Show Where to Look but Don't Tell What to See

Challenges in teaching software architecture and how to circumnavigate some of them.

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https://www.xing.com/profile/Alexander_Lorz
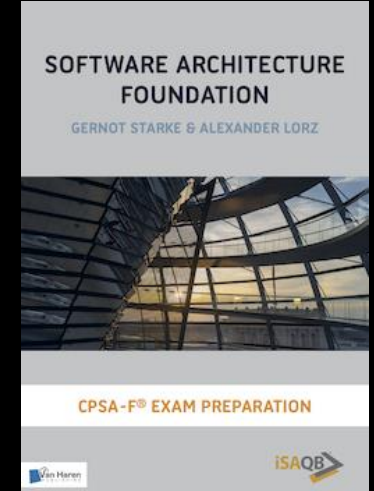
SOFTWARE
ARCHITECTURE
GATHERING
DIGITAL

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about:me

Freelance consultant and developer, software architecture professional, trainer, author.

Tinkerer, tech and science nerd.

Member of iSAQB WG Foundation Level

Head of iSAQB WG Train-The-Trainer

SOFTWARE ARCHITECTURE
FOUNDATION

GERNOT STARKE & ALEXANDER LORZ

CPSA-F® EXAM PREPARATION

"The best teachers are those who show you where to look, but don't tell you what to see."

attributed to the Alexandra Trenfor

see [1]

PROBABLY MADE UP

[1] E. Andersen: One Way To Make Yourself Much Smarter, Right Now – Forbes, 2014

Challenges for Delivering iSAQB FL Trainings

We all want to deliver great training experiences.

(My) challenges:

- Operational constraints on training courses.
- Consensus on terms/concepts (or lack thereof).
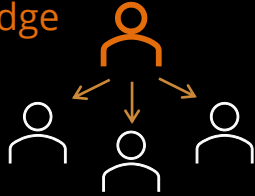- Varying background and knowledge of participants.
- Adult learning.

Learning theories (or principles, or approaches, ….)
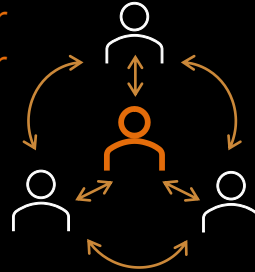
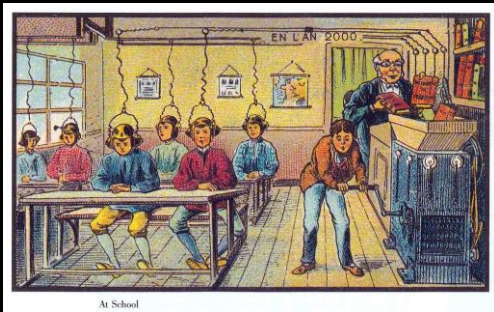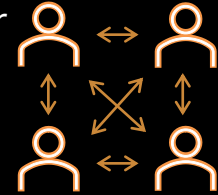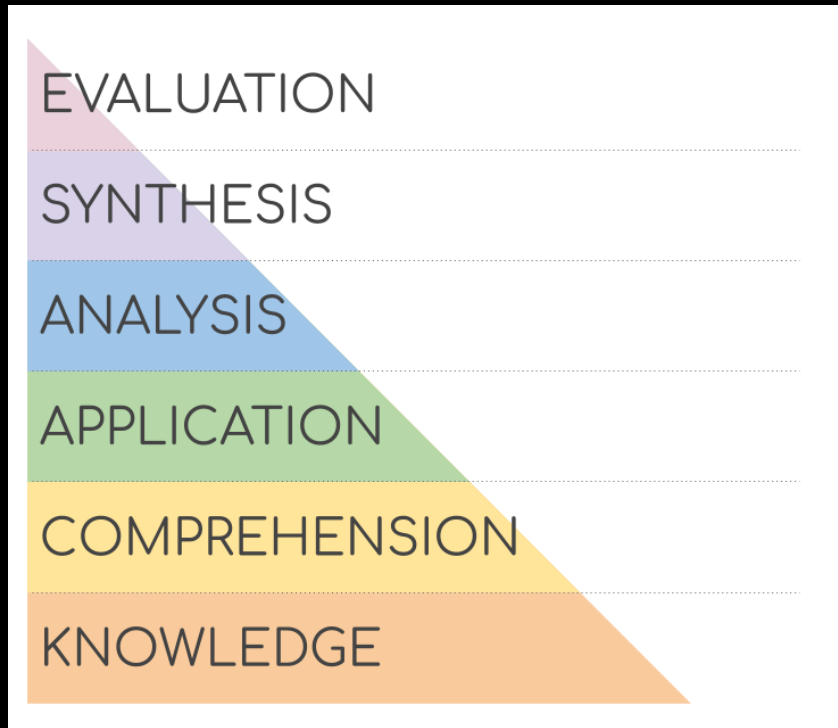| Pedagogy teacher-led-learning	Andragogy adult/self-directed learning M. Knowles (1970)	Heutagogy self-determined learning Hase & Kenyon (2000)

source of knowledge

enabler facilitator

learner is teacher
teacher is learner

Autonomy and self-direction

Task or problem centered

Need to know - why learn x ?

Use own/others experience

Internal motivation

Interdependent

Manage own learning

Negotiate goals

Not based on need, rather on potential

What shall CPSA-FL courses provide?

EVALUATION

SYNTHESIS

ANALYSIS

APPLICATION

COMPREHENSION

KNOWLEDGE

Bloom's taxonomy – cognitive domain

"… **knowledge** and **skills** required to design, specify and document a software architecture … for small and medium-sized systems."
Foundation Level Curriculum

Motivation: What do (most) training participants want?

EVALUATION

SYNTHESIS

ANALYSIS

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KNOWLEDGE

Bloom's taxonomy – cognitive domain
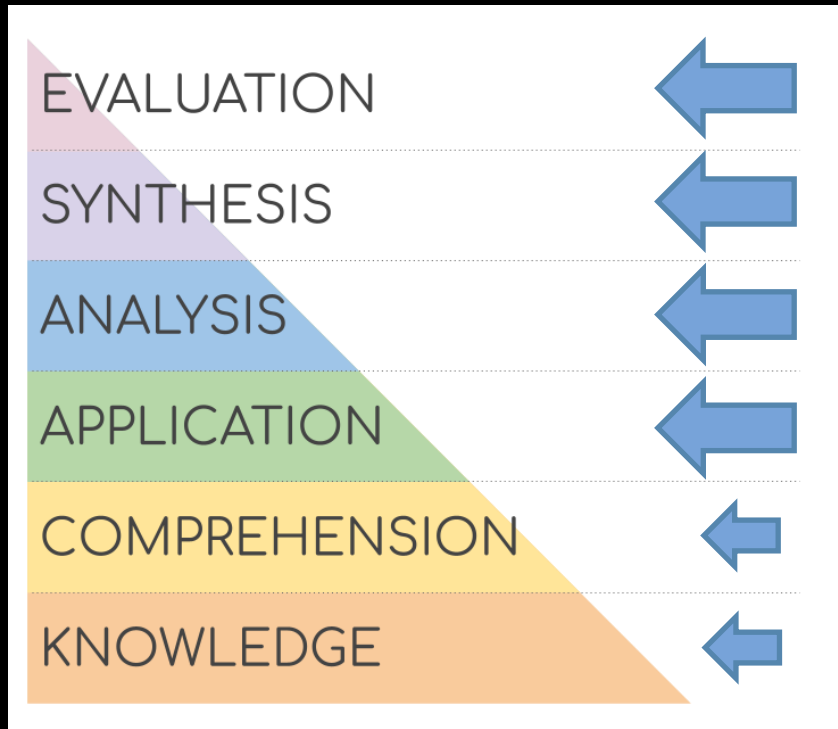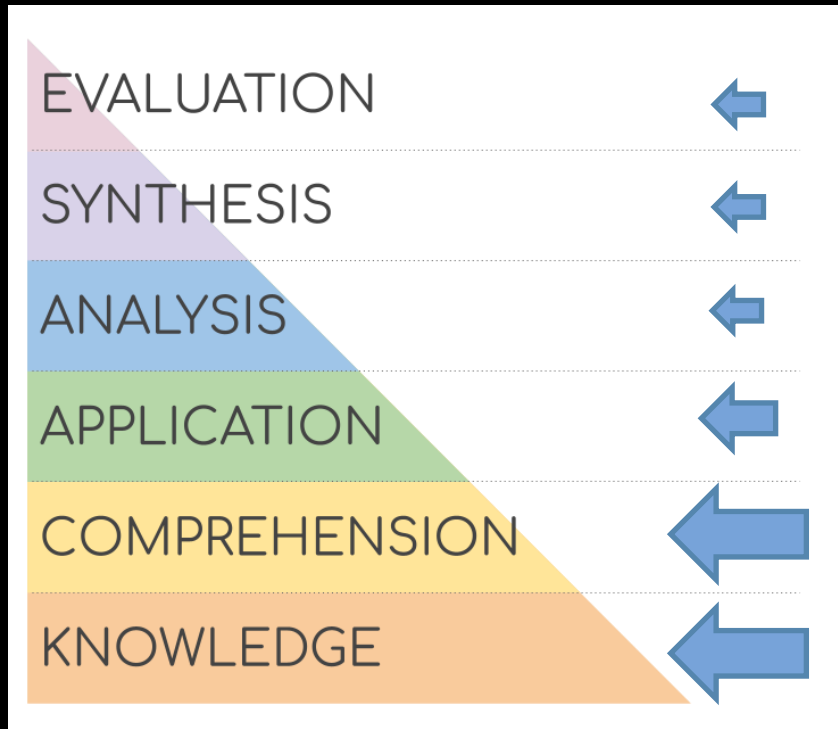
Applicable knowlege for their professional work

Becoming better/more efficient at their job

Solve current/anticipated problems

Motivation: What do (almost all) participants want as well?

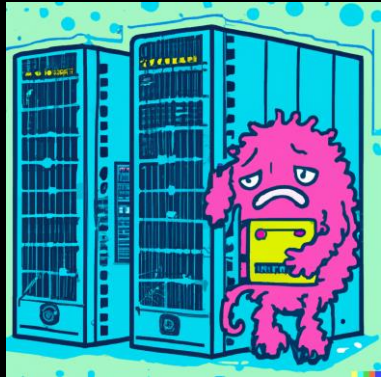

Bloom's taxonomy – cognitive domain

Motivation: „Why are you here?"

self select

Usually highly motivated.
Eager to take extra load.
Focus on skills/competencies.

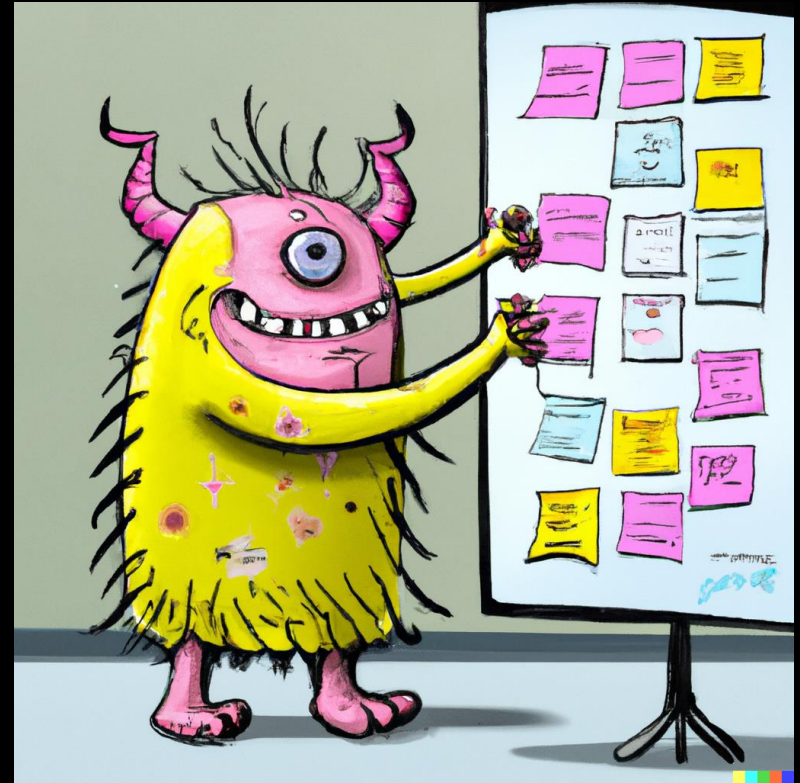**„sent", e.g.
required by
employer**

More focused on exam.
More likely to tune out.
"Just teach me what you think
I should know."

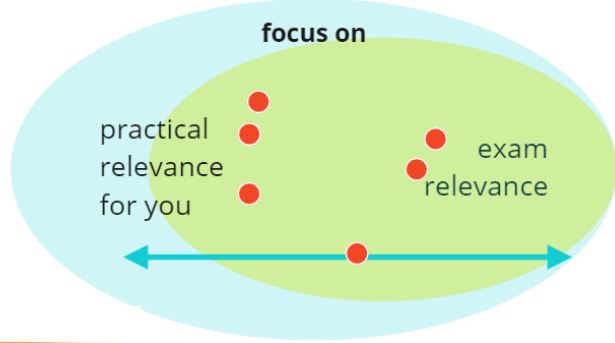## How to Increase Motivation?

Remember? Adult learners ...

- ... are autonomous,
- self-directed, and
- task oriented.

They respond better to **internal motivation**.

Motivation, Self-direction and Commitment
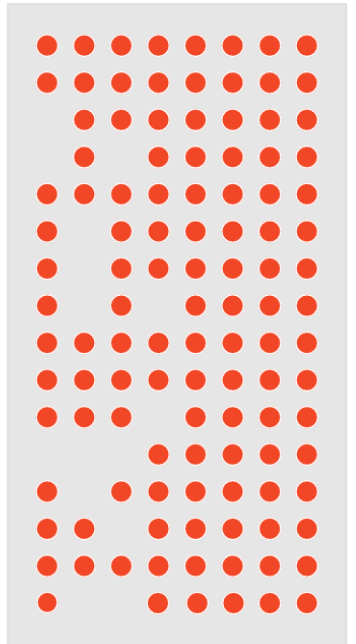## Establish (Personal) Learning Goals

Motivation, Self-direction and Commitment
Establish (Personal) Learning Goals

People want to maintain consistency with their self-concept.

Explicit public commitments direct future behavior.

See: Cialdini, Robert B. "Influence: the psychology of persuasion"
New York: William Morrow (2006).

Photo by alise storsul on Unsplash

Increasing Motivation and Learning Outcomes
Use Sharon Bowman's 4 Cs Instructional Design Model

CONNECT

How does it apply to me?
What do I already know?
What do I want to learn?

CONCEPTS

New info - multisensory
Hearing, seeing, discussing,
searching, reading, writing, ...
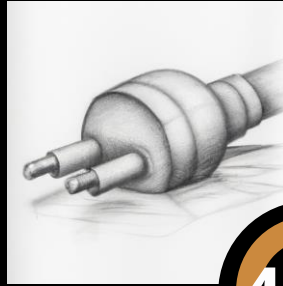
4 Cs

CONCLUSIONS

Wrap-Up. Retention.
Learner led summary.
Ideas on how to apply.

CONCRETE PRACTICE

Active review
Teach-back, work on
example scearto

<Name>

State the most important fact you know about design/architectural patterns.

What did you hear/read about pattern that you didn't really need to know?

What is your next step in learning more about patterns?

Pipes-and-Filter
Alice, Bob

Was ist das (z. B. wie ist das aufgebaut, woraus besteht es, wie funktioniert es ...)?

Welches Problem löst das Muster?

Welche Auswirkung hat es auf welche Art von Kopplung?

Welche Vor- und Nachteile hat es?

Optional: Eigene Erfahrungen damit.

Microservices
Carol, Dave

Was ist das (z. B. wie ist das aufgebaut, woraus besteht es, wie funktioniert es ...)?

Aufteilung eines Systems in kleine eigenständige / unabhängige Komponenten

Werden oft von eigenständigen Teams entwickelt

Können u.U. unabhängig deployed und skaliert werden

Kommunikation über Interfaces

Schnellere Entwicklung durch die kleine Einheiten ---> daher Microservices

Monolithisch versus Microservices

Welches Problem löst das Muster?

Teilen und herrschen

Aufbrechen des Monolithen

Langsame Releasezyklen beschleunigen

Welche Auswirkung hat es auf welche Art von Kopplung?

Lose Kopplung ---> Dezentrale Datenhaltung

Welche Vor- und Nachteile hat es?

Schnelle Time-to-Market

Latenz, Bandbreite

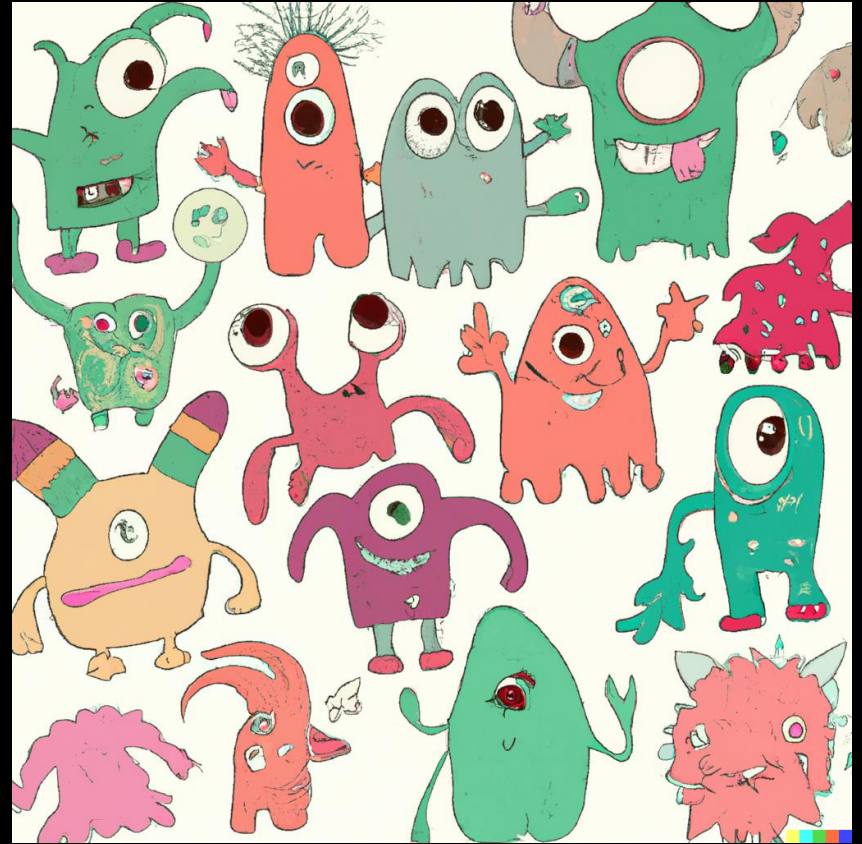Microservices hilft Skalierbarkeit sicherzustellen

Optional: Eigene Erfahrungen damit.

Varying Background and Knowledge of Participants

Longtime professional
Straight from university
Executive, Career changer

Some are missing prerequisites.

Automotive/embedded
vs.
Enterprise software
vs.
Startup company

LEVERAGE different backgrounds

Let (not only experienced) people do the talking.
- Adults LIKE to learn from role models.

What if it goes in the wrong direction?
- "Please explain why do you think so."
- Let others explain a different view.
- Highlight differences (in context, edge cases).
- "Does this work for you only or in general?"
- Create awareness for different contexts.

Respectful and constructive, keep a light and informal mood.
- "That's iSAQB consensus" only as last resort.

Software Architecture is an Evolving Field

Lots of „It depends".

No clear consensus on some concepts.

Ambiguous/fuzzy terms

e.g.
- Role/responsibilities of architects [2]
- IEEE 24765:2017 - 10 definitions of „interface"

[2] That's Not in My Job Description | SAG 2021
https://www.youtube.com/watch?v=VjO8q4ZR52k

first liquid fueled rocket by Robert Goddard, 1926
images-assets.nasa.gov/image/9132833/9132833~orig.jpg

# Dealing With Incomplete/Inconsistence Knowledge

"Students ... may get frustrated because they are used to the one correct answer, even when there are often multiple correct answers, depending on the conditions." [3]

Activities to compare academic and non-academic knowledge.

- Group discussions
- Example scenarios

Dealing with incomplete or inconsistent knowledge is an important skill!

Mark Richards
@markrichardssa

What is #softwarearchitecture?
Software architecture is the stuff you can't google

Tweet übersetzen

11:43 nachm. · 28. Okt. 2021 · Twitter for iPhone

[3] Kenner, C., & Weinerman, J. (2011). Adult learning theory: Applications to non-traditional college students. Journal of College Reading and Learning, 41(2), 87-96. https://files.eric.ed.gov/fulltext/EJ926365.pdf
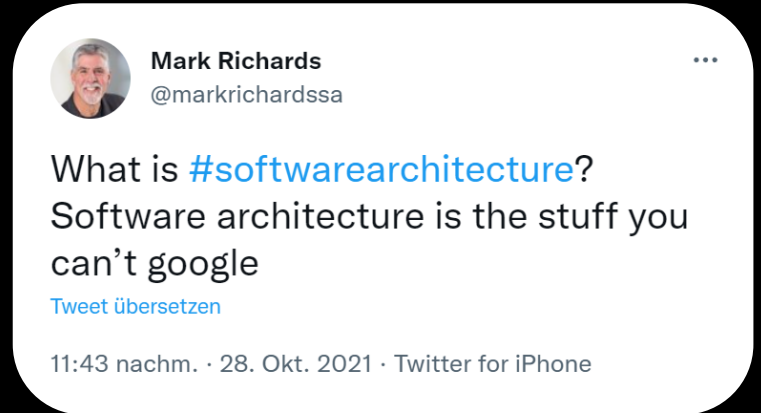
Operational Constraints on Training Courses

Comprehensive curriculum vs. 3-day-trainings

How to make room for self directed learning, 4Cs and exercises?

- Does it really take more time?
- Clear instructions!
- Provide preparation material in advance (textbook + instructions)
- Offer "overflow session".

Summary

Challenges presented were my (personal) challenges.
Your mileage may vary. Your solutions may differ.

Becoming a self-determined learner on the
topic of adult learning really helped a lot.
Sources in this talk might get you started.

Talk to and share sessions with other trainers!
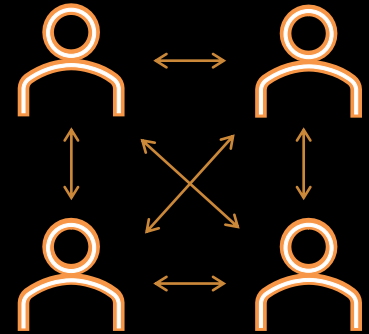
In learning you will teach
And in teaching you will learn

Phil Collins