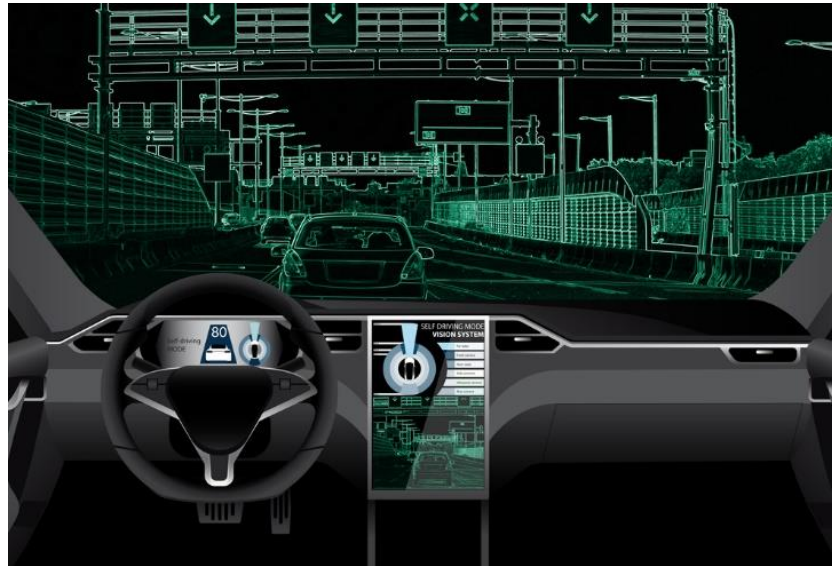


Hauptseminar SS 2019:
«**Engineering Trustworthy Cyber-Physical
Systems**»

Prof. Dr. Frank J. Furrer



HS DAY 2 / Meeting 10. Juli 2019

Content:

1. Introduction (F.J. Furrer)
2. Presentation and Feedback
3. Final Words (F.J. Furrer)

Name	Presentation	Feedback
<i>Furrer, Frank J.: Introduction</i>	09:20 – 09:35	
Schoenicke Daniel	09:35 – 09:50	09:50 – 10:00
Ludwig Heiner	10:00 – 10:15	10:15 – 10:25
Time Reserve (Overruns)	10:25 – 10:40	
Break	10:40 – 11:00	
Hilbert Hannes	11:00 – 11:15	11:15 – 11:25
Time Reserve (Overruns)	11:15 – 11:25	
<i>Furrer, Frank J.: Final Comments</i>	11:25 - 12:40	

New Reviewer-Assignment 29. June 2019:

Name	Vorname	Peer Reviewer 1	Peer Reviewer 2	Reviewer3
Ludwig	Heiner	Schoenicke	Hilbert	Furrer
Hilbert	Hannes	Ludwig	Schoenicke	Furrer
Schoenicke	Daniel	Hilbert	Ludwig	Furrer
Fuhrmann	Robert	Ludwig	Hilbert	Furrer
Furrer	Frank J.			

Content:

1. Introduction (F.J. Furrer)

2. Presentation and Feedback

3. Final Words (F.J. Furrer)

Assessment Papers Phase 2

Robert Fuhrmann: [Aufgabe](#)

Daniel Schoenicke: Analyse bestehender E-Voting Systeme und Folgen einer möglichen Einführung dieser in Deutschland

Hannes Hilbert: Evaluation der Sicherheit von Inter-Fahrzeug-Kommunikation zur Verkehrssicherung und -optimierung

Heiner Ludwig: Wahl einer geeigneten Netzwerktechnologie zur sicheren Kommunikation auf Flächen bis 1 km² zwischen Mitarbeitern im Kontext des Baugewerbes

Generelle Kommentare:

Grosse Fortschritte V1 \Rightarrow V2

Storyline + Struktur: Gute Grundlage für Final Paper

State-of-the-Art: z.T. knapp

My contribution: Nicht sichtbar genug

Bebilderung: z.T. verbesserungsfähig (Anzahl + Qualität)



Friday,
July 26, 2019

Reminder: The **7** Principles of a good Paper

For final
Paper

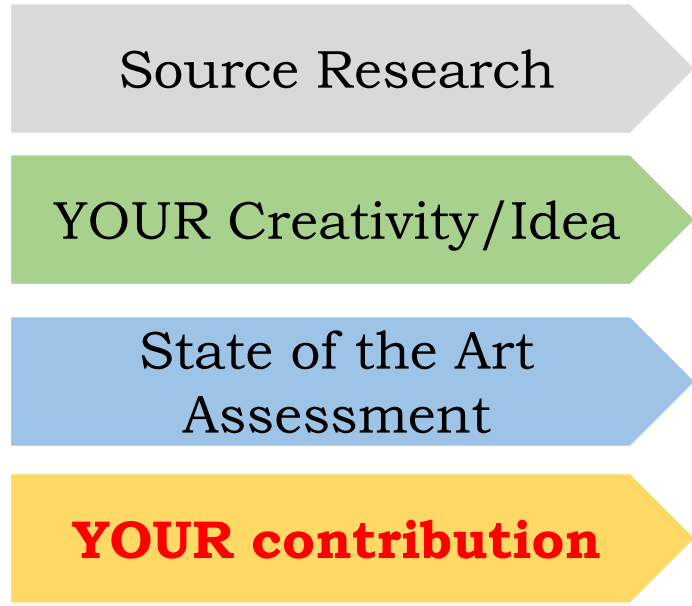


shutterstock.com • 1133076746

1 ... you must have something to say



<http://www.sec-ed.co.uk>



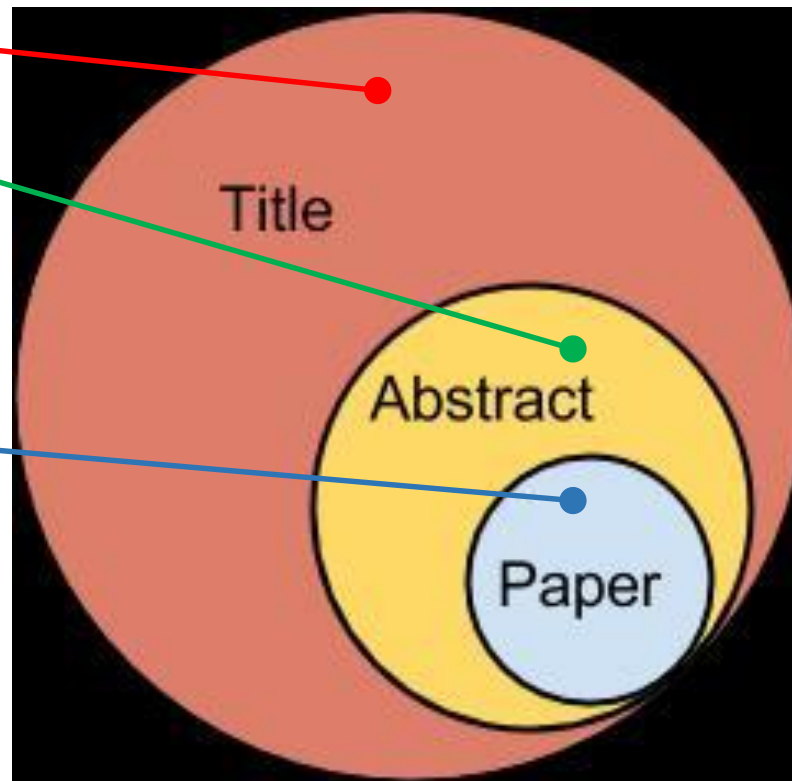
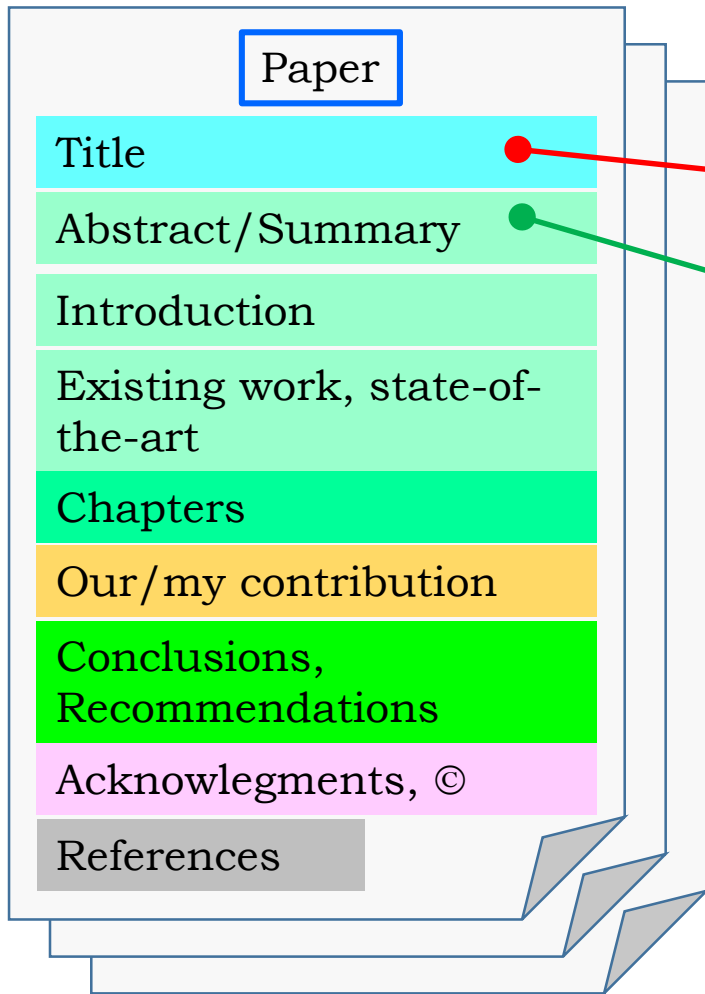
- Didactic (tutorial)
- Scientific (New results)
- Technical (New applications)
- Disruptive (New field)
- Methodical (New ways)



«My contribution»

2

... you must choose a promising, «seducing» title



Reader incentive to read and accept the paper (~ to area!)

<http://blogs.nature.com>

© Heiner Ludwig, 2019

Titel V1:
Konzept zur sicheren Kommunikation auf Flächen bis 1 km² zwischen Mitarbeitern im Kontext des Baugewerbes



Promise, Contribution

Trustworthy CPS

Titel V2:
Wahl einer geeigneten Netzwerktechnologie zur sicheren Kommunikation auf Flächen bis 1 km² zwischen Mitarbeitern im Kontext des Baugewerbes

Context

Qualifier



Titel V3:
Wahl einer sicheren Netzwerktechnologie zur Kommunikation zwischen Mitarbeitern auf Baustellen

3

... you must have a logical, consistent, and interesting storyline

Storyline = Logical, seamless sequence of ideas



The reader must be **guided** gently and pleasurable through your written material

- Logical and no breaks
- Understandable terminology
- **NO** unnecessary concepts
- Short and concise
- Good language

Bad Storyline
⇒ **Very bad Paper**

4

... you must build a well-structured, figure-rich paper

Ursachen der Irrationalitäten

Suchen wir die tieferen Ursachen dieser gigantischen Verschwendung, der betäubenden Irrationalität, dieser offenbar unaufhaltsamen Abenteurersucht. Es gibt mehrere:

Zunächst ist ein Hang zur „Gigantomanie“ zu entdecken, die offensichtlich Politiker und Vorstände beseelt. Alle Bahnanlagen der ganzen Stadt kommen unter die Erde, eine Art Manhattan wird möglich, Stuttgart wird „Metropole“. München und Frankfurt..., alle anderen Städte, denen dies auch angetragen wurde, lehnten es ab -- nur Stuttgart, sich Bundesweit diskriminiert fühlend, stieg ein. Nun, wo die Zerstörung Platz greift, merken die Bürger, dass sie Opfer werden, Opfer von -- so formulierte es Benedikt Weibel, der ehemalige Vorstand der Schweizer Bundesbahnen -- Geltungssucht und Größenwahn!

Ein zweites Ursachenelement liegt in der DB: es wurde und wird geschickt verborgen: Die DB Planer wussten und wissen, dass das Konzept und dessen Ziele sich gar nicht verwirklichen lassen. Wenn der Bahnbetrieb zu Bauzeiten weiter gehen muss, ist nur eine schmale Baugrube längs des Bahnhofgebäudes möglich, die nur 8 (statt derzeit 17) Gleise erlaubt und beengte Bahnsteige mit schmalen Treppen bedingt. Damit sind die Sicherheit und die Leistungsfähigkeit sowie der Komfort der heutigen Anlagen nicht erreichbar. Wegen vorhandener S-Bahn- und U-Bahn-Tunnel muss der Tiefbahnhof mit Gefälle gebaut werden, was gegen deutsche und internationale Sicherheitsbestimmungen verstößt. Wegen der Tieflagen und der beengten Zu- und Abgänge ist der Brand- und Katastrophenschutz gemäß der Versammlungsstätten-Verordnung nicht erreichbar. Warum wurde dies zunächst verschwiegen und erst spät von Mitarbeitern an die Öffentlichkeit gebracht („121 Risiken“, publiziert im Magazin „stern“)? Die DB kontierte zunächst mit irreführender Propaganda, verschleierte Gutachten und behauptete unzutreffende Kosten. Seitdem mehr und mehr Experten die Falschbehauptungen der DB kritisieren und sogar Strafanzeigen erstatteten, schweigt sie zu den meisten Vorwürfen.

Damit ist ein viertes Ursachenelement für die aktuelle Lage evident: Die DB AG und ihre Gremien haben unüberwindbare Mauern des Schweigens errichtet und pflegen konsequente Ignoranz gegenüber der Fachwelt der Fachpresse, den anerkannten Experten, dem kritisch gewordenen Publikum und sogar gegenüber dem Bundesrechnungshof und dem wissenschaftlichen Dienst des Deutschen Bundestags. Selbst wohlmeinende Schreiben und Vorschläge werden einfach ignoriert, offensichtlich in der Hoffnung, dass sich Vorschläge, Kritiken und Klagen von selbst erledigen, wenn erst einmal die „Umwkehrbarkeit“ mit maximalen Zerstörungen erreicht ist. Dies erscheint wohl auch deshalb erfolgversprechend, weil in den vergangenen Jahren die Medien dieser Ignoranz weitgehend folgten und kritiklos auch den unglaubwürdigsten Statements der DB folgten. Es gibt nur wenige Ausnahmen, vor allem in Berichten des Magazins „stern“. Aber auch in der ZEIT konnte man jüngst über den geplanten Bahnhof lesen: „weil er ein Symbol der Macht ist... Es geht um Merkel und Grube, um Ehre und Eitelkeiten...“

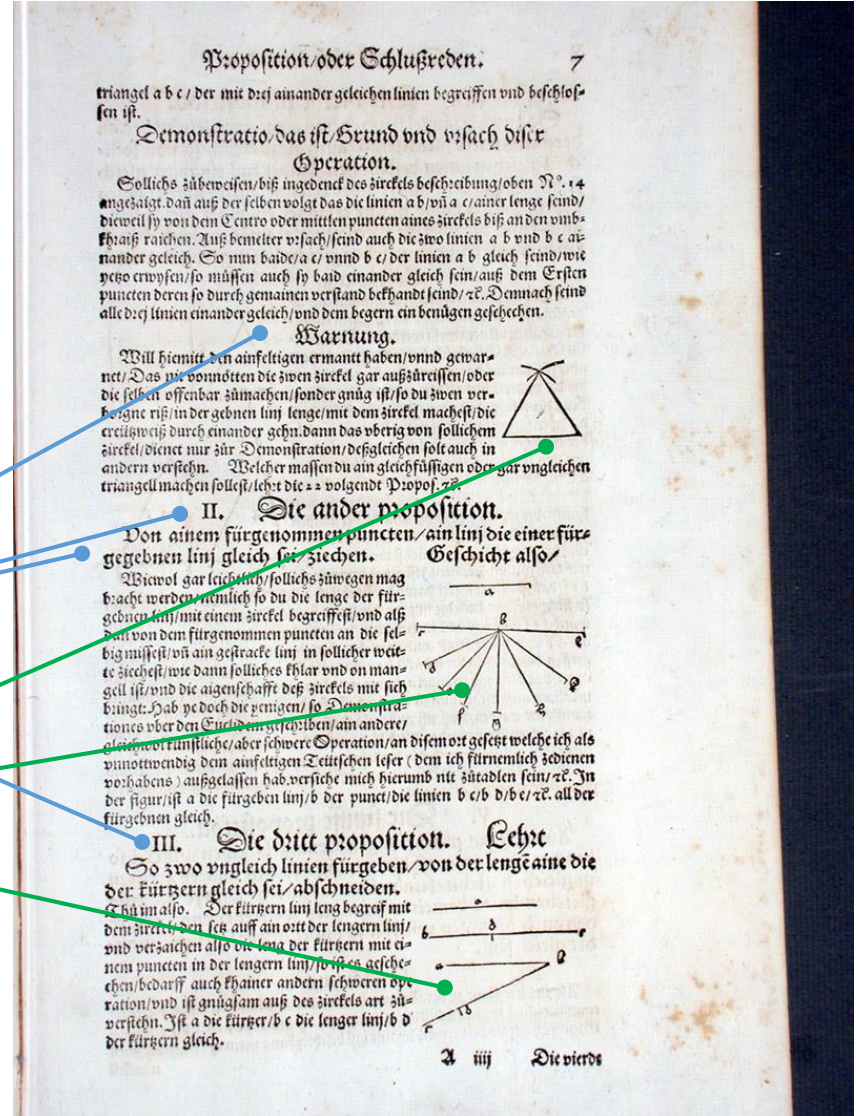
Neben dem Hang zur „Gigantomanie“, die offensichtlich die Promotoren bewegt, kann als weitere Ursache der Reiz des vielen Geldes gesehen werden, ausgelöst durch die Vision, dass Milliarden Euro Steuergelder in diese Stadt fließen sollen -- zum eigenen Vorteil und zu Lasten anderer! Hotels und Gaststätten, Vermieter, die tausende Gastarbeiter für die Tunnelbaustellen beherbergen, Handwerker und Bauunternehmer glauben zu profitieren. Gerade dafür scheinen die Schwaben anfällig: Wirkt hier die Freude eigener Vorteilsnahme, ja vielleicht sogar „Habsucht“, das unablässige Bestreben nach mehr Hab und Gut -- egal wie viel man schon besitzt?



<https://www.heilpraxisnet.de>

Title hierarchy and structure

Figures, photos, and illustrations

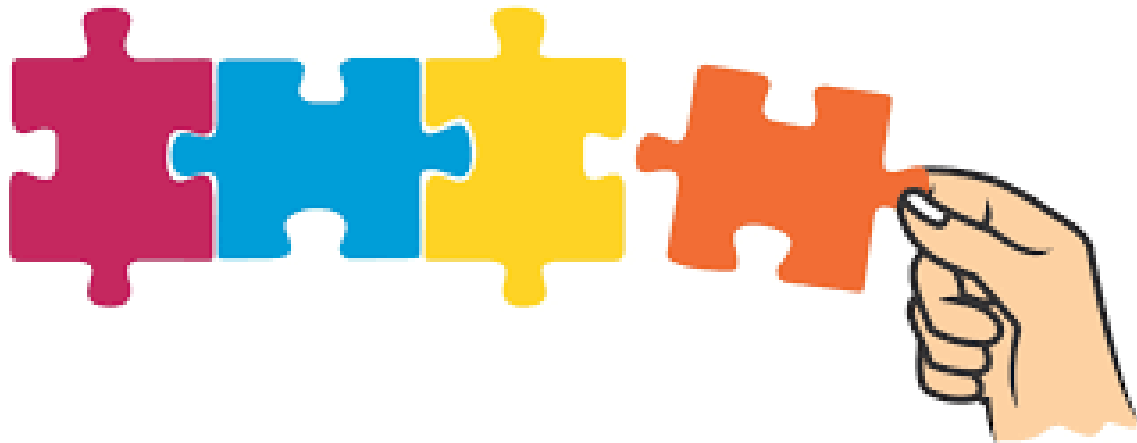


<http://www.stiegfried-busch.de>

<http://www.ab.unibas.ch>

5

... you must clearly state the advancement of the state-of-the-art
[*your contribution*]



➤ What is the current state-of-the-art (SOTA)?

➤ Which is your contribution?

➤ What is the value?

➤ Why is it important?

6

... in many cases you should suggest ideas for further work

Current Knowledge in the Field

State-of-the-Art (SOTA)



<https://www.automotive-fleet.com>

Your contribution

Suggestion for Continuation



Motivate other People to **continue** your work

7

... always quote sources, references, and copyrights [no plagiarism, legal & fairness requirements]

© Copyright

Zayaraz10	G. Zayaraz: Quantitative Approaches for Evaluating Software Architectures – Frameworks and Models VDM Verlag, Munich, Germany, 2010. ISBN 978-3-6392-4041-2
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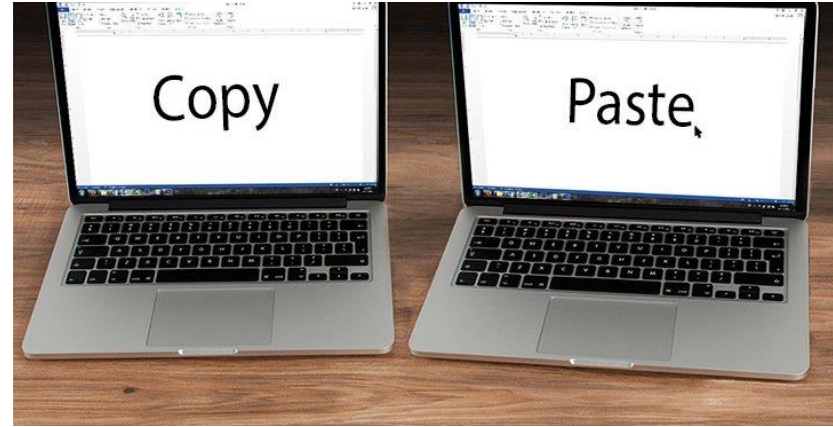


Direct quotations

Strictly NO plagiarism



Acknowledge any **substantial** help you received from people



https://berocket.com
https://www.chronicle.com
https://blog.angularindepth.com

https://aidd.org
https://www.thebalancemb.com

Content:

1. Introduction (F.J. Furrer)

2. Presentation and Feedback

3. Final Words (F.J. Furrer)

Presentation Block



Start

15 mins

Presentation

Start

7 ½ mins

Time overrun

Start

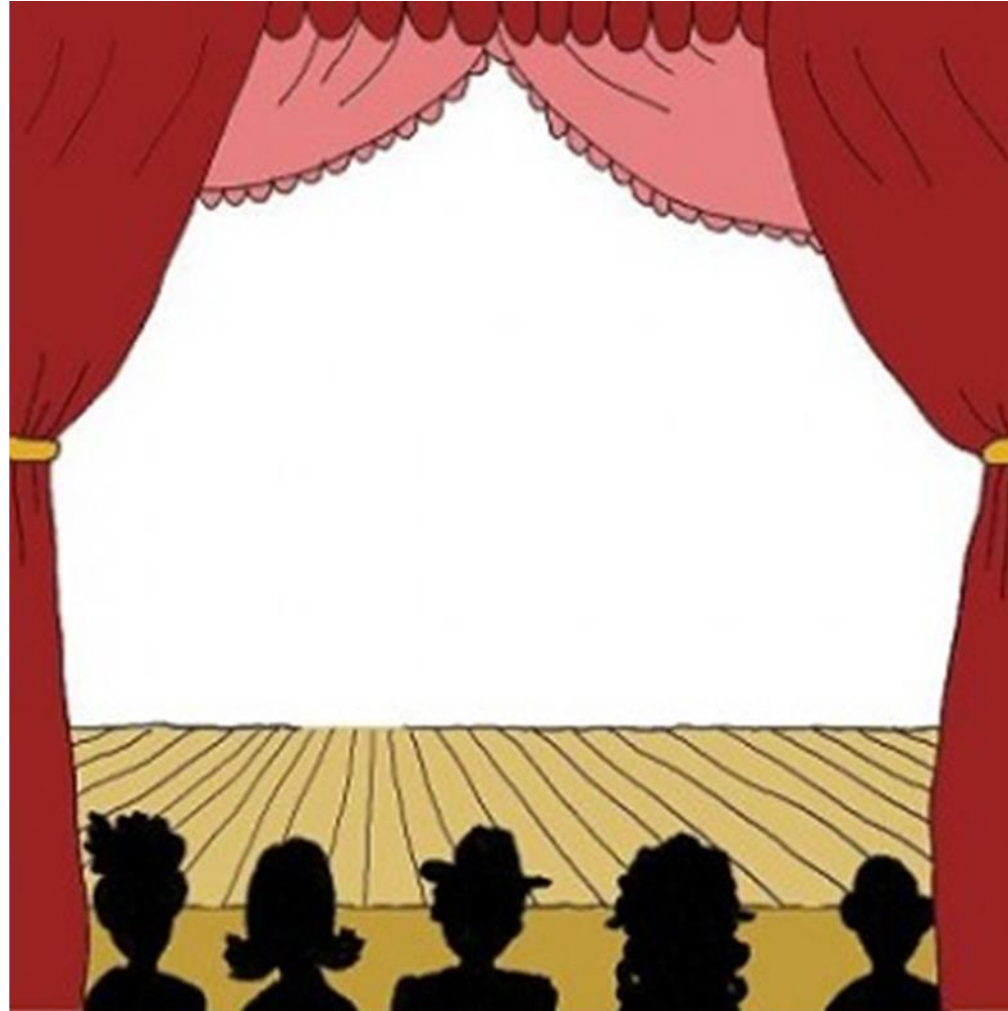
10 mins

Peer Feedback

Start



Name	Presentation	Feedback
Furrer, Frank J.: <i>Introduction</i>	09:20 – 09:35	
Schoenicke Daniel	09:35 – 09:50	09:50 – 10:00
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Furrer, Frank J.: <i>Final Comments</i>	11:25 - 12:40	



... the stage is yours!

Daniel Schoenicke

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

✓

✓

✓

✓

✓

✓

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

Heiner Ludwig

✓

✓

✓

✓

✓

✓



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

Hannes Hilbert

✓

✓

✓

✓

✓

✓

Content:

1. Introduction (F.J. Furrer)
2. Presentation and Feedback
3. Final Words (F.J. Furrer)

Soft Skills

Personality

Burn-Out

Soft Skills



Soft Skills =

Personal attributes that enable someone to interact effectively and harmoniously with other people.

<http://www.oxforddictionaries.com>

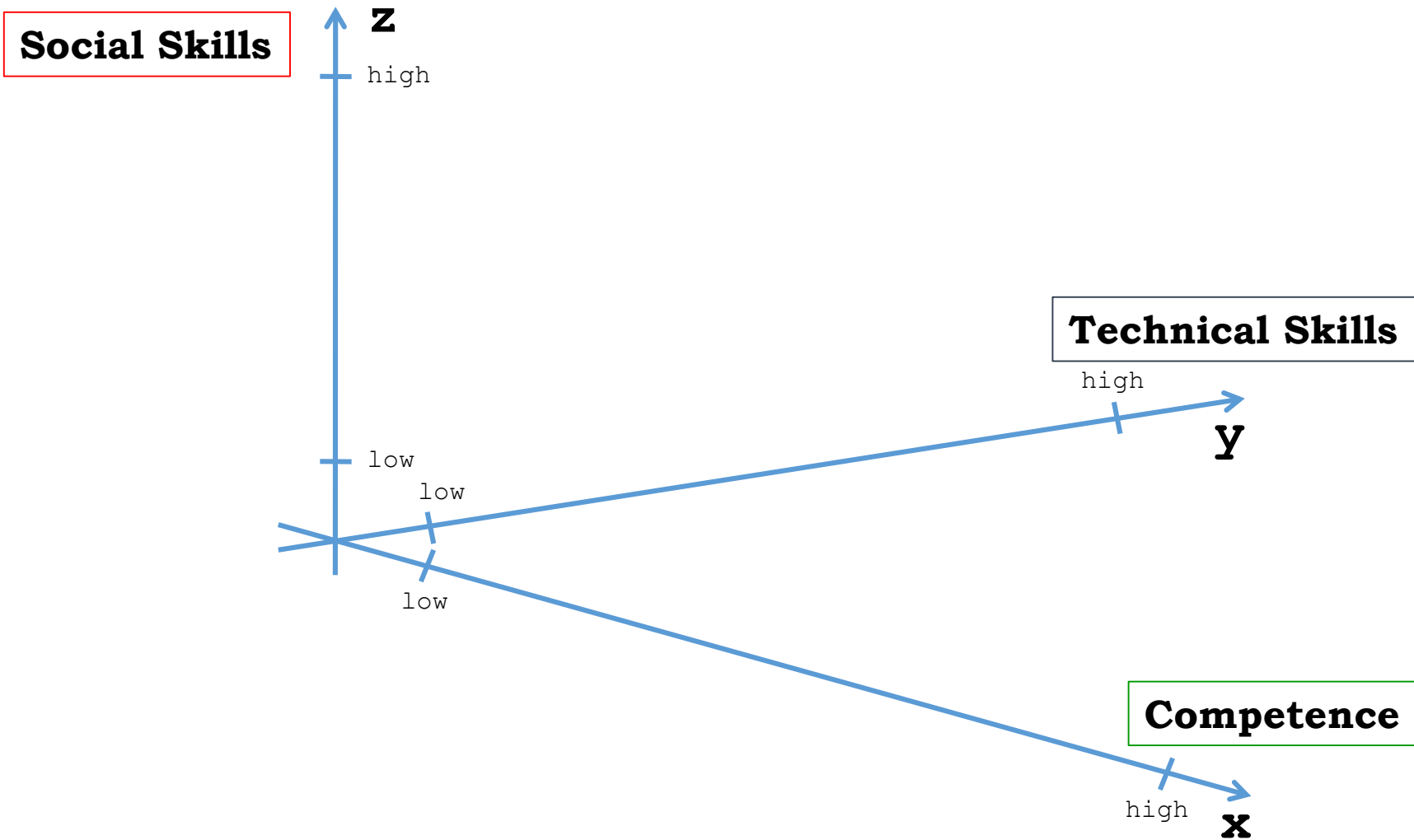
Soft Skills

„The fundamental principle behind any *soft skill* is to cultivate the perception in **other people's minds** that they can gain and benefit by engaging with us“

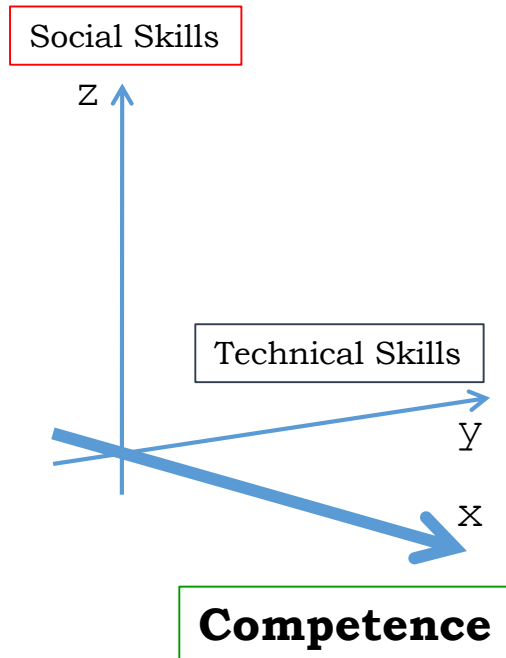
[Wushow Chou 2013, ISBN 978-1-118-52178-6]



Skills Coordinate System



Skills: **Competence**



(Professional) Competence

- IT (architecture) knowledge
- IT (practical) experience
- State-of-the-Art knowledge (broad, hardware, software, processes)
- Technology mastering (HW & SW)
- Business knowledge
- Innovation capability
- Implementation power & persistence
- Vision

Competence: Life-Long Learning

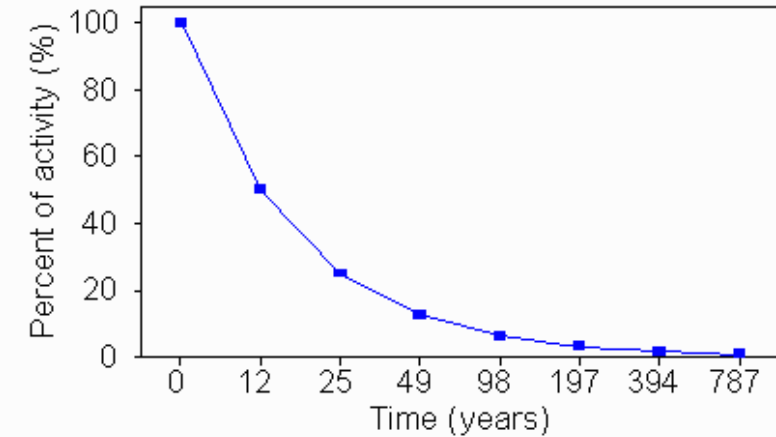
„Half-Life of IT-Engineering Knowledge“

Which is the half-life of IT-engineering knowledge ?

Def: The time-span after which *half* of your current IT-knowledge has become obsolete

Decay Curve for Tritium

Amount of radioactivity vs time



<http://www.chem.csustan.edu/chem3070/3070m04.htm>

Field	Half-life (in years)
Physics	13
Mathematics	9
Economics	9
Computer Science	6

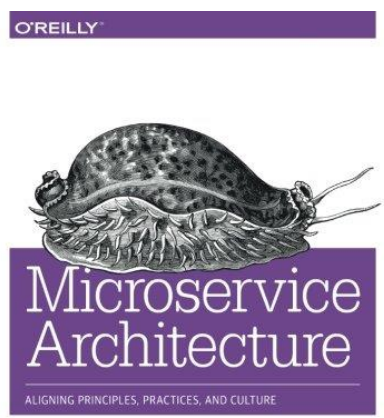
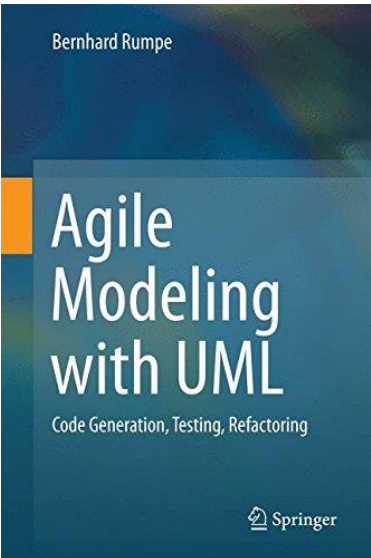
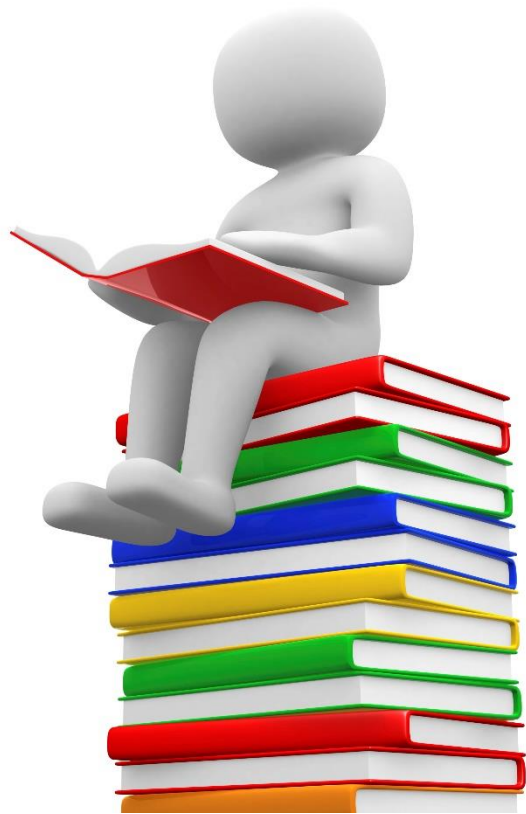
Competence: Life-Long Learning

„Half-Life of IT-Engineering Knowledge“: **6 years**

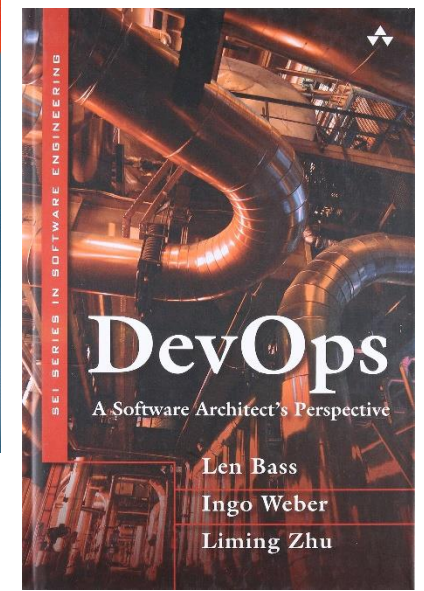
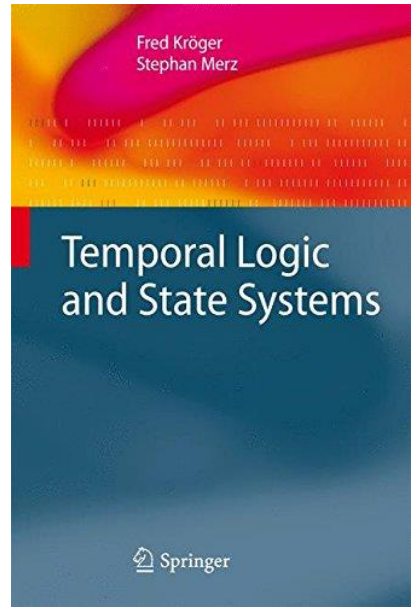
Remedy: Read ≥ 8 textbooks per year

≥ 6 Books in your professional field

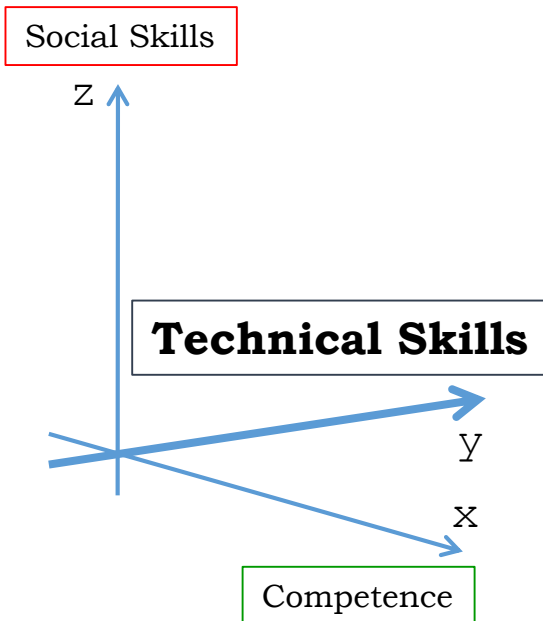
≥ 2 Books in a related field



etc.



Skills: **Technical Skills**



Technical Skills

- Communication skills (speech & writing)
- Presentation skills (oral, graphical & writing)
- Logical reasoning capability
- Efficiency & effectiveness
- Languages
- „Architecture Feel“ (Simplicity & beauty)

Efficiency:

Doing the things right

Effectiveness:

Doing the right things

Important: **Communications skills**

Writing:

- Papers
- Reports
- Proposals
- Books
- Reviews
- ...



Presenting:

- Results
- Proposals
- Requests
- Milestones
- Failures
- ...

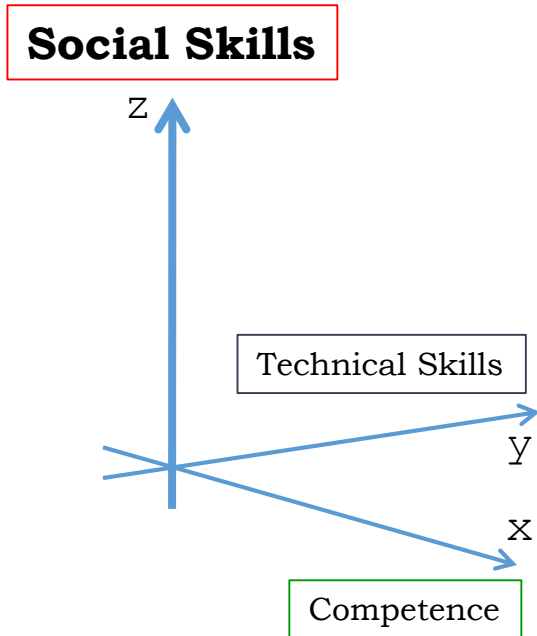


You can have
brilliant ideas,
but if you can't get
them across,
your ideas won't get
you anywhere.

--Lee Iacocca

BigPictureCoaching.net

Skills: **Social Skills**



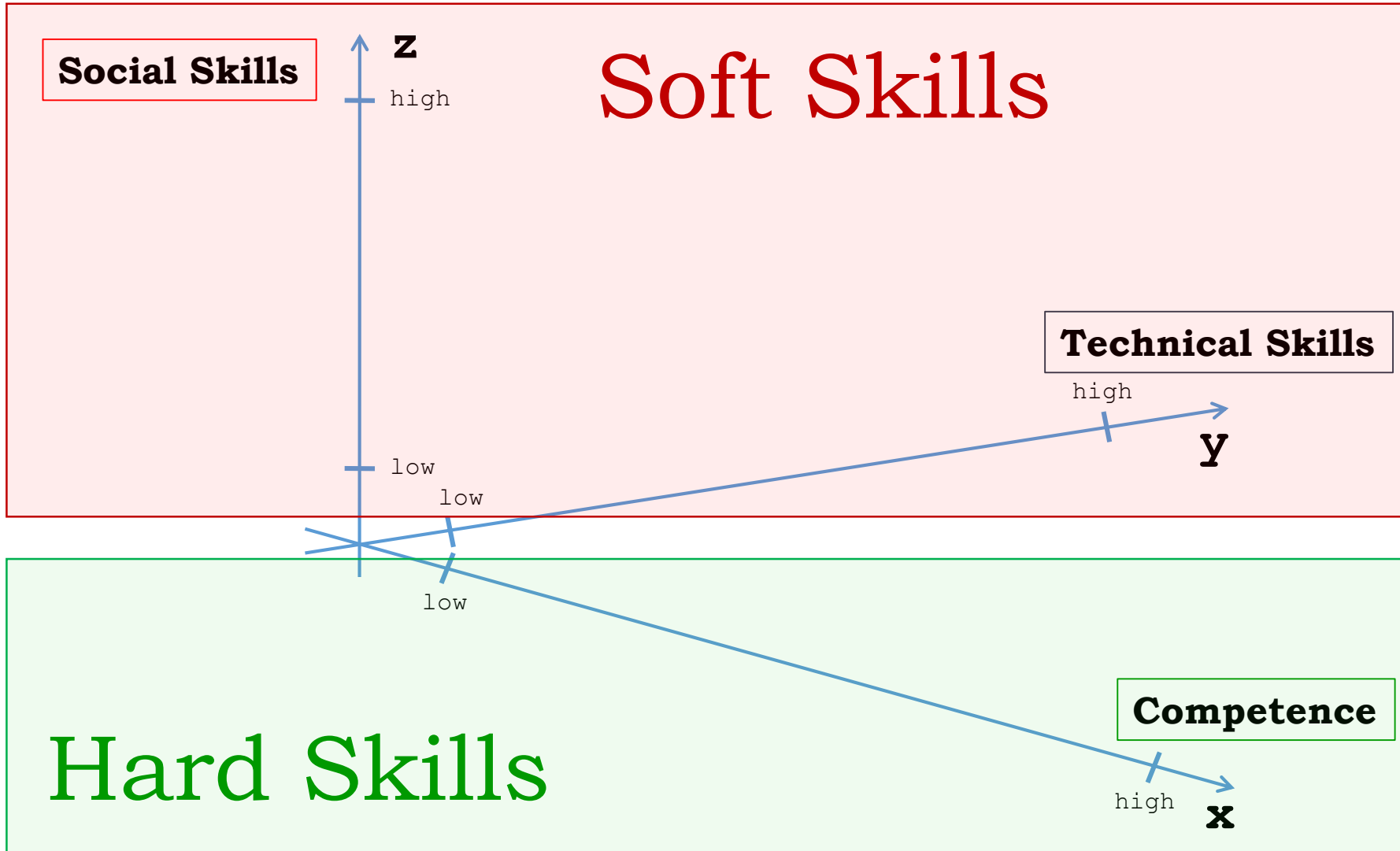
Social Skills

- Negotiation skills
- Persuasion capability
- People interaction capability
- Enthusiasm
- Leadership
- Life-long learning
- Socializing/Networking
- Team Work
- Honesty (Ethics)
- Work-life balance

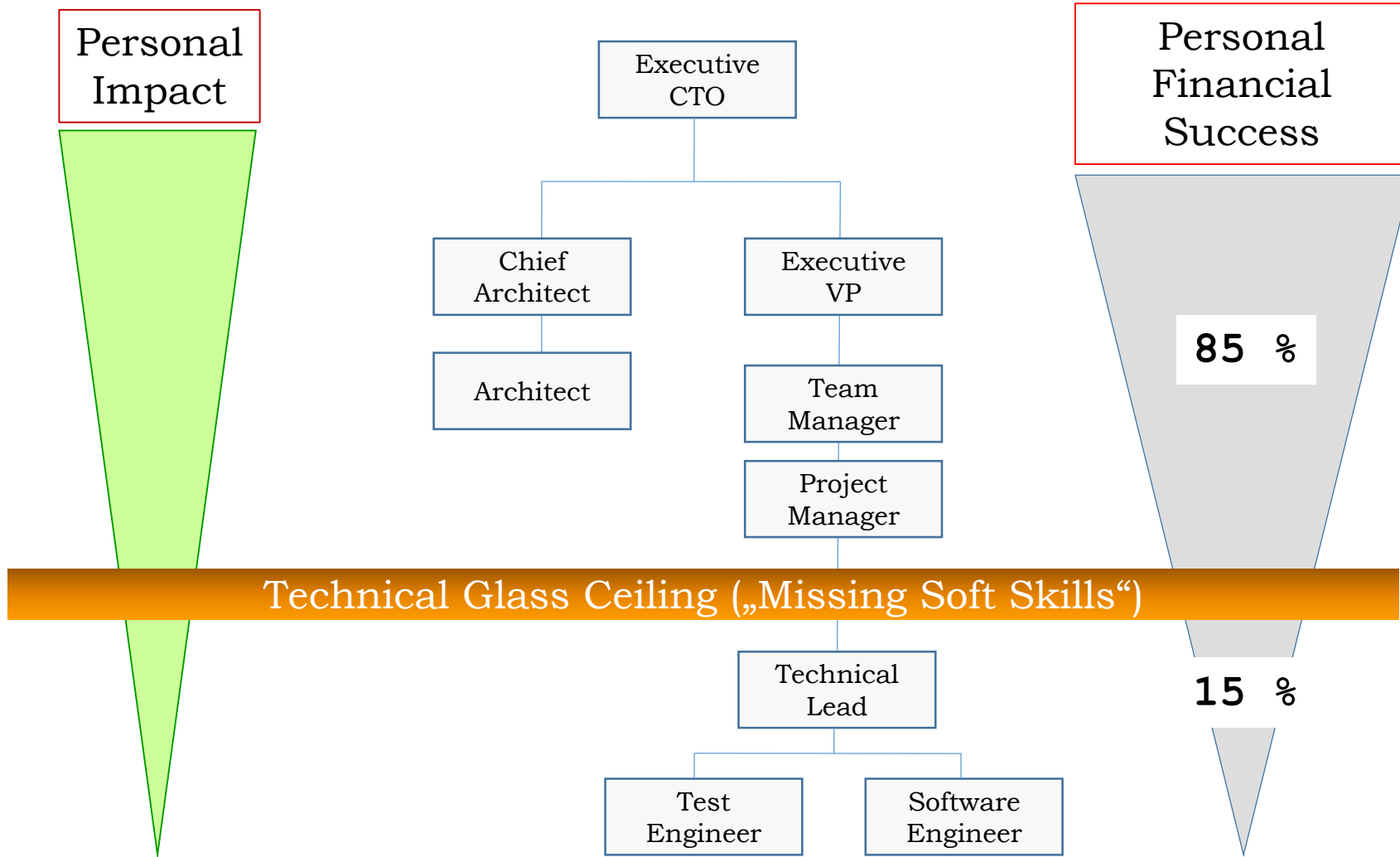


<http://samingersoll.com/life-work-balance/>

Skills Coordinate System



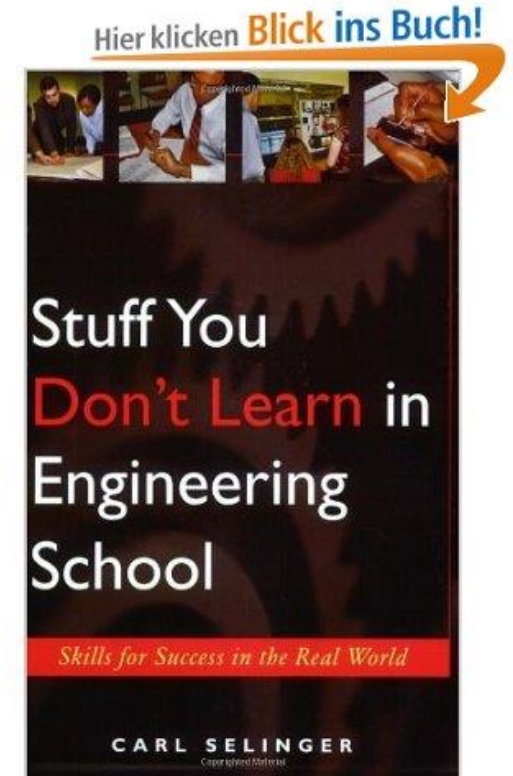
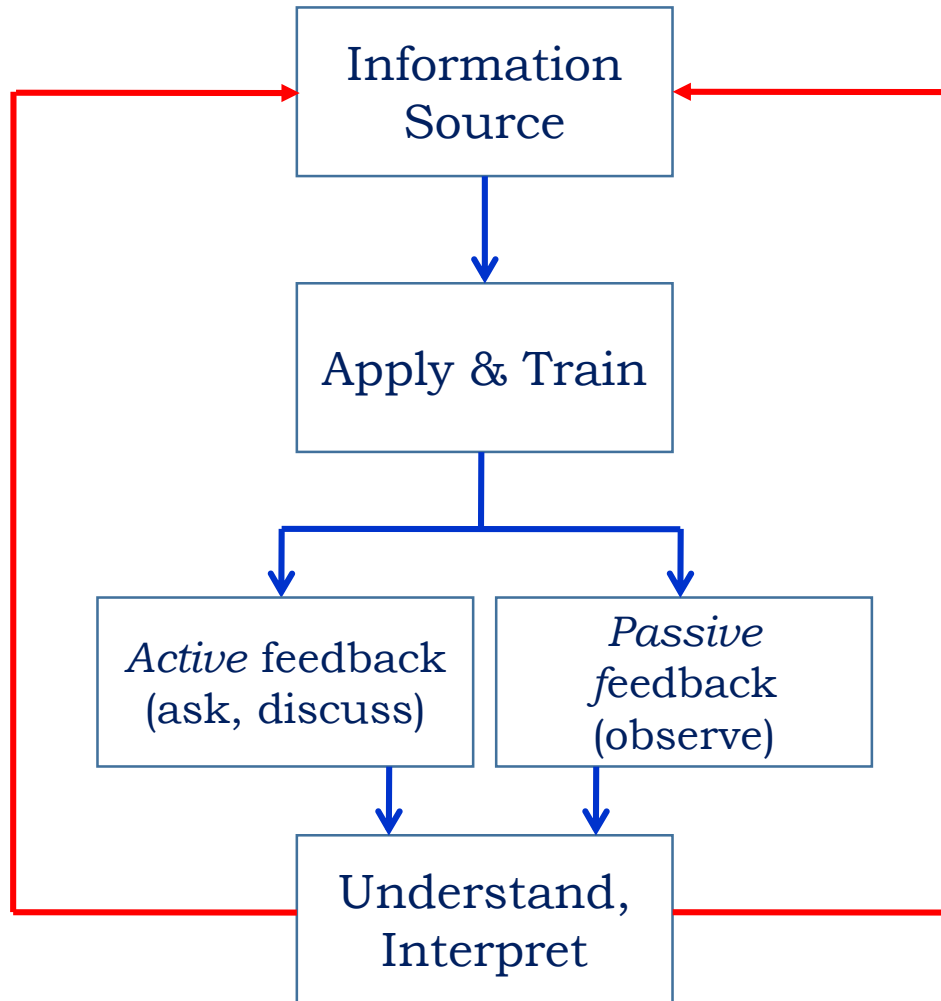
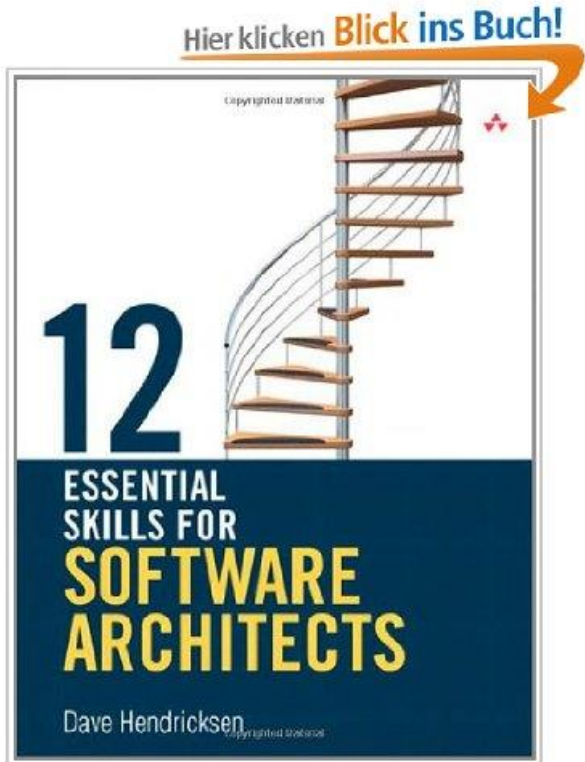
Hard Skills ↔ Soft Skills: Which are more important?



Dave Hendricksen, 2012, ISBN 978-0-321-71729-0

Dale Carnegie, 1937
ISBN 978-1-4391-9919-0

How can we learn *Soft Skills*?



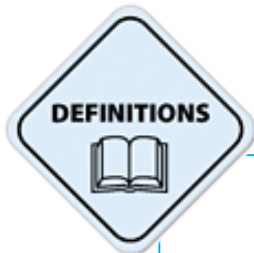
Personality

Personality



Context-dependent:

- ❖ Father
- ❖ Teacher
- ❖ Policeman
- ❖ ...



Personality:

The combination of **characteristics or qualities** that form an individual's distinctive character

[The New Oxford Dictionary of English]

Example: Future-Proof Software-Systems Engineer Personality (WS19/20)

Photo Credit: Silvia Furrer



Courage

Fighting Spirit



Wisdom

Mediation Capability

http://en.wikipedia.org/Great_Horned_Owl

<http://www.wildanimalfightclub.com>



<http://www.taniga.net>

... and – most important:

Honesty
(Ehrlichkeit)



<http://warrencampdesign.com>

(Professional) Competence:

Your professional advice must be (provably) correct and believable, as well as realistic

Behaviour:

Your behaviour must be truthful, fair and human in all situations

Praising and Reprimanding

<http://www.mindtools.com>



Praise:

- honest
- precise
- no „..., but ...“
- (can be) personal

„Your design of the module ABC is clear and elegant. I like it“



<http://footage.shutterstock.com>

Reprimand:

- true
- precise
- fair
- constructive
- never personal

„You did not take into consideration that a suitable data structure is already existing“

Software Engineering **Ethics**

ACM/IEEE: Software Engineering Code of Ethics and Professional Practice (© 1999)

1. PUBLIC - Software engineers shall act consistently with the public interest.
2. CLIENT AND EMPLOYER - Software engineers shall act in a manner that is in the best interests of their client and employer consistent with the public interest.
3. PRODUCT - Software engineers shall ensure that their products and related modifications meet the highest professional standards possible.
4. JUDGMENT - Software engineers shall maintain integrity and independence in their professional judgment.
5. MANAGEMENT - Software engineering managers and leaders shall subscribe to and promote an ethical approach to the management of software development and maintenance.
6. PROFESSION - Software engineers shall advance the integrity and reputation of the profession consistent with the public interest.
7. COLLEAGUES - Software engineers shall be fair to and supportive of their colleagues.
8. SELF - Software engineers shall participate in lifelong learning regarding the practice of their profession and shall promote an ethical approach to the practice of the profession.

<http://www.acm.org/about/se-code>



Burn-Out



An excessive *mismatch* of
Work ↔ Life balance
may lead to a **burnout**



Burnout

Emotional and physical ***exhaustion***
 resulting from a combination of ***exposure***
 to environmental and internal ***stressors***
 and ***inadequate coping*** and lack of adaptive skills

<http://medical-dictionary.thefreedictionary.com/burnout>

... Burnout is an extremely serious medical condition!



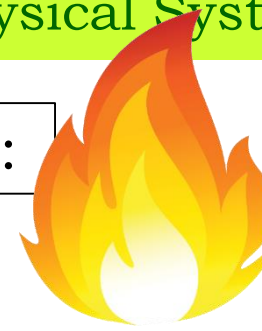
The Tell Tale Signs of Burnout

<https://www.psychologytoday.com/blog>

Signs of physical and emotional exhaustion:

- Chronic fatigue
- Insomnia
- Forgetfulness/impaired concentration and attention
- Physical symptoms (chest pain, heart palpitations, shortness of breath, gastrointestinal pain, dizziness, fainting, and/or headaches)
- Increased illness
- Loss of appetite
- Anxiety
- Depression
- Anger

... In your professional life you have two responsibilities:



1) **Early recognition** of symptoms for burnout in **yourself**
 ⇒ get help (books, family, medical support, ...)

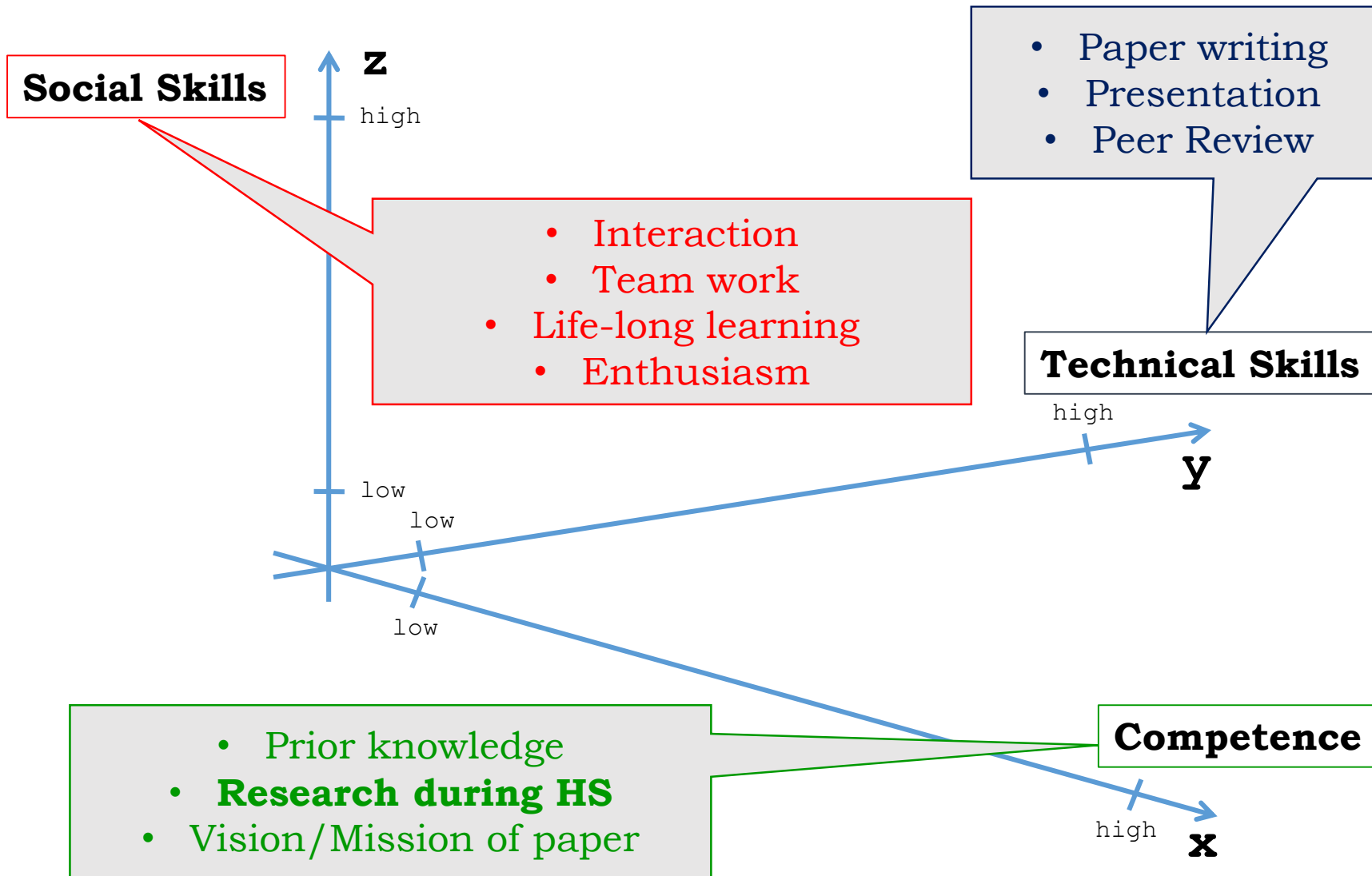
2) **Early recognition** of symptoms for burnout in **your colleagues**
 ⇒ give help





... Be aware all your life

Skills improved in the Hauptseminar



After the delivery of the final paper (July 26, 2019):
... you have earned 3 ECTS Credits



<http://audioto.ru/best/ects-credits-system>

... you will also get a personal assessment and a grade for your work

Final Questions:

a) 3 out of 6 left the HS without completion

Q: Was the HS too demanding?

- in time?
- topically?

b) For V1 and V2 all struggled to complete the task to satisfaction

Q: Was the task too difficult?

Q: Do the students have too little time (other tasks)?





The End

It was a pleasure to work with you

Hope to work with you again

All the best!