



Software (Systems) Architecture Foundations

Practical Work #1

Introduction & System Context

How we Work

Week #13 – no lecture no practice

Out of order lecture

Thursday **29.03 16:10-17:50**

- Weeks #09 ÷ #16
 - Monday 16:00-17:30 lecture (room EIK 221)
 - Tuesday 16:00-17:30 practice (room EIK 221)
- Practical work – happens in teams
 - Each team selects a software system, and
 - Designs architecture for it (studying the alternatives and selecting best)
 - Describes the architecture from selected viewpoints (to support stakeholders)
 - Analyses the architecture for selected quality attributes (ensuring that these will be met)
 - Presents their architecture with reasoning and analysis results (in written form)
- Evaluation
 - Presentation and defense of description and analysis of the architecture of the selected software system, done during practical work and off classes

Plan

Week Practical Work

- 1 Formulation of teams and distribution of subjects
Purpose, Context and Stakeholders of the system
Concerns of the stakeholders of the system
- 2 Vision of system architecture
Alternatives variants of system architecture
- 3 Selecting viewpoints and views for documenting the system architecture
- 4 Identifying important quality attributes
Selecting evaluation scenarios
Evaluating alternative architectures using the selected scenarios
- 5 Selecting best architecture alternative
Elaborating selected alternative and documenting architecture
- 6 Changes needed to supporting the family (product-line) of systems
- 7 Drafting architecture function for a selected enterprise
Presentations of group-work
- 8 Presentations of group-work

Teams & Assignments

	System	Team
1	Cloud-ready product/agreement management system (i.e. ledger) for financial services industry	
2	Software for mobile (smart-)phone	
3	Automatic (intelligent) financial trading system	
4	Fire control system for mobile (land or maritime) vehicle	
5	Customer relationship management system with AI	
6	Flight control (fly-by-wire) software for drone	
7	Software for network of autonomous sensors	
8	Fault-tolerant and secure communication (chat) system	
9	VR/AR role-playing or action game	
10	Software for package delivery robot	

Identify Purpose, Context and the Stakeholders of the System

20 min. individual work

20 min. presentations (selected teams)



Identify and Describe the Concerns of the Stakeholders of the System

20 min. individual work

20 min. presentations (selected teams)

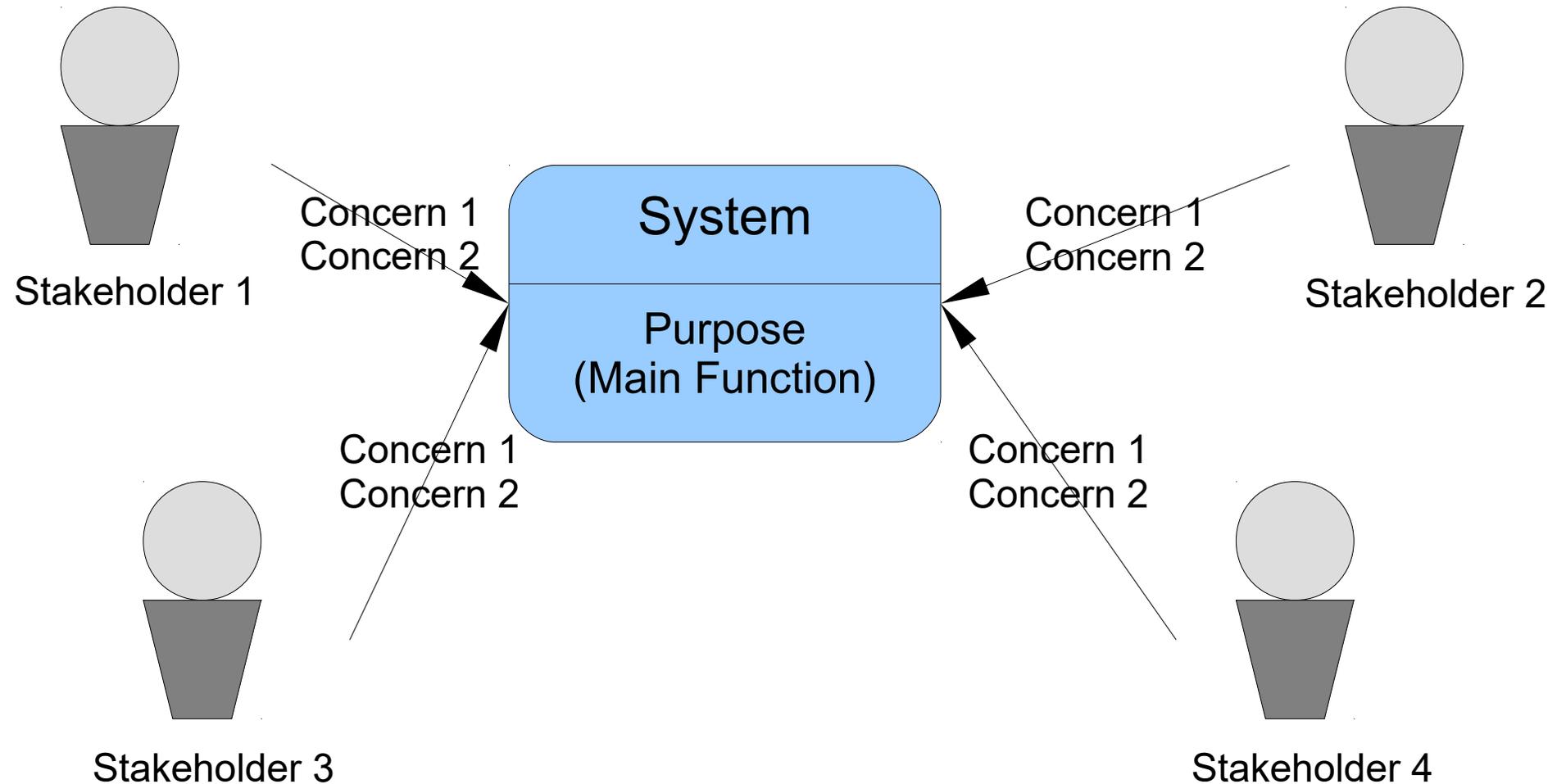


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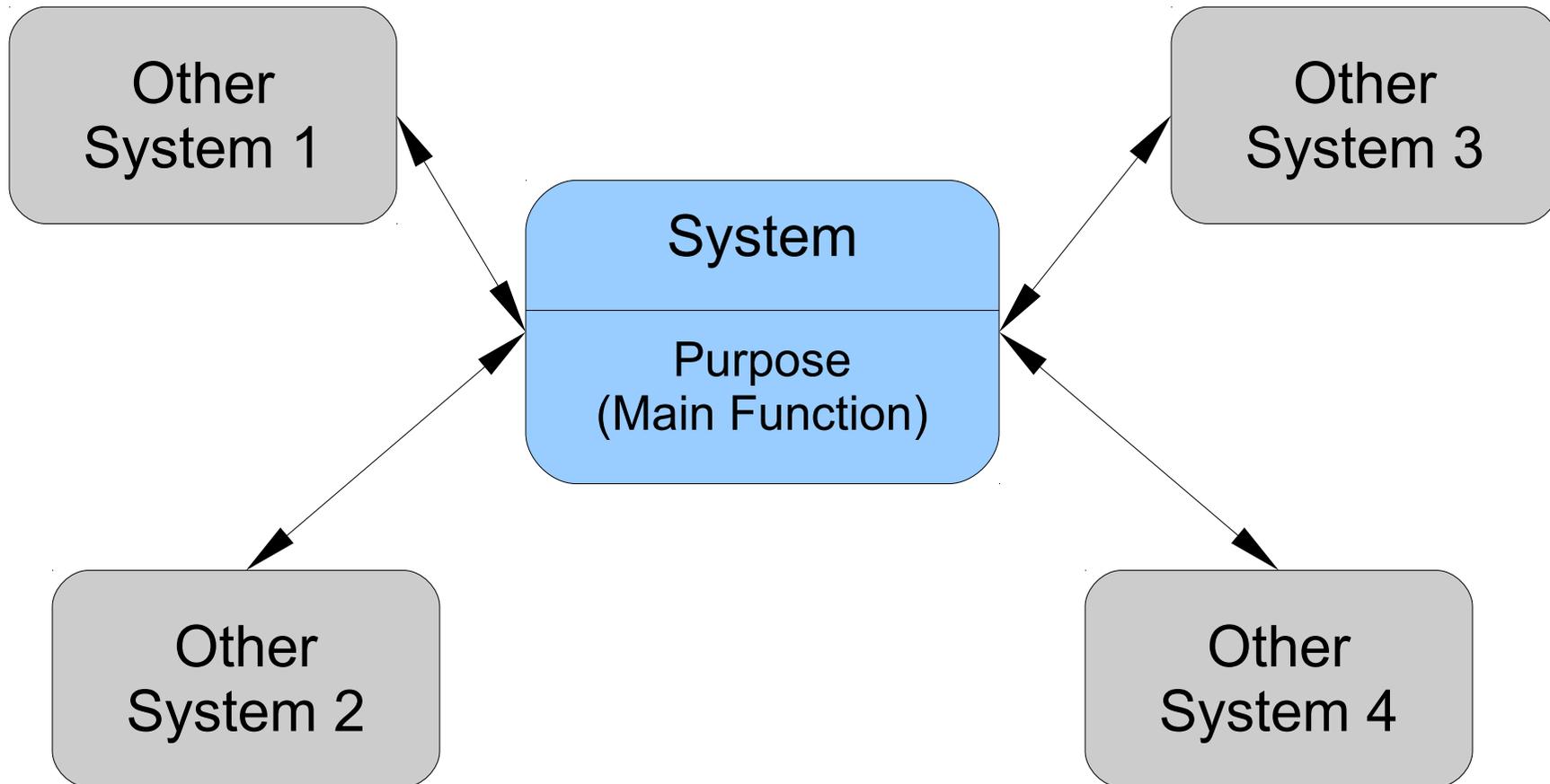
Practical Work #2

Vision of System Architecture

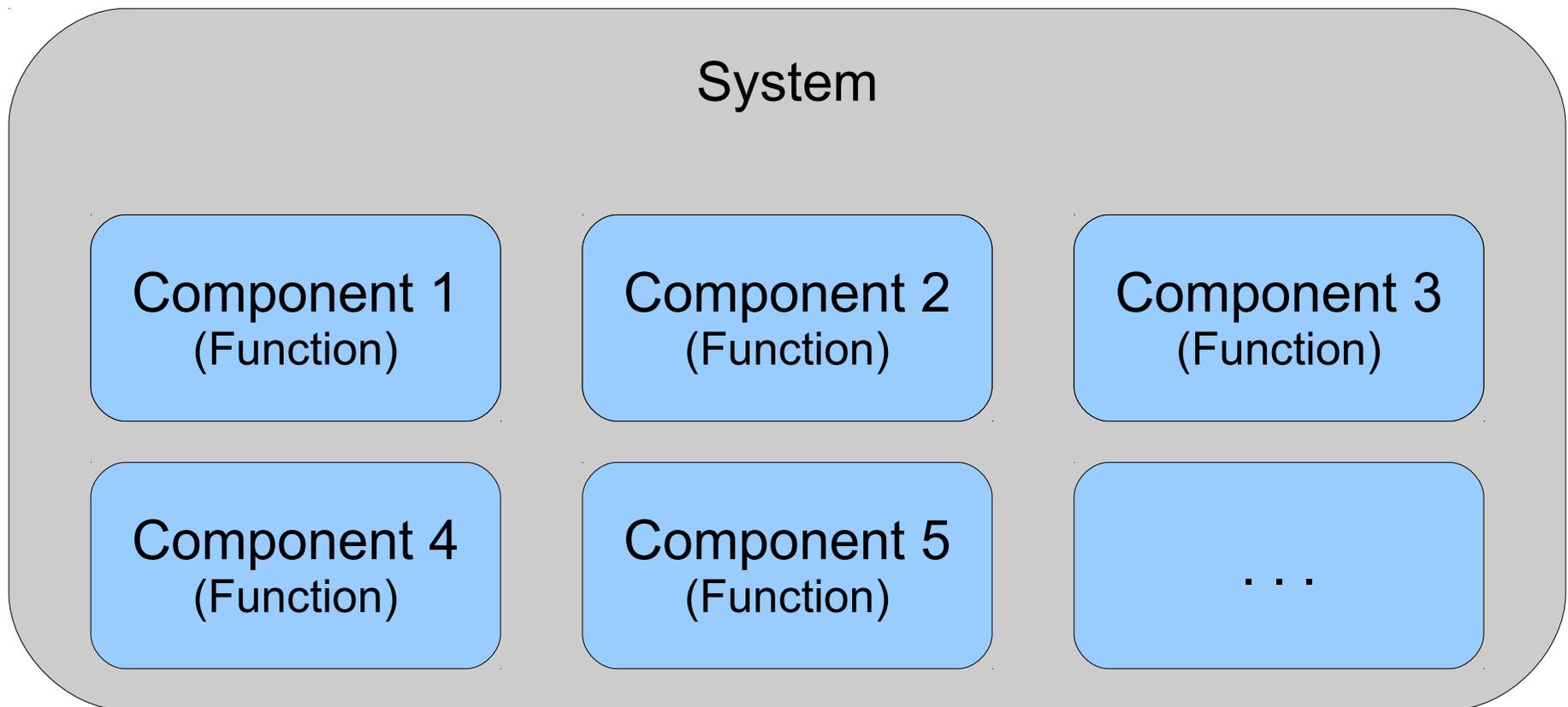
What we have so far ...



What we have so far ...



Next we should do ...



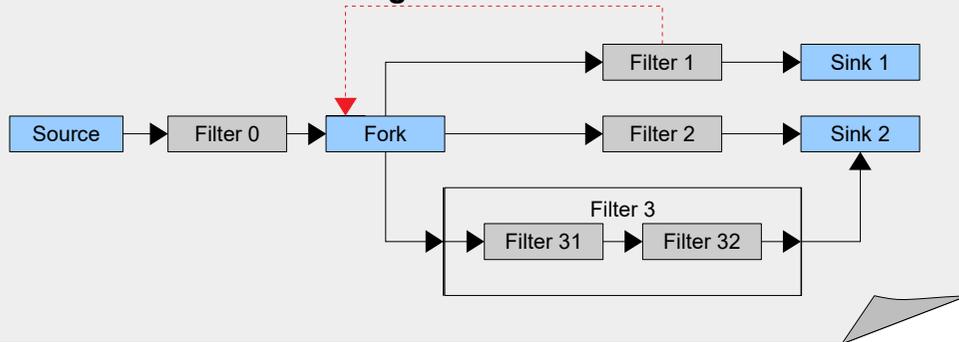
Propose two Alternative Variants of the Architecture of the System

60 min. individual work = 30 min. per alternative

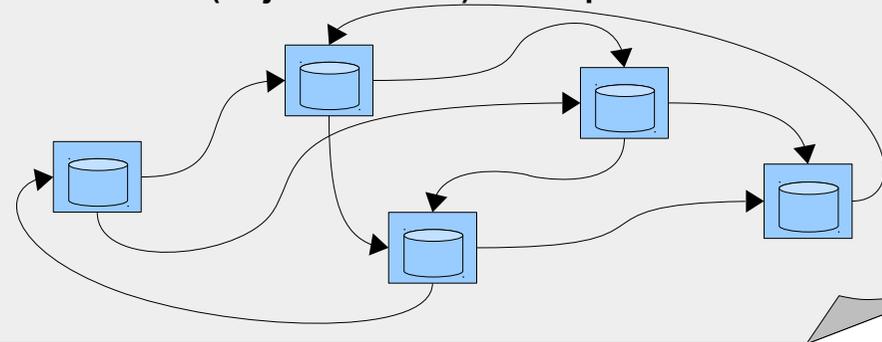
20 min. presentation (selected teams)

Recap – Main Architecture Styles

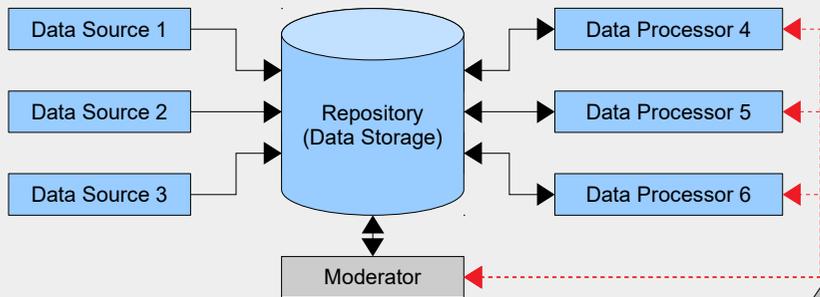
Data-Flow = Shared Nothing



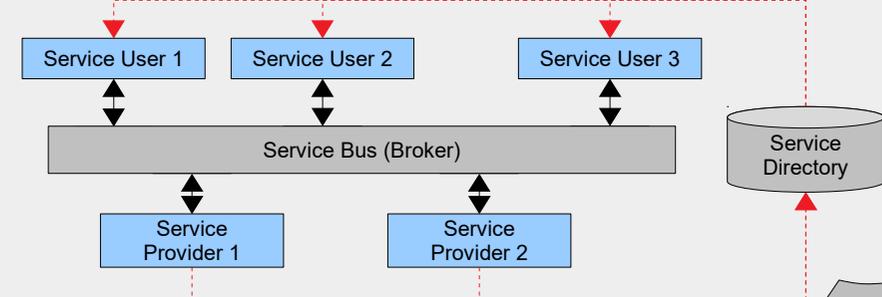
Data Abstraction (Object-Oriented) = Encapsulated Data



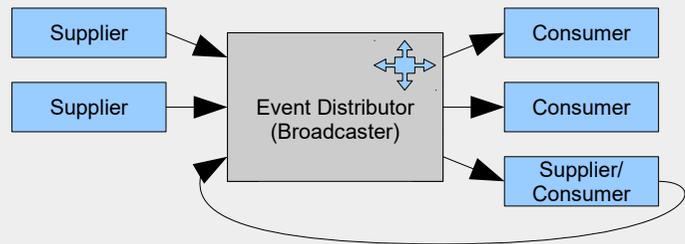
Data-Centered = Shared Everything



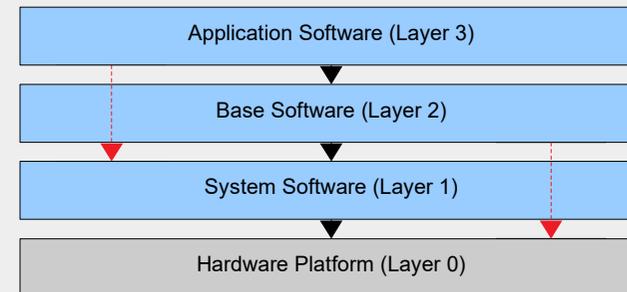
Independent Components = Interoperability



Event-Based (Implicit Invocation) = Decoupled Control



Layers (Abstract Machines) = Portability





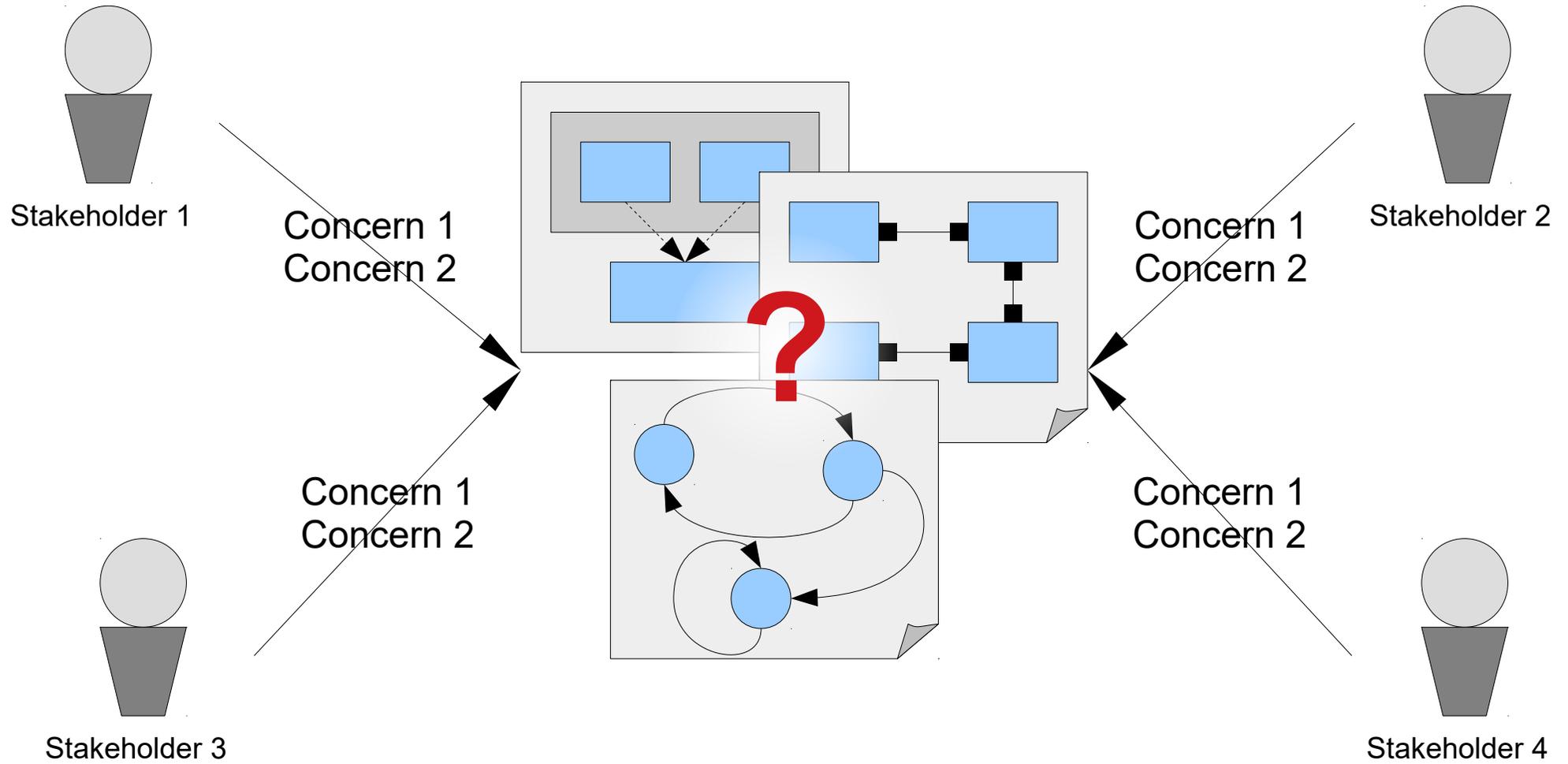
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Practical Work #3

Documenting the Architecture

Next we should do ...

Show mappings to concerns !



At least one

- variation point
- view with behavior description
- interface description
- mapping between views

Select Viewpoints and Views for Documenting the Architecture of the System

60 min. individual work

20 min. presentation (selected teams)



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Practical Work #4

Evaluating the Architecture

Cover end-user, developer
and business concerns !

Identify Important Quality Attributes, Select and Describe Three Scenarios for Evaluating Architecture for these

20 min. individual work

20 min. presentation (selected teams)

Quality Attribute Scenario Template

Quality Attribute	
Source	some entity (human, other system, or any other actuator) that caused the stimulus
Stimulus	an event or condition that requires a response
Artifact	target of stimulus – what is stimulated (a collection of systems, the whole system, or some piece or pieces of it)
Environment	conditions under which the stimulus occurs (an overload, a normal operation, or some other relevant state)
Response	what happens when stimulus arrives
Response Measure	how response is measured to test the requirement

Architecture Approach	Alternative 1	Alternative 2
Reasoning		
Risks		
Trade-Off		

Evaluate the Architecture Alternatives and Select Best Alternative

20 min. individual work

20 min. presentation (selected teams)



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Practical Work #7

Presentation of Group Work
Results

Alar Raabe

Presentations of Final Results of Group Work

15 min. for presentation per team
(hand over written work)

Teams

System	
2	Software for mobile (smart-)phone
4	Fire control system for mobile (land or maritime) vehicle
5	Customer relationship management system with AI
8	Fault-tolerant and secure communication (chat) system



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Practical Work #8

“Grand Finale”

Alar Raabe

Presentations of Final Results of Group Work

15 min. for presentation per team
(hand over written work)

Teams

System

- 1 Cloud-ready product/agreement management system (i.e. ledger) for financial services industry
- 6 Flight control (fly-by-wire) software for drone
- 7 Software for network of autonomous sensors
- 9 VR/AR role-playing or action game
- 10 Software for package delivery robot

55. The architect lets all things come and go effortlessly, without desire. He never expect results; thus he is never disappointed. He is never disappointed, thus his spirit never grows old.

Lao Tsu (by Philippe Kruchten)

Thank You!