




Control patterns: renewable energy case

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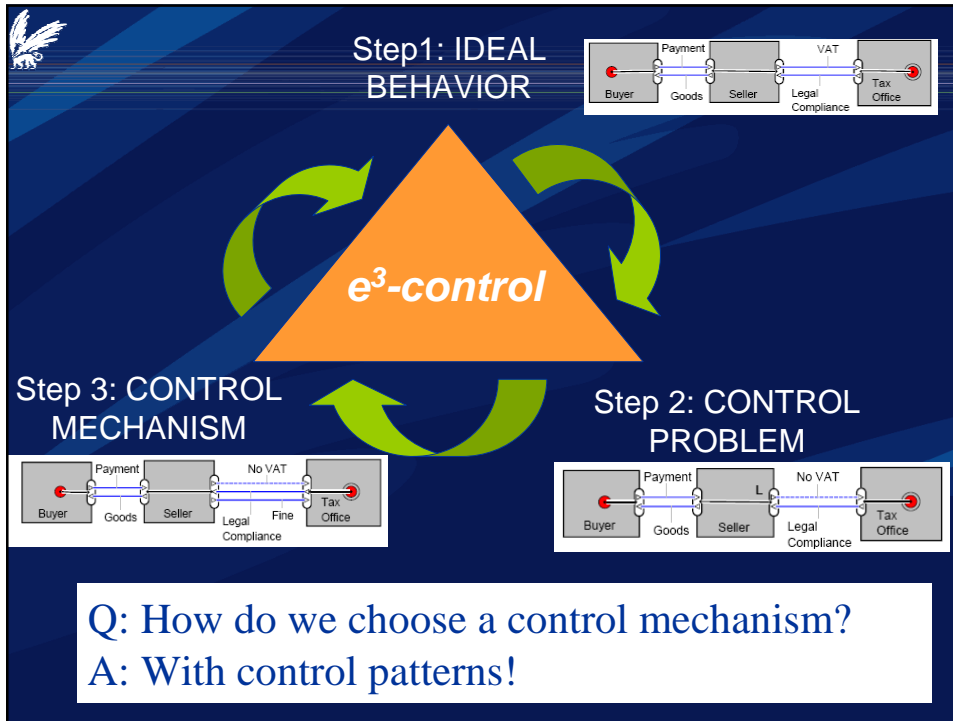
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Introduction

- In a **network organisation** actors may behave opportunistically: not comply with obligations; commit fraud
- **Controls** can be introduced
- A need for a **structured approach** to design control mechanisms in networks
 - *e³-control*
- A need for **guidelines about certain controls**
=> CONTROL PATTERNS

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Control Patterns

- A **design pattern** is a description of a general accepted **solution** for some recurrent **problem**, which is applicable in a certain **context** (Gamma et.al. 1995).
- A **control pattern** is a description of generic and re-usable **control mechanism** for a recurring **control problem**

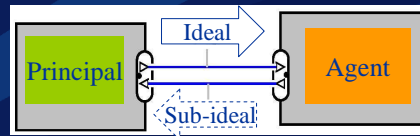
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Agency theory

Eisenhardt, Keil

- **Principal** and **agent**
- Agent behaves **opportunistically**



Opportunistic behavior

		Ex-ante (hidden information)	Ex-post (hidden action)
		Type	
Contractual controls		Incentives Penalties	
Procedural controls	Screening	Monitoring	

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Accounting control theory

Romney&Steinbart 2003

		Ex-ante controls	Ex-post controls
Contractual controls			
Procedural controls	Screening <i>Commitment confirmation</i>	Monitoring <i>Execution confirmation</i>	

Focus on procedures:

- Segregation of duties
- Order of activities
- Direct transfer of documents

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Patterns Library

	Ex-ante controls	Ex-post controls
Contractual controls		Incentive Penalty
Procedural controls	Partner Selection Certification Commitment confirmation	Monitoring Execution confirmation

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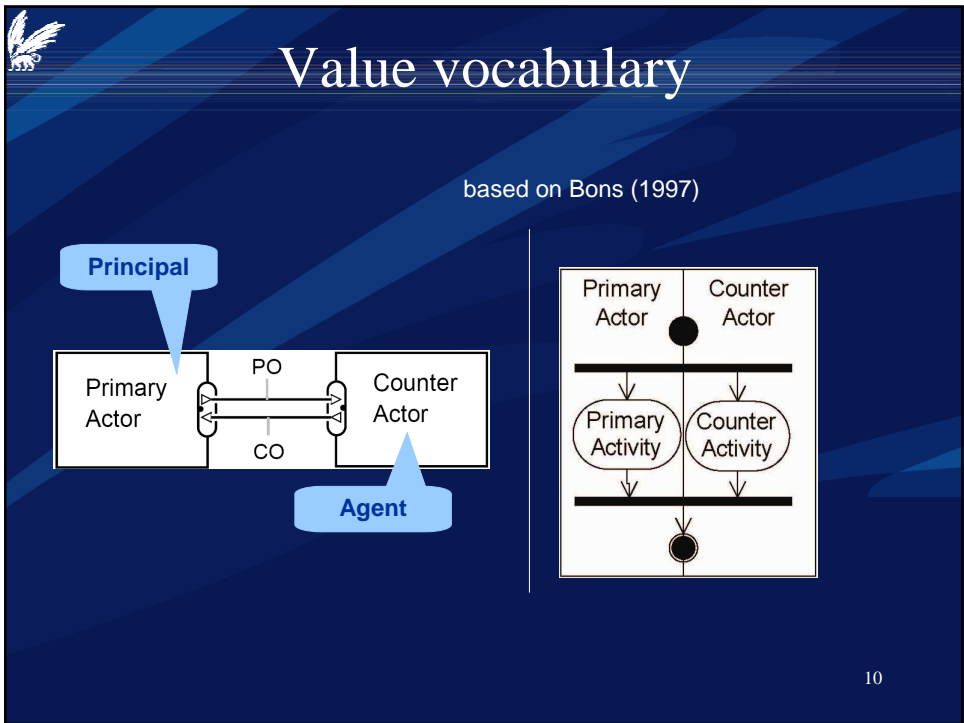
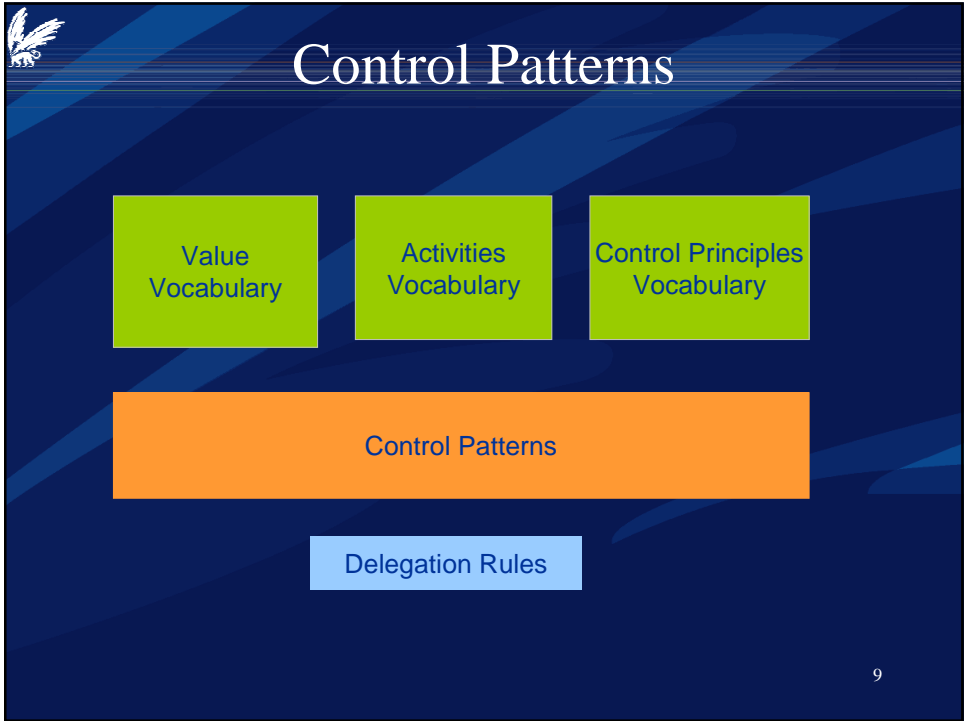
Control Patterns

	Value view	Process view
Context	Ideal value model	Ideal process model
Problem	Sub-ideal value model	Sub-ideal process model
Solution	Value model with controls	Process model with controls

Value as:

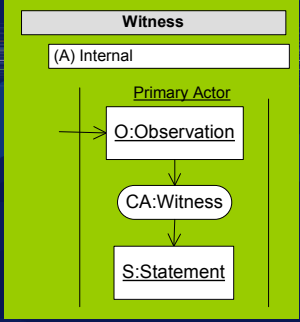
- the core of **contractual controls**
- abstract specification of **procedural controls**
- controls as **value-added services**

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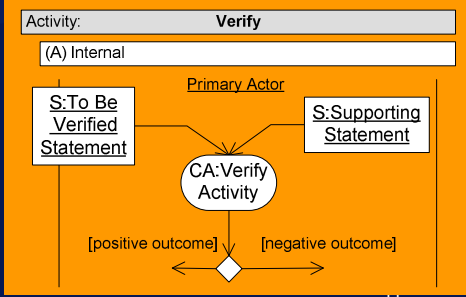


Activities vocabulary

- A:Primary
- A:Counter
- **CA:Witness**
- **CA:Verify**
- CA:Testify
- CA:Authorize
- CA:Confirm



The Witness activity flow is shown in a green box. It starts with an internal actor (A) Internal. A Primary Actor performs an O:Observation, which leads to CA:Witness, which then leads to S:Statement.

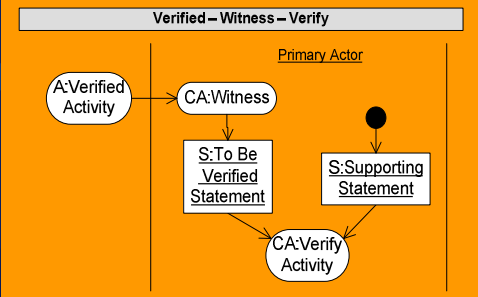


The Verify activity flow is shown in an orange box. It starts with an internal actor (A) Internal. A Primary Actor performs S:To Be Verified Statement and S:Supporting Statement, both leading to CA:Verify Activity. CA:Verify Activity leads to a diamond decision point with two paths: [positive outcome] and [negative outcome].

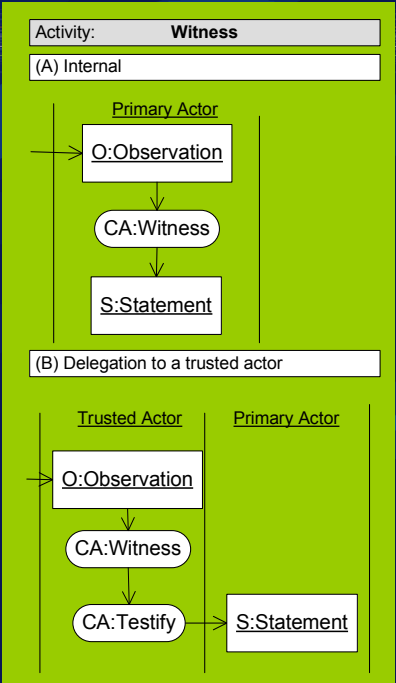
Control principles vocabulary

Describe normative rules for relations between:

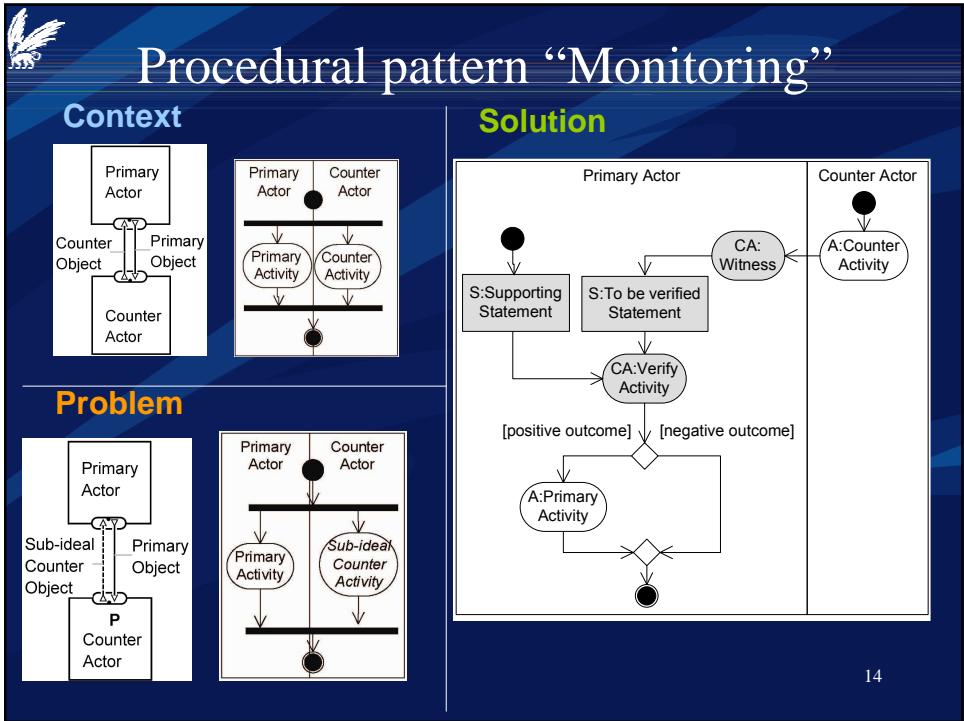
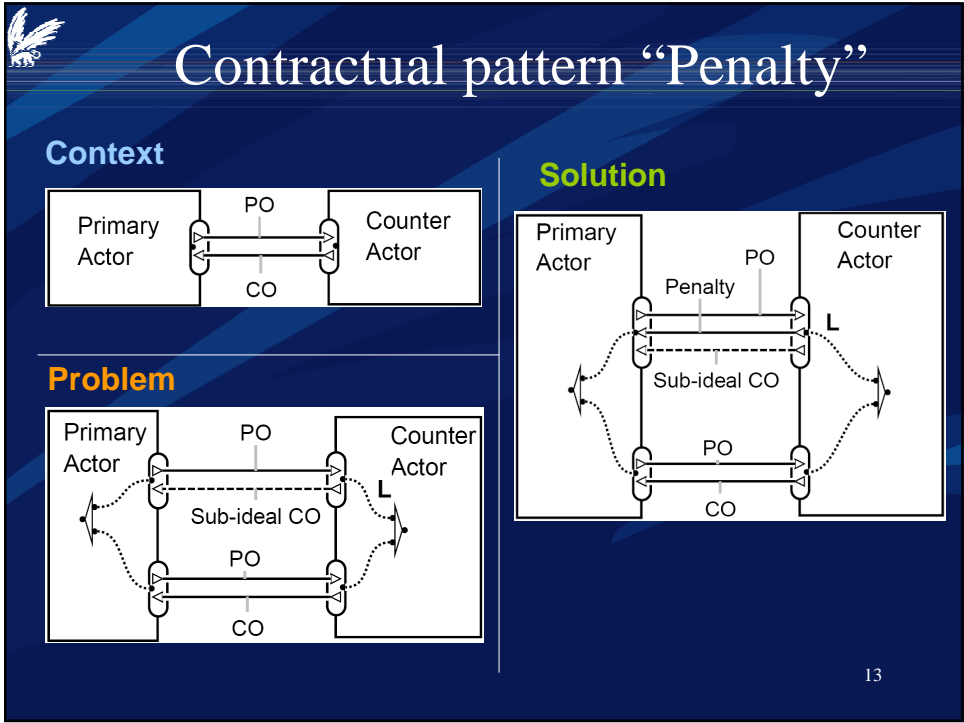
1. Activities and Objects
2. Activities and Actors
3. Activities and Activities



The Verified - Witness - Verify control principle is shown in an orange box. It illustrates the relationship between A:Verified Activity, CA:Witness, S:To Be Verified Statement, S:Supporting Statement, and CA:Verify Activity. A:Verified Activity leads to CA:Witness, which leads to S:To Be Verified Statement. S:Supporting Statement leads to CA:Verify Activity. S:To Be Verified Statement and S:Supporting Statement both lead to CA:Verify Activity.



The Delegation to a trusted actor control principle is shown in a green box. It illustrates the relationship between a Trusted Actor and a Primary Actor. The Trusted Actor performs O:Observation, which leads to CA:Witness, which then leads to CA:Testify. CA:Testify leads to S:Statement, which is performed by the Primary Actor.





Renewable certificates case

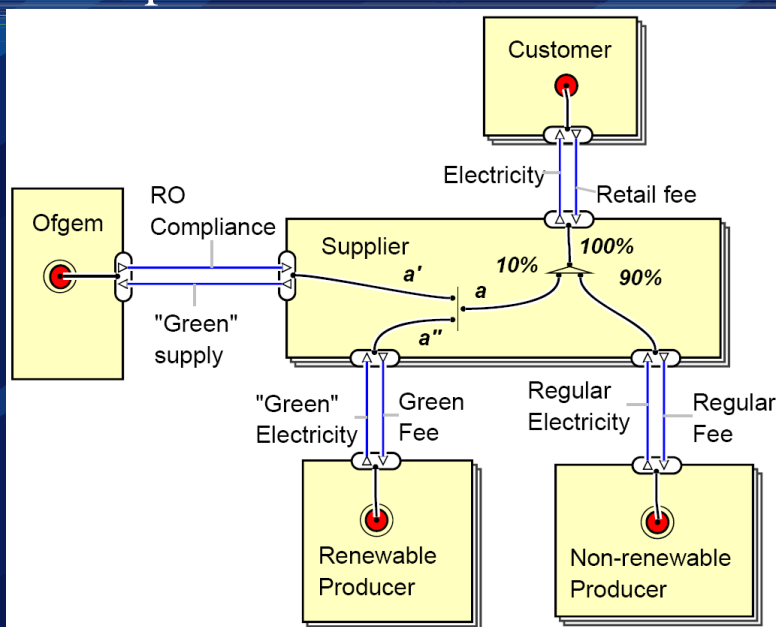
- **Green energy** is desirable, but **more expensive**
- UK: **Renewable Obligation** (RO) obliges suppliers to **'source'** 2,6% (before - 10%) of green electricity
- **Buy-out fee** for non-compliance
- **Renewable Obligation Certificates** (ROCs)
- **Ofgem** governs the process



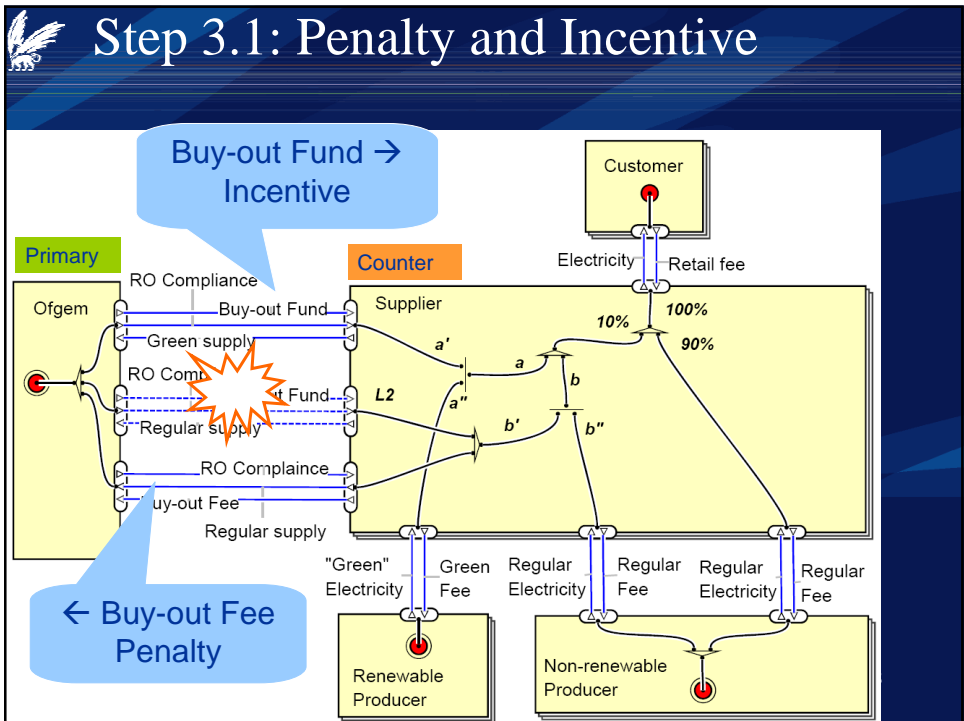
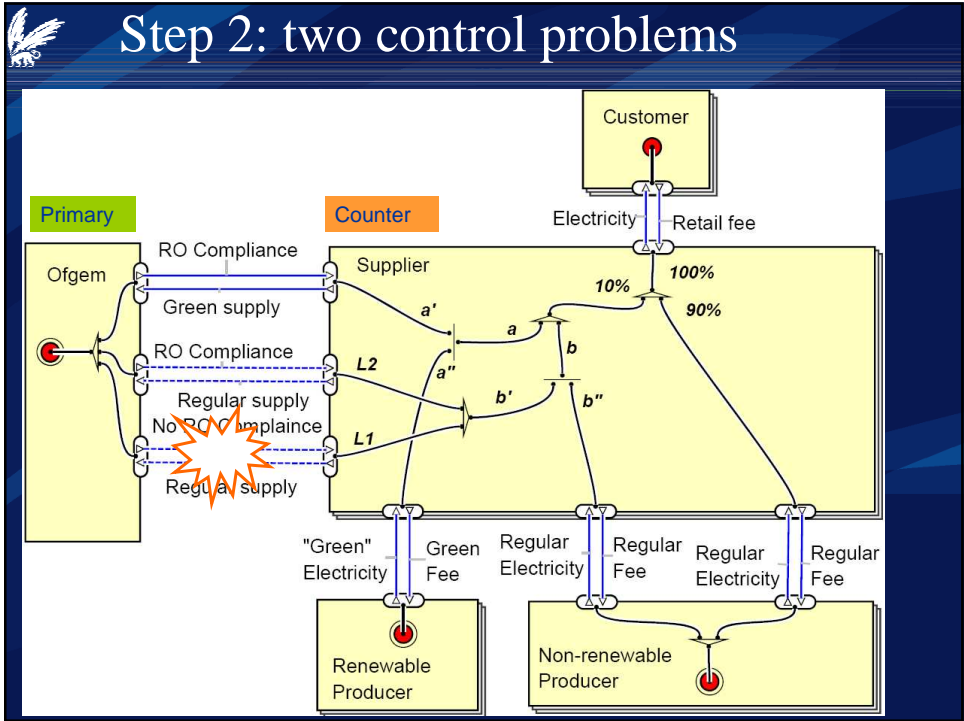
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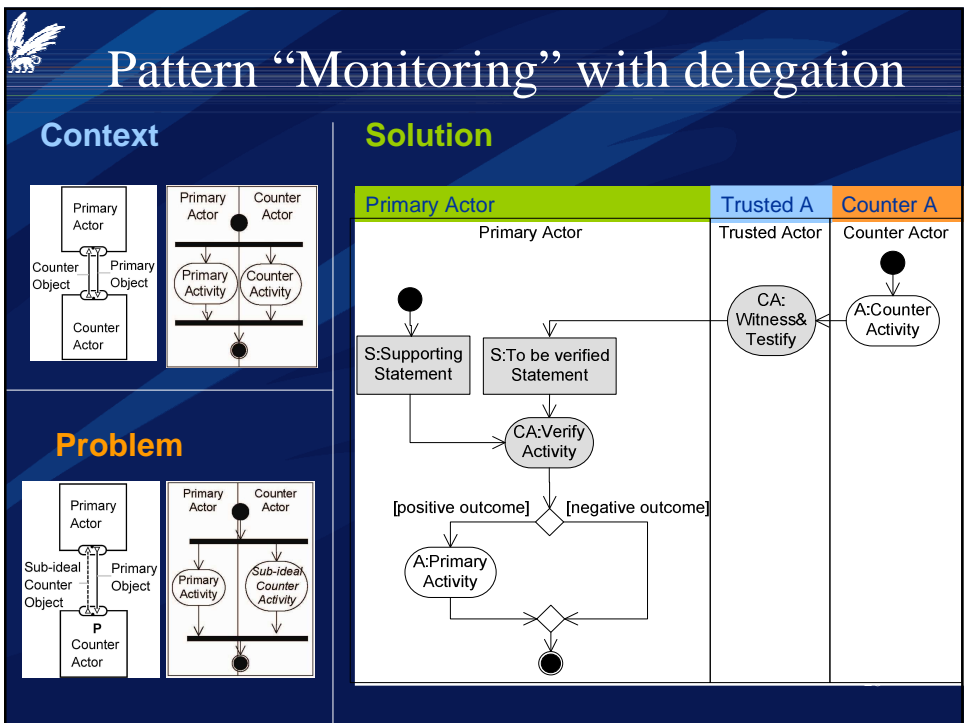
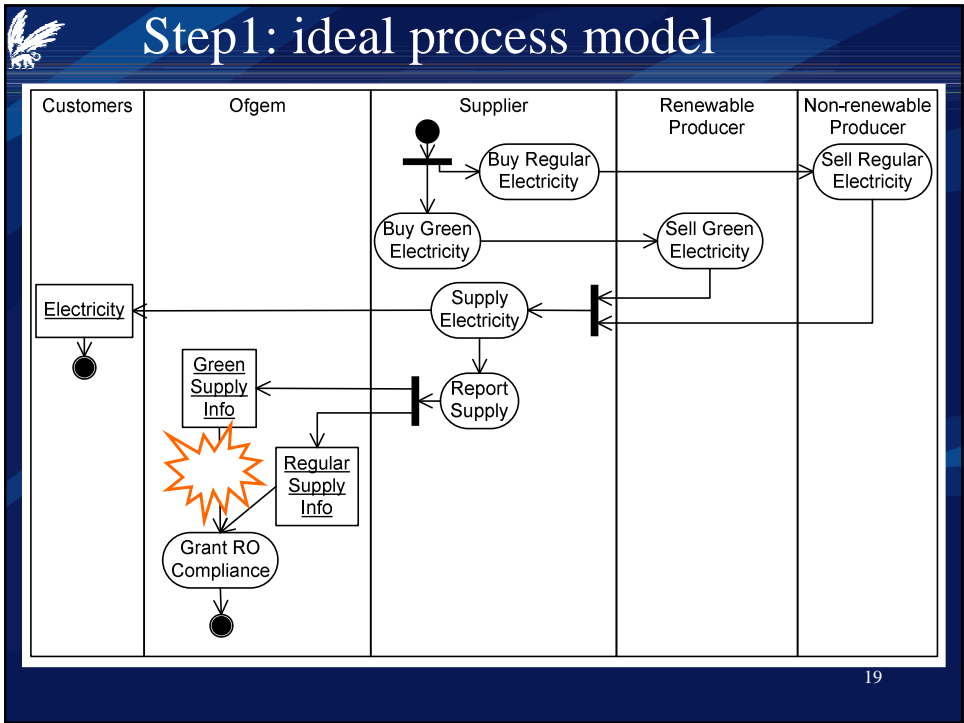


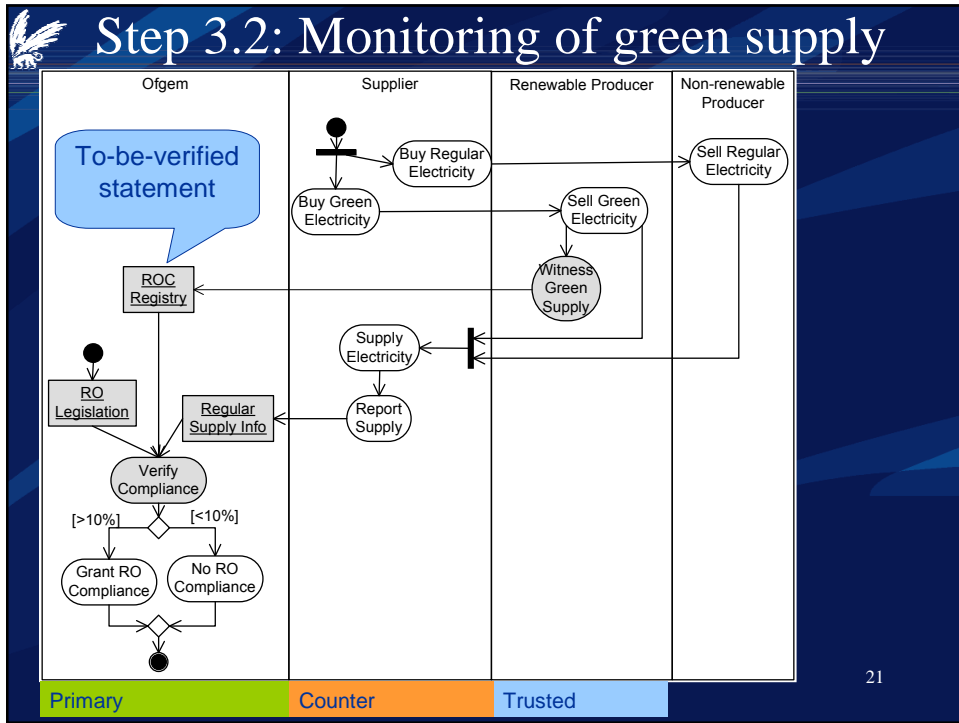
Step1: ideal value model



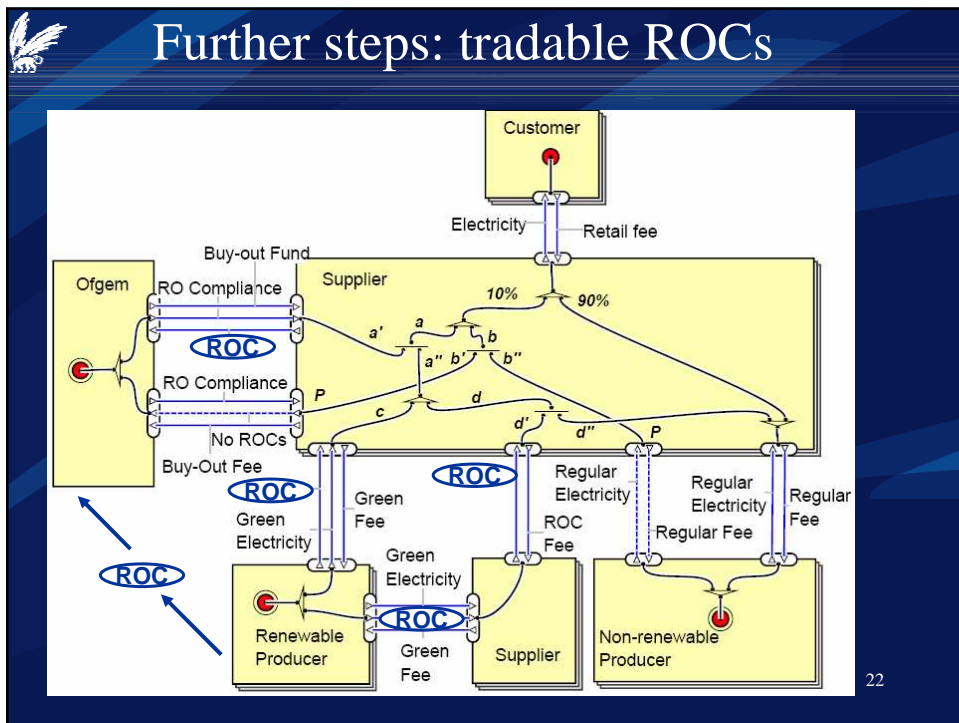
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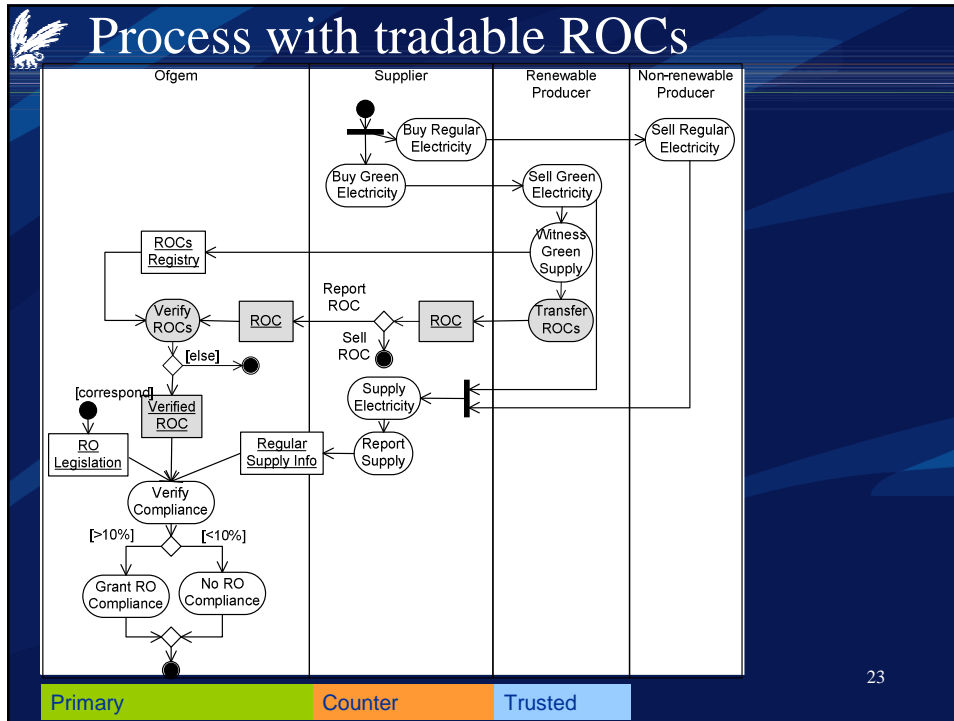




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Conclusions and discussion

- **Control patterns library**, based on:
 - agency theory
 - accounting control theory
 - both value perspective AND process perspective are needed for control
- **ROC case study** is very complex. Demonstrates the three roles of value:
 - as the core of **contractual controls** (incentives/penalties)
 - As abstract specification of **procedural controls** (monitoring)
 - controls as **value-added services** (ROCs as value objects tradable in a market)
- ROC case uses all bits of theory=> validates patterns
- ROC is also an example of highly **regulated environment** with public / private relationships