For whom, for what purpose, with whom?

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Abstract

Global changes in society and technology developments affect the way of working of systems engineers. Increased end-user capability levels require increased integration and trans-organizational interoperability. Challenge for individuals is to have a clear own contribution: What is its purpose, for whom do they do this, and with whom?

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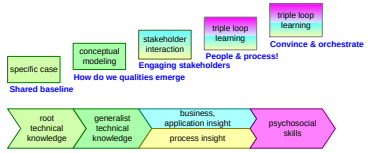
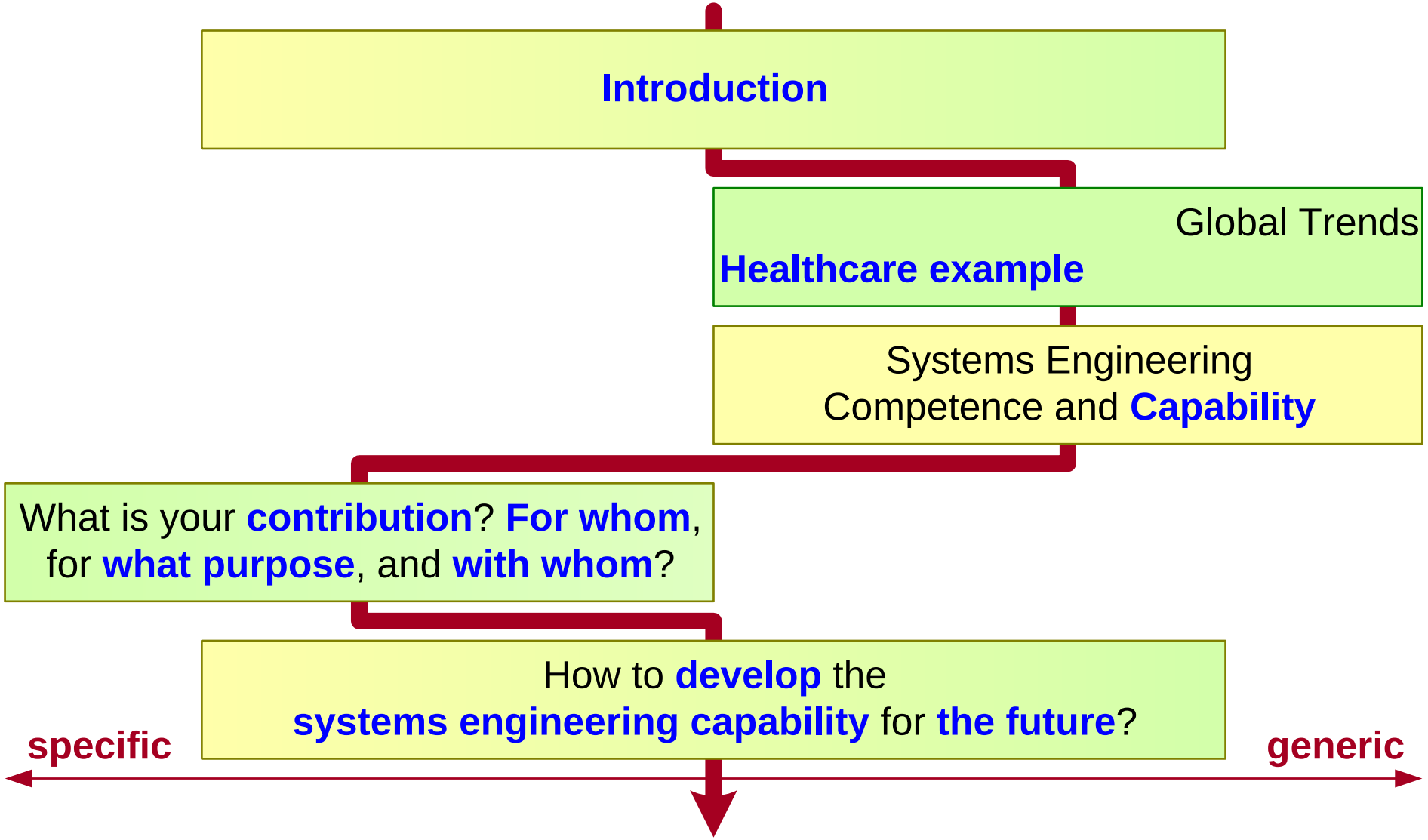
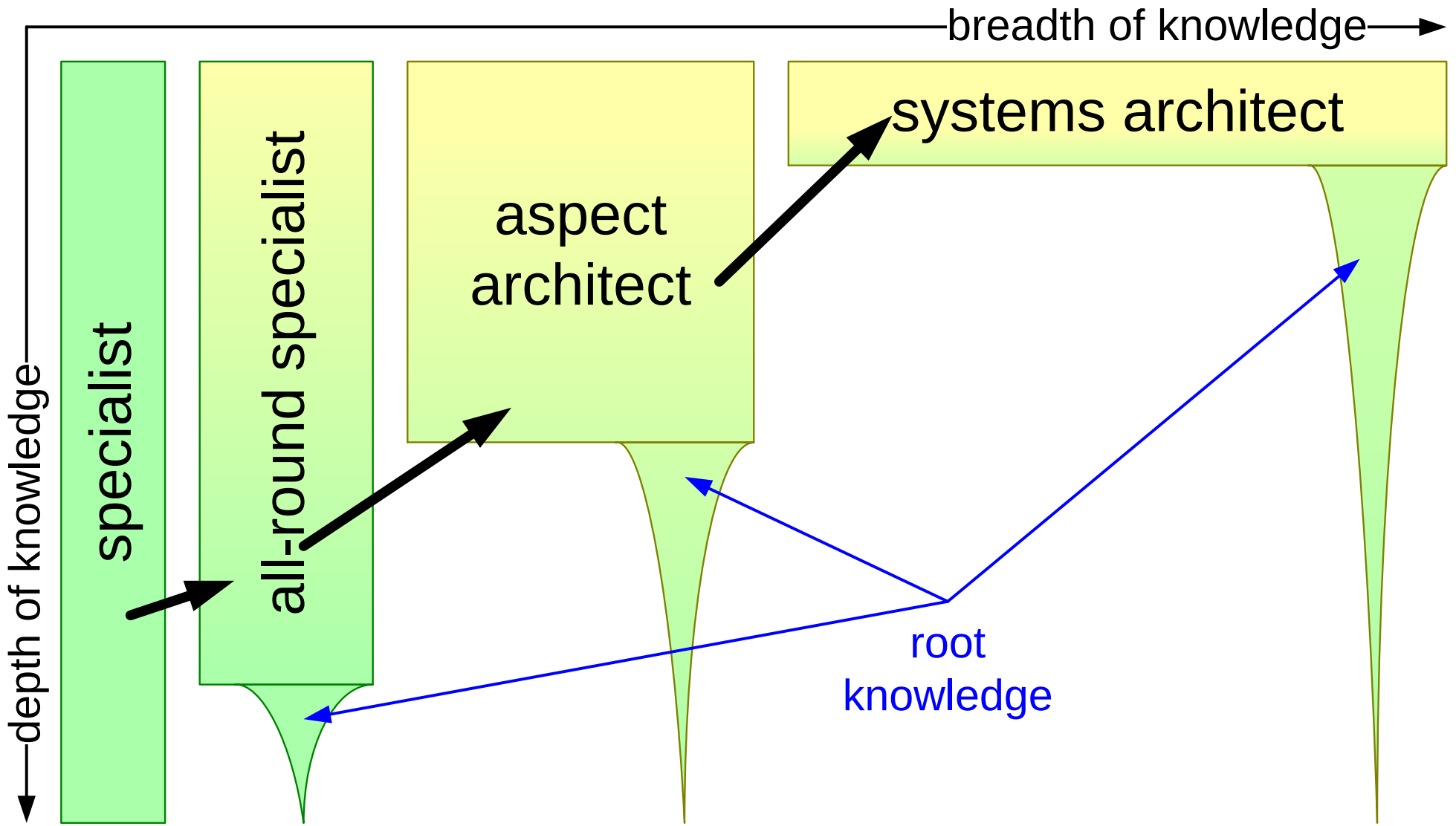


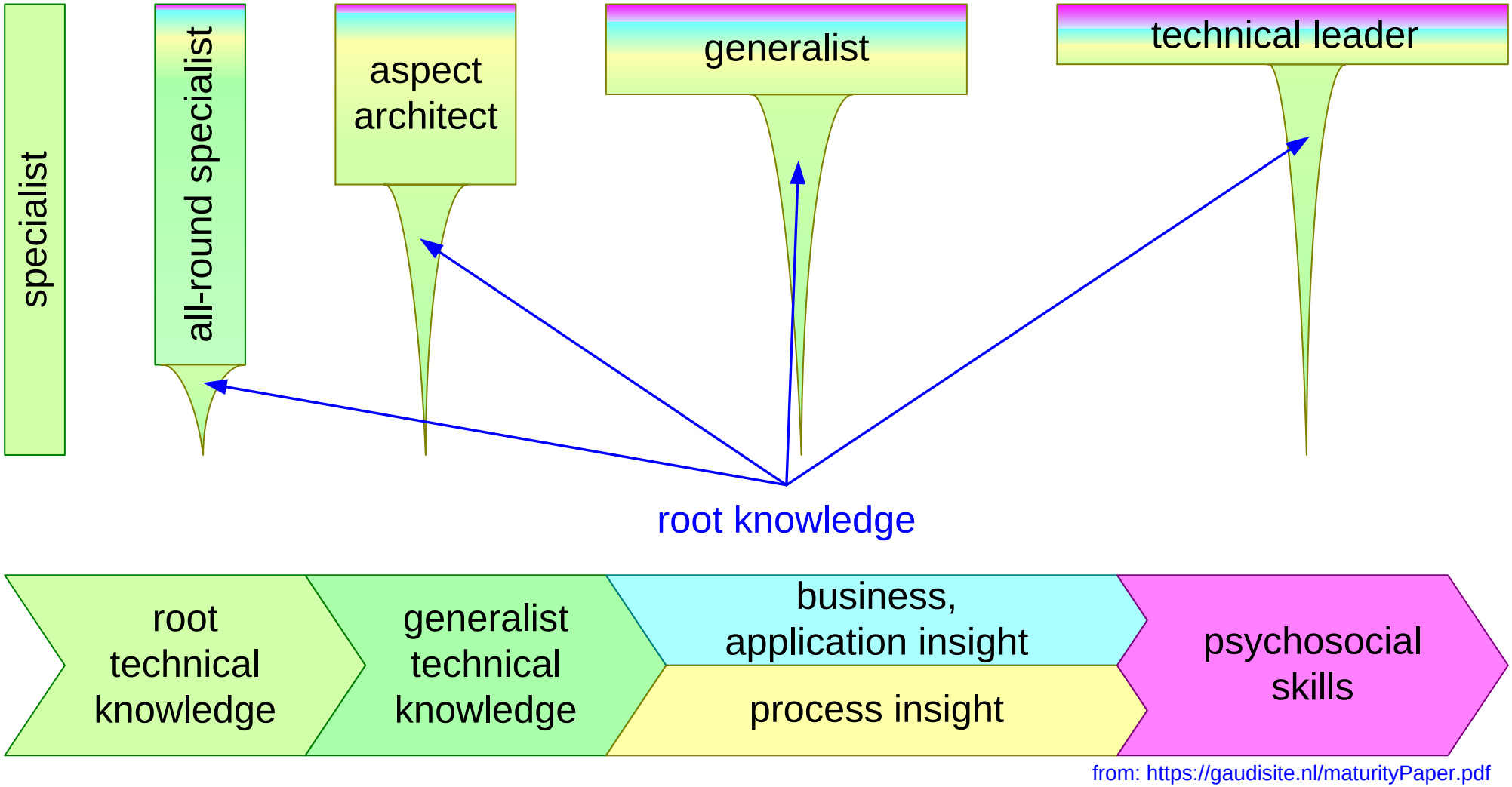
Figure of Content



Architect Growth Path 1999



Since 2017: Integrate Systems and Leadership Development



from: https://gaudisite.nl/maturityPaper.pdf

Buzzword Evolution

Anno 1990:	*Plus anno 2026:*
Platform	Systems of Systems
Common components	Reference architectures
Standard design	Model Based SE
Framework	Design Principles
Family architecture	Enterprise Engineering
Reuse	AI4SE
Products (in project environment)	Autonomy
Process	Leadership

Providing Perspective to Individuals

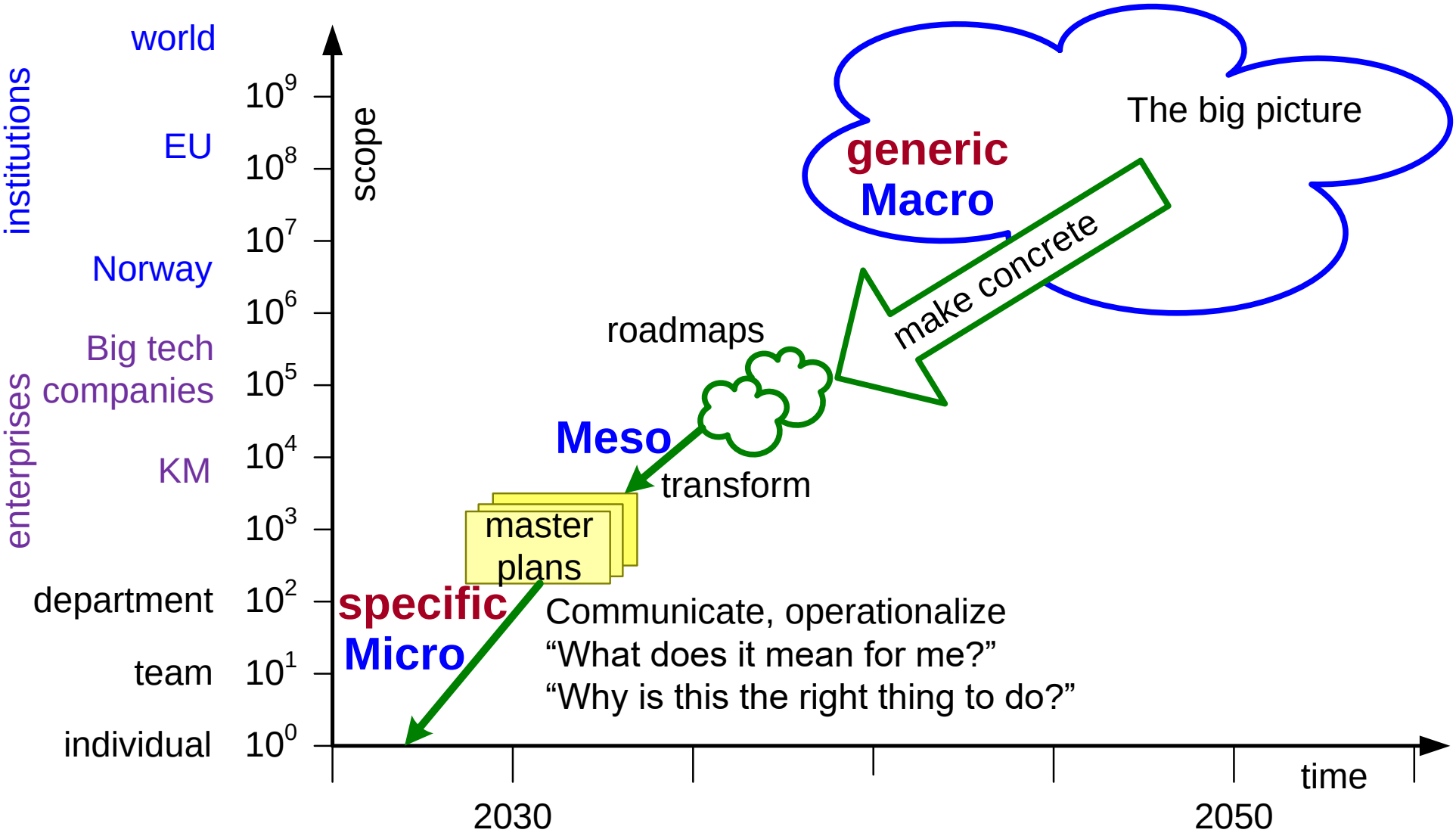
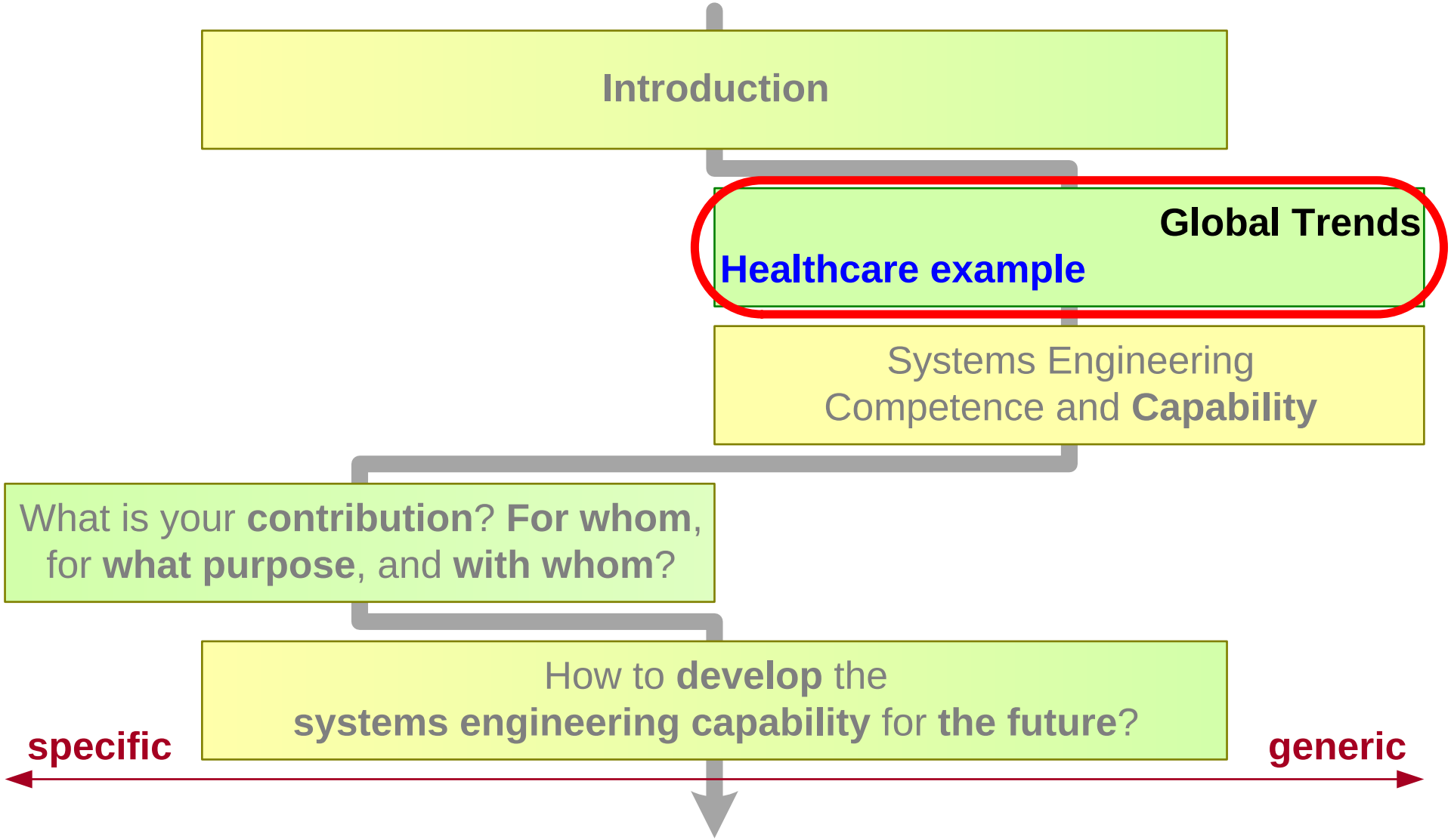


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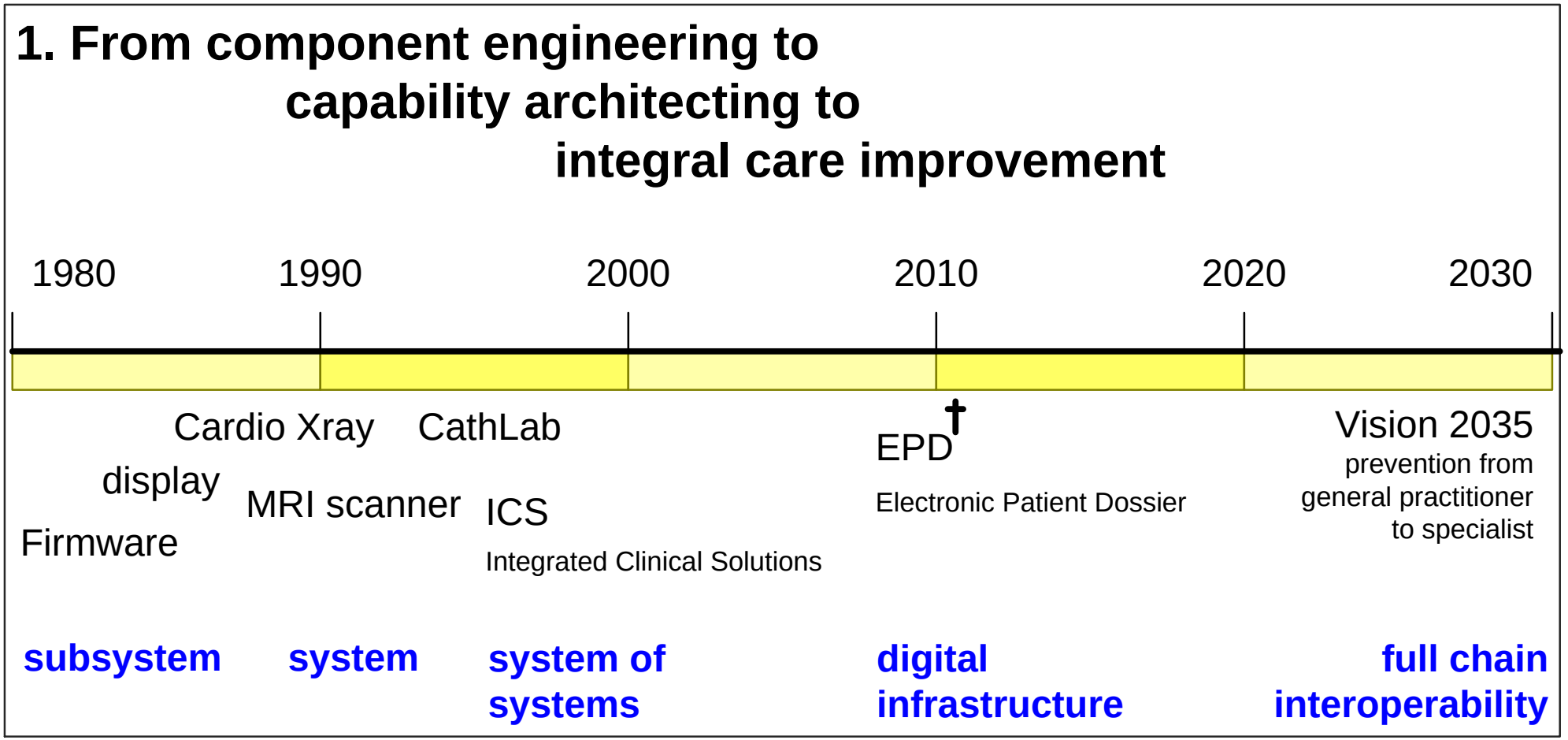


Global System Trends

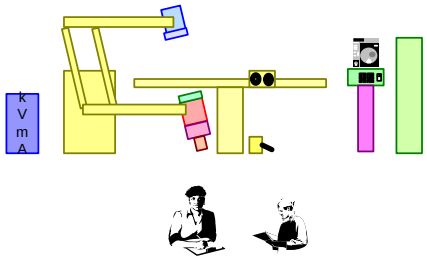
- anno 2025, systems are **socio-technical cyber-physical systems-of-systems**
- these systems operate in **extensive ecosystems**
- **humans and organizations** cause **complexity**
- climate emergency: **sustainability** is an additional container of qualities
- political emergency: **security** is critical
- **digital technologies** enable capabilities across constituent systems
- biological, clinical, pharmaceutical, material science, **and many more technologies** change rapidly

legend **social** **technical** **integral**

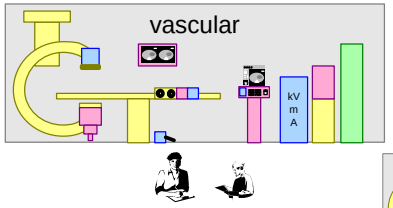
Example Scope Increase in Healthcare



Example Scope Increase in Cardio



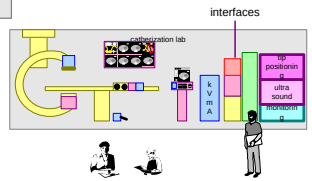
subsystems



system

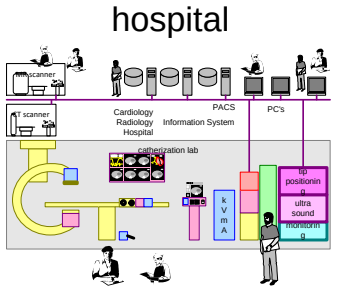


catharization lab

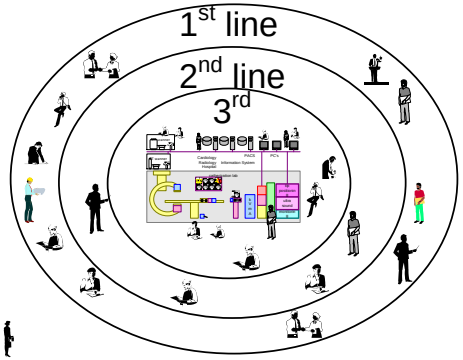


system of systems

hospital

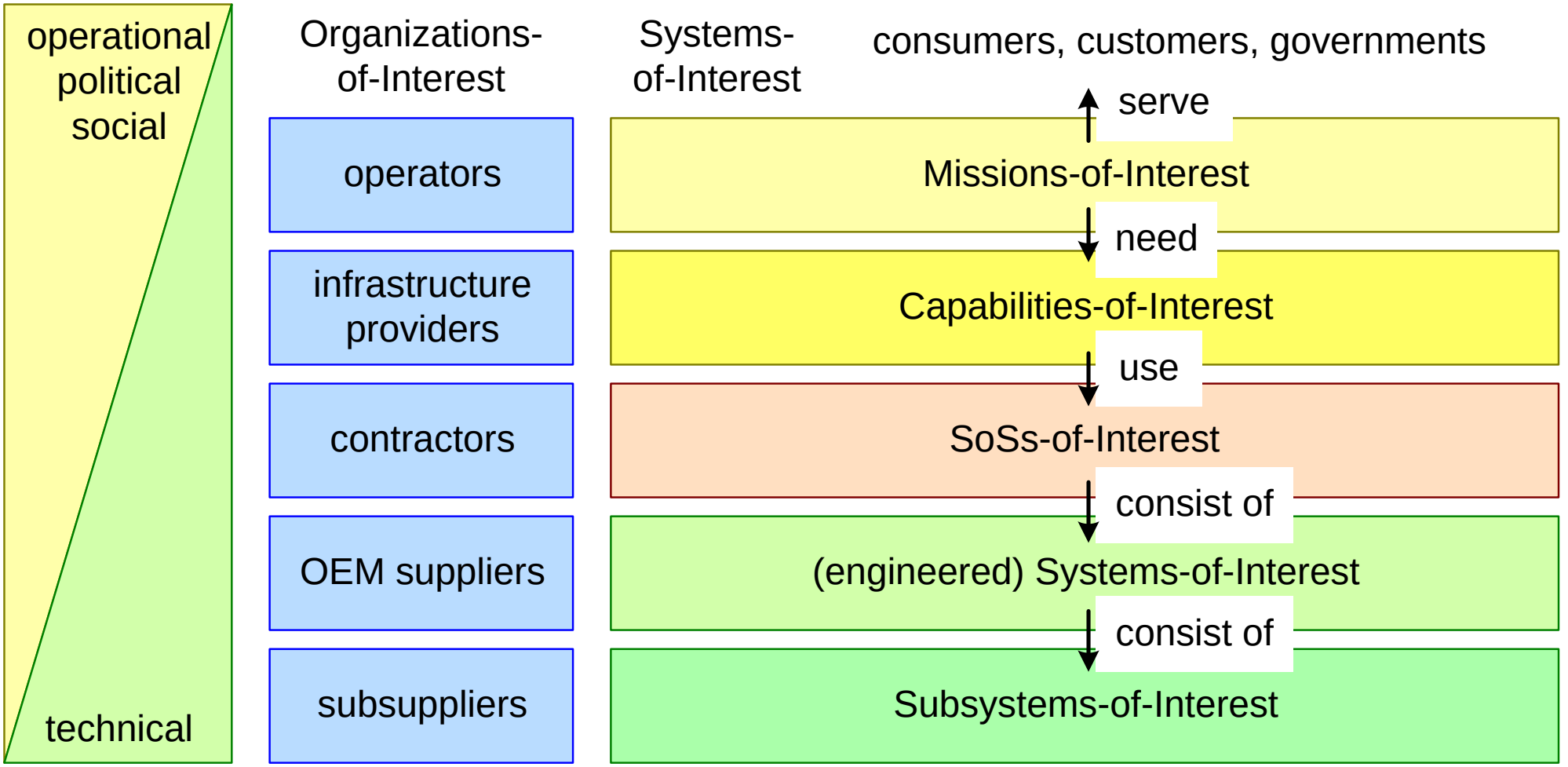


digital infrastructure

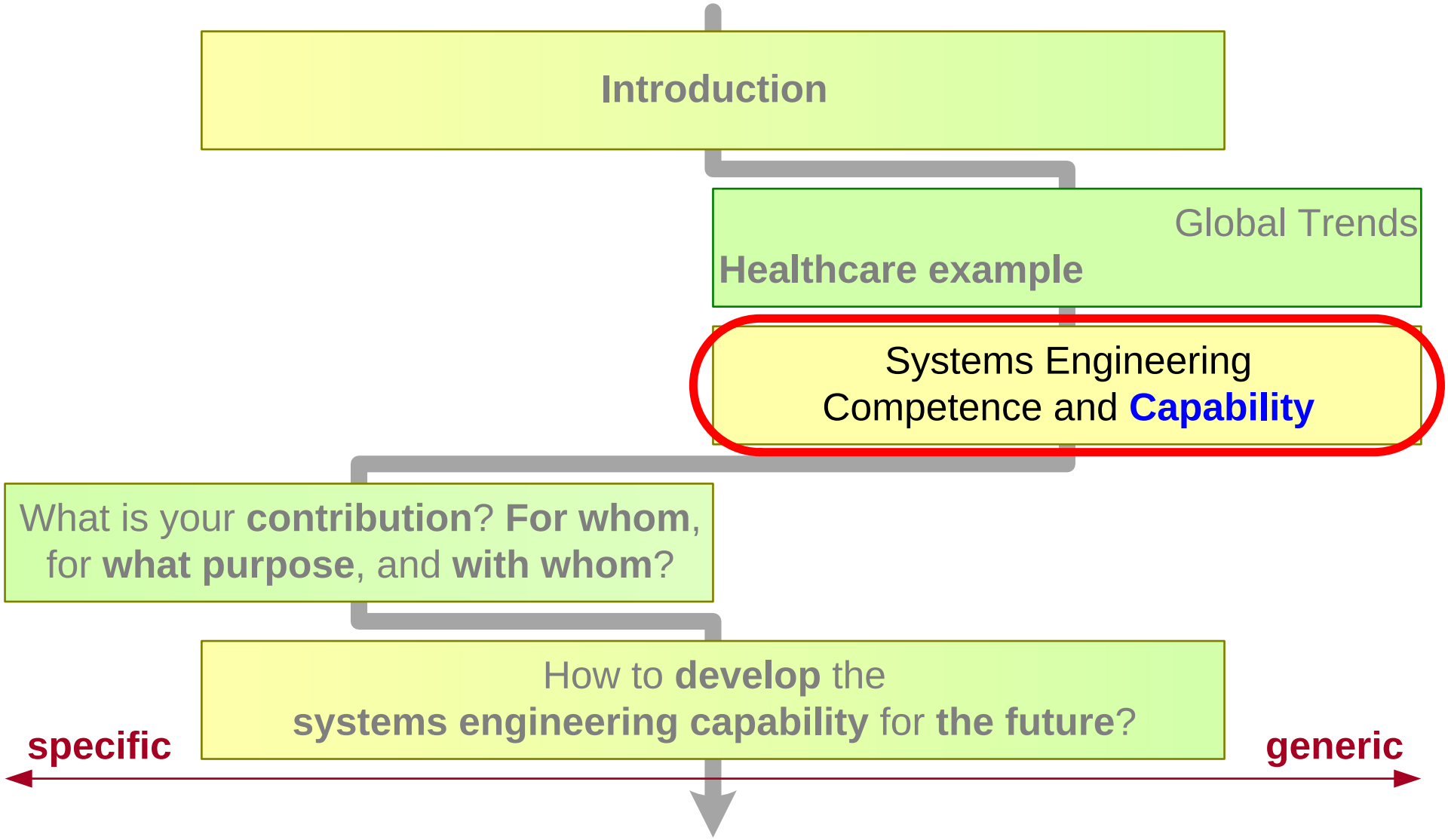


full chain interoperability

We Need Many Types of Architects



Capabilities and Competences



INCOSE definition Operational Capability

"A **Operational Capability** is … an organizational unit's ability to execute a specified course of action, **to implement a business process** or **to provide a service**.

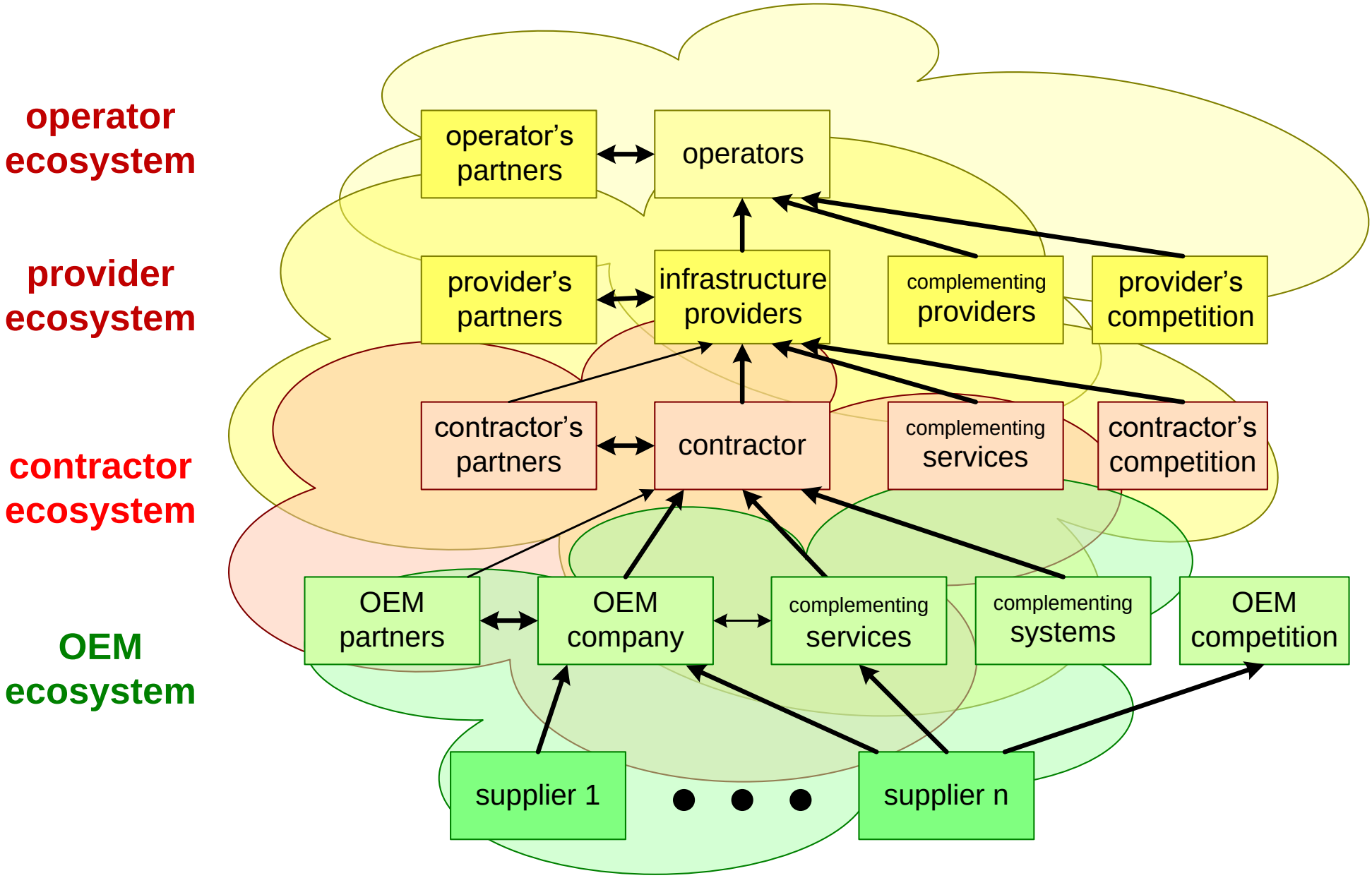
Operational Capabilities typically require **people**, **processes**, **infrastructure**, **technology** and **supporting systems** to be implemented.

A Operational Capability is an enduring element, its **implementation may change** over time.

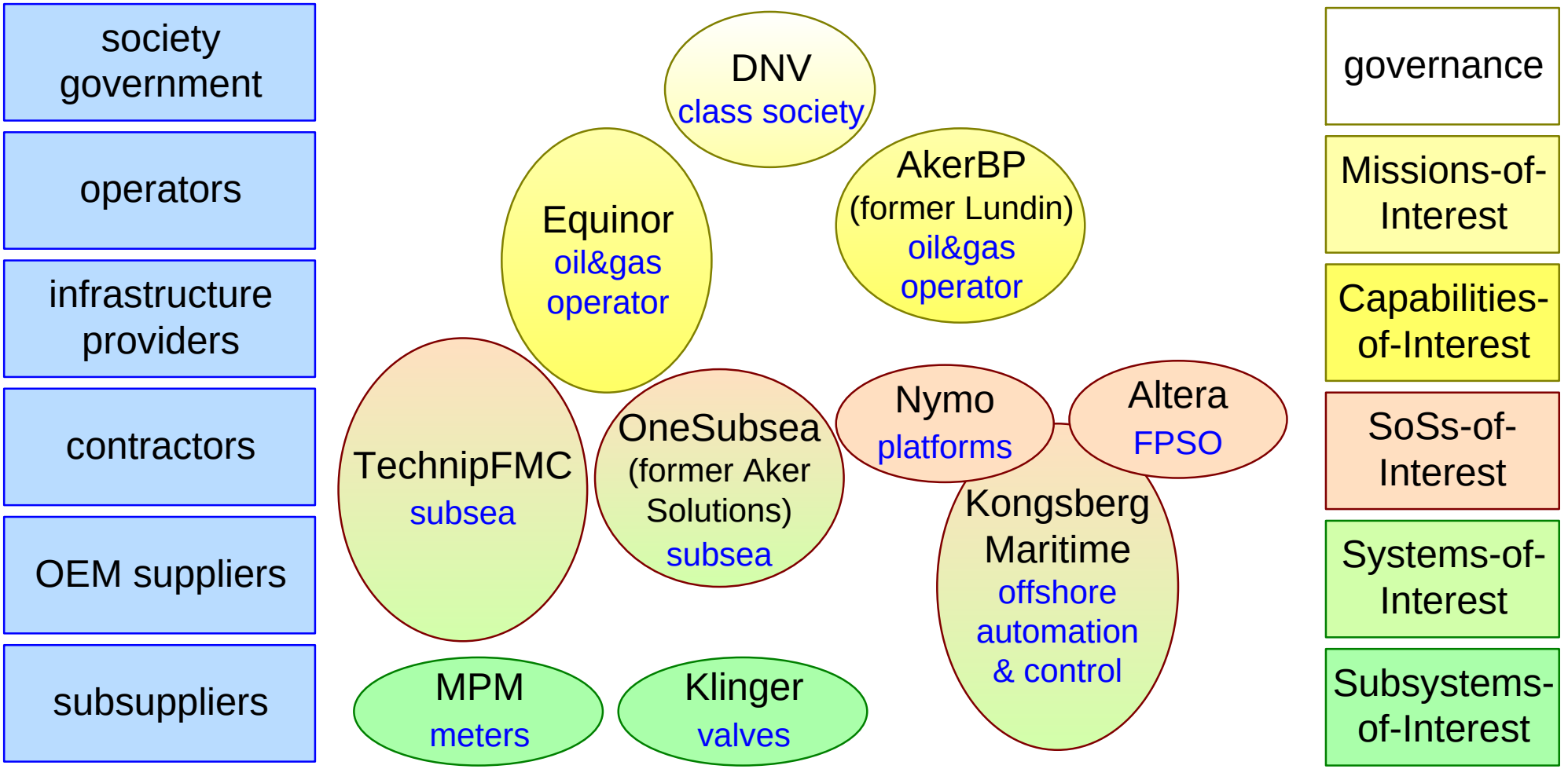
…"

https://saf.gfse.org/devdoc/Operational%20Domain/Operational%20Capability%20Definition%20Viewpoint.html

Capabilities Emerge from Networked Ecosystems



Norwegian Example of Oil and Gas Companies



Developing the Development and Engineering System

research & education focus: how to develop systems effectively?



role models

systems engineering
systems architecting
systems integration
configuration man.

capabilities competencies

stakeholder engagement
conceptual modeling
writing requirements
foundational knowledge

product creation
change management
quality management

process organization

line management
program structure

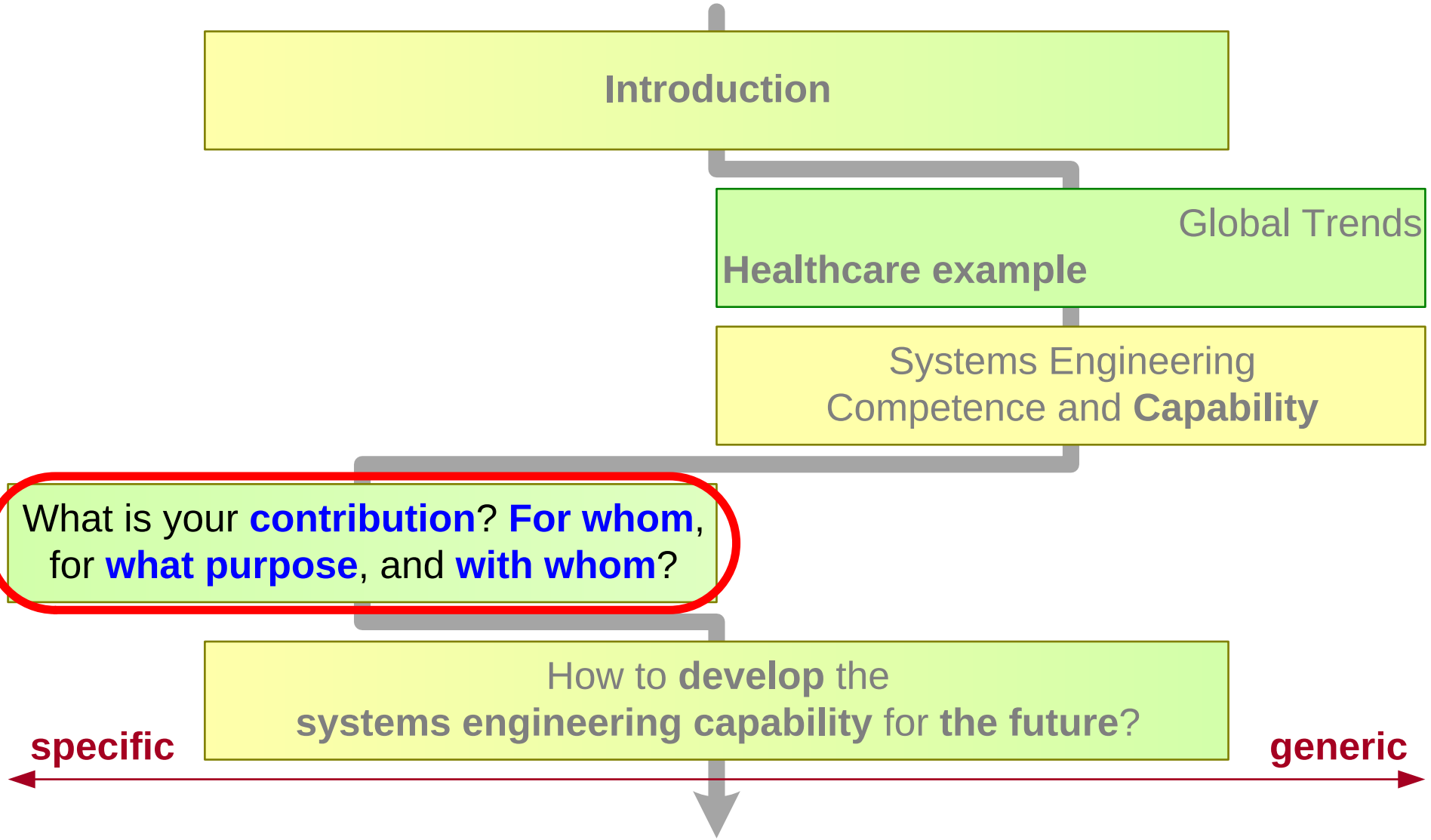
repositories
access control
authentication

infrastructure tools

MBSE
ERP
CAD

social ⟷ **technical**

Capabilities and Competences



Type Answer in The Shared Spreadsheet

What is your contribution?

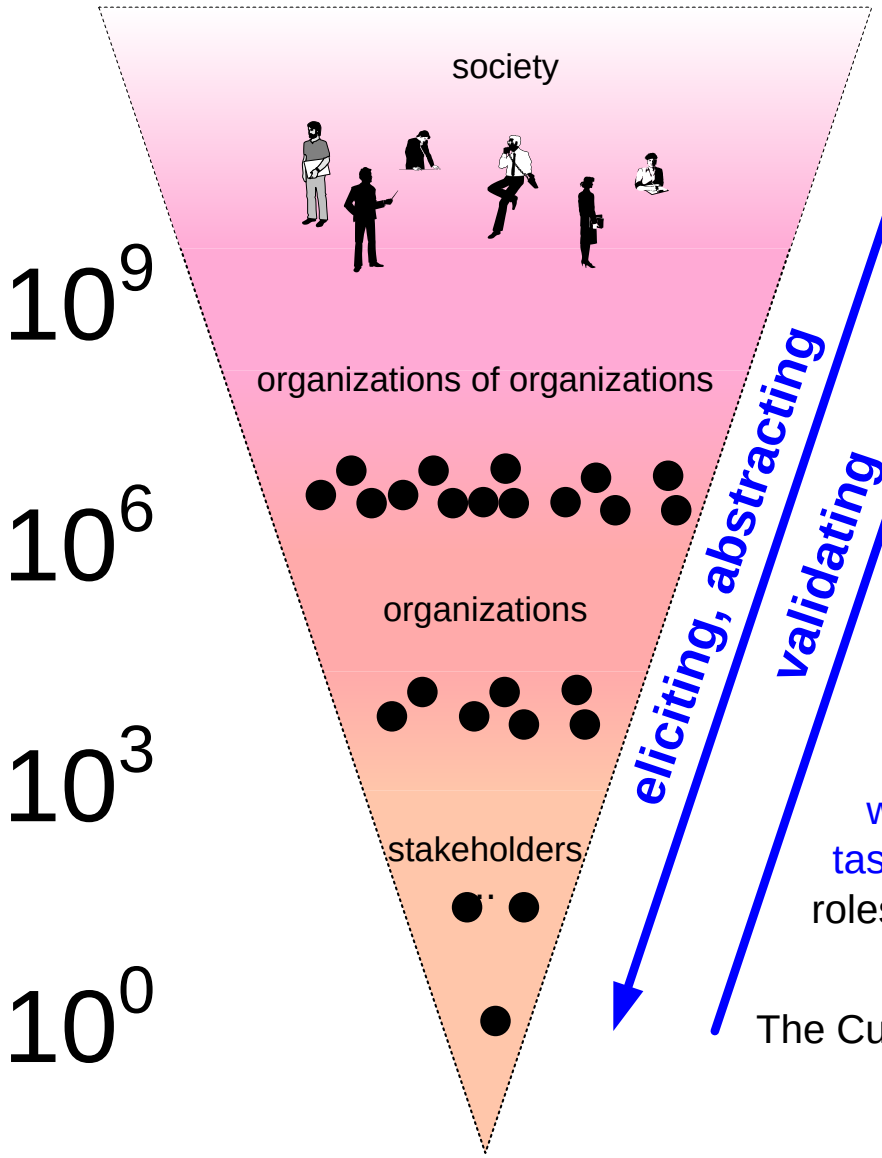
What is your capability, component, function, model, tool, system, product, team, or service of interest?

Type Answer in The Shared Spreadsheet

For whom?

Who benefits, pays for, or uses your contribution?

At What Abstraction Level do we Answer?



eliciting, abstracting

validating

behaviors, pains, interests, concerns, patterns
variations, exceptions
individuals in varying situations

behaviors, pains, interests, concerns, patterns
individuals with personal
emotions, beliefs, and opinions

workflows, processes, problems, needs
variations, exceptions
analyzed and classified stakeholders
ergonomics, demographics

behaviors, interests, concerns
variations, exceptions
characterized roles
archetypes, persona, charicatures

workflows, processes, problems, needs
tasks, artifacts, locations, interactions, relations, events
roles

The Customer

Type Answer in The Shared Spreadsheet

What Abstraction Level did you use?

Add a more abstract role when you had concrete persons

Add a specific person when you had abstract stakeholders

Type Answer in The Shared Spreadsheet

For what purpose?

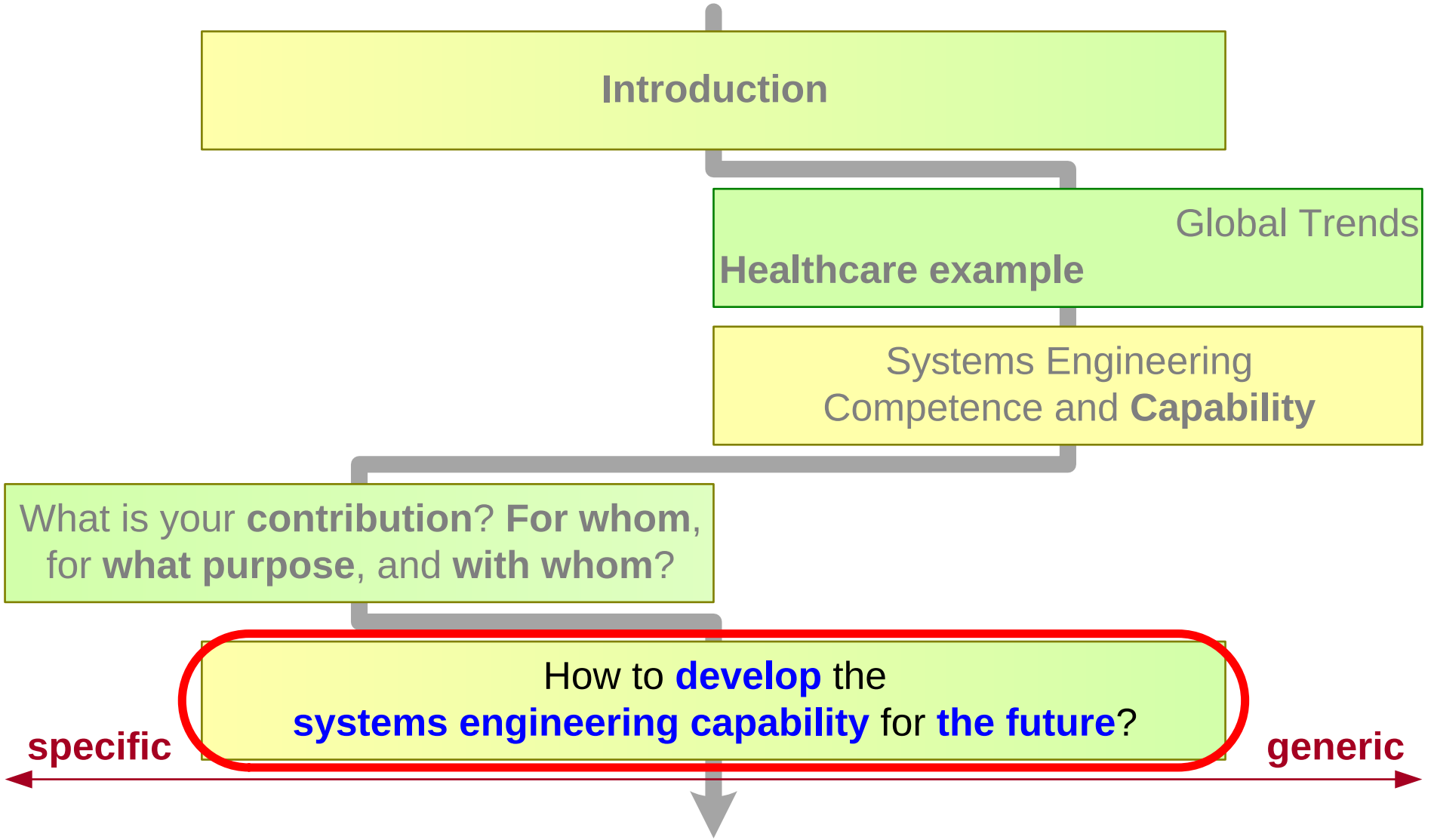
What is the purpose of your contribution for its beneficiary?

Type Answer in The Shared Spreadsheet

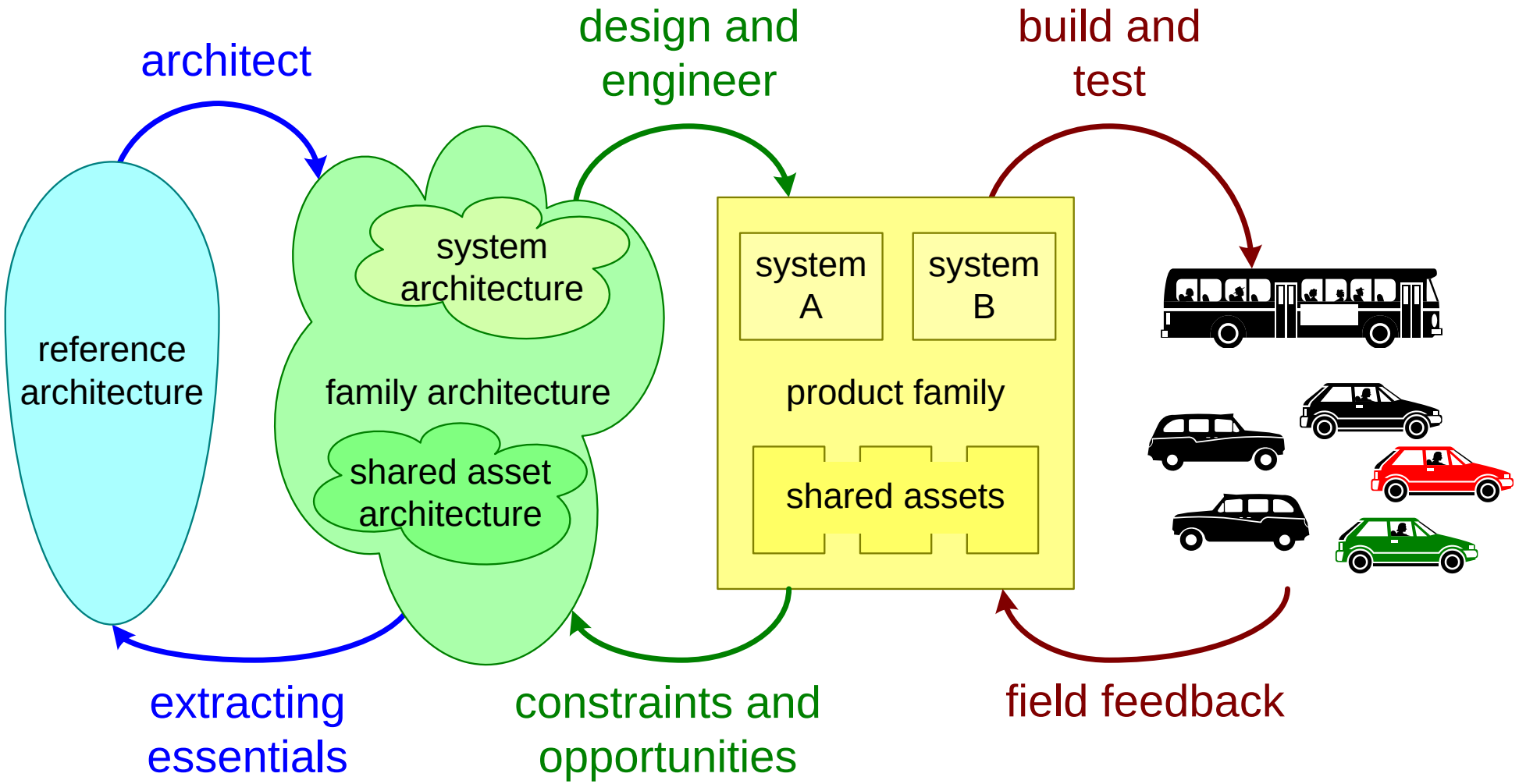
With whom?

With whom do you cooperate to achieve the contribution?

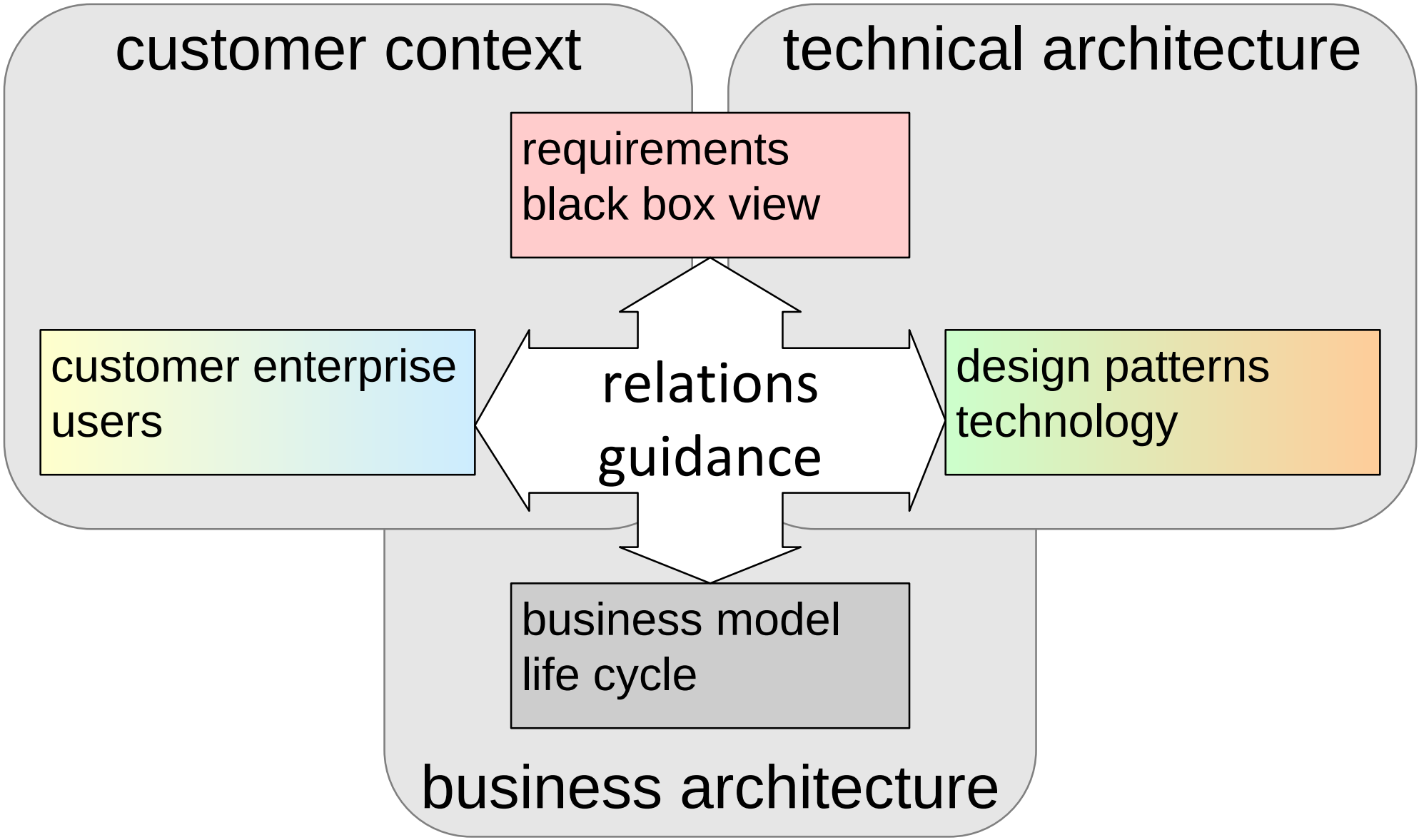
Capabilities and Competences



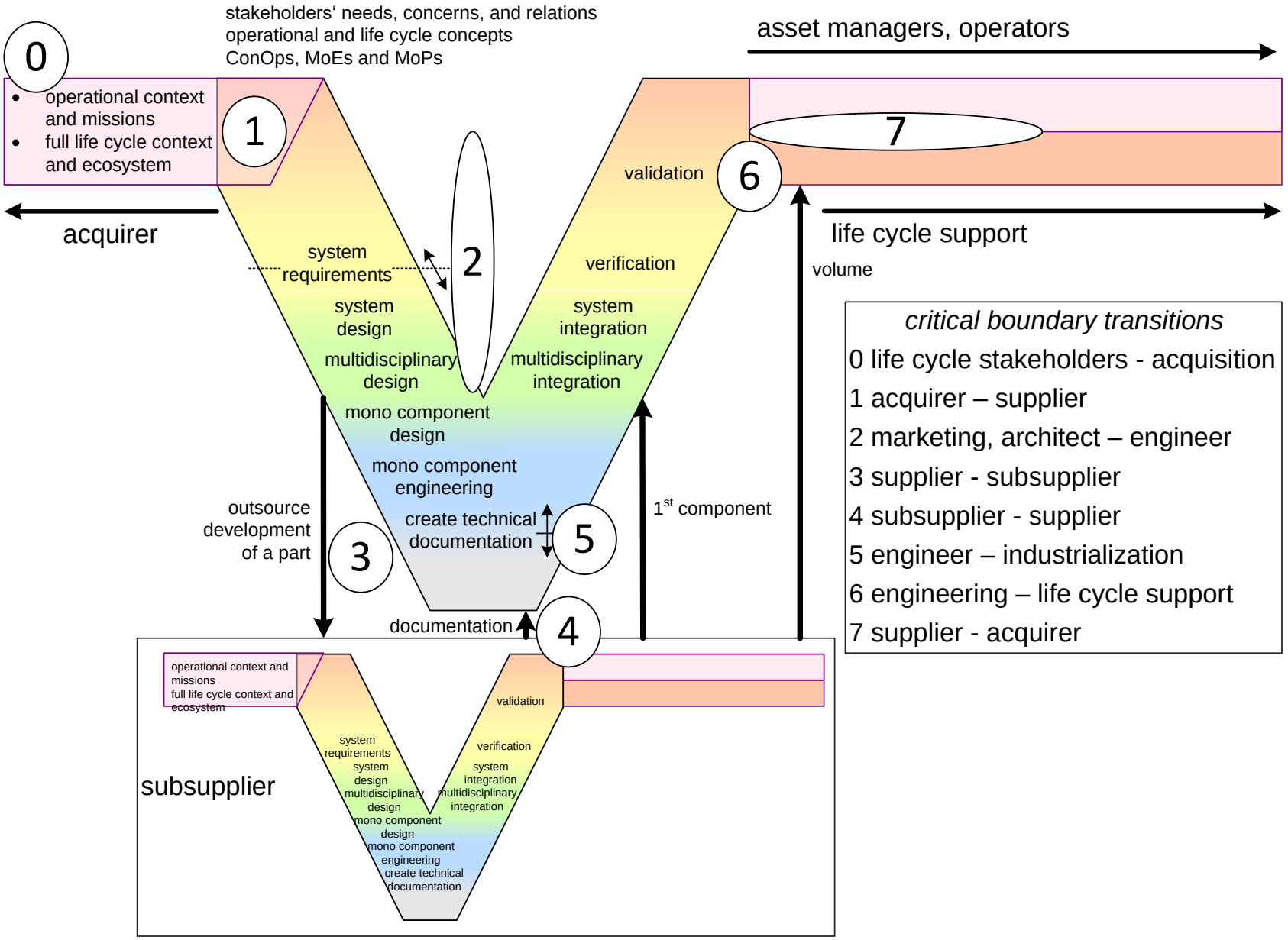
Reference Architecture is an Ultimate Abstraction



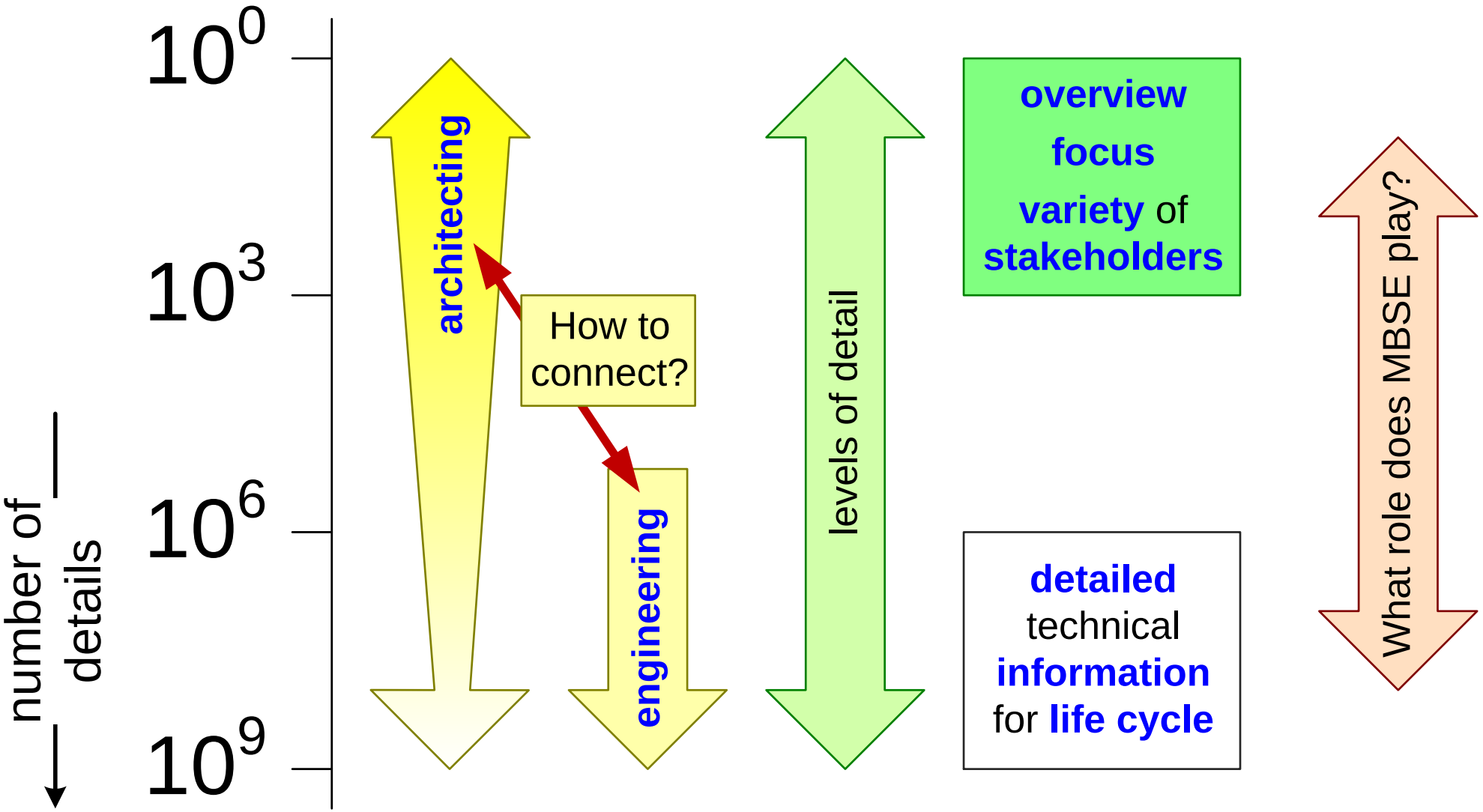
Reference Architectures Connecting Enterprise and Design



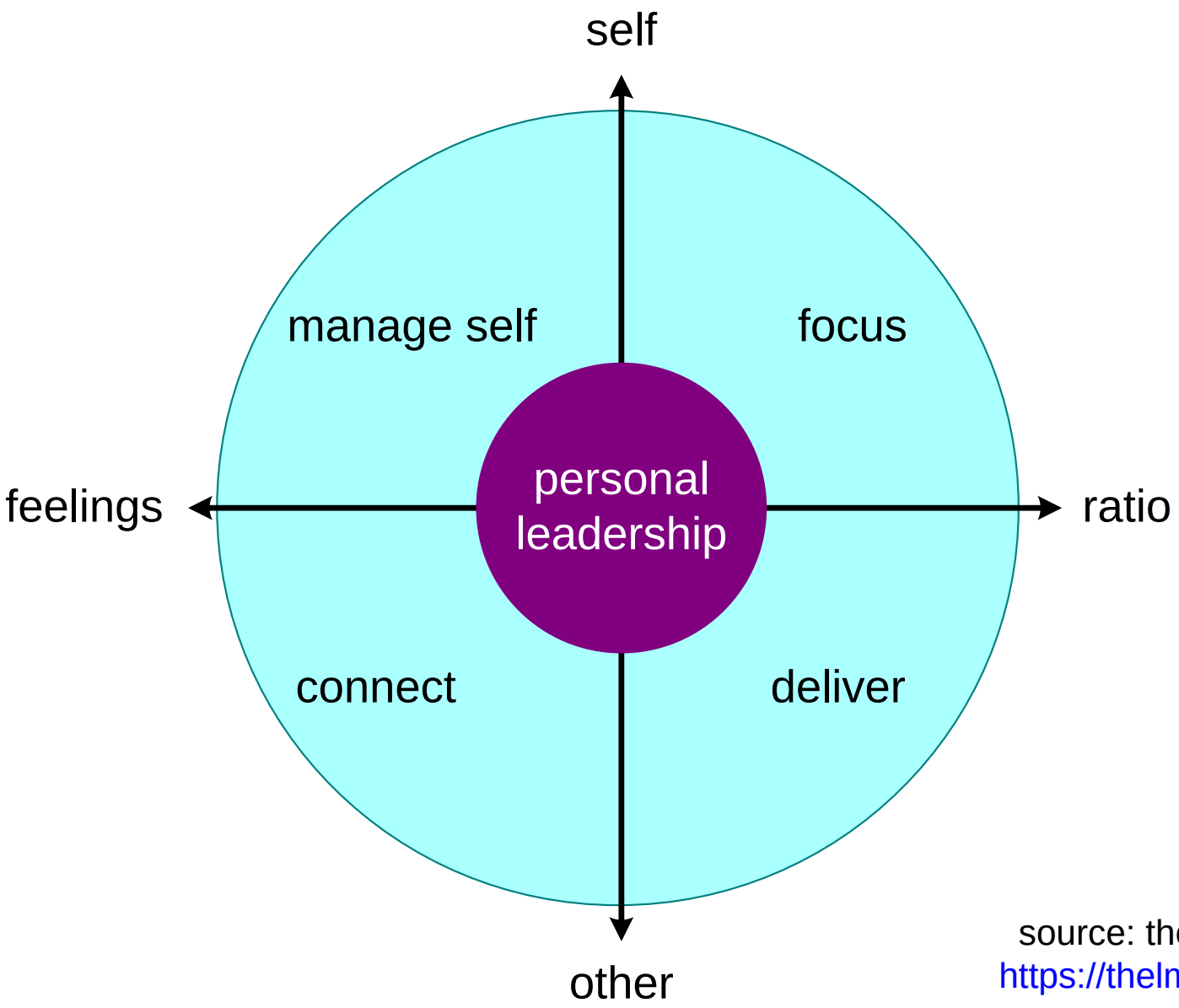
Bottlenecks in Digital Engineering



How to Connect Breadth and Depth?

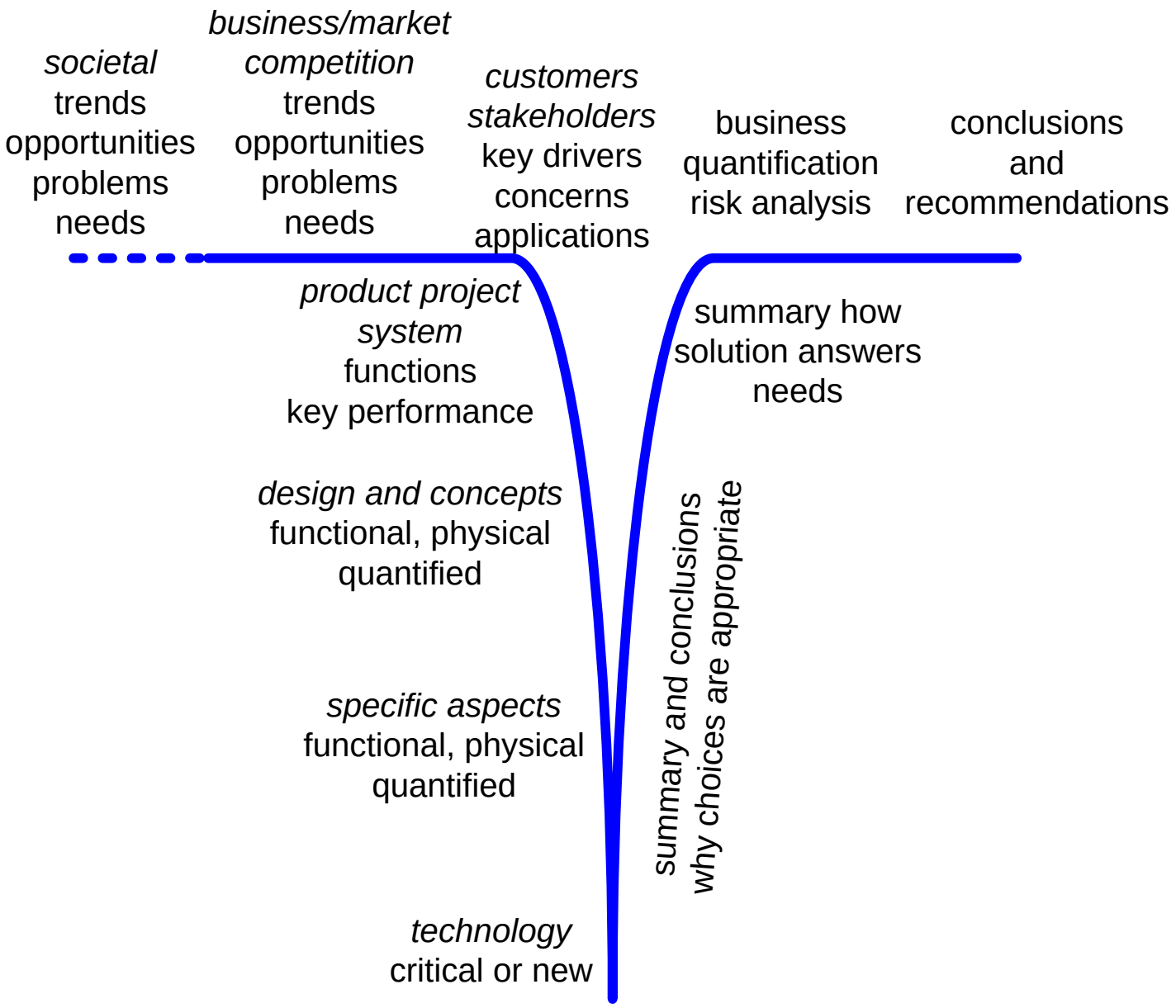


Leadership Skills Multiply Architect Effectiveness

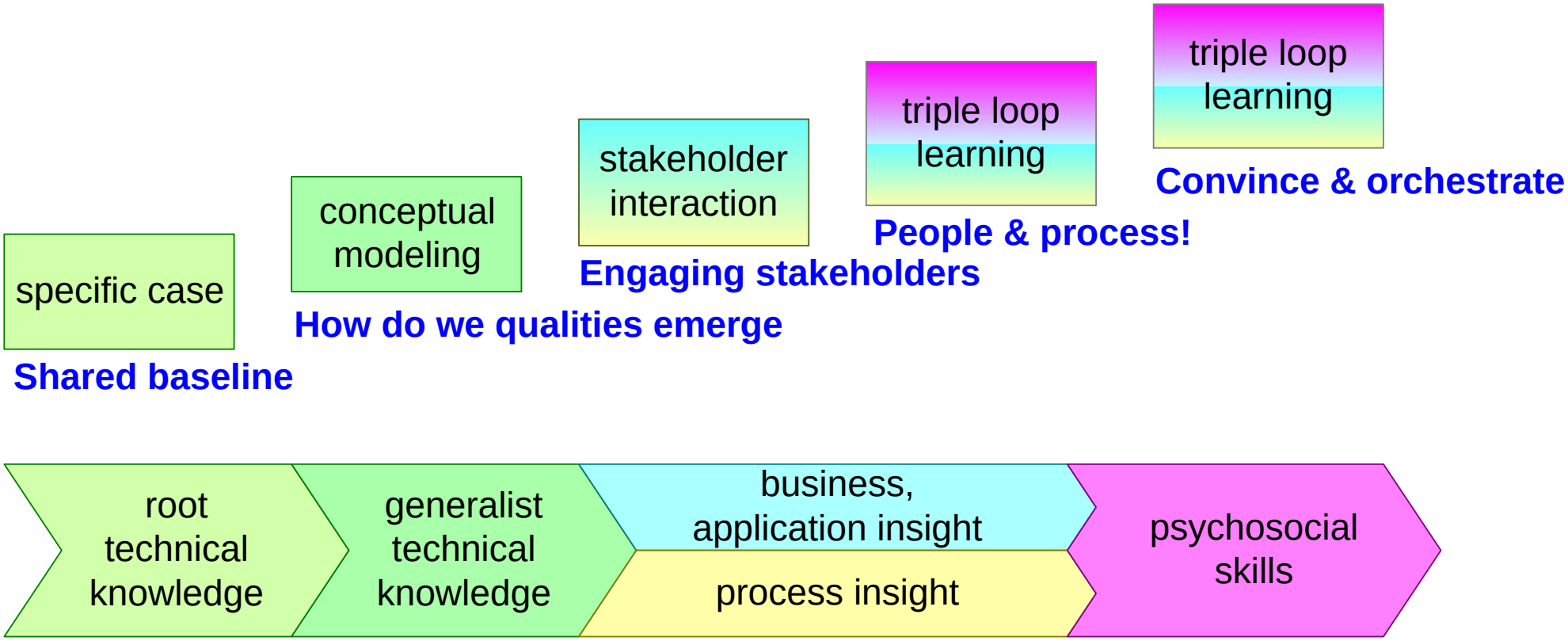


source: the LMS group
https://thelmsgroup.nl/en/

Connecting Management and Technology



Growth in Systems Leadership Program



Conclusion

Effective development, delivery, support, and decommisioning requires:



role models

that show the proper use of

enterprise & operational **capabilities & competencies**

building upon

fitting **processes & organization**

using

supporting **infrastructure & tools**

social ⟷ **technical**

Hence, **Life-Long Learning** is essential

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