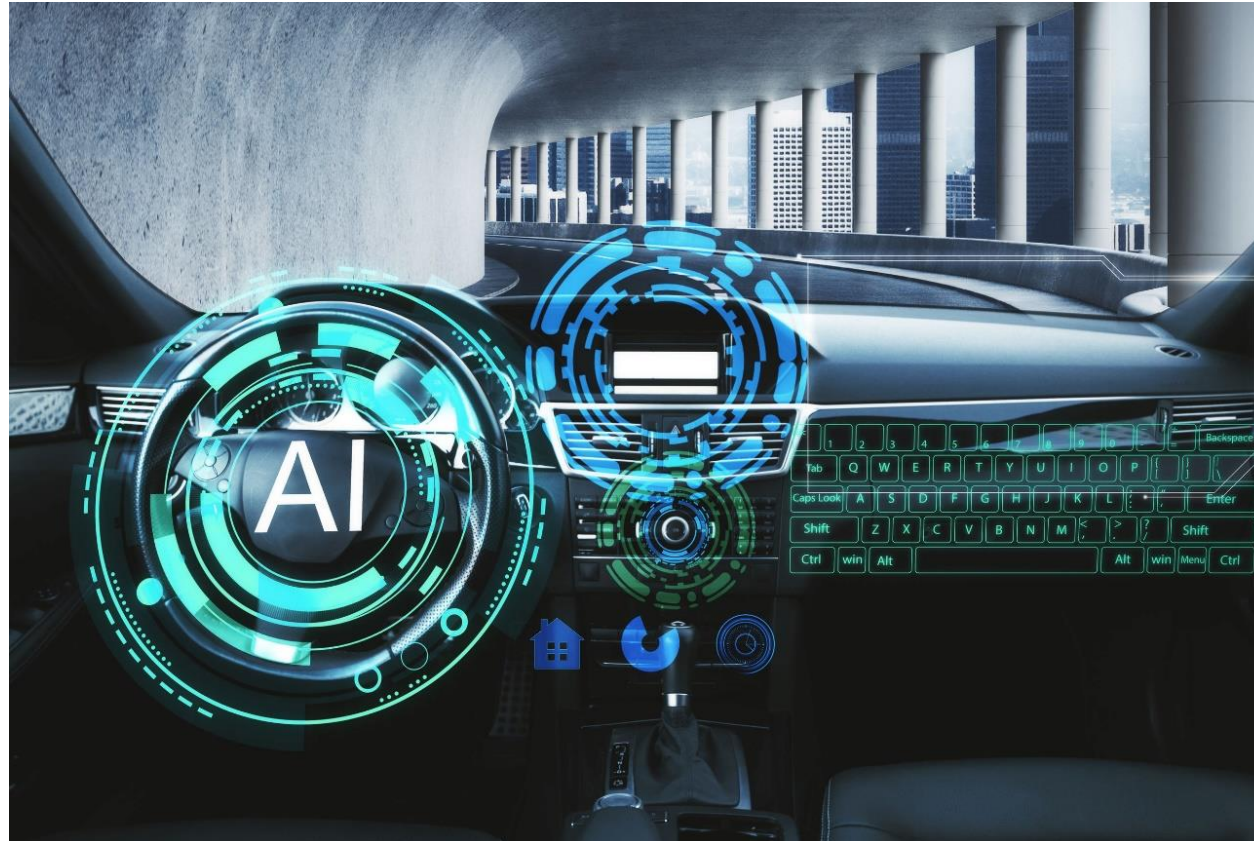
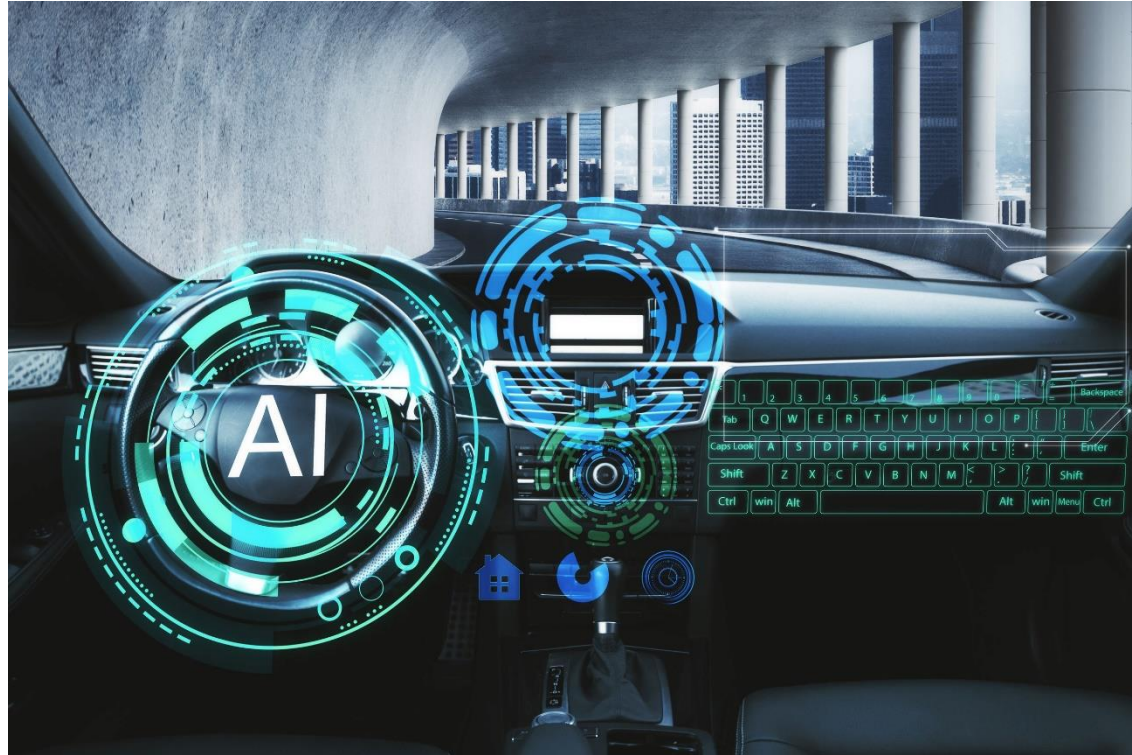


Prof. Dr. Frank J. Furrer

# «Engineering Principles for Safety and Security of Cyber-Physical Systems»



Hauptseminar Day 2: 27. May 2022



## Content

### Part 1

- Peer Reviews
- Choice of Topics
- Research Questions
- Storylines

### Part 2

- Presentations
- Feedback

### Part 3

- Final Words

### Part 4

- Work Plan
- Next Steps

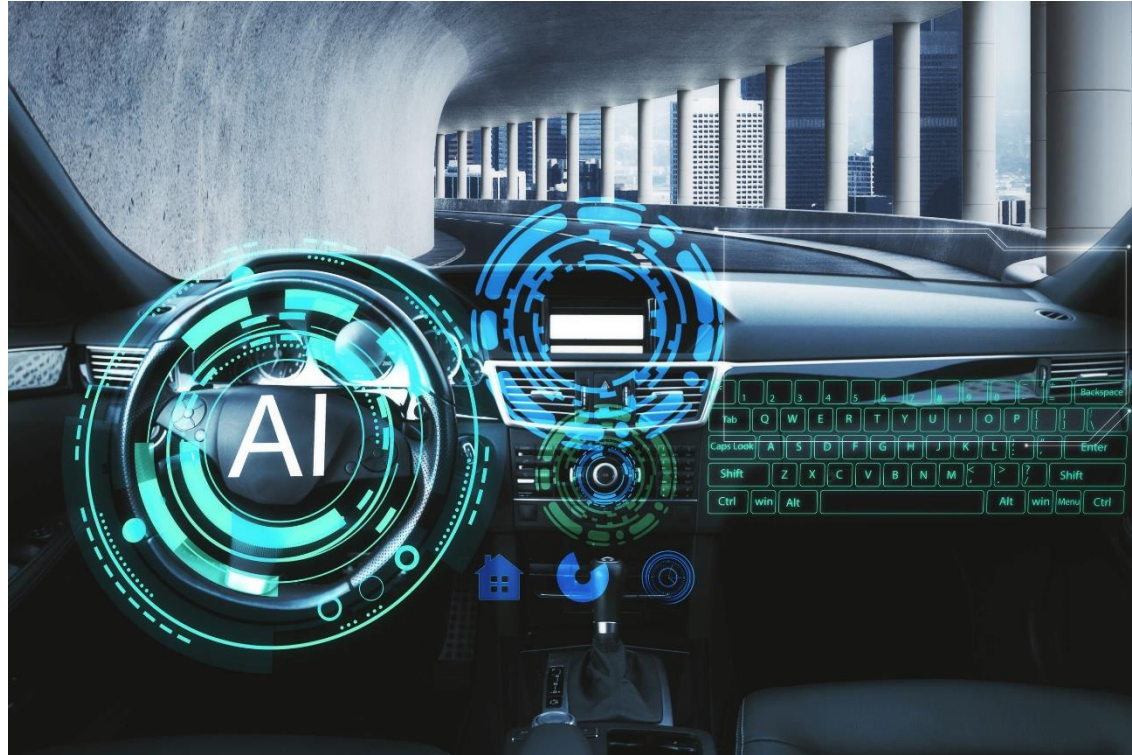
## Schedule Day 2

Name	Presentation	Feedback
Furrer, Frank J.: <i>Introduction</i>	Introduction 09:20 – 10:10	
Johanna Bernholz	10:10 – 10:30	10:30 – 10:45
Tom Gneuss	10:45 -11:05	11:05 – 11:20
Short Break	11:20 – 11:30	
Leonard Wagner	11:30 – 11:50	11:50 – 12:05
Furrer, Frank J.: <i>Final Comments</i>	12:05 -12:30	



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WWW.PHDCOMICS.COM



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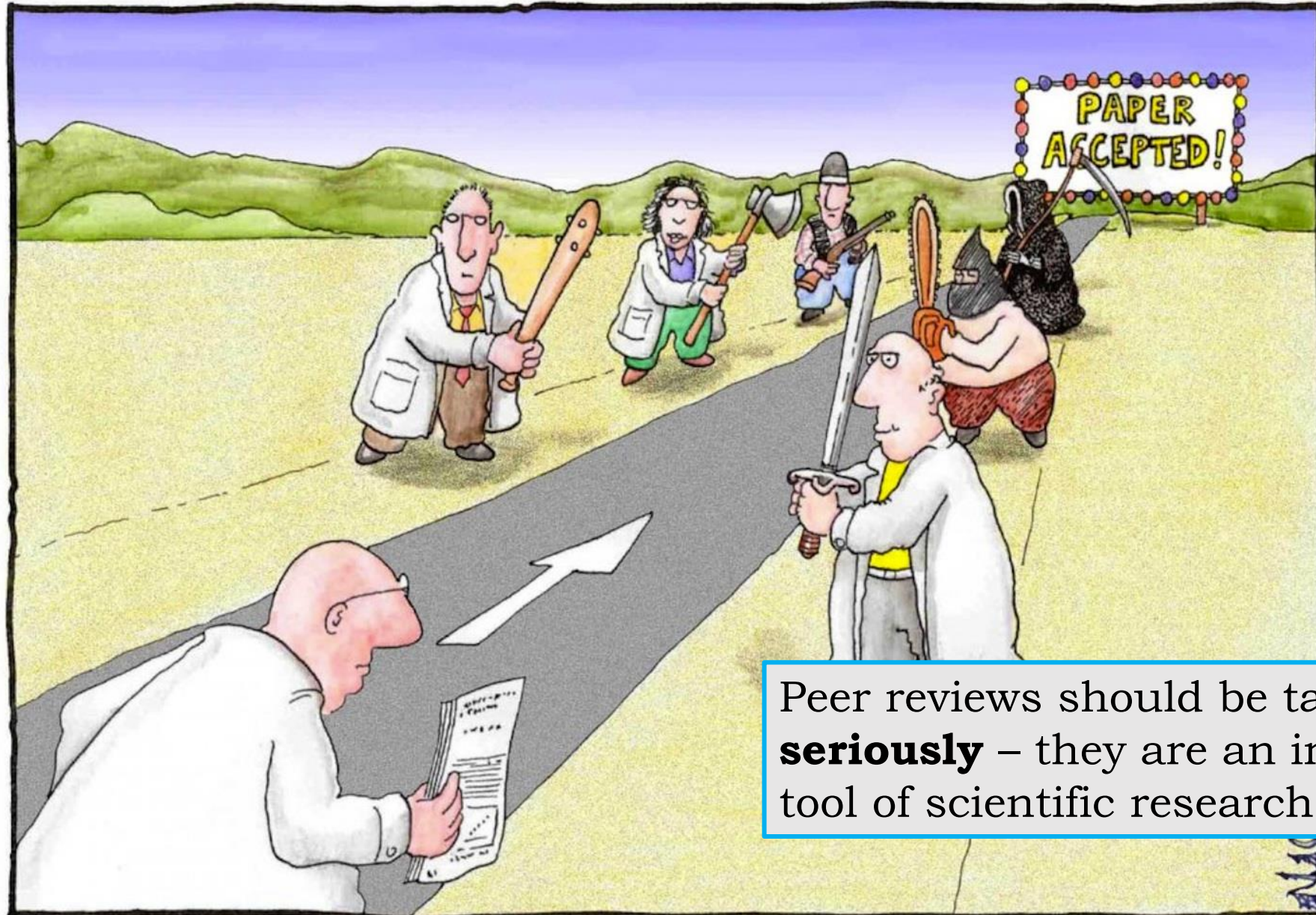
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... Your Peer Reviews

The peer reviews were fair and helpful – *but rather short*



Peer reviews should be taken very **seriously** – they are an important tool of scientific research

**Peer Evaluations: Some "Do's"****Engineering Principles**

1. Do treat the writer with courtesy and respect.
2. Do comment on the performance, not the person.
3. Do focus on how the argument is supported (or not), rather than whether you agree or disagree with it.
4. Do aim for balance and completeness in pointing out strengths and problem areas.
5. Do comment on specific examples of strengths and problem areas.
6. Do aim to help the writer see how to improve future work as well as the current draft.

**Peer Evaluations: Some "Don't's"**

1. Don't use snippy marginal comments such as "So what?" or "What's your point?"
2. Don't get into debates over unresolvable questions of individual value and belief (for example, questions relating to religion, gun control, or abortion).
3. Don't argue with the writer. Raise objections or ask for explanations only to clarify and suggest ways of strengthening the argument.
4. Don't confine your comments to mechanical details.
5. Don't make vague, global comments.
6. Don't rewrite for the writer

<http://www.mhhe.com/mayfieldpub/maner/resources/peer5.htm>

# PEER REVIEW



- 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





Importance of good reviewers: **Academia**

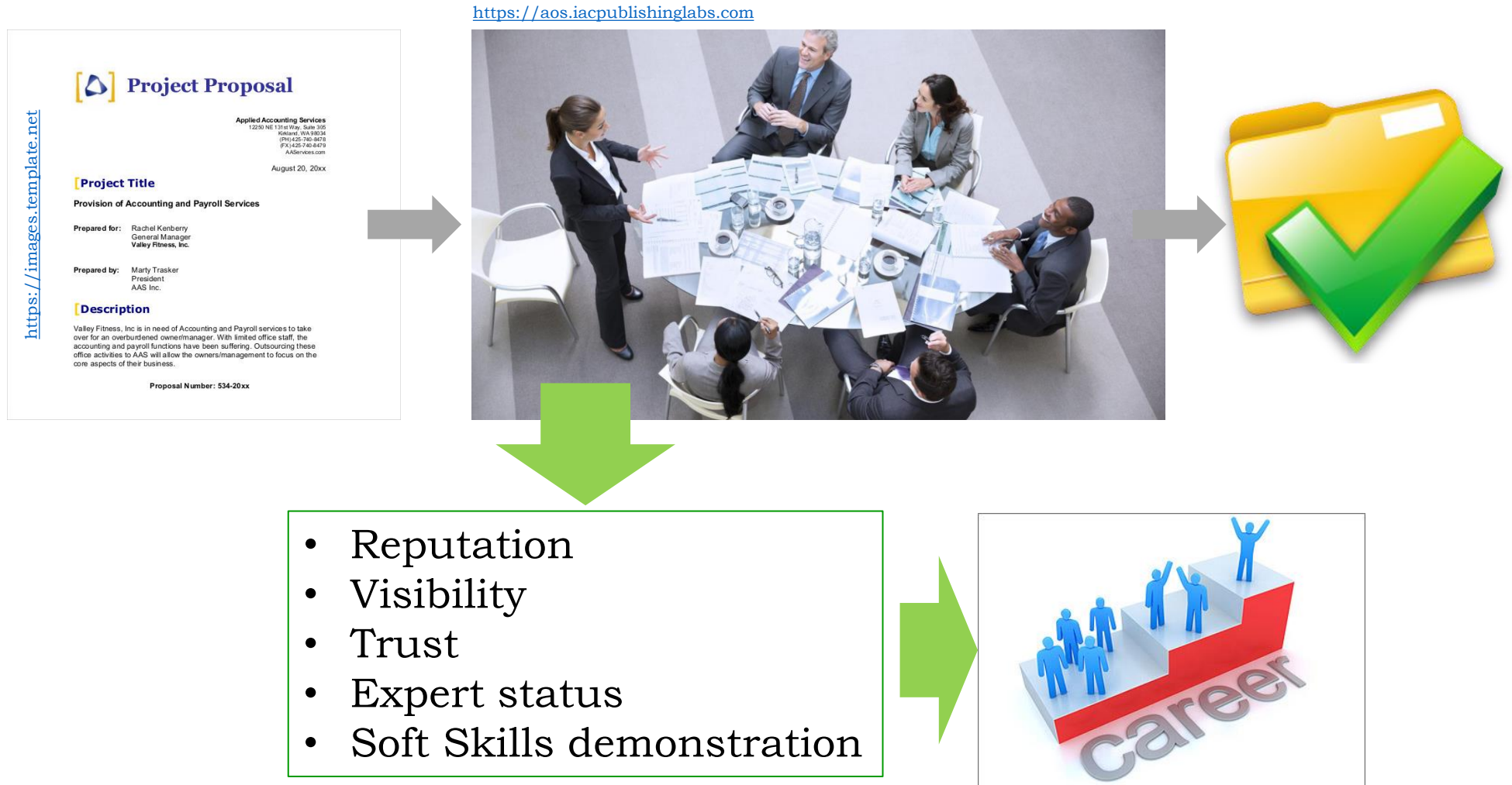
Feedback for Author  
Decision for Publisher

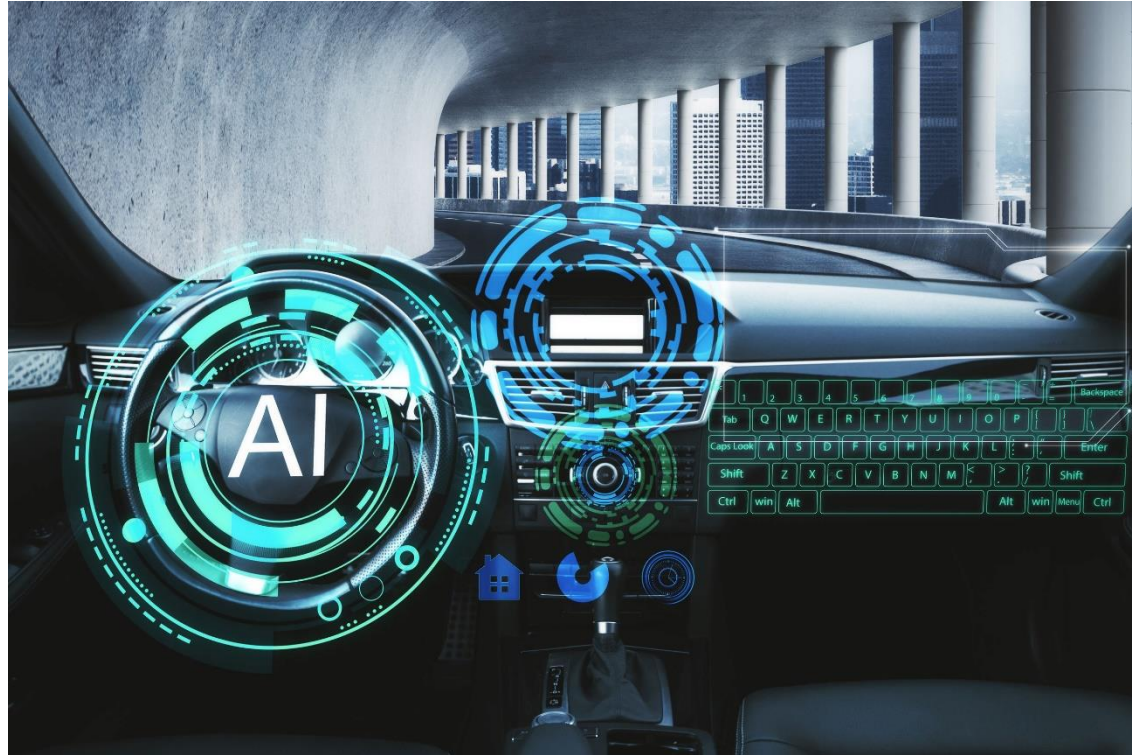


- Reputation
- Conference Program Committees
- Visibility
- Networking



Importance of good reviewers: **Industry**





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## Choice of Topics

### Johanna Bernholz:

My chosen topic is **safety accidents of Tesla** vehicles operating on autopilot on the specific example of Ms. Naibel Benavides (<https://www.nytimes.com/2021/08/17/business/tesla-autopilot-accident.html>).

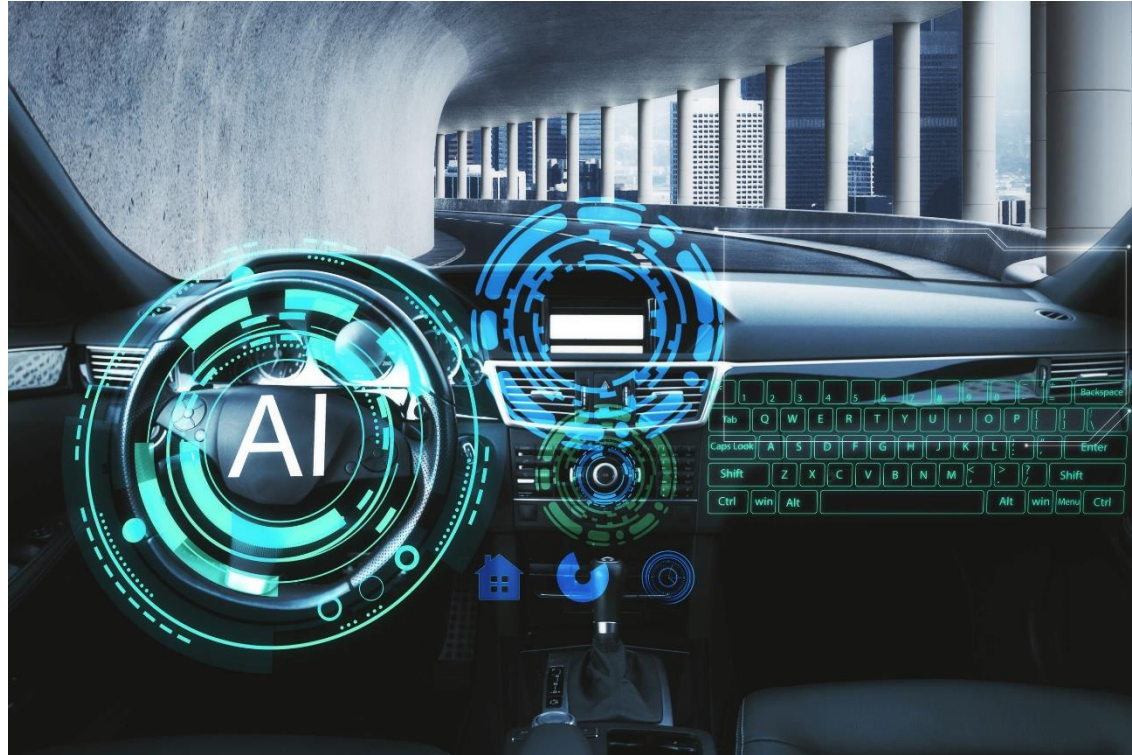
### Tom Gneuss:

The topic chosen as F2 security accident is **Stuxnet** - a computer worm targeting Siemens SCADA systems at the final stage

### Leonard Wagner:

Security Incident: **NotPetya** (focus will be upon the Maersk corporation as a victim)

Excellent Choices  
Good fit to the HS-Theme



Content

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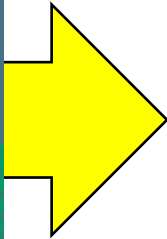
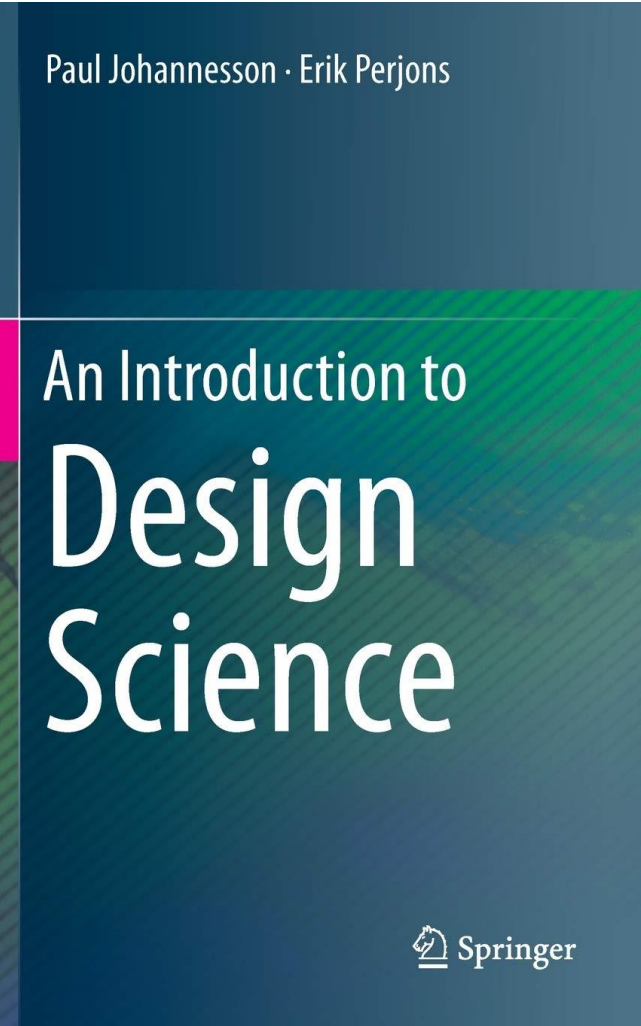
- Work Plan
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# Research Questions

**Research** is the creative and systematic work generating new knowledge or better understanding of existing knowledge

Problem or lack of specific knowledge

Res



- ✓ New knowledge
- ✓ Extended knowledge
- ✓ Deeper knowledge

**Research Questions**



## Research Questions



“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/>

# Research Questions

Johanna Bernholz:

Which are the causes for the deathly accident of Ms. Naibel Benavides?

Johanna Bernholz:

Why did the Tesla autopilot fail to detect the Chevrolet Tahoe?

Johanna Bernholz:

Why do many of these accidents happen during the night time?

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



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



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





Replaced by Author

## Research Questions

Tom Gneuss:

How does Stuxnet differ from the attacks that were known before?

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



Tom Gneuss:

Which advantages and disadvantages does a selective targeting yield compared to indiscriminate attacks?

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



Tom Gneuss:

Is it an acceptable risk for our own software to be carrier for an attack targeted at other systems?

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



Requires a risk-analysis of the supply chain risks, focused on the perspective of the software manufacturer), e.g.:  
[https://www.researchgate.net/publication/334736415\\_Managing\\_cyber\\_risk\\_in\\_supply\\_chains\\_A\\_review\\_and\\_research\\_agenda](https://www.researchgate.net/publication/334736415_Managing_cyber_risk_in_supply_chains_A_review_and_research_agenda)

# Research Questions

Tom Gneuss:

Can attacks after Stuxnet **support the claim**, that cyber warfare against a countries key infrastructure is performed mainly using Advanced Persistent Threats (APTs) rather than generic - fast but widespread – attack patterns?

**Yes/No-Question**

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

?  
✓  
?  
?  
?  
!  
✓

Advanced Persistent Threats (APTs) have become a large and knowledge-intensive discipline of cyberwar, e.g.:  
<https://ieeexplore.ieee.org/ielaam/9739/8727625/8606252-aam.pdf>  
 The effort to research this topic is beyond this HS

**Proposal**  
 «What is the danger potential of APT XY to the power grid infrastructure of Germany?», e.g.:  
<https://core.ac.uk/download/pdf/214841416.pdf>



# Research Questions

Leonard Wagner:

What are the similarities and differences of nuclear weapons and computer exploits developed by the ministries of defense in terms of destruction and deterrence in the 21st century?

Leonard Wagner:

Was the offensive NOBUS (“NobodyButUs”) principle one of the main causes that NotPetya was so successful?

Yes/No-Question

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



Requires a good methodology

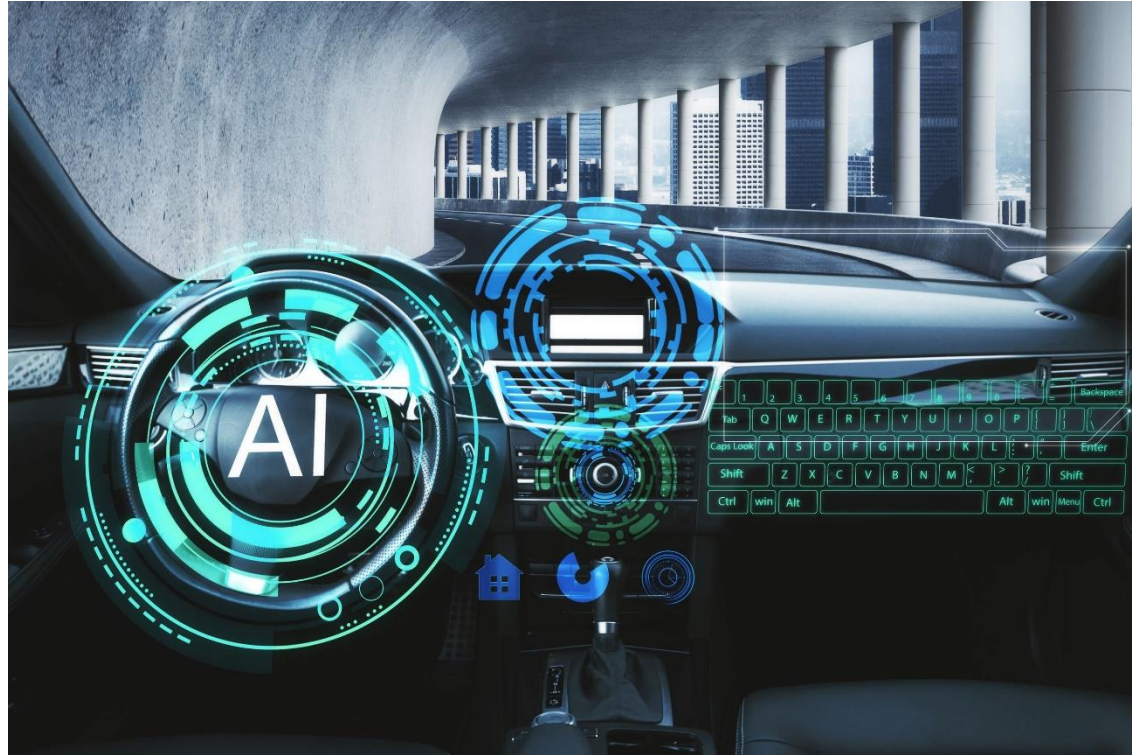


- **Focused**
- **Researchable**
- **Feasible**
- **Specific**
- **Complex**
- **Relevant**



**Proposal**  
«Which is the quantitative impact of NOBUS on the spread of NotPetya», e.g.:  
<https://krebsonsecurity.com/2017/06/petya-ransomware-outbreak-goes-global/>





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## Storylines

All:  
Interesting,  
logical, and  
consistent



All:  
Lack of clear focus  
[Restriction!]

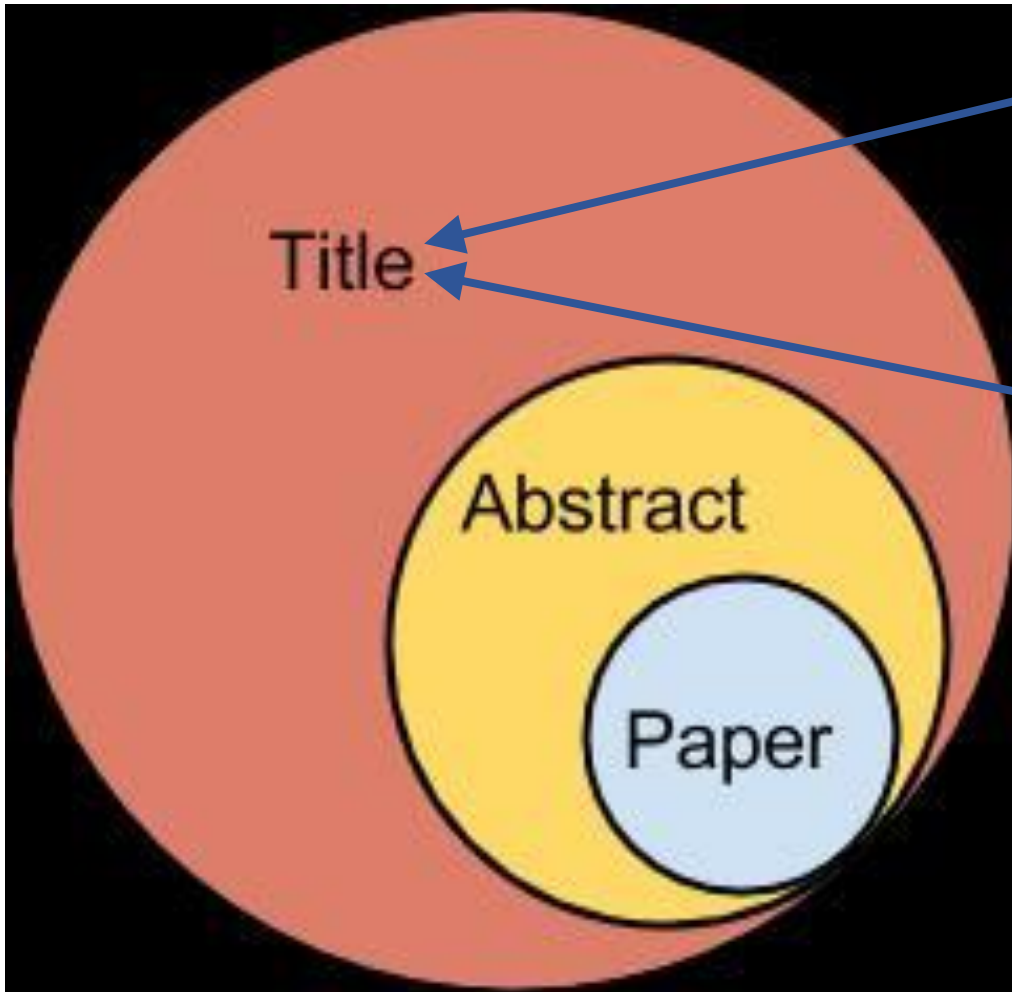
All:  
Encompass too  
much material  
[too much for the  
available time]

Careful:  
Some of the  
concepts  
introduced are  
very complex, e.g.  
APT

<https://www.dreamstime.com>

Title

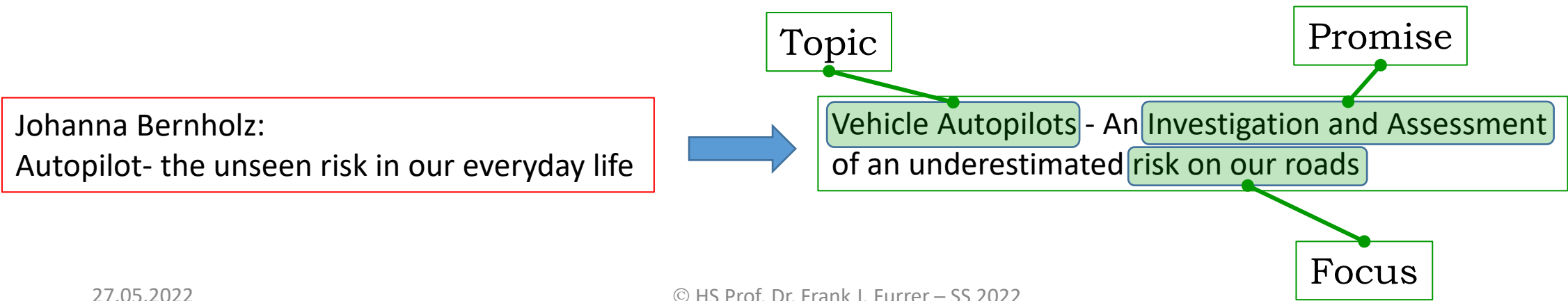
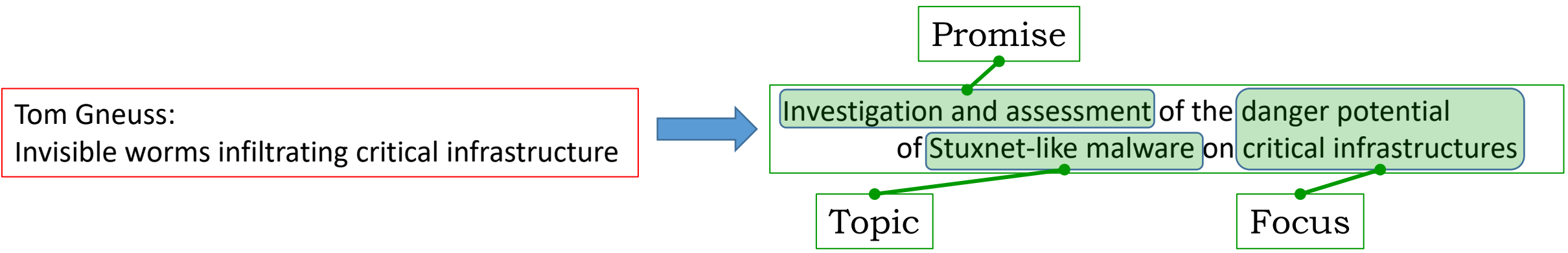
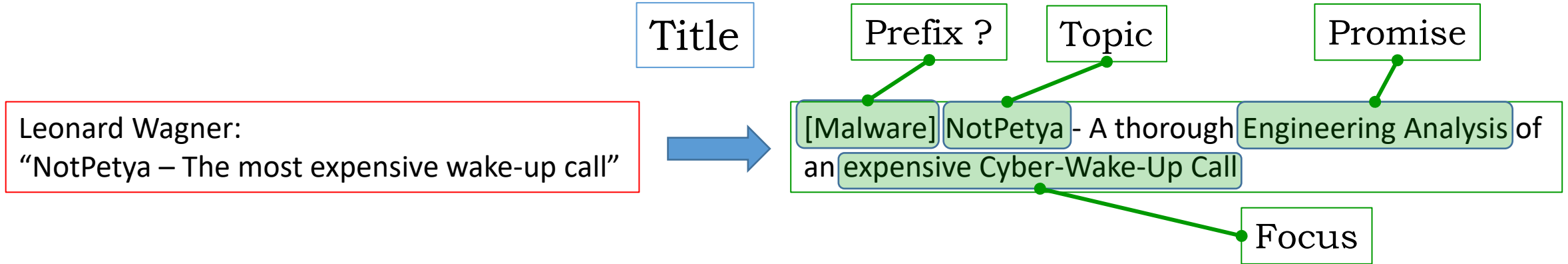
Reader **Motivation** to read the Paper



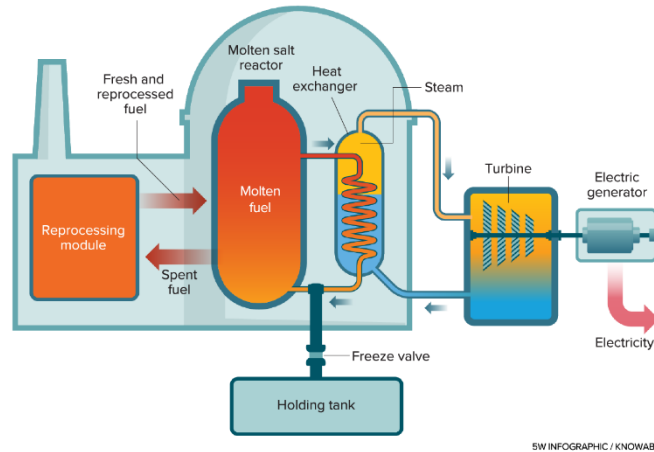
The title must contain a **promise** to the reader

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





How a molten salt reactor works



## Thorium molten salt reactor

A technology developed and experimentally proofed in the 1960's

Inherently safe: Zero risk of a nuclear accident

No generation of Plutonium or other long-lived radioactive material

Burns existing nuclear waste, such as Plutonium

### Title Proposals for a tutorial Paper:

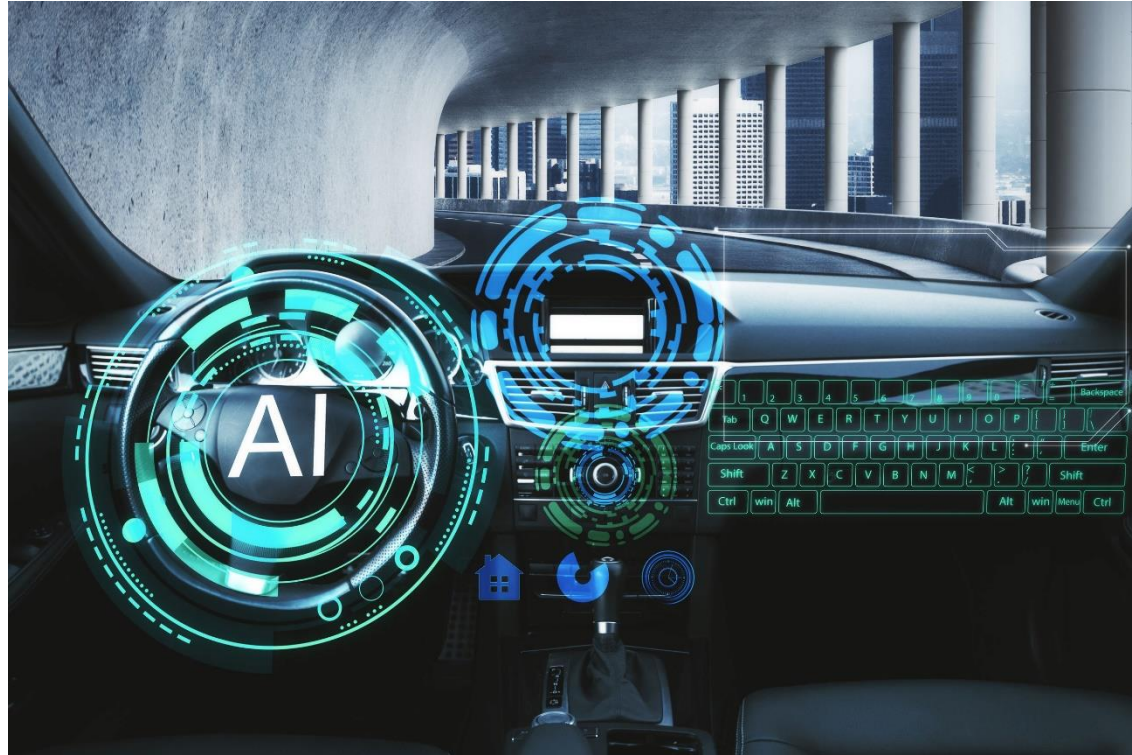
a) Thorium – Its Properties and Applications

b) Thorium – Cheaper than Coal

c) Thorium – The Green Energy of the Future

d) Thorium – The eighth element





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# Procedure

Presentation  
(15-20 mins)

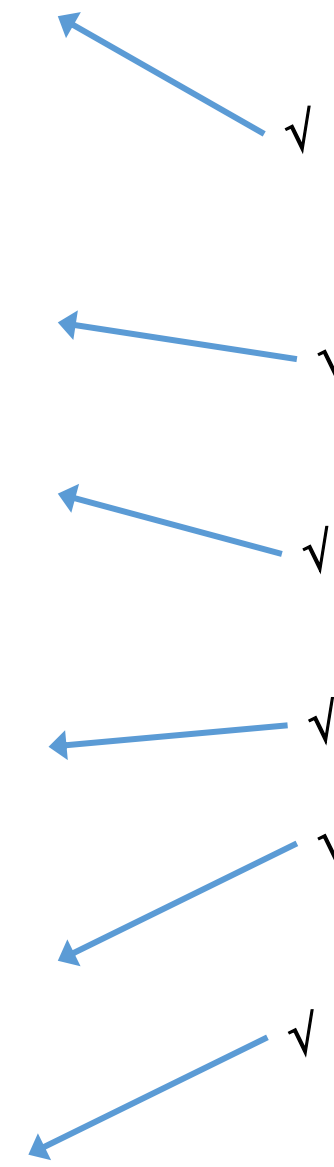


<http://magneticspeaking.com/blog/>

Audience  
Feedback  
(10 mins)

<b>Storyline</b>	<ul style="list-style-type: none"> <li>Logical</li> <li>Consistent</li> <li>Attractive</li> <li>Clear</li> </ul>	Excellent <input type="checkbox"/> Good <input type="checkbox"/> Improvable <input type="checkbox"/>
<b>Illustrations Pictures</b>	<ul style="list-style-type: none"> <li>Fitting/Adequate</li> <li>Granularity</li> <li>Power of Expression</li> <li>Support of Speaker</li> </ul>	Excellent <input type="checkbox"/> Good <input type="checkbox"/> Improvable <input type="checkbox"/>
<b>Animation</b>	<ul style="list-style-type: none"> <li>Focussed (emphasizing the message of the slide)</li> <li>Speed</li> <li>Unnecessary effects</li> <li>Timing</li> </ul>	Excellent <input type="checkbox"/> Good <input type="checkbox"/> Improvable <input type="checkbox"/>
<b>Density</b>	<ul style="list-style-type: none"> <li>Too dense (per slide or per time unit)</li> <li>Too slow (more material per slide or per time unit)</li> <li>Balance of slides</li> <li>Bullet point lists</li> </ul>	Excellent <input type="checkbox"/> Good <input type="checkbox"/> Improvable <input type="checkbox"/>
<b>Delivery</b>	<ul style="list-style-type: none"> <li>Personal style</li> <li>Interaction with the audience</li> <li>Complementary speech/illustrations</li> </ul>	Excellent <input type="checkbox"/> Good <input type="checkbox"/> Improvable <input type="checkbox"/>

<b>Storyline</b>	<ul style="list-style-type: none"> <li>• Logical</li> <li>• Consistent</li> <li>• Attractive</li> <li>• Clear</li> </ul>	<p>Excellent <input type="checkbox"/></p> <p>Good <input type="checkbox"/></p> <p>Improvable <input type="checkbox"/></p>
<b>Illustrations Pictures</b>	<ul style="list-style-type: none"> <li>• Fitting/Adequate</li> <li>• Granularity</li> <li>• Power of Expression</li> <li>• Support of Speaker</li> </ul>	<p>Excellent <input type="checkbox"/></p> <p>Good <input type="checkbox"/></p> <p>Improvable <input type="checkbox"/></p>
<b>Animation</b>	<ul style="list-style-type: none"> <li>• Focussed (message of the slide)</li> <li>• Speed</li> <li>• Unnecessary effects</li> <li>• Timing</li> </ul>	<p>Excellent <input type="checkbox"/></p> <p>Good <input type="checkbox"/></p> <p>Improvable <input type="checkbox"/></p>
<b>Density</b>	<ul style="list-style-type: none"> <li>• Too high</li> <li>• Too low</li> <li>• Balance of slides</li> <li>• Bullet point lists</li> </ul>	<p>Excellent <input type="checkbox"/></p> <p>Good <input type="checkbox"/></p> <p>Improvable <input type="checkbox"/></p>
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<b>Message</b>	<ul style="list-style-type: none"> <li>• Precise</li> <li>• True</li> <li>• „catching“</li> </ul>	<p>Excellent <input type="checkbox"/></p> <p>Good <input type="checkbox"/></p> <p>Improvable <input type="checkbox"/></p>



# What is the sure death of a good presentation ?

## No Solution:

- Talking faster
- Skipping slides
- Shorten explanations

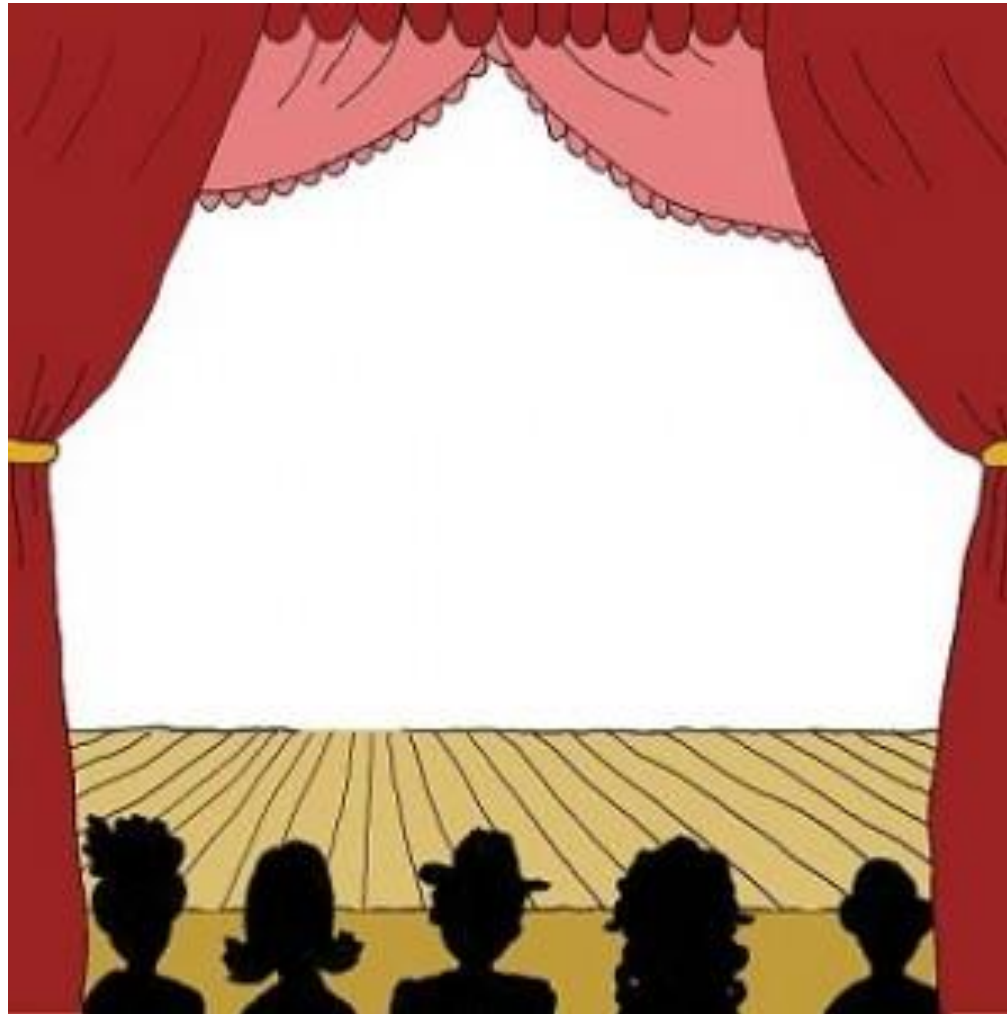
**Time overrun !**



<http://www.wfs.org>

## Schedule Day 2

Name	Presentation	Feedback
Furrer, Frank J.: <i>Introduction</i>	Introduction 09:20 – 10:10	
Johanna Bernholz	10:10 – 10:30	10:30 – 10:45
Tom Gneuss	10:45 -11:05	11:05 – 11:20
Short Break	11:20 – 11:30	
Leonard Wagner	11:30 – 11:50	11:50 – 12:05
Furrer, Frank J.: <i>Final Comments</i>	12:05 -12:30	



... the stage is yours!

**Johanna Bernholz**  
 Presentation 1  
 27.5.2022

<b>Storyline</b>	<ul style="list-style-type: none"> <li>• Logical</li> <li>• Consistent</li> <li>• Attractive</li> <li>• Clear</li> </ul>	Excellent <input type="checkbox"/> Good <input type="checkbox"/> Improvable <input type="checkbox"/>	✓
<b>Illustrations Pictures</b>	<ul style="list-style-type: none"> <li>• Fitting/Adequate</li> <li>• Granularity</li> <li>• Power of Expression</li> <li>• Support of Speaker</li> </ul>	Excellent <input type="checkbox"/> Good <input type="checkbox"/> Improvable <input type="checkbox"/>	✓
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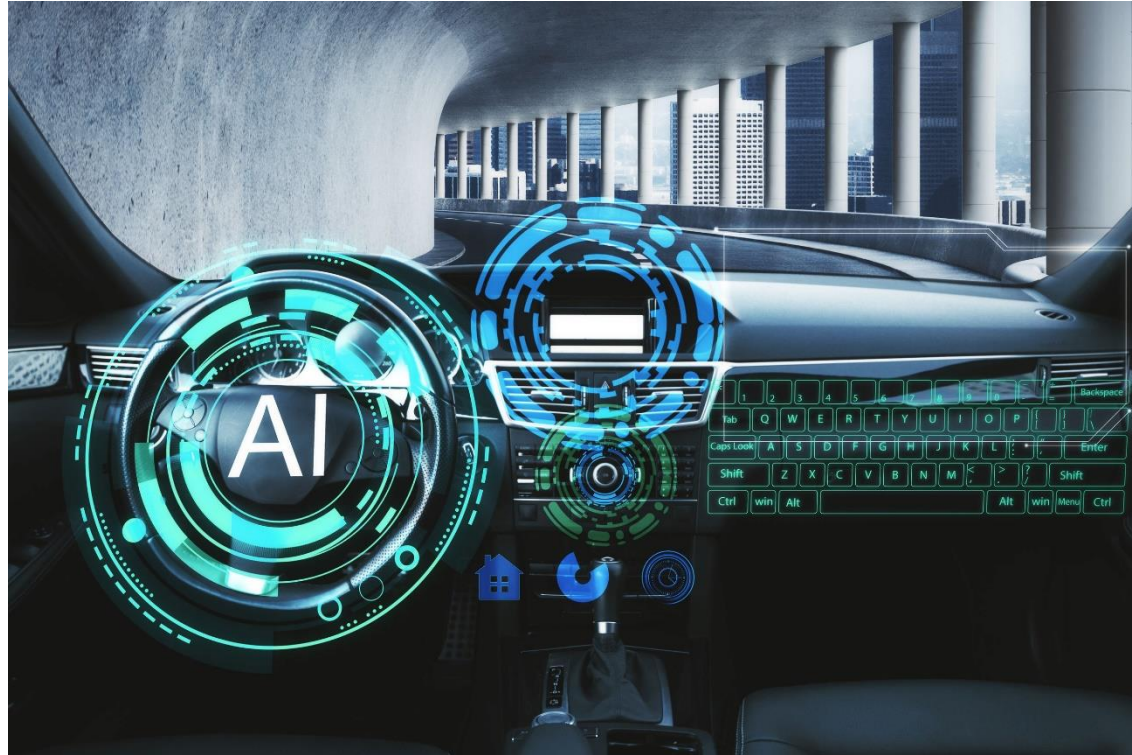
**Tom Gneuss**  
 Presentation 1  
 27.5.2022

<b>Storyline</b>	<ul style="list-style-type: none"> <li>• Logical</li> <li>• Consistent</li> <li>• Attractive</li> <li>• Clear</li> </ul>	Excellent <input type="checkbox"/> Good <input type="checkbox"/> Improvable <input type="checkbox"/>	✓
<b>Illustrations Pictures</b>	<ul style="list-style-type: none"> <li>• Fitting/Adequate</li> <li>• Granularity</li> <li>• Power of Expression</li> <li>• Support of Speaker</li> </ul>	Excellent <input type="checkbox"/> Good <input type="checkbox"/> Improvable <input type="checkbox"/>	✓
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<b>Message</b>	<ul style="list-style-type: none"> <li>• Precise</li> <li>• True</li> <li>• „catching“</li> </ul>	Excellent <input type="checkbox"/> Good <input type="checkbox"/> Improvable <input type="checkbox"/>	✓



**Leonard Wagner**  
 Presentation 1  
 27.5.2022

<b>Storyline</b>	<ul style="list-style-type: none"> <li>• Logical</li> <li>• Consistent</li> <li>• Attractive</li> <li>• Clear</li> </ul>	Excellent <input type="checkbox"/> Good <input type="checkbox"/> Improvable <input type="checkbox"/>	✓
<b>Illustrations Pictures</b>	<ul style="list-style-type: none"> <li>• Fitting/Adequate</li> <li>• Granularity</li> <li>• Power of Expression</li> <li>• Support of Speaker</li> </ul>	Excellent <input type="checkbox"/> Good <input type="checkbox"/> Improvable <input type="checkbox"/>	✓
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<b>Density</b>	<ul style="list-style-type: none"> <li>• Too high</li> <li>• Too low</li> <li>• Balance of slides</li> <li>• Bullet point lists</li> </ul>	Excellent <input type="checkbox"/> Good <input type="checkbox"/> Improvable <input type="checkbox"/>	✓
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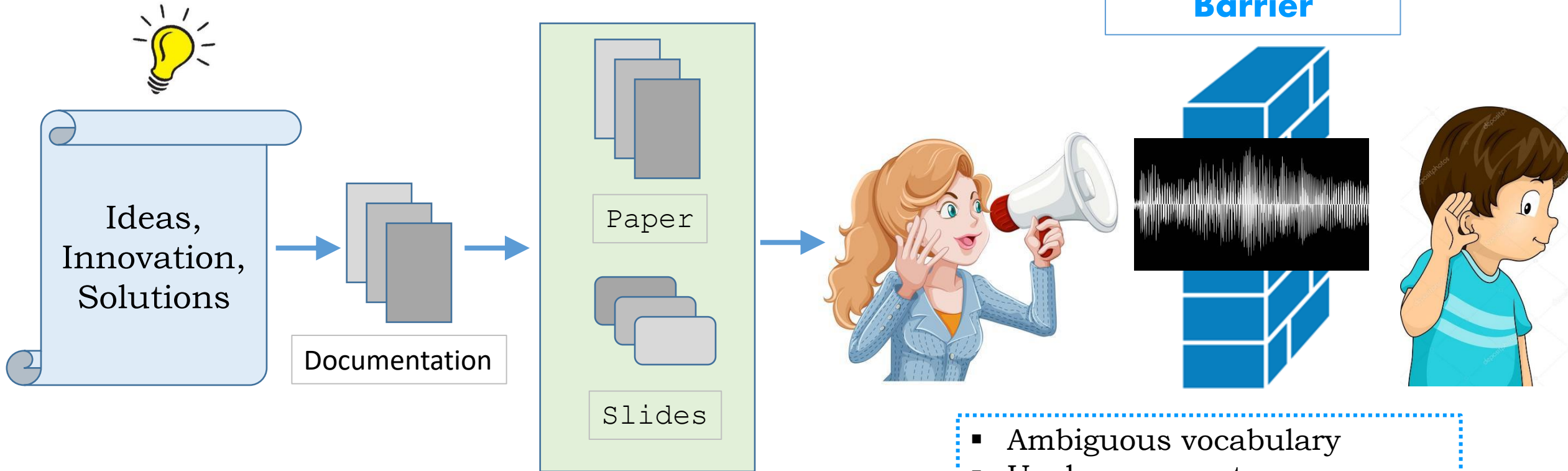
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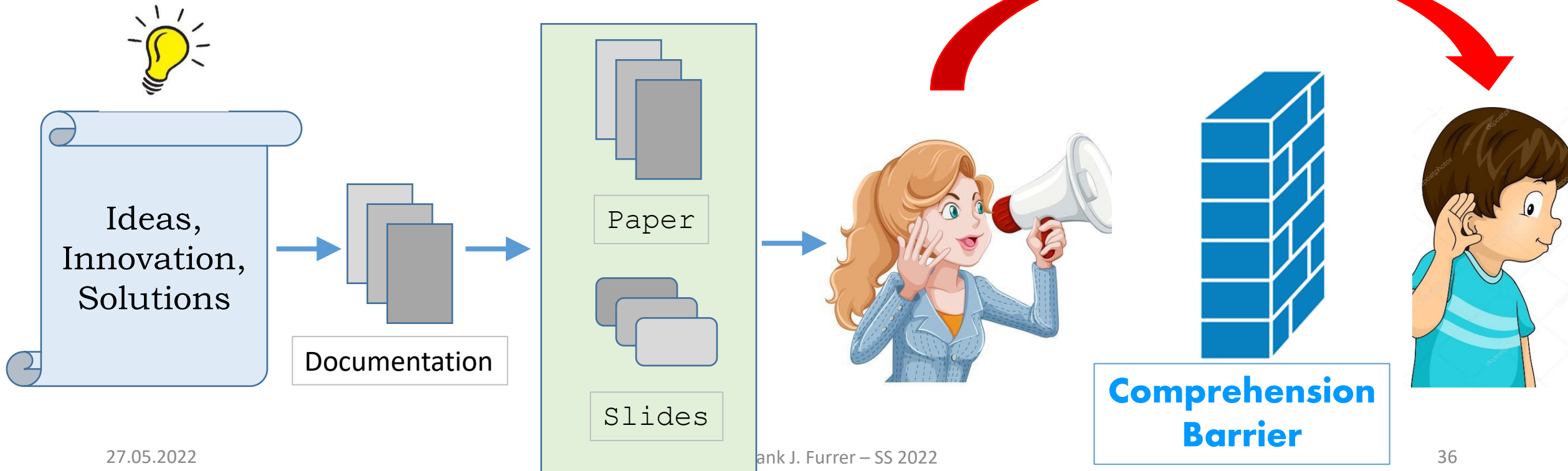
# The Communication Chain



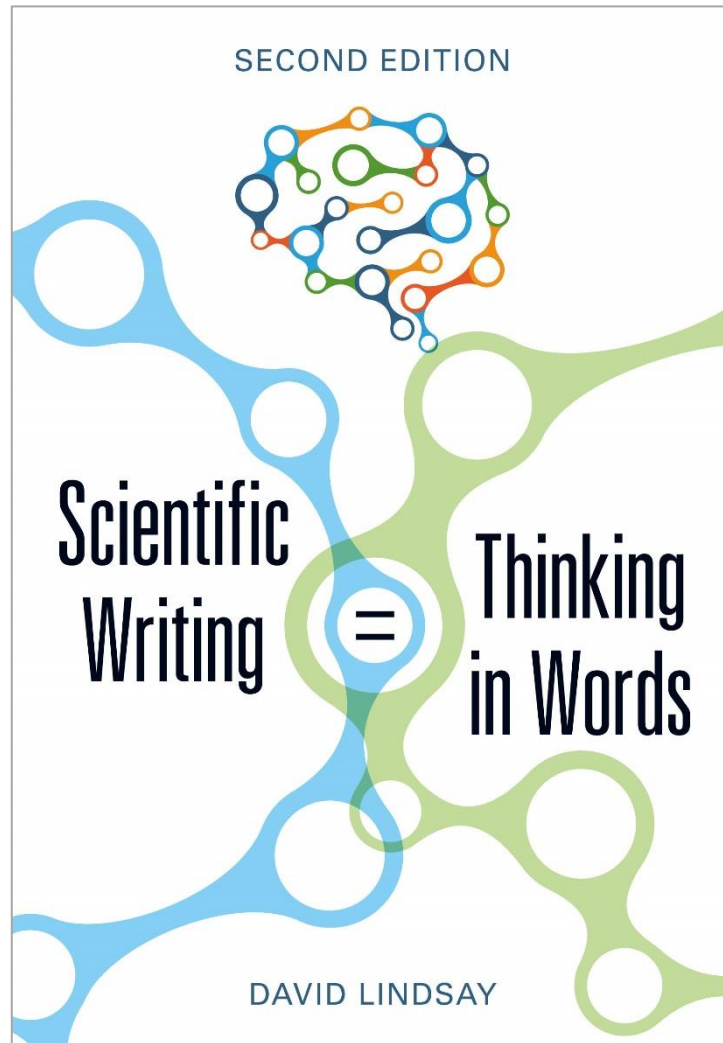
- Ambiguous vocabulary
- Unclear concepts
- Differing contexts
- Lack of antecedent knowledge
- Twisted storyline
- Vague message

# The Communication Chain

## Importance for your Career

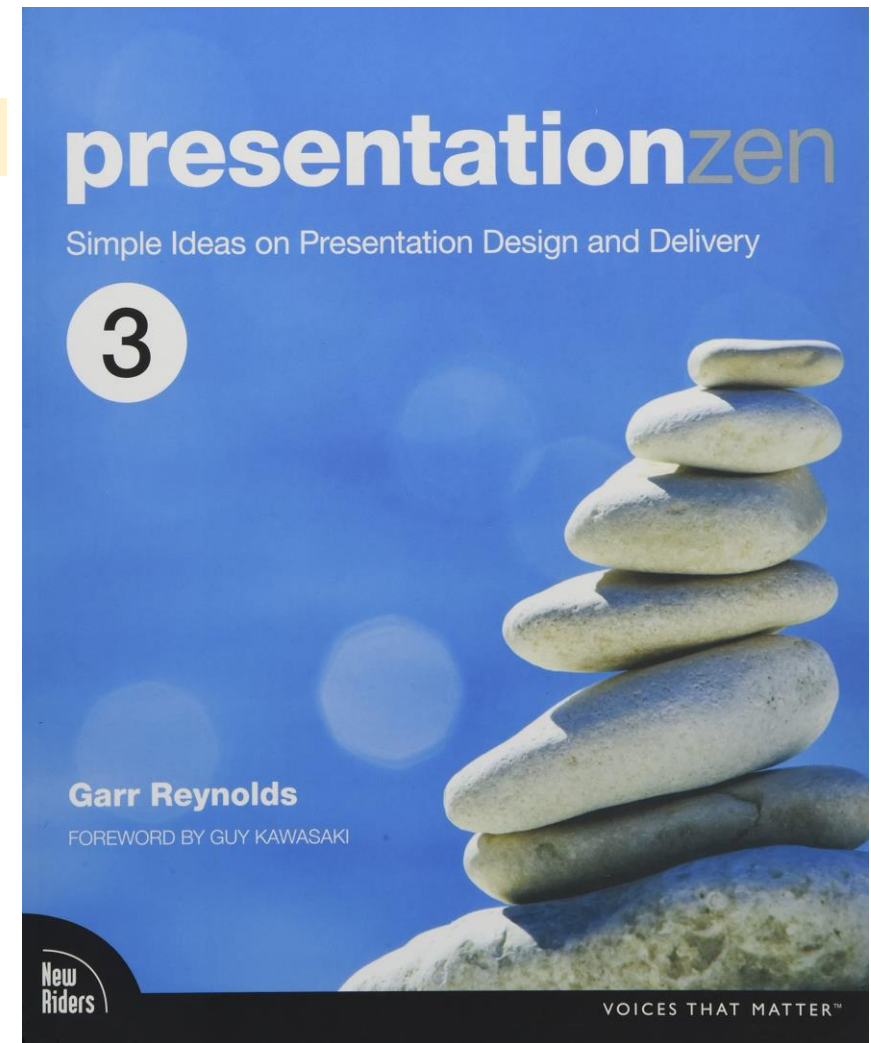


## Self-Study: Communication Skills



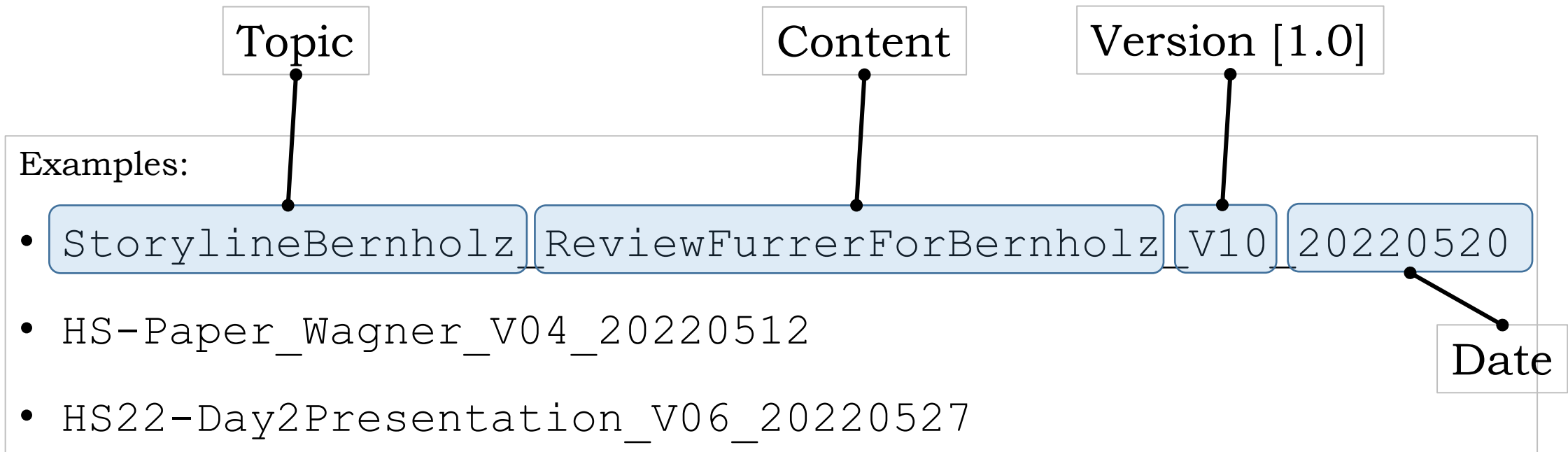
ISBN 978-0-135-80091-1

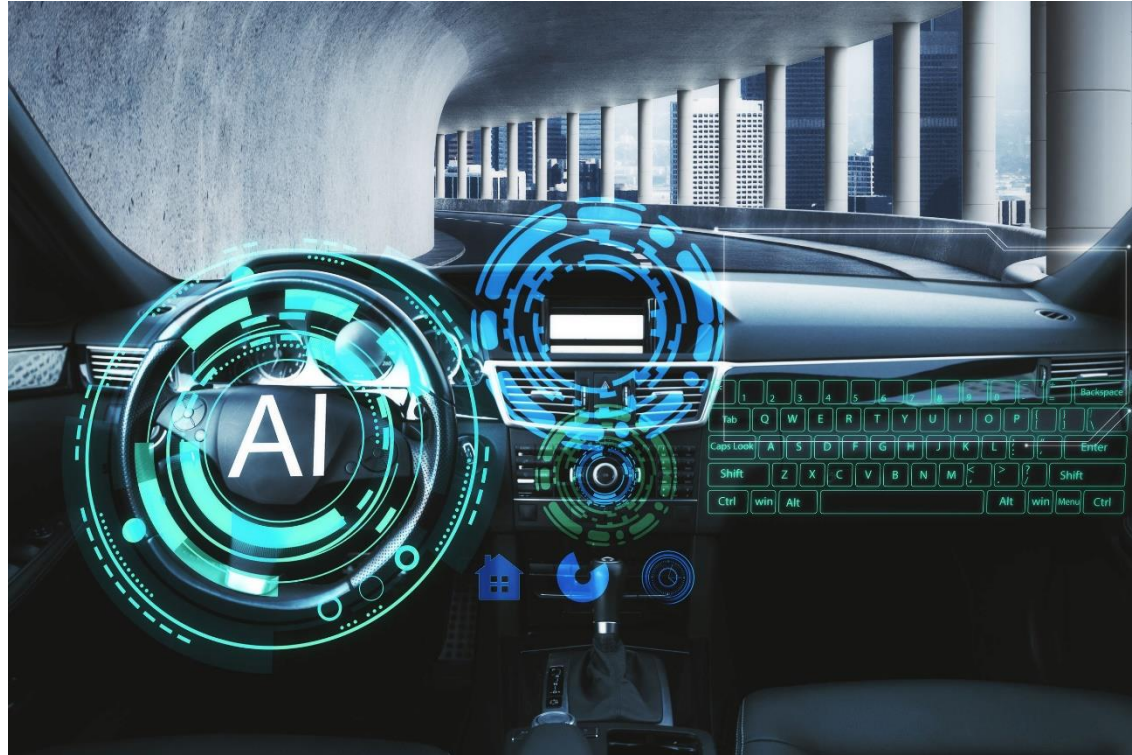
ISBN 978-1-4863-1147-7



## File Naming

Please use meaningful, versioned file-names





## Content

### Part 1

- Peer Reviews
- Choice of Topics
- Research Questions
- Storylines

### Part 2

- Presentations
- Feedback

### Part 3

- Final Words

### Part 4

- Work Plan
- Next Steps

## Next Step

Deliver the <b>draft of your paper</b> to your peer reviewers (No storyline update required)	Monday, June 13, 2022
Feedback to paper from Reviewers & F.J. Furrer	Friday, June 17, 2022
<b>Hauptseminar Day 3 Meeting</b>	<b>Friday, July 1, 2022: 09:20 – 10:50/11:10 - 12:40 (2. + 3. DS), Room APB/INF 2101</b>



