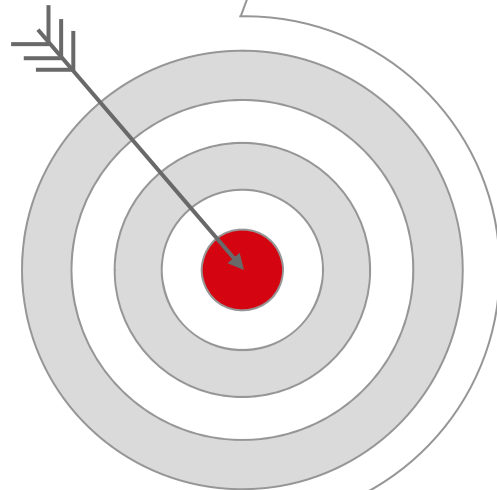


Architecture and Integration

Determining Architecture Quality

Fachbereich 2 Informatik und Ingenieurwissenschaften

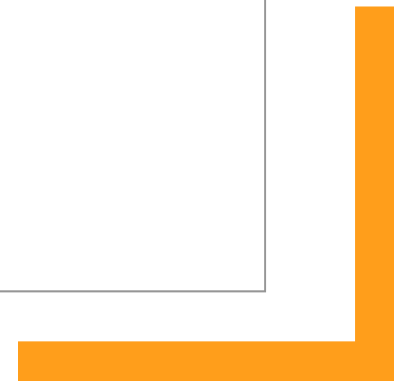
Learning Objectives: Determining Architecture Quality



Explaining properties of a good architecture

Explaining typical criteria for evaluating an information system architecture

Assessing the quality of an architecture



Particify

How would you rate this architecture? Likert, 5 examples



Quality Aspects of an Architecture

- 1 **Concise:** Contains all relevant facts and not more
- 2 **Clear:** can be easily understood by all stakeholders
- 3 **Conform:** architecture models follow agreed principles
- 4 **Coupling:** modules or elements should be loosely coupled
- 5 **Cohesion:** elements within modules are strongly connected
- 6 **Correct:** Depicts the corresponding system correctly

Architecture Quality

Benefits of Concise Architecture

Issues from exhaustive architectures

Architecture

- Contains unnecessary elements
- Explosion of relationships
- Architecture hard to change

Architecture model

- Contains irrelevant information
- Effort for modelling complete information
- Effort for keeping information up-to-date
- Hard to find relevant information

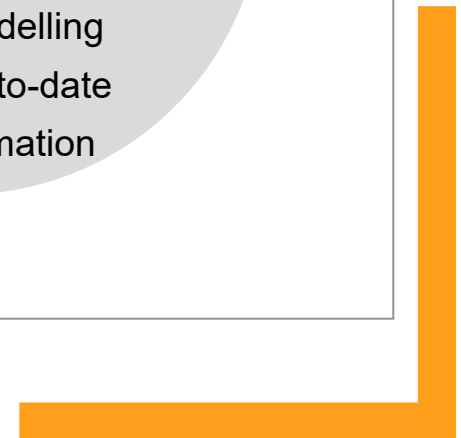
Benefits of concise architectures

Architecture

- Focuses on required elements
- Only required relationships
- Architecture easier to maintain

Architecture model

- Focuses on relevant information only
- Reasonable effort for modelling
- Easy to keep models up-to-date
- Model shows basic information



Benefits of Clear Architecture

Issues from chaotic architectures

Architecture

- Missing structure
- No common patterns
- Plethora of relationships
- Architecture hard to change

Architecture model

- Model hard to read
- Model is hard to maintain
- Relevant information hard to find

Benefits of clear architectures





Architecture

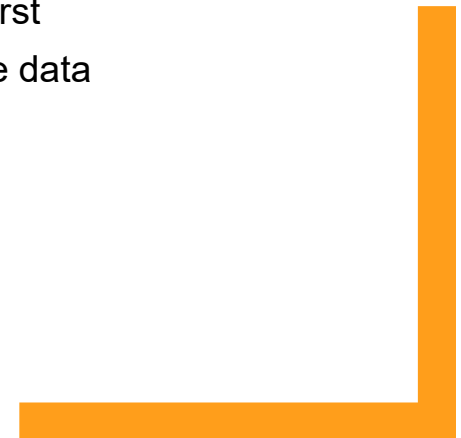
- Clear structure
- Follows common principles
- Contains relevant relationships only
- Architecture easier to change

Architecture model

- Models tend to be easy to understand
- Models can be changed easier
- Common structure helps finding information

Conformance: Example Principles

Principle		Descriptions
IT systems adhere to open standards		<ul style="list-style-type: none">• No individual or proprietary solutions• Open to communicate with partners and systems• Reuse of common knowledge
Software applications are preferably open source		<ul style="list-style-type: none">• No vendor lock-in• Software can be customized to individual needs• Maintenance together with community
Data is provided by the source		<ul style="list-style-type: none">• Enter data where it gets available first• Those who generate data, enter the data
Each kind of data is stored in single dedicated IT system		<ul style="list-style-type: none">• Avoid data redundancies• Reduce data quality issues• Provide single source of truth



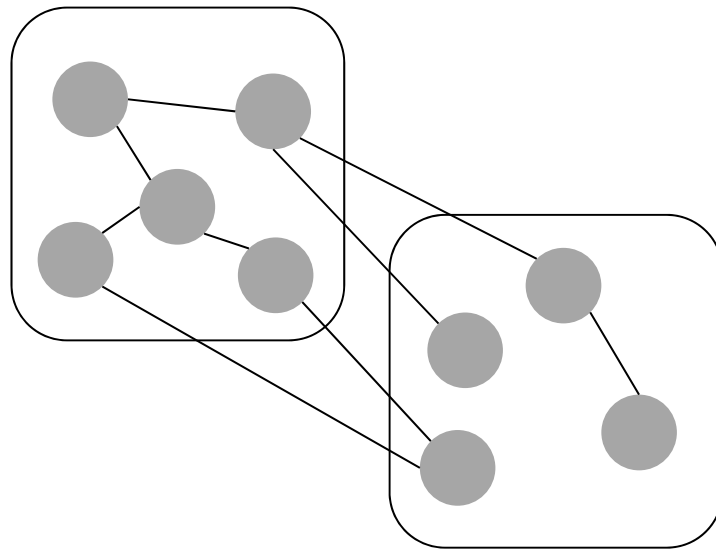
Particify

Which kind of principles could you imagine for an architecture?

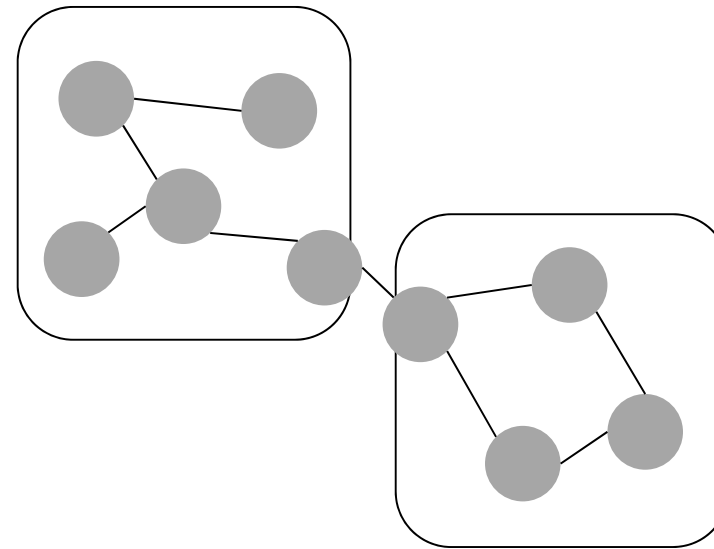


Coupling: Overview

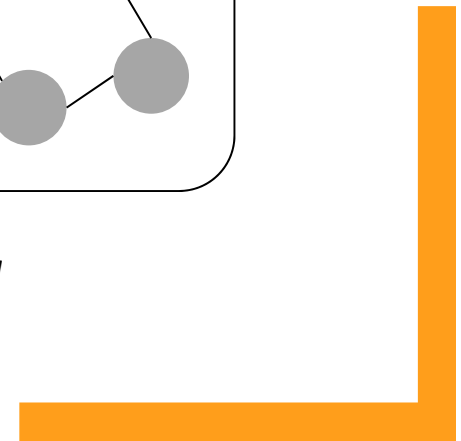
- *Coupling* refers to the number of dependencies between two or more systems.
- Low coupling is usually recommended as it fosters modularisation



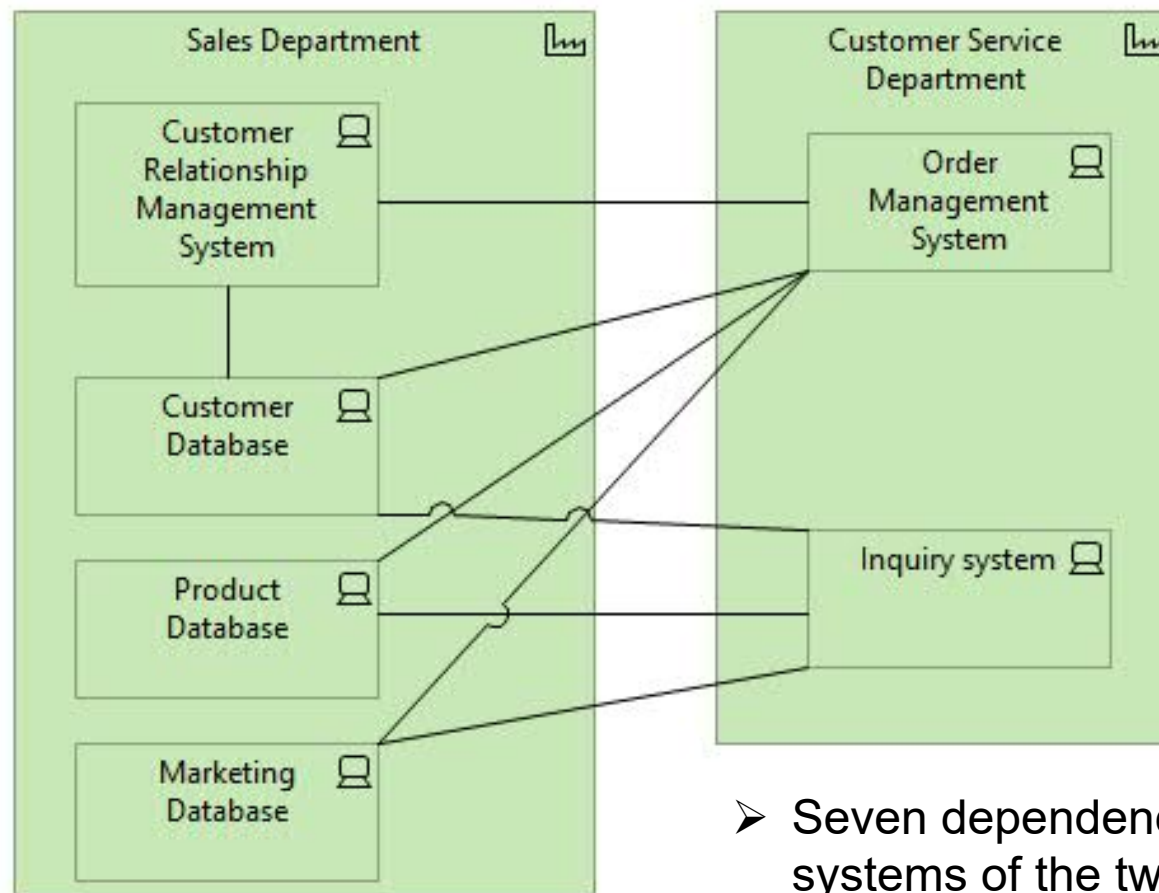
High coupling



Low coupling

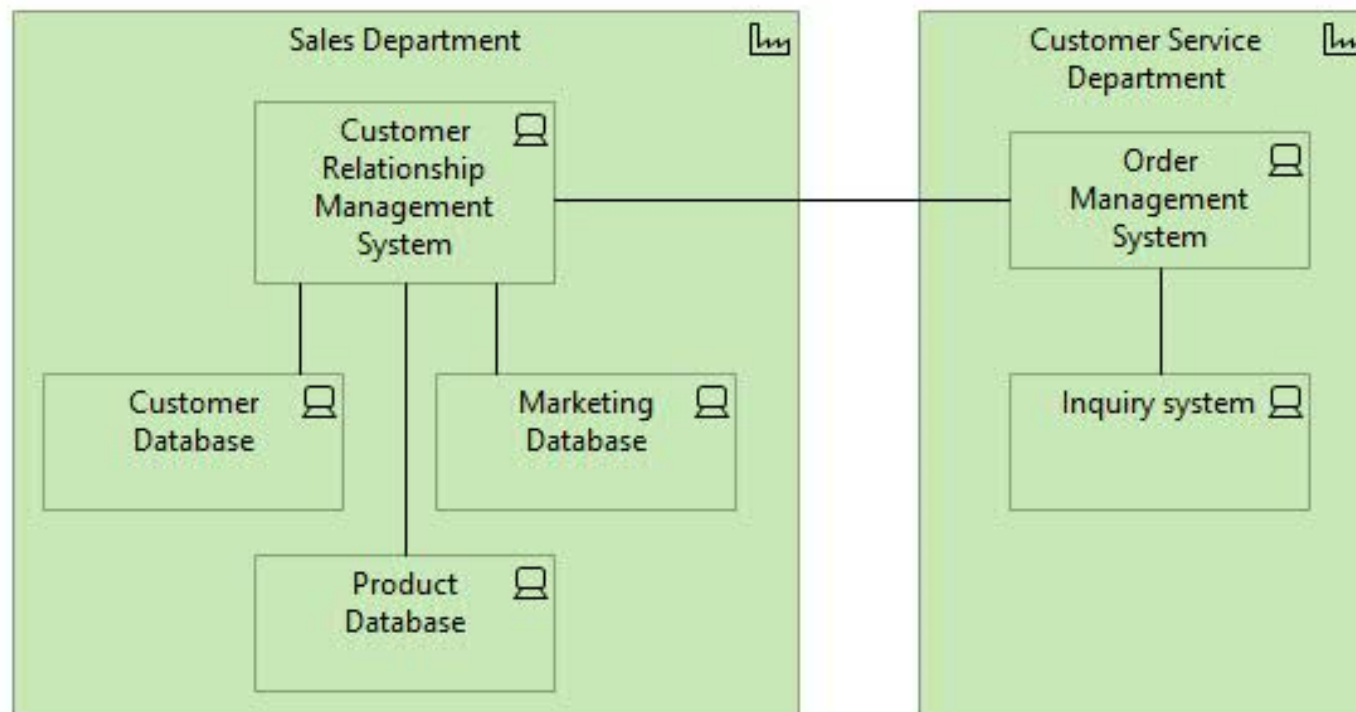


High Coupling: Example

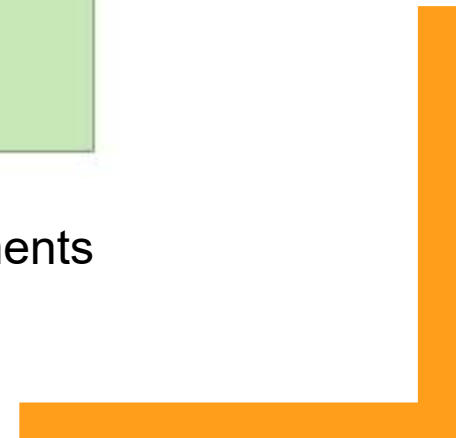


- Seven dependencies between IT systems of the two departments.

Low Coupling: Example

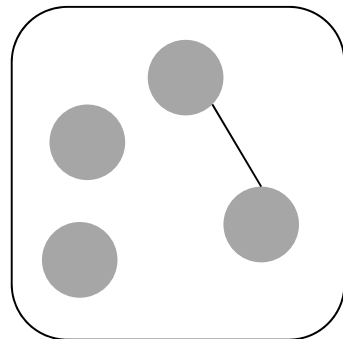


- Single dependency between IT systems of the two departments
- High cohesion

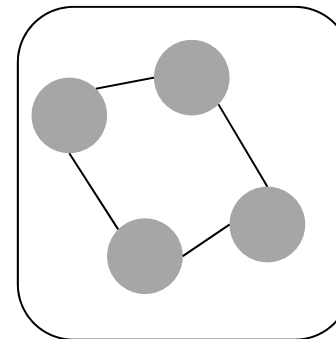


Cohesion: Overview

- *Cohesion* refers to the number of dependencies between elements within one system.
- High cohesion is usually recommended as internal elements are strongly related
- Low coupling usually determines high cohesion (and vice versa)



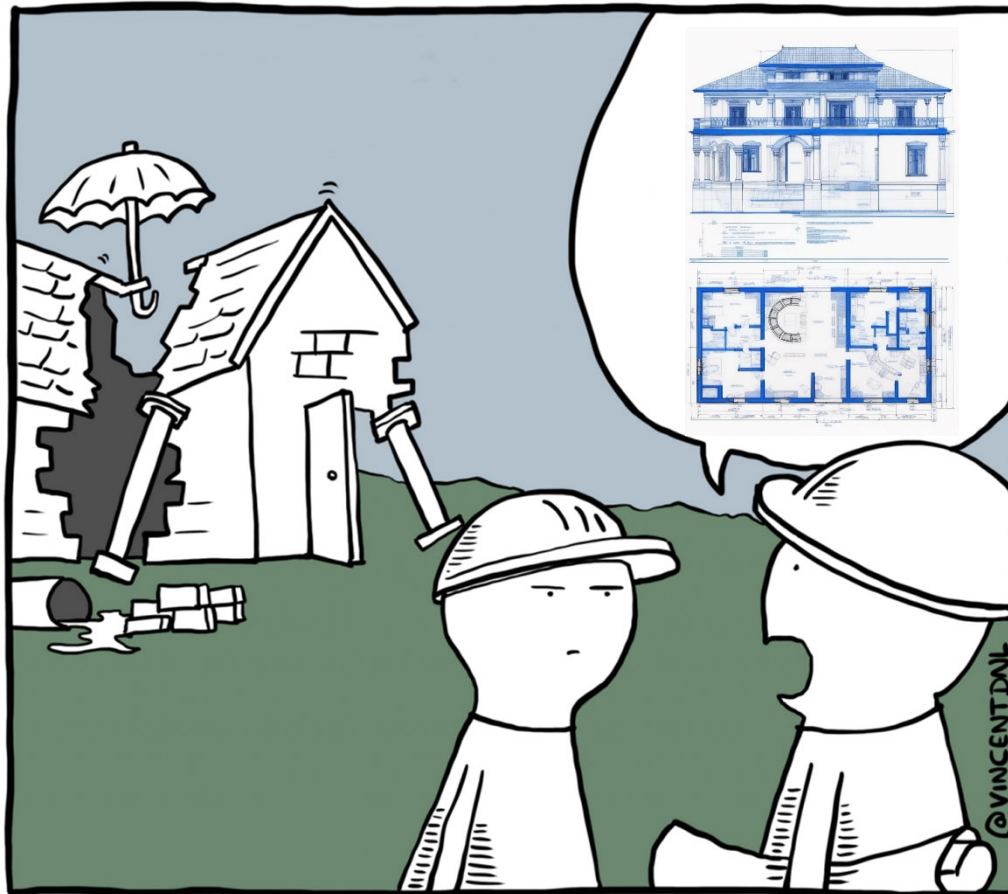
Low cohesion



High cohesion



Correctness of an Architecture Model



- An architecture model has to depict the corresponding architecture as it is
- A wrong picture will not help with fixing issues but just hides them



Correctness of an Architecture Model



A correct **architecture model** needs to represent

- Elements as they exist in reality (as-is) or planned (to-be)
- Complete set of relationships
- Correct information concerning elements and relationships
- Underlying principles and assumptions
- Any weakness (for as-is models)
- Improvements (for to-be models)

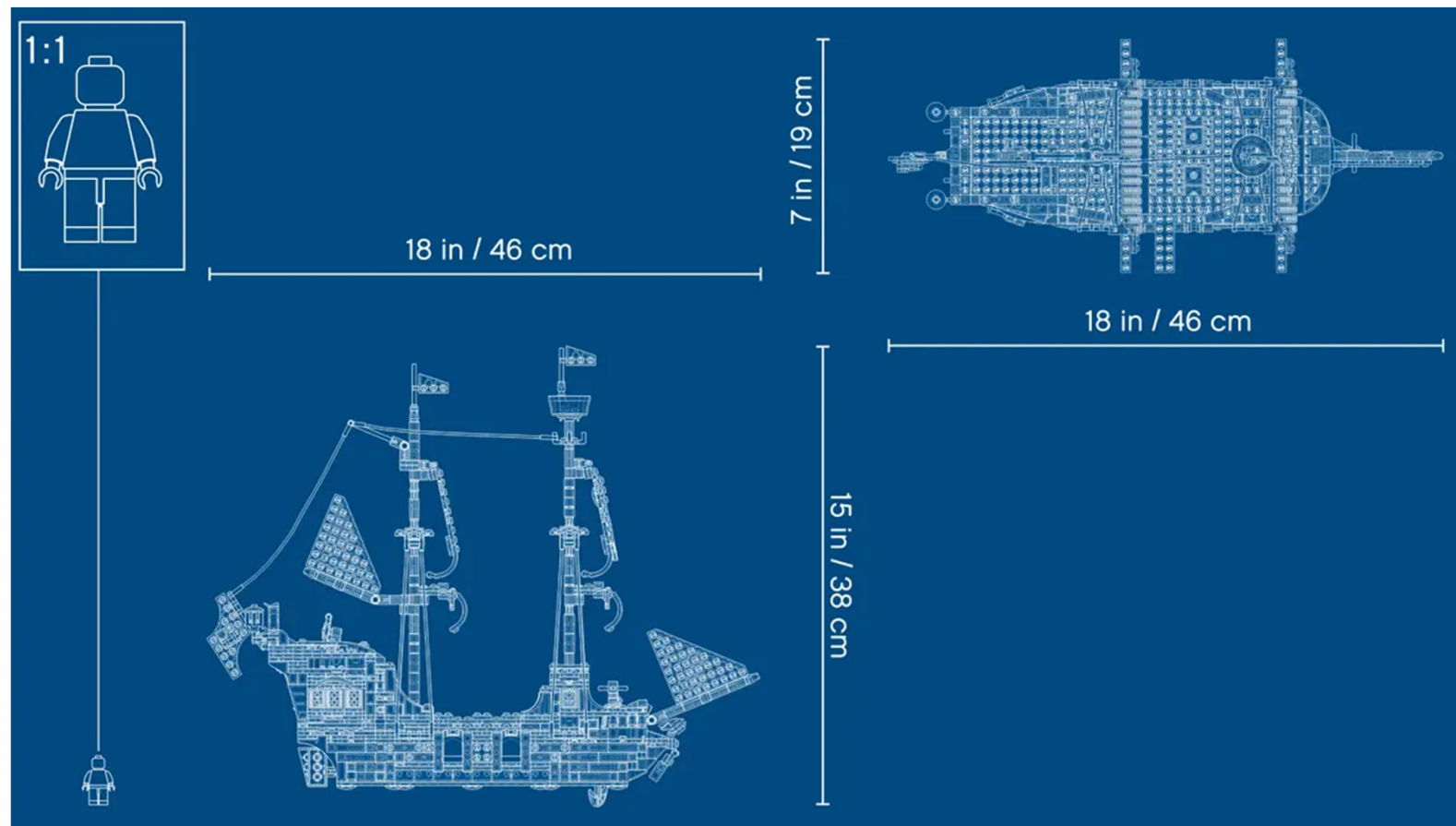
➤ Otherwise, it cannot be used for managing architecture!



What is this Architecture About?



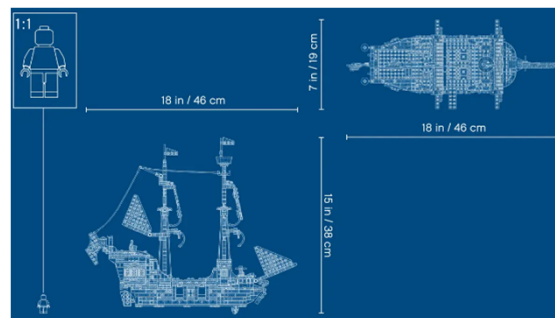
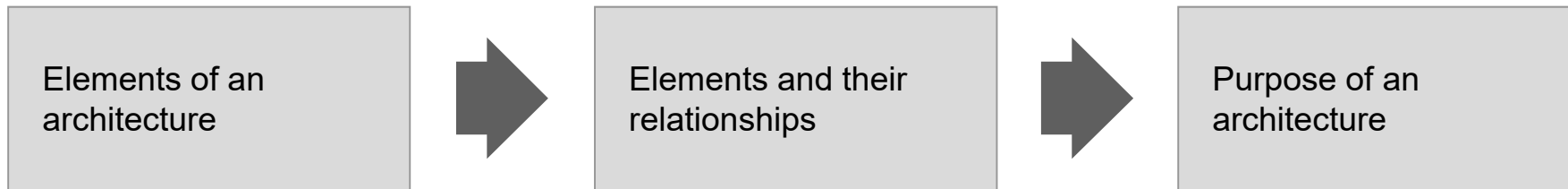
Complete Picture: Architecture of a Pirate Ship



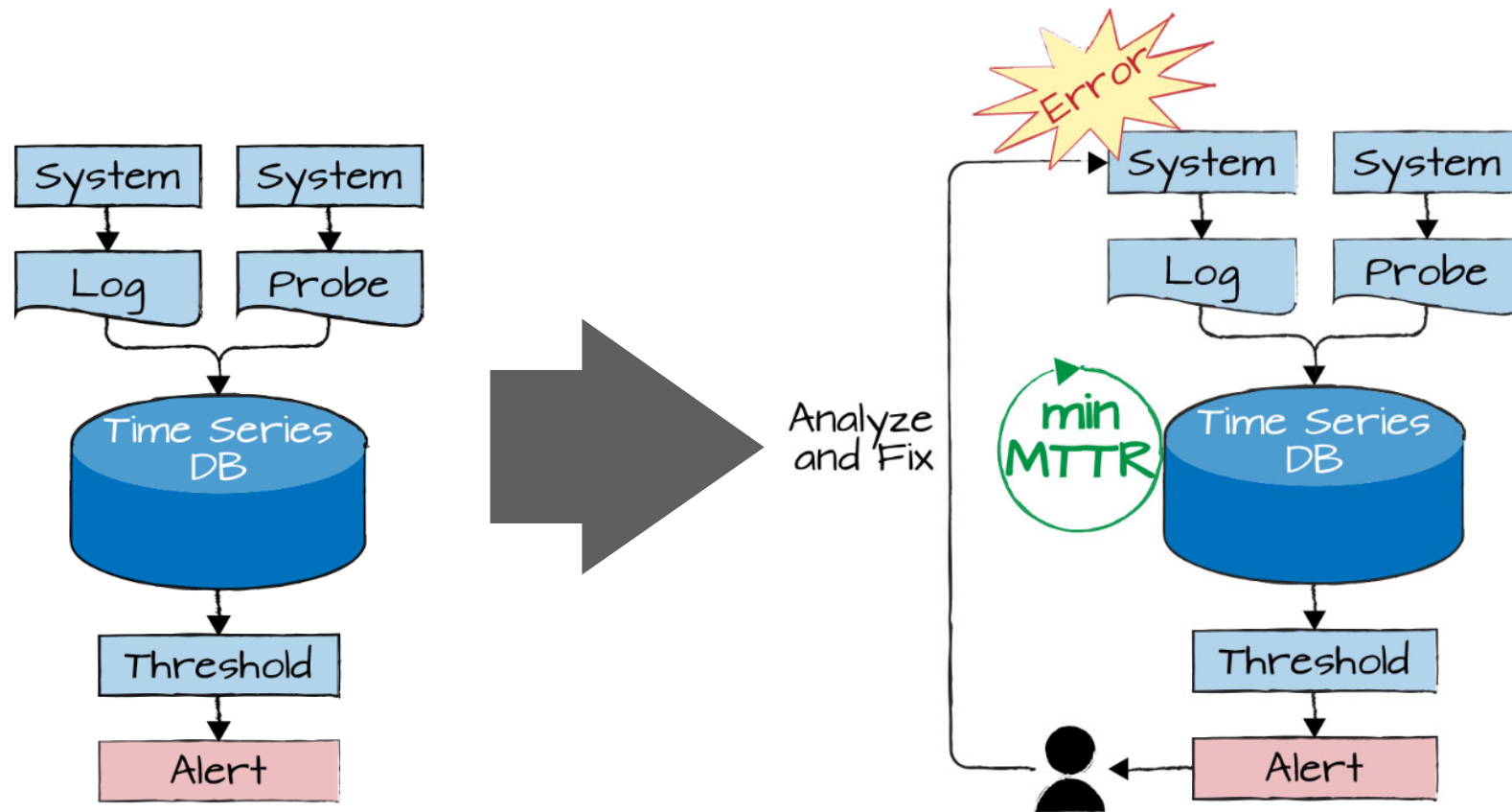
Purpose Matters: Architecture of a Pirate Ship



Architecture Follows a Purpose



Show the Pirate Ship



Source: Hohpe: The Software Architect Elevator, 2020, pp.154

Quality Aspects with respect to Purpose

1 **Concise:** Contains relevant facts for its purpose

2 **Clear:** easily understood by affected stakeholders

3 **Conform:** follows agreed principles for its purpose

4 **Coupling:** purpose influences the modules of an architecture

5 **Cohesion:** each module follows a purpose

6 **Correct:** correctness determined by its purpose

Architecture Quality

Exercise 6.1:

- Read the article provided in CampUAS: “Chris: Architecture is ...”
- Prepare a presentation concerning the following questions:
 - What is shown in the architecture?
 - What is the key message of the text?
 - How does Chris justify his statements?
- Time: 25 minutes

