Fraunhofer IESE

SSA – Architecture and Agility

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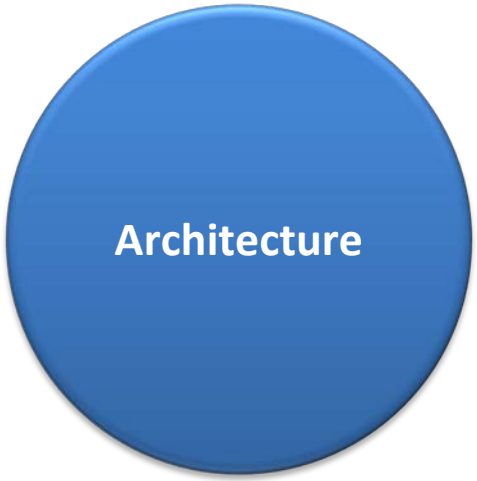
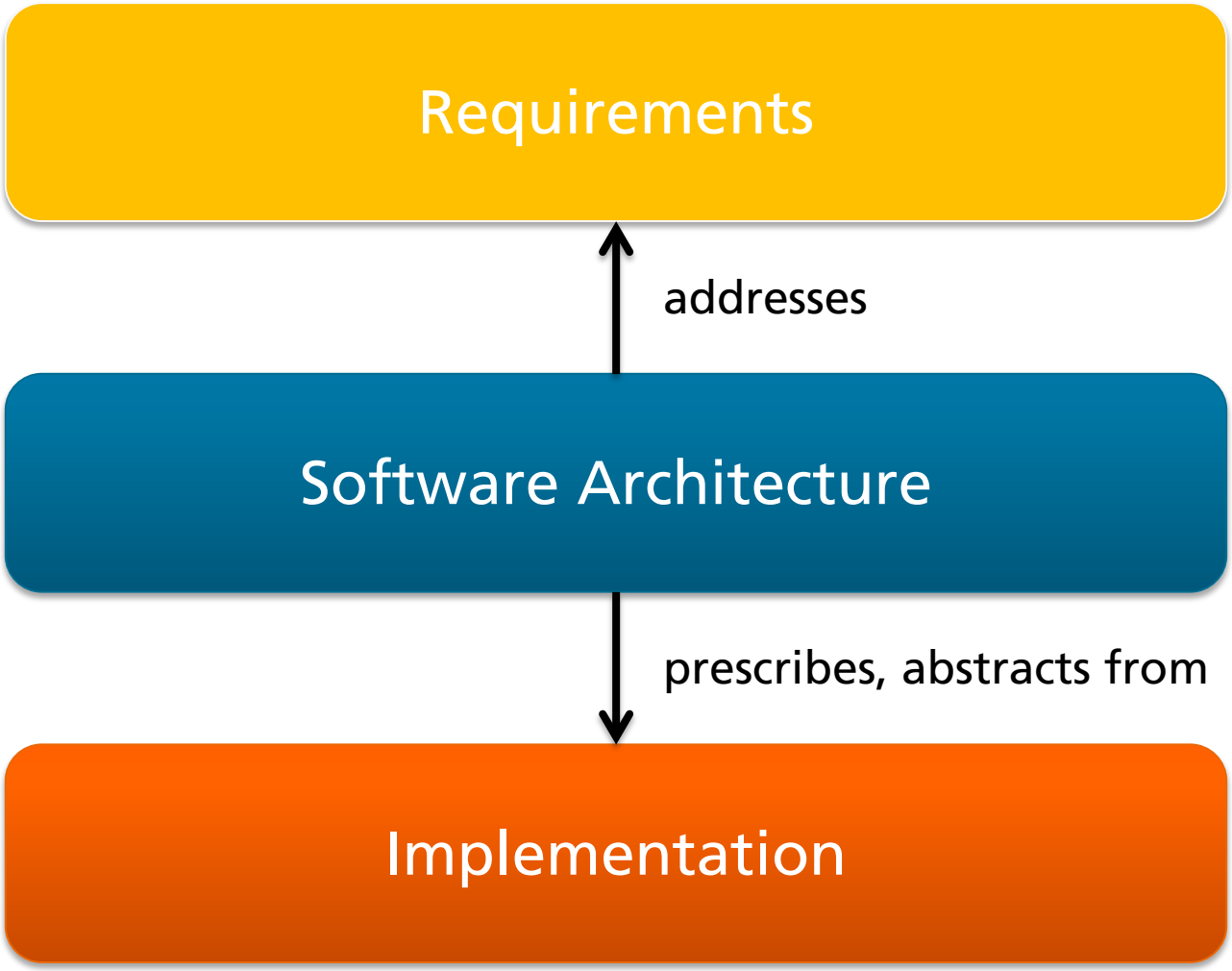
Lecture "Software and System Architecture (SSA)"

Architecture-Centric Engineering

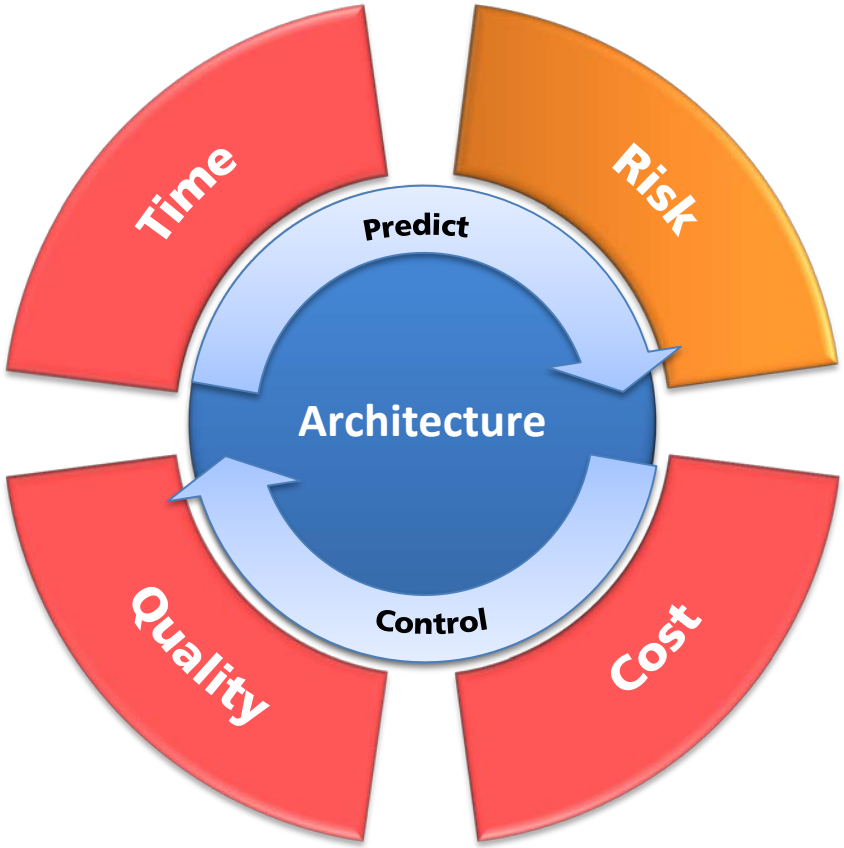
Architecture is a Central Artifact



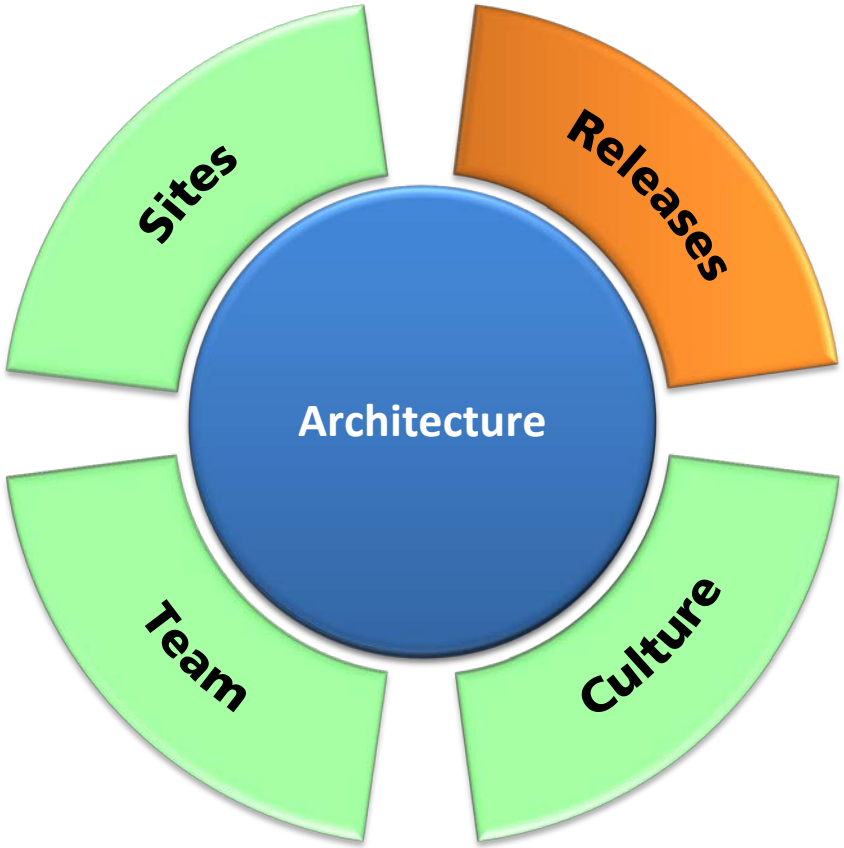
But Architecture is NOT a Stand-Alone Artifact!



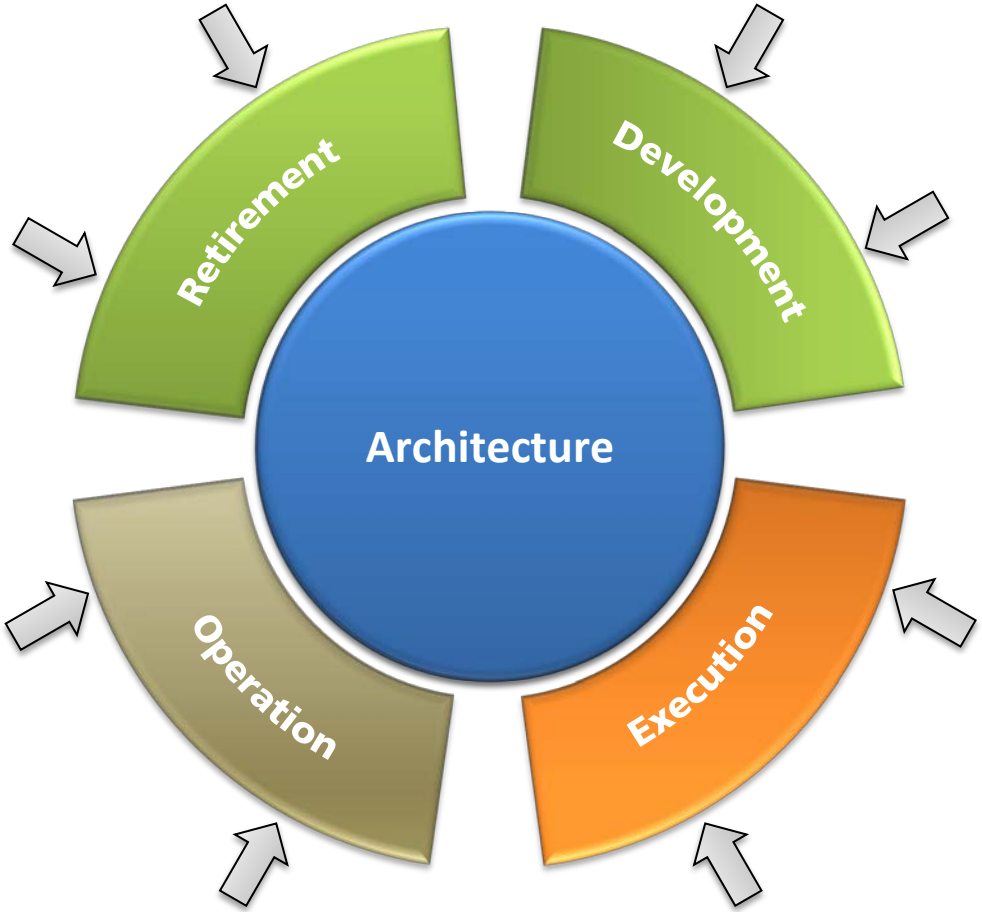
Project Management



Organizational Management

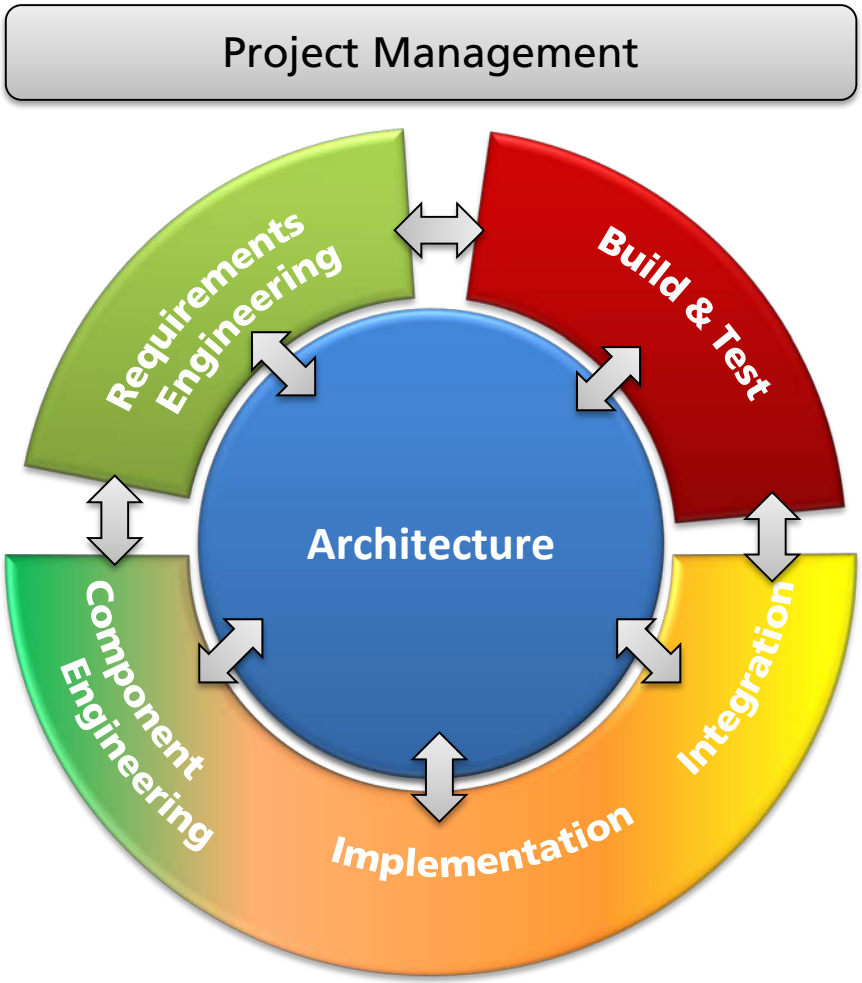


Lifecycle Management



⇨ Evolution Trigger

Development



Architecture and Agility

Agile Manifesto

Individuals and interactions over processes and tools

Working software over comprehensive documentation

Customer collaboration over contract negotiation

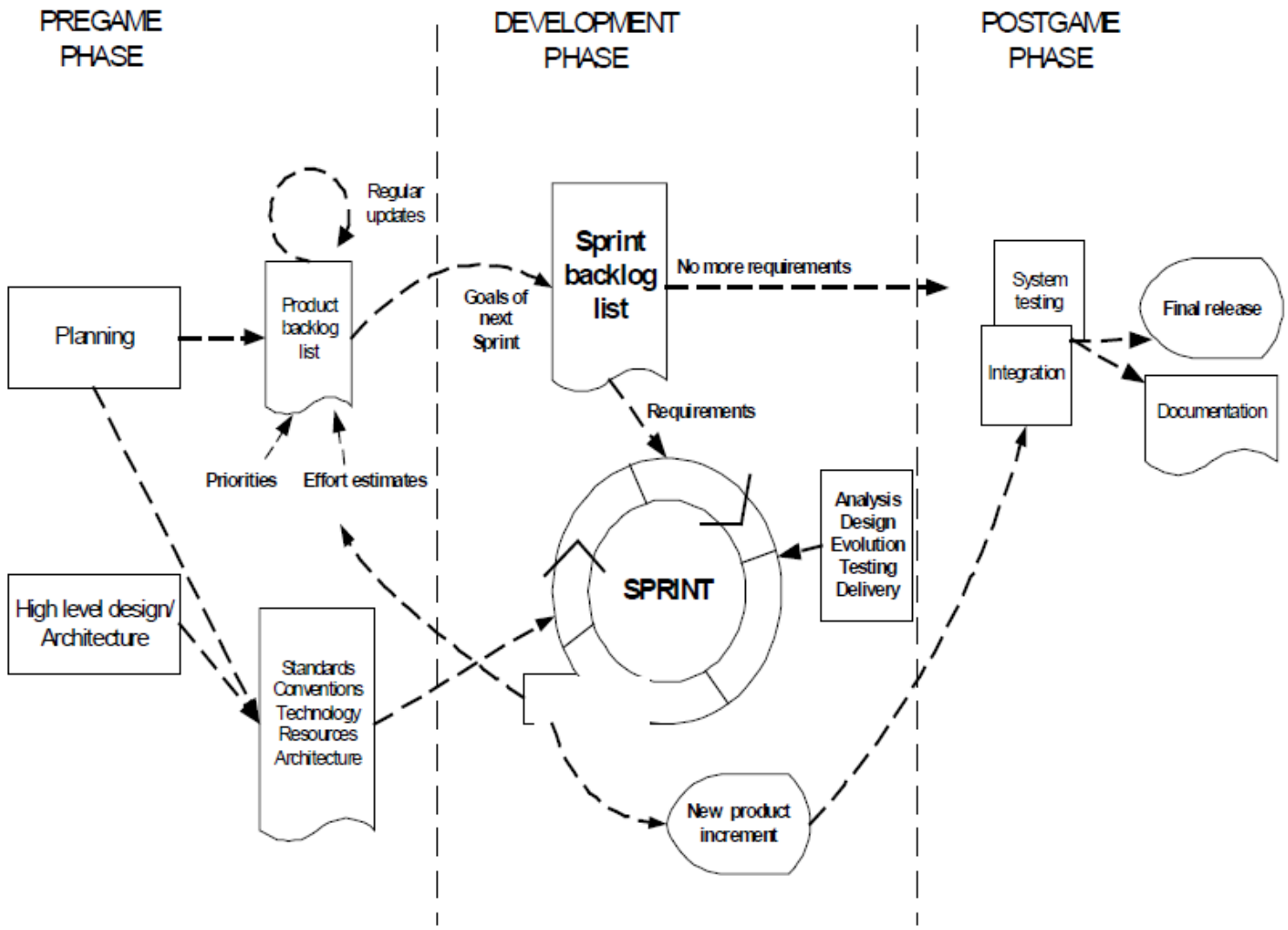
Responding to change over following a plan

That is, while there is value in the items on the right,
we value the items on the left more

[http://agilemanifesto.org/]

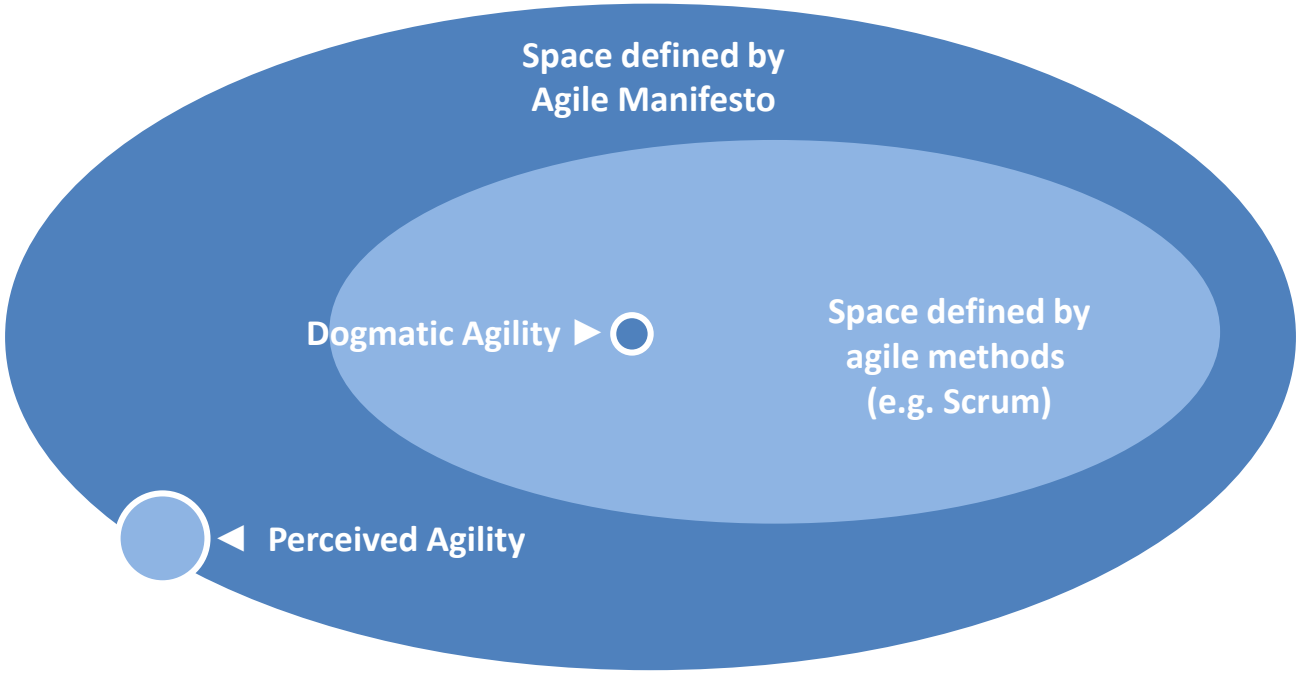
Agile Development Processes in Practice

- Scrum
  - Scrum, but…
- Kanban
- Xtreme Programming
- Lean Development
- …



http://www.vtt.fi/inf/pdf/publications/2002/P478.pdf

Different „Types“ of Interpreting Agility in Practice



Positive Observations

- Fast results
- Early customer feedback
- Value oriented development
- Change considered as unavoidable fact in software development

Characteristics of Successful Agile Projects

- Small team of skilled developers
- Developers directly talk to customers
- Architectural decisions are taken based on experience
- Coding starts very early
- Running system is delivered, discussed, and improved

Negative Observations

- Agile as excuse for..
  - Ad hoc organization
  - Development without plan
- Highly dependent on (excellent) people
- Major refactorings reduce development speed
- High maintenance cost in subsequent lifecycle

- Does not scale to large-scale projects without adaptations
- Does often not lead to maintainable systems
- Does not allow changing developers
- Does not lead to uniform solutions

Common Anti-Patterns

- Planning with only one iteration in mind
- Customer value overrated, long term business value neglected
- Code considered as the only documentation
- Every requirement should be completely changeable
- Volatile organizational structures are considered agile
- Wrong productivity assumptions
- Self organizing team = No process

[*K. Krogmann, M. Naab, O. Hummel*; "Warum viele Organisationen weniger agil sind, als sie denken"; Business Technology 2.14; 2014]

Code considered as the only documentation

- "Code is documentation"
  - There are other stakeholders than developers
  - Separation of concerns hardly possible
  - Missing abstraction
  - Missing documentation of rationales
  - Basis for long-term maintenance and evolution?

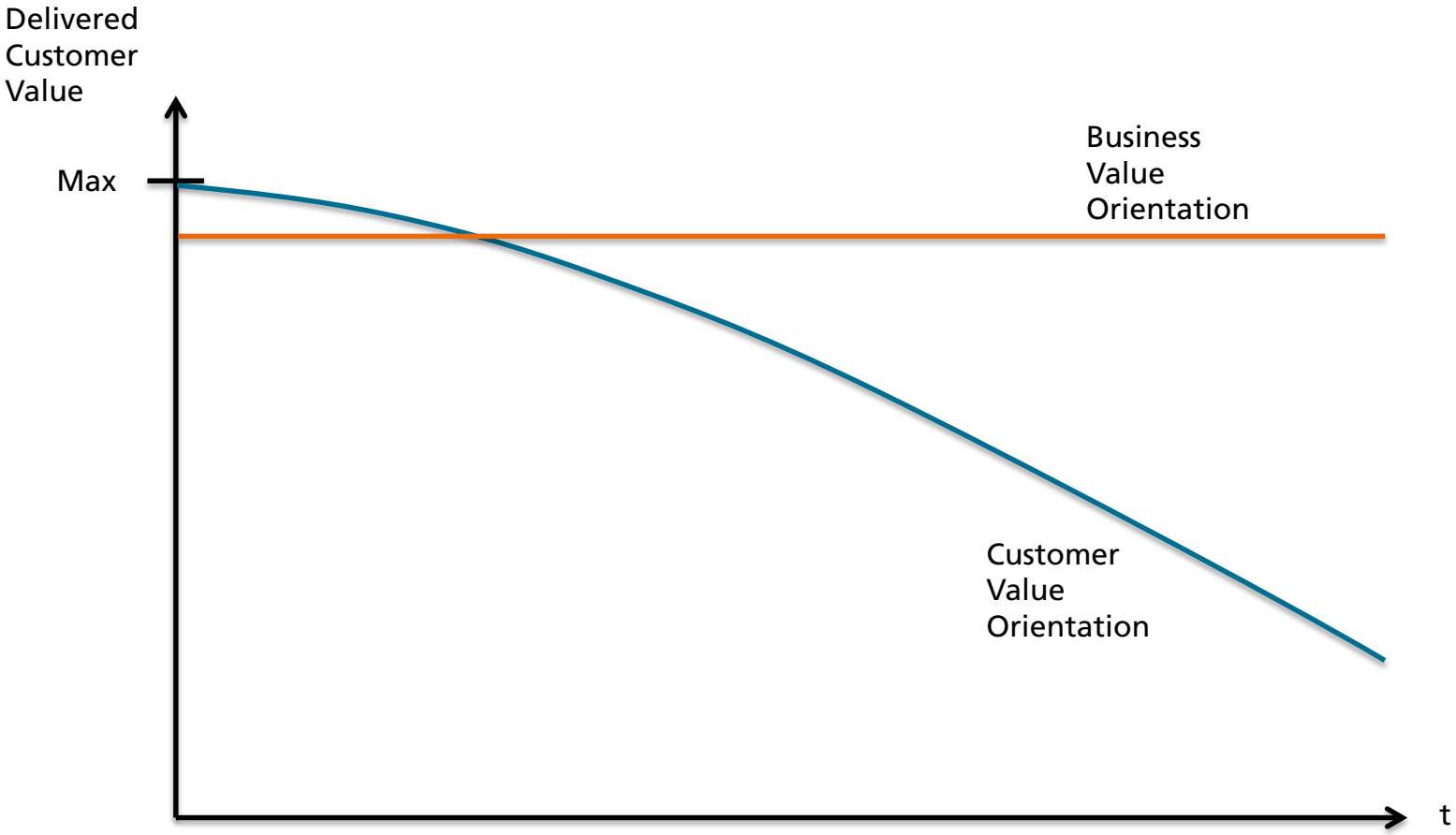
Business Value over Customer Value

- Agile companies often only look at customer value
- They should look at business value (for their own company), too

- **Business Value =**
  Customer Value +
  Future Ability to deliver Customer Value

  (parallel customers, low effort, high-speed delivery, …)

- Thus, there needs to be a counter-part to „feature-oriented only“ POs



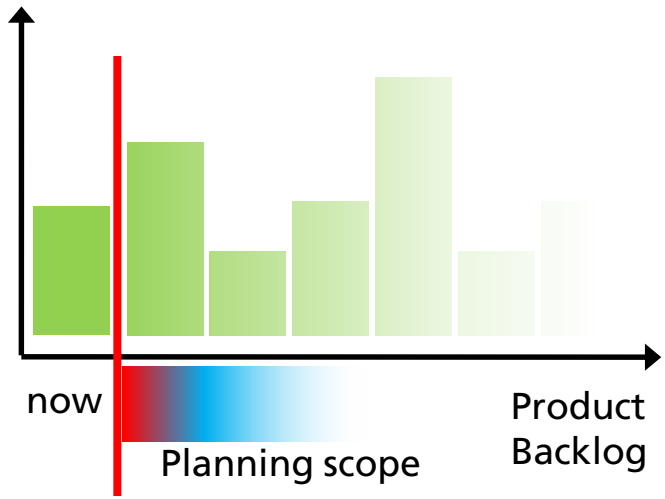
Planning with only one iteration in mind

Short-term architectural solutions: Planning only with next sprint in mind

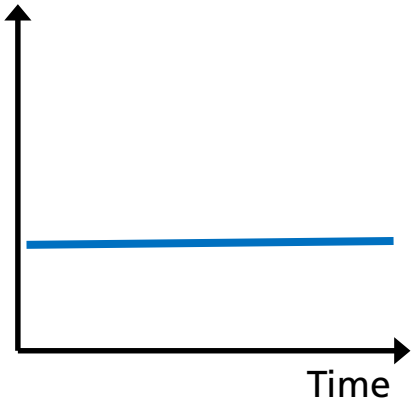
Global architectural changes within every sprint

Expensive global refactoring (up to 50% refactoring per sprint)

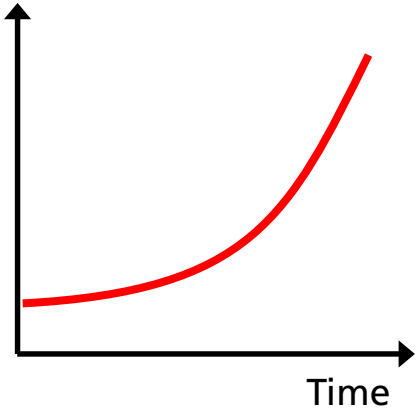
Architectural Impact



Architecture Decisions per Increment



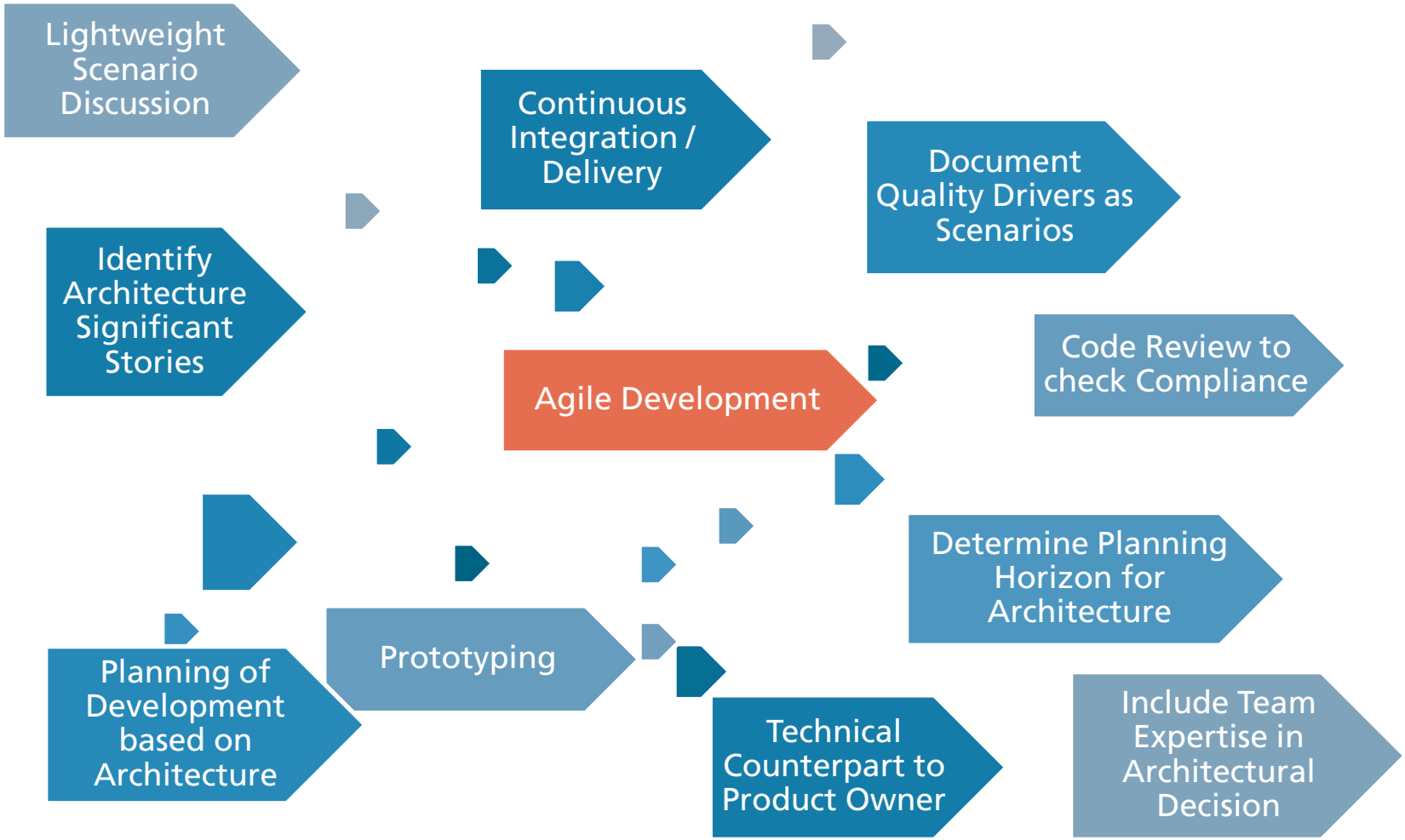
Effort per Increment



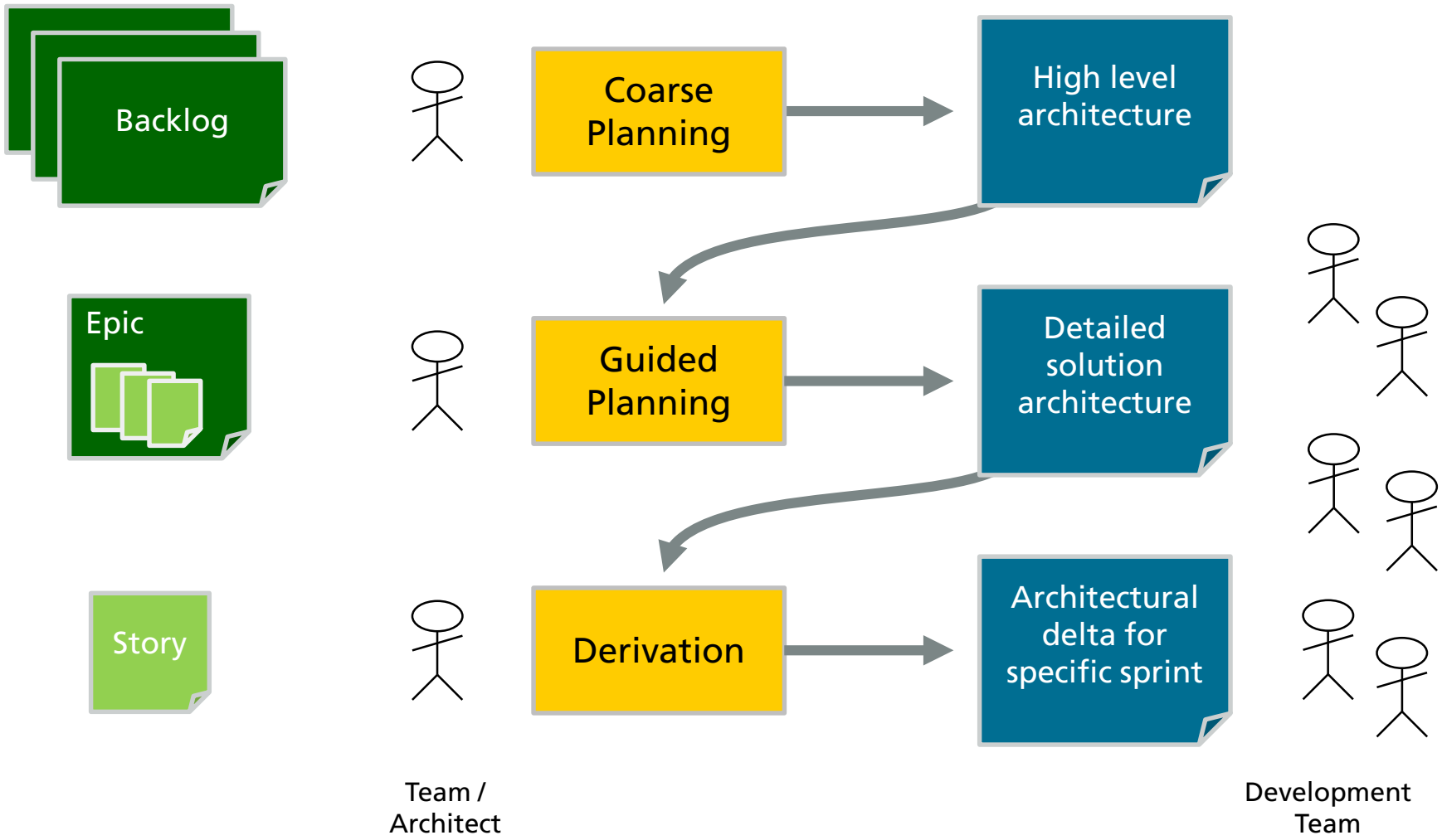
Architecture Work in Agile Environment

- "As little as possible, as much as needed"
- Planning
  - Use available knowledge
  - Risk-based approach → mitigate risks
- Structuring
  - Enable definition of work packages
  - Guide development
- Actively deciding what is decided anyway
  - "You cannot prevent architecture"
  - "You can only prevent an inappropriate architecture
- Always adjusted to organization and project situation

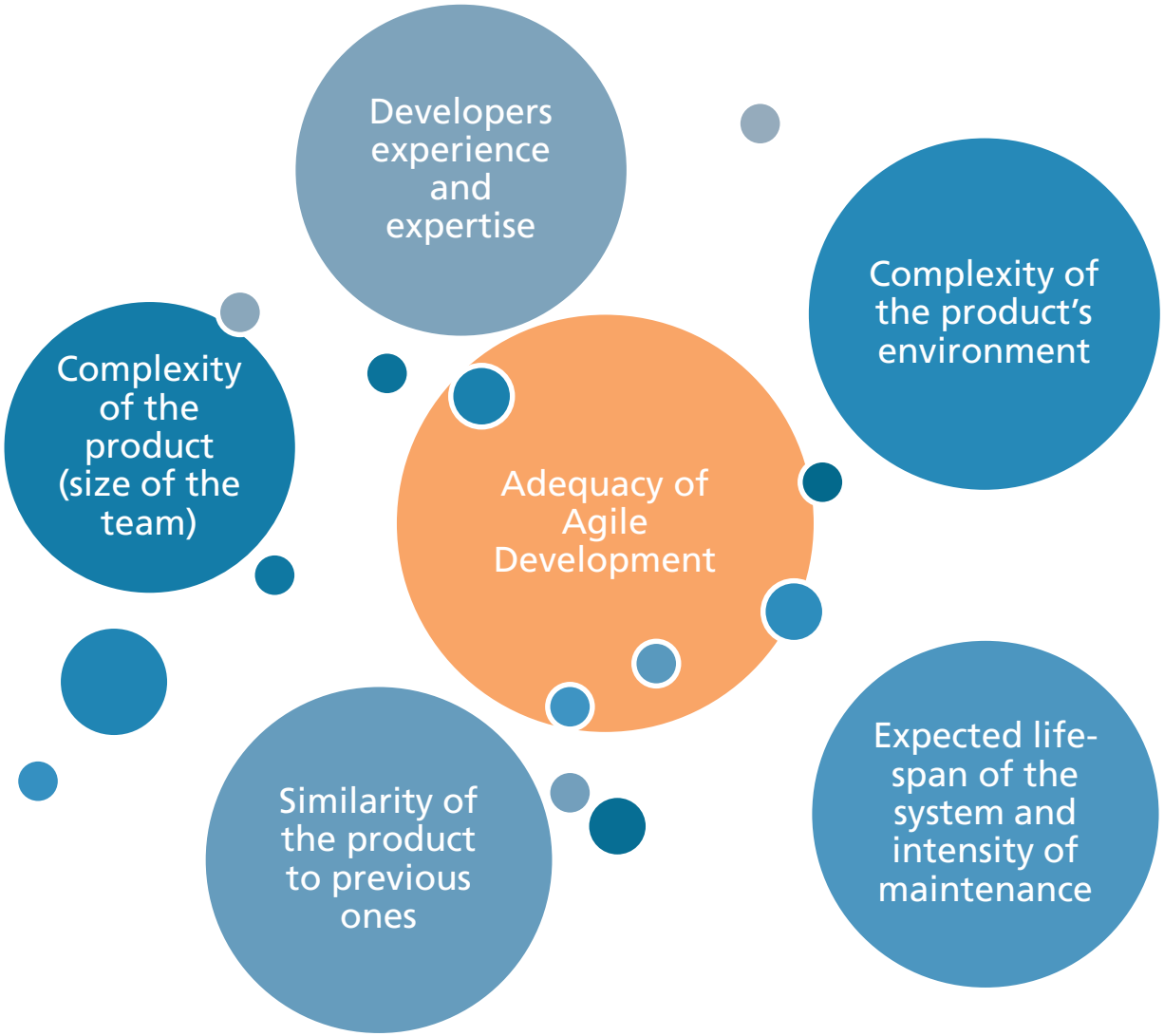
Architecture Best Practices for Agile Development



Exemplary Architecture Planning in Agile Development



Influence Factors for Adequacy of Agile Development



Things to Remember about Agile Development

- You have to care about the quality attributes of your system!
- You always make architectural decisions…
  - … during architecture design or implementation
- Your architectural decisions get manifested in your implementation
- Don’t rely too much on refactoring
  - It can be very effort-intensive
  - Not all architectural decisions can be refactored
  - It might compromise your architecture

→ Plan upfront, at least to a certain extent

Discussion

- What characterizes a good architect?

BEST JOBS IN AMERICA

Money/Payscale.com's list of great careers 2010

Full List | High Pay | Job Growth | Quality of Life | Sectors

1. Software Architect

1 of 100 Next

Top 100 rank: 1
Sector: Information Technology

What they do: Like architects who design buildings, they create the blueprints for software engineers to follow -- and pitch in with programming too. Plus, architects are often called on to work with customers and product managers, and they serve as a link between a company's tech and business staffs.

What's to like: The job is creatively challenging, and engineers with good people skills are liberated from their screens. Salaries are generally higher than for programmers, and a typical day has more variety.

"Some days I'll focus on product strategy, and other days I'll be coding down in the guts of the system," says David Chaiken, 46, of Yahoo in Sunnyvale, Calif., whose current projects include helping the web giant customize content for its 600 million users. Even though programming jobs are moving overseas, the face-to-face aspect of this position helps cement local demand.

PHOTO: DAVID LAURIDSEN

Chaiken, a software engineer for more than two decades, relishes the more collaborative work.

What's not to like: You are often outside the management chain of command, making it hard to get things done.

Requirements: Bachelor's degree, and either a master's or considerable work experience to demonstrate your ability to design software and work collaboratively.

What Architects Should be…

Software designer

Domain expert

Software architect

Standards expert

Technology expert

Software Engineering economist

Leader and manager

What Architects do…

Communicate with stakeholders

Develop project strategy

Software architect

Lead

Design systems

Prototype spike solutions

Evaluate technologies

An Architect's Skills…

Engineering skills

Organizational skills

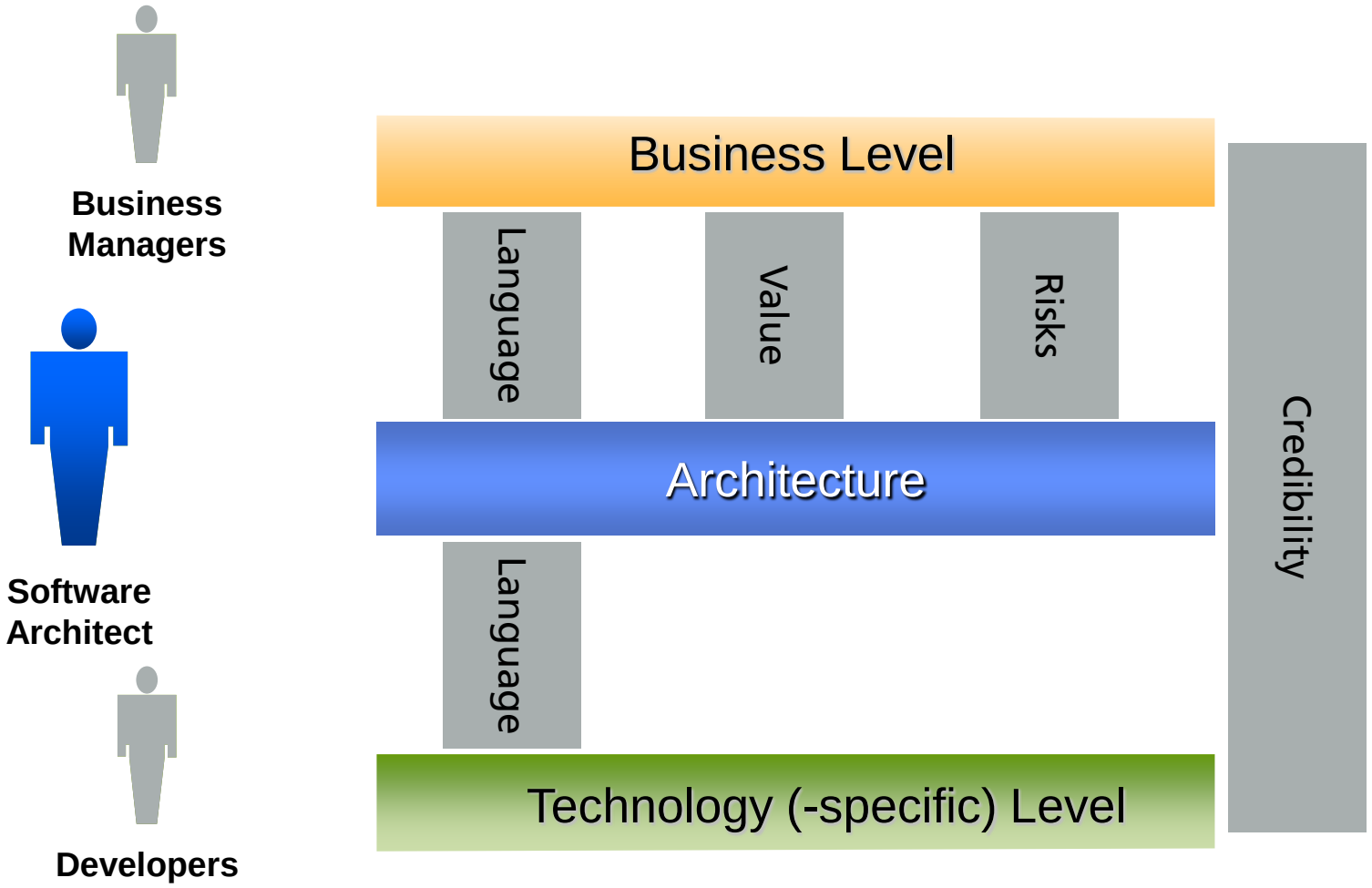
Software architect

Interpersonal skills

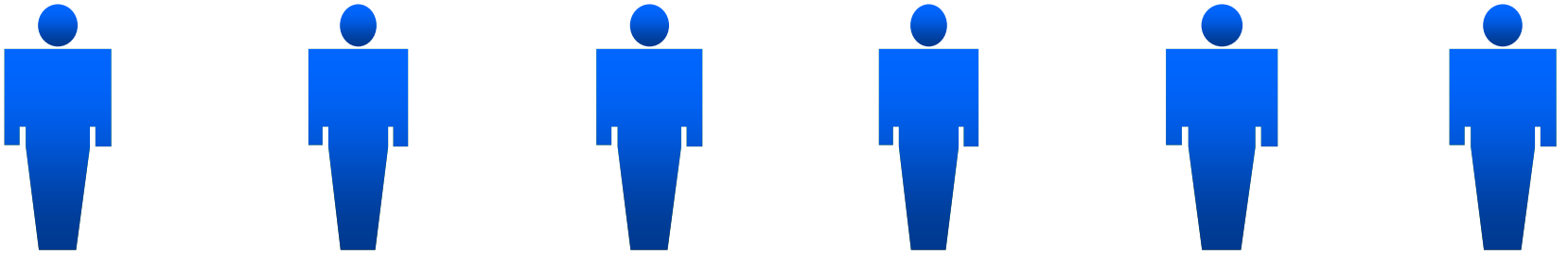
An Architect's Skills…

- … and, most important, **communication skills**!

Architect as a Mediator and Communicator



Types of Architects



Project architect | **Application architect** | **System architect** | **Enterprise architect** | **Software architect** | **… architect**

- → Determines scope, role, responsibility, and relationships
- → Depends on the organization, goals, products, …
- → Terms vary!!!

An Architect's Goals…

Meet time, budget and quality

→ Happy project owner!

Design adequate solutions for the requirements

→ Happy customers and users!

Software architect

Design testable, producible, and shippable software (variants)

→ Happy internal stakeholders!

Break-down complexity in manageable, integratable frames open for creative solutions

→ Happy engineers


architecture
software
development
systems
requirements
time
Architecture
product
quality
technologies
system
decisions
design
like
business
generation
projects
evolution
processes
Fraunhofer
practices
making
Tekla
particular
aspects
basis
challenges
architectural
IESE
organizations
Systems
technology
products
many
results
level
make
clear
architecture-centric
SAVE
control
evaluation
implementation
organization
context
packages
goals
activities
need
usage
engineering
key
Therefore
competencies
support
use
one
architectures
customers
information
models
Engineering
services
compliance
provide
order
terms
documentation
help