

# Collaborative MBSE – Introduction of a Requirements and Verification Tool at Belimo

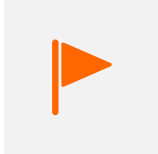
Simon Hofmann (Belimo Automation AG)

Klaus Mai (:em engineering methods AG)

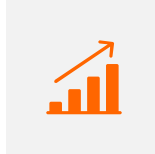
18th of September, 2023

# Introduction Belimo

## Who is Belimo?



Founded: 1975  
Corporate headquarters: Hinwil,  
Switzerland



Traded at SIX (Swiss exchange)  
since 1995.



Over 100 Million actuators for the  
control of HVAC applications in the  
field.



1'900 employees worldwide -  
In over 80 countries on all  
continents.



We invest more than 7% of our  
revenue in research and  
development.



Global leader in development and  
production of field devices for  
regulation and control of HVAC  
systems.



# :em engineering methods AG

## We Deliver the Digital Future of Engineering.

- Founded in 2001 in Darmstadt, as a “spin-off” from TU Darmstadt, headquartered in Darmstadt with a subsidiary in Böblingen.
- Independent IT and consulting company for strategy, processes, methods and technologies in engineering.
- Software and solution provider for engineering applications.
- Specific know-how in different industries.
- Engagement of 100 IT consultants, software developers and engineers.
- Successful and sustainable development – owners manage business! Founders and executive board:



Dr. Erik Claassen  
CTO



Christian Donges  
CSO



Dr. Sven Kleiner  
COO



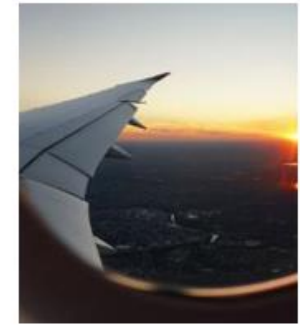
Dr. Marcus Krastel  
CEO



**Mobility and  
Transportation**



**Industry and  
Automation**



**Aerospace  
and Defence**



**Electrics/Electronics  
and High Tech**



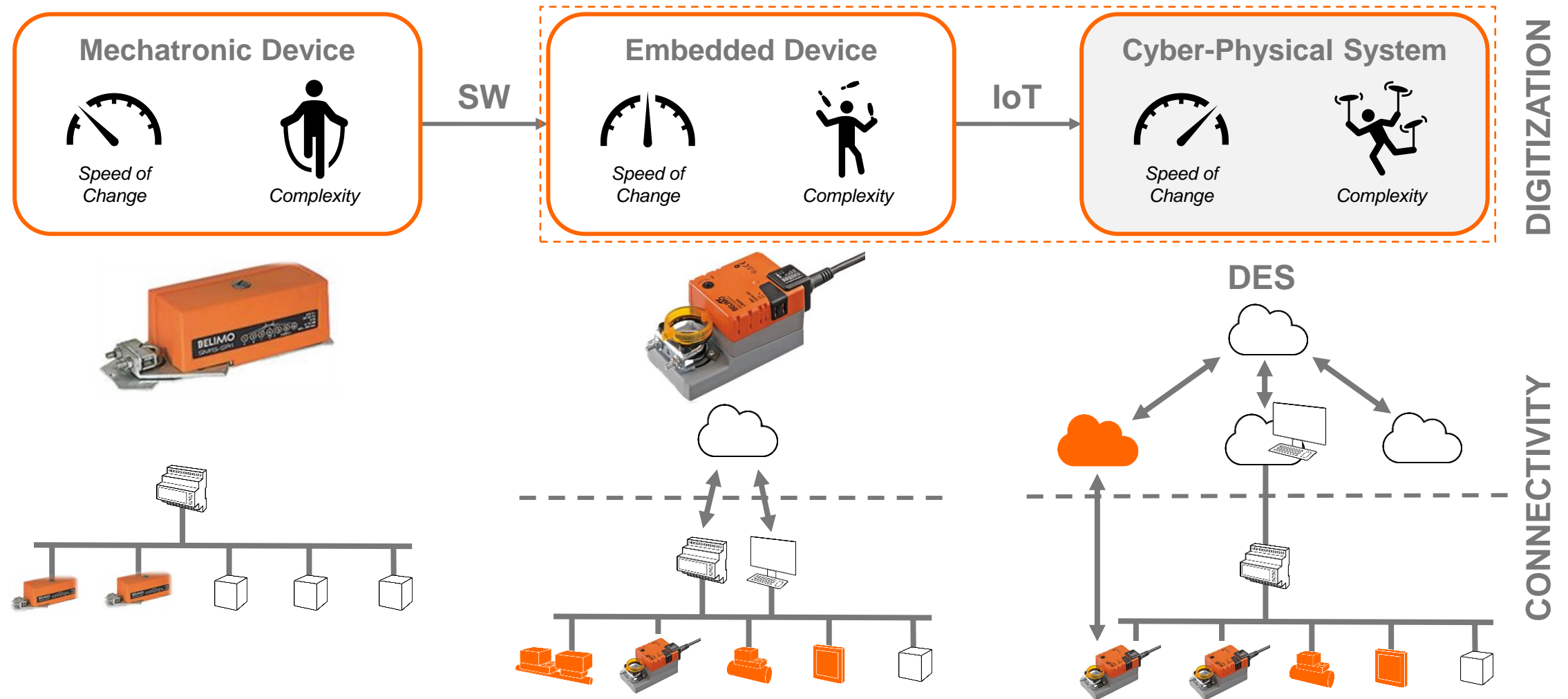
**Medical Technology  
and Life Science**



# Agenda

- Motivation for MBSE / RE
- Requirements Engineering as part of (Model-based) Systems Engineering
- Document-based vs. Model-based approach
- Roadmap MBSE Introduction
- Phases of codebeamer Introduction
  - Evaluation Phase
  - Implementation Phase
  - Rollout Phase
- Big Picture Belimo SE Tool Landscape
- Summary & Challenges

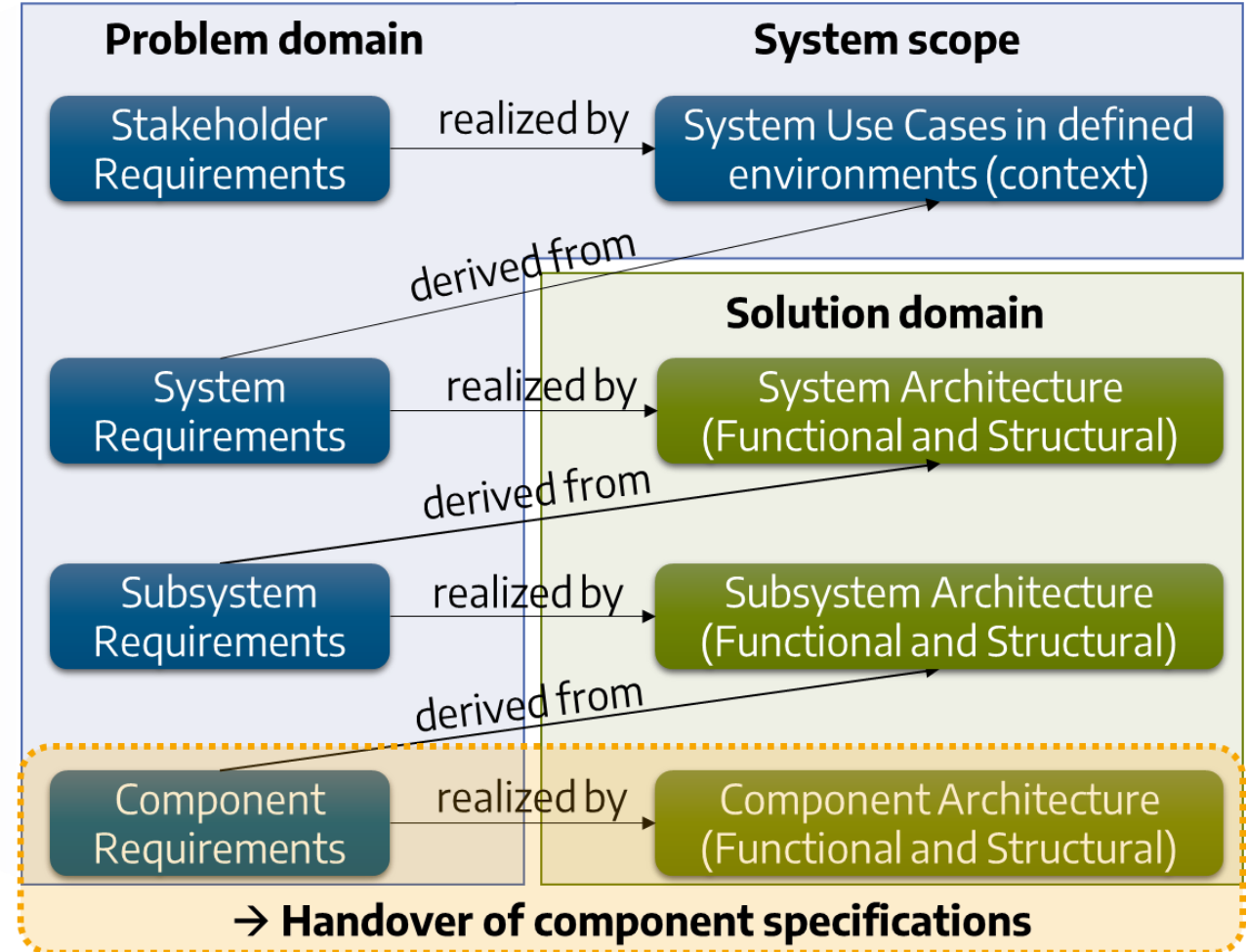
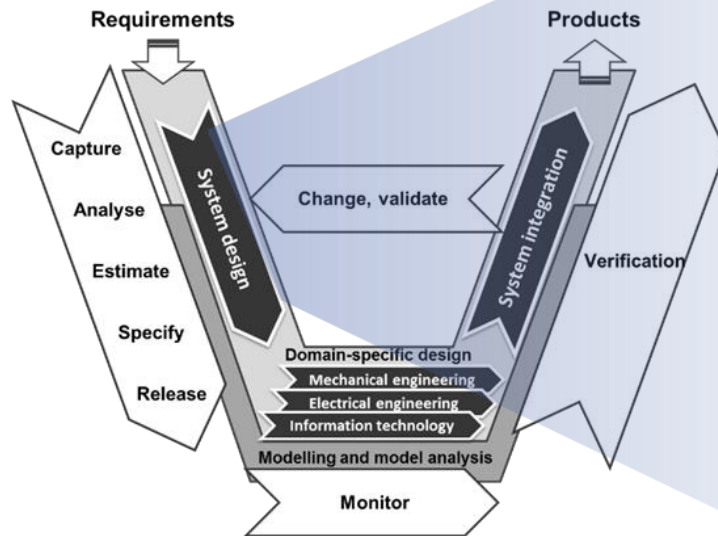
# Why Belimo needs MBSE



# Requirements Engineering

## Key discipline within (Model-Based) Systems Engineering

### Zig-Zagging Approach

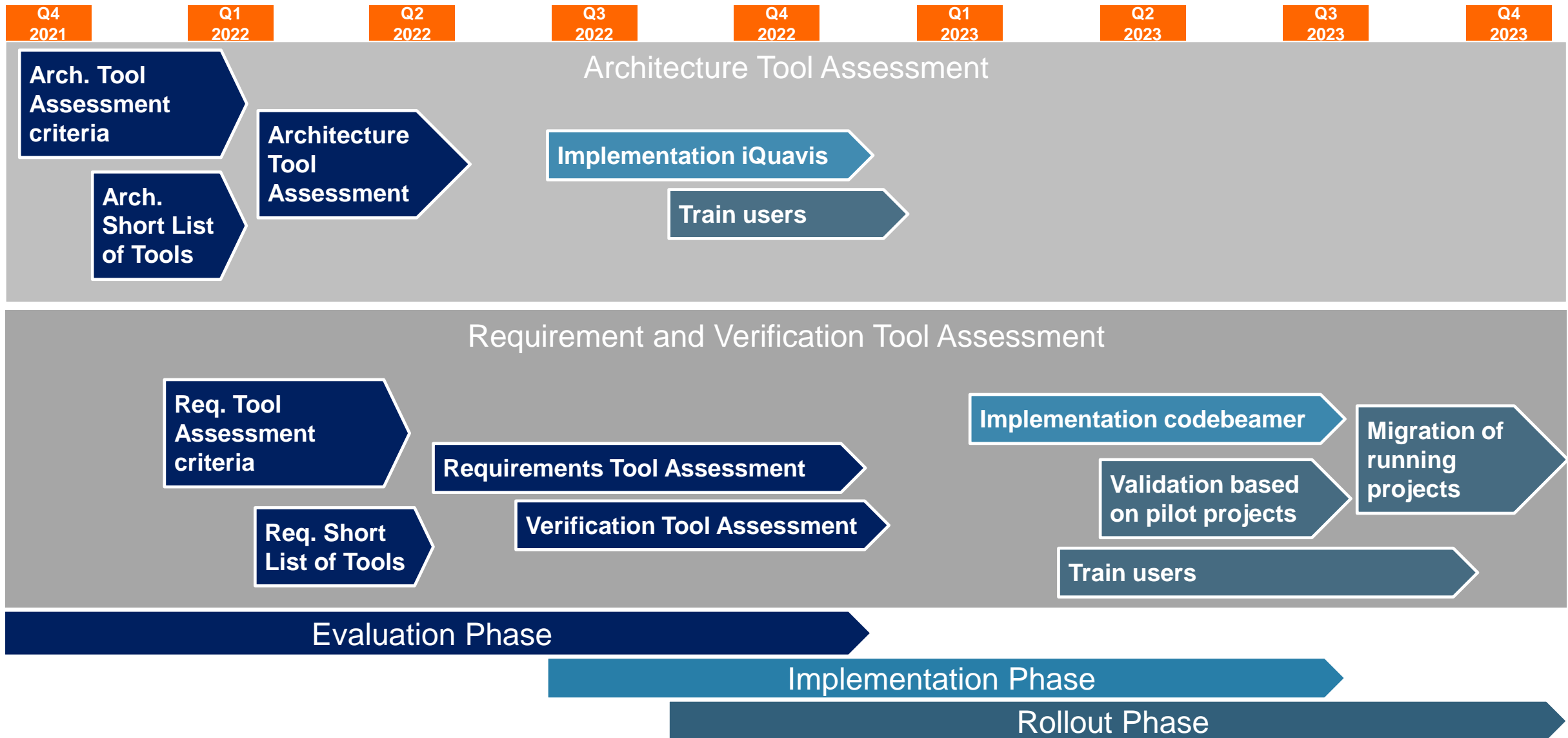


**em** engineering  
methods AG **BELIMO®**





# Roadmap MBSE Introduction

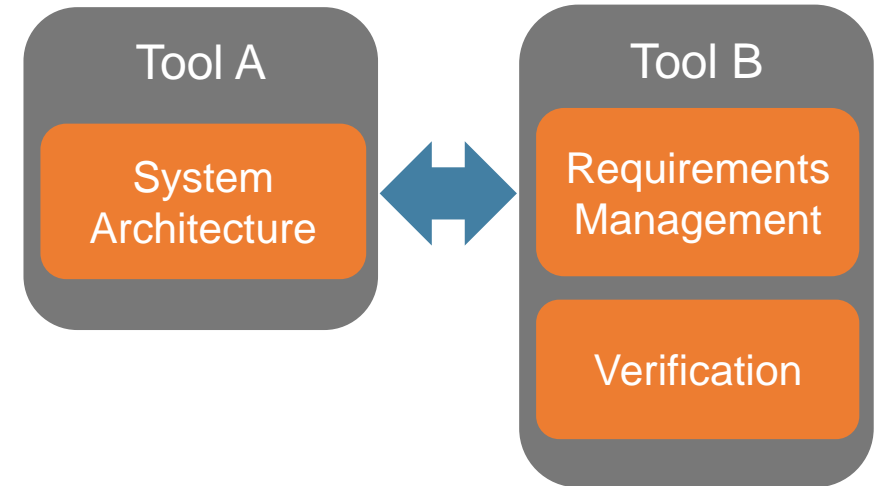




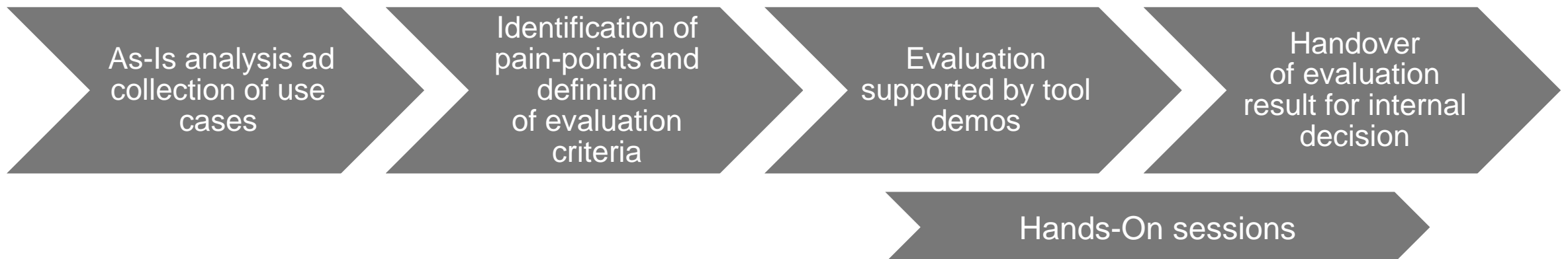
# Evaluation Phase

## Goal:

Find a toolchain, that enables model-based system engineering, including requirements and verification



## High-Level evaluation process



# Evaluation Phase

- **Hands-on sessions** (proof of concept) with both **tool vendors** (Architecture: Enterprise architect & iQuavis, requirements / verification: Polarion & codebeamer)
- **Onboarding trainings** for admins, **requirements engineers**, **test managers**
- **First implementation** on trial instance (Initial discussion on “how to **reuse e.g. requirements**”)
- Trial **use cases** for both tools
- **Democratic decision** Everyone has one vote which tool performed better in the proof of concept

As-Is analysis and  
collection of use  
cases

Identification of  
pain-points and  
definition  
of evaluation  
criteria

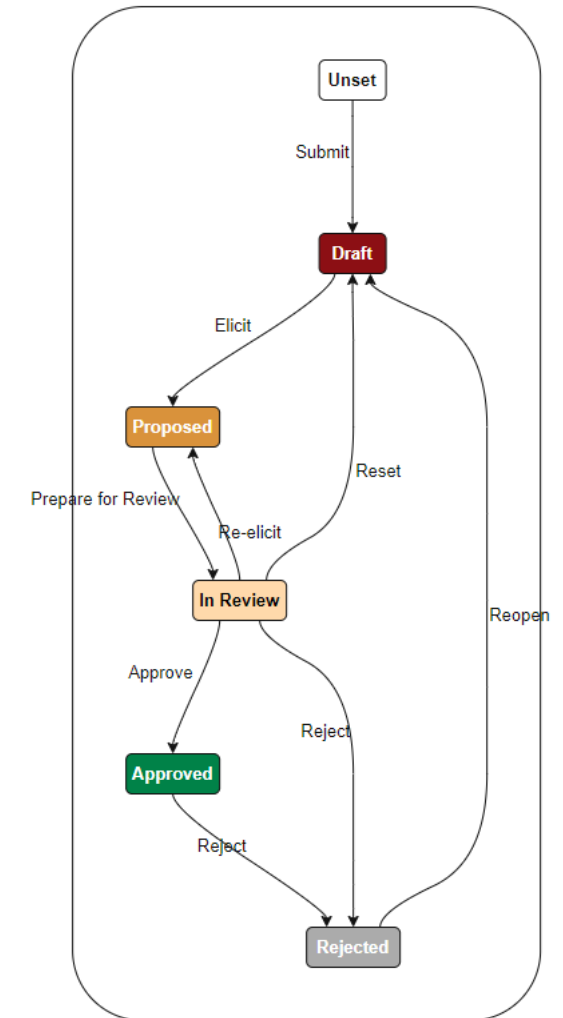
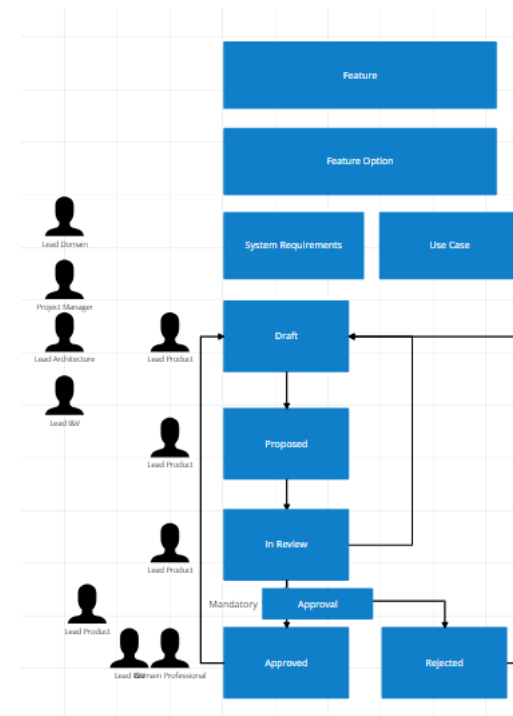
Evaluation  
supported by tool  
demos

Handover  
of evaluation  
result for internal  
decision

Hands-On sessions

# Implementation Phase

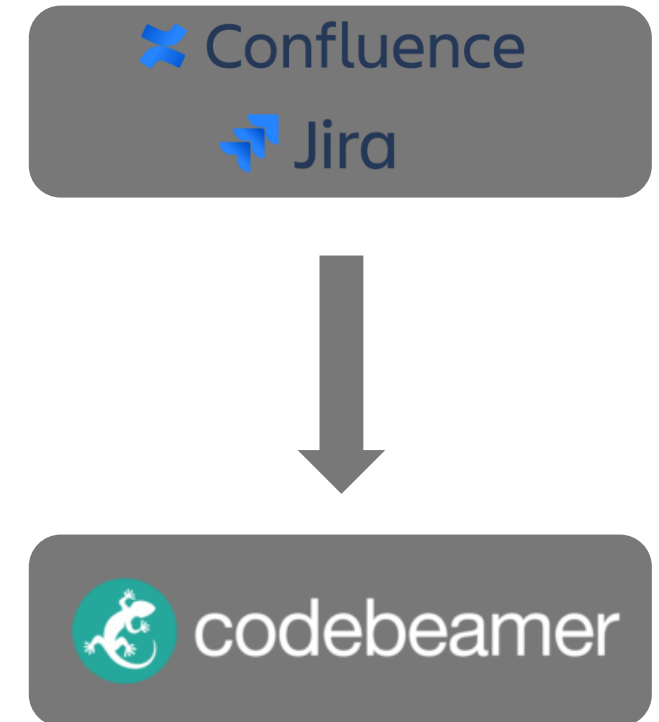
- Alignment of implementation with different stakeholders, regarding:
  - Needed artifact classes / trackers
  - Definition of workflows
  - Roles & rights system
  - Document export templates
  - Reuse concept
  - Project templates
  - Compliance proof of concept
  - Interface (REST, Swagger) codebeamer – iQuavis (architecture)



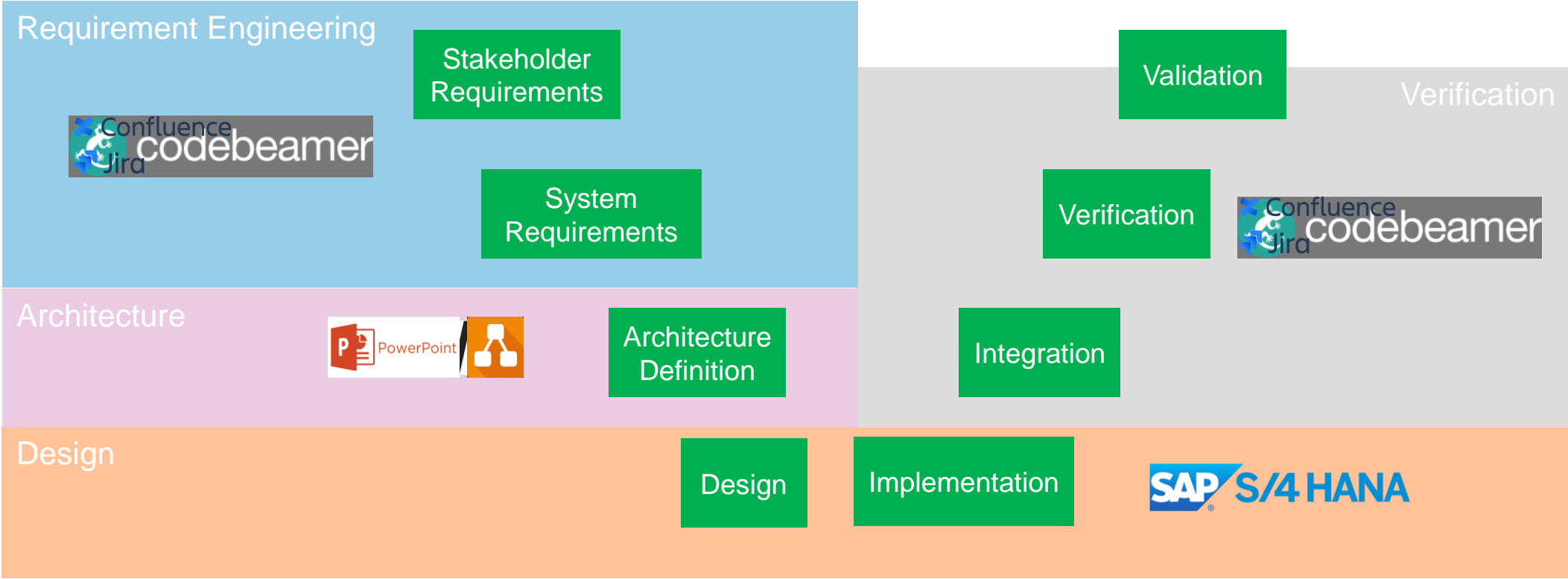


# Rollout Phase

- Pilot Projects
  - Validation of implementation
  - Test migration concept
- Training
  - Early trainings for administrators and key users
  - Training of project teams shortly before migration of their project
- Migration
  - Define Migration strategy
    - Migration project by project
    - Running projects first
  - Adaption of migration based on pilot projects
  - Coordination of migration timeline



# Big Picture Belimo SE Tool Landscape



# Summary & Challenges

- **Evaluation**
  - Involvement of different teams / stakeholders increases acceptance
  - Planning of hands-on sessions took a lot more time than planned
  - It is hard to compare tools (in a POC) with users that have only received a user training
- **Implementation**
  - Implementation based on use cases helps to sharpen specification
  - Delays due to late arrival of licenses
- **Rollout**
  - Competence-based training concept is essential
  - Gap analysis through iterative validation of implementation based on pilot projects
  - Migrations depend a lot on operative business (delays in projects)



Thanks for your attention

**Questions?!**