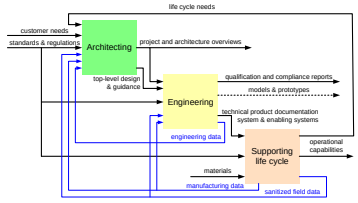
Life Cycle; The Flow of Artifacts

by *Gerrit Muller* USN-SE
e-mail: gaudisite@gmail.com
www.gaudisite.nl

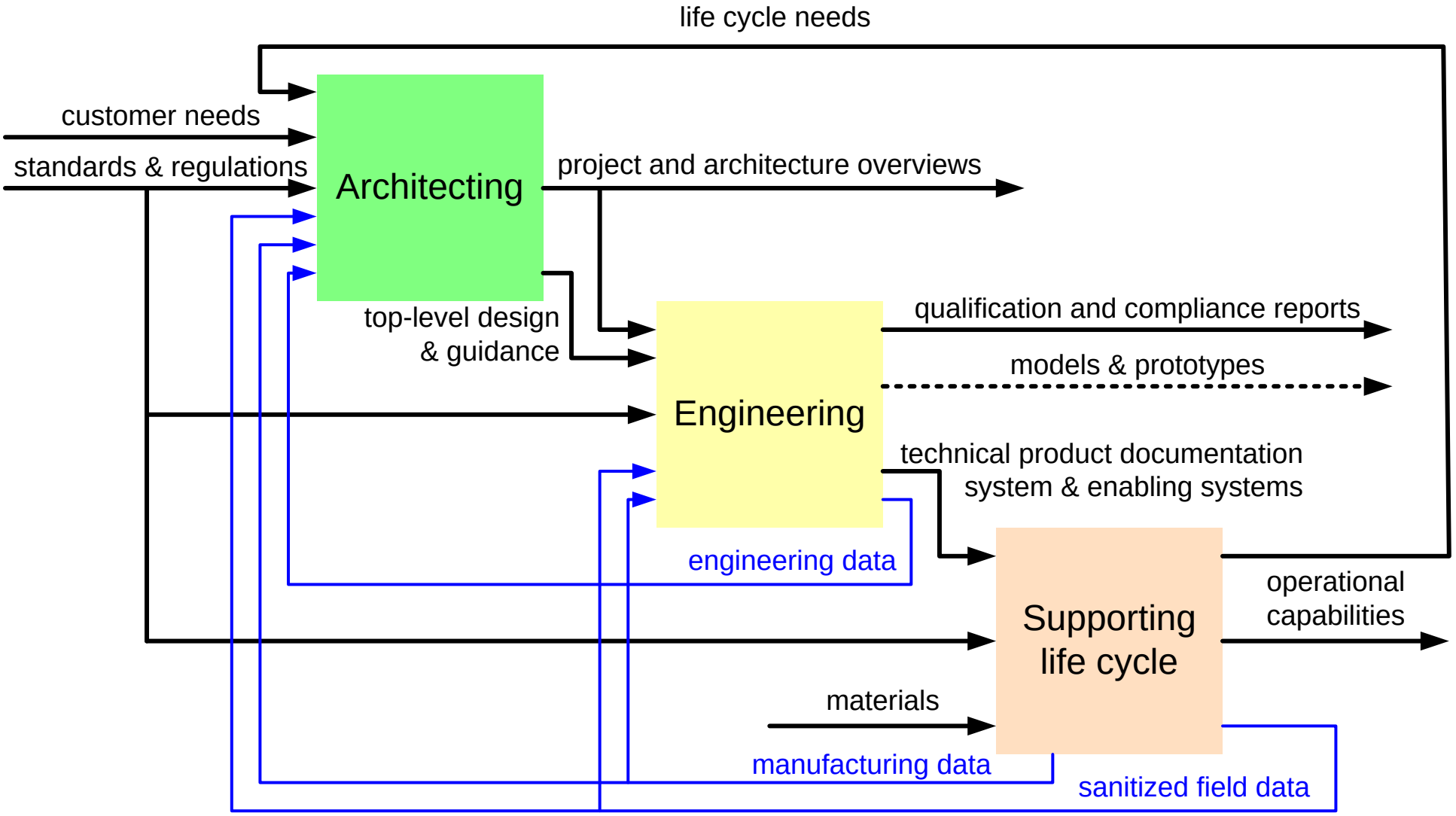
Abstract

During the full life cycle of a system, from conception to decommissioning, organizations produce many artifacts for many purposes. This presentation provides an overview of the artifacts during the life cycle.

March 9, 2025
status: preliminary draft
version: 0.2



Flows


life cycle needs
customer needs
standards & regulations
Architecting
project and architecture overviews
top-level design
& guidance
qualification and compliance reports
models & prototypes
Engineering
technical product documentation
system & enabling systems
engineering data
operational
capabilities
Supporting
life cycle
materials
manufacturing data
sanitized field data

Main Functions per Flow

Architecting

Context and problem understanding

Solution exploration and guidance

Engineering

Parts definition, design, analysis, verification

Project Management

Requirements Engineering

Interface Management

Supporting life cycle

procurement, manufacturing, testing

packaging, transportation, installation, configuration, commissioning

diagnosing, repairing, maintaining, upgrading, decommissioning

Characteristics

Architecting

Confidence, direction, and focus, despite uncertainties and unknows

heterogeneous stakeholders, PESTEL + domain

Engineering

Evidence, analytical, rigorous

primarily technical stakeholders

Supporting life cycle

operational, directive inputs

continuous improvement, data driven feedback

Artifacts

Architecting

Project and Architecture overviews

Engineering

Specifications, designs, feasibility reports, design verification

System models, mono-disciplinary models

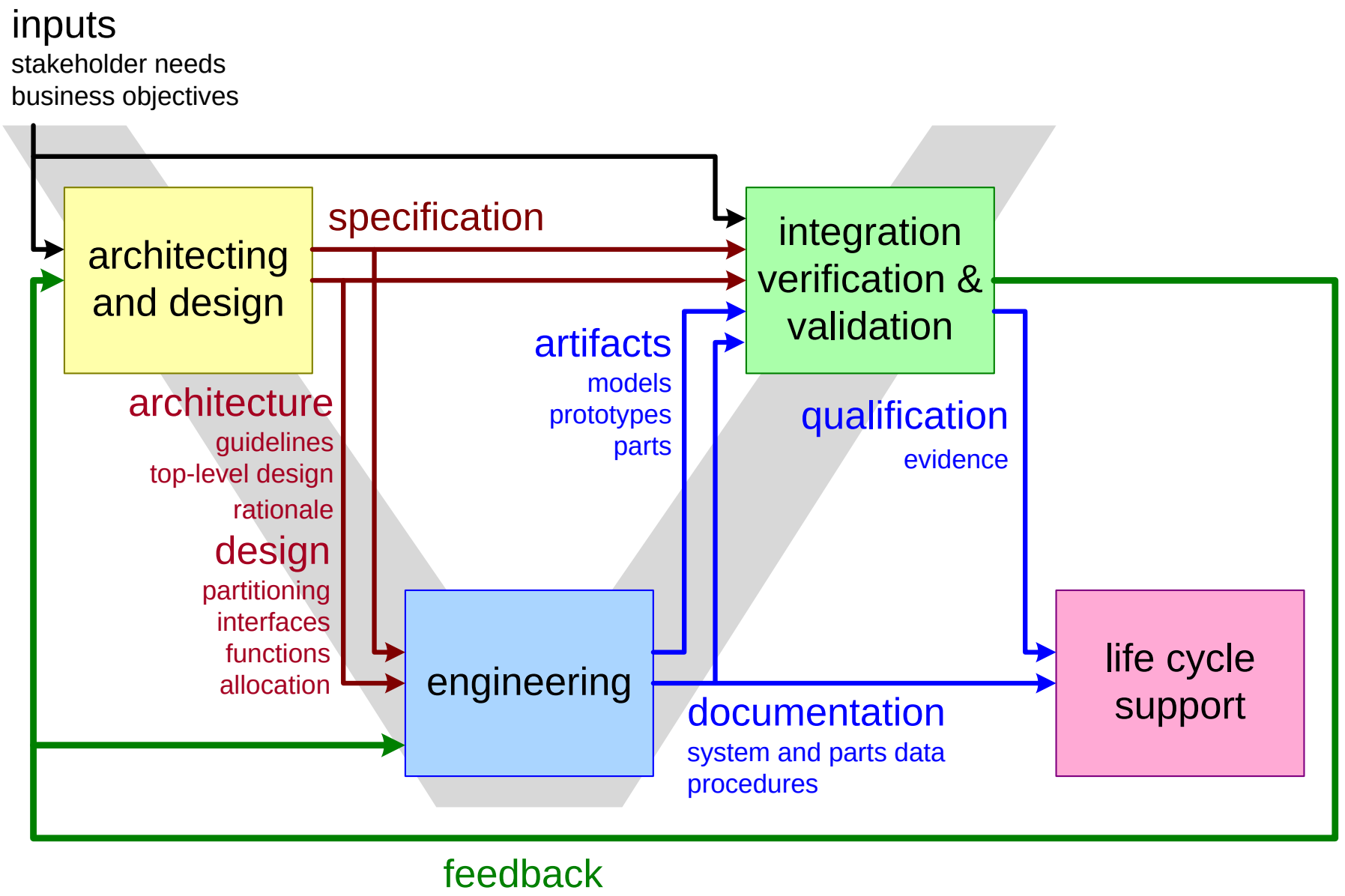
Supporting life cycle

product breakdown, commercial and service structures

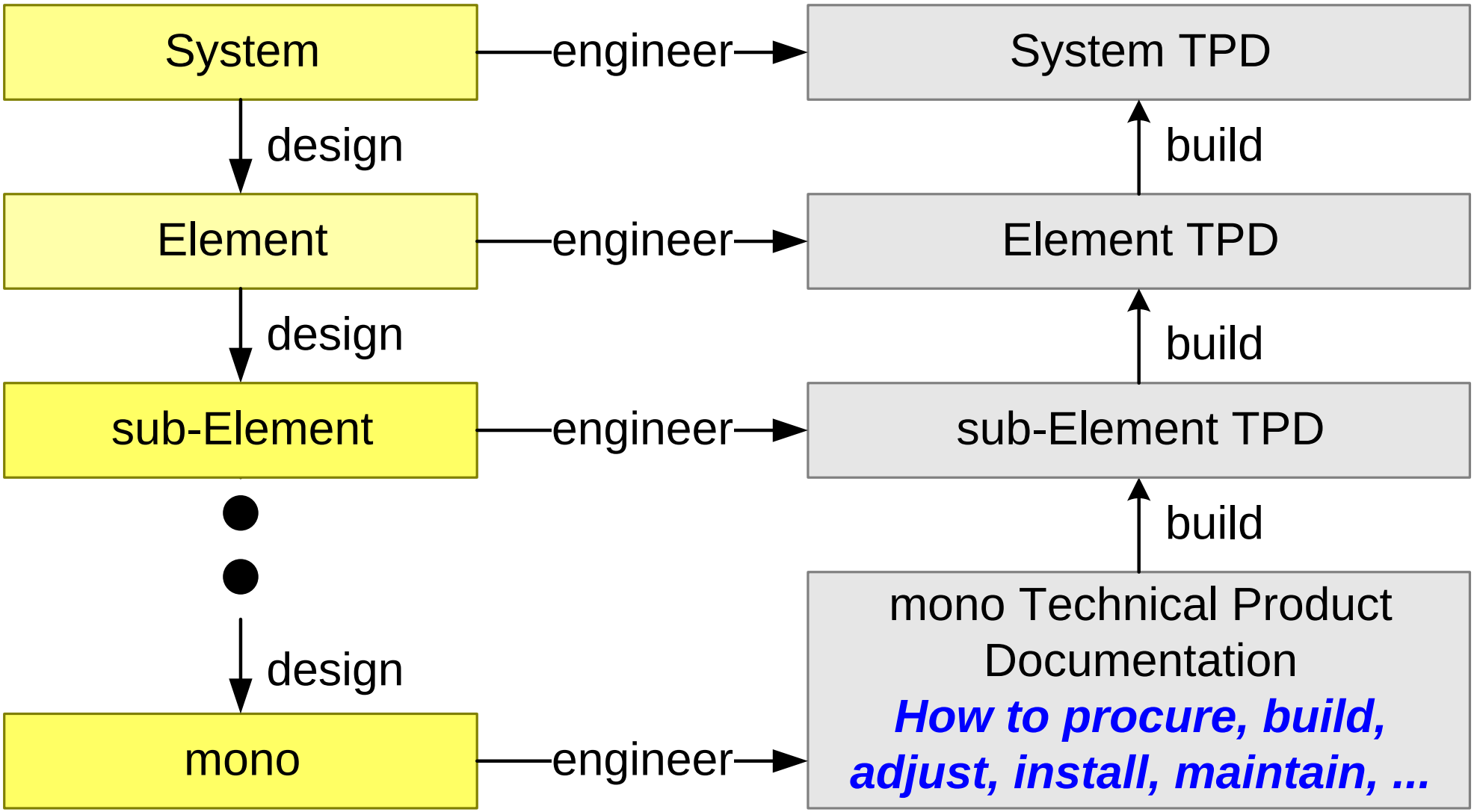
instructions for procurement, manufacturing, testing, etc.

logistics, mnaufacturing, etc. data

Functions Mapped on V-Model



Documentation Hierarchies



Architecting and Engineering Management are Complementary

Systems Architecting, Design, and Integration

Systems **Partitioning** (Work Breakdown Structure, Bill of Material)

Dynamic Behavior (functionality, interaction)

Quantified **Quality Attributes** (performance, safety, reliability, …)

in **relation** to each other and in the **context**

prerequisite for

content for

Systems Engineering Management

Project Management

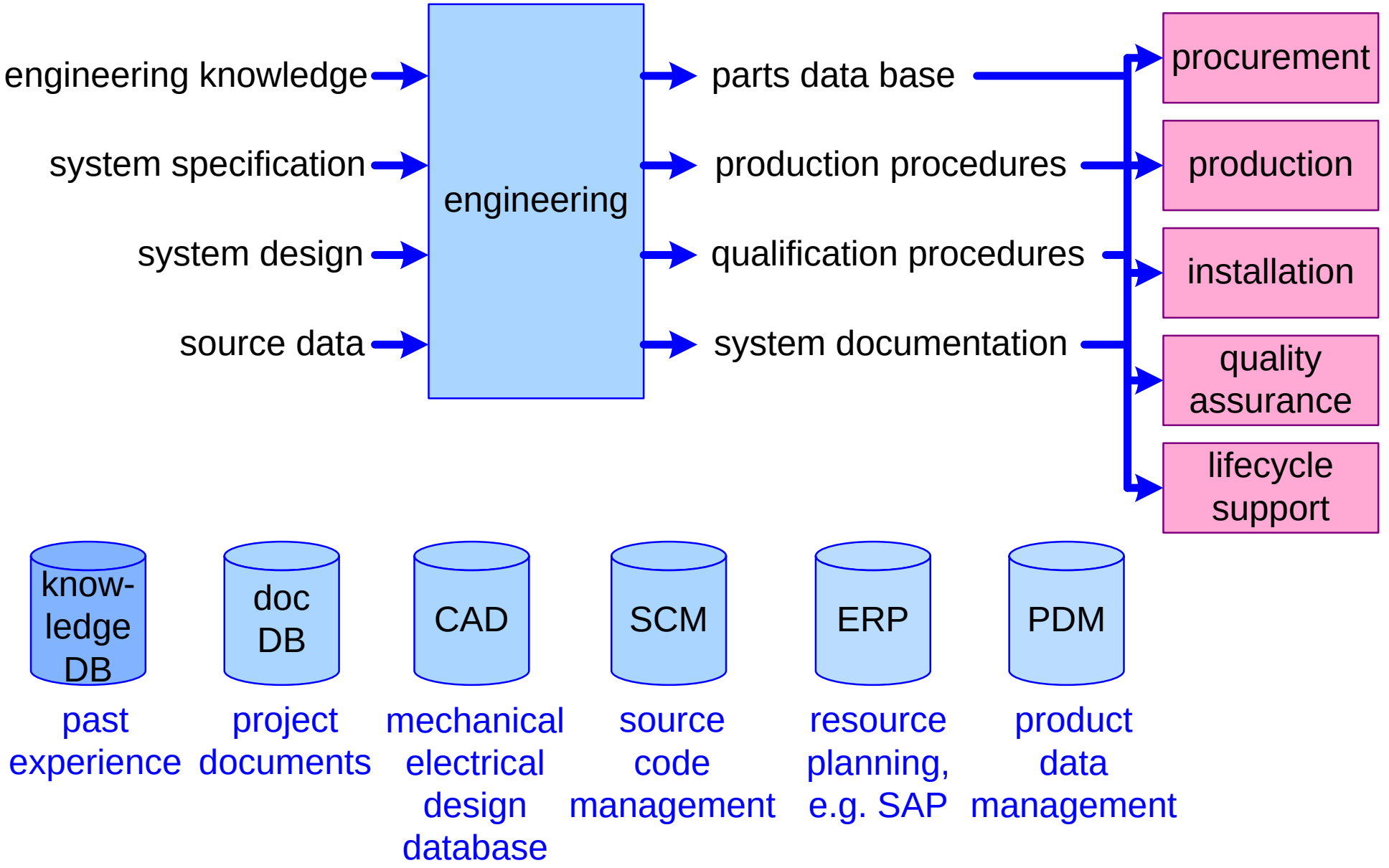
Requirements Engineering

Interface Management

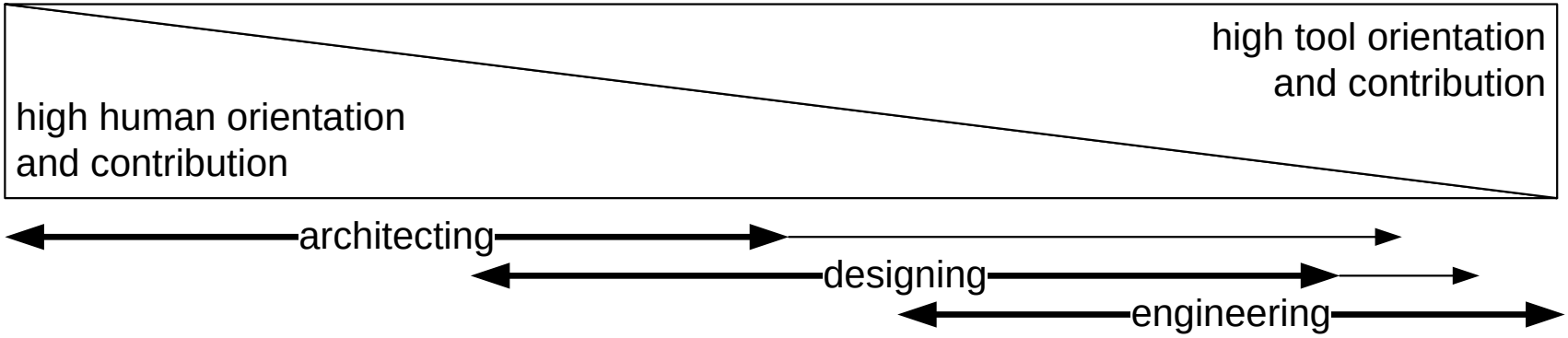
Product Life Cycle Management

and much more...

Engineering Produces Information for the Lifecycle

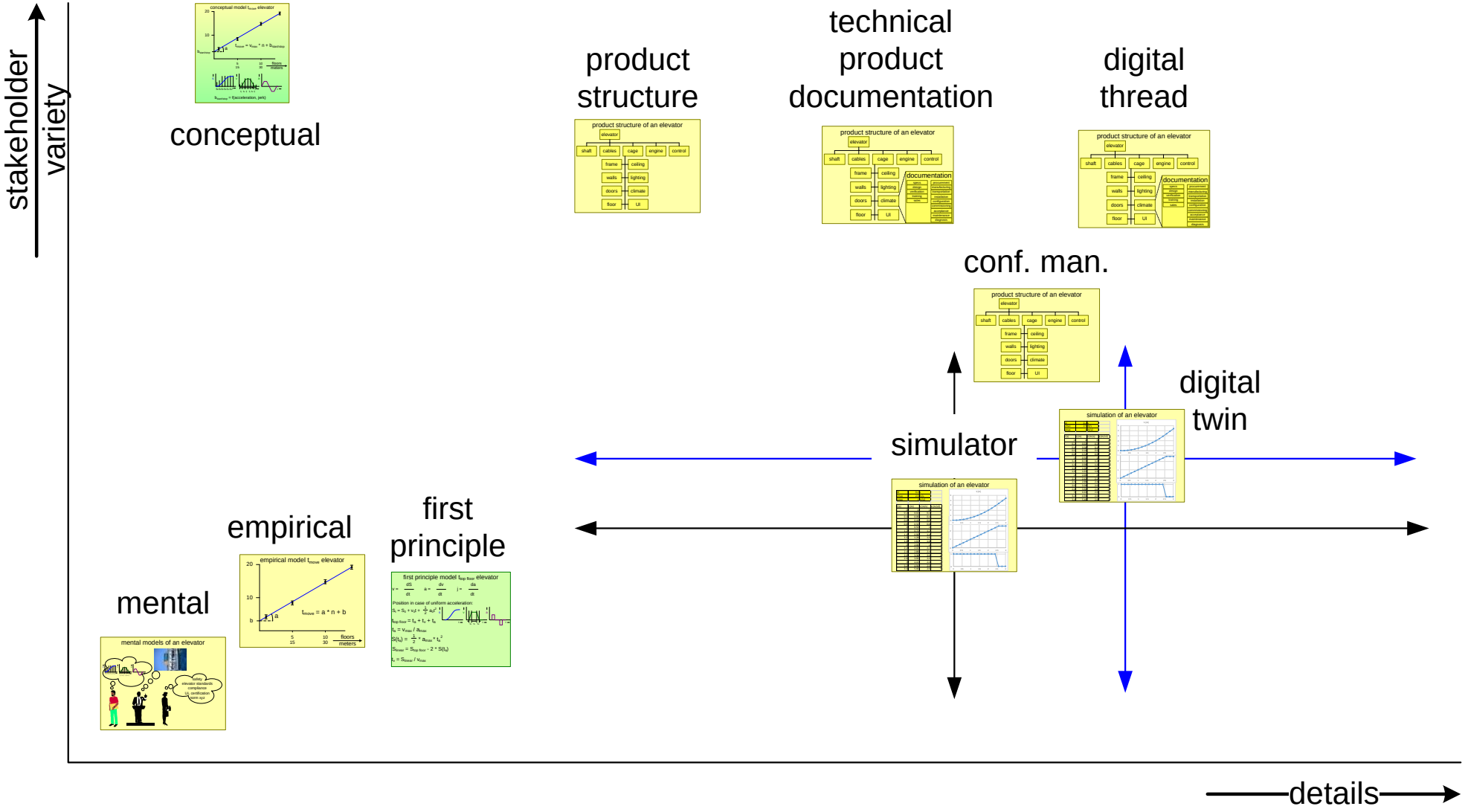


The Modeling Space

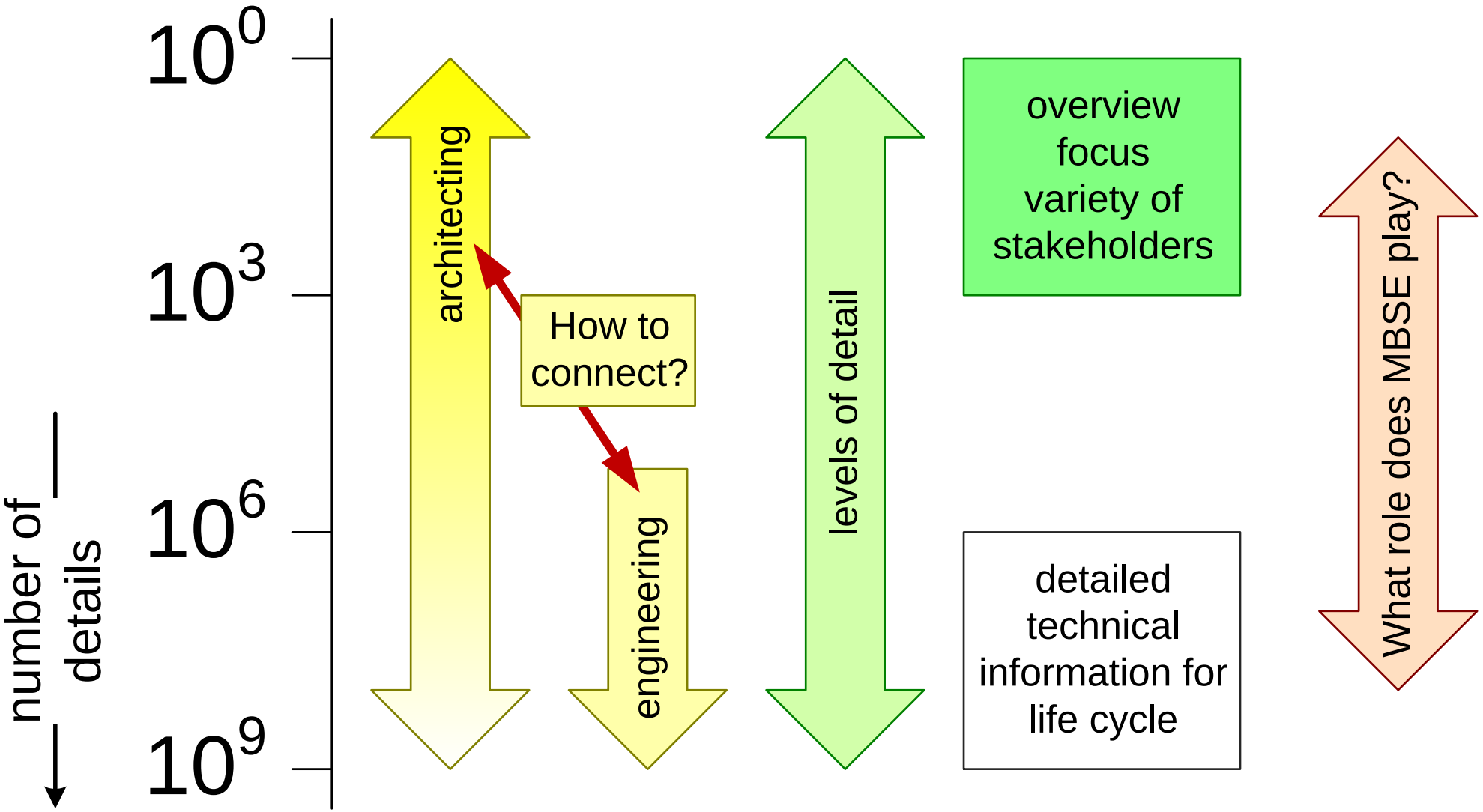


purpose	shared understanding, communication, reasoning, decision making	supporting process and organization: problem and solution space exploration	problem and solution space analysis	managing tracing qualifying
fidelity	very limited sufficient for decisions	increasing over time and phase		
degree of formailty	very limited interaction is crucial	increasing over time and phase		
executable	fast prototyping: executable	problem and solution space: executable		managing and tracing: navigatable and analyzable qualifying: executable

Map of the Modeling Types



What Role does MBSE Play?



Potential Value Propositions MBSE

- to support **reuse** or a platform based product strategy
  - to configure, generate, compose, validate
- to **automate** or generate
  - **tests**, **simulations**
- to **trace** needs, requirements, or quality attributes throughout the design and engineering
  - especially regulated qualities like **safety**
- to function as **knowledge base** for development and engineering
- to **access component-data** based on the field configuration (digital shadow)
- to populate and update **PLM** systems, e.g. ERP (digital thread)