

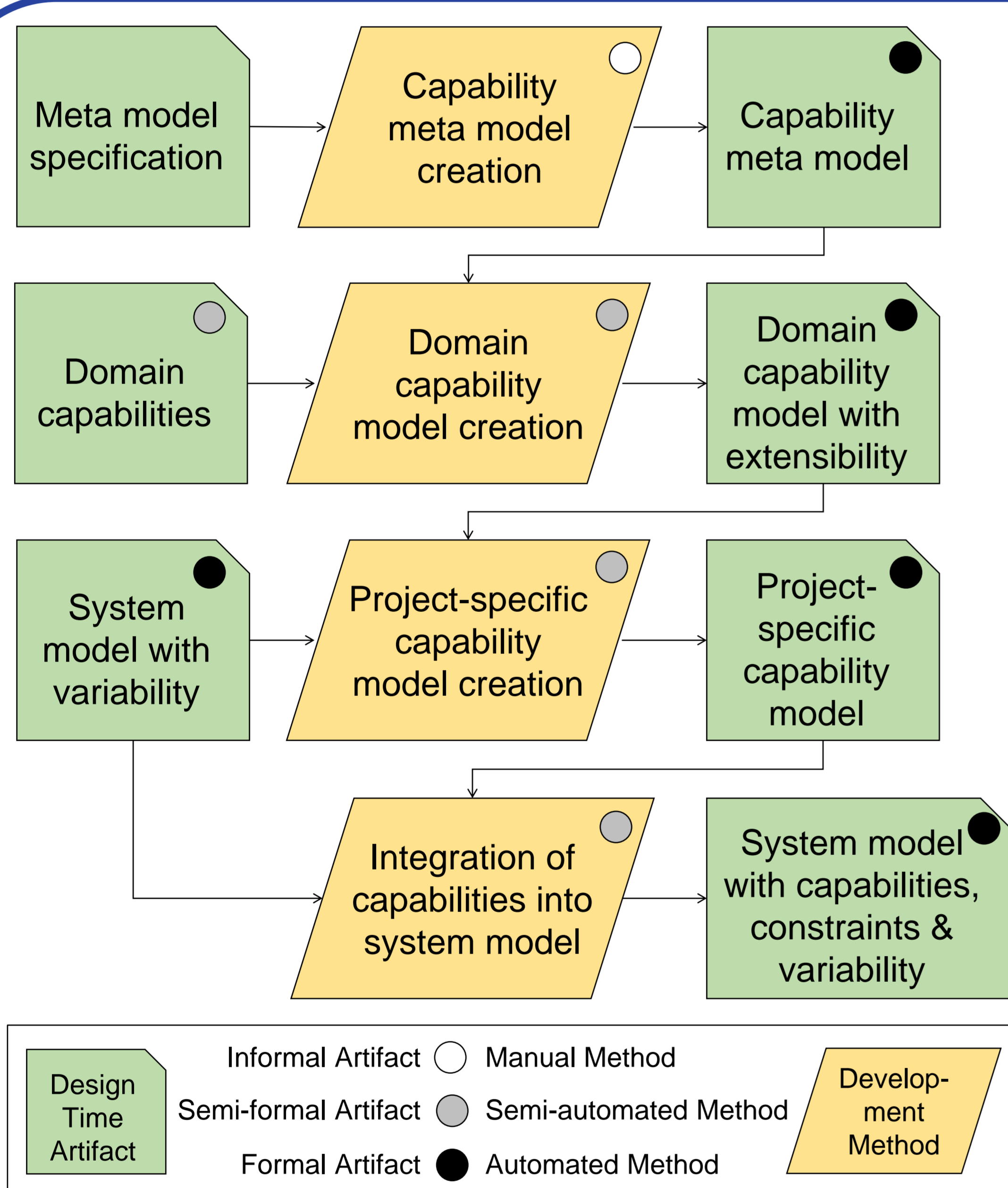
Capability Modeling

Capabilities of a technical system

What are capabilities? What is the purpose of a capability model?

- The capability of a technical system describes, whether and with what quality it is able to perform an activity that aims at the completion of a specific task or the fulfillment of a context-dependent goal.
- The quality of the activity that is performed depends on the context (i.e. on current requirements or boundary conditions) as well as on the immanent properties of the respective system.
- Capabilities are perceptible from the context of a system (similar to user functions). Based on a domain-wide consistent, generic capability description, they can be instantiated and concretized with system-specific features and characteristic values during the design phase of the system.
- Capability models are used to formalize and document capabilities for technical systems to enable their re-use. They form the basis for runtime applications like a matching of available capabilities with required capabilities as caused by current contextual requirements.

Capability modeling approach



Capability meta model creation

- definition of the structure and the basic rules for the capability description,
- neutral to any domain or application case

Domain capability model creation

- identification of the main capabilities of a domain based on a defined scope and by considering existing ontologies, expert knowledge and industry standards,
- independent from any specific system manufacturer

Project-specific capability model creation

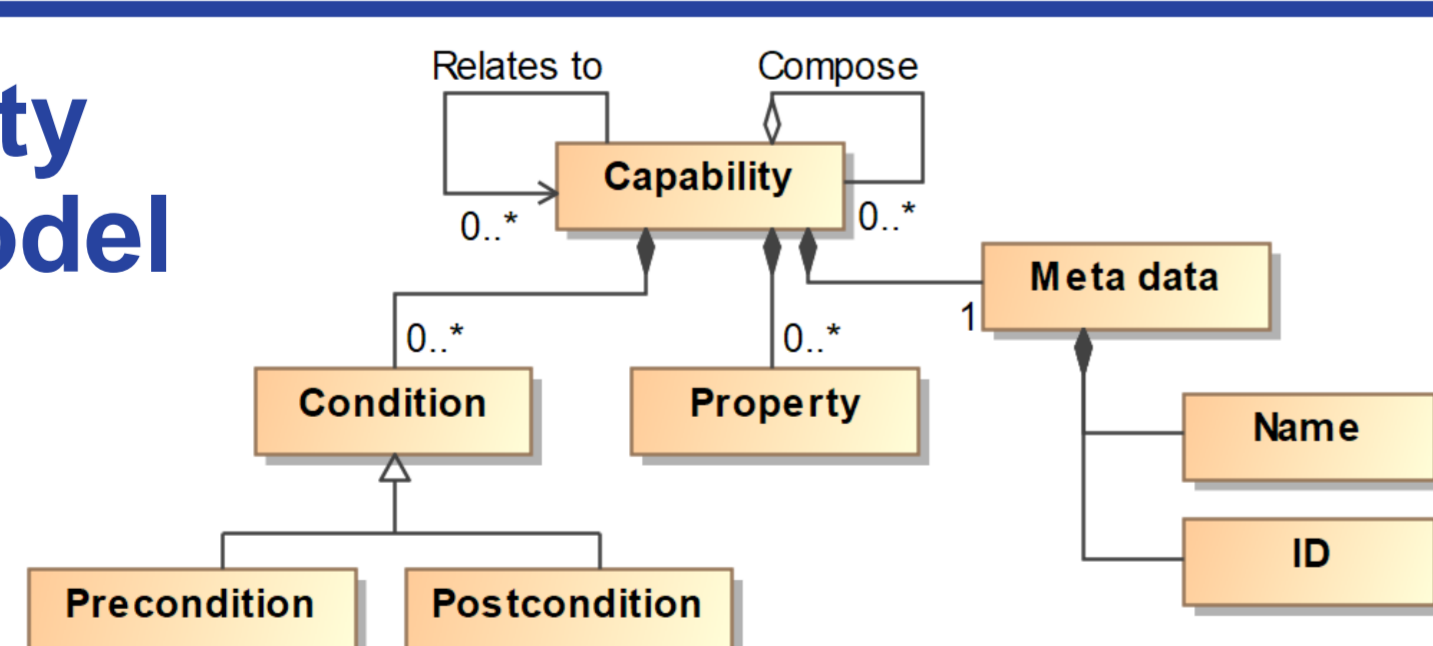
- uses the domain capability model as a basis,
- allows potential extensions to the domain capability model (e.g. for niche or special applications or in case of technical innovations)

Integration of capabilities into the system model

assignment of the capabilities to the system model and its sub-systems while taking system-specific constraints on these capabilities into account

Results

Capability meta model



Capability description in the domain capability model

Example 1-1: Capability "drilling"

Meta data:
Name: Drilling
ID: 331-01
Properties (only excerpts):
related manufacturing features: blind hole, through hole
diameter (mm)
depth (mm)



Capability description for the integration into the system model

Example 1-2: Capability "drilling" of Machine A

Meta data:
Name: Drilling
ID: 331-01
Properties (only excerpts):
related manufacturing features: blind hole, through hole
diameter (mm): 3 - 30
depth (mm): <= 100

Required and provided capabilities

