



All Architecture Evaluation is not the Same

Lessons Learned from more than 50 Architecture Evaluations in Industry



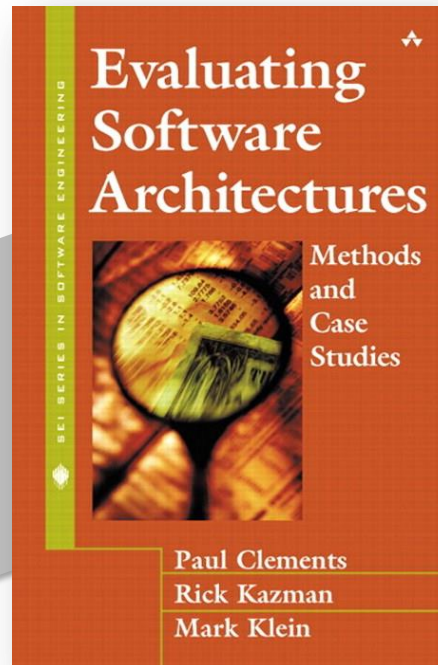
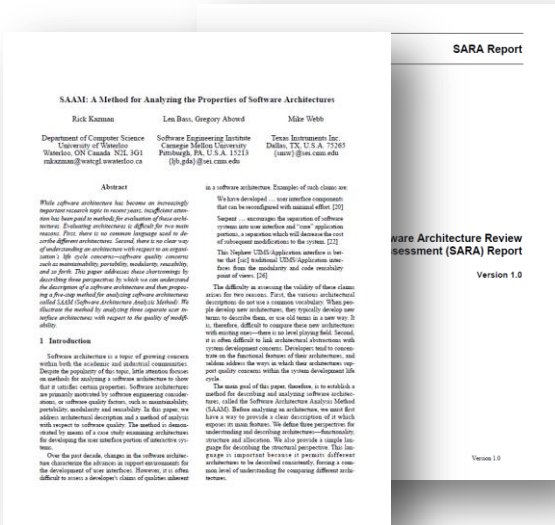
Matthias Naab

May 2, 2013
SATURN 2013, Minneapolis

Fraunhofer IESE



Architecture Evaluation is a Mature Discipline ...



... but only few Practical Examples Published

Fraunhofer IESE

> 50 Architecture Evaluations

2004 - 2013

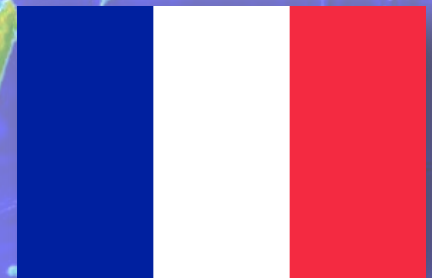
Goals of this Talk

Complement literature

Share experiences with other practitioners

Give empirical evidences

Companies in these Countries Involved





Fibu.NET | Fiktion | Standard | Fiktion | Einkauf | Kaufmann | K&P | Themen | F&F | Einkauf | Fiktion | Hilfe

Standard | Buchhaltung | Bilanz - Vorgabe HGB | Bilanz | 19.06.2011 09:23:57 | 2011 | Vorgabe vom 19.06.2011 | Bilanz | 19.06.2011 09:23:57 | 2011 | Bilanz | 19.06.2011 09:23:57 | 2011 | Bilanz | 19.06.2011 09:23:57

Bilanz - Vorgabe HGB

Konto	Beschreibung	HGB	Vorgabe HGB	Passive	Aktive	HGB	Vorgabe HGB	Passive	Aktive	HGB	Vorgabe HGB
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Systems under Evaluation: Code Base

```
public class RelationInfoView extends DetailView {
```

```
    private Action csvExport;
```

```
    protected Rel
```

```
    public Relat
```

```
}
```

```
public static final String[] HEADERS = { "Origin Folder", "Origin Component", "Origin Routine", "Origin Variable",  
    "Target Component", "Target Routine", "Target Variable", "Relation Type", "Evaluation Type", "Point In Time
```

```
@Override
```

```
public void c
```

```
    super.cre
```

```
    csvExport
```

```
    @Supp
```

```
    public
```

```
        ArrayList<String> result = new ArrayList<String>();  
        result.add(arrayToString(HEADERS));
```

```
        targetFile += "_" + new SimpleDateFormat("yyyy-MM-dd HH.mm.ss.SSS").format(new Date()) + ".csv";  
        saveFile(targetFile, result);  
        showMessage("Results saved to " + targetFile);  
    }
```

Size: 10 KLoC – 10 MLoC

Languages:

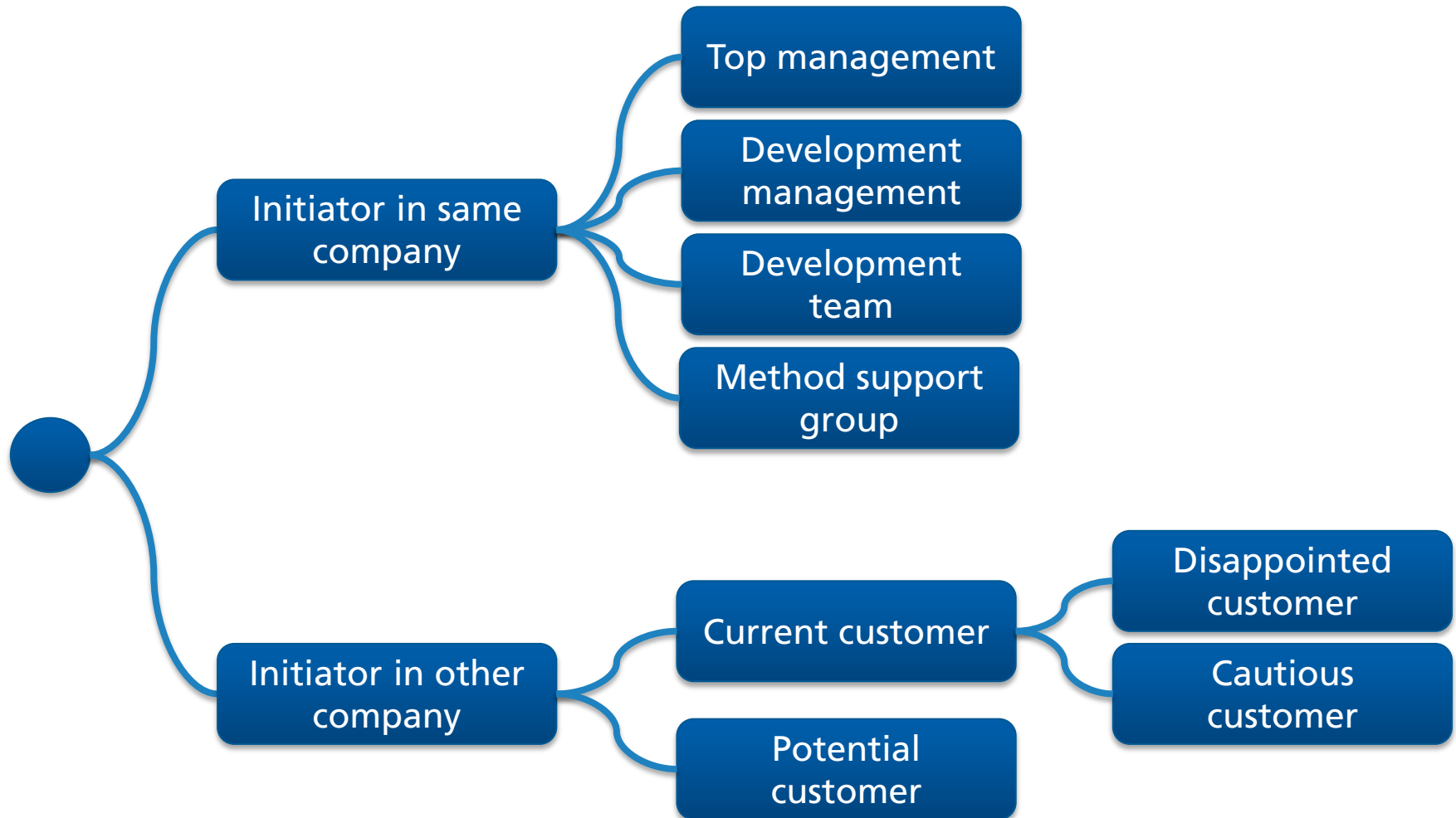
Java, C, C++, C#,

Delphi, Fortran, Cobol, Gen

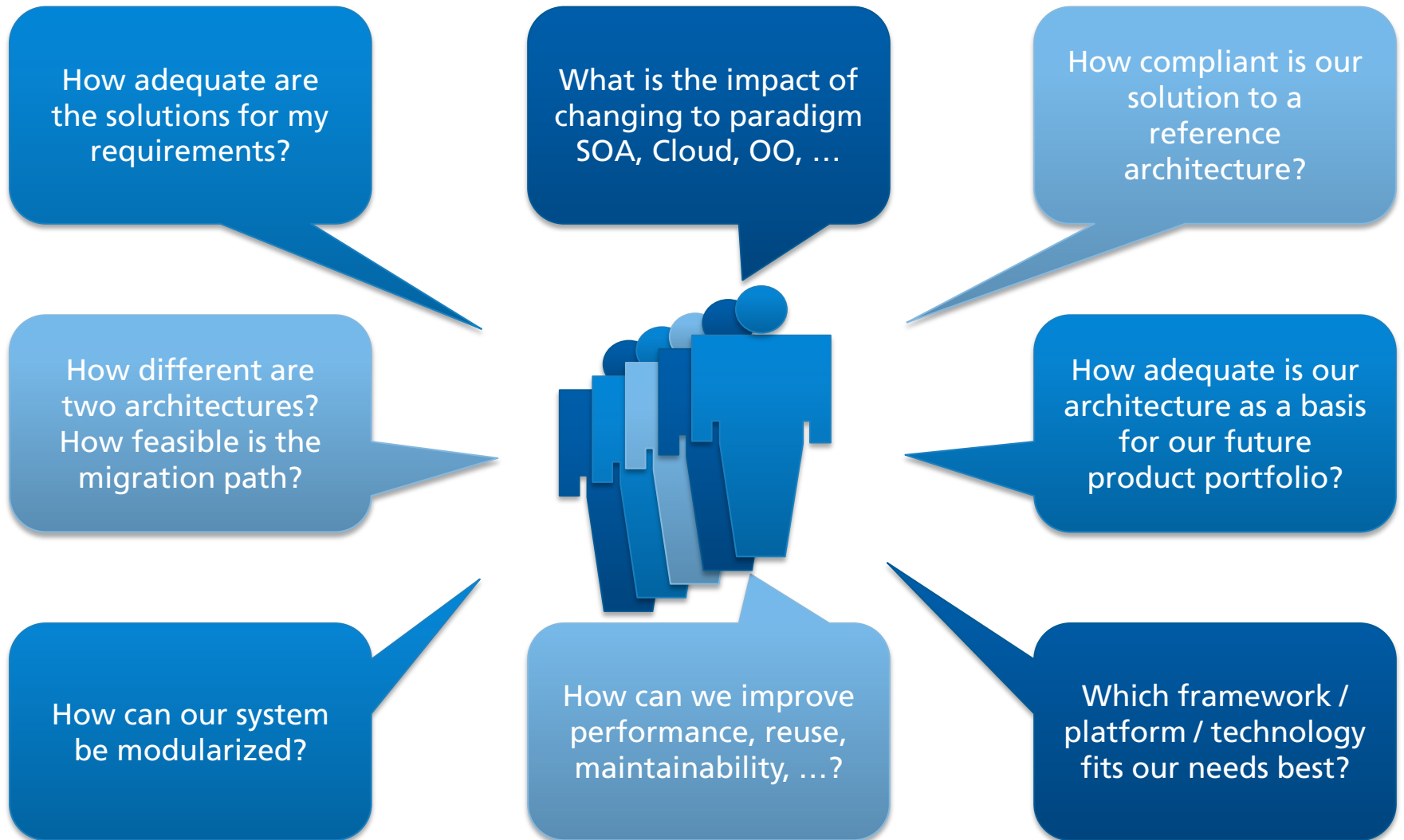
Age: 0 years – 30 years

Initiation of Architecture Evaluations

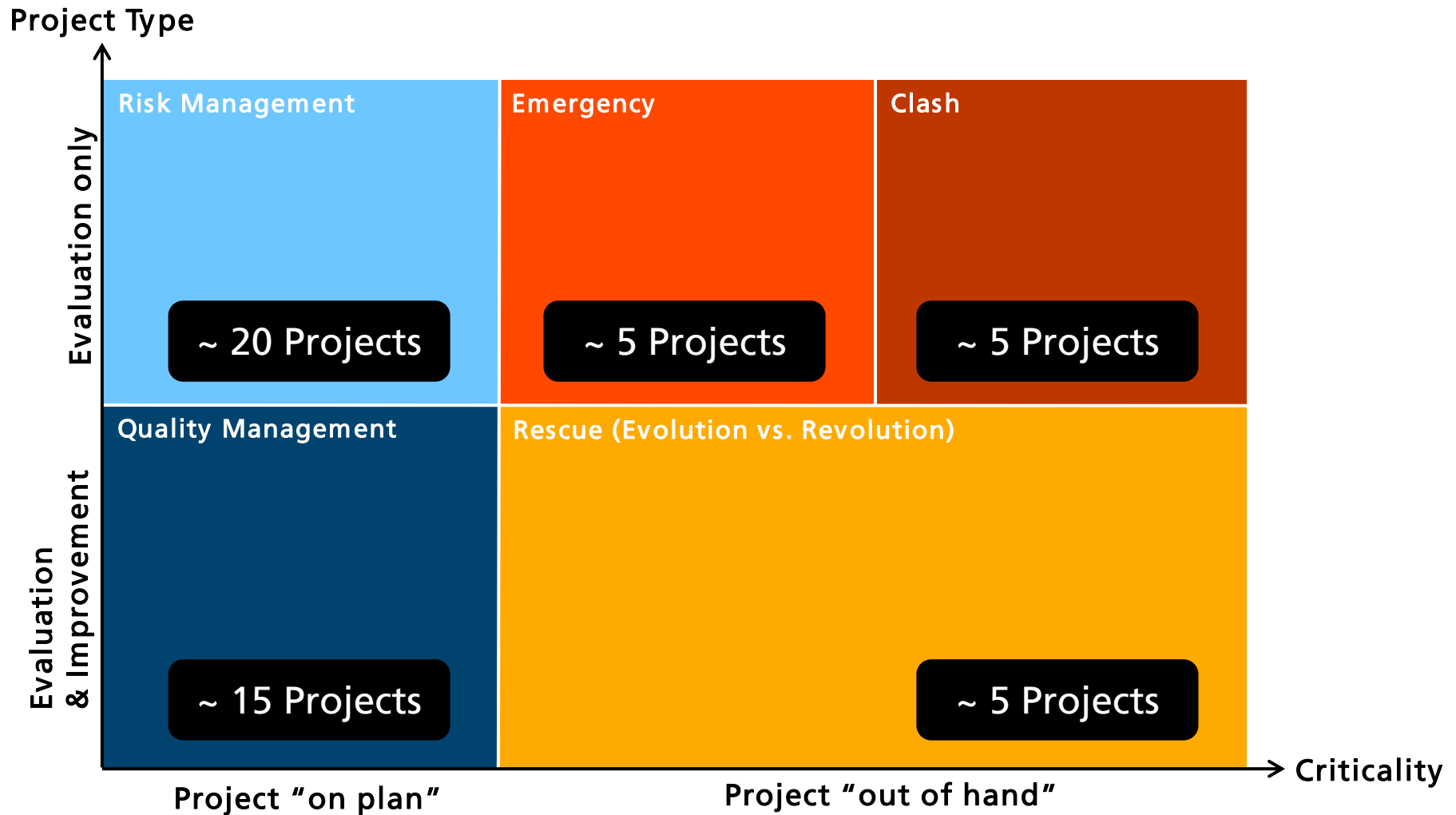
Initiator of Architecture Evaluation



Typical Goals and Evaluation Questions

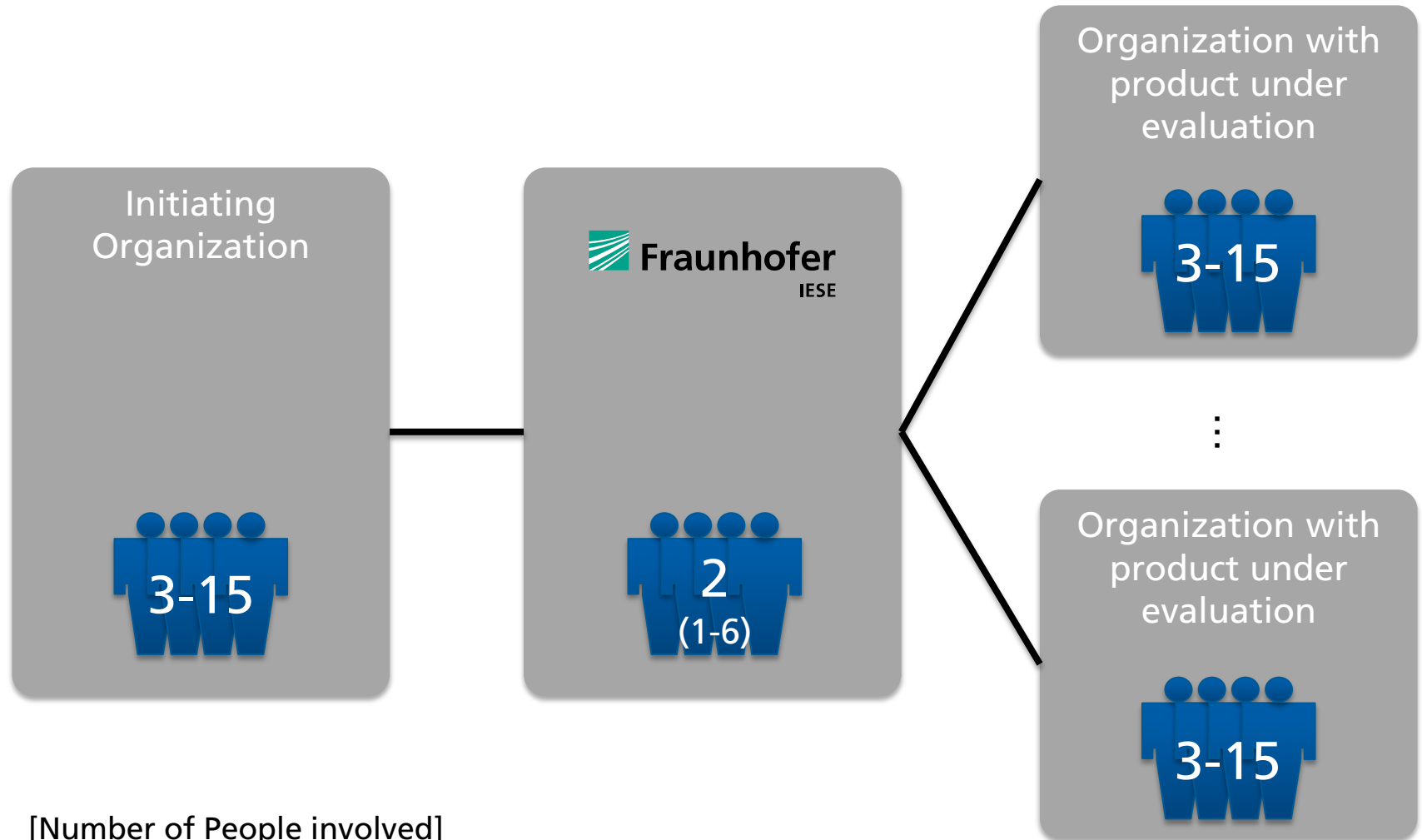


Initial Situation of Architecture Evaluation

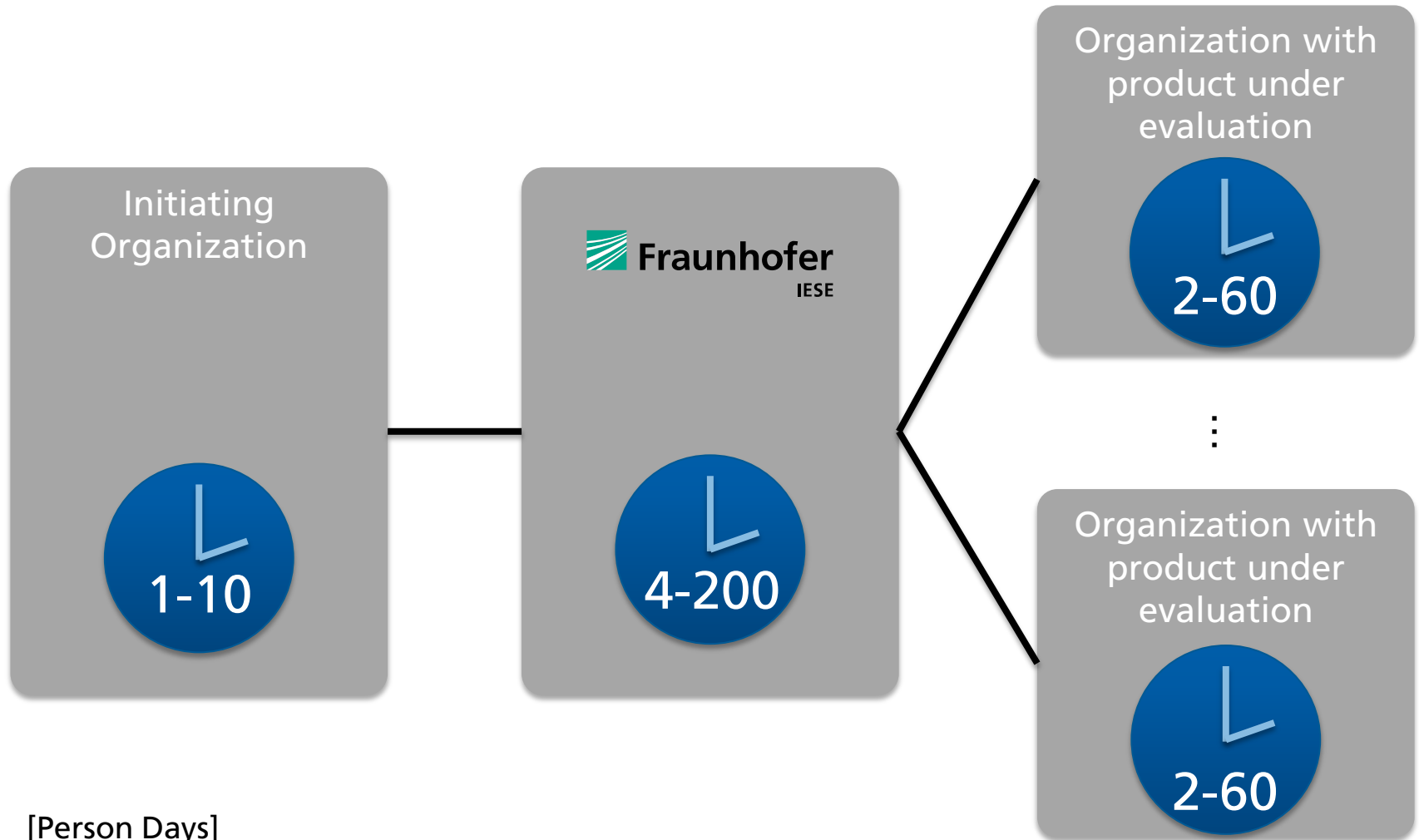


Setup of Architecture Evaluation Projects

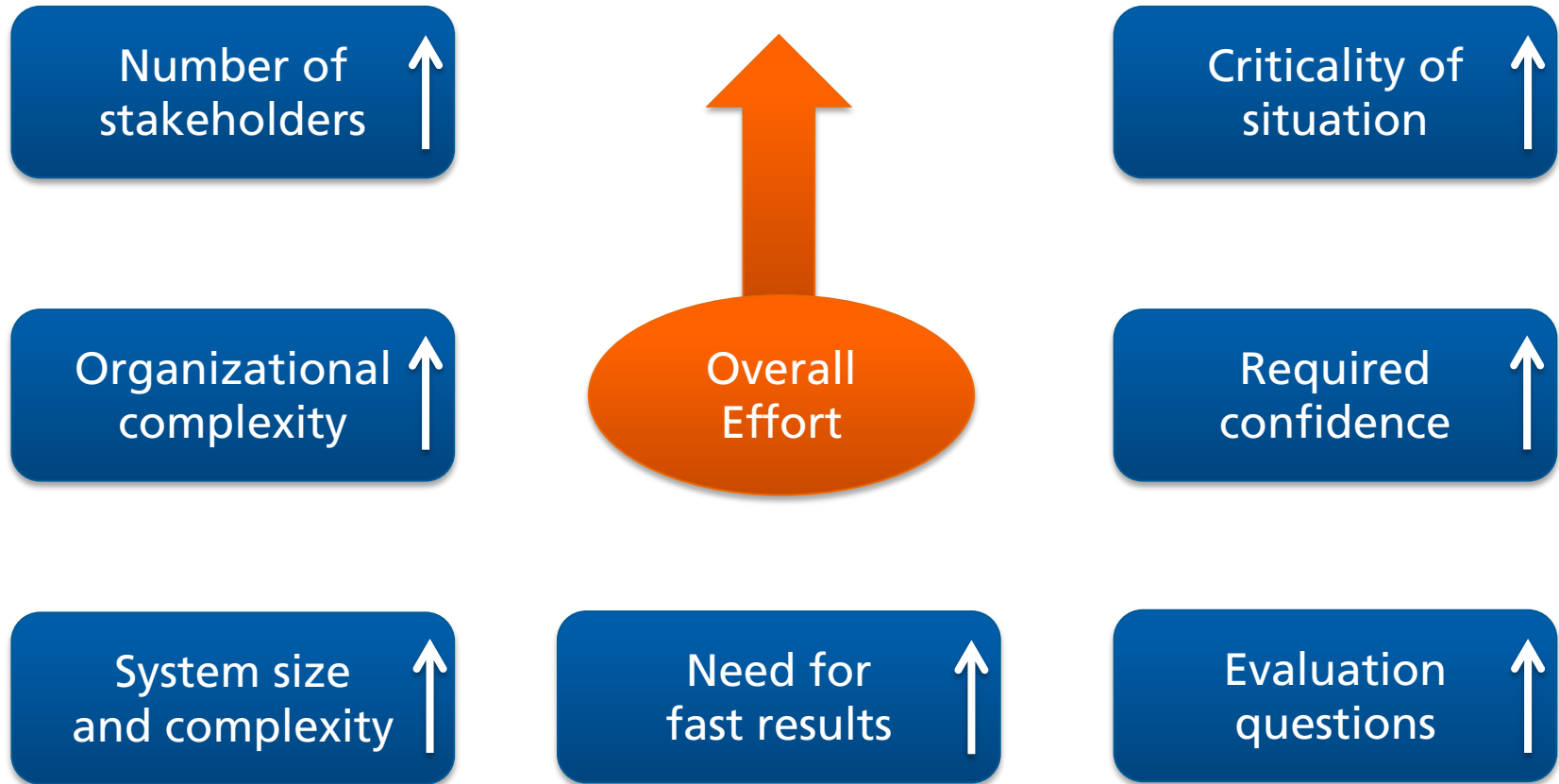
Organizational Constellation of Evaluations



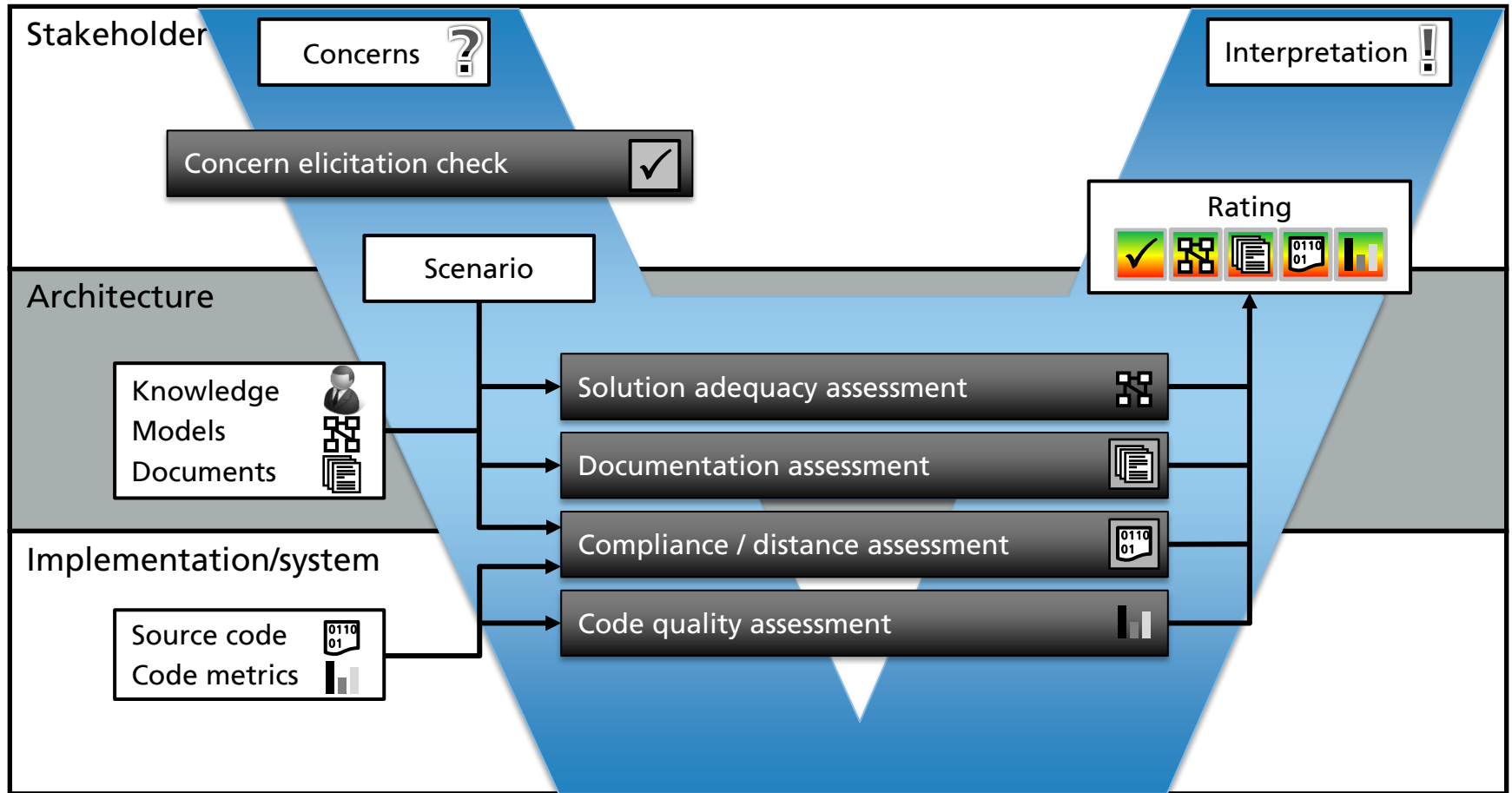
Effort Spent on the Evaluation



Factors Driving Effort for Architecture Evaluation



Overview on Architecture Evaluation Approach



Outcome of Architecture Evaluations

Findings: Requirements that are Often Neglected

Runtime Quality Attributes

Typically known

Partially missing
quantification

Often addressed
well

Devtime Quality Attributes

Often not
explicitly known

Often hard to
quantify

Often not
addressed well

Operation Quality Attributes

Typically not
explicitly known

Partially missing
quantification

Often not
addressed well

Findings: Adequacy of Architectures under Evaluation

Architecture typically not thoroughly defined

Often Emergency or Rescue projects

Architecture often not fully adequate any more (older systems)

Architecture thoroughly defined and maintained

Often Risk Management or Quality Management projects

6

11

16

[33 solution adequacy assessments]

Findings: Aspects that are „Over-Elaborated“

Technical Architecture

Specification of general architectural styles

Selection of technologies

Over-Elaborated

Business Architecture

Definition of concrete components or guidelines how to define them

Mapping of concrete functionality to technologies

Neglected



Findings: Architecture Documentation



Architectural
Requirements

Often not
available

Often very good
knowledge

Architecture

Often not
available

Often very good
knowledge

Implementation

→ Missing uniformity, lack of compliance,
quality problems

Reconstruction is essential as
basis for evaluation



Findings: Architecture Compliance

Implementation chaotic

Strong adverse impact
on quality of systems

Impact often perceived
by users and developers

High cost for rework

Typically very high
overall quality

9

7

10

[26 compliance checks]

Interpretation of Evaluation Results

No standard
interpretation
possible

Stakeholders partially
try to influence the
interpretation for
their goals

Interpretation has to
consider evaluation
questions + many
context factors

**Architecture
Evaluation often
not fully objective
and quantitative**

Tool-based reverse
engineering often
leads to nice but
useless visualizations

Even quantitative
data (e.g. number of
incompliant
relationships) often
hard to interpret

Representation of
results for
management is
challenging
(→ actions?)

Follow-Up of Architecture Evaluations

Which Problems can be Fixed, which can't?

Problems that often
can be fixed

Missing documentation

Missing support for
several new scenarios

Lower degree of
incompliance in code

Problems that often
can't be fixed

High degree of
incompliance in code

Missing thoroughness in
definition of initial
architecture

Strong degree of
degeneration of
architecture over time

Missing commitment in
the fixing phase

Actions Taken after the Architecture Evaluations

Project stopped

New project for
future
architecture

Project for
removing
architecture
violations

Project for
improvement of
architecture

Selection of one
of the candidate
systems /
technologies

Initiative for
improvement of
architecture
capabilities

None

Key take aways of this talk

Evaluate your Architecture – early and regularly!

Effort and method strongly depend on goals and context

Interpretation of results is challenging

Thorough and continuous architecting is key to success

[illegible]



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