Assessing the cost and benefit of a microservice landscape discovery method - A case study at a German insurance enterprise

Ludwig Achhammer, Master-Thesis Kickoff, 27.05.2019

Chair of Software Engineering for Business Information Systems (sebis)
Faculty of Informatics
Technische Universität München
wwwmatthes.in.tum.de

IT4IT promotes a value-chain based operating model for managing IT business

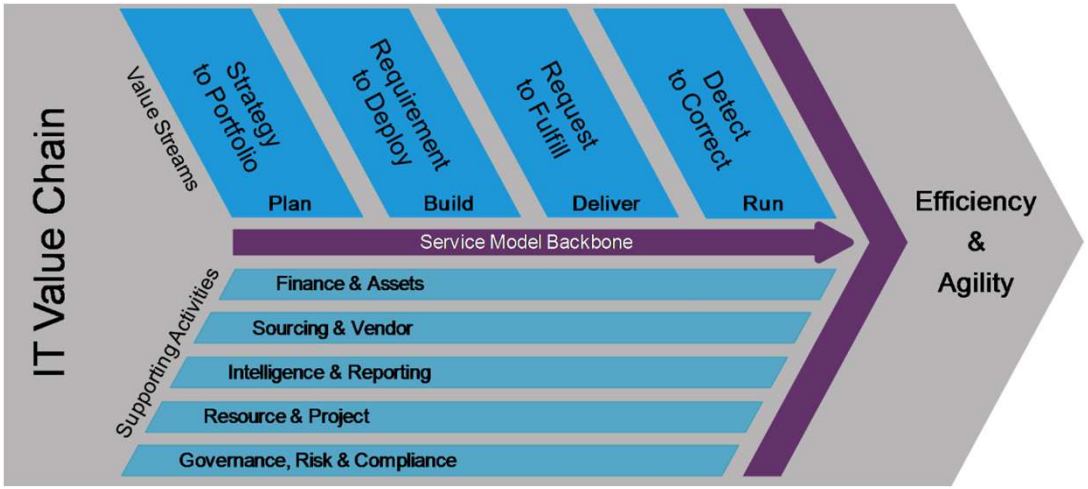
Strategic IT management, planning and transition requires

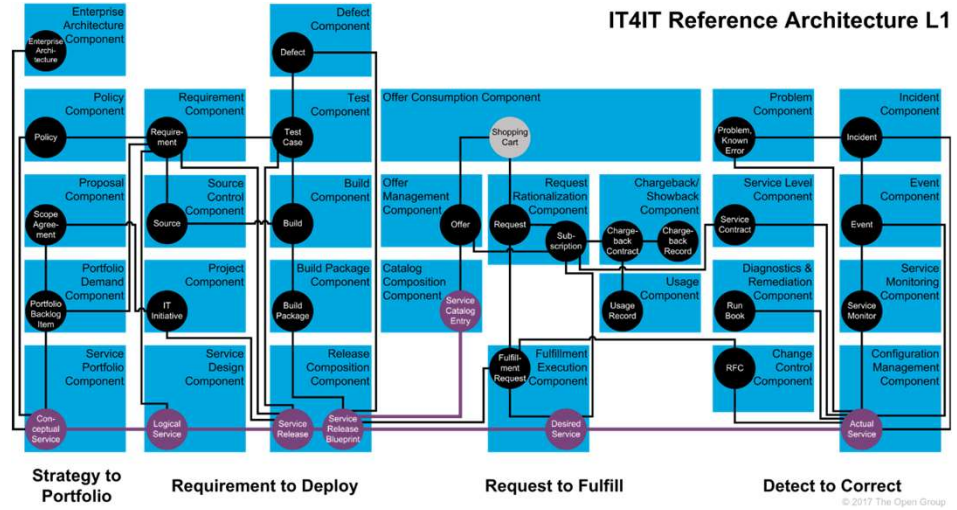
- a holistic view on the business, provided / consumed services and the underlying IT landscape
- knowledge about the intra- and interdependencies of architectural elements across these layers

→ EAM aims to supports strategic planning, decision making and transformations by modelling the enterprise architecture

But: EA relevant information is generated in various tools along the value chain

→ How to bring the scattered architectural information together?





*IT Value Chain: http://pubs.opengroup.org/it4it/refarch20/chap03.html#_Toc431202723
*IT4IT reference architecture: http://pubs.opengroup.org/it4it/refarch21/IT4ITv2.1.html

Agenda

1. **Motivation & problem statement**
2. **Solution concept**
3. **Thesis goals & research questions**
4. **Evaluation design and environment**
5. **Timeline & next steps**

Motivation

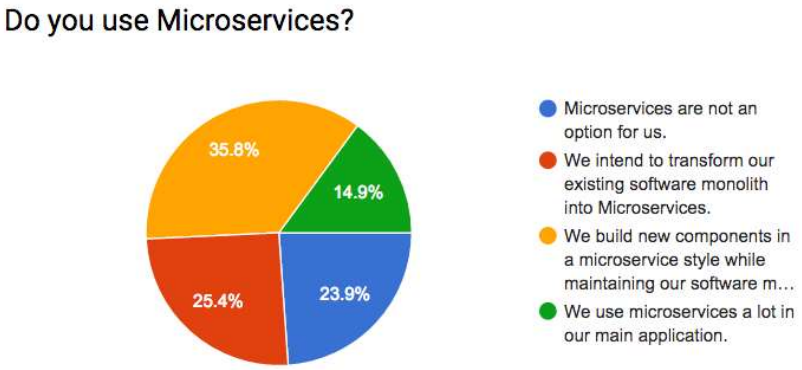
Enterprise Architecture Documentation (EAD) is a challenge ever since for EAM

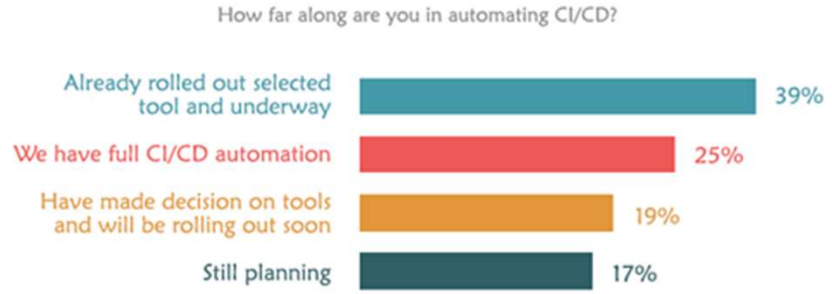
- Relevant EA information is scattered across diverse information systems and stakeholders [5]
- Ongoing tracking of changes to keep the model up to date [1, 2]
- EAD is mostly performed manually; often there is no defined process and responsibilities [1]

→ **EAD is a time-consuming, cost intensive and error-prone task** [1, 2, 3]

Recent trends challenge EAD processes all the more:

- Growing adoption of agile development practices (DevOps, Scrum, CI/CD) [4]
- Growing adoption of cloud- and microservice based environments [4]





*https://jaxenter.com/microservices-trends-2017-survey-133265.html
**https://dzone.com/articles/the-top-three-benefits-of-continuous-delivery

Problem Statement

What the increasing use of cloud- / microservice environments implies:

- Artefacts change faster than ever
- The diversity of technologies used increases
- Runtime artefacts become more volatile

→ The overall architectural complexity increases [3]

Problems faced by practitioners:

- Established EA tools only provide poor support for performing EAD effectively [1]
- Automation has become a must to cope with fast-paced EA environments [1]

→ Insufficient EAD constitutes a major risk for the EAM practice as such and any derived decision

Conclusion: [6, 7]

→ There is a need for automating the EAD process considering

a) The scattered nature of EA relevant information
b) The ecosystem of agile practices
c) The integration of cloud-based environments

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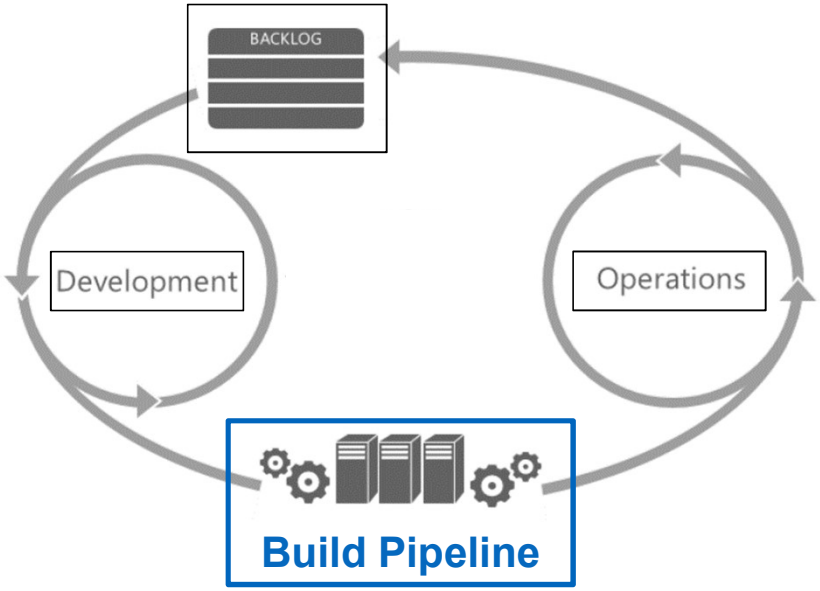
Pipeline-based automated EAD solution approach

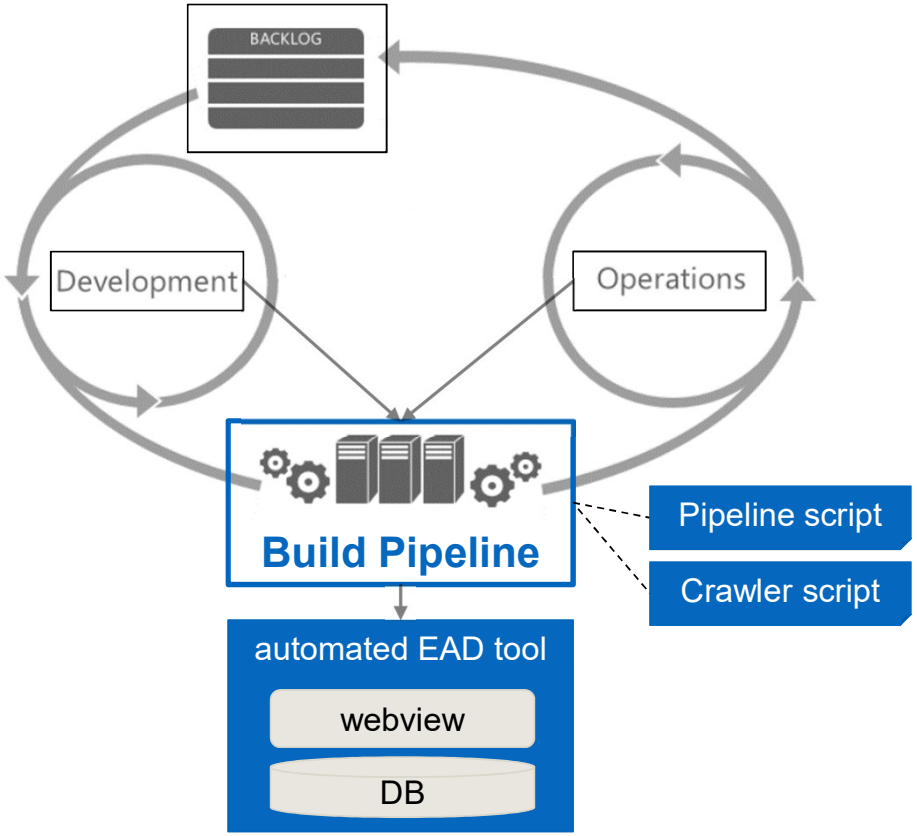
General Idea: integrate the EA discovery process into the build pipeline (CI/CD)

1. CI/CD tool instrumented to conduct automated EAD tasks (new or changed artefacts) with each build
2. Continuously monitor the state of deployed artefacts (runtime information)



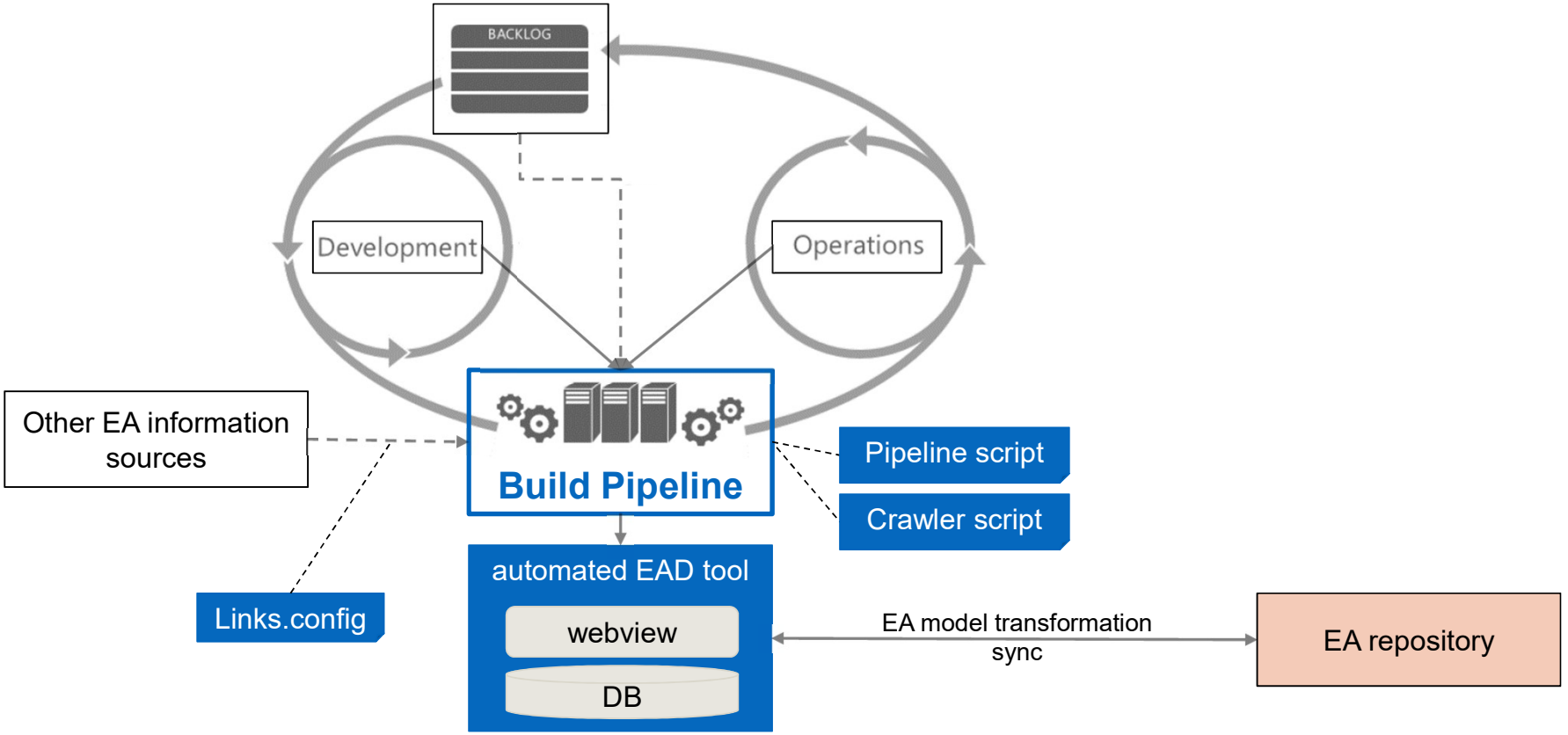
Pipeline-based automated EAD solution approach

- Add to script to the central development pipeline
  - Pipeline script purpose: document EA with each deployment
  - Crawler script purpose: update documented EA continuously



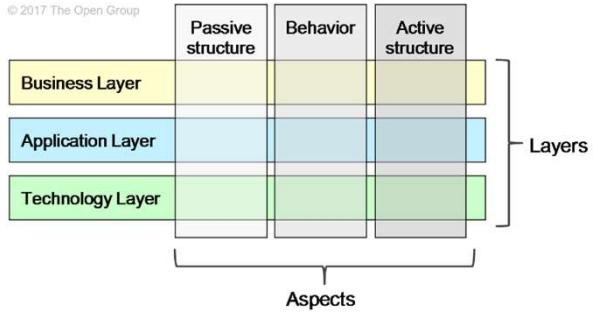
Pipeline-based automated EAD solution approach

- Development teams provides links to federated information sources
  - Pipeline script poll information from federated EA information sources using their API
  - EAD tool aggregates the information gathered and forwards to central EA Repository



Pipeline-based automated EAD solution approach

→ Integrate various relevant EA information sources along the IT4IT value chain (company specific)



PPM

VCS

Inspection

BACKLOG

Development

Operations

OpenShift

CloudFoundry

GCP

AWS

CMDB

APM

CHG

BPM

Other EA information sources

Build Pipeline

Pipeline script

Crawler script

automated EAD tool

webview

DB

Links.config

EA model transformation sync

EA repository

PPM = Project Portfolio Management; **APM** = Application Performance Monitoring; **BPM** = Business Process Management; **CHG** = Change Management; **GCP** = Google Cloud Platform

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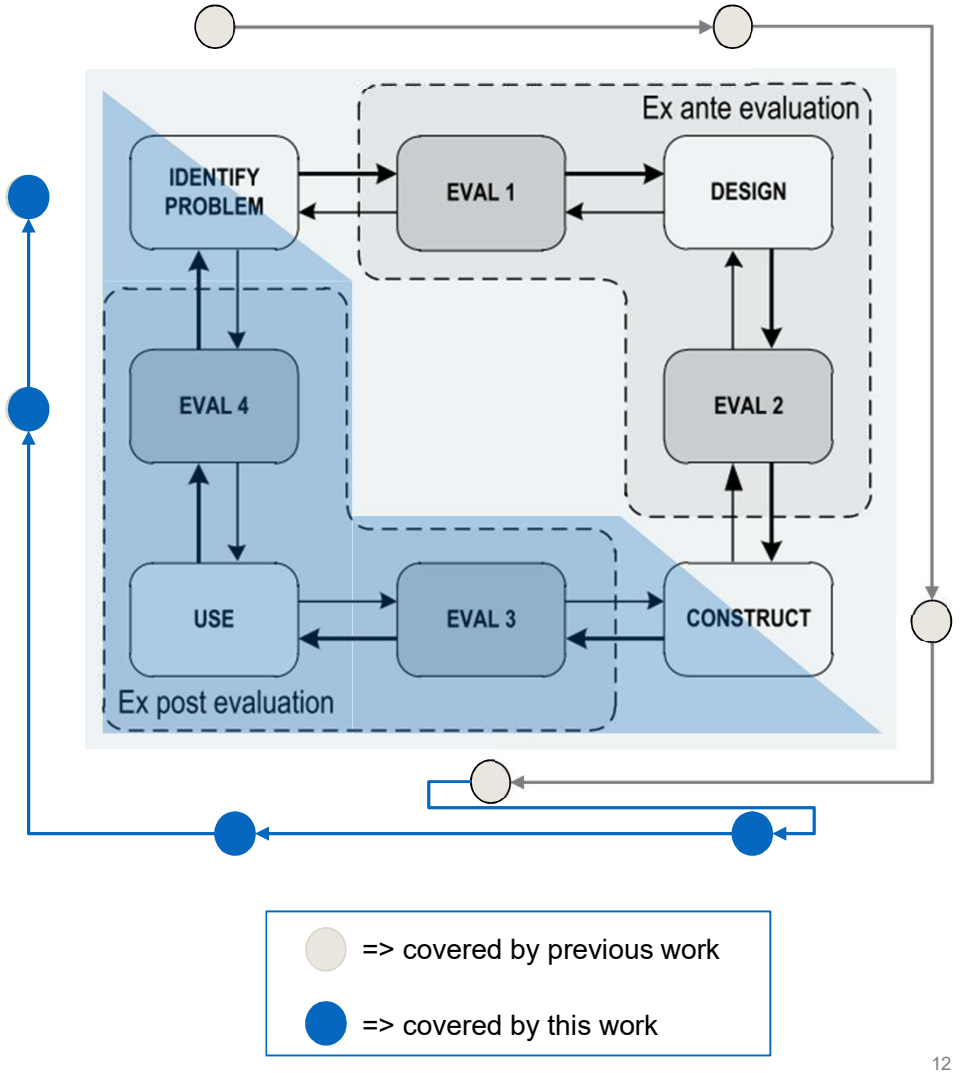
Deliverables and contributions

Deliverables

1. Refine design / Advance the construct based on previous evaluation cycle (EVAL 3)
2. Integration and adoption of the construct to a real case evaluation environment (USE)
3. Conduction of an evaluation (EVAL 4) consisting of
   a) case study at a industry partner
      - Examine capabilities towards specific EAM use cases
      - Critically assess cost and benefits
   b) a series of interviews with multiple other EA practitioners

Expected Contributions / Artefacts

1. Refined concept design and construct of the EAD solution approach
2. (dis-)prove of the approaches capabilities, critical assessment of cost and benefits
3. Inferred conclusions w.r. to the general EAM practice



Research Questions

RQ1 What EA model elements can automatically be discovered using runtime information and federated information sources?

RQ2 What challenges/requirements have to be addressed when adopting the proposed EAD solution approach?

RQ3 What are costs* and value proposition for Enterprise Architecture Management?

RQ4 What specific EAM use cases could be enabled using this approach (e.g. cloud fit, cloud governance)?

*refers to non-financial aspects as well

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Evaluation Environment at the industry partner

General IT Organisation:

- App. 1.600 employees
- App. 1.800 applications in use

Agile Development:

- Centrally defined development process
- Centrally defined build / deployment process

Cloud PaaS Environments (on premise) in use:

- Pivotal CloudFoundry + Redhat OpenShift

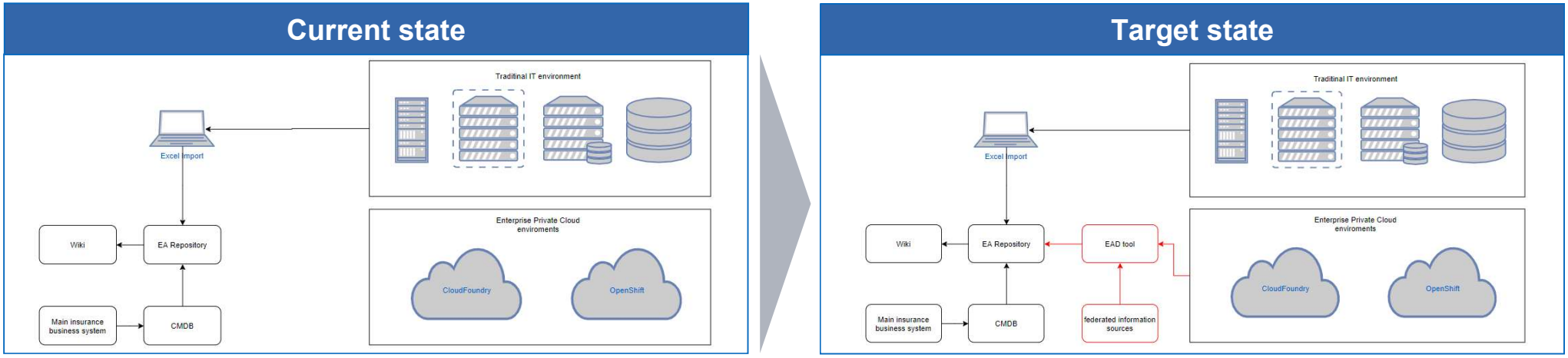
→ Total of app. 400 deployed cloud services

Key drivers to adopt:

- External: GDPR, ISO 22301 (BCM), VAIT
- Internal: Cloud Migration Project, BCM, IT Governance

Current EA documentation process for cloud environments:

- Performed manually
- No formal process defined

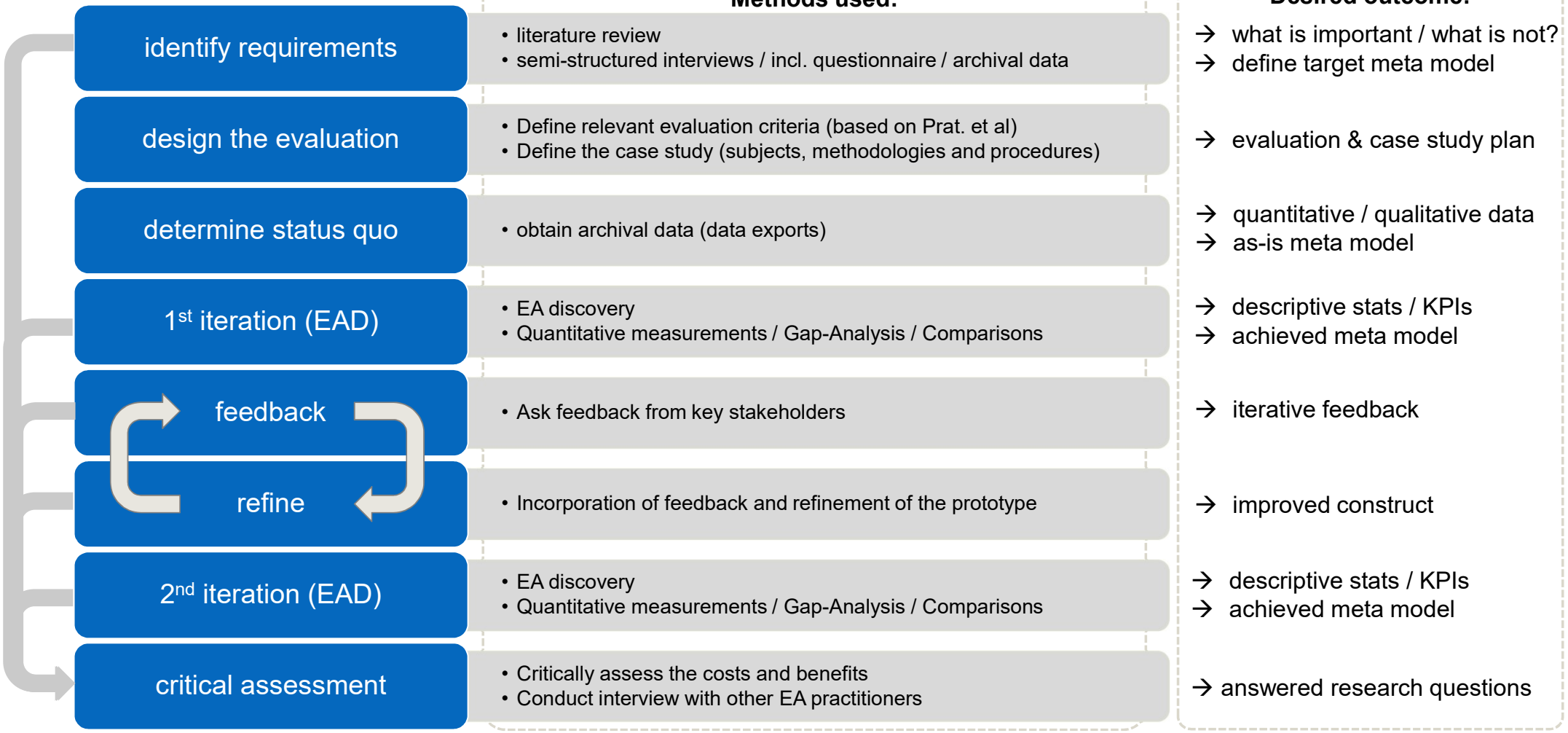


Research Approach – Case Study at a German insurance enterprise

Main building blocks:

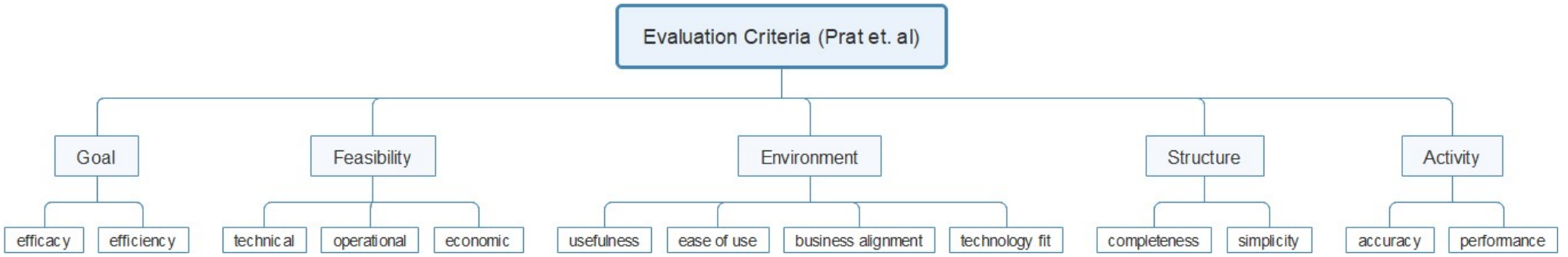
Requirements Analysis	• Literature review • Semi-structured interviews with industry partner
Evaluation Design	• Select & define evaluation criteria • Determine mix of methods and measurements to be used
Evaluation	• Inside view: Semi-structured interviews / KPIs / Gap-Analysis • Outside view: Semi-structured interviews with multiple EA practitioners
Conclusion	• Reflect the achievements against requirements and status quo • Assess the cost / benefit ratio of adopting the solution approach • Assess applicability with other EA practitioners

Evaluation details



Evaluation aspects & criteria

Evaluation criteria [8]*



- Fulfillment of requirements
- Satisfaction of information demand
- Information surplus
- Data quality surplus (accuracy, completeness, consistency, ..)
- Effort reduction due to automation

Benefit aspects

- Preconditions & barriers to adopt
- Limitations
- Side effects on
  - people,
  - processes,
  - organisation (how invasive?)

Cost aspects (also non financial)

*subset of the hierarchy of evaluation criteria acc. to Prat et al.

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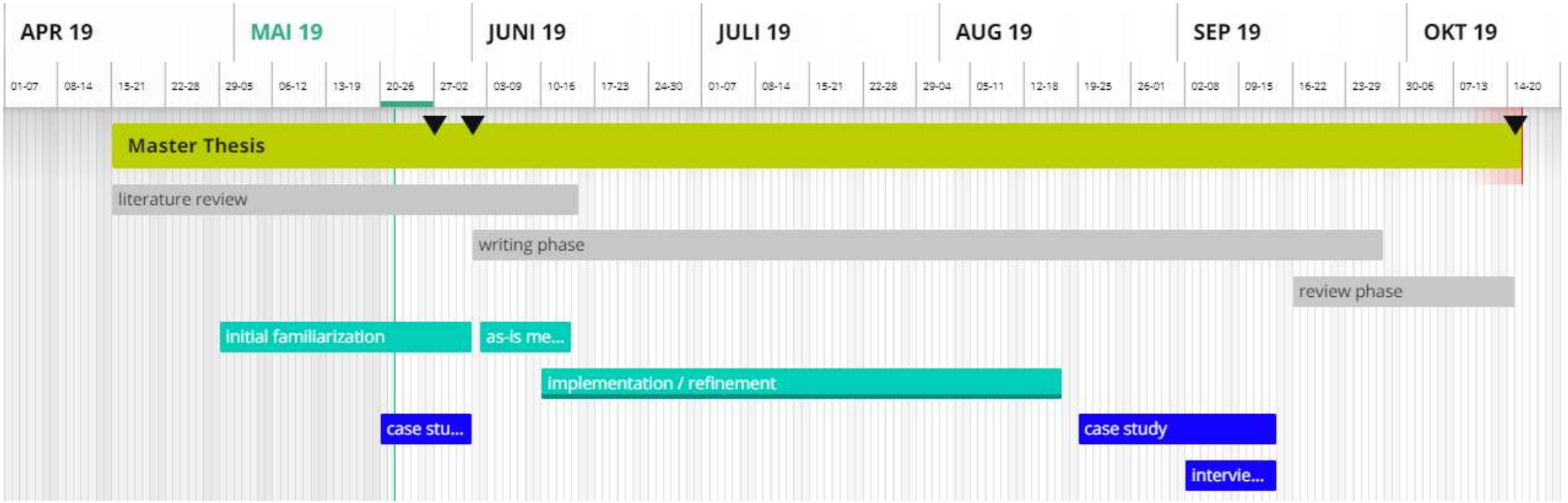
Timeline & Next Steps



In progress:

- Literature review on requirements & challenges of EAD
- Case study design
- Training on the prototype

Next Steps:

- 01.06.2019: Start at the industry partner
- Analyse AS-IS situation and requirements

Backup

Ludwig Achhammer

Technische Universität München
Faculty of Informatics
Chair of Software Engineering for Business Information Systems

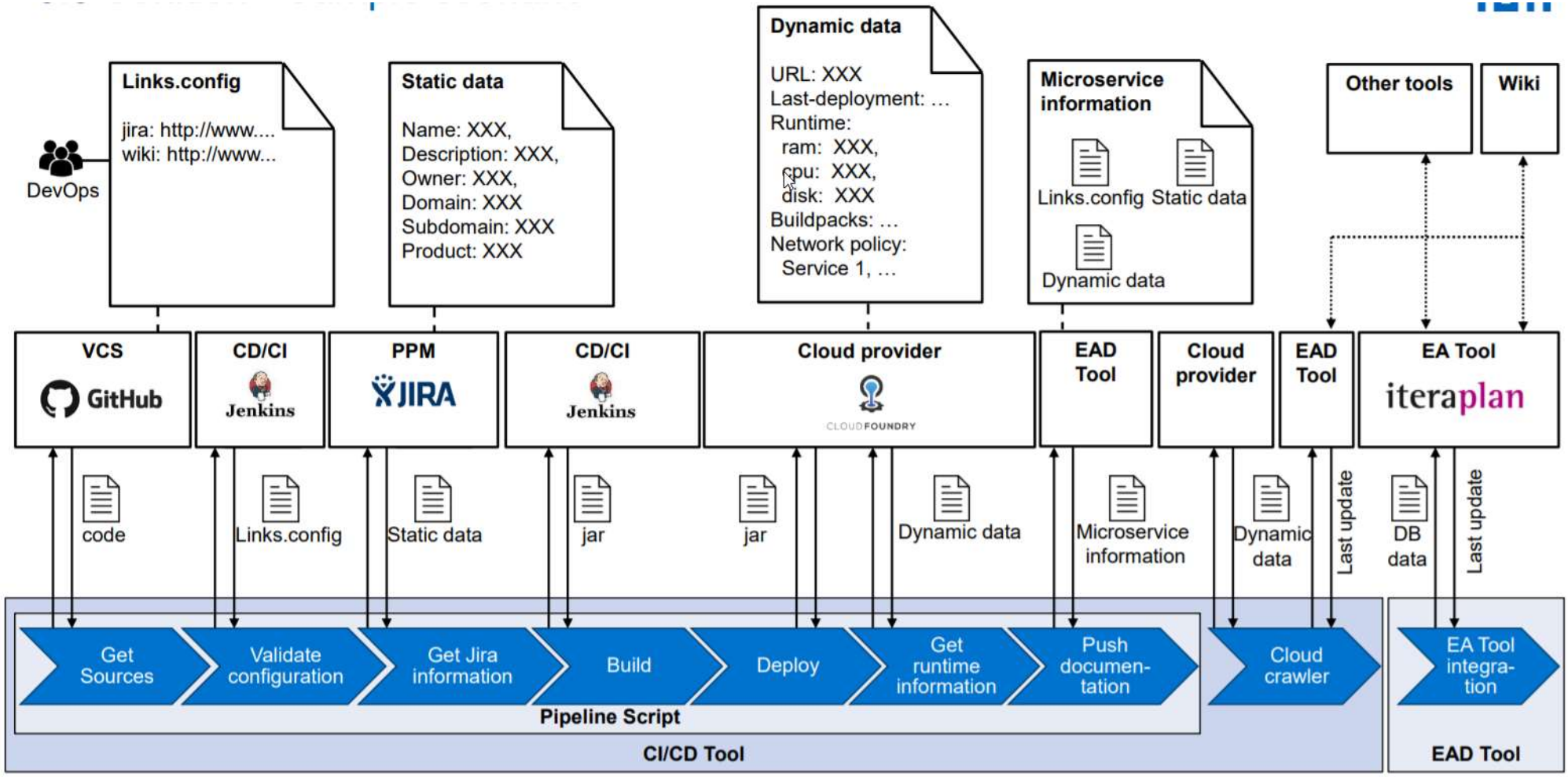
Boltzmannstraße 3
85748 Garching bei München

Tel +49.89.289.
Fax +49.89.289.17136

ludwig.achhammer@tum.de
wwwmatthes.in.tum.de

Backup

Exemplary instantiation of the solution concept (prototype)



References

#	Title	Authors	Year
[1]	Enterprise Architecture Documentation: Current Practices and Future Directions	Sascha Roth; Hauder, Matheus; Farwick, Matthias; Breu, Ruth; Matthes, Florian	2013
[2]	Automation Processes for Enterprise Architecture Management	Farwick, Matthias; Agreiter, Berthold; Breu, Ruth; Ryll, Steffen; Voges, Karsten; Hanschke, Inge	2011
[3]	Towards Integrating Microservices with Adaptable Enterprise Architecture	Bogner, Justus; Zimmermann, Alfred	2016
[4]	Towards Integrating Microservices with Adaptable Enterprise Architecture	Bogner, Justus; Zimmermann, Alfred	2016
[5]	Enterprise Architecture Documentation: Empirical Analysis of Information Sources for Automation	Farwick, Matthias; Breu, Ruth; Hauder, Matheus; Roth, Sascha; Matthes, Florian	2013
[6]	A Requirements Based Approach for Automating Enterprise IT Architecture Modeling Using Multiple Data Sources	Valja, Margus; Lagerstrom, Robert; Ekstedt, Mathias; Korman, Matus	2015
[7]	Towards Living Landscape Models: Automated Integration of Infrastructure Cloud in Enterprise Architecture Management	Farwick, Matthias; Agreiter, Berthold; Breu, Ruth; Häring, Matthias; Voges, Karsten; Hanschke, Inge	2010
[8]	A Taxonomy of Evaluation Methods for Information Systems Artifacts	Prat, Nicolas; Comyn-Wattiau, Isabelle; Akoka, Jacky	2015