Observer

A conflict of contradicting forces

Developer Controls Process

ORGANIZATIONAL PATTERN

Make the developers as a team decide how the organic development.

Architect Also Implements

Community of Trust

Scrum

PATTERN LANGUAGE

Christopher Alexander

The Timeless Way of Building

A Pattern Language

Context

Independent Regions

...

House Cluster

House for a Small Family

Alcoves

...

The Water Cooler

Google's fancy workspace is a giant water cooler pattern application

Any problems that might come out of this?

Organizational patterns form pattern languages

Architect Controls Product – establishes an architect role

Architect Also Implements – elaborates on that role making it also implement (develop)

Developing In Pairs – further precises how the architect collaboration with developers may be realized

Conway's Law

Conway's Law

Symmetric aspect-oriented modularization

The base code is oblivious of aspects

Asymmetric aspect-oriented modularization (Aspect)

Dividing people into independent teams and assigning them software modules to be developed directly may be easier with symmetric AOP (peer use cases)

pointcut calculations(): **call**(* Stock.calc*(..));

Much of pointcut fragility can be avoided by encouraging communication among developers

Organizational Style pattern language

AOP provides for a greater level of decoupling between the software modules developed by different parts of the organization, including reversing dependencies (use case extension)

Aspects are about obliviousness, but the developers or teams whose code is affected by the aspects others have developed may be oblivious of them, too

By creating groups with similar activities and employing symmetric AOP (peer use cases), code becomes more modular and the development becomes easier

Project Management pattern language

> Conway's law: people <-> code

> Organizational patterns and aspect-oriented programming can support each other

> 9 organizational patterns examined more closely

> Organizational patterns referred by the examined ones are natural candidates for further examination

> Currently examining organizational patterns close to design patterns (People and Code pattern language)

Informatics 2019

Synergy of Organizational Patterns and Aspect-Oriented Programming

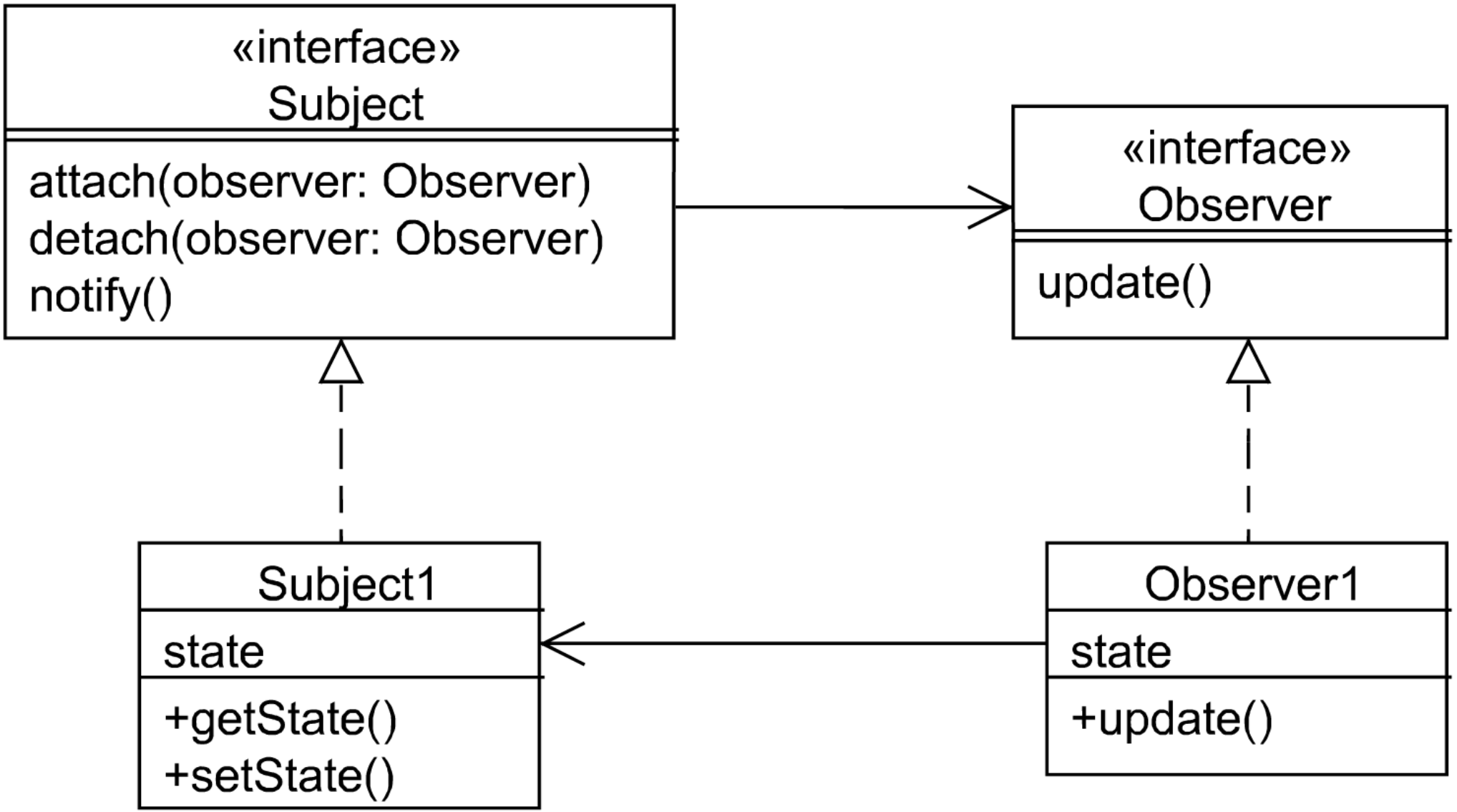
Peter Berta and **Valentino Vranić**

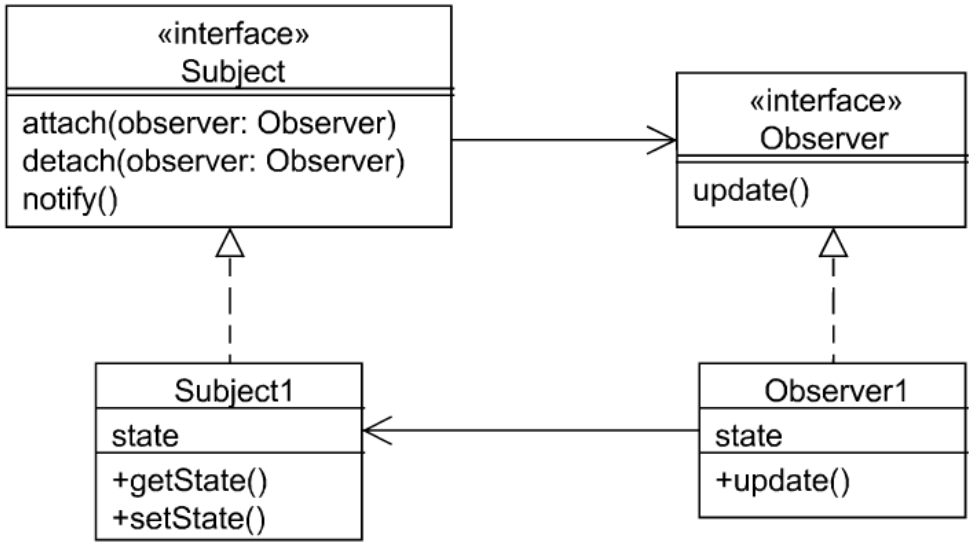
Institute of Informatics, Information Systems, and Software Engineering

STU FIIT

vranic@stuba.sk fiit.sk/~vranic

20/11/2019


«interface»
Subject
attach(observer: Observer)
detach(observer: Observer)
notify()
«interface»
Observer
update()
Subject1
state
+getState()
+setState()
Observer1
state
+update()



Observer

observing objects should be notified of the change in the state of the subject of their observation,

But they should be attachable to the subject without having to modify it

The Scrum Team consists of a Product Owner, the Development Team, and a Scrum Master. Scrum Teams are self-organizing and cross-functional. **Self-organizing teams choose how best to accomplish their work, rather than being directed by others outside the team. Cross-functional teams have all competencies needed to accomplish the work without depending on others not part of the team.** The team model in Scrum is designed to optimize flexibility, creativity, and productivity. The Scrum Team has proven itself to be increasingly effective for all the earlier stated uses, and any complex work.

J. Sutherland and K. Schwaber. Scrum Guides. 2017.

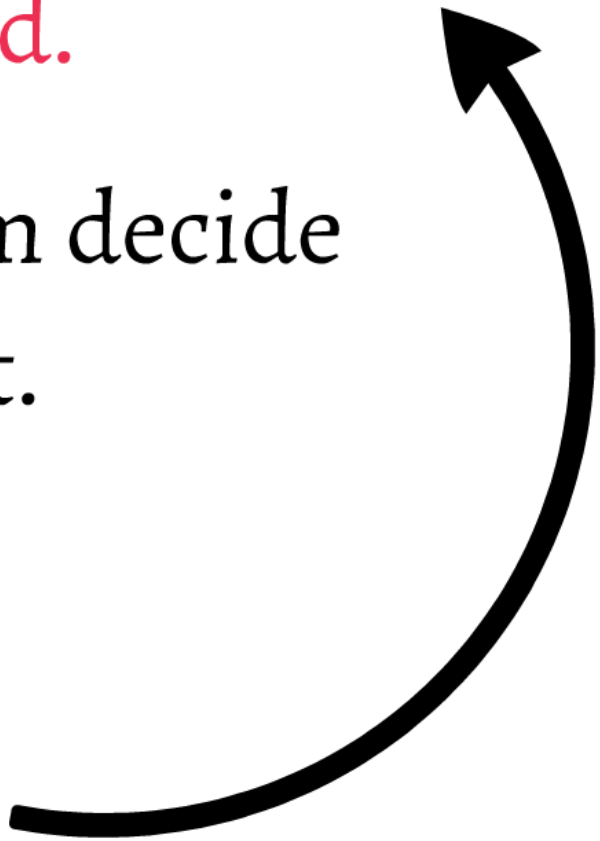
ORGANIZATIONAL PATTERN

Developer Controls Process

People don't like being ordered what to do,

But the work needs to be organized.

Make the developers as a team decide how to organize development.



The Scrum Team consists of a Product Owner, the Development Team, and a Scrum Master. Scrum Teams are self-organizing and cross-functional. **Self-organizing teams choose how best to accomplish their work, rather than being directed by others outside the team. Cross-functional teams have all competencies**

A conflict of contradicting forces

Developer Controls Process

ORGANIZATIONAL PATTERN

People don't like being ordered what to do,

But the work needs to be organized.

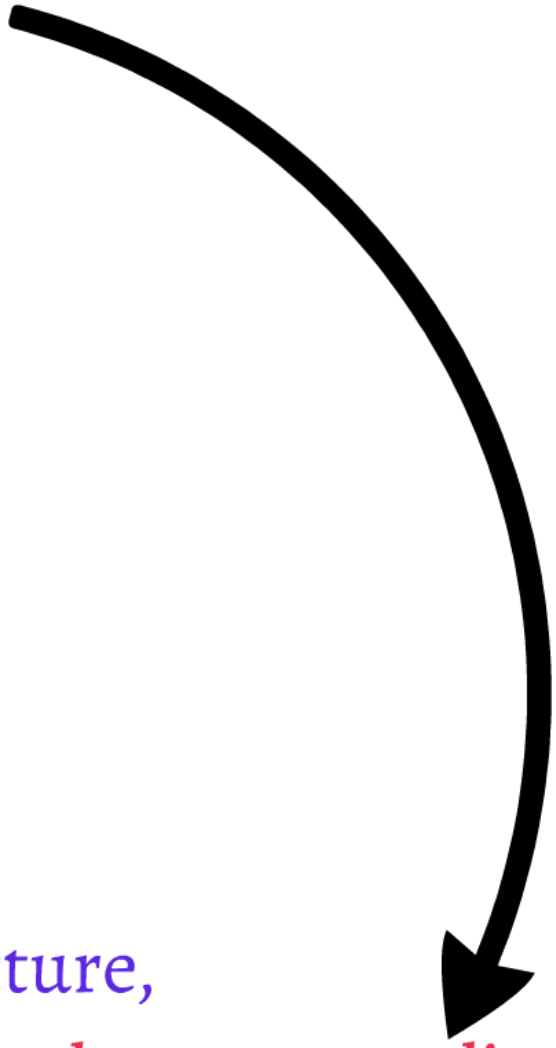
Make the developers as a team decide how to organize development.

The Scrum Team consists of a Product Owner, the Development Team, and a Scrum Master. Scrum Teams are self-organizing and cross-functional. **Self-organizing teams choose how best to accomplish their work, rather than being directed by others outside the team. Cross-functional teams have all competencies needed to accomplish the work without depending on others not part of the team.** The team model in Scrum is designed to optimize flexibility, creativity, and productivity. The Scrum Team has proven itself to be increasingly effective for all the earlier stated uses, and any complex work.

J. Sutherland and K. Schwaber. Scrum Guides. 2017.

team. Cross-functional teams have all competencies needed to accomplish the work without depending on others not part of the team. The team model in Scrum is designed to optimize flexibility, creativity, and productivity. The Scrum Team has proven itself to be increasingly effective for all the earlier stated uses, and any complex work.

J. Sutherland and K. Schwaber. Scrum Guides. 2017.



Architect Also Implements

Architects need to focus on the overall structure,
But they should not loose contact with the devlopment reality.

Let the (software) architect participate in actual programming.

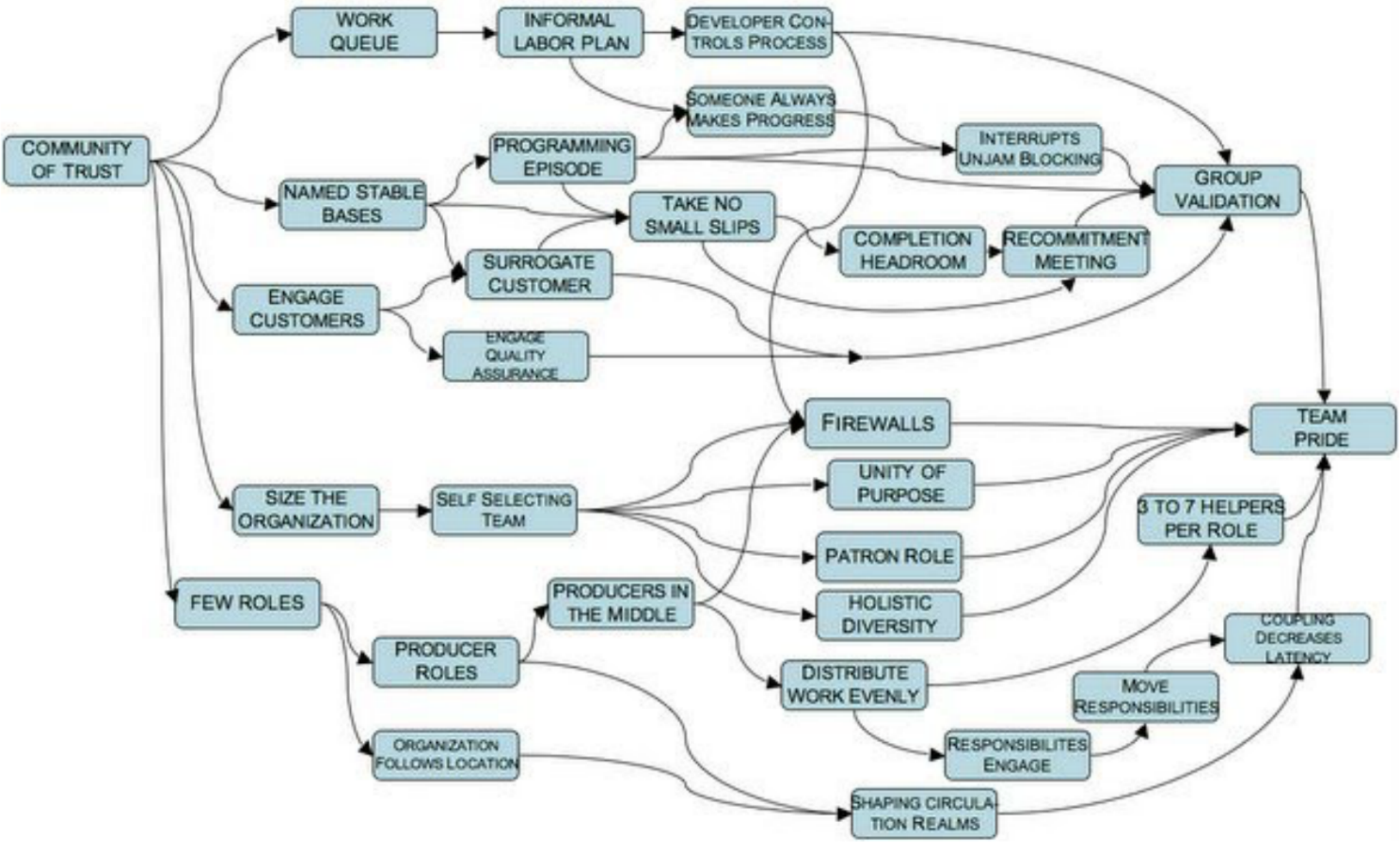
Community of Trust

People are naturally cautious and suspicious, which is often enforced by rules and practices, but for to really do the work, they need to trust each other.

Those "in charge" should make obvious they trust others by giving up the watch-over activities and letting people decide about their own work. Good and sincere communication is essential to overcoming fear.

Scrum

PATTERN LANGUAGE



J. Sutherland, J. Coplien et al. Scrum as Organizational Patterns. Gertrud&Cope, 2011.

Organizational patterns form pattern languages

Architect Controls Product – establishes an architect role

> **Architect Also Implements** – elaborates on that role making it also implement (develop)
>
> > **Developing In Pairs** – further precises how the architect collaboration with developers may be realized

Organizational patterns form pattern languages

Architect Controls Product – establishes an architect role

> **Architect Also Implements** – elaborates on that role making it also implement (develop)
>
> > **Developing In Pairs** – further precises how the architect collaboration with developers may be realized

Conway's Law

Any organization that designs a system (defined broadly) will produce a design whose structure is a copy of the organization's communication structure.

How organizational patterns correspond to particular programming paradigms?

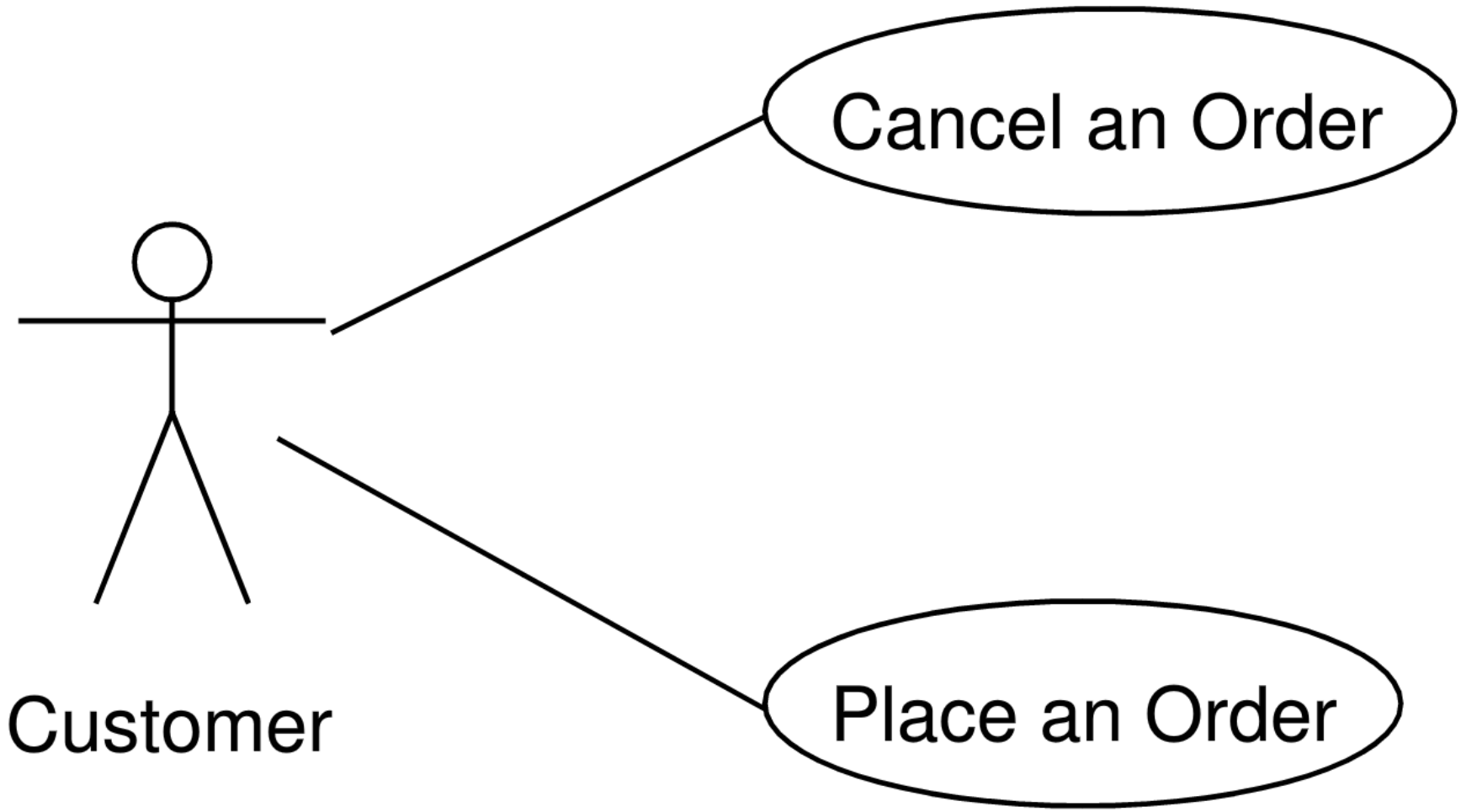
➡ Organizational Patterns in Aspect-Oriented Programming (AOP)

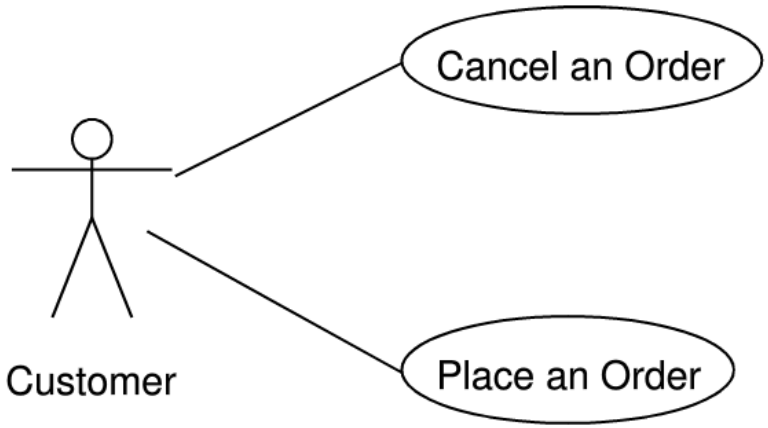
Conway's Law

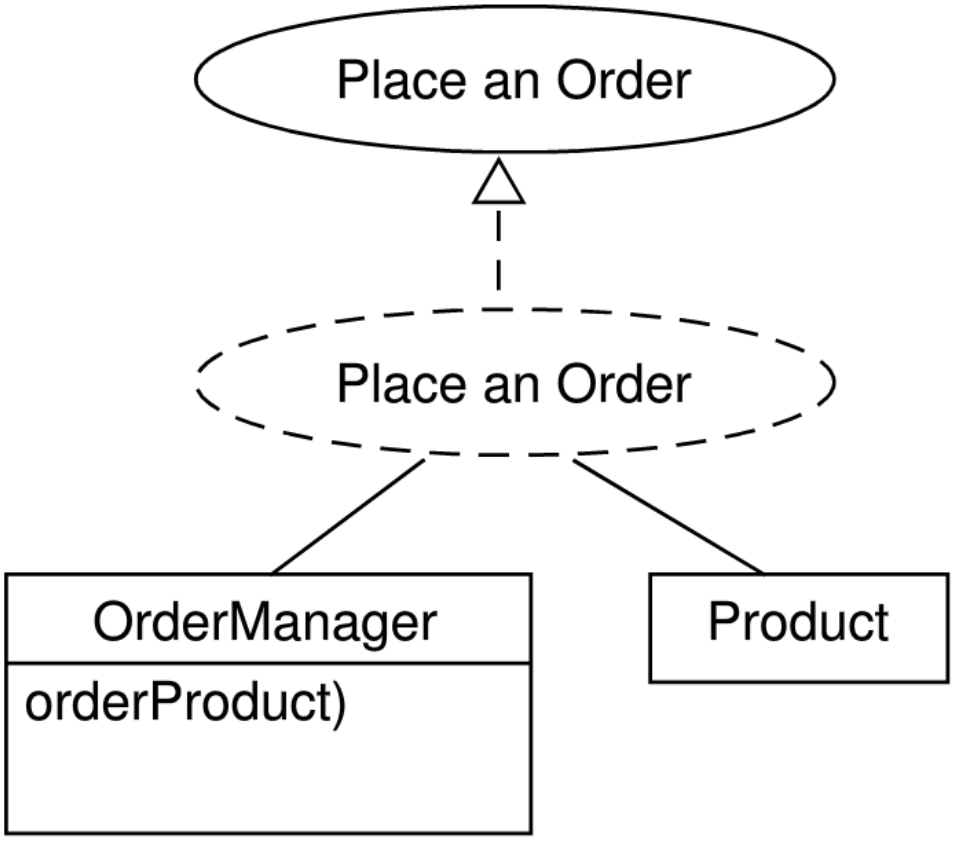
There is a need for a system to follow a particular architecture

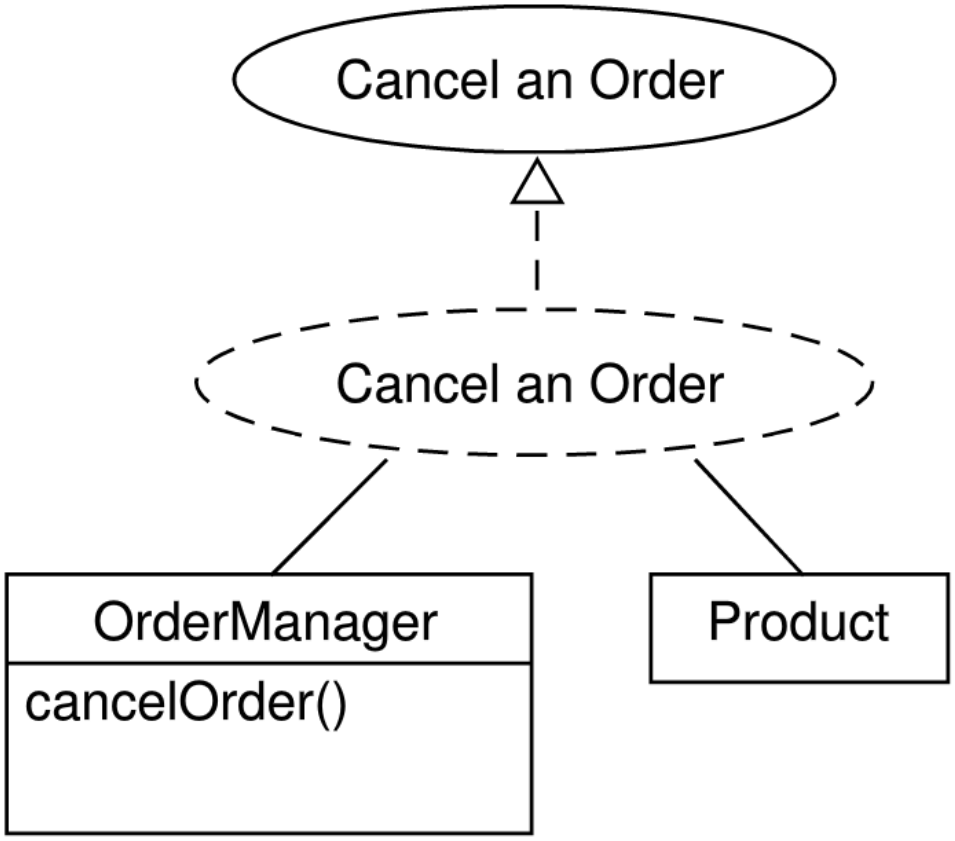
But its structure is constrained by the structure of the organization that produces the system

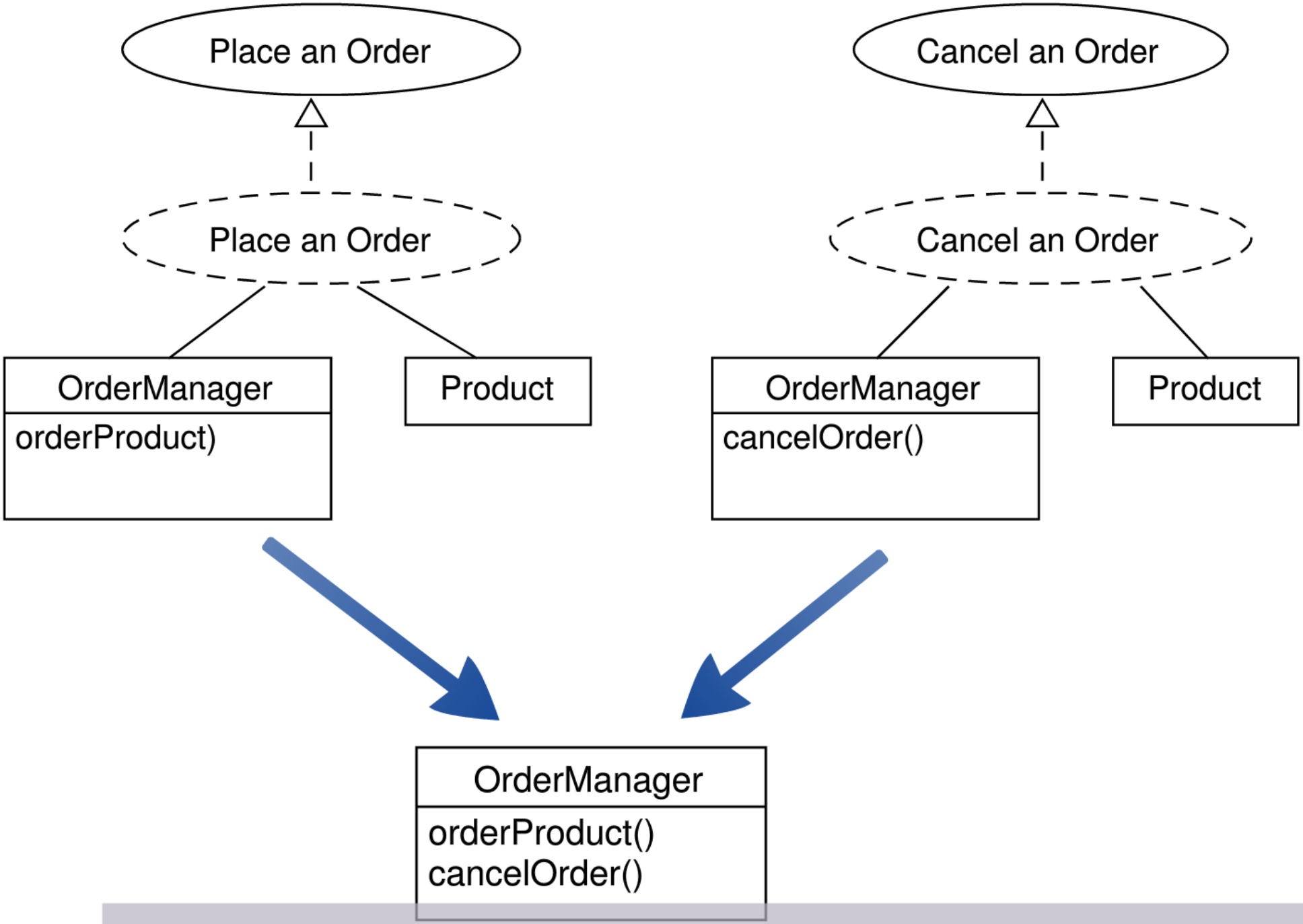
Adapt the organizational structure to the needs of the system architecture


Cancel an Order
Customer
Place an Order

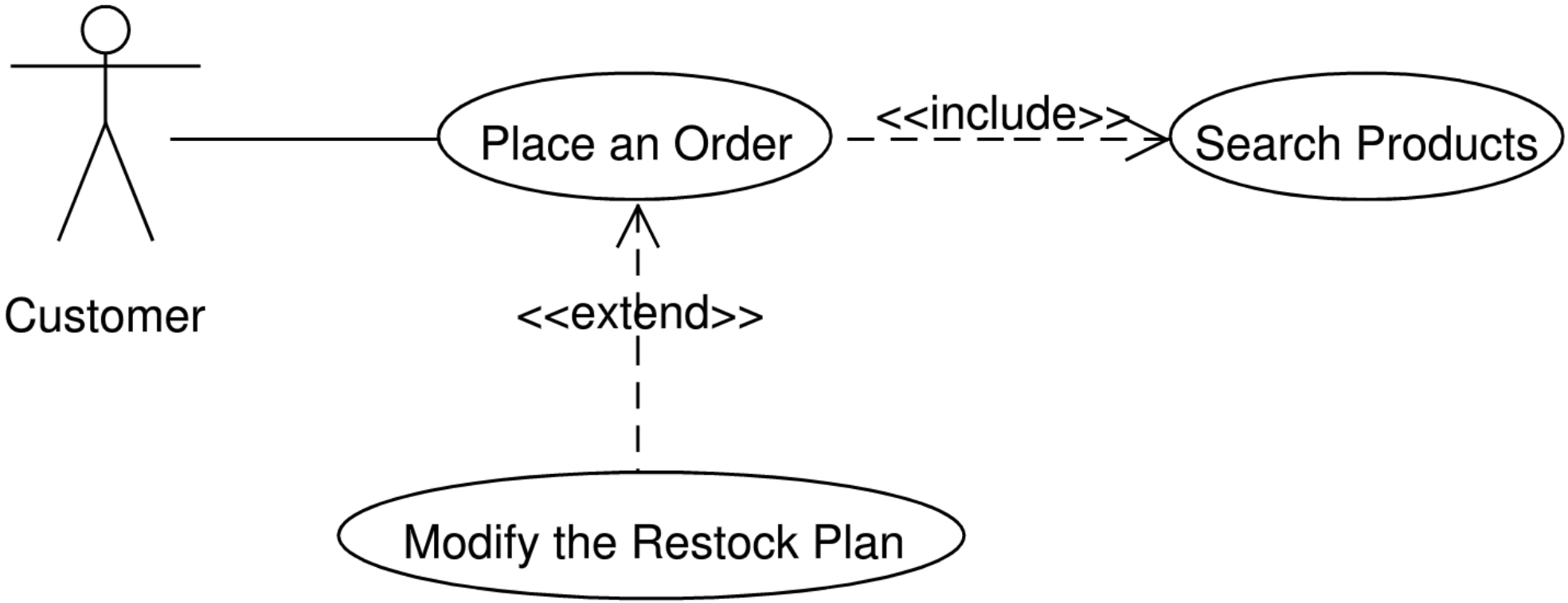

Cancel an Order
Customer
Place an Order


Place an Order
Place an Order
OrderManager
orderProduct)
Product


Cancel an Order
Cancel an Order
OrderManager
cancelOrder()
Product



Symmetric aspect-oriented modularization


Customer
Place an Order
<<include>>
Search Products
<<extend>>
Modify the Restock Plan

UC Place an Order

Basic Flow: Place an Order

1. Customer selects to place an order.
2. UC *Search Products* is being activated.
3. Customer confirms the product selection and adjusts its quantity.
4. If the product is available, System includes it in the order.
5. Customer continues in ordering further products.
6. Customer chooses the payment method, enters the payment data, and confirms the order.
7. Customer can cancel ordering at any time.
8. The use case ends.

Extension points:

- *Checking Product Availability*: Step 4

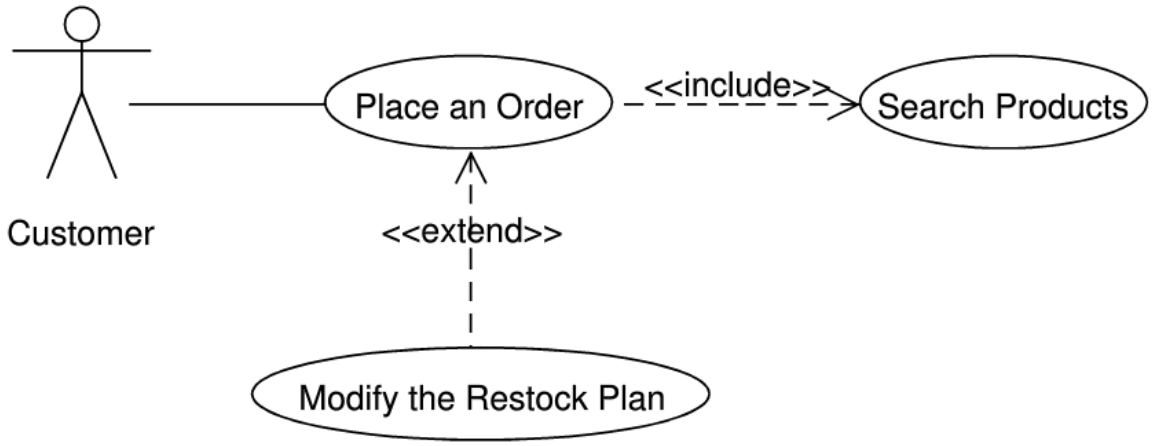
UC Place an Order

Basic Flow: Place an Order

1. Customer selects to place an order.
2. UC *Search Products* is being activated.
3. Customer confirms the product selection and adjusts its quantity.
4. If the product is available, System includes it in the order.
5. Customer continues in ordering further products.
6. Customer chooses the payment method, enters the payment data, and confirms the order.
7. Customer can cancel ordering at any time.
8. The use case ends.

Extension points:

- *Checking Product Availability*: Step 4



UC Modify the Restock Plan

Alternate Flow: Modify the Restock Plan

After the *Checking Product Availability* extension point of the Place an Order use case:

1. System checks the available quantity of the product being ordered.
2. If the quantity is below the limit, System adds the quantity under demand to the restock plan.
3. The flow continues with the step that follows the triggering extension point.

```
public class Ordering {
    ...
    public void order() {
        ...
        new ProductSearch().search(product);
        ...
        if (productAvailable(product)) {
            ...
        } else...
    }
    ...
}
```

```
public class Ordering {
    ...
    public void order() {
        ...
        new ProductSearch().search(product);
        ...
        if (productAvailable(product)) {
            ...
        } else...
    }
    ...
}
```

The base code is oblivious of aspects

```
public aspect RestockPlan {
    ...
    void around(Product product):
        call(* Ordering.productAvailable(..) && args(tovar) {

        // increase the quantity in the restock plan
        ...
    }
    ...
}
```

Asymmetric aspect-oriented modularization (AspectJ)

ck.calc*(..));

ty can be

developers

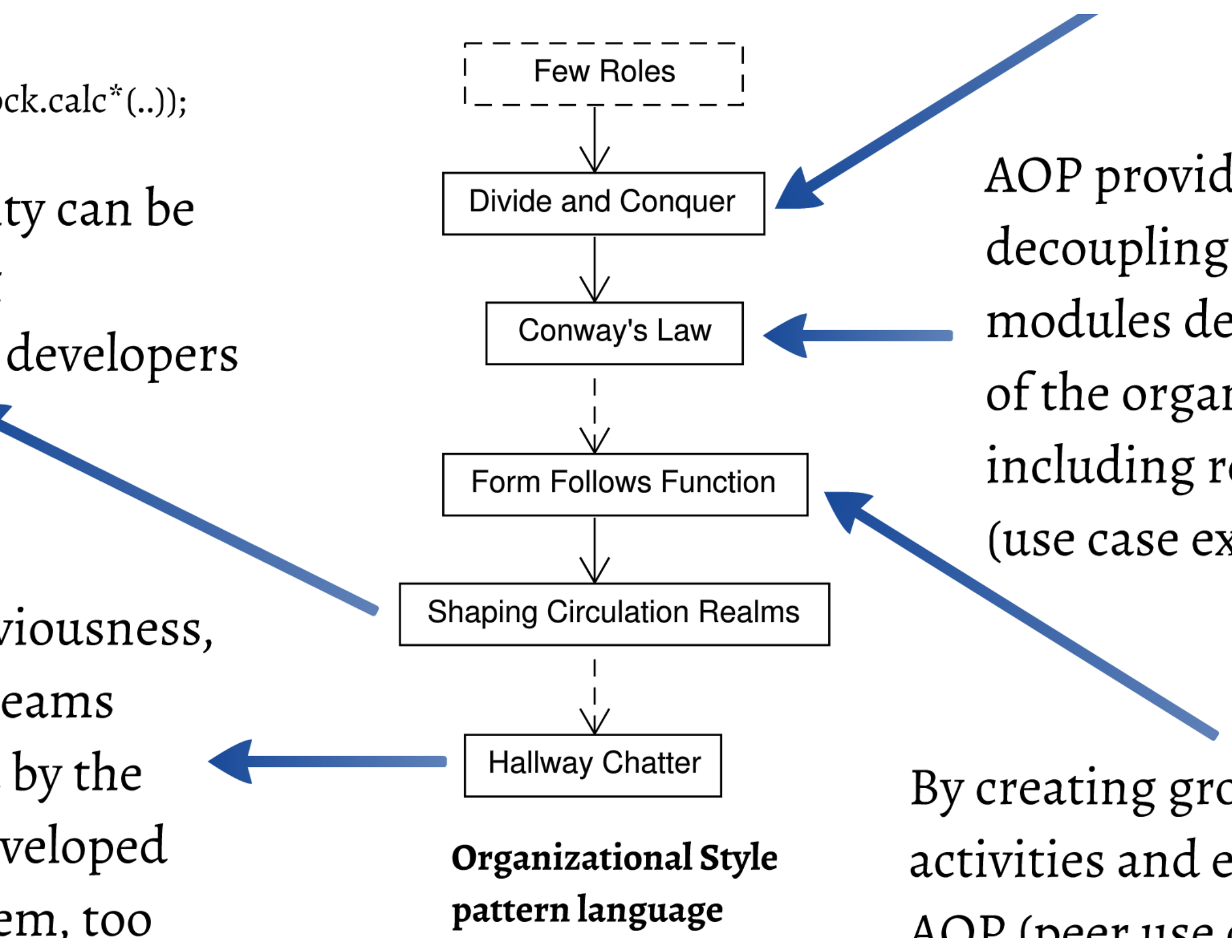
viousness,

eams

by the

veloped

em, too

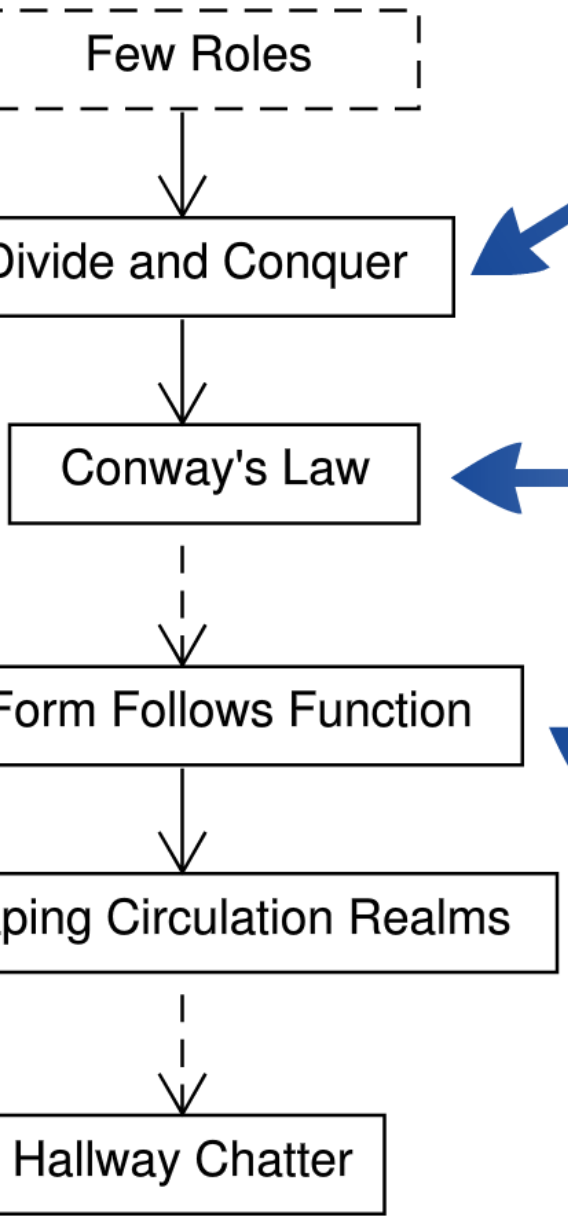


Organizational Style pattern language

AOP provid
decoupling
modules de
of the orga
including r
(use case ex

By creating gr
activities and e
AOP (peer use

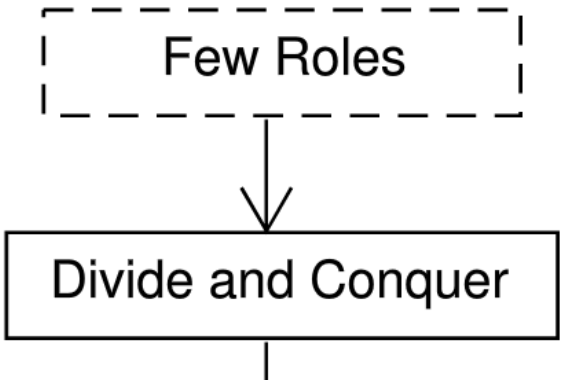
directly may be easier with
symmetric AOP (peer use cases)



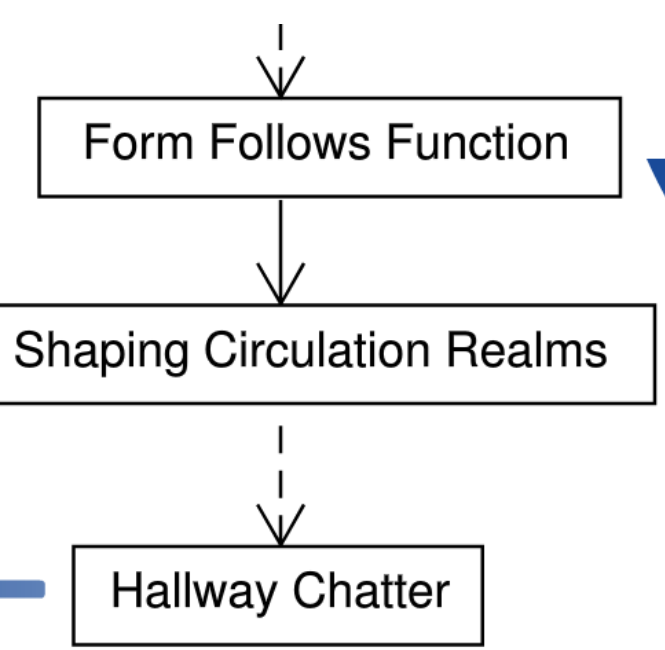
AOP provides for a greater level of decoupling between the software modules developed by different parts of the organization, including reversing dependencies (use case extension)

By creating groups with similar

Dividing people into independent teams and assigning them software modules to be developed directly may be easier with symmetric AOP (peer use cases)



AOP provides for a greater leve
decoupling between the softwa



Organizational Style pattern language

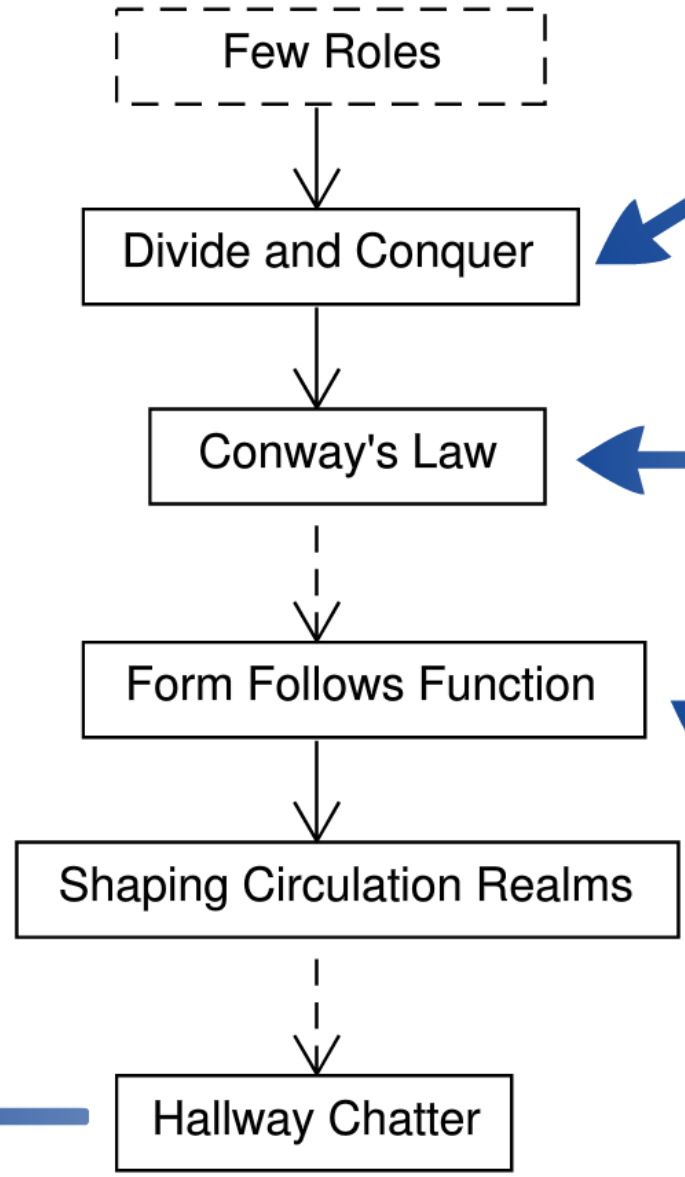
including reversing dependencies (use case extension)

By creating groups with similar activities and employing symmetric AOP (peer use cases), code becomes more modular and the development becomes easier

pointcut calculations(): **call**(* Stock.calc*(..));

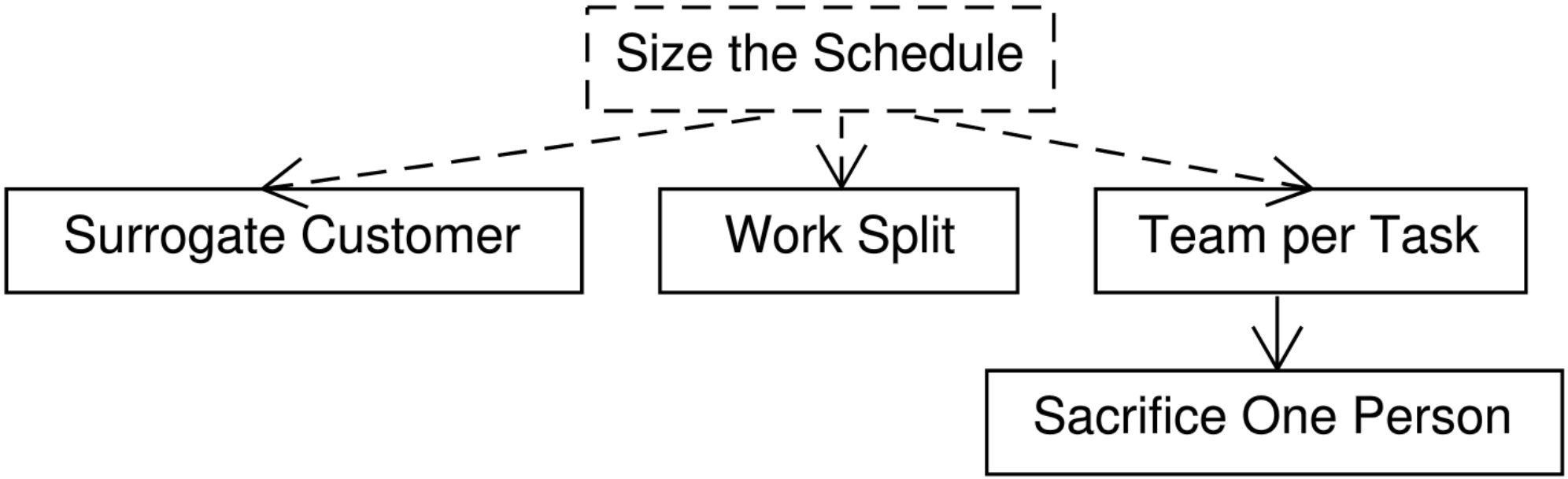
Much of pointcut fragility can be avoided by encouraging communication among developers

Aspects are about obliviousness, but the developers or teams whose code is affected by the aspects others have developed may be oblivious of them, too



Organizational Style pattern language

Project Management pattern language



> Conway's law: people <-> code

> Organizational patterns and aspect-oriented programming can support each other

> 9 organizational patterns examined more closely

> Organizational patterns referred by the examined ones are natural candidates for further examination

> Currently examining organizational patterns close to design patterns (People and Code pattern language)