the postbox!**
 - (Don't send it to me by post or anything like that...)
- **Important:**
 - **First** take the printed copy(ies) to the Dean's Office,
 1. **once** I have the PDF and
 2. **once** we've exchanged the confirmation of acceptance via email.
 - **Then** (!) you can tell the Dean's Office that you already **have** the **confirmation of acceptance** (✓) and that you really just want them to put the printed copy in my pigeonhole as well, and that the Dean's Office doesn't need to worry about anything else.
 - Please let me and, if applicable, the second examiner know by **email** that the printed copy is now in the postbox.





You may also print **double-sided**! However, **perfect binding** often requires a minimum number of pages! Please check with your copy shop. For **bachelor's theses**, single-sided printing is therefore often the norm. **Master's theses and dissertations** can be optimised for double-sided printing in terms of typesetting.



- Exactly how the second examiner receives the PDF – instead of a printed copy – (from you by email, from me by email or via access to this Moodle) is still a **matter to be decided on a case-by-case basis**. It's not a make-or-break issue, though; **no need to stress**.
- **My recommendation in this matter:**
 - In addition to uploading the PDF to Moodle, it's a good idea **to email the second examiner** with the PDF, and feel free to CC the first examiner as well.
 - (Only if this email clearly does not appear to come from the student will I send the PDF to the second examiner by retrieving it from Moodle.)
 - (If the second examiner would like a **printed copy**, then the PDF is irrelevant to them. You can still send it to them. It's up to you.)





Important!

Organisatorisches

Abgabe Exposé [PDF]

Namensschema einhalten: BT_<Erstellungsjahr>_<Nachname>_<Vorname>_Expose.pdf (BT = Bachelor Thesis) oder MT_<Erstellungsjahr>_<Nachname>_<Vorname>_Expose.pdf (MT = Master Thesis)

Hinweis: Bitte benachrichtigen Sie mich nach dem Upload zusätzlich per E-Mail, denn Moodle informiert mich nicht automatisch.

Anmeldung:

Lesen Sie u.a. den Folienabschnitt "**Checkliste vor Anmeldung der Arbeit**" im Foliensatz "Abschlussarbeiten_00_Intro".

Übrigens quasi-synonym: (dozentenseitige) **Ausgabe** ▲ (studentenseitige) **Anmeldung**!

Abgabe:

Lesen Sie u.a. den Folienabschnitt "**Checkliste vor Abgabe der Arbeit**" im Foliensatz "Abschlussarbeiten_00_Intro".

Übrigens quasi-synonym: (dozentenseitige) **Annahme** ▲ (studentenseitige) **Abgabe**!

Abgabe Abschlussarbeit [PDF]

Namensschema einhalten: BT_<Abgabejahr>_<Nachname>_<Vorname>_Thesis.pdf (BT = Bachelor Thesis) oder MT_<Abgabejahr>_<Nachname>_<Vorname>_Thesis.pdf (MT = Master Thesis)

Lesen Sie mind. 1-2 Wochen vor Abgabe nochmals die **Checkliste der EMI-Fakultät** (= "Merkblatt Bachelorarbeiten.doc" bzw. "Merkblatt Masterarbeiten.doc")!



- Please also read through the entire first section, '**Organisational matters**', again on Moodle!
- Among other things, upload your work under the heading '**Submission: CD equivalent [ZIP]**'.
 - (See further down in the image)
- You do NOT need to submit this at the same time as the PDF! Instead, submit it **shortly** afterwards, at the latest by the time of **your defence**.



Receipt $\triangleq$ Delivery

FAQ:
**Checklist shortly after submitting your
work**



- Sourcecode
 - Empfohlener Ordnername für den Sourcecode: **sys-src/** (mit beliebiger Unterordnerstruktur)
 - Für Erst- und Zweitprüfer
 - Also in jedem Fall Teil des ZIPs, wenn ein SW-Prototyp entwickelt wurde
 - Also auch bei Quellcode, der in Repos des Kooperationsunternehmens verwaltet wurde, quasi als Kopie und als Anhang der Abschlussarbeit
 - Muss eine Datei README.md enthalten, die alle erforderlichen Schritte zum erfolgreichen Build-Vorgang dokumentiert (auch wenn diese Schritte nicht alle für Erst- und Zweitprüfer ausführbar sein sollten, bei Abhängigkeiten auf Infrastrukturen des Kooperationsunternehmens)
- Kompilierte Version
 - Empfohlener Ordnername: **release/**
 - Inkl. Startskripten etc. pp.
 - ACHTUNG: Gemeint ist nur eine saubere Deployment-Fassung! Nicht irgendwelche Binaries in der Build-Umgebung (bspw. kein node_modules Verzeichnis)
 - V.a. bei Open-Source-Projekten zusätzlich zum Quellcode
 - Aber NICHT benötigt bei Abhängigkeiten auf lizenzierte Applikationen eines Kooperationsunternehmens
 - (Und natürlich nur wenn überhaupt ein SW-Prototyp entwickelt wurde)
 - OBACHT: Prüfen Sie anhand eines frischen git clone und einem neuen Build-Vorgang, ob Sie auch tatsächlich alle für den Build relevanten Dateien im Repo eingchecked haben!
 - Es stellt sich oft heraus, dass Dateien fehlen, weil Sie hier nicht im Team entwickeln, lokal bei Ihnen alles vorhanden ist und Sie von niemandem auf im Repo fehlende Dateien aufmerksam gemacht werden
- Bereinigungsanmerkungen
 - **Halten Sie das ZIP klein!**
 - Machen Sie ggf. vor dem Zipping einen frischen git clone Ihres git-Repos
 - Das .git Subverzeichnis natürlich ebenfalls raus aus dem ZIP halten
 - Wenn Sie nicht über einen frischen git clone gehen:
 - Wenden Sie das Äquivalent von 'make clean' auf alle SW-Projekte und ggf. auf das LaTeX-Projekt an
 - Keine temporären und durch einen build rekonstruierbare Verzeichnisse wie bspw. node_modules
 - Dann zusätzlich die Arbeitsverzeichnisse Ihrer Editoren und IDEs identifizieren und löschen (quasi alle in .gitignore aufgelisteten Artefakte löschen)
 - Alle Verzeichnisse mit einem Punkt "." am Anfang auf Relevanz kontrollieren (sind auch meist Arbeitsverzeichnisse von irgendwelchen Build-Tools)
 - ... Sie sehen: am besten einfach einen frischen git clone machen!
 - Mit obiger "kompilierter Fassung" ist nicht die gesamte build/** Verzeichnisstruktur gemeint (sondern eher nur so etwas wie dist/**); ergänzen Sie also diese deployment-Fassung manuell zu Ihrer finalen Abgabestruktur, kontrollieren Sie vorher ob es sich starten lässt
 - Kontrollieren Sie auch Ihr biblib-PDFs auf eine angemessene Dateigröße, also dass keine großen Ausreißer (>15MB) darunter sind; sprechen Sie ggf. nochmal mit mir
 - Sprechen Sie auch vorher nochmal mit mir, wenn Sie das ZIP in Summe nicht unter 100MB kriegen

- Source code as part of of the **checklist** in **Moodle**
"Submit CD equivalent [ZIP]"
 - The screenshot is incomplete and may be out of date!
- Please **also** re-read at least the following slides for your **final check**:
 - Slide "**Further notes: Prototype Implementation**"
 - Slide "**Side note: Code quality**"
 - In particular, apply tools such as **PMD** and **CPD** to your source code
 - Check your **test coverage** (at least with regard to your **Surface API**)



Visibility: Recommendations on Registries and Indexing

428



Self-publishing options:

BT and MT
as well as
TechReps



Your University Homepage:
Publication List » PDF Link
e.g., OTH research report



PDF
PDF
PDF + ~~TeX~~
It also requires endorsements & arXiv quality control checks

About [ResearchGate](#) (RG): a DOI from RG is provided only for preprints and technical reports, but **NOT** for papers that have already been published following peer review (articles and conference proceedings) → if in doubt, use [Zenodo](#) or [figshare](#).

About [arXiv](#): you **CAN** submit a previously published peer-reviewed paper to arXiv, provided you supply the TeX source files

and clearly cite the original publication details, using its “journal reference” field ([even for conference proceedings](#)).



You don't actually need me!
You can upload it yourself! (But for some reason, nobody ever does it without me... ☹)



Technical Report

FoodFresh: Multi-Chain Design for an Inter-Institutional Food Supply Chain Network

Technical Reports: CL-20YY-NN, June 2023

Philipp Stangl and Christoph P. Neumann

Department of Electrical Engineering, Media and Computer Science
Ostbayerische Technische Hochschule Amberg-Weiden
Amberg, Germany

Email: {p.stangl | c.neumann}@oth-aw.de

Abstract—We consider the problem of supply chain data visibility in a blockchain-enabled supply chain network. Existing methods typically record transactions happening in a supply chain on a single blockchain and are limited in their ability to deal with different levels of data visibility. To address this limitation, we present FoodFresh – a multi-chain consortium where organizations store immutable data on their blockchains. A decentralized hub coordinates the cross-chain exchange of digital assets among the heterogeneous blockchains. Mechanisms for enabling blockchain interoperability help preserve the benefits of independent sovereign blockchains while allowing for sharing of data across blockchain boundaries.

Index Terms—blockchain; consortium; supply chain network; controlled transparency; interoperability.

I. INTRODUCTION

The food industry comprises companies dedicated to manufacturing and processing raw materials and semi-finished products from agriculture, forestry, and fishing. In recent years, food supply chains have progressed from shorter, independent to more unified, coherent relationships among supply chain participants [1]. Developing long-term, and collaborative relationships requires evolutionary technological solutions that simultaneously retain a competitive edge.

Blockchain technology is considered a way to increase supply chain visibility, support fraud detection and supply chain optimization. Current applications of blockchain technology in food supply chain management, e.g., Food Trust [2], rely mainly on a single distributed ledger. The implications on supply chain networks are two-fold: (i) organizations participating in multiple supply chains must store their data on multiple blockchains, and (ii) participants see information originally not intended for them but can view every transaction on a distributed ledger.

In this paper, we propose FoodFresh – a multi-chain approach for inter-institutional supply chain networks, allowing organizations to store immutable data on their blockchain. A decentralized hub coordinates the cross-chain communication among the heterogeneous blockchains. The hub further ensures that all parties comply with the overarching rules of the consortium.

The remainder of the paper is organized as follows: in Section II, a selection of related work is presented. Subsequently, an overview of the relevant technology is given in Section III.

Next, Section IV-A discusses our proposal with the design rationale. We conclude the paper in Section V, followed by the references at the end.

II. RELATED WORK

Recently, various solutions for blockchain-enabled supply chains have been proposed. For instance, Longo *et al.* have presented a software connector to connect an Ethereum-like public blockchain with an enterprise information system [3]. The software connector allows companies to share information with their partners with different levels of visibility. Schutz and Freund [4] have proposed a blockchain-enabled distributed supply chain. Their main idea is a network-centric design, which incorporates domain-specific blockchains for handling specific business processes and a hub or main blockchain that connects the blockchains to communicate with each other.

Polkadot uses a hybrid consensus model, separating block production (Blind Assignment of Blockchain Extension (BABE)) from finality (GHOST-based Recursive Ancestor Derivation).

A Master's thesis with absolutely no ambition to be published will generally find it very difficult to achieve a 'very good' grade! (It's not the extent of your success that counts, but your determination!)

fully developed, it can replace them – The primary difference between the two is the data stored on the relay chain. In HRMP, the relay chain stores the full message with its payload. XCMP, on the other hand, will only store a reference to the payload. The target parachain will be responsible for decoding the message payload.

From the perspective of inter-institutional supply chains, FoodFresh extends our previous work on inter-institutional cooperation [5]–[8] that was focused on healthcare, in which

Research Report

Simon Liebl, M.Eng.
Prof. Dr. Andreas Abmuth
Prof. Matthias Söllner

Security für eingebettete Systeme in kritischen Infrastrukturen: Ergebnisse und Erkenntnisse

Zusammenfassung

Im Zuge des industriellen Internet der Dinge werden Sensoren und Aktoren netzwerkfähig und intelligenter. Die vergrößerte Angriffsfläche führt jedoch zu einem erhöhten Risiko von Cyberangriffen auf industrielle Kontrollsysteme. Vor allem in kritischen Infrastrukturen kann dies zur Gefahr für Mensch und Umwelt werden. In diesem Bericht wird das Forschungsprojekt „ISEC“ vorgestellt, dessen Ziel die Entwicklung von Security-Lösungen für leistungsschwache industrielle eingebettete Systeme ist. Es werden Ergebnisse aus den Bereichen Bedrohungsanalyse, Physical Unclonable Functions und Kryptografie

Abstract

As the Industrial Internet of Things progresses, sensors and actuators become network-enabled and smarter. However, the increasing attack surface leads to a higher risk of cyberattacks on industrial control systems. This may endanger people and the environment, especially for systems in critical infrastructures. This report presents the research project “ISEC”, which aims to develop security solutions for low-power industrial embedded systems. The results from the threat analysis, the evaluation of Physical Unclonable Functions and cryptographic solutions are presented and a few findings described.

es jedoch einige Herausforderungen, wie geringe Rechen- und Speicherkapazitäten, geringe Verfügbarkeit und lange Produktlebensdauer, die in Betracht gewollt werden sollen.

Skizze

systems, den Sensoren und Aktoren, analysieren zu können, werden diese Geräte netzwerkfähig und intelligenter.

Durch das so entstehende industrielle Internet der Dinge (IIoT) nimmt die Angriffsfläche auf die ehemals isolierten und meist proprietären Systeme stark zu. Es müssen deswegen auf allen Ebenen Geräte und Systeme abgesichert werden, um Angriffe zu verhindern. Vor allem in den sog. kritischen Infrastrukturen [1], wie Energie, Gesundheit und Transport und Verkehr, könnte ein erfolgreicher Angriff zu katastrophalen Konsequenzen für Mensch, Umwelt und Gesellschaft führen. Bei der Umsetzung von Security-Maßnahmen auf Geräten wie Sensoren und

Im Projekt „Intelligente Security für elektrische Stellantriebe und Stromrichter in kritischen Infrastrukturen (ISEC)“ forscht die OTH Amberg-Weiden gemeinsam mit den beiden Industriepartnern SIPOS Aktorik GmbH und Grass Power Electronics GmbH an Security-Lösungen speziell für eingebettete Systeme mit geringen Ressourcen. Die Produkte beider Firmen werden den zuvor beschriebenen kritischen Infrastrukturen zugeordnet. Die elektrischen Stellantriebe für Industriearmaturen der SIPOS Aktorik GmbH werden beispielsweise in Kraftwerken, Kläranlagen und Pumpwerken eingesetzt und sind somit in den Sektoren Energie und Wasser angesiedelt. Grass Power Electronics GmbH entwickelt leistungselektronische





- **Generative AI in scientific publications? Generally permitted.**
 - See [the ACM Policy on Authorship!](#)
- **Once you have submitted your final thesis**
 - ... you **are permitted** to use generative AI to have your thesis summarised!
 - This makes it easy to produce a first draft for an OTH research report (approx. **2,500 words**) or TechRep (approx. **3,000 to 4,500 words**).
 - (Creating such documents before submission is actually more helpful. But better to do it in a simplified way at the end than not at all!)
- **Reminder:**
 - You must not use generative AI for your final thesis, as this will affect your mark. My policy prohibits this.
 - Incidentally, whilst working on your thesis, you may still use generative AI to produce a serious publication, provided you exercise the necessary care and comply with the policies of ACM, IEEE and Springer regarding the use of generative AI.
This is not a contradiction.





You decide on the publication (by me) and, above all, not your company

Einräumung von Veröffentlichungsrechten

Die/der Studierende: Erika Musterfrau
Fachsemester: 7
Im Studiengang: Künstliche Intelligenz

studiert an der **Ostbayerischen Technischen Hochschule Amberg-Weiden**, Kaiser-Wilhelm-Ring 23, 92224 Amberg (OTH Amberg-Weiden).

Die/der Studierende schreibt eine Abschlussarbeit zum Thema:
«Titel
der
Arbeit»

Erstprüfer ist **Prof. Dr. Christoph P. Neumann**.

Die/der Studierende stellt die Abschlussarbeit dem Erstprüfer zur Verfügung und räumt ihm das Recht zur Veröffentlichung der Abschlussarbeit auf dessen Homepage und in öffentlich zugänglichen Datenbanken für Abschlussarbeiten ein. Das Recht ist kostenfrei und zeitlich, sachlich sowie örtlich unbegrenzt.

Amberg, den

Unterschrift Studierende/r

You always retain every right to publish your work yourself!
(see slide 'Visibility: Registries and Indexing Recommendation')

■ Ideally:

- Have a **printed copy with the original signature** placed in my pigeonhole via the Dean's Office

■ Note to simplify the process:

- Some people only sign the publication authorisation after their defence and may then no longer be in the vicinity of Amberg or the Dean's Office due to work commitments...
- In such cases, I will also waive the requirement for a physical copy to make things easier for you.

■ A **scanned version sent by email is sufficient in case of doubt**

- My main concern is your own declaration of intent, which should be given **voluntarily**



FAQ:

Checklist before defending your thesis



- **How is the date for the defence arranged?**
 - I arrange the date myself with the second examiner, as our diaries are often the more complicated ones.
 - I'll send you a **proposed date**!
 - You naturally have the right to choose, i.e. the right to decline.
 - (The Dean's Office has NOTHING to do with arranging this date!)
- **When should I present my thesis to you?**
 - Definitely after you've submitted the PDF (see slide '**Timeline with buffer month**').
 - We usually schedule a defence date **approximately 4 weeks after you've submitted** the PDF. In other words, halfway through the marking period available to us.
 - Major planning factors that can usually cause a deviation from this are holiday periods (e.g. Christmas) and exam periods.
 - The process of setting a date begins once you have submitted your PDF, without us knowing whether we will have assessed your thesis by the defence date.
 - Total time slot: approx. **45 minutes** → presentation (**20–30 mins**) + subsequent discussion session (approx **10–15 mins**) during which the audience





**“Invite your external supervisor
and as many colleagues as you like
from the partner organisation
to your presentation!”**

Prof. Dr.-Ing. Christoph P. Neumann

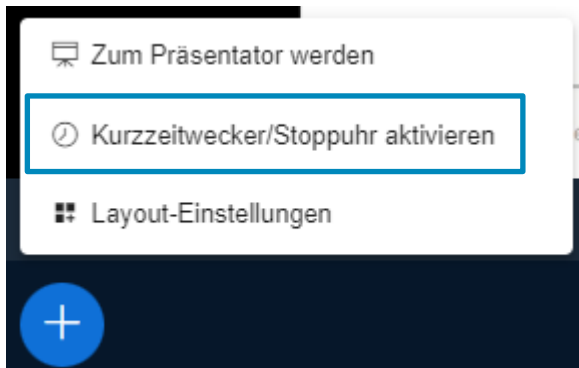
In the case of BBB, for example, you may simply send the URL and the code
(without needing to check with me)!





20 to 30 (average: 25) minutes

plus 10 to 15 minutes for a discussion session
Total: 45-minute session slot



BBB: [Timer/Stopwatch](#)

able to everyone! Includes an audio signal at the end)



Android: Visual Timer

(Useful! Free.)



Digital kitchen timer

(Useful! Approx. €7 to €13)





- **Please arrive at least 5 minutes early** (preferably 10–15 minutes)
 - At the very least, the second examiner expects the **presentation** to start **on time**
 - Applies to in-person sessions and also to BBB
- **Preparing your live demo:**
 - **Relevant example data**
 - NOT: Product “P1” with product description “test”
 - If necessary, prepare text templates for example data
 - **Recommendation:** Immediately before the live demo, use a slide with a graphical outline to show the scope of your demo (even if it’s just a box-and-arrow visualisation of your step-by-step sequence) → While presenting this overview, emphasise its relevance to your audience! This ensures the demo doesn’t get bogged down in details
- **Slide quality for BBB:**
 - Log in to the CyberLytics BBB room yourself a few days beforehand (you will automatically be the moderator there)
 - Experiment with the different options for making the slides visible
 - I recommend using **desktop sharing** rather than uploading a PDF
 - BBB PDF uploads sometimes cause an unsightly side effect for other participants: poor font quality, i.e. the **microtypographical spacing between letters** can (in some cases) be a (major) visual problem – and you won’t even notice it yourself because your own BBB display appears flawless ☹ !!

If necessary, use screenshots or a video instead of a live demo if, due to dependencies on the company’s infrastructure mean it cannot be demonstrated live





Bachelor's

Worth noting: A **gpt-4o** is a much stricter reviewer than gpt-4-turbo!

I am a Computer Science student preparing for the defence of my Bachelor's thesis. My submitted Bachelor's thesis is attached. **Please act as a technically competent and critical examiner in my field of study. You are free to critique the submitted thesis.** Based on Chapter 20, please draw up **20 possible examination questions** that might be put to me during the defence.

The questions should cover various aspects:

- * Theoretical foundations and understanding of key concepts
- * Methodological decisions and their rationale
- * Interpretation of key findings
- * Assumptions and possible limitations
- * Academic relevance and applicability
- * Outlook and future research questions
- * Interdisciplinary links, where relevant
- * Critical questions and potential weaknesses

Please **vary the type of** questions: some should be **open-ended and reflective**, whilst others should be **specific, critical or challenging**.





(After submitting your work,
at the latest before your defence)

- Please copy the assessment form from our Moodle, under the EMI section, as a Word document:
 - "EMI: Bachelor's Thesis Assessment"
 - "EMI: Master's Thesis Assessment"
- Please fill this in **beforehand** →
 - (eight details) ... and send it back to me as a Word file!
 - No rush: we won't need the assessment form until the day of your defence at the earliest

Ostbayerische Technische Hochschule
Amberg - Weiden

Fakultät Elektrotechnik, Medien und Informatik



An das Prüfungsamt

Eingang:

BEWERTUNG DER BACHELORARBEIT

Herr/ Frau: «EINFÜGEN»
Matr.- Nr.: «EINFÜGEN»
Studiengang: «EINFÜGEN»
Semester: «EINFÜGEN»

hat am: «EINFÜGEN» die Bachelorarbeit mit dem Thema:

«EINFÜGEN»

abgegeben.

Der Titel (Thema) der Abschlussarbeit hat sich während der Bearbeitungsphase geändert:

Ja ☐ Nein ☐

Bei Ja, bitte unbedingt den neuen Titel in deutsch und englisch auf dem Bewertungsblatt bei Thema (siehe oben) eintragen und kenntlich machen!

Sie wurde vom Aufgabensteller, «EINFÜGEN», mit der Note bewertet.

Der Zweitprüfer, «EINFÜGEN», bestätigt die Note.

Die Prüfer haben sich bei unterschiedlicher Bewertung auf die Note geeinigt.

Bei unterschiedlicher Bewertung durch Erst – und Zweitprüfer sollen sich die Prüfer auf eine übereinstimmende Benotung einigen. Kommt eine Einigung nicht zustande, so wird aus den Noten der Prüfer das arithmetische Mittel gebildet; das Ergebnis wird auf eine Stelle nach dem Komma abgerundet (§ 23 Abs. 3 RaPO).

Amberg, den

Aufgabensteller:

Amberg, den

Zweitprüfer:

Amberg, den

Vorsitzender der Prüfungskommission EMI

Vorzeichen: Aufgabensteller
Studiennummer
Datum

Leave space for the
signatures





Compensation for disadvantages?

Of course! It does exist! Depending on the severity of the underlying cause of your compensation for disadvantage – even waive the present

Readers who don't know what 'compensation for disadvantage', this slide is simply not relevant to them!





1. Easy to understand

- Do not assume that the second examiner has already read your thesis: make sure everyone is on board
- Focus less on ~~textbook knowledge~~ and more on motivation | Research questions | Requirements

2. High-calibre

- Lead the reader specifically towards your results (research contribution | fitness for use)
- At least 1 slide outlining the non-triviality of your task

3. Slide numbers ⚠

- Pay particular attention to this when using external slide templates provided by companies! Any presentation whose content I wish to discuss in earnest afterwards must have slide numbers. This is your responsibility! No excuses.

4. 12 to 24 net slides ⚠ (net := excluding title slides, section separators and appendices)

- Presentation duration: approx. 25 mins (20–30 mins). Plus discussion session: approx. 10–15 mins.
- Gross slide count: {title slide + agenda slide} also takes 1–2 minutes
- Rule of thumb: “Max. 1 slide per minute” ➔ Therefore: max. between 12 and 24 net slides





‘Visualisation is essentially a craft that can be learnt any artistic ability.’

Professor Dr Martin Lehner
Vice-Rector for Teaching at the Technikum Wien University of Applied Sciences

Repeat!
(This applies just as much to the final thesis itself)





Wall-of-text slides are the worst thing you can have in your presentation!

Please do not use them.

Under no circumstances should you simply read out word for word what is the slide when you're presentation.





- **Minimum requirements:**

- ALL criteria must be met; alternatively, passing one hurdle is sufficient for a 5.0

1. **Fewer** than **66%** of the net slides are **'wall-of-text' slides** ✓



2. Of the average **presentation time** of 25 minutes, is delivered in person ✓

3. **Free** from **plagiarism** ✓

- **Definition:**

- **Net slides** := Excluding title pages, section separators and appendices



Defence, but also regular meetings

**Presentation via online proceedings
(BBB)**



1. Taking on the role of **presenter in BBB**:



2. **First**, switch on **your microphone**, then manage your slide sharing



3. **Technical sharing** of your presentation: **two options!**

② PDF upload



① Screen sharing

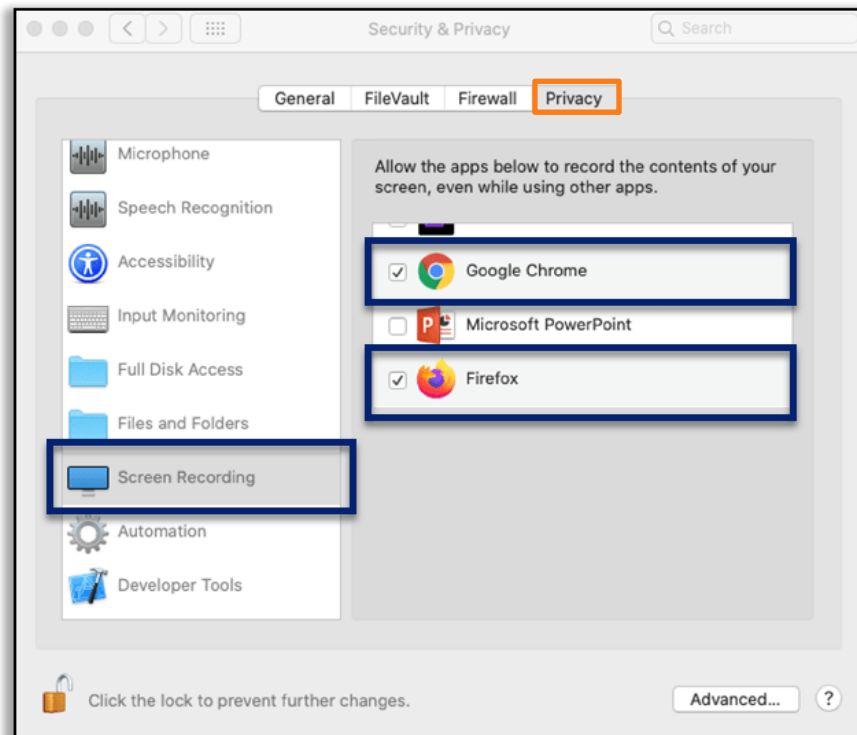


Mac user? Screen sharing in BBB requires system authorisation beforehand

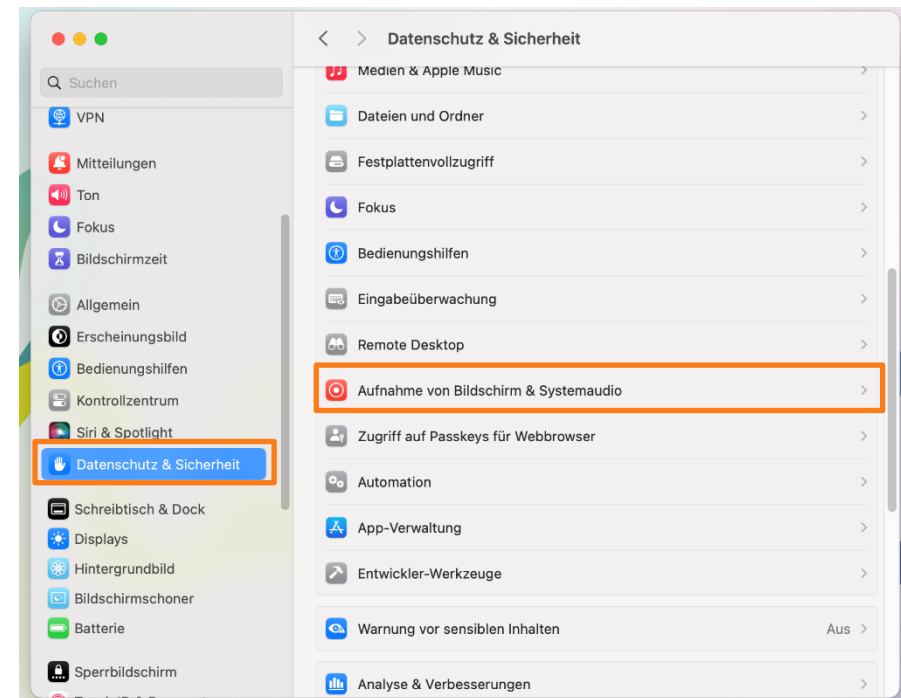
446



Older English versions of macOS:



Newer German macOS:



However, you must close the browser first!



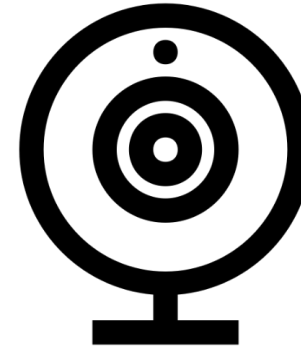


BigBlueButton currently works best with a browser
based on **Chromium** or **WebKit/Blink**!





- You **will need** a webcam for your defence at BBB
 - In examination situations, the right to the **inviolability of the home** takes second place to other legal provisions



Created by Aleksey Popov
from Noun Project

Webcam



FAQ on the Touch-Down



Created by Adrien Coquet
from Noun Project

- **Please ensure you remove yourself from the Moodle course at some point after your defence!**
 - Or wait until your mark has been entered into PRIMUSS
 - Feel free to save all materials and links beforehand
- **I will occasionally send out group emails via Moodle, and it would be helpful if the participant group consisted only of those currently working on the project and their respective supervisors**
 - So, at some point in a few months' time, once your project has long since been 'case closed', I may remove you as a participant myself during sporadic course maintenance – so please don't be surprised if this happens





You decide on the publication (by me) and, above all, not your company

Repeat
(if not already done)

Einräumung von Veröffentlichungsrechten

Die/der Studierende: Erika Musterfrau
Fachsemester: 7
Im Studiengang: Künstliche Intelligenz

studiert an der **Ostbayerischen Technischen Hochschule Amberg-Weiden**, Kaiser-Wilhelm-Ring 23, 92224 Amberg (OTH Amberg-Weiden).

Die/der Studierende schreibt eine Abschlussarbeit zum Thema:
«Titel
der
Arbeit»

Erstprüfer ist **Prof. Dr. Christoph P. Neumann**.

Die/der Studierende stellt die Abschlussarbeit dem Erstprüfer zur Verfügung und räumt ihm das Recht zur Veröffentlichung der Abschlussarbeit auf dessen Homepage und in öffentlich zugänglichen Datenbanken für Abschlussarbeiten ein. Das Recht ist kostenfrei und zeitlich, sachlich sowie örtlich unbegrenzt.

Amberg, den

Unterschrift Studierende/r

You always retain every right to publish your work yourself!
(see slide 'Visibility: Registries and Indexing Recommendation')

■ Ideally:

- Have a **printed copy with the original signature** placed in my pigeonhole via the Dean's Office

■ Note to simplify matters:

- Some people only sign the publication authorisation after their defence and may then no longer be in the vicinity of Amberg or the Dean's Office due to work commitments...
- In such cases, I will also waive the requirement for a physical copy to make things easier for you.

■ A **scanned version sent by email** is sufficient in case of doubt

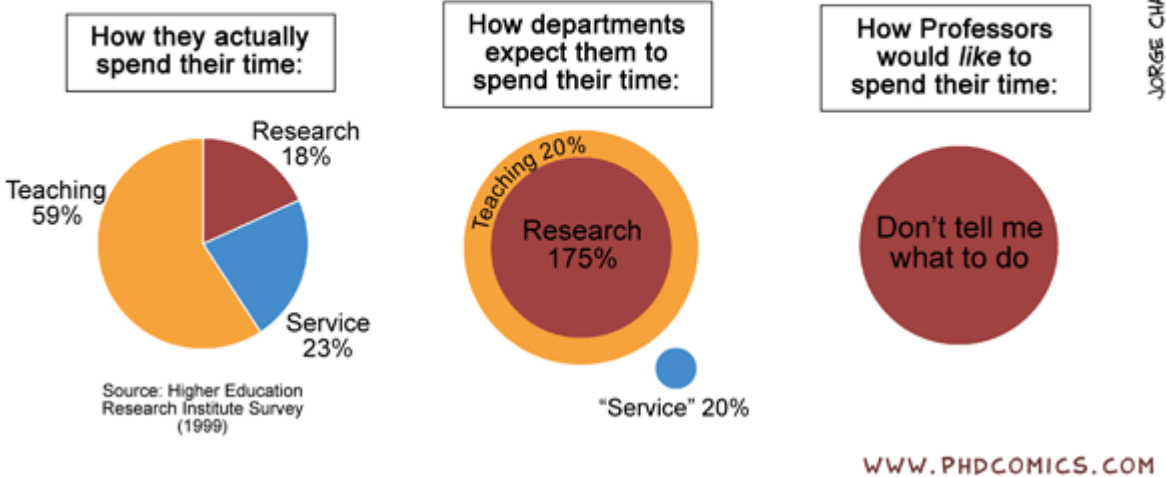
- My main concern is your own declaration of intent, which should be given **voluntarily**



Level of care required

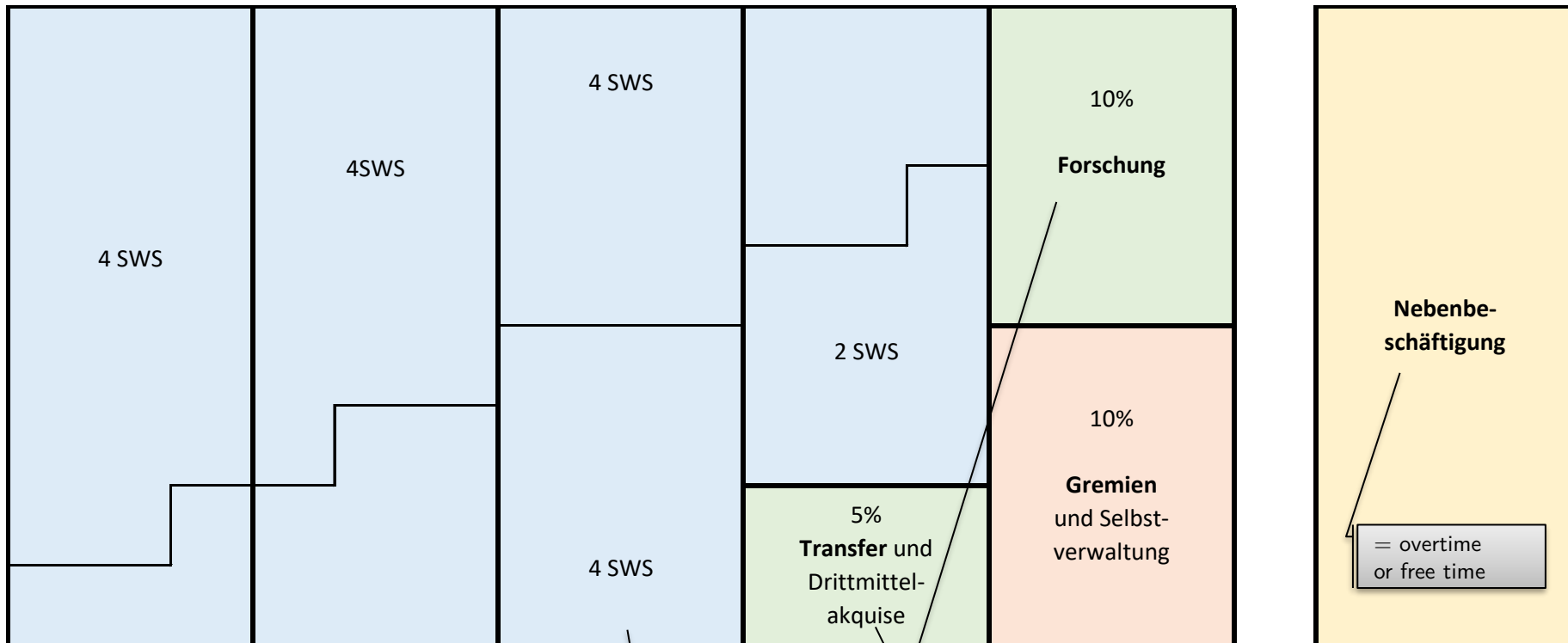


HOW PROFESSORS SPEND THEIR TIME





1 LVS $\triangleq$ 1 SWS



With 18 LVS, university of applied sciences professors have twice the teaching load of university professors

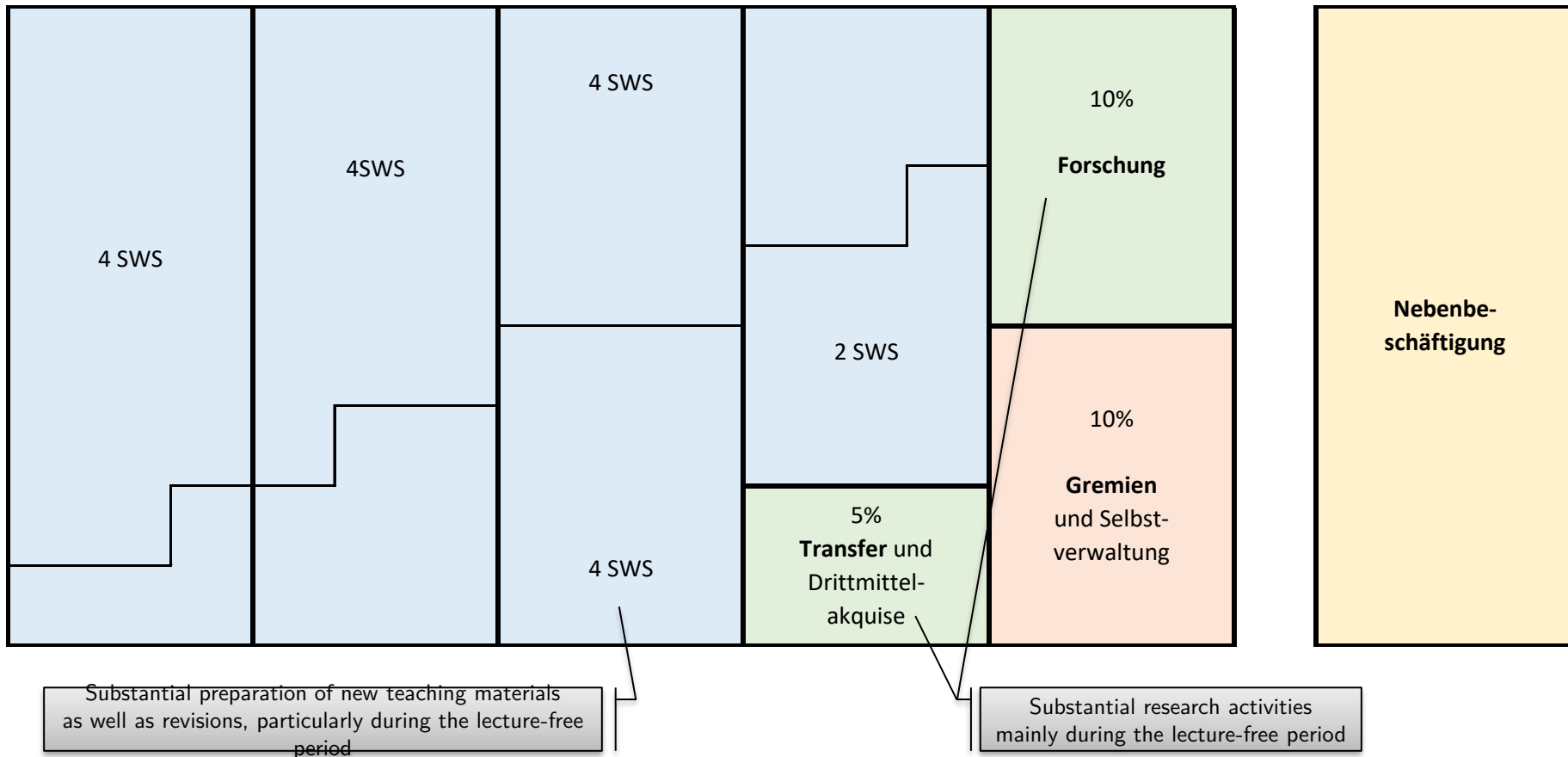
In the first 1 to 2 years of a university of applied sciences professorship, research, third-party funding acquisition and knowledge transfer are almost entirely sidelined by the requirement to deliver 2x18 LVS of teaching

= overtime or free time



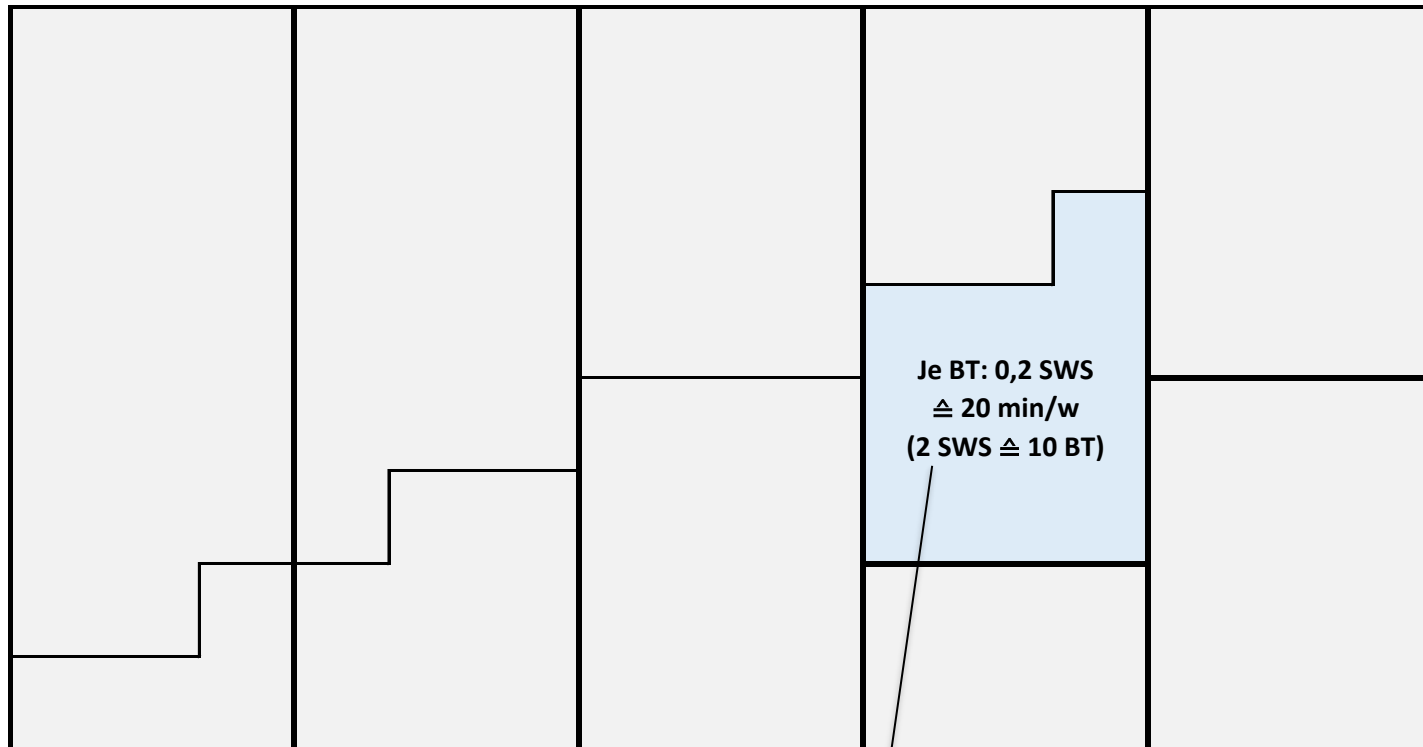


1 LVS $\triangleq$ 1 SWS





1 LVS $\triangleq$ 1 SWS



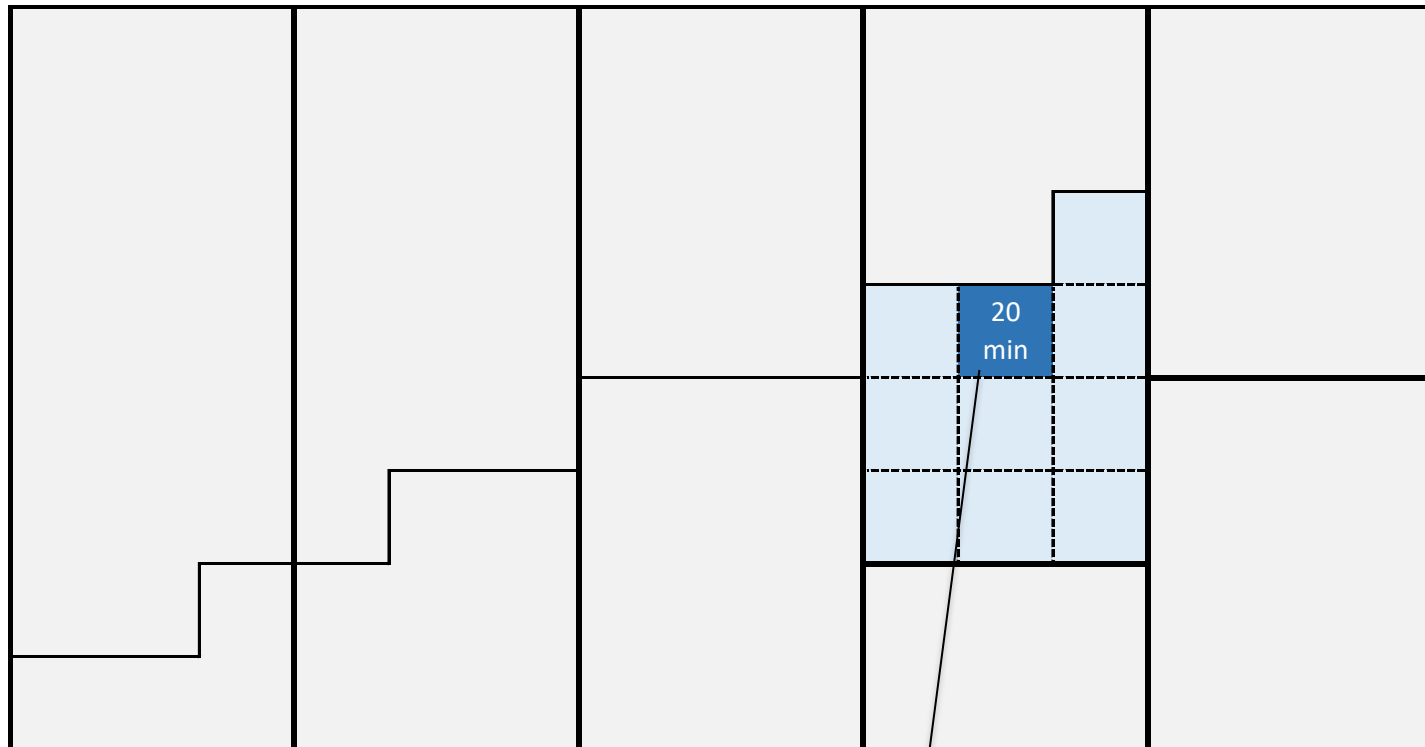
**Je BT: 0,2 SWS
 $\triangleq$ 20 min/w
(2 SWS $\triangleq$ 10 BT)**

For professors, supervising final theses is predominantly teaching and hardly any research





1 LVS $\triangleq$ 1 SWS



The proportion of my working time
for a Bachelor's thesis. (Unfortunately!)





Bachelor's thesis (BT)

$$\frac{0.2}{18 \div 0.75}$$

 **8 ‰**

"less than 1%"

Master's thesis (MT)

$$\frac{0.4}{18 \div 0.75}$$

1.7%

"less than 2%"

At universities of applied sciences, 18 SWS are said to account for around 75% to 80% of a professor's working time. (The remainder: academic self-governance, research, knowledge transfer, etc.)

... of our professors' working hours. As first examiners only. Unfortunately.





- **Workload of 20 mins/week for 8 months or 35 weeks = 12 hours (all-inclusive)**
 - **1 month** preparation phase $\triangleq$ 4 weekly supervision sessions $\triangleq$ **1.3 hours**
 - **Initial meeting: 1 h ✓**
 - Review and feedback session on **the proposal: 2 x ½ h ⚡**
 - **Emails ⚡**
 - If necessary, appointment with the company: **¾ h plus travel time**
 - **5 m** processing phase $\triangleq$ 22 weekly support sessions $\triangleq$ **7.3 h**
 - 25-minute **regular meetings** every two weeks for 22 weeks ✓ (= **4.6 hours**)
 - **Emails** ($\triangleq$ 18 weeks' superv)
 - **Preliminary feedback** on up to 10 pages [20% of 50 pages]: **4 hours ⚡**
 - **2 months'** revision phase $\triangleq$ 8 weekly supervision sessions $\triangleq$ **2.7 hours**
 - **Assessment** of 50 pages: **7 h ⚡** ($\triangleq$ 21 weekly supervision sessions)
 - Cross-subsidisation via the 'Committees and Academic Self-Governance' budget or 'Transfer and Third-Party Funding Acquisition' is generally not possible to a sufficient extent [Reminder: Theses are part of teaching duties for professors, not research]
 - **Thesis defence: ¾ h ✓** and **grading formalities: ½ h ✓**





- **Workload of 40 minutes per week for 8 months or 35 weeks = 24 hours (all-inclusive)**
 - **1 month** preparation phase $\triangleq$ 4 weekly supervision sessions $\triangleq$ **2.7 hours**
 - **Initial meeting: 1 h ✓**
 - Review and feedback session on **the proposal: 2 x ½ h**
 - **Emails ⚡**
 - If necessary, meeting with the company: **¾ h plus travel time**
 - **5 m** processing phase $\triangleq$ 22 weekly support sessions $\triangleq$ **15 h**
 - 25-minute **regular meetings** every two weeks for 22 weeks ✓ (= **4.6 hours**, same as BT!)
 - **Emails ✓**
 - **Preliminary feedback** on up to 16 pages [20% of 80 pages]: **6 hours ✓**
 - **2 months'** revision phase $\triangleq$ 8 weekly supervision sessions $\triangleq$ **5.3 hours**
 - **Assessment** of 80 pages: **9 h ⚡** ($\triangleq$ 27 weekly supervision sessions)
 - Cross-subsidisation via the 'Committees and Academic Self-Governance' budget or 'Transfer and Third-Party Funding Acquisition' is generally not possible to a sufficient extent
[Reminder: Theses are part of teaching duties for professors, not research]
 - **Thesis defence: ¾ h ✓** and **grading formalities: ½ h ✓**





- **For Master's theses:**

- For good to very good Master's theses, after about one to two months you should **have a deeper technical understanding** of the subject area of your thesis **than your supervisor or examiners!**
 - Try to write and submit a scientific publication!
(It doesn't necessarily have to be ACCEPTED – the attempt and the feedback are what count!
Peer-reviewed, but not necessarily international.)

- **For doctoral theses:**

- In the case of doctoral theses, too, the doctoral candidate must necessarily **have much more deeply** immersed in the subject matter than their supervisor and the other reviewers.
 - Aim to have at least five academic publications as first author!
(Accepted; Peer-reviewed; International)
- Nevertheless: **the doctoral thesis is (merely) a researcher's 'journeyman's piece'!**
 - If you remain in research after completing your doctoral thesis, **then you are a true researcher!**



Asymmetrical Etiquette



- Please address me as ‘Prof. Neumann’
- You may omit ‘Herr’
- You do not need to write out ‘Professor’ in full
- There’s no need for ‘Dear’, a simple ‘Hello’ will do

- This is simply my personal preference and applies to the academic staff as a whole
 - You can find general recommendations, for example, at http://rolandschaefer.net/?page_id=1736

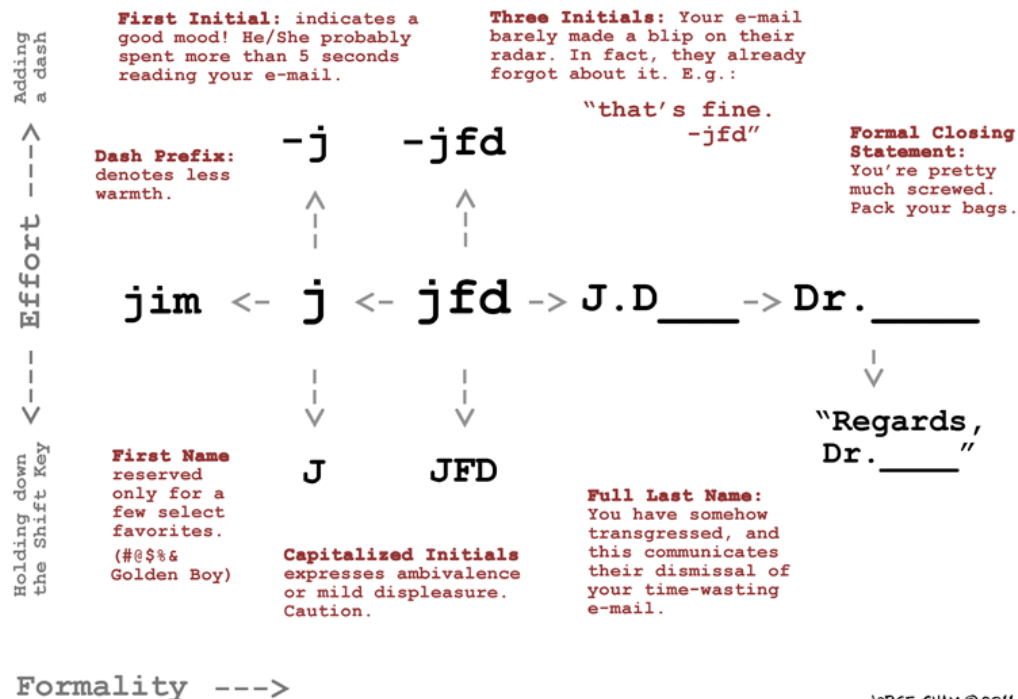
- My signature is not intended as a template for students
 - For a general guide to interpreting professors’ email signatures, please see, for example, <https://phdcomics.com/comics/archive.php?comicid=1413>





The Semiotics of Professor E-mail Signatures

Abstract: Professorial types express their mood by a ratio of casualness to effort in how they sign their e-mails. By paying close attention to these variations, you can learn to identify their mood and prepare accordingly.



JORGE CHAM © 2011
WWW.PHDCOMICS.COM
(with thanks to Janice from Rice)



Bachelor's degree → Industry



- Remember to notify the **Jobcentre three and a half months before the deadline**
 - This will prevent any waiting periods for benefits should you need one or two months' of interim funding during the transition
- Remember to finalise your **application documents** in good time, i.e. **whilst you are working on your final thesis**
 - Don't underestimate the effort involved!
 - For Bachelor's theses, the Christmas holidays are often a good time to work on them, if not before
 - (Mr Obvious: So assume that you'll be using the **Christmas holidays** to relax **and** work on your application documents; under no circumstances should you schedule any work on your final thesis during the Christmas holidays)
- **Apply for roles in industry well before you hand in your final dissertation**





■ Basic knowledge: Hiring

- Observation: Often, there is **NO suitable job vacancy** at the external partner company at the right time! This is normal!
- Implication: Your supervisor must first navigate the company's hierarchy to find creative solutions. These coordination processes take 3 to **6 weeks**!
Do not underestimate the time required on the company's part for this!

■ PLEASE NOTE

- Your supervisor at the partner company is usually **NOT aware** that you are already grappling with the topic of job applications long before you hand in your final thesis!
- **Most supervisors unconsciously wait until the final phase of the thesis before the topic of a job offer is raised.**
 - This behaviour is, of course, naive at best and, in the worst case, disastrous because it is too late: the very best students, in particular, will already have applied widely across the job market by then and cannot be won back by a late job offer.

■ Recommendation: Bring up the subject yourself and in good time!

- DO NOT expect your supervisor to take the initiative in good time



(PLEASE NOTE: This is not legal advice!)



- If you have signed a contract: During the probationary period, both parties generally have the right to terminate the contract at any time, without giving a reason!
- Please note: Essentially, a **signed contract** doesn't really mean much, apart from being a **declaration of intent**!
 - (Of course, the medium-term terms of employment are set out, such as pay and holiday entitlement, etc. Yes, that's true.)
 - **During the probationary period, different mechanisms apply here than you're used to with contracts!** Unlike **sales contracts** or **tenancy agreements**!
 - Don't let yourself **be intimidated**!
- **RECOMMENDATION:** If you receive a better offer, don't hesitate to accept it, and please do NOT turn it down just because you've already signed another contract!
 - (In the worst-case scenario, you'll only have to turn up for one day at the 'cheating' company; but very few insist on that, as it's really just a farce at that point. If the 'cheating' company isn't reasonable, consult a solicitor again.)
 - This principle also applies throughout the entire probationary period, and particularly during the first half: in most cases, you can later remove a 'wasted' probationary period of up to three months after graduation entirely from your CV, as this would be considered a perfectly normal job-seeking phase. So, if necessary, treat the first three months of the probationary period as an extended job-hunting phase and don't let the maze of contracts intimidate you.





→ There are plenty of good books out there – make sure you read at least one of them!
Here are two suggestions, in case you don't simply go to the company where you did your work placement:





Act as a senior hiring manager with over 20 years' experience in the [PREFERRED INDUSTRY]. You have first-hand expertise in the [DESIRED ROLE] and a deep understanding of what it takes to succeed in this position. Your task is to identify the ideal candidate based solely on their CV, ensuring they meet and exceed expectations for [JOB DESCRIPTION].

Break down the key qualifications, technical and soft skills, relevant experience, and project work that would make a candidate stand out. Highlight essential industry certifications, domain expertise, and the impact of past roles in shaping their suitability.

Additionally, assess leadership qualities, problem-solving abilities and adaptability to evolving industry trends. Where relevant, consider cultural fit, teamwork and the communication skills required for success within the organisation.

Finally, provide a structured assessment framework outlining what an exceptional CV should look like, red flags to avoid, and how to differentiate between a good candidate and a perfect hire. Ensure your response is comprehensive, strategic, and aligned with real-world recruitment best practices.





→ There are also plenty of good books on the subject of job interviews;
so please read at least one of them!

Elke Eßmann

111 Arbeitgeberfragen im Vorstellungsgespräch

- Absichten erkennen
- Pluspunkte sammeln
- Stolpersteine vermeiden

GOLDMANN





Paris



"Create your **talent profile** and let companies apply to you"

Heidelberg



instaffo.TM

"**AI-powered candidate matching**"

"**Dating portal** for applicants and companies"

">**100k** pre-qualified candidates, **+1,300** new registrations every week"

Founded in **2015**





Which recruitment platforms are particularly suitable for the target group of students?

GraduatesWork placements
Regional focus





What mix of recruitment platforms would an HR professional consider when advertising a job vacancy?

Job vacancies

Employer branding

Search & Matching

Recruitment events



instaffo.





Which platforms offering remote-working jobs and, as a rule, very high incomes are available for digital nomads and modern workers?

Paris

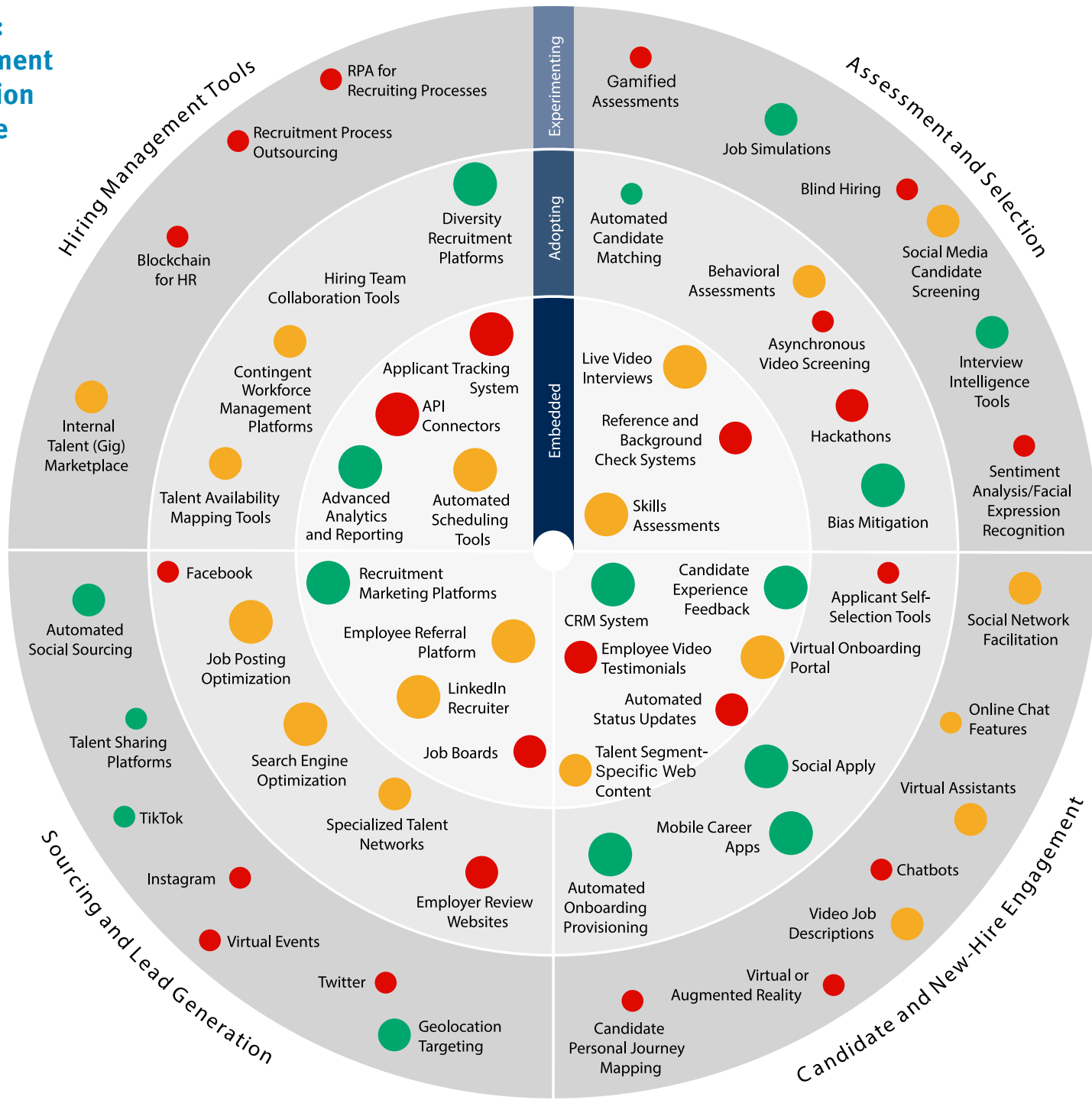


**Welcome
to the Jungle**

formerly known as otta



Gartner: Recruitment Innovation Bullseye



Bachelor's → Master's



IMPORTANT

**‘Make the most of life
as much as possible!
It will be worth it.’**

Prof. Dr.-Ing. Christoph P. Neumann





You can, regardless of whether your Bachelor's thesis has been marked yet, attend Master's modules as long as you are still on your Bachelor's degree!!

TOP 11 Belegen von Master-Modulen im Bachelorstudium

Es wird über die Möglichkeit diskutiert, Studierenden zu ermöglichen, Module aus einem Masterstudiengang zu belegen - ohne abgeschlossenes Bachelorstudium. Voraussetzung hierfür ist, dass die Studierenden im Bachelor mindestens 180 ECTS erlangt haben und keine offenen Dritt- oder Viertversuche vorhanden sein dürfen. Es können dann innerhalb eines Masterstudiengangs maximal 30 ECTS erworben werden.

Die Belegung der Module erfolgt als Antrag über das Studienbüro. Die Prüfungsanmeldung erfolgt mit Antrag auf freiwillige Prüfungsanmeldung ebenso über das Studienbüro. Es erfolgt keine Immatrikulation im Master, es werden lediglich die Module belegt und Prüfungen abgelegt.

Die Module im Master werden dann als freiwillige Module im Notenblatt hinterlegt, beginnt der Student dann den Master, werden diese angerechnet. Wenn nicht, erhält er ein Zusatzzeugnis.

Beschluss: Es wird zugestimmt, Studierenden das Belegen von Mastermodulen ohne abgeschlossenes Bachelorstudium unter den o.g. Voraussetzungen zu ermöglichen – einstimmig.

Source: Extract from the minutes of the EMI Examination Board (date unknown to me)

Who should I contact regarding the practical arrangements? Examinations Office (C S





■ Key figures

- Daniela Winter (Examinations Office $\subset$ Student Services)
- Prof. Dr Alfred Höß (Chair of the Examination Board)

■ Notes from Daniela Winter in an email:

- Students who wish to attend lectures outside their degree programme and sit examinations there must always seek clarification and approval from the Student Office and the Examination Board (PK).
- Anyone not listed on the examination register may have registered late with the approval of the Examination Board; the student can/must prove this by providing a printout of the examination registration receipt; all other participants are listed on the examination register.
- (Anyone who cannot provide this proof but sits the exam anyway is not entitled to do so. This also applies to Bachelor's programmes; here too, authorisation must be in place, e.g. through progression requirements.)

Transition from Bachelor's to Master's #2:

Provisional application for a Master's degree

481



IMPORTANT!

- You can also apply for the Master's programme around the end of January if you expect to have submitted your final thesis by the start of the Master's programme in mid-March, but – due to marking periods, the 'four-day rule', etc. – have not yet been deregistered from the Bachelor's programme by mid-March!
 - This even works if you haven't even submitted your thesis in January, but will only submit it just before mid-March! Go for it!!
 - If in doubt: speak to 1) the Examinations Office [Daniela Winter] and 2) the relevant programme director [e.g. Master's in AI: Prof. Gerald Pirkel]
 - The usual procedure seems to be: 1) re-enrol in the Bachelor's programme via PRIMUSS, and 2) enrol for the Master's programme online – indirectly via PRIMUSS, but with a new registration
 - The administration will presumably then ensure a seamless transition (e.g. to ensure you don't end up paying two sets of tuition fees), at least IF the risks do NOT materialise or IF ALL requirements are ultimately met [Check with them! My information is neither binding nor necessarily up to date!!]



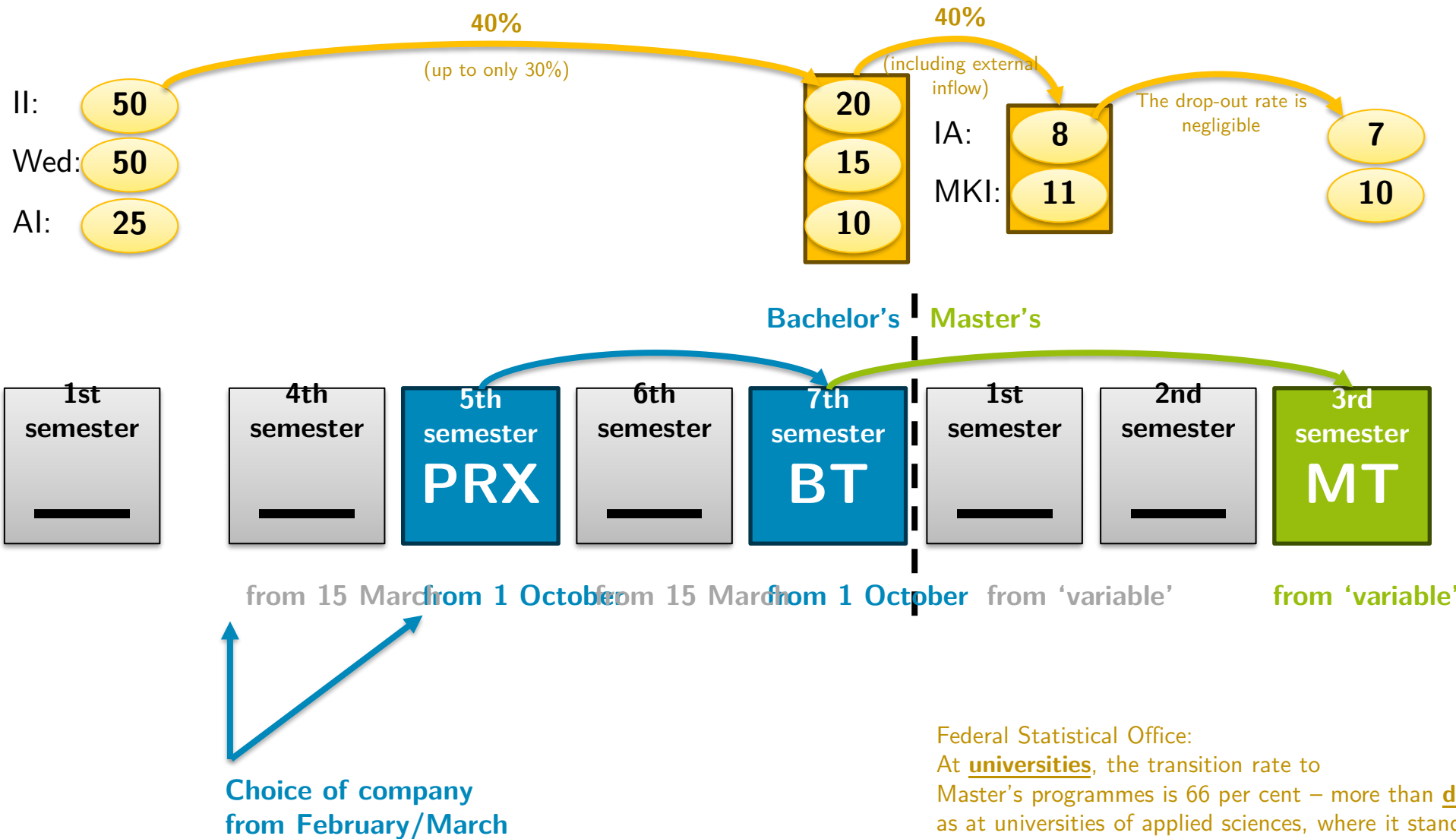


- **Do you need a part-time job to fund your Master's degree?**
 - Ask the **Dean's Office** about vacant **project positions**! There are always some available, and sometimes these haven't even been officially advertised yet because they're still in the planning stages.
 - Feel free to ask **Prof. Dr Daniel Loebenberger** about jobs at **the Fraunhofer Institute**, for example!
 - (There are even more opportunities...)
- [In principle, of course, a **Master's degree** is a **full-time programme**. Part-time jobs must therefore be compatible with your studies.]



Transition rates and final-year project topics in the context of universities of applied sciences with a work placement semester

483



Federal Statistical Office:

At universities, the transition rate to Master's programmes is 66 per cent – more than at as at universities of applied sciences, where it stands



Towards Publishing Your Thesis as a Scientific Paper

Authorship Criteria



<https://journals.ieeeauthorcenter.ieee.org/become-an-ieee-journal-author/publishing-ethics/ethical-requirements/#authorship>

IEEE considers individuals who meet **all** of the following criteria to be authors:

1. made a significant intellectual contribution to the theoretical development, system or experimental design, prototype development, and/or the analysis and interpretation of data associated with the work contained in the article;
2. contributed to drafting the article or reviewing and/or revising it for intellectual content;
3. approved the final version of the article as accepted for publication, including references.

Contributors who do not meet all of the above criteria may be included in the Acknowledgment section of the article.



However, being an employee only or a source of funding only (i.e. otherwise uninvolved) is not sufficient for authorship: **an actively involved thesis supervisor usually always qualifies as a co-author for any IEEE publication!** In healthy cases, this constitutes neither coercive authorship, nor gift authorship, nor mutual support authorship.



<https://www.acm.org/publications/policies/new-acm-policy-on-authorship>

<https://www.acm.org/publications/policies/frequently-asked-questions#h-what-are-the-unacceptable-authorship-practices-that-acm-authors,-editors,-and-pc-chairs-should-be-aware-of?>

Criteria for Authorship

ACM has established a more detailed criteria for determining if an individual's contribution to a Work rises to the level of authorship or if they should be acknowledged for their contribution in the acknowledgements section of a work.

Anyone listed as author on an ACM submission must meet all the following criteria:

- They are an identifiable human being. Anonymous authorship is not permitted, although pseudonyms and/or pen names are permitted provided accurate contact information is given to ACM. ACM does not currently permit collective authorship.
- They have made substantial intellectual contributions to some components of the original Work described in the manuscript, such as contributing to the conception, design, and analysis of the study reported on in the Work and participating in the drafting and/or revision of the manuscript.
- They take full responsibility for all content in the published Works.

Note: All individuals who meet the above criteria should be listed as authors on the Work. The practices of gift authorship, guest authorship, ghost authorship* (see the FAQ for detailed definitions of these and related terms and for discussion of related, acceptable practices), and purchased authorship are clear violations of ACM Publications Policy and when proven may have severe consequences for those found to have participated in such practices. For more information about these practices, please see the FAQ document.



However, being an 'employee-only' or 'funding-only' (i.e. otherwise uninvolved) **supervisor** is not sufficient for authorship: **an actively involved thesis supervisor usually always qualifies as a co-author for any ACM publication!** In healthy cases, this constitutes neither coerced authorship, nor 'gift' authorship, nor authorship based on mutual support.



<https://www.nature.com/nature-portfolio/editorial-policies/authorship>

Authorship

Authorship provides credit for a researcher's contributions to a study and carries accountability. Authors are expected to fulfil the criteria below (adapted from [McNutt et al.](#), Proceedings of the National Academy of Sciences, Feb 2018, 201715374; DOI: 10.1073/pnas.1715374115; licensed under [CC BY 4.0](#)):

Each author is expected to have made substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data; or the creation of new software used in the work; or have drafted the work or substantively revised it

AND to have approved the submitted version (and any substantially modified version that involves the author's contribution to the study);

AND to have agreed both to be personally accountable for the author's own contributions and to ensure that questions related to the accuracy or integrity of any part of the work, even ones in which the author was not personally involved, are appropriately investigated, resolved, and the resolution documented in the literature.

Nature Portfolio journals encourage collaboration with colleagues in the locations where the research is conducted, and expect their inclusion as co-authors when they fulfil all authorship criteria described above. Contributors who do not meet all criteria for authorship should be listed in the Acknowledgements section.

However, being an employee-only or funding-only contributor (i.e. otherwise uninvolved) is not sufficient for authorship: **an actively involved thesis supervisor usually always qualifies as a co-author for any Nature publication!** In appropriate circumstances, this constitutes neither coercive authorship, nor 'gift' authorship, nor authorship based on mutual support.





<https://research.kuleuven.be/en/integrity-ethics/integrity/practices/publication-and-authorship/authorship#section-2>

2 Authorship criteria

2.1. Authorship must be reserved for individuals who:

1. make a substantial intellectual contribution to:

- the conception and design of the study; AND/OR
- the collection of research data; AND/OR
- the analysis and interpretation of research data;

2. AND make a substantial contribution to the drafting of the manuscript (e.g. article, paper or essay, book) and/or substantially contribute to its critical revision;

3. AND approve the final version of the manuscript submitted for publication;

4. AND agree to be accountable for all aspects of the work by ensuring that all questions related to the accuracy and integrity of any part of the work are investigated and resolved with due care. In addition to being accountable for the parts of the work he or she has prepared, an author must be able to identify which co-authors are responsible for other specific parts of the work. Finally, authors must have justified confidence in the integrity of their co-authors' contributions.

2.2 All researchers who have made a substantial intellectual contribution with a view to fulfilling the first criterion must be given the opportunity to fulfil the second and third criteria. Anyone who agrees to this commits to continued cooperation throughout the process with a loyal, collegial and constructive attitude, so that a manuscript can be completed and published in a normal manner and within a reasonable period of time.

However, being an employee only or a funder only (i.e. otherwise uninvolved) is not sufficient for authorship: **an actively involved thesis supervisor usually always qualifies as a co-author for any publication!** In healthy cases, this is neither coercion of authorship, nor gift authorship, nor authorship based on mutual support.





- **Qualitative indicators:**

- Insight discussions (e.g., who made which decisions?)
- Section ownership (e.g., who wrote or provided insights for key sections?)
- Involvement in critical revisions following peer review
- ...

- **Quantitative proxies:**

- Time invested
- Number of meaningful contributions
(e.g., experimental designs, statistical models, core algorithms, ...)
- Version history and manuscript edit logs
- ...





- **Rules of thumb / thresholds?**

- Someone who contributes only **5–10%** of the total effort **may still** qualify for authorship if their contribution is conceptually or analytically central (e.g., devising a new algorithm or statistical method)
- Why are percentages NOT used in the policies and specifications: Contributions vary in nature and impact, not just in volume!

- **Contributor Role Taxonomy (CRediT)**

- **Home:** <https://credit.niso.org/>
- Includes **14 roles** for **the Authorship Matrix**: Conceptualisation, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software (Architecture or Programming or Testing/QA), Supervision, Validation, Visualisation, Writing – original draft, Writing – review & editing
- **Elsevier** example of a CRediT Authorship Matrix in **text form**: <https://www.elsevier.com/researcher/author/policies-and-guidelines/credit-author-statement>



Varying levels of prior knowledge



Computer Science:

- **Programming**
 - Parallel programming, multi-threading
 - Distributed programming
- **Database systems**
 - SQL, transactions, ACID
- **Operating systems**
 - Linux/Windows, setting up server systems, virtualisation

Getting S#*t Done:

- **git, build environment, CI/CD**
- **Project/Self-management**
 - Describing requirements
 - Effort estimates



Created by Adrien Coquet
from Noun Project



Prerequisite knowledge guide: an example Bachelor's Degree in Artificial Intelligence (AI)

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ECTS:

65 Computer Science/AI

5 Project Management

50 Elective modules

Semester 1 (Winter)			30	36
Künstliche Intelligenz				
KI.11	Künstliche Intelligenz.1 (KI.Ethik, Interaktion & Meeting)		5	5
Programmieren & Informatik				
KI.12	Programmieren.1 (Python)		5	5
KI.13	Informatik.1 (Grundlagen)		5	4
Mathematik & Nebenfach				
KI.14	Mathematik 1 & Repetitorium		10	9
KI.15	English & Web  / 		5	4
Semester 2 (Sommer)			30	37
Künstliche Intelligenz				
KI.21	Künstliche Intelligenz.2 (Klassische KI & Meeting)		5	5
Programmieren & Informatik				
KI.22	Programmieren.2 (C & C++)		5	5
KI.23	Informatik.2 (Datenbanksysteme)		5	4
Mathematik & Nebenfach				
KI.24	Mathematik 2 & Repetitorium		10	9
KI.25	Stochastik		5	5
Semester 3 (Winter)			30	25
Künstliche Intelligenz				
KI.31	Data Engineering & Data Analytics		5	4
Programmieren & Informatik				
KI.32	Programmieren.3 (Java & JavaScript)		5	5
KI.33	Algorithmen & Datenstrukturen		5	4
Mathematik & Nebenfach				
KI.34	Grundlagen der Betriebswirtschaftslehre		5	4
Spezialisierung				
KI.35	Spezialisierungsmodul.1		5	4
KI.35.A	Softwareengineering.1			
KI.35.B	Elektrotechnik			
KI.35.C	Design und Produktion digitaler Medien			
KI.36	Spezialisierungsmodul.2		5	4
KI.36.A	Computernetzwerke			
KI.36.B	Grundlagen der Energietechnik			
KI.36.C	Technische Mechanik 1 & Transfer			
Semester 4 (Sommer)			30	26
Künstliche Intelligenz				
KI.41	Machine Learning		5	4
KI.42	Computer Vision 1		5	4
Programmieren & Informatik				
KI.43	BigData, Cloud & NoSQL		5	4
KI.44	Mobile & Ubiquitous Computing		5	6
KI.45	Projektmanagement & Agile Entwicklungsmethoden		5	4
Spezialisierung				
KI.46	Spezialisierungsmodul.3		5	4
KI.46.A	Softwareengineering.2			
KI.46.B	Intelligente Stromnetze			
KI.46.C	Grundlagen der Robotik			

Semester 5 (Winter)			30	8
Künstliche Intelligenz				
KI.51	KI.Kolloquium & SpringSchool		5	4
KI.51.1	KI.Kolloquium (online, aktuelle Themen der KI) 🇩🇪 / 🇬🇧			
KI.51.2	KI.SpringSchool 🇬🇧 (mit KI.Alumnitreffen)			
Spezialisierung				
KI.52	Spezialisierungsmodul.4		5	4
KI.52.A	Innovation Intelligenter Rennwagen (*)			
KI.52.B	Smart Home & Gebäudeautomation (im Block)			
KI.52.C	Industrie-Roboter-Programmierung (im Block)			
Praxisphase				
KI.53	Praxismodul (Betriebspraktikum & Bericht)		20	0
Abschnitt 3			60	38
Semester 6 (Sommer)			30	24
Künstliche Intelligenz				
KI.61	KI.Projekt		5	4
KI.62	Deep Learning		5	4
KI.63	Visualisierung & Erklärungskomponenten		5	4
KI.64	Innovationsmanagement & Patente		5	4
Spezialisierung				
KI.65	Wahlfach.1 (Studiengangsspezifische Wahlpflichtmodule)		5	4
KI.66	Wahlfach.2 (Studiengangsspezifische Wahlpflichtmodule)		5	4
Semester 7 (Winter)			30	14
Spezialisierung				
KI.71	Wahlfach.3 (Studiengangsspezifische Wahlpflichtmodule)		5	4
KI.72	Spezialisierungsmodul.5		5	4
KI.72.A	Natural Language Processing & Information Retrieval			
KI.72.B	Energieeffiziente Gebäude			
KI.72.C	Serious Games			
KI.73	Spezialisierungsmodul.6		5	4
KI.73.A	Computer Vision.2			
KI.73.B	Kraft-Wärme-Kälte-Kopplung			
KI.73.C	Intelligente Tutorsysteme			
Bachelorphase				
KI.74	Bachelormodul		15	
KI.74.1	Bachelorseminar 🇩🇪 / 🇬🇧			2
KI.74.2	Bachelorarbeit 🇩🇪 / 🇬🇧		12	0



Varying levels of prior knowledge: an example Bachelor's degree in Media Informatics (MI)

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AI/Data Science-focused structure of your Bachelor's degree programme?

1. Practical semester?
2. Compulsory elective modules?
 - Big Data, Cloud & NoSQL



AI 1, AI 2, ML,
Big Data, Cloud & NoSQL

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Modul	CP	SWS
Studienabschnitt 1		
Grundlagen digitaler Systeme	5	4
Englisch	3	2
Theoretische Informatik	5	4
Mathematik 1	8	8
Design & Produktion digitaler Medien	5	4
Programmierung	12	8
Mediengestaltung	5	4
Web-Client-Technologien	5	4
Stochastik	5	5
Betriebssysteme	3	2
Informationsvisualisierung	5	4
Studienabschnitt 2		
Algorithmen u. Datenstrukturen	5	4
Codierungstheorie & Kryptologie	5	4
Computernetzwerke	5	4
Software-Engineering 1	7	6
Informationsethik & Technikphilosophie	5	4
Screen-Design	5	4
Data Analytics	5	5
Projektmanagement & agile Entwicklungsmeth.	5	4
Benutzeroberflächenprogrammierung	5	4
Web-Datenbank-Systeme	5	4
Mensch-Computer-Interaktion	5	4
Mobile and Ubiquitous Computing	5	6
Studienabschnitt 3		
Praxissemester		
Praxisphase	22	--
Praxisseminar	--	2
Praxisbegleitende LV (Betriebswirtsch. Grundlagen)	5	4
Semester 6 und 7		
Software-Engineering 2	3	2
Software-Projekt	7	4
Studiengangsspezifische Wahlpflichtmodule	10	8
Web-Anwendungsentwicklung	5	4
Interaktive Systeme	5	4
Bachelorarbeit	12	--
Bachelorseminar	3	2
Computer Vision	5	4
App-Programmierung	5	4
Informationssicherheit	5	4

65

5

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AI/Data Science-focused
structure
of your Bachelor's degree
programme?

1. Practical semester?

2. Compulsory elective modules?

- Web application development
- Big Data, Cloud & NoSQL



AI 1, AI 2, ML,
Web application development,
Big Data, Cloud & NoSQL

Created by unicon,
from the Noen Project



Modul	CP	SWS
Studienabschnitt 1		
Grundlagen digitaler Systeme	5	4
Englisch	3	2
Theoretische Informatik	5	4
Mathematik 1	8	8
Cyberphysische Systeme 1	5	6
Programmierung	12	8
Mathematik 2	7	8
Datenbanksysteme	5	4
Stochastik	5	5
Betriebssysteme	3	2
Studienabschnitt 2		
Algorithmen u. Datenstrukturen	5	4
Codierungstheorie & Kryptologie	5	4
Computernetzwerke	5	4
Software-Engineering 1	7	6
Informationsethik & Technikphilosophie	5	4
Regelungstechnik	5	4
Data Analytics	5	5
Projektmanagement & agile Entwicklungsmeth.	5	4
Benutzeroberflächenprogrammierung	5	4
Embedded Systems	7	6
Industrielle Kommunikationstechnik	5	4
Mobile and Ubiquitous Computing	5	6
Studienabschnitt 3		
Praxissemester		
Praxisphase	22	--
Praxisseminar	--	2
Praxisbegleitende LV (Betriebswirtsch. Grundlagen)	5	4
Semester 6 und 7		
Software-Engineering 2	3	2
Software-Projekt	7	4
Studiengangsspezifische Wahlpflichtmodule	10	8
Cyberphysische Systeme 2	5	5
Industrie-4.0-Projekt	5	4
Bachelorarbeit	12	--
Bachelorseminar	3	2
Computer Vision	5	4
Fertigungsleittechnik	3	2
Informationssicherheit	5	4
Echtzeitbetriebssysteme	3	3

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5

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Varied prior knowledge: an example Bachelor's degree in Electrical and Information Technology (EI)

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A computer science-heavy structure
of your Bachelor's degree
programme?

1. Practical semester?

2. Specialisation?

- Cyber-physical systems (CPS)

- ~~Compulsory elective modules?~~

- (As far as I'm aware, there are no compulsory elective modules relevant to my field of study in the Bachelor's programme in Electrical Engineering)

- (I cannot offer these myself in EI due to a lack of OS, DBS and SWE)

Operating systems, database systems,
Software Engineering,
Data Analytics, AI 1, AI 2, ML,
Web application development,
Big Data, Cloud & NoSQL

3. Personal initiative?



Created by Adriaan Groot
from Maastricht University



Modul	CP	SWS
Studienabschnitt 1		
Elektrotechnik 1	9	8
Elektrotechnik 2	9	8
Englisch	3	2
Informatik 1 (C, but including AUD)	10	10
Konstruktion	3	2
Mathematik 1	8	8
Mathematik 2	7	8
Physik	9	8
Werkstofftechnik	3	2
Studienabschnitt 2		
Angewandte Systemtechnik	7	6
Digitaltechnik	7	6
Elektrische Messtechnik	5	4
EI. Bauelemente u. Schaltungstechnik	9	8
Elektrotechnik 3	5	4
Embedded Systems	7	6
Informatik 2 (C++, but including threads)	5	6
Regelungstechnik	7	6
Computernetzwerke	5	4
Digitale Signalverarbeitung	7	6
alle Vertiefungsrichtungen		
Praxisphase	22	--
Praxisseminar	--	2
Praxisbegleitende LV: BWL und Projektmanagement	5	4
Studiengangspez. Projekt	5	--
Studiengangspez. Wahlpflichtmodule	10	8
Bachelorarbeit	12	--

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5/4!

Business administr





- **Same as above**
 - an additional point for a Master's thesis within the scope of my teaching area 'Big Data and Cloud Computing for AI' remains in place
 - Because: Neither in the Master's in AI (nor in the Master's in IA or AR) can you compensate for the heterogeneity from the Bachelor's phase
- **The Bachelor's thesis now counts as an additional point in all the above questions, regardless of whether your Bachelor's programme was AI/Data Science-focused or computer science-focused**
 - As it is in the past and, ideally, was related to my subject areas
- **An additional criterion regarding the heterogeneity of prior knowledge is whether you have taken my Master's course 'Big Data and Cloud-based Computing' (BDCC) in MKI (compulsory module) or IA (optional module)**
 - Other Master's modules are of secondary importance for my Master's thesis topics





<https://github.com/cyberlytics/awesome-basics>

- If you are affected by the issue of heterogeneous prior knowledge, then be sure to visit this page!



Created by Adrien Coquet
from Brain Project

