

Future Research Topics in Enterprise Architecture Evolution Analysis

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What is an enterprise architecture?





Common language for business and IT

- Technical, social, and economic aspects
- Layers and crosscutting concerns
- Relationships are more important than element details

Current practices used for documenting an EA

Current practices for gathering information about an EA

- Workshops,
- Interviews,
- Questionnaires,
- •

Problem: Documenting an EA is a manual task [Ha12a, Ha12b, Ro13]

- Time consuming
- Error-prone
- Cost intensive
- Information is incomplete/invalid
- Information is soon outdated
- People don't cooperate

At the same time:

Decision makers must be supported with **up to date information** in a **high quality**

Our current research endeavor: Automated EA Documentation

Research Hypothesis

Relevant information for EA already is contained in operative IT environments!

Goals

- Gather data from operative IT systems
- Combine, harmonize, and integrate information in a common model
- Manage information (lifecycles, processes)
- Communicate results to stakeholders

Old and new questions

Over time, a plethora of 3rd party data (multiple versions) within EA repository. Validate data of different information sources, compare versions of an EA, etc.







Managed Evolution: Evolutionary EA Design controlled by Principles and Standards





cf. [Mu10, Bu10]

System Cartography: Timeinterval Map

- An analogy to a Gantt-Diagram
- Versions of:
 - Applications,
 - Projects,
 - Programs, or
 - Organisational Units



The dimensions *modeled at, planned for*, and *variants* may be combined



Current state of the EA



Planned state of the EA



Target state of the EA

How to analyze the evolution of an enterprise architecture?



Common language for business and IT

- Technical, social, and economic aspects
- Layers and crosscutting concerns
- Relationships are more important than element details

Versioning of Maps





Comparing Different Versions of an EA: A Brief Example





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Challenges: Scalability

- Comparing multiple entities (more than two) and respective instances with each other
- Comparing structural information (relationships) over time
- Avoid Information overflow
- ➔ re-evaluation of concepts
 - → EA management visualizations (cf. e.g. [Bu08])
 - → information visualization (cf. e.g. [Tu01])
 - → Methods & principles of system cartography (cf. [Wi07, Ma08])





Challenges: Scoping vs. "Big Picture"



- Different levels of granularity to be analyzed
 - strongly depends on the actual stakeholder
 - a high-level overview sometimes is very beneficial
 - history (versions) of a particular business unit or business application could also be subject of interest for a deeper analysis → semantic zoom?

Challenges: Layout algorithms

- Known layout algorithms aim at esthetical pleasing layouts
 - e.g. NFDH algorithm: decreases the overall height of boxes with respect to an aspect ratio
 - ➔ would close any open space (white-spots) that are created, e.g. during migration.
 - ➔ White-spots are actually useful to communicate (the amount of) change when analyzing EA evolutions.



Challenges: Generic vs. special purpose solutions sebis

- Some solutions will be generic (information visualization)
- Others will be very specific for the domain of EA and EA management (similar to [Bu10a])



→ The applied method must be (at least partially) included in EA information model

Challenges: Communication of timespans



Visual feedback on the actual timespan (and time differences) shown is useful but sometimes hard to achieve

Existing visualization approaches, e.g. [Tu01], may be helpful for this purpose.

MIT Timeline



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http://www.simile-widgets.org/timeline/

IBM Research





https://www.research.ibm.com/visual/projects/history_flow/

Version control systems (Mercurial, GIT)



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Further Questions



- What is the experience of the audience concerning Visual representation/communication of change
 - Techniques
 - Layouts and algorithms
 - Tool support
- Visual support for code evolution
 - Are tools utilized in practice? Why, why not?
 - e.g. Software in the city (Schreiber et al. SE 2013)
 - Comparing of binaries
 - Do 3D visualization help? (cf. e.g. [Te09])
- Visualization/Analysis of the Evolution of (distributed) Software Architectures?
- Which tools are used?
- Are differences of the information model relevant to practice?



(a)





Thank you for your attention.



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