Tutorial How to Engineer Systems as Start-up or in Disruptive Circumstances?

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

Abstract

Start-up companies operate in an environment, where their market is not clear, nor their business model. At the same time, the contours of their solutions are still shaping up and the technology, production and delivery process and the supply are all under development. In other words, everything is moving simultaneously. Start-ups need persistence and focus to spend their limited resources well, while they also need to be open minded and responsive to market and business needs. How can start-ups use the systems engineering knowledge in a way that it fits this context?Interestingly, large organizations may have similar needs, when disruptive developments take place. A clear example is defense, where drones and electronic warfare disrupt existing doctrines. This tutorial guides the participants to a highly iterative systems engineering process with the continuous challenge to do just enough. The purpose is to facilitate the required level of responsiveness, while at the same time bring sufficient anticipation of the many enabling systems that need development.

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logo
TBD

Introduction How to Engineer Systems as Start-up or in Disruptive Circumstances?

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

Abstract

Start-ups and organizations responding to disruptive changes share the challenge of responding fast, often with limited suitable resources, while the environment may impose rigid ways of working. This paper explores these challenges and options to cope with them.

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Disruptive Change Consequences

drivers

- big pain
- big need
- big opportunity

challenges

- time pressure
- limited resources
- unknowns
- uncertainties
- ambiguity
- everything and now

Frameworks for Architecting

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

Abstract

Frameworks offer structure to look at and better understand the aspects these frameworks address. Frameworks provide a frame for understanding. They are by definition simplified conceptualizations; its users have to use them with care.

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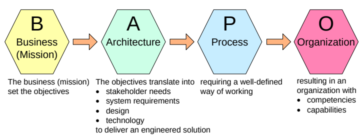
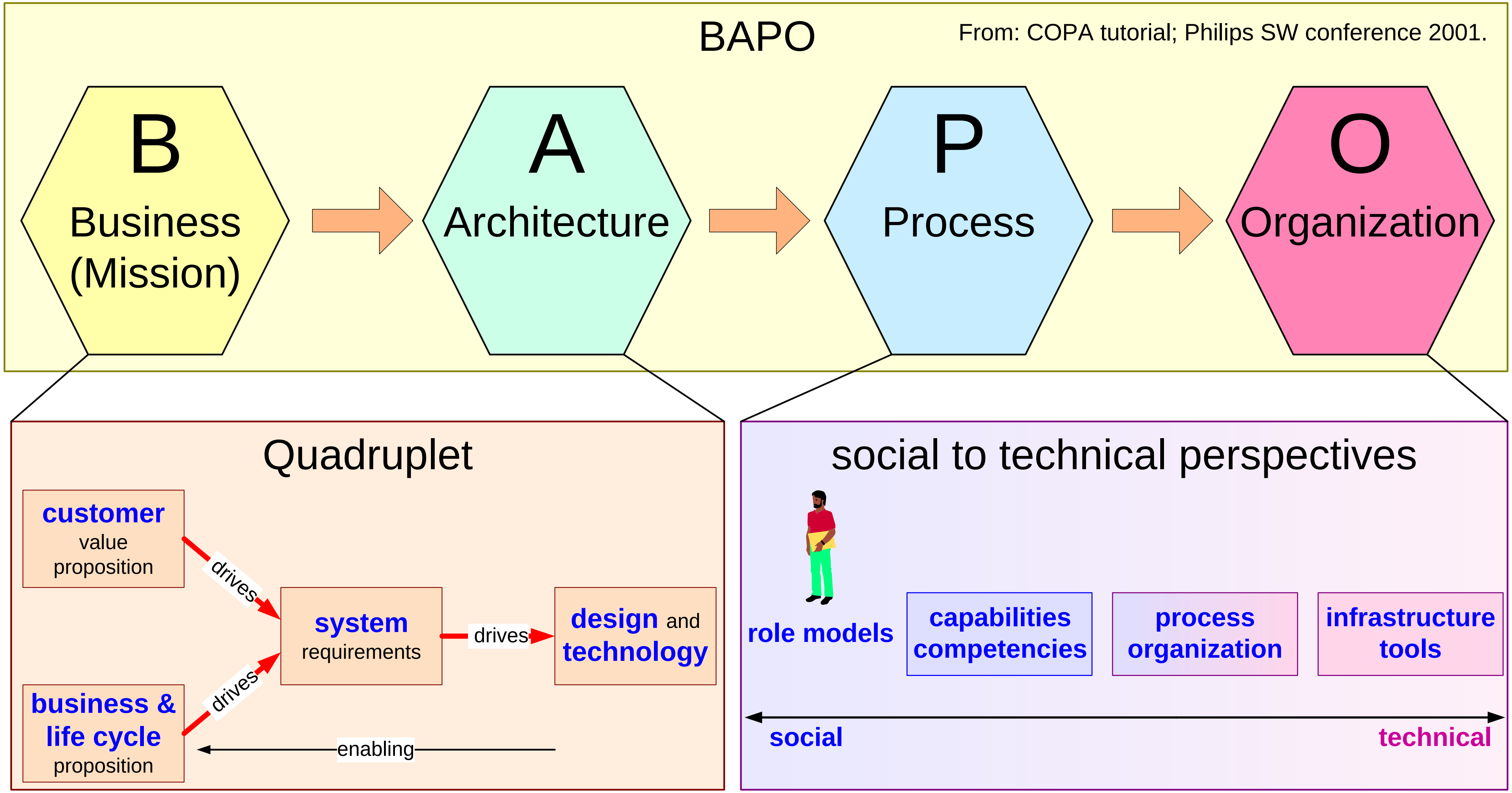
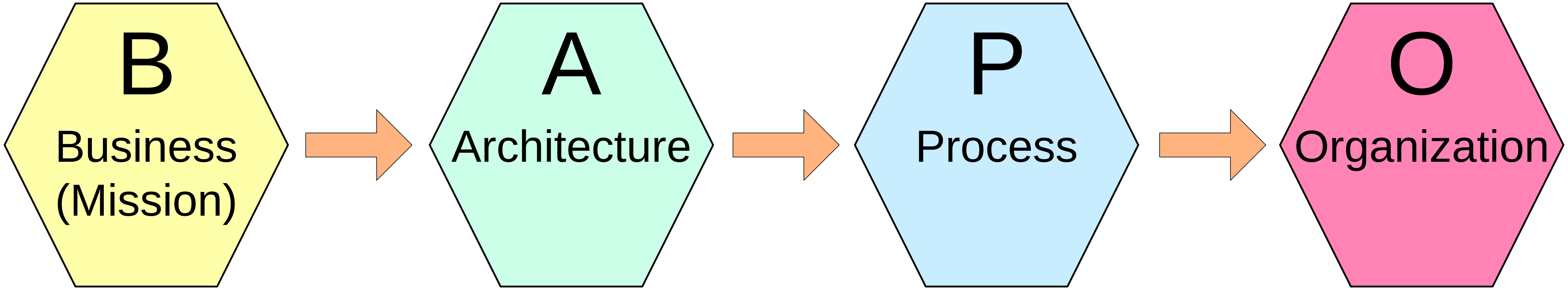


Frameworks for Architecting



The Encompassing BAPO Framework



The business (mission) set the objectives

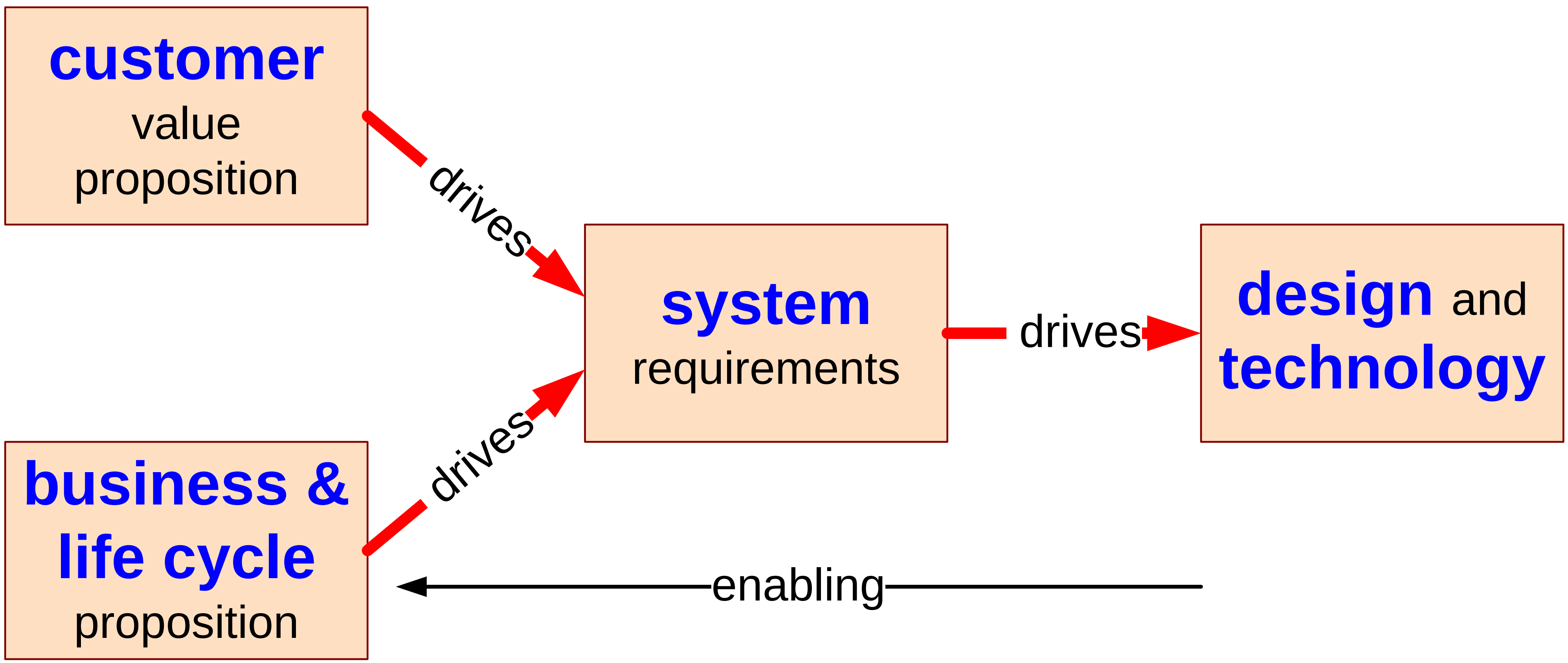
The objectives translate into
- stakeholder needs
- system requirements
- design
- technology

to deliver an engineered solution

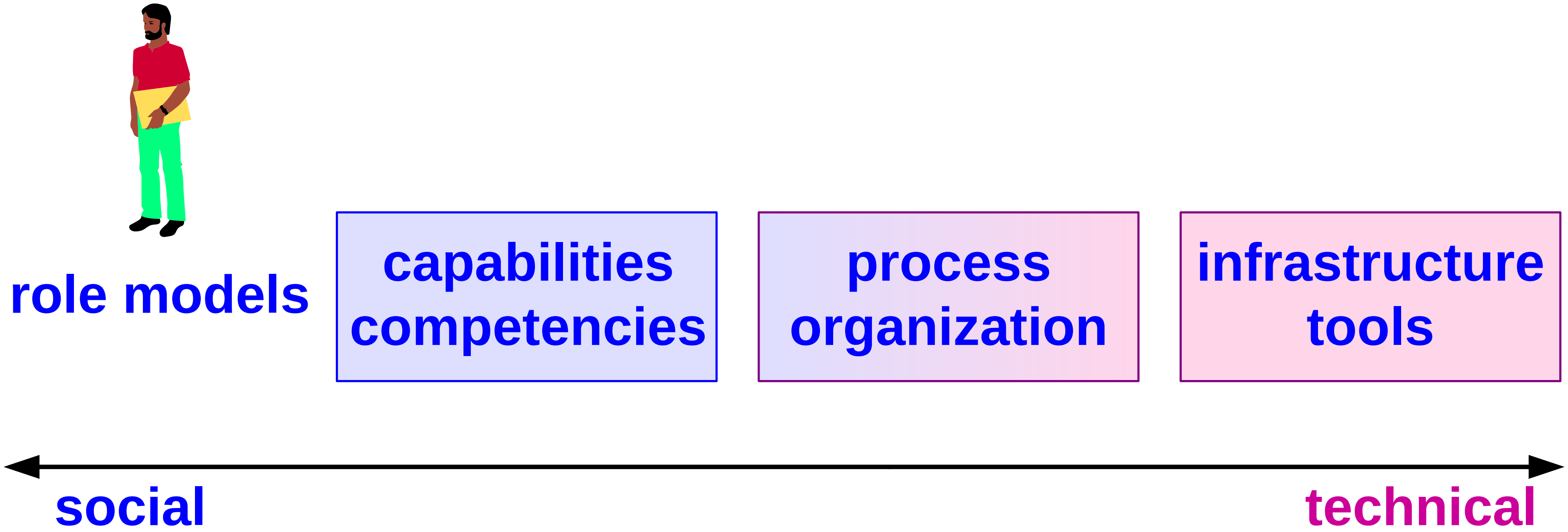
requiring a well-defined way of working

resulting in an organization with
- competencies
- capabilities

The Customer and Business Propositions are Driving



Change Requires Addressing the Full Spectrum



Market Product Life Cycle Consequences for Architecting

by *Gerrit Muller* University of South-Eastern Norway-NISE
e-mail: gaudisite@gmail.com
www.gaudisite.nl

Abstract

The lifecycle of a product category in the market determines many aspects of the architecting approach. The lifecycle consists typical of 4 phases: infancy, adolesence, mature and aging.
A discontinuity in market success is seen in the transition from one phase to the next phase. The explanation given is that the phases differ in characterictics and require different approaches. The right approach for one phase is sub optimal for the next phase. A set of characteristics per phase is given and the consequences for architecting are discussed.

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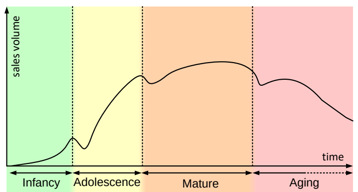
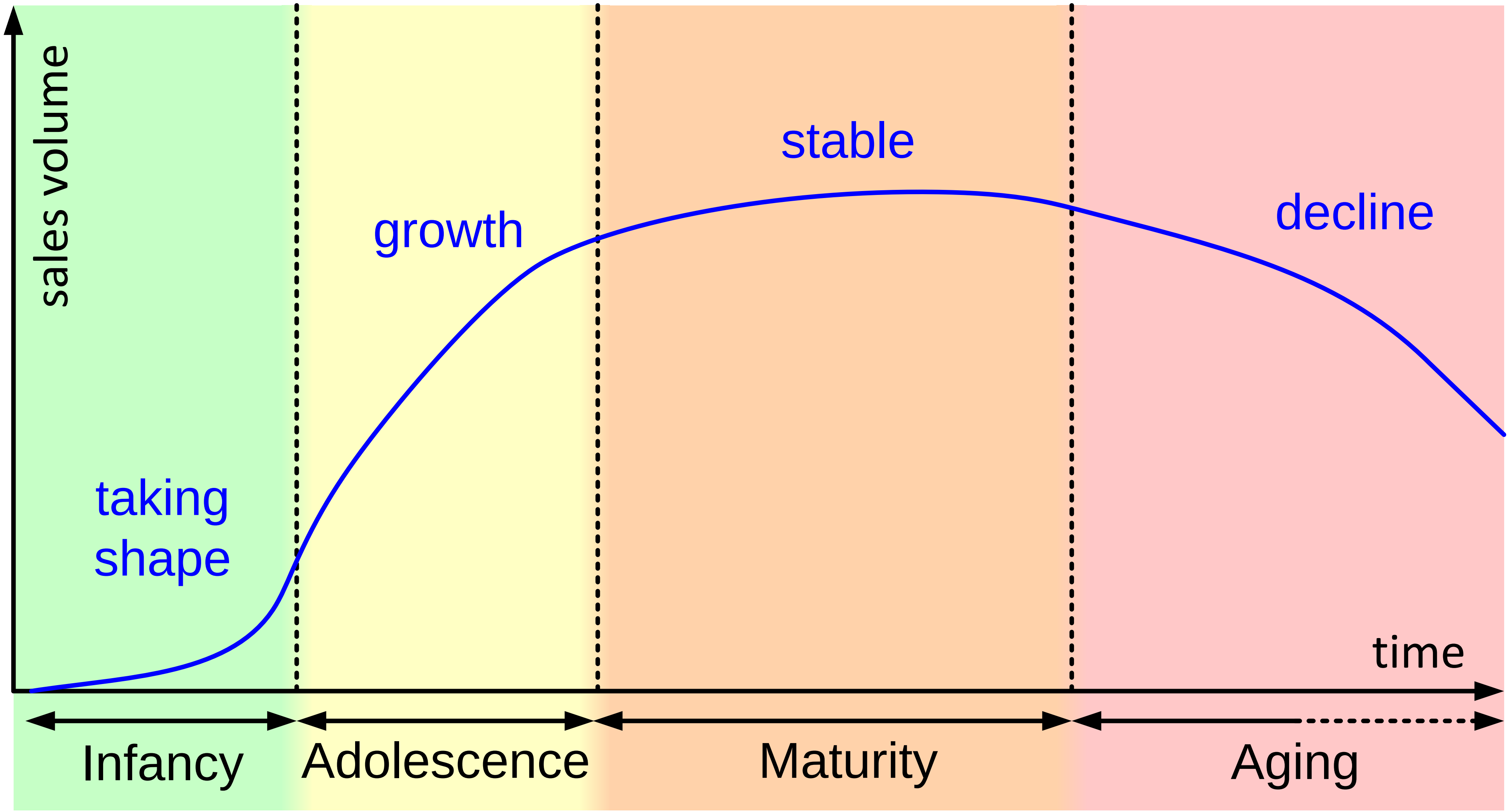
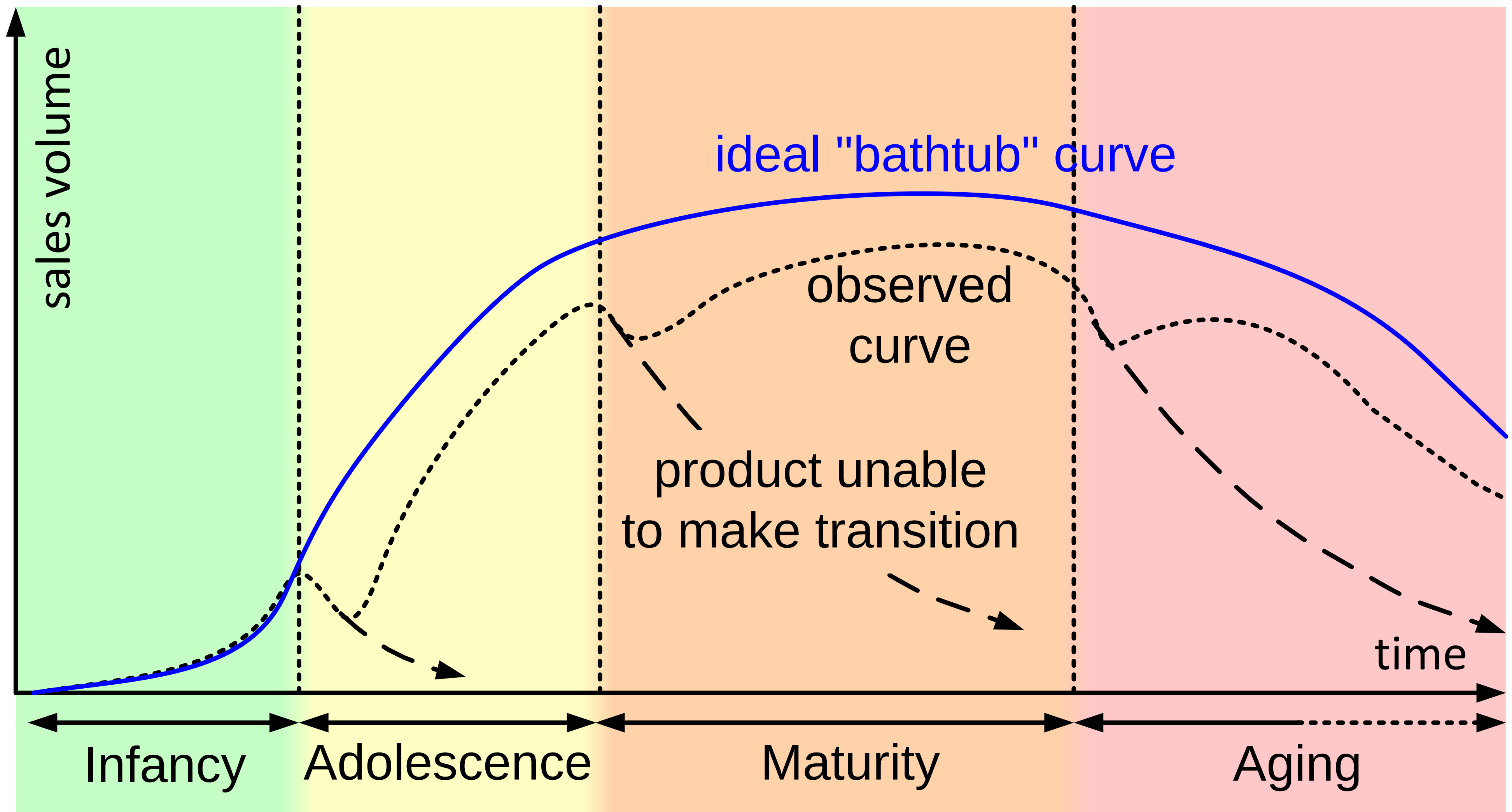


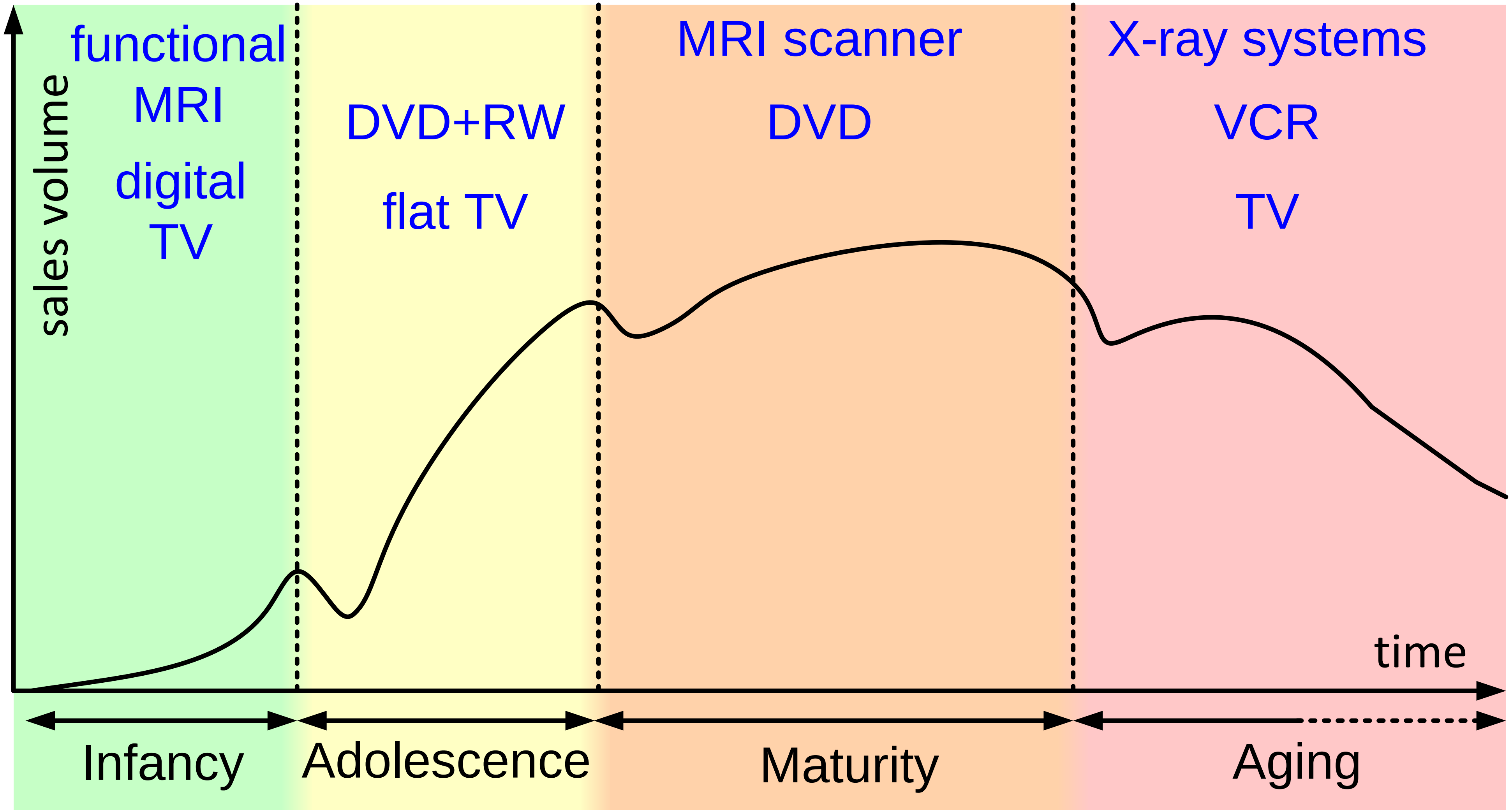
Ideal Bathtub Curve



Market Product Life Cycle Phases in Practice



Examples of Product Classes on the Curve



Attributes per Phase

	Infancy	Adolescence	Mature	Ageing
Driving factor	Business vision		Stable business model	Harvesting of assets
Value from	Responsiveness	Features	Refinements / service	Refining existing assets
Requirements	Discovery	Select strategic	Prioritize	Low effort high value only
Dominant technical concerns	Feasibility	Scaling	Legacy Obsolescence	Lack of product knowledge Low effort for obsolete technologies
Type of people	Inventors & pioneers	Few inventors & pioneers "designers"	"Engineers"	"Maintainers"
Process	Chaotic		Bureaucratic	Budget driven
Dominant pattern	Overdimensioning	Conservative expansion	Midlife refactoring	UI gadgets

Introduction to Ecosystems

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

Abstract

This presentation shows how various players across an ecosystem behave. It uses a simple layering model to explain the various roles.

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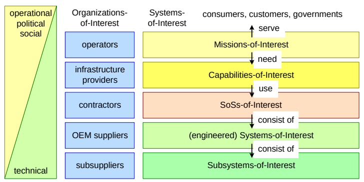
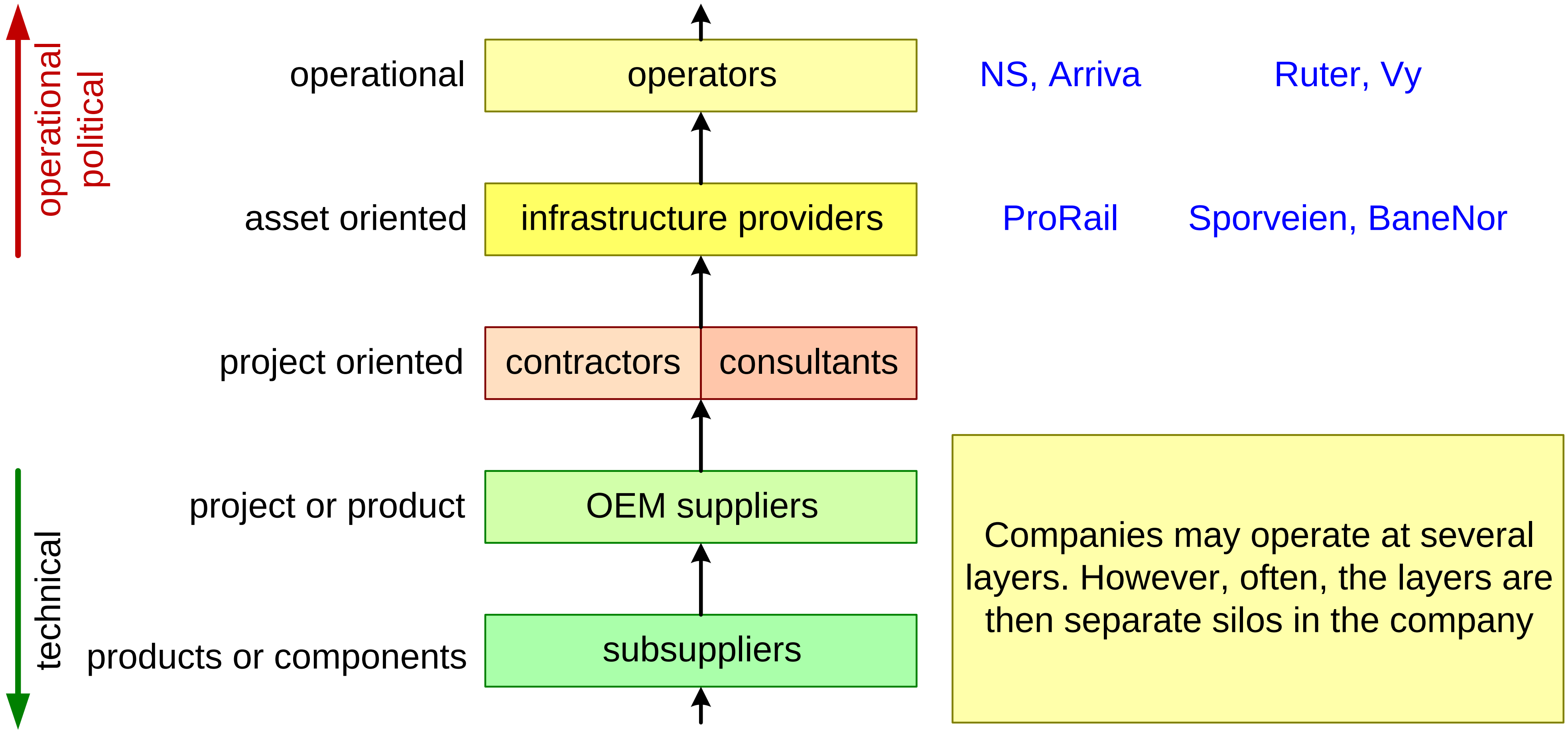


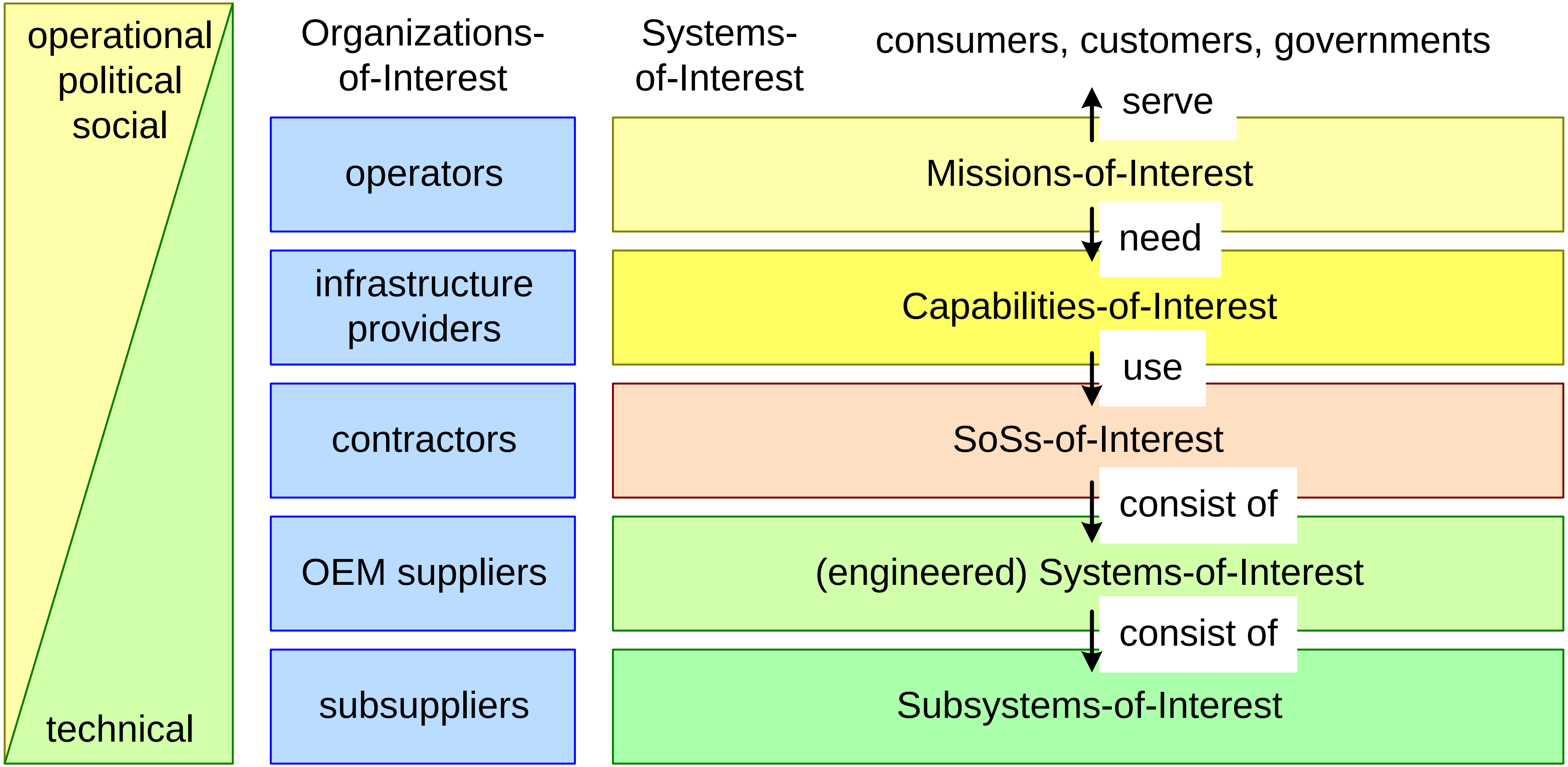
Characterization of Domain Layers

operators	transport passengers produce oil & gas	acquisition	performance-based SLA
infrastructure providers	provide infrastructure manage assets	acquisition	Request for Proposal
contractors	build, adapt, integrate systems of systems	acquisition/ procurement	Request for Proposal
OEM suppliers	create, manufacture systems	procurement	specification
subsuppliers	create, manufacture products, components		

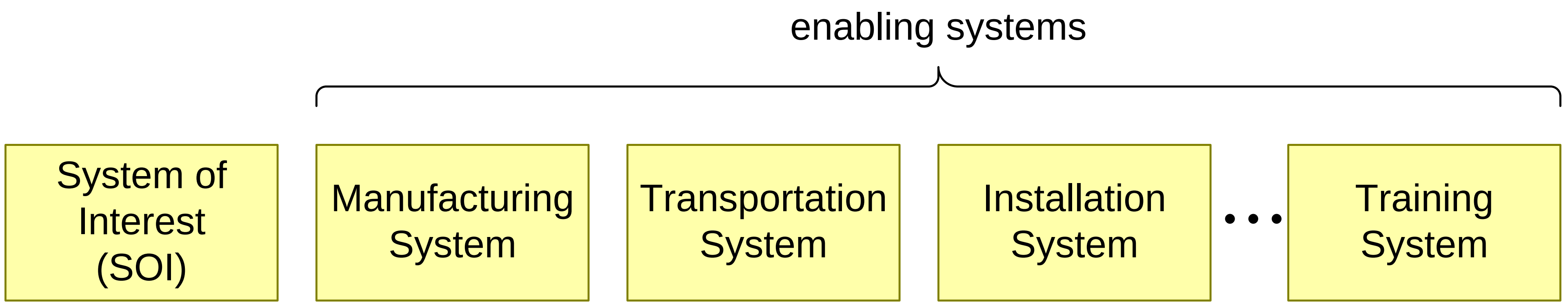
Positions in the Value Network Differ in Nature



Perspective Changes from Layer to Layer

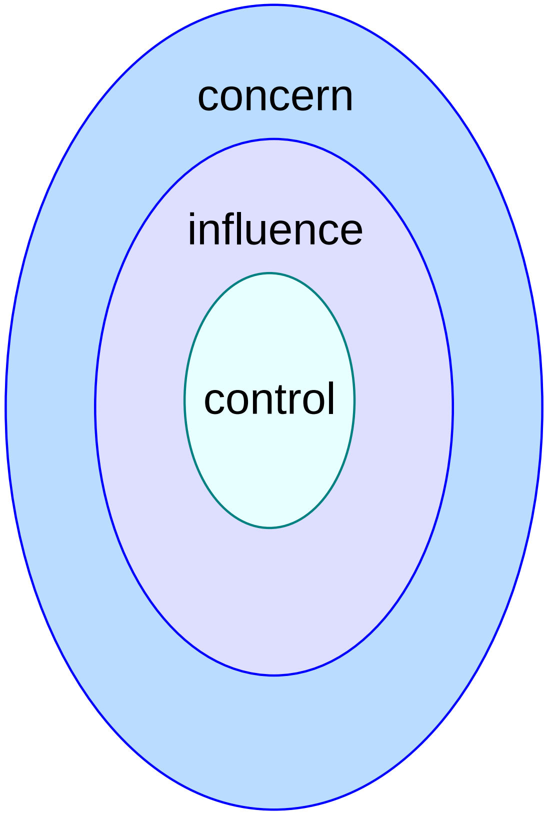


Development Has to Develop the SoI and the Enabling Systems

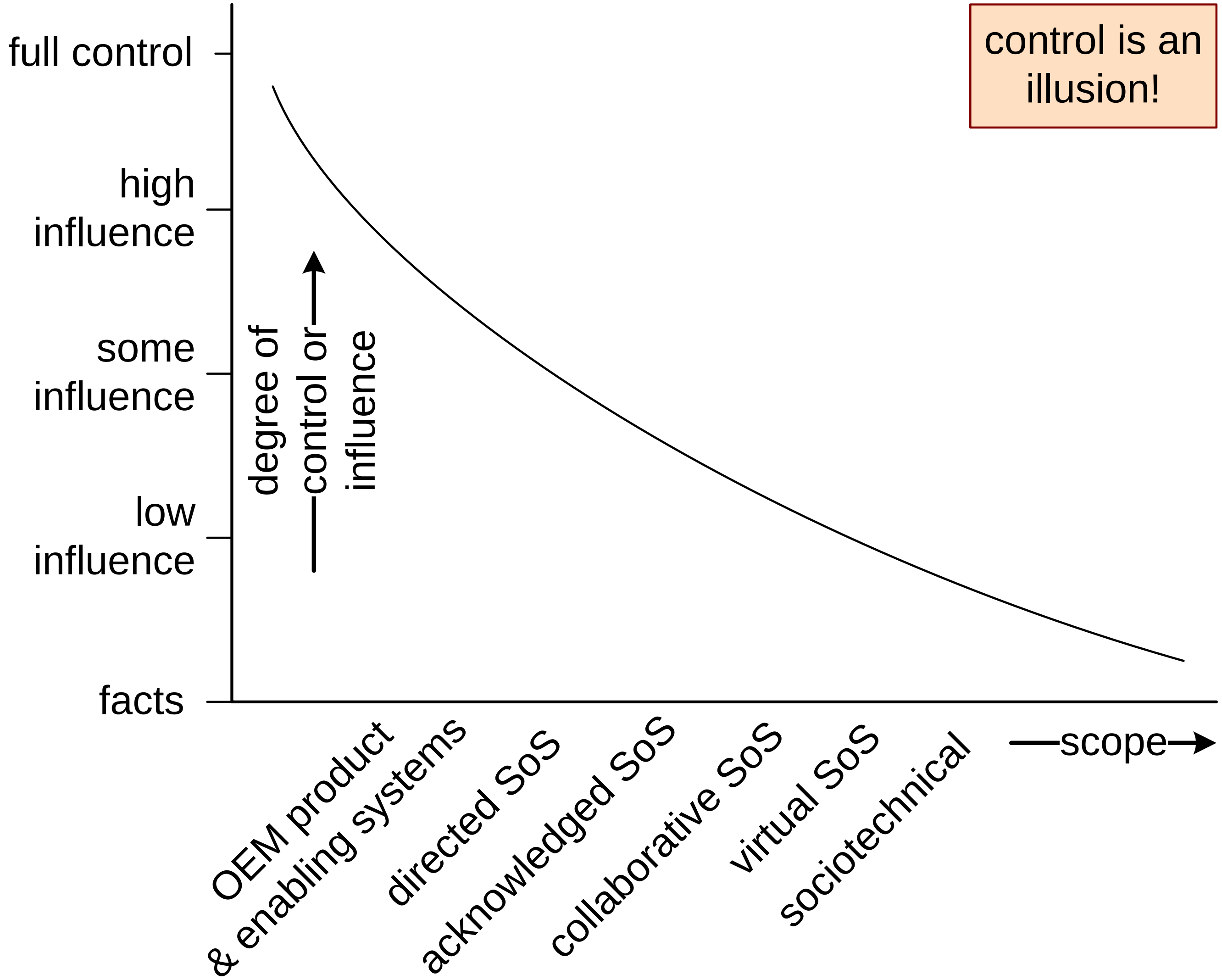


Development and Engineering must develop the System of Interest and all Enabling Systems

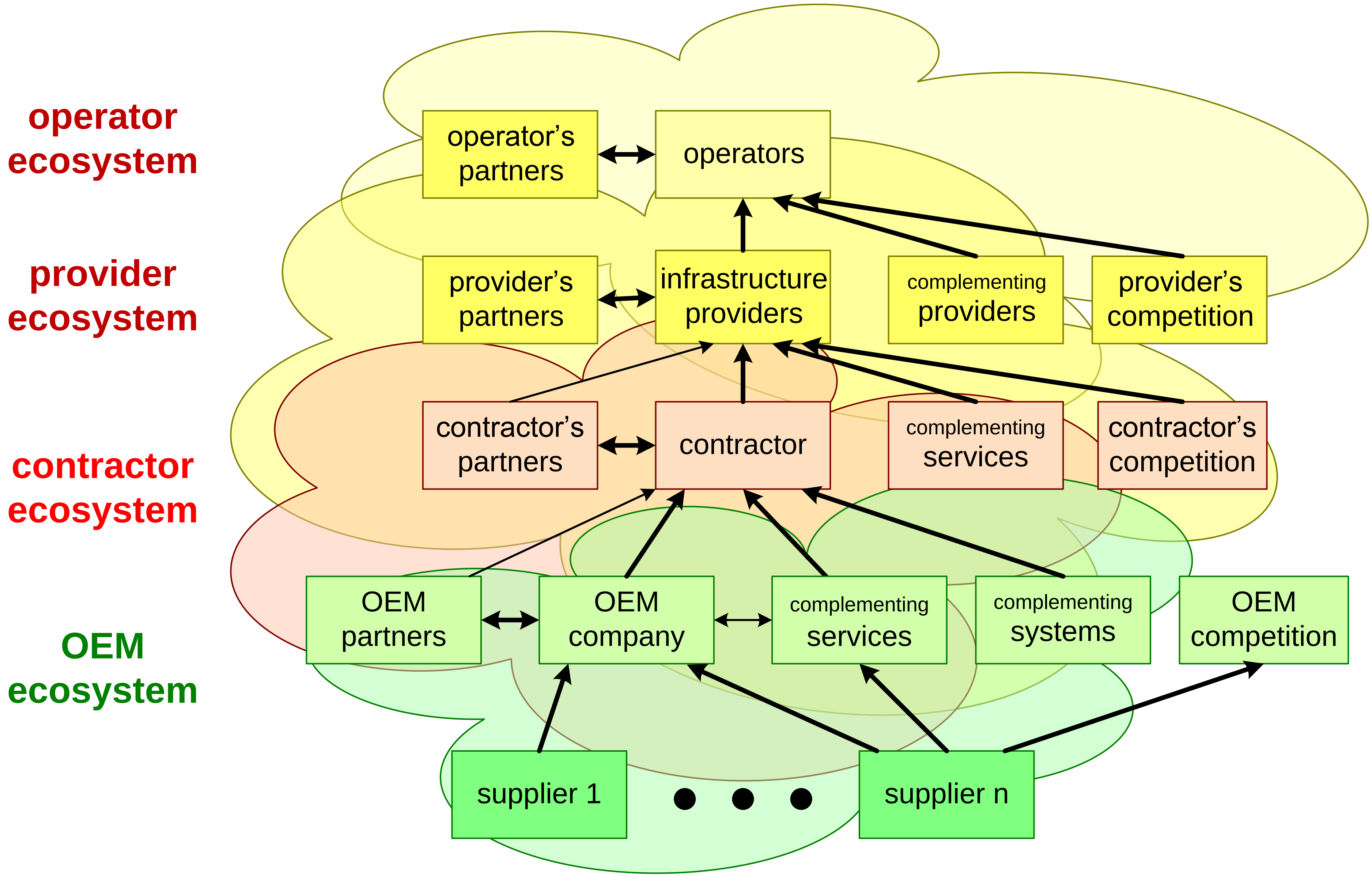
The Level of Influence Decreases with Scope



framework after
"The 7 Habits of Highly Effective People.",
Stephen Covey



Each System is Part of its Ecosystem



Stakeholders, from Abstract to Individual Humans

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

Abstract

Systems engineering uses the term stakeholders very often. This presentation explores the concept of stakeholders. We look at abstractions that we make as well as the relation to real human beings, from flesh and blood, with their emotions, beliefs, and behavior.

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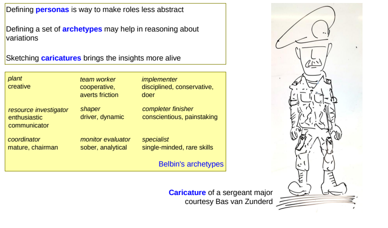
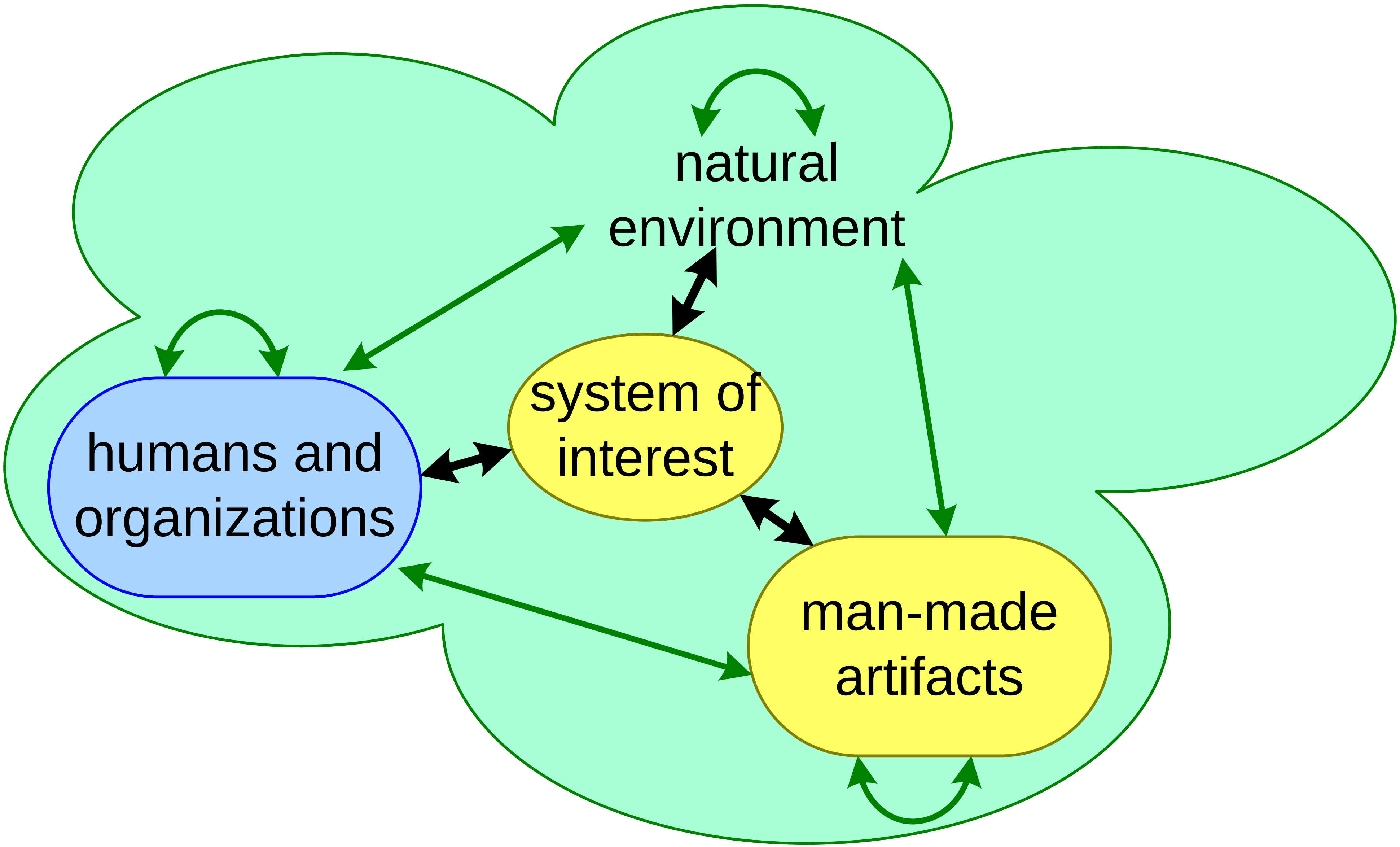
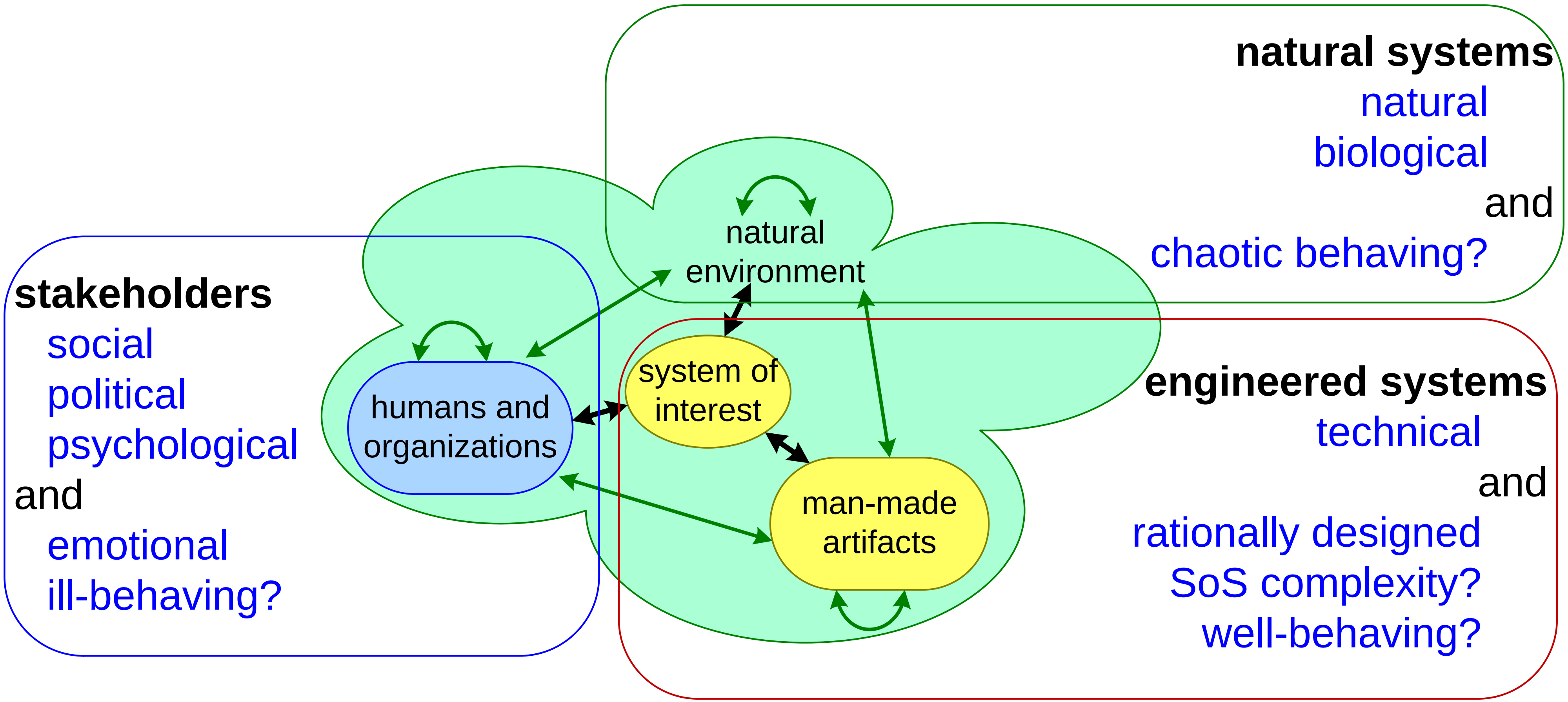


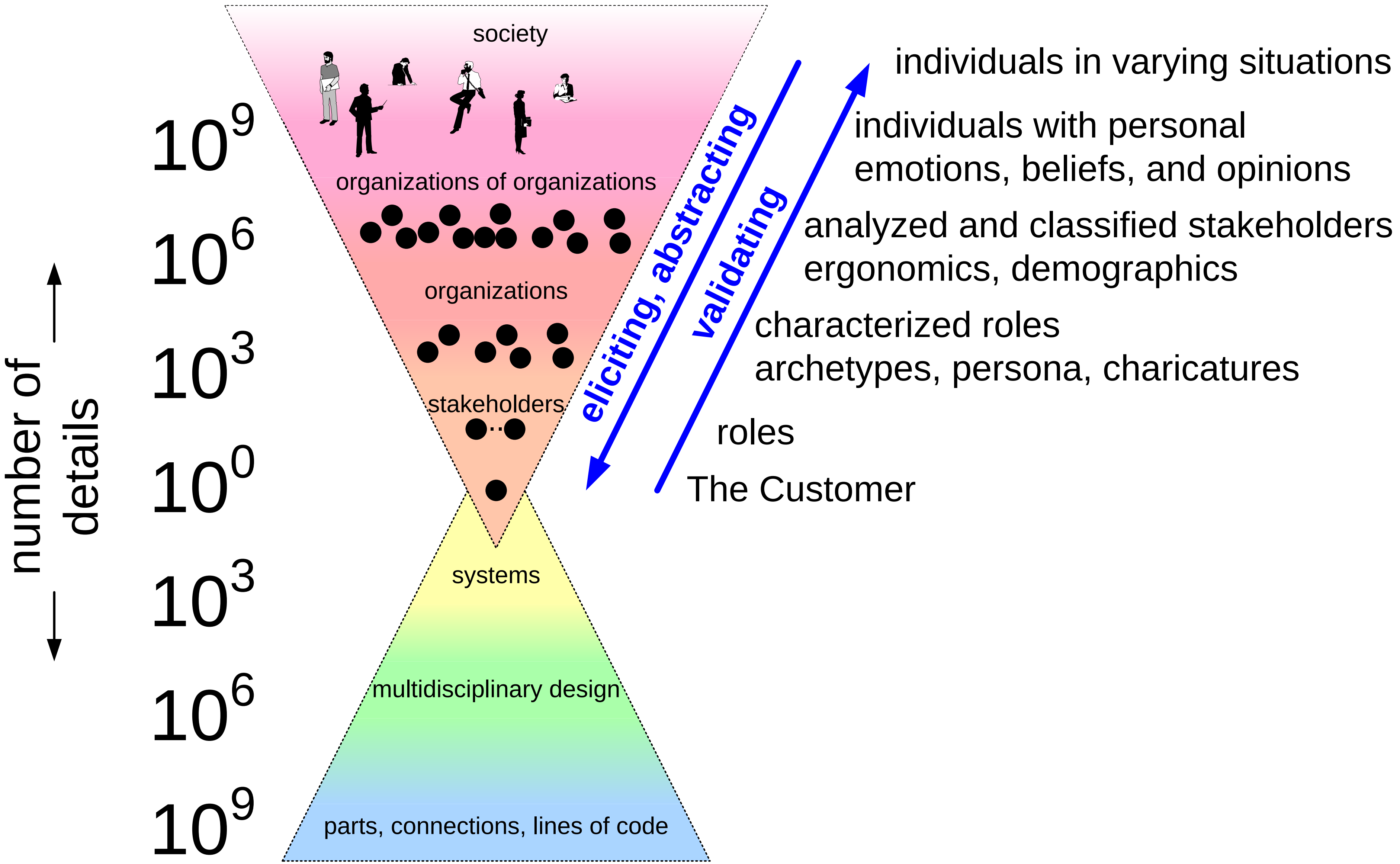
The Context of a System-of-Interest



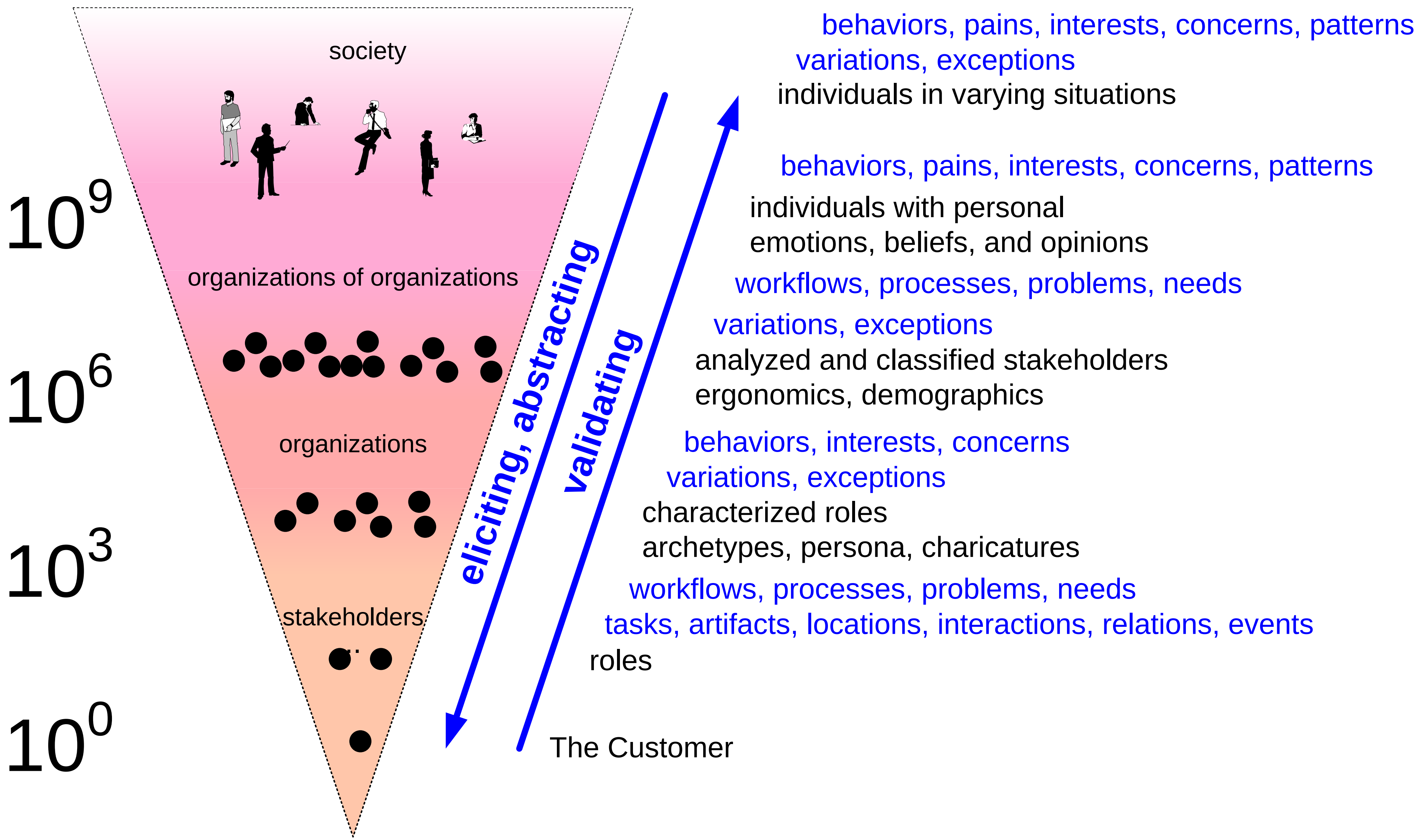
Stakeholders: Psychological and Socio-Political



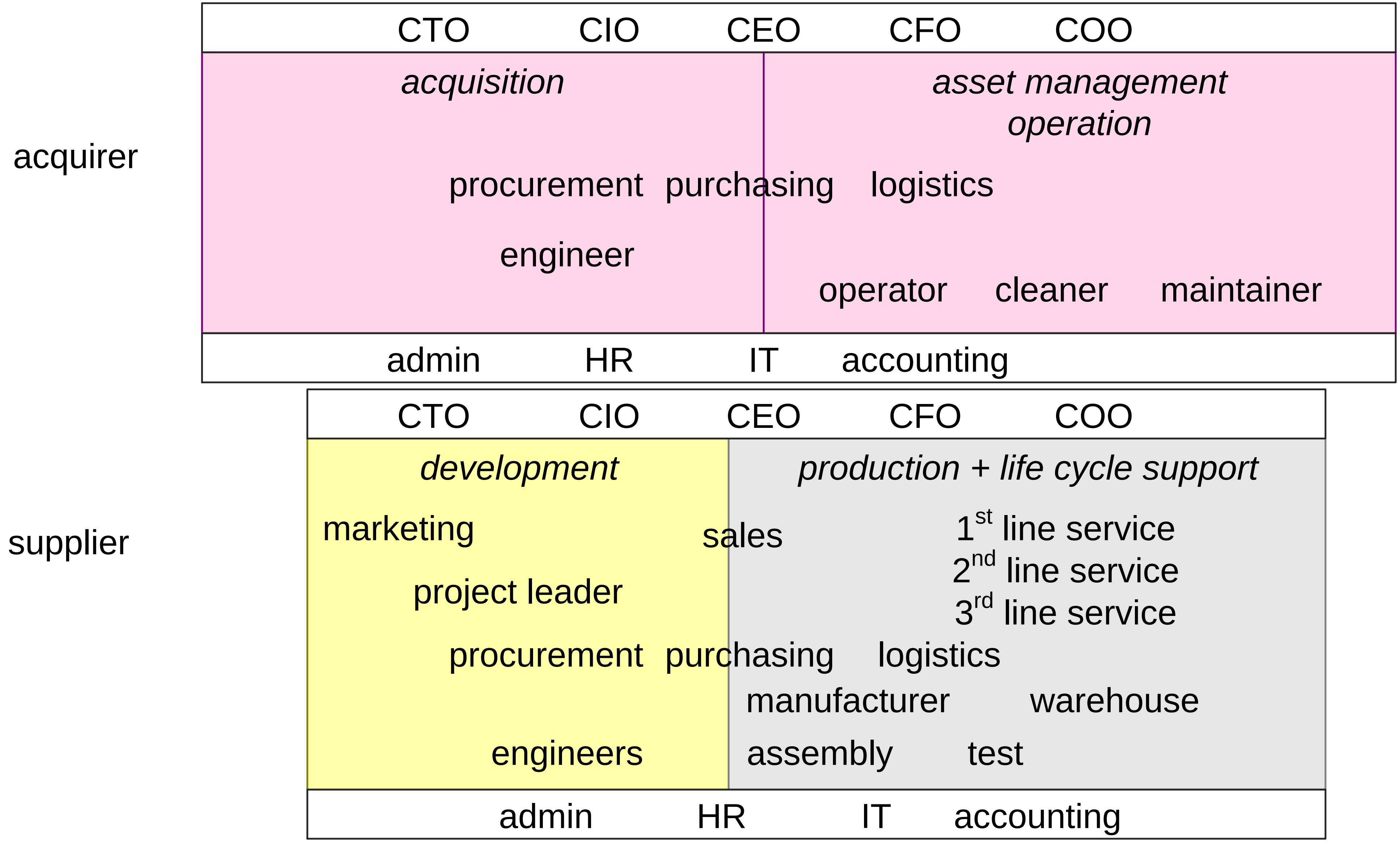
Abstraction from Humans to Roles



Elaborating What to Observe



Generic Roles Business-to-Business



Making Roles More Specific

Defining **personas** is way to make roles less abstract

Defining a set of **archetypes** may help in reasoning about variations

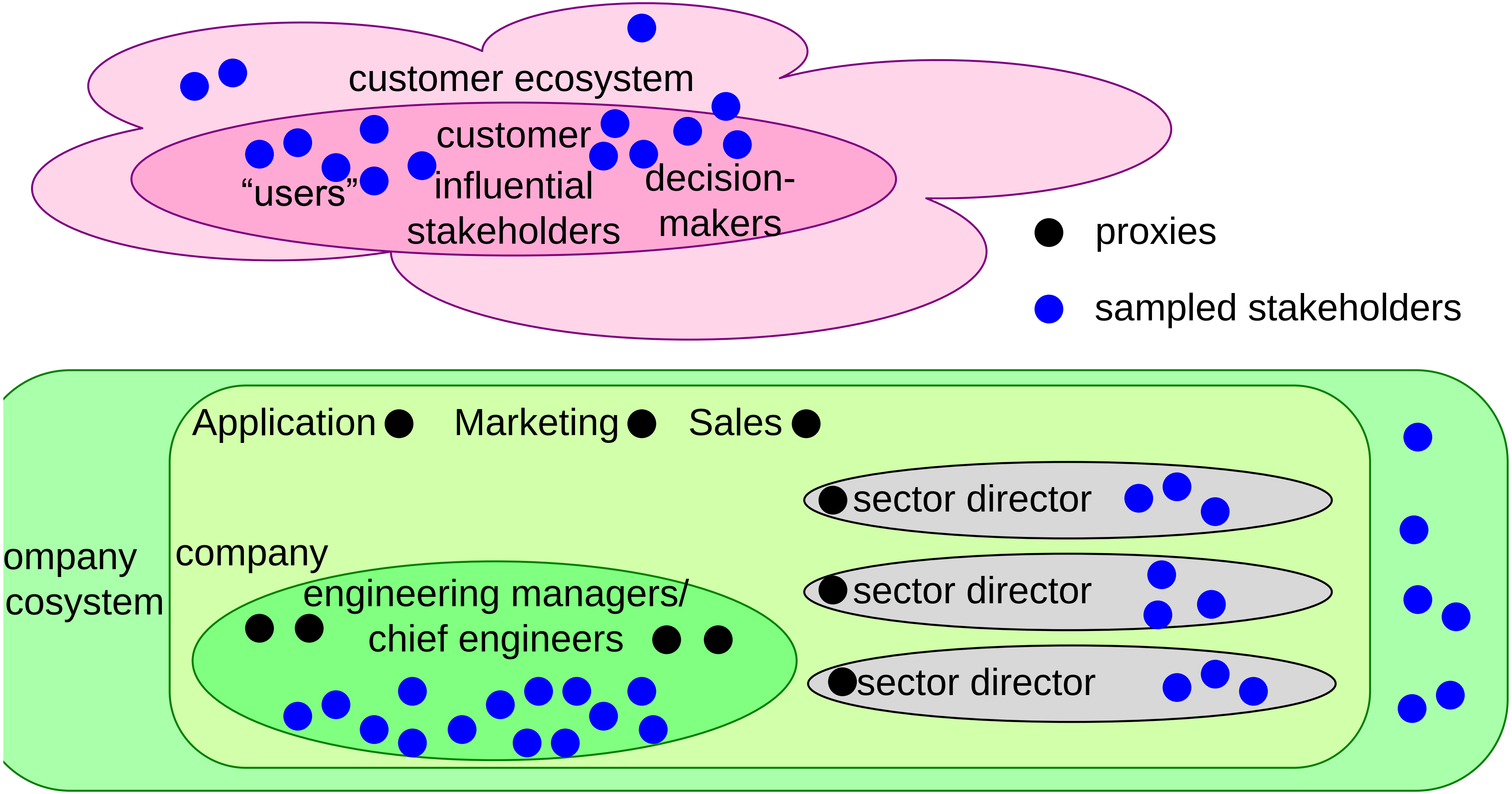
Sketching **caricatures** brings the insights more alive

plant creative	*team worker* cooperative, averts friction	*implementer* disciplined, conservative, doer
resource investigator enthusiastic communicator	*shaper* driver, dynamic	*completer finisher* conscientious, painstaking
coordinator mature, chairman	*monitor evaluator* sober, analytical	*specialist* single-minded, rare skills

Belbin's archetypes

Caricature of a sergeant major
courtesy Bas van Zunderd

Multiple People Engage Stakeholders



Multiple People Engage Stakeholders 2

- Sales: customer stakeholders with decision power or big influence
- Marketing: customer stakeholders and the wider customer ecosystem
- Application: customer stakeholders that actively work with the system
- Sector directors: (manufacturing, customer support, etc.) life cycle stakeholders and the wider life cycle ecosystem
- Systems engineers: sampling enough relevant stakeholders to work with their problem and topic of interest

How can systems engineers know what is enough sampling and what stakeholders are relevant?

Increasing Compentences to Achieve a Trustful Network

engaging more effectively with stakeholders and **building** a **network** and **trust**

empathizing with stakeholders

understanding stakeholder **pains**, **concerns**, **interests**, and **needs**

understanding what they **do**, **how** they do it, **what** they **use**, **whom** they **communicate** with

listening and **observing** stakeholders in their **environment**

Approach to Engaging Stakeholders