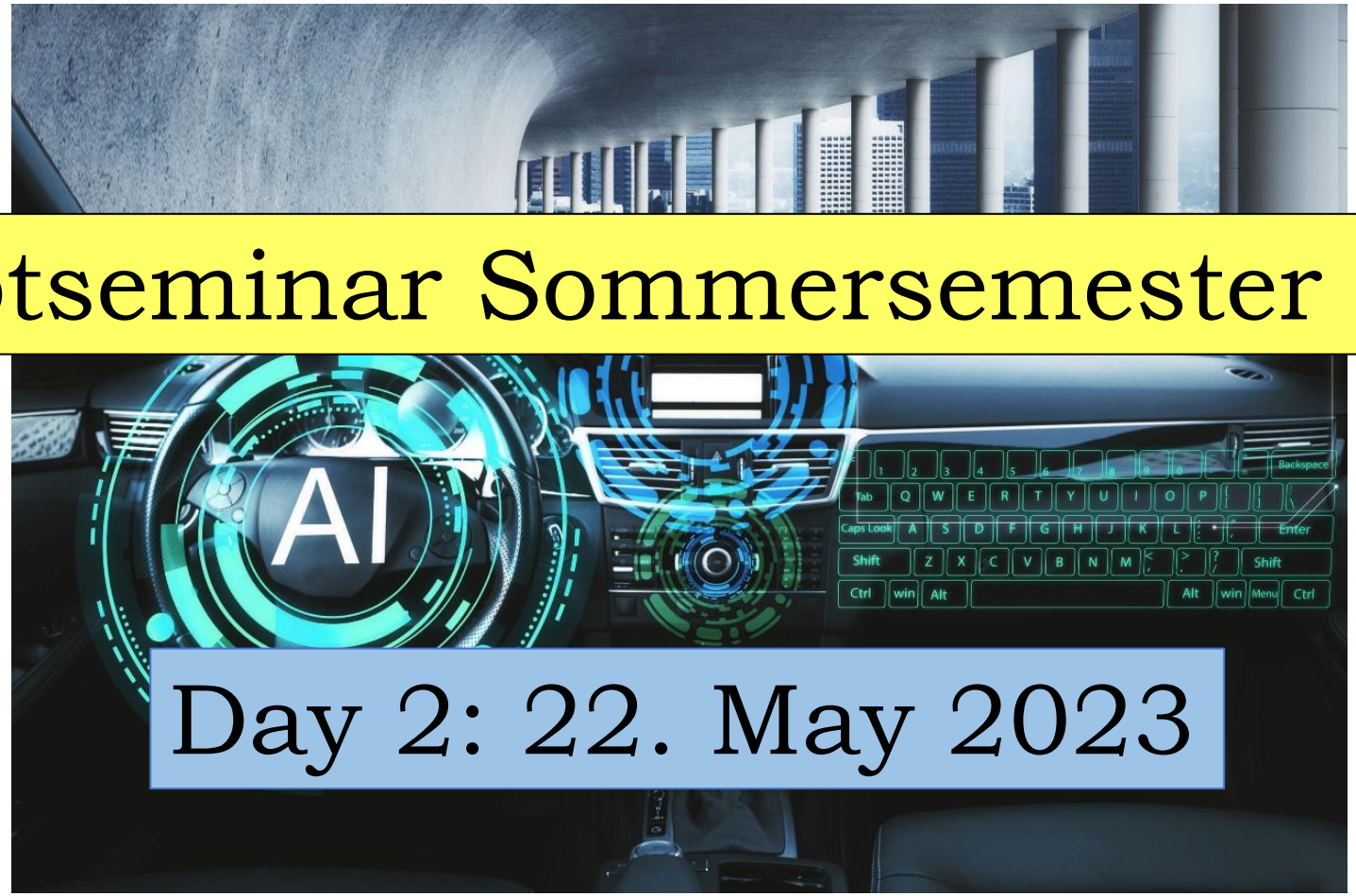
Prof. Dr. Frank J. Furrer

«Safety and Security of Cyber-Physical Systems»



Hauptseminar Sommersemester 2023

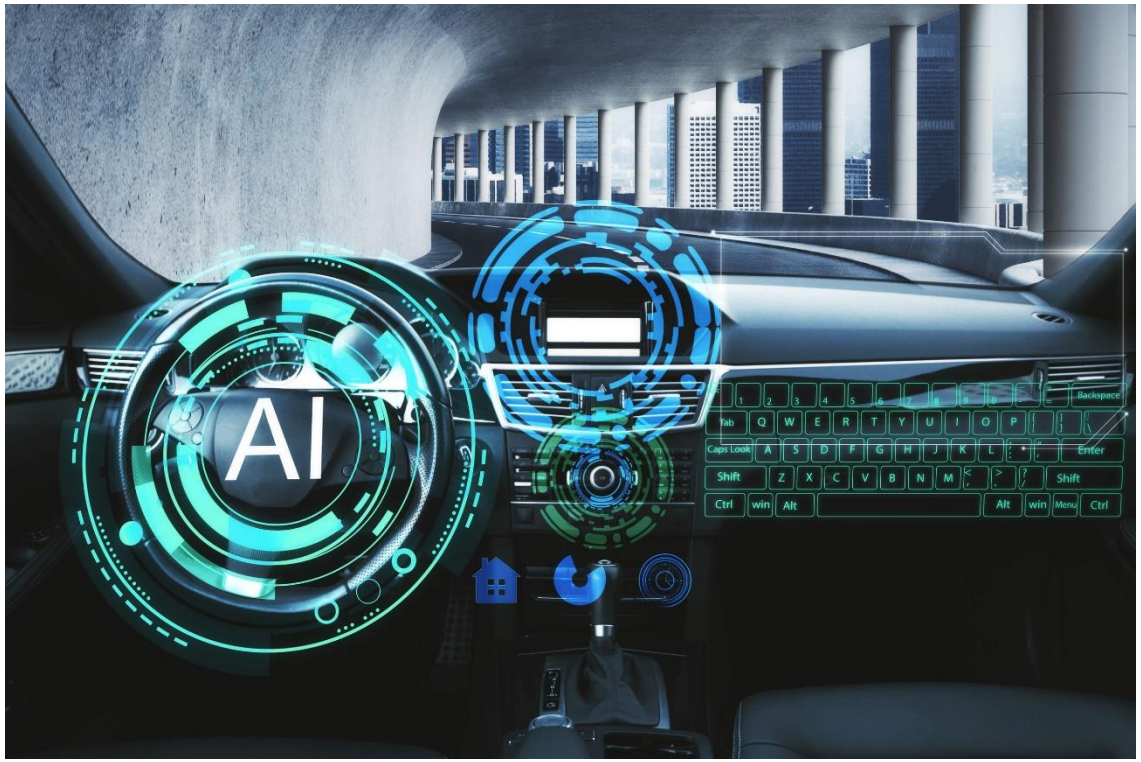
Day 2: 22. May 2023

© https://www.123rf.com/photo_115434623
Used with permission {28.12.2019}

https://maximolly.medium.com/phd-writing-workshop-the-lit-review-16c561768a93

Schedule Day 2

Name	Presentation	Feedback
Furrer, Frank J.: *Introduction*	Introduction 09:20 – 09:40	
Tom Felber	09:40 – 09:55	09:55 – 10:05
Franz Glöckner	10:05 – 10:20	10:20 – 10:30
Short Break	10:30 – 10:45	
Richard Müller	10:45 – 11:00	11:00 – 11:10
Tuan Anh Nguyen	11:10 -11:25	11:25 – 11:35
Furrer, Frank J.: *Final Comments*	11:35 - 12:40	



Content

Part 1

- Choice of Topics & Research Questions
- Paper Checklist
- Peer Reviews

Part 2

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- Work Plan
- Next Steps

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Research Questions

https://www.duden.de/rechtschreibung/Vergroesserungsglas

"A good research question is essential to guide your research paper, project or thesis. It pinpoints exactly what you want to find out and gives your work a clear focus and purpose"

Shona McCombes, 2022

https://www.scribbr.com/research-process/research-questions/

All research questions should be:

- **Focused** on a single problem or issue
- **Researchable** using primary and/or secondary sources
- **Feasible** to answer within the timeframe and practical constraints
- **Specific** enough to answer thoroughly
- **Complex** enough to develop the answer over the space of a paper or thesis
- **Relevant** to your field of study and/or society more broadly

https://www.scribbr.com/research-process/research-questions/

http://katdaley.blogspot.com/2016/03/what-makes-good-research-question.html

Research Questions

- **Focused**
- **Researchable**
- **Feasible**
- **Specific**
- **Complex**
- **Relevant**

Tom Felber

Topic: Boeing 737 Max Disaster:

RQ1: What exactly did happen? A timeline of events that led to the crashes

RQ2: Why did the accidents happen, which mistakes were made and which principles have been violated?

RQ3: Which improvements have been done since then?

for/to … ?

- **Focused** √
- **Researchable** √
- **Feasible** √
- **Specific** ?
- **Complex** √
- **Relevant** √

Franz Glöckner

Topic: Bangladesh Bank Security Incident:

RQ1: How did the attack chain and exploited vulnerabilities contribute to the heist's impact?

RQ2: What defenses failed during the heist, and what post-incident enhancements were implemented?

RQ3: What lessons emerged from this incident, and how did they benefit the community?

- **Focused** √
- **Researchable** √
- **Feasible** √
- **Specific** √
- **Complex** √
- **Relevant** √

and …

Richard Müller

Topic: Observations on Flight Helios 522:

RQ1: Where can the chain of events that lead to the crash be broken?

RQ2: Which safety principles were implemented, and where did they fall flat?

RQ3: What improvements have since been made?

- **Focused** ?
- **Researchable** √
- **Feasible** √
- **Specific** ?
- **Complex** √
- **Relevant** √

Are we not more interested in which safety principles were NOT implemented?

Not specific and targetted enough

Tuan Anh Nguyen

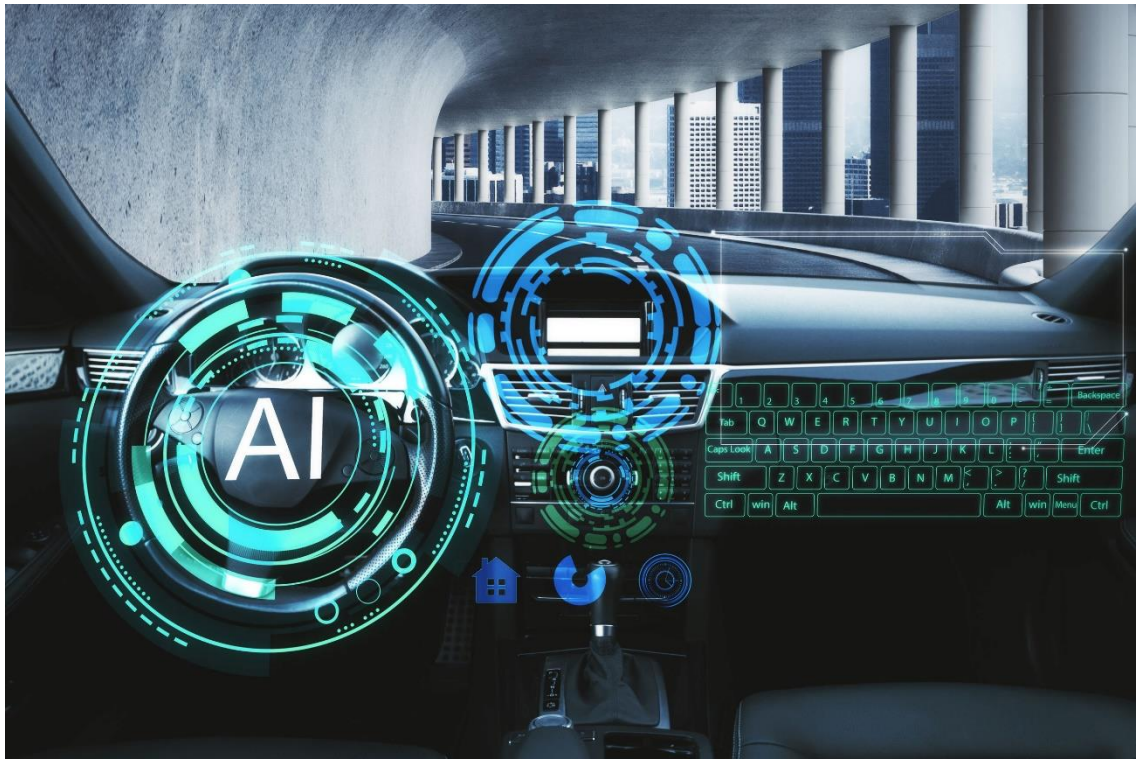
Topic: Ukraine Power Grid Attack (2015):

RQ1: Analyze the technical capabilities of the attackers, which weaknesses were taken advantage of and assess the damage caused

RQ2: Investigate the active vulnerabilities of the system and why the security at the time didn't work against the attack

RQ3: Inspect what security measures were enforced after the incident and how effective they were against future attacks (after 2015).

- **Focused** √
- **Researchable** √
- **Feasible** √
- **Specific** √
- **Complex** √
- **Relevant** √



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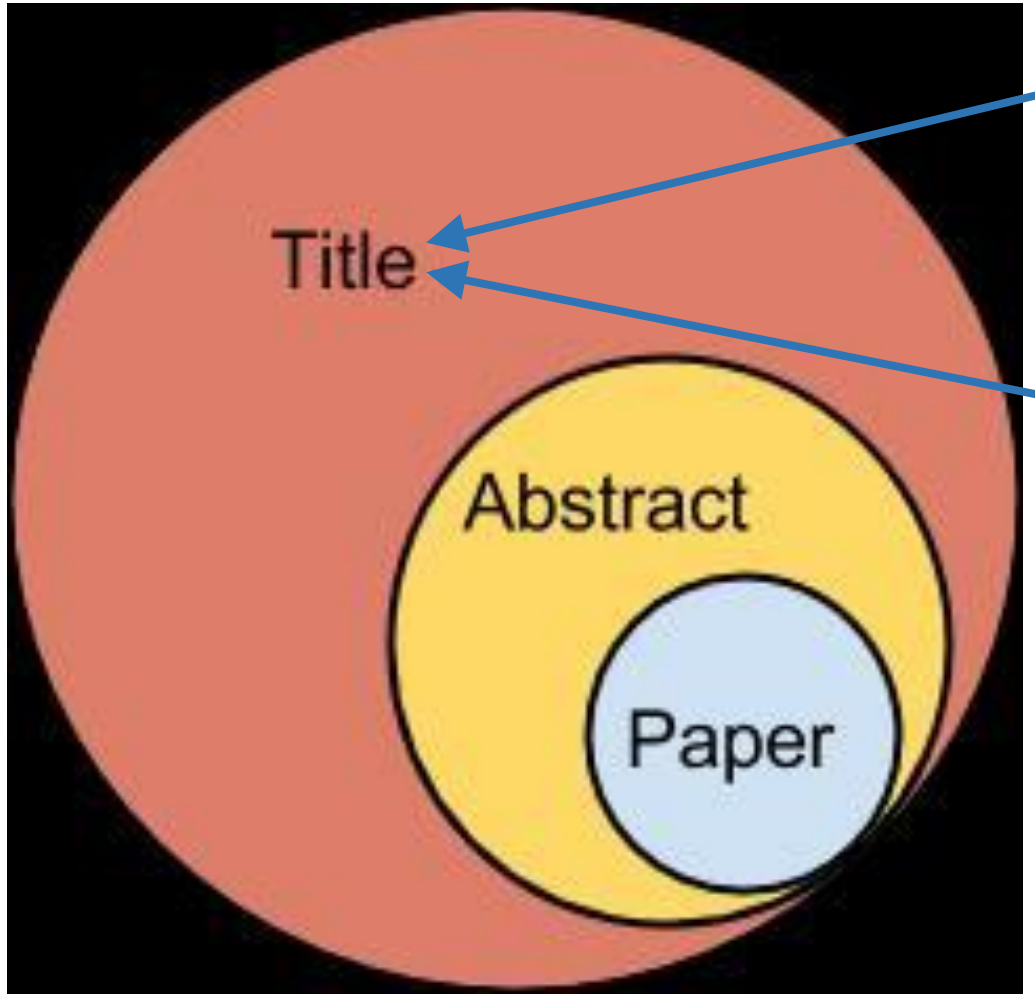
Title

Reader **Motivation** to read the Paper



The title must contain a **promise** to the reader

https://de.aliexpress.com

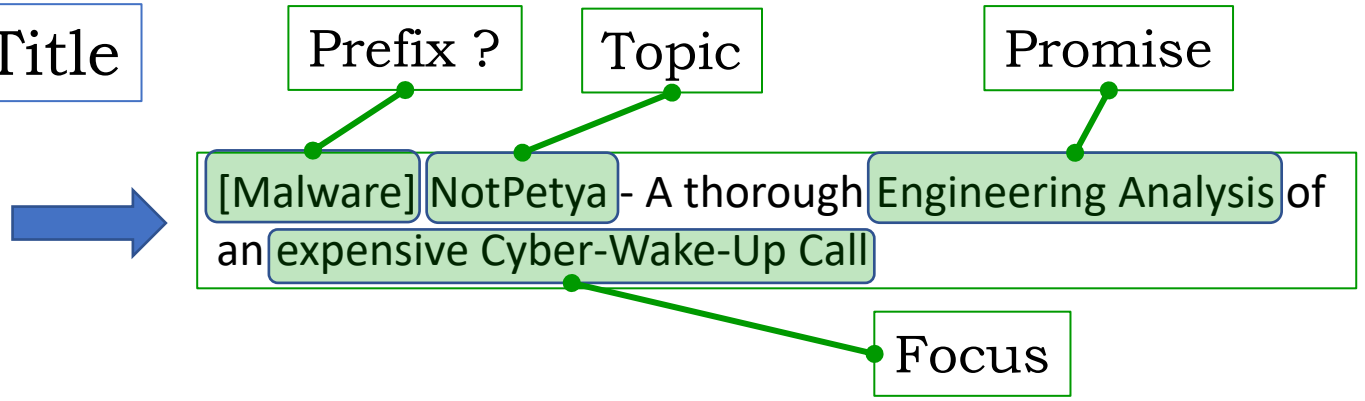
Which is my **learning benefit** if I invest the time to read the paper?

http://blog.bonus.lv

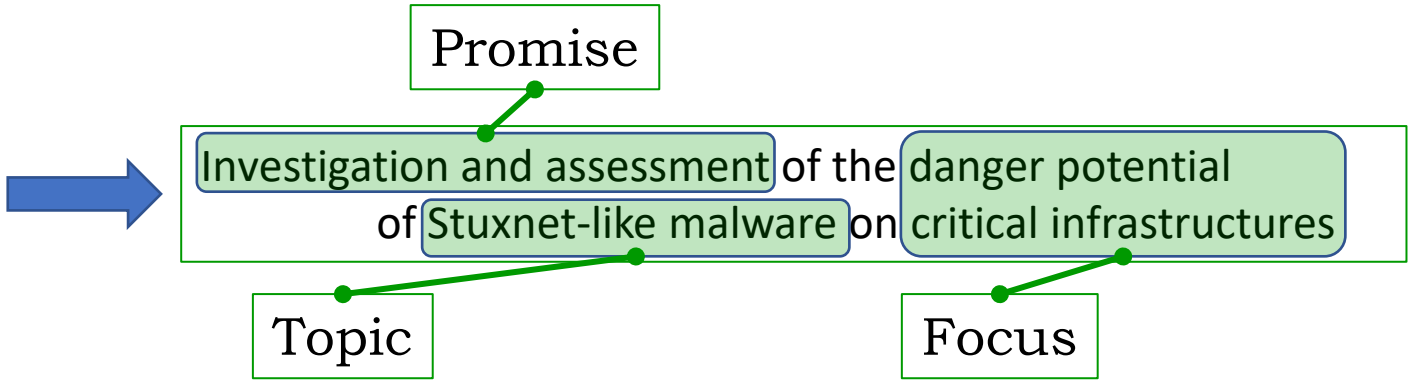
http://blogs.nature.com

HS 2022: Final Titles

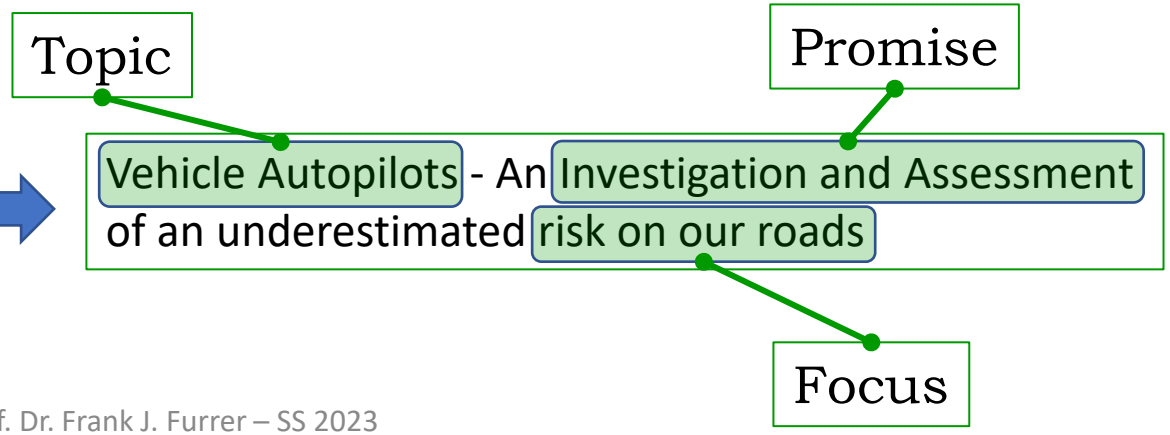
Leonard Wagner:
“NotPetya – The most expensive wake-up call”



Tom Gneuss:
Invisible worms infiltrating critical infrastructure



Johanna Bernholz:
Autopilot- the unseen risk in our everyday life



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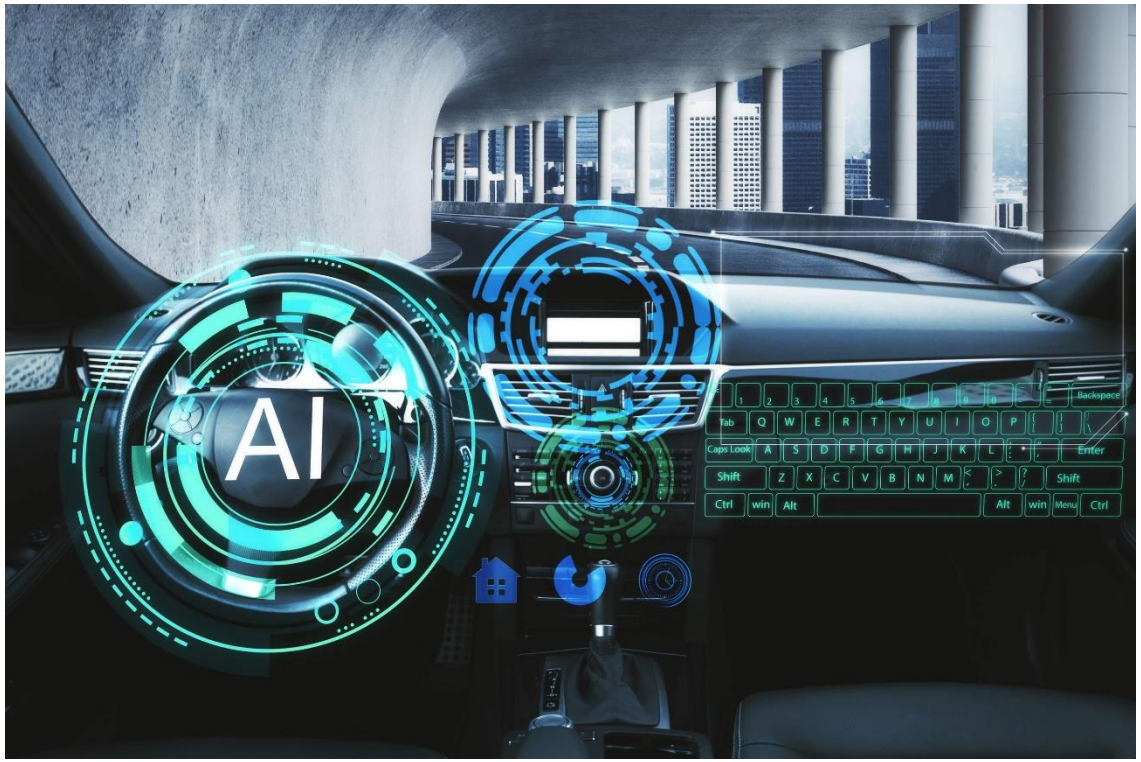

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Peer Reviews

Slide from Day 1

http://clipart-library.com/clipart/8T688za7c.htm

https://imhsci.org

Peer Review

Peer reviewer = Equal ranking, qualified, independent individual

- ✓ Reading & understanding the paper
- ✓ Pointing out weak or missing points & arguments
- ✓ Making suggestions for improvement
- → **Delivering a review report**

- Examine the importance of the research question(s) addressed in the manuscript (e.g., are objectives and justification clearly stated?).
- Assess the originality (contribution, addition of knowledge to scientific literature or field) of the manuscript.
- Clearly identify the strengths and weaknesses of the method described in the manuscript.
- Make specific useful comments on the writing of the manuscript (e.g., writing, organization, figures, etc.).
- Offer specific comments on the author's interpretation of the results and conclusions drawn from the results.

https://www.elsevier.com/reviewers/how-to-review

Please take reviewing seriously and invest sufficient time – It is an essential service to your peers

All peer reviews were short, poor and did barely provide any constructive substance!

Hello Tom,
really engaging topic, and pretty recent too. I hadn't heard anything of the topic, despite the global nature of the problem.
I have no complaints about the research questions.
kind regards
Richard

https://www.liftenablement.com

Hello Franz,
you made a nice choice as a topic and I like the RQs that you made. They cover all the important parts of the accident. As another reviewer mentioned, it may be good to combine the RQs, so that there aren't too many.
Kind Regards
Tuan Anh Nguyen

RQ1: What are key requirements of a generic framework for protective shells in safety and security-critical cyber-physical systems to improve their trustworthiness by reducing the risks of failures and exploitations?

Die Frage enthält eine Antwort (requirement = trustworthiness, solution: reduce riks). Hier sehe ich 2 Wege: die Frage zielt auf eine konkrete Anforderung ab (How to increase the trustworthiness of safety and security-critical CPS? Oder die Frage ist, welche Anforderungen ein solches CPS haben soll: What are key requirements for s&s-critical CPS (e.g., verifyability, reliability, …). Ich denke, dass die Vertrauenswürdigkeit die perfekte Qualität ist, die man angehen sollte. Also die erste Frage fände ich sinnvoller. Hier direkt wieder ein Literaturhinweis: Trust in adaptiven Systemen wurde unter anderem in einem großen Projekt namens OCTrust untersucht: https://www.uni-augsburg.de/de/fakultaet/fai/isse/projects/octrust/

OC steht hierbei für Organic Computing – einem Synonym für selbst-adaptive/-organisierte Systeme.

Hier wurden auch Metriken für Trust in SAS eingeführt. Diese würden sich wiederum hervorragend

für die Evaluation der Arbeit eignen.

https://www.pinterest.com

Peer Reviews
are not a nuisance,
but an important building block
of your career

https://www.pinterest.ch

- Improves paper or project
- Enhances the skills and knowledge of author(s)

Why are peer reviews good for the reviewer(s)?

Academia:
- Leads to important contacts
- Generates visibility and recognition

Industry:
- Massively raises the visible value of the reviewer
- Leads to invitation to project groups

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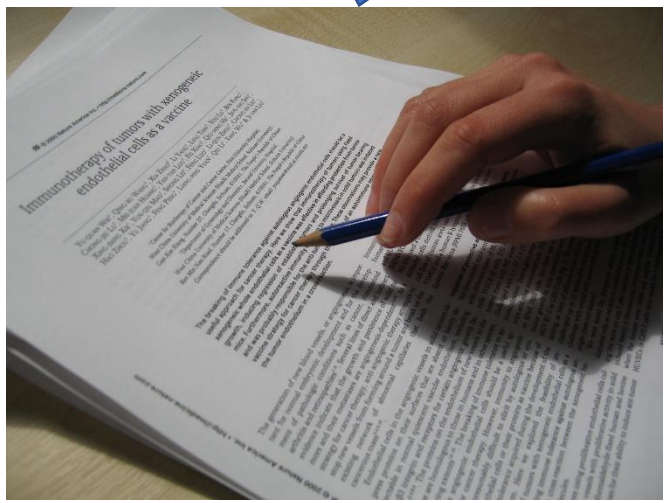
Importance of good reviewers: Academia

Feedback for Author
Decision for Publisher



http://science.spb.ru

Review Report

http://data-mining.philippe-fournier-viger.com

- Reputation
- Conference Program Committees
- Visibility
- Networking

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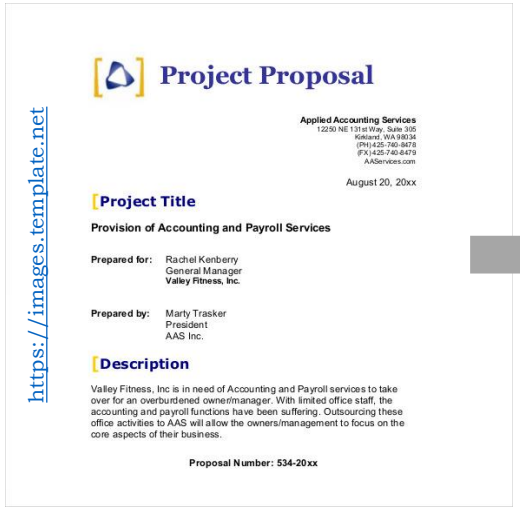
Importance of good reviewers: Industry



https://aos.iacpublishinglabs.com

- Reputation
- Visibility
- Trust
- Expert status
- Soft Skills demonstration

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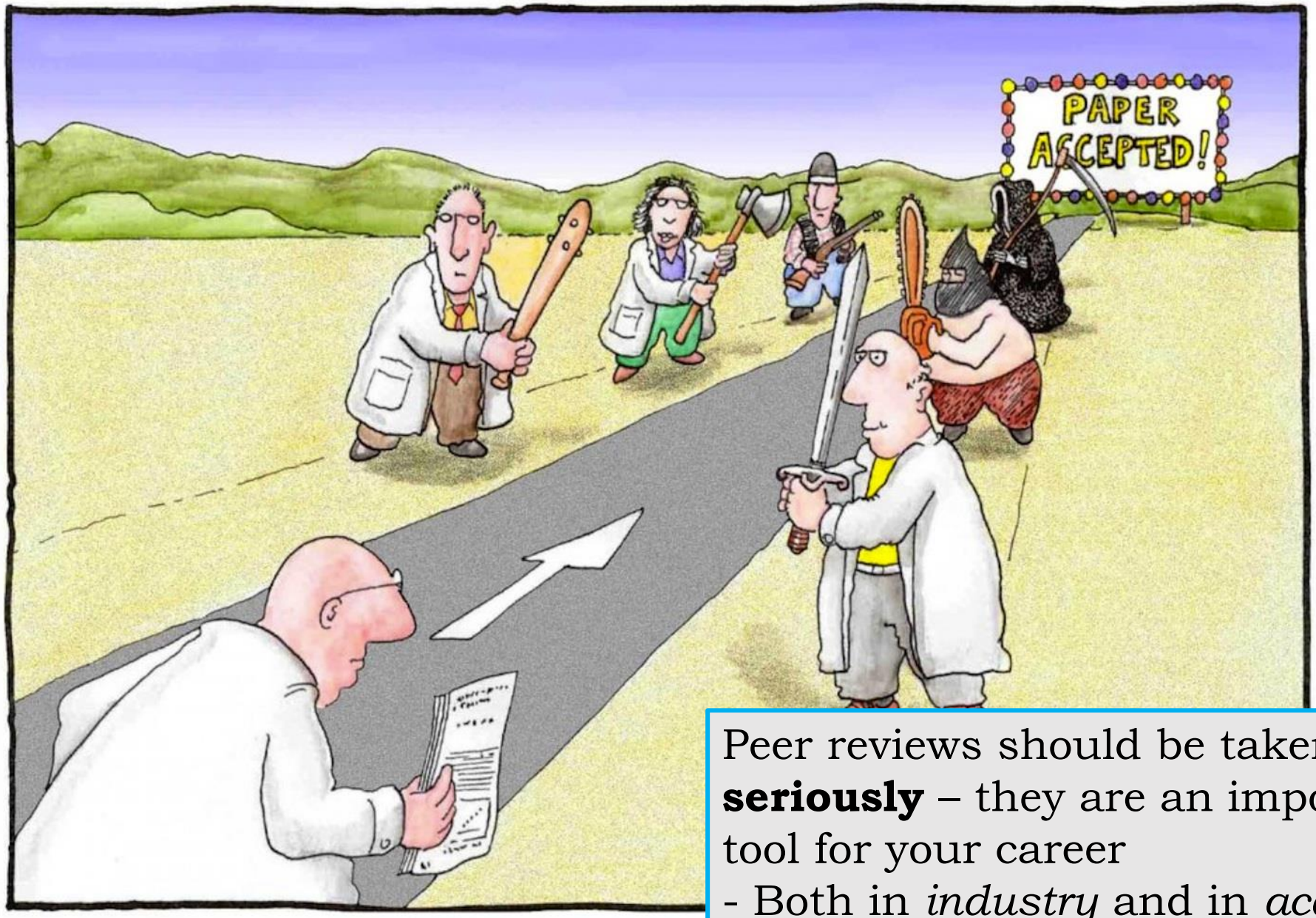
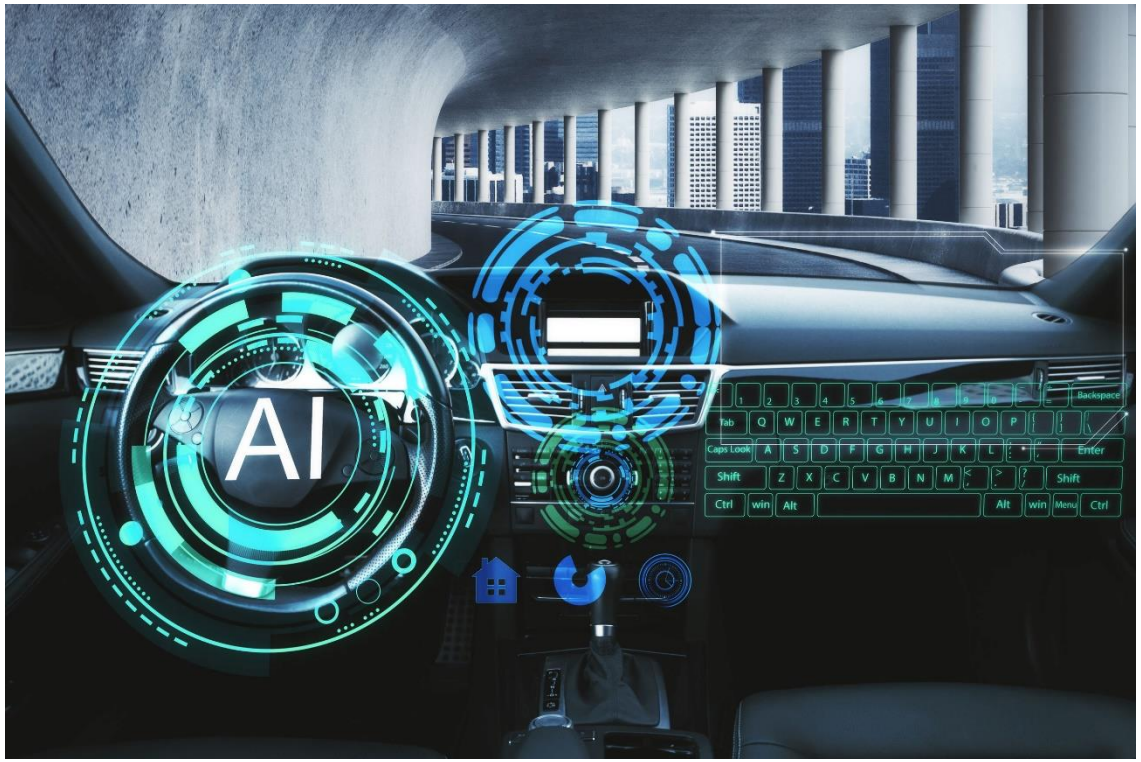
http://genomicenterprise.com/blog/2010/09/03



Peer reviews should be taken very **seriously** – they are an important tool for your career
- Both in *industry* and in *academia*



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Your Presentation:

Procedure

Presentation
(15 mins)

http://magneticspeaking.com/blog/

Audience
Feedback
(10 mins)

Storyline	• Logical • Consistent • Attractive • Clear	Excellent ☐ Good ☐ Improvable ☐
Illustrations Pictures	• Fitting/Adequate • Granularity • Power of Expression • Support of Speaker	Excellent ☐ Good ☐ Improvable ☐
Animation	• Focussed (emphasizing the message of the slide) • Speed • Unnecessary effects • Timing	Excellent ☐ Good ☐ Improvable ☐
Density	• Too dense (per slide or per time unit) • Too slow (more material per slide or per time unit) • Balance of slides • Bullet point lists	Excellent ☐ Good ☐ Improvable ☐
Delivery	• Personal style • Interaction with the audience • Complementary speech/illustrations	Excellent ☐ Good ☐ Improvable ☐

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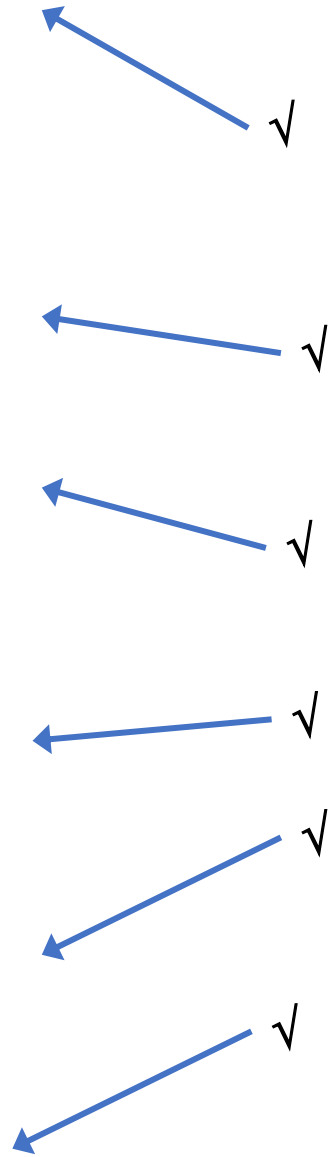
Storyline	• Logical • Consistent • Attractive • Clear	Excellent ☐ Good ☐ Improvable ☐
Illustrations Pictures	• Fitting/Adequate • Granularity • Power of Expression • Support of Speaker	Excellent ☐ Good ☐ Improvable ☐
Animation	• Focussed (message of the slide) • Speed • Unnecessary effects • Timing	Excellent ☐ Good ☐ Improvable ☐
Density	• Too high • Too low • Balance of slides • Bullet point lists	Excellent ☐ Good ☐ Improvable ☐
Delivery	• Personal style • Interaction with the audience • Complementary speech/illustrations	Excellent ☐ Good ☐ Improvable ☐
Message	• Precise • True • „catching“	Excellent ☐ Good ☐ Improvable ☐



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What is the sure death of a good presentation ?

http://info.everywoman.com

No Solution:

- Talking faster
- Skipping slides
- Shorten explanations

Time overrun !

http://www.wfs.org

Schedule Day 2

Name	Presentation	Feedback
Furrer, Frank J.: *Introduction*	Introduction 09:20 – 09:40	
Tom Felber	09:40 – 09:55	09:55 – 10:05
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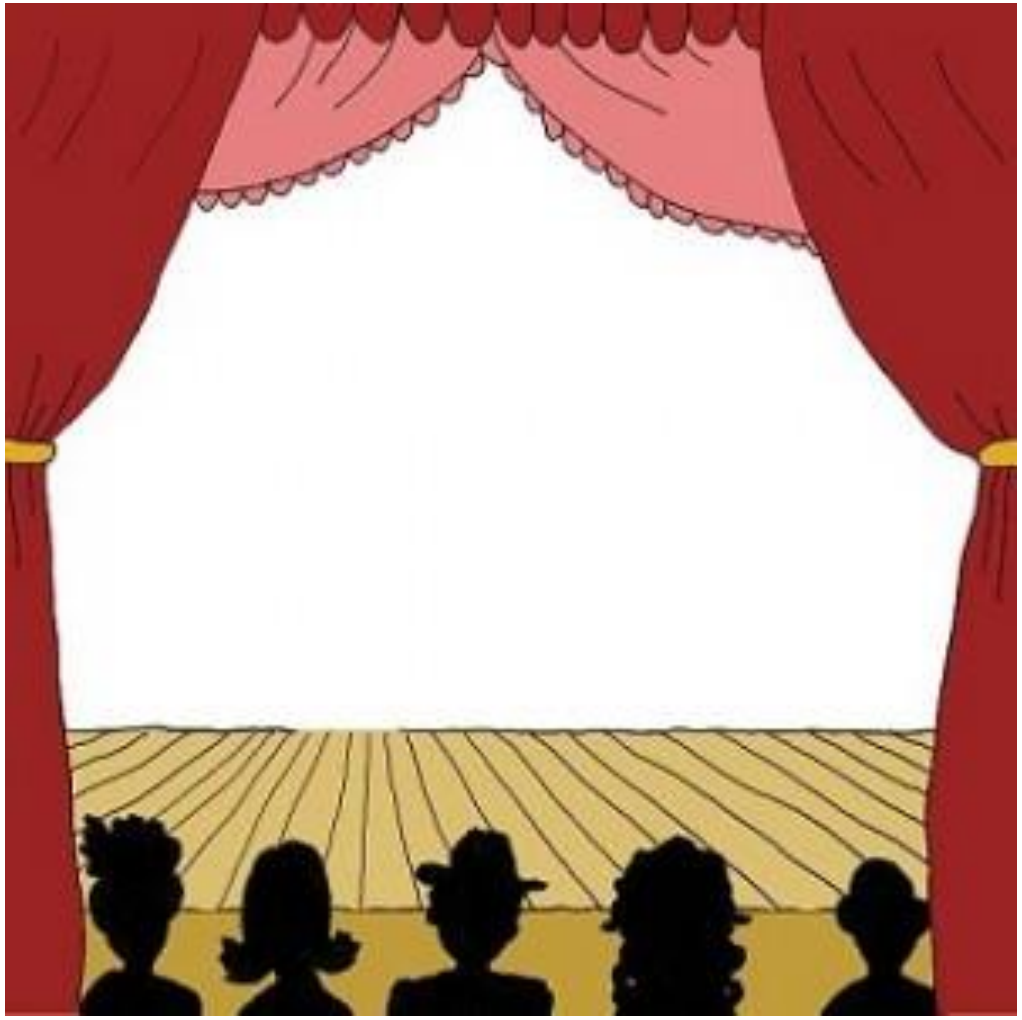
Furrer, Frank J.: *Final Comments*	11:35 - 12:40	



… the stage is yours!

Assessment of Presentation:

Tom Felber

Storyline	• Logical • Consistent • Attractive • Clear	Excellent ☐ Good ☐ Improvable ☐	√
Illustrations Pictures	• Fitting/Adequate • Granularity • Power of Expression • Support of Speaker	Excellent ☐ Good ☐ Improvable ☐	√
Animation	• Focussed (message of the slide) • Speed • Unnecessary effects • Timing	Excellent ☐ Good ☐ Improvable ☐	√
Density	• Too high • Too low • Balance of slides • Bullet point lists	Excellent ☐ Good ☐ Improvable ☐	√
Delivery	• Personal style • Interaction with the audience • Complementary speech/illustrations	Excellent ☐ Good ☐ Improvable ☐	√
Message	• Precise • True • „catching“	Excellent ☐ Good ☐ Improvable ☐	√

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Assessment of Presentation:

Franz Glöckner

Storyline	• Logical • Consistent • Attractive • Clear	Excellent ☐ Good ☐ Improvable ☐
Illustrations Pictures	• Fitting/Adequate • Granularity • Power of Expression • Support of Speaker	Excellent ☐ Good ☐ Improvable ☐
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Message	• Precise • True • „catching“	Excellent ☐ Good ☐ Improvable ☐

√ √ √ √ √

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https://clipartix.com/coffee-cup-clip-art-image-13354/

Short Break:

10:30 -10:45

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Assessment of Presentation:

Richard Müller

Storyline	• Logical • Consistent • Attractive • Clear	Excellent ☐ Good ☐ Improvable ☐	√
Illustrations Pictures	• Fitting/Adequate • Granularity • Power of Expression • Support of Speaker	Excellent ☐ Good ☐ Improvable ☐	√
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Message	• Precise • True • „catching“	Excellent ☐ Good ☐ Improvable ☐	√

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Assessment of Presentation:

Tuan Anh Nguyen

Storyline	• Logical • Consistent • Attractive • Clear	Excellent ☐ Good ☐ Improvable ☐	√
Illustrations Pictures	• Fitting/Adequate • Granularity • Power of Expression • Support of Speaker	Excellent ☐ Good ☐ Improvable ☐	√
Animation	• Focussed (message of the slide) • Speed • Unnecessary effects • Timing	Excellent ☐ Good ☐ Improvable ☐	√
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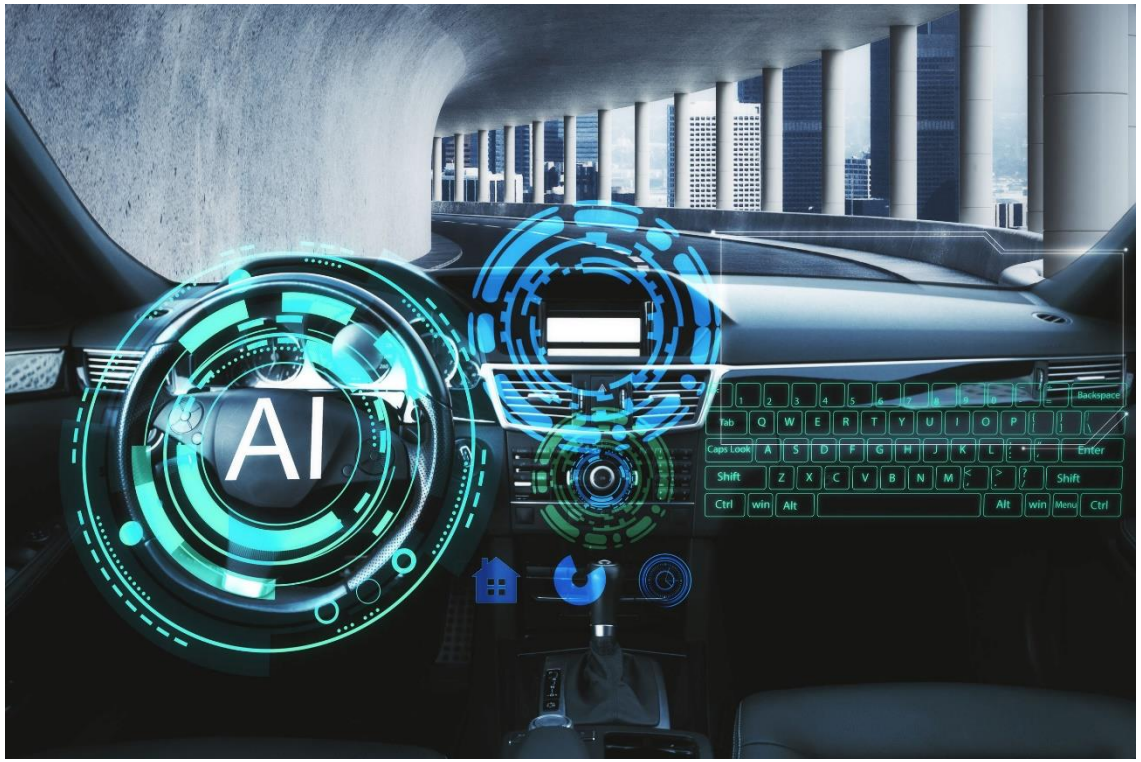

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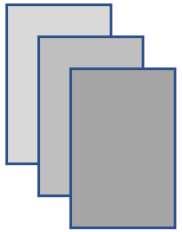
The Communication Chain



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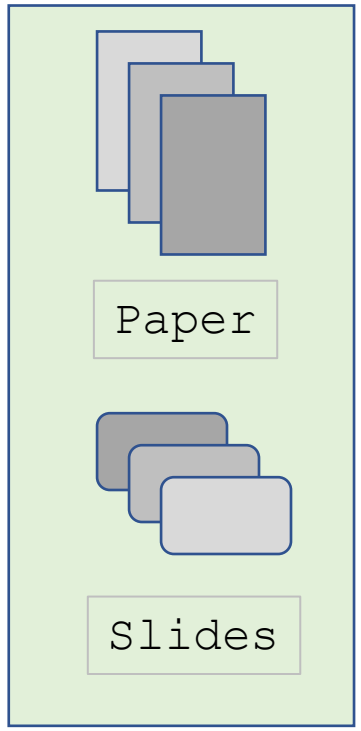

Comprehension Barrier

- Ambiguous vocabulary
- Unclear concepts
- Differing contexts
- Lack of antecedent knowledge
- Twisted storyline
- Vague message

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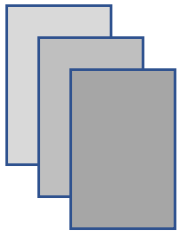
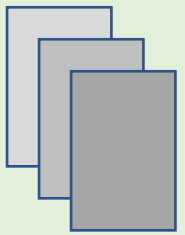
Importance for your Career

Ideas, Innovation, Solutions



Documentation



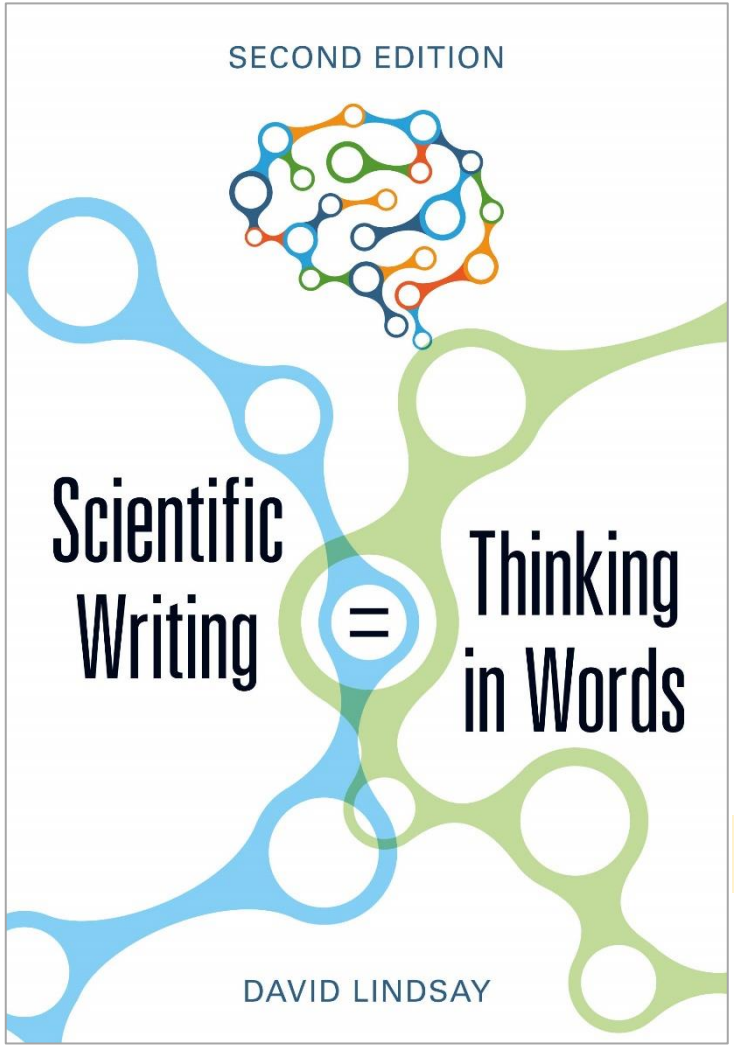
Paper

Slides

Comprehension Barrier

https://de.vecteezy.com

Self-Study: Communication Skills



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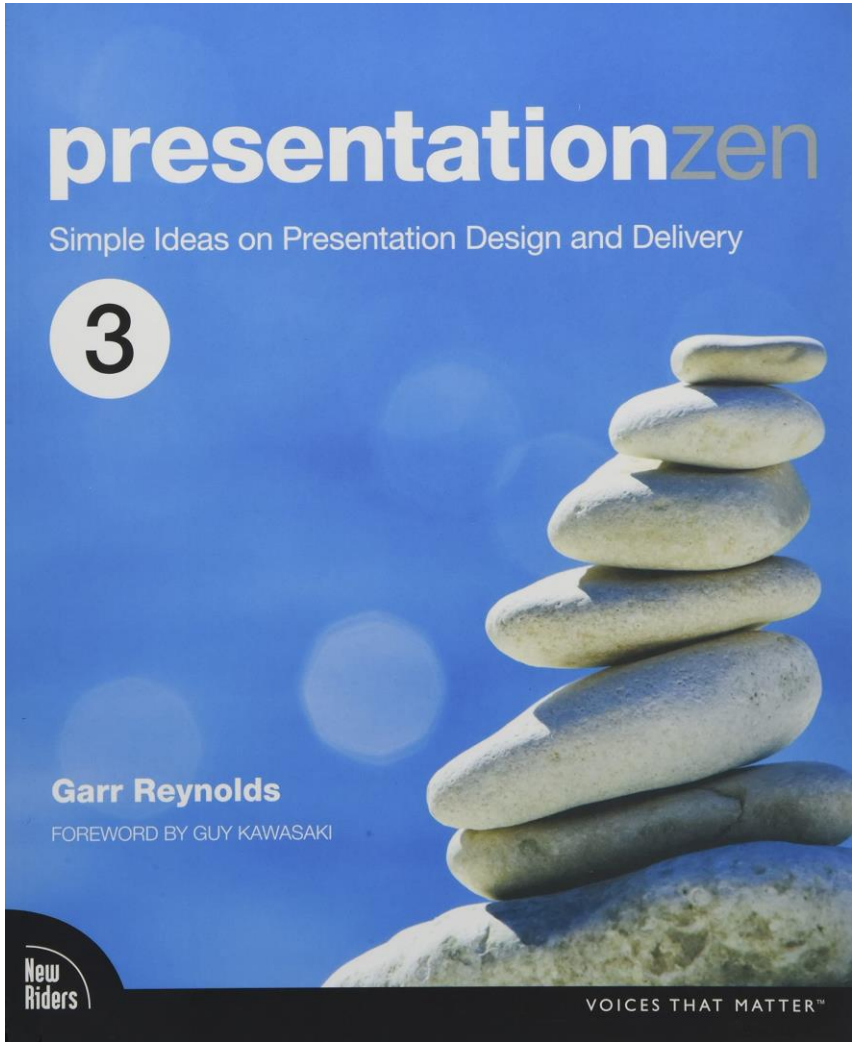

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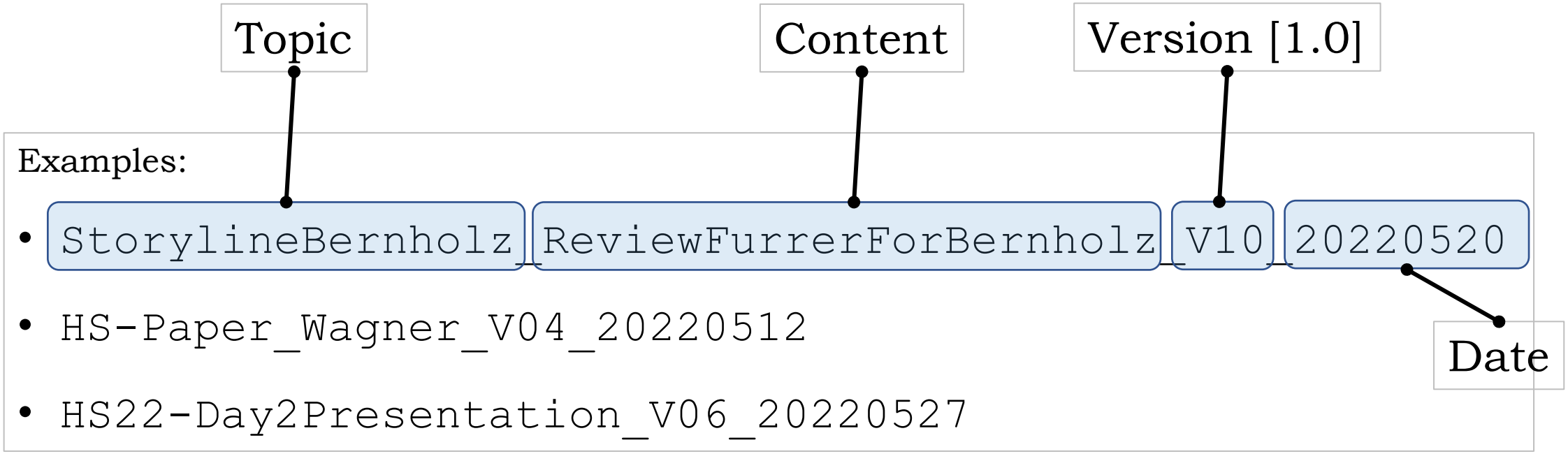
File Naming

Please use meaningful, versioned file-names



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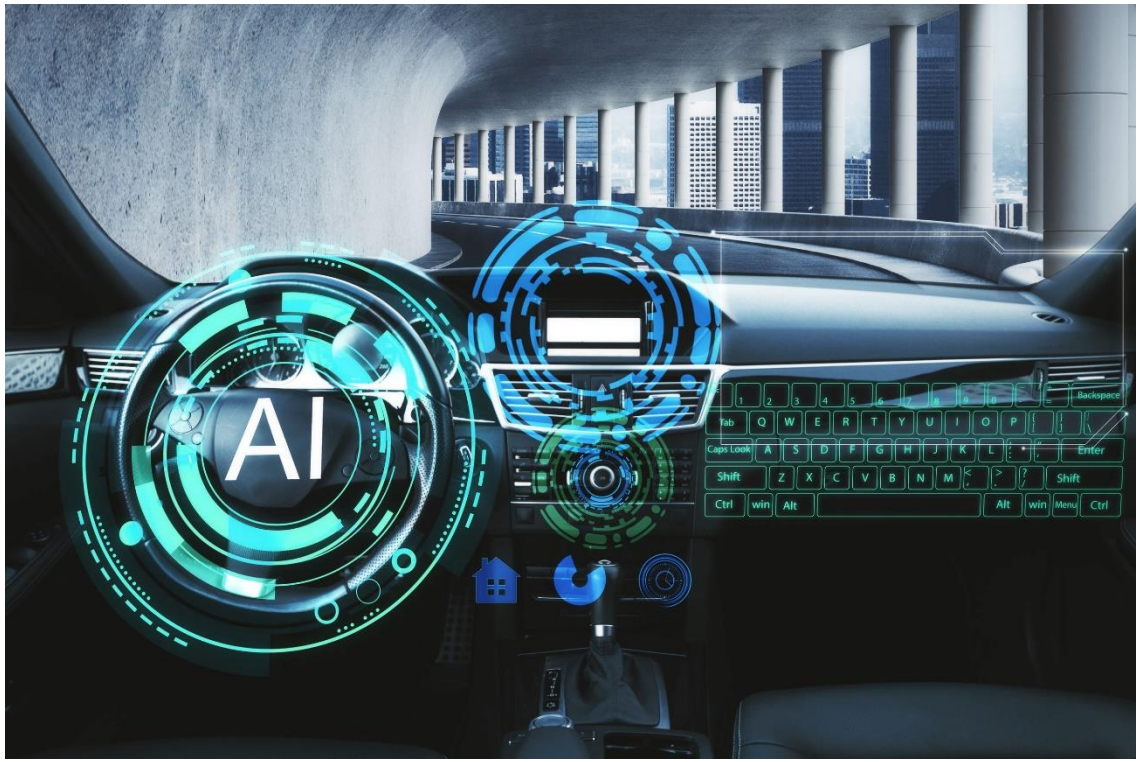

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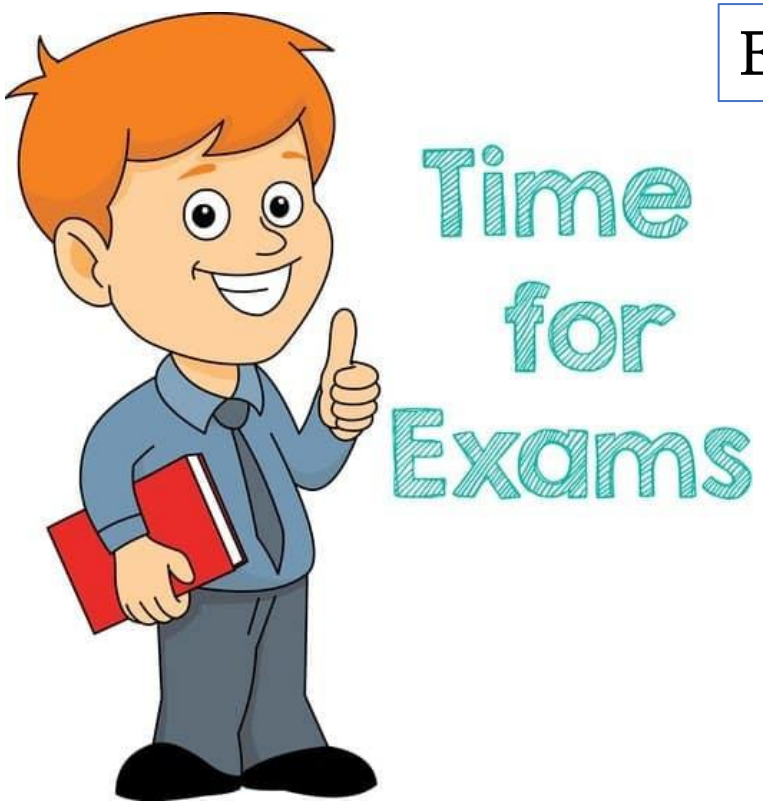
Feedback to **paper 1st draft** from Reviewers	Friday, May 26, 2023	e-mail from: • Your peer reviewers • frank.j.furrer@bluewin.ch
Deliver Final Paper	Friday, June 16, 2023	By e-mail to: • Your peer reviewers • frank.j.furrer@bluewin.ch
Feedback to final paper from Reviewers	Friday, June 23, 2023	By e-mail from: • Your peer reviewers • frank.j.furrer@bluewin.ch
Deliver final presentation (as ppt or pdf)	Friday, June 30, 2023	By e-mail to: • frank.j.furrer@bluewin.ch
Hauptseminar Day 3 Meeting [In personam, no remote participation]	**Monday, July 3, 2023: 09:20 – 10:50/11:10 - 12:40 (2. + 3. DS), Room APB/INF 2101**	• 2nd participants presentation • Peer discussions, Feedback on style and content
Oral Exams	Monday, July 3, 2023: 15:00 – 17:00, Room APB/INF 2101	By individual appointment
Receive assessment and grade	Monday, July 3, 2023: **After completion of oral exam**, Room APB/INF 2101	**Important Note**: If the final paper and the final presentation are not received **before** the oral exam, the confirmation and the grade of the exam will delayed



https://www.modernschool.org/school-news-and-events/exam-tips/attachment/time-for-exam-student-thumbs-up-clipart/

Exam Schedule 3rd July 2023

3.7.2023:

15:00 Tom Felber

15:30 Richard Müller

16:00 Franz Glöckner

16:30 Tuan Anh Nguyen

Room APB/INF 2101

Grade = ¼ * (Paper + Reviews + Presentation + Oral Exam)

https://www.bookmarkmeetings.ch