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## **Training**

# **ANSAwise - Enterprise Modelling for Distributed Systems**

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### **Abstract**

This module of the ANSAwise training course programme describes the ODP Enterprise viewpoint, shows some examples of enterprise modelling in action, and explains the agent-activity-resource technique for enterprise modelling.

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APM.1313.03

**Approved**  
Briefing Note

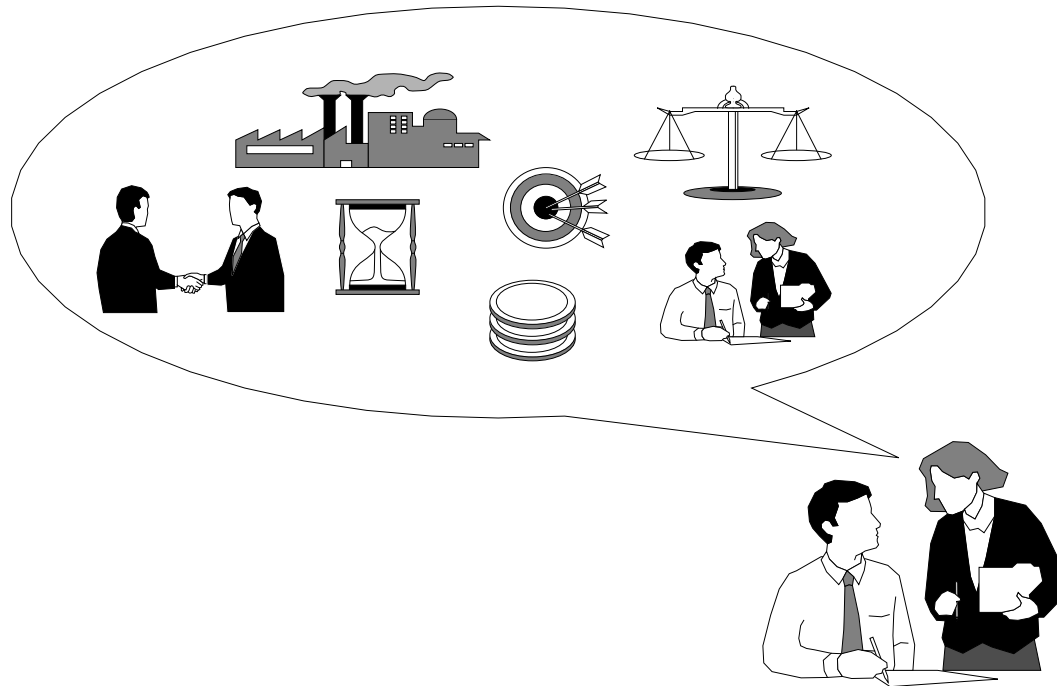
15th September 1995

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**Distribution:**  
**Supersedes:**  
**Superseded by:**



# Enterprise Modelling for Distributed Systems





## In this session

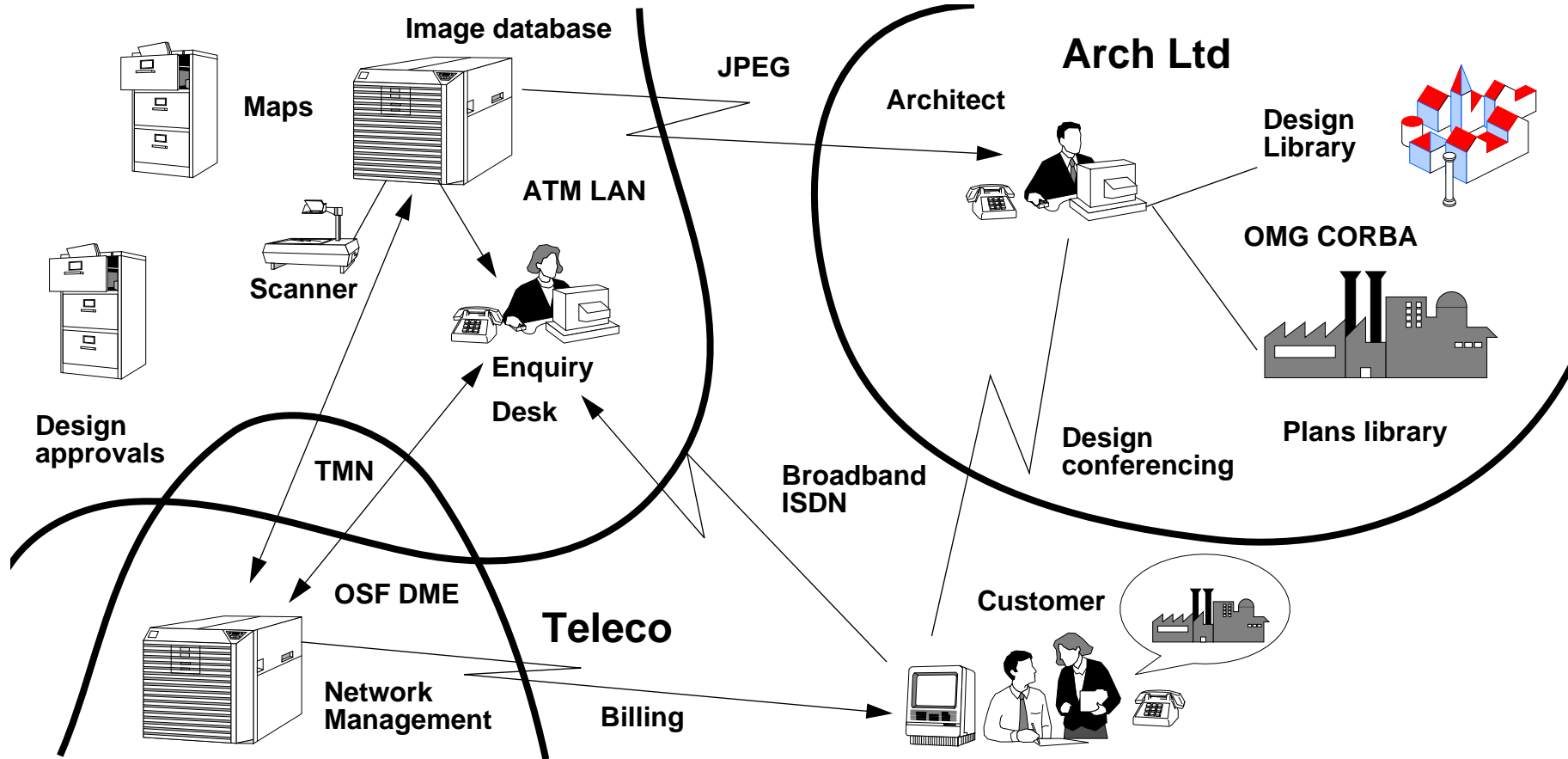
- *Explain the concepts in the ODP Enterprise viewpoint*
- *Show examples of enterprise modelling in action*
- *Explain a simple technique of enterprise modelling*



## **A scenario - enterprise viewpoint for urban planning**

- *The local authority for Newtown wants to encourage new housing and high-technology industry to move in*
- *The authority decides to provide electronic access to its Planning and Land Registry Functions*
- *The leading architects in the town (Arch Ltd) develop interactive design conferencing services with their clients*
- *The local authority out-sources management of its telecommunications services to Teleco plc*

# Newtown - Basis for Enterprise viewpoint





## Who are the stakeholders?

- *Service providers*
- *Service users*
- *Regulatory authorities*
- *... potentially, every organization in the value chain of service provision*
- *Often, start by concentrating on*
  - *a particular business activity (group of services)*
  - *as seen by a particular stakeholder*
  - *in a particular scenario*



## What is enterprise modelling?

- *The Enterprise is concerned with purpose...*
  - why do we provide the services we do? What are they really for?
- *“The Enterprise viewpoint is concerned with social, managerial, financial, and legal policy issues”...*
  - ... more simply: people, targets, money, agreements,...
- *Enterprise modelling allows you to describe an organization and its systems...*
  - ... to explore alternatives
  - ... to match your understanding against stakeholders’ perceptions
- *This description is an enterprise specification*





## Enterprise specification

- *An enterprise specification answers these questions*
  - What service is being provided?
  - Who is it provided to?
  - Under what circumstances is it provided?
  - What obligations and liabilities are incurred by service provision and use?



## Some enterprise specification concerns

- ***Remuneration***
  - how and when is payment made?
  
- ***Availability***
  - when is the service to be introduced?
  - during what times is the service available?
  - when is the service to be phased out?
  
- ***Security***
  
- ***Quality of service***



## A larger-scale example

- ***A UK organization using ANSA***
  - £100 billion turnover
  - £1.4 billion budget
  - 67,000 staff
  - 1000 offices
  - 30 million 'customers'
- ***In this organization, the enterprise modelling focuses on process analysis, security, and system management***
- ***The aim is to control cost, risk, and timescale***



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## Enterprise specification in ODP

- *An enterprise specification is concerned with*
  - purpose
  - scope (or boundary)
  - policies
- *As we shall see, enterprise specifications have a legalistic flavour*



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## ODP enterprise modelling

- ***The ODP Reference Model standardizes***
  - ***the content of the enterprise specification ('Enterprise language')***
  - ***validity rules ('structuring rules')***
- ***It does not standardize***
  - ***the form of the enterprise specification (a way of writing it down; a notation as text or diagrams)***
  - ***the process of enterprise specification (a particular modelling method)***

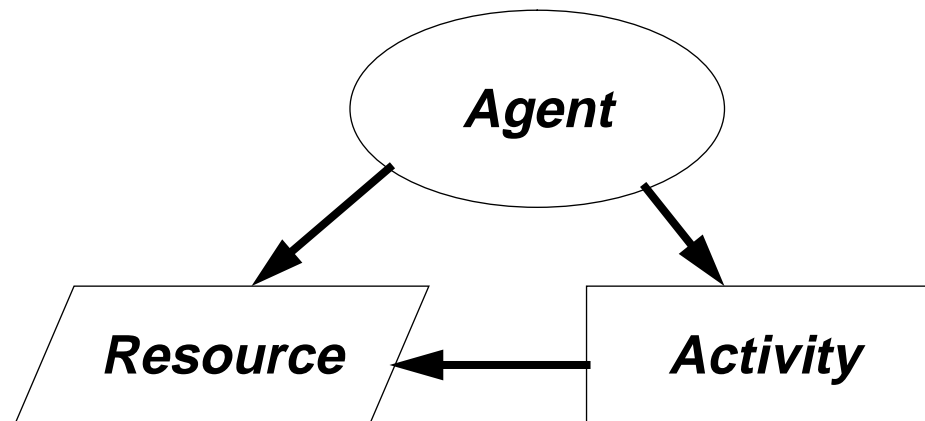


## “Enterprise language?”

- *What the ODP Reference Model calls “Enterprise language” is really a carefully chosen set of concepts*
  - it is not a specification language, nor an interface definition language with its own syntax
  - so there is no ODP “Enterprise Language Reference Manual”
- *To write down an enterprise specification, you need to devise your own notation for these concepts (text, diagrams, or both)*

## Techniques for enterprise modelling

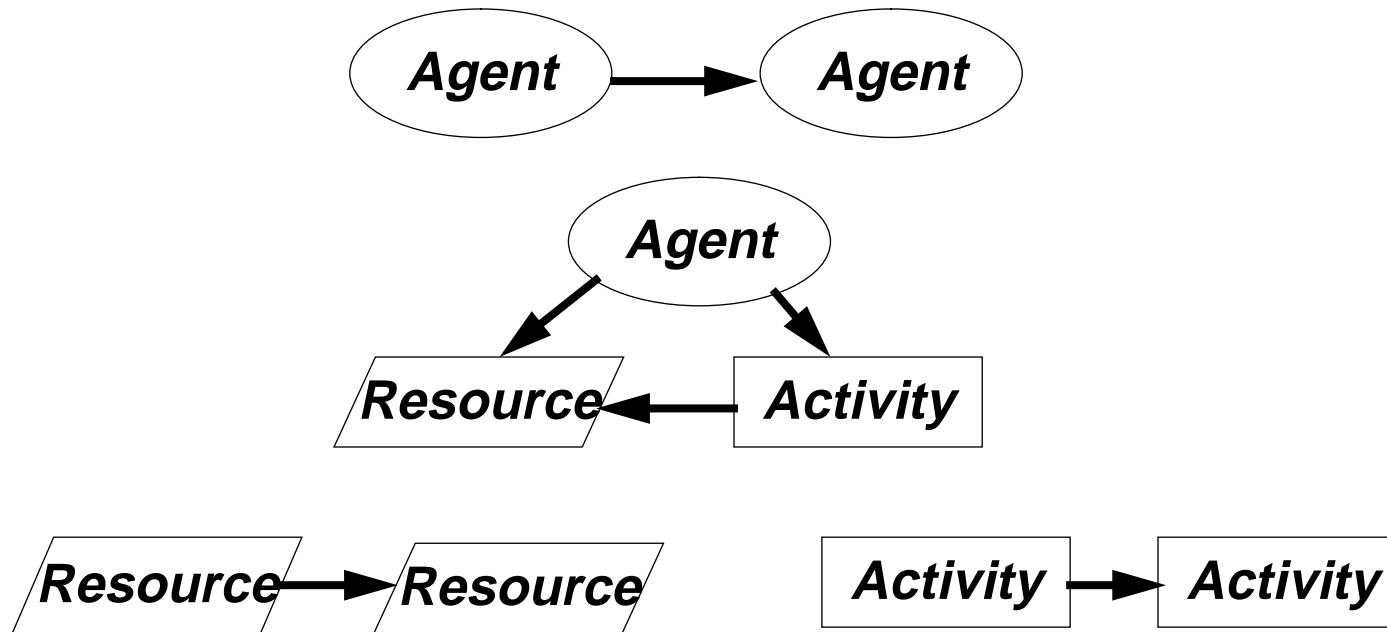
- *It could be cumbersome to write an enterprise specification*
- *Consider simple techniques (rather than a entire modelling method)*
- *Here is the agent-activity-resource (AAR) technique*



- *Both the technique and the notation are our own*
  - *they are not standardized*

## Using the AAR technique

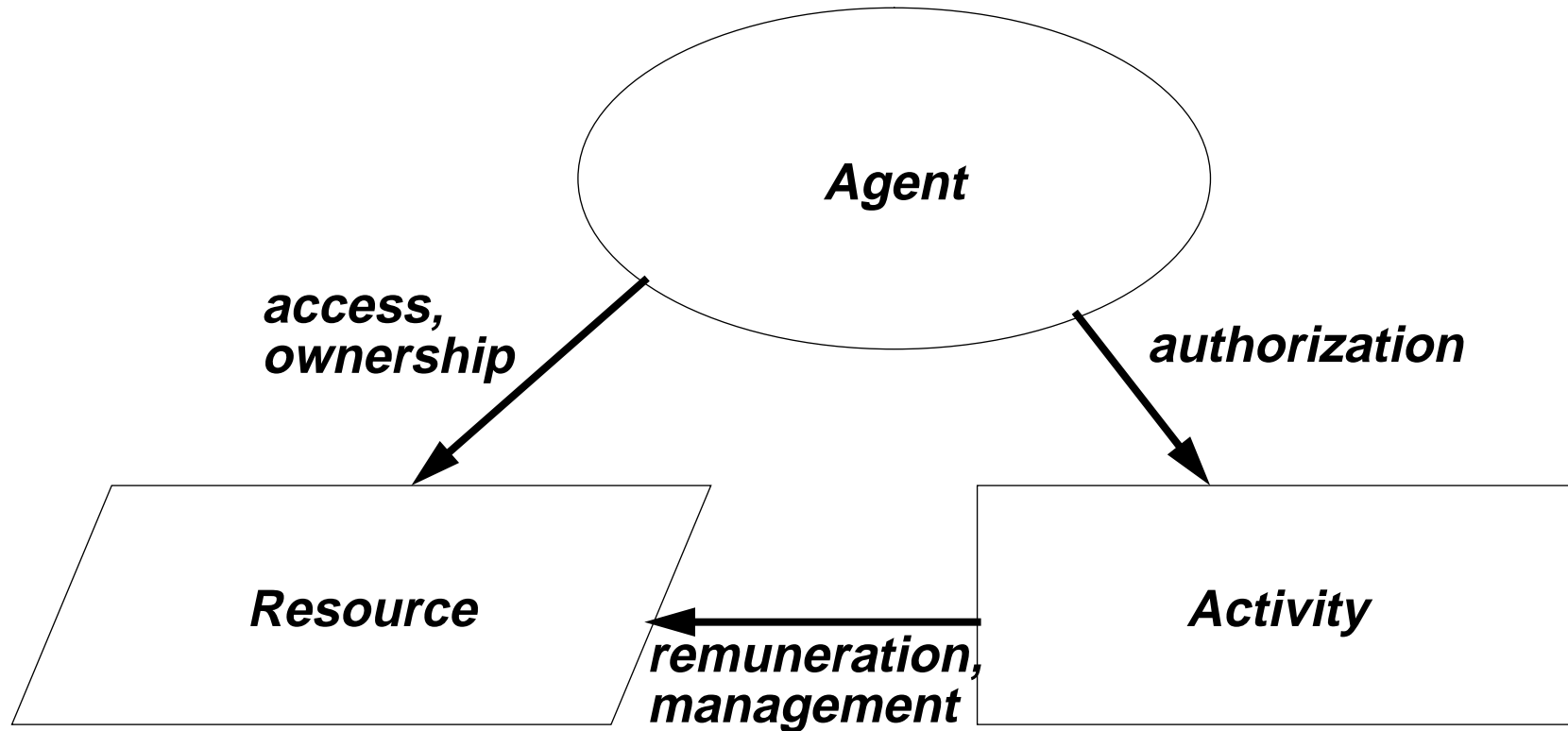
- *There are six kinds of relationships....*



- *... each has a different meaning*



## The AAR relationships



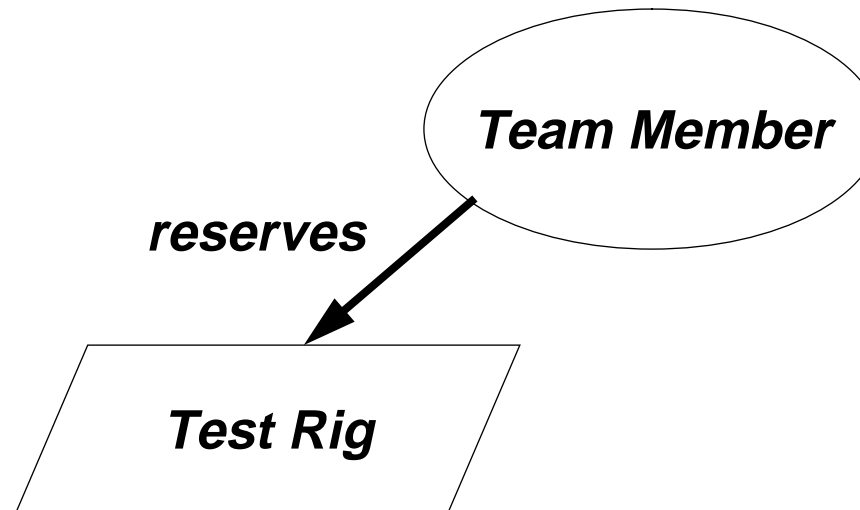
## Agent-Agent relationships

- *These represent structural roles*
  - *for example, delegation and authority relationships*



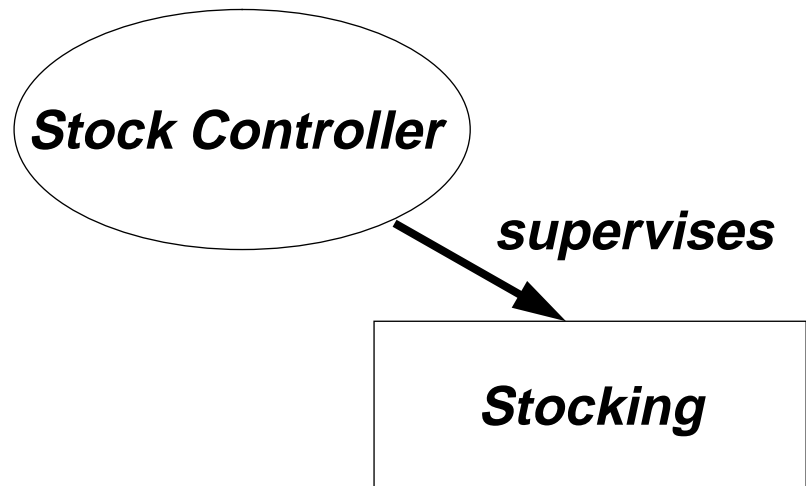
## Agent-Resource relationships

- *These represent access rights*
  - for example, the right to create, destroy, or reserve a resource



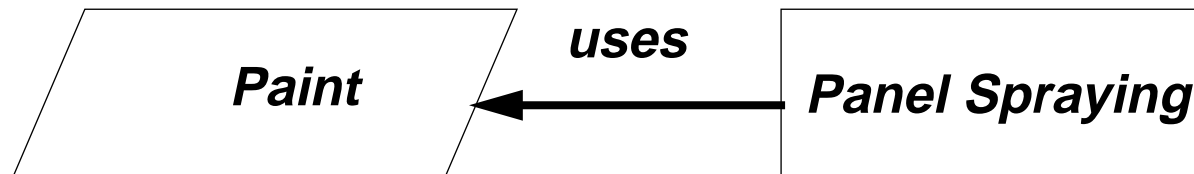
## Agent-Activity relationships

- *These represent functional roles*
  - *for example, control or supervision*



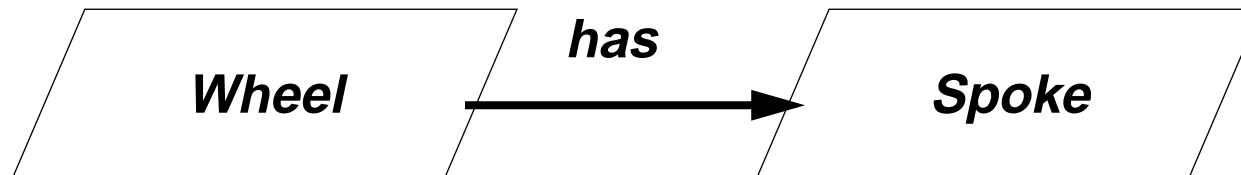
## Activity-Resource relationships

- *These represent transformations*
  - *for example, creation, destruction, and consumption*



## Resource-Resource relationships

- *These represent formations*
  - *for example, containment*



## Activity-Activity relationships

- *These represent interactions*
  - *for example, the initiation or termination of another activity*





## Agents

- ***Individuals, organizations, and systems each control themselves***
  - they are *active*
  - they are *autonomous*
  - they are represented as *agents*
- ***No agent can impose control over another agent***
  - the other agent can (deliberately or accidentally) behave differently
  - ... people and things do not always do what we hope!
  - ...failure is natural and expected, and must be described explicitly
- ***Instead of control, there is negotiation of contracts***





## Contracts

- ***Interaction between agents is via contracts***
  - “A contract is an agreement governing part of the collective behaviour of a set of objects”
- ***A contract places obligations on the objects involved***
- ***The specification of a contract may include:***
  - the roles of the objects concerned, and their associated interfaces
  - quality-of-service attributes
  - indications of durations or periods of validity
  - indications of behaviour which invalidates the contract
  - liveness and safety conditions
- ***Negotiation can be automated by matching contract specifications***



## Contract specifications

- *As well as agents, contracts involve*
  - activities: what each agent is obliged to do (and in what order)
  - resources: what they do it with
- *Policies can constrain contracts*



## Policies

- ***Policies specify bounds on intended behaviour, for example***
  - security policy: who will be offered the right to use a service
  - remuneration policy: when service users are obliged to pay
  - arbitration policy: who resolves contractual disputes
- ***Policies are application-specific***
  - payment may involve a subscription charge, per-use charge, per-time-unit charge...
- ***Policies can change***
  - “this month’s special offer...”



## Policy specification

- *A policy is a set of rules related to a particular purpose*
- *A rule for a particular behaviour can be expressed as:*
  - *an obligation: the behaviour is required*
  - *a permission: the behaviour is allowed*
  - *a prohibition: the behaviour is forbidden*
- *In other words, rules specify rights and responsibilities*
  - *permissions empower, with rights*
  - *obligations and prohibitions constrain, with responsibilities*



## Communities

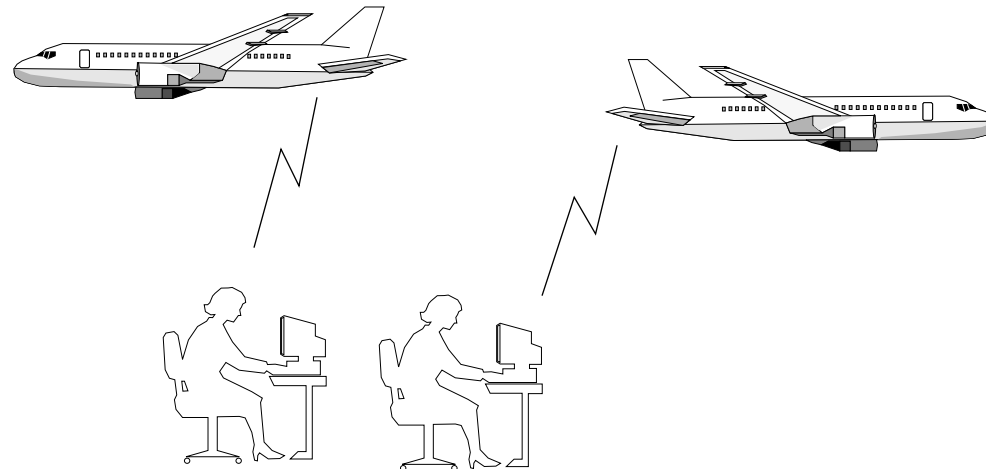
- ***Enterprise objects are grouped into communities***
  - ***a community has an objective: a common purpose***
  - ***the members of the community share this objective***
  - ***this objective is also a contract***



## Federation

- *A federation is a particular kind of community*
  - ... a voluntary community
- *Members of a federation have freedom*
  - ...freedom to join
  - ...freedom to leave
- *Members are still subject to their obligations*
  - joining and leaving will be governed by the community's contract
- *Administration within a federation is co-operative (peer-to-peer)*
  - ... there is no single administrator

## A contrasting example - air traffic control



- *This picture is misleading...*



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## Enterprise modelling for social context

- *...Modelling is not just about rules*
- *Air traffic control has an excellent safety record*
  - responsibility is fulfilled by team work...
  - ... multi-level checking, mutual observation, pride in the job
- *The legalistic flavour of contracts does not model well such activities*
  - good modelling techniques for social context do not yet exist
  - some believe that modelling social context is inappropriate





## The scope of enterprise modelling

- *Enterprise modelling can deal with political and economic issues*
- *Social issues are a research area*
- *Technological issues can be dealt with by representing systems as agents*
  - *other aspects of technology belong in the other ODP viewpoints*



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## Modelling your system - agents and boundaries

- *Represent your enterprise as a community*
  - identify its objective ('corporate mission statement')
  - it will probably be a federation (of departments or divisions)
- *Represent 'internal customers' as agents*
- *Represent 'external customers' as agents*
  - include all the stakeholders, not just customers and suppliers
- *Represent a 'system of interest' as an agent*
  - normally a computer system
- *Inspect the boundaries of the enterprise*
  - it may not match the boundary of your business



## Modelling your system - contracts

- *Identify the resources*
- *Identify the activities*
- *Specify the contracts, obligations, and responsibilities*



## Summary

- ***Enterprise specification is a model of the purpose of an enterprise***
  - ***expressed as contracts between agents that are members of communities***
- ***The focus for enterprise modelling depends on your business needs***
- ***Enterprise modelling will be much easier with tool support***
- ***For more on:***
  - ***the Enterprise viewpoint, see *Architecture and Design Frameworks* (TR.38.00)***
  - ***the AAR technique, also see *Architecture and Design Frameworks* (TR.38.00)***