

Use Case Modelling

Existing and planned system models are used during Requirements Engineering

- Models of the **existing system** are used during requirements engineering.

They help clarify what the existing system does and can be used as a basis for discussing its strengths and weaknesses. These then lead to requirements for the new system.

- Models of the **new system** are used during requirements engineering to help explain the proposed requirements to other system stakeholders.

Engineers use these models to discuss design proposals and to document the system for implementation.

Use Case Model

- Use case diagrams, show the interactions between a system and its environment (users and other systems).
- Use-cases are a scenario based technique in the UML which identify the actors in an interaction and which describe the interaction itself.
- A set of use cases should describe all possible interactions with the system.
- High-level graphical model supplemented by more detailed tabular description .

UML – Unified Modeling Language

- ✧ Unified Modeling Language (UML) has become a standard modeling language for object oriented systems. (Booch et.al. 2005.)
- ✧ UML is a set of 13 different diagram types that may be used to **model** software systems.
- ✧ However five diagrams types are taught to represent the essentials of the system (Erickson and Siau, 2007)
 - ✧ **Use Case Diagrams**
 - ✧ Sequence Diagrams
 - ✧ Activity diagrams
 - ✧ Class Diagrams
 - ✧ State Diagrams

Use Case Modelling Concepts

- Use case Diagrams
 - Use cases
 - Actors
 - Relationships
- Business Modelling
- System modelling
- Both work with Actors, Use cases and relationships

To Model Use Cases

- Determine system scope and purpose.
- Identify the actors.
- Identify the use cases.
- Create a use case diagram. (note the diagram is only part of the model)
- Describe the use cases.
- Identify user services and business services.
- Develop user services and business services.
- Complete the use case descriptions.

Business use cases

- When the business is modelled using Use Case modelling, more than just the user services are modelled (business actors and business use cases)
- A Business use case is the way in which a customer/client/user can make use of a business to get the result they want.
 - E.g. get a new driving licence
 - pay an invoice.

System use cases

- When the user services are modelled, then the boundaries and actors are specific to the system (actors and use cases).
- System use cases is the way in which a user of a computer system can make use of the system .
System use cases avoid all manual issues such as :
 - Phone the customer to confirm
 - file a print out

Business Use Case modelling

- Three types of activities (or Business Use Cases):
 - 1. Commercially important activities, often called business processes. (Core business use cases)
 - 2. Support activities that are needed to make the system work, such as administration, cleaning and security.
 - 3. Management work.

Core business use cases

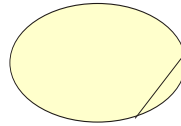
- Should have a communicates-relationship to or from a business actor.
 - So that businesses are built around the services their users request.
- Can be triggered periodically or they can run for a very long time
 - (e.g. a surveillance function).
- Have business actors that originally initiated them.

Non-core business use cases

- Management and supporting business use cases do not necessarily need to connect to a business actor, although they normally have some kind of external contact. A management business use case, for instance, might have the owners of the business, or the board, as its business actor.
- Abstract business use cases do not need a business actor, because they are never instantiated ("started") on their own.

Business Modelling

- There are Business Use Cases
- Communication between business use cases and business actors.
- The icon for a business use case



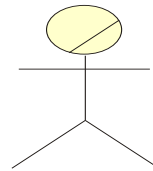
Ring In Booking

Business actors

- An actor is an entity with whom the business interacts.
- The term actor means the role someone, or something plays while interacting with the business.
E.g.
 - Customers , Suppliers, Partners, Potential customers (the "market place"), Local authorities , Colleagues in parts of the business not modeled.
- An actor normally corresponds to a human user, but sometimes **an information system** plays the role of an actor, or 'time' can also do so.

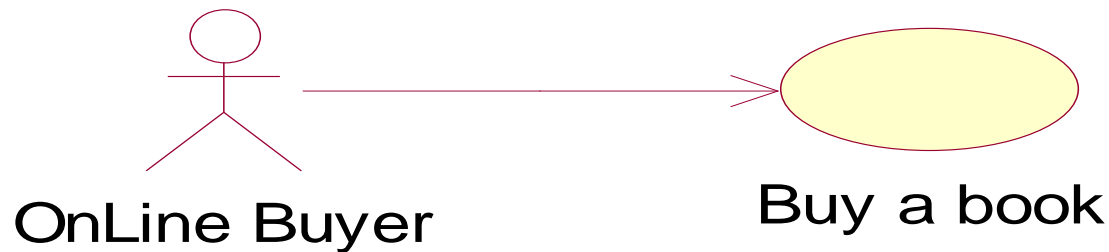
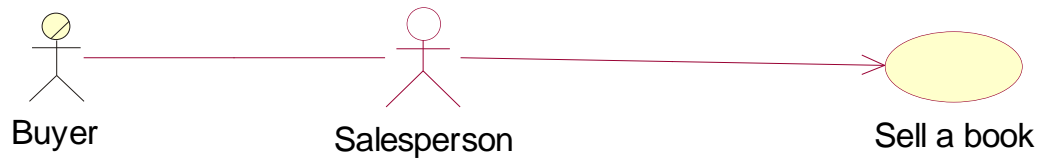
Business Modelling

- There are Business Actors
 - Anyone or anything that is external to the organisation, but interacts with it.
 - For example a business actor for your business may be it's suppliers or creditors.
 - The icon for a business Actor



Supplier

Business Actor, Actor, Use Case



Drawing Use Case Diagrams

Purpose

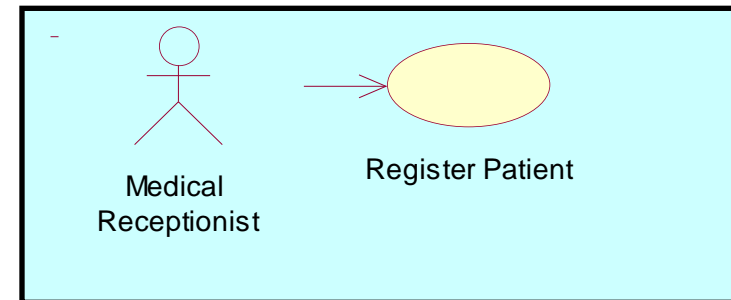
A **Use Case** is a description of the functionality of the system from the users' perspective

- document the functionality of the system from the users' perspective
- document the scope of the system
- document the interaction between the users and the system using supporting use case descriptions (behaviour specifications)

Use case descriptions give a description of the interaction between the users of the system (i.e. actors) and the high level functions in the system (i.e. use cases)

Components of a Use Case Diagram

- Actors – stick figures.
- Use cases - ovals.
 - High level event-triggered processes.
 - Way in which the user uses the system.
- Communication lines
 - connecting actors to Use Cases.
- Extension lines
 - (Use case to Use case)
 - One use case **extends** another if it is sometimes performed by it.
 - One use case **includes** another if it is part of it's normal processing.



Notation used in Use Case Diagrams

Actors

- drawn as stick people with a name
- the roles that people, other systems or devices take when communicating with a particular use case or use cases
- not the same as job titles or people
 - people with one job title may play the roles of several actors
 - one actor may represent several job titles

Notation used in Use Case Diagrams

Actors cont.

- Have one role for each use case with which they interact, that is one role per *communicates* relationship.
- Must have a name or identifier.
- May be played by a single object.
- May have **generalisations** with other actors – an actor may inherit characteristics of a more general actor.

Notation used in Use Case Diagrams

Use cases

- drawn as ellipses with a name in or below each ellipse
- describe a sequence of actions that the system performs to achieve an observable result of value to an actor
- the name is usually an active verb and a noun phrase

Notation used in Use Case Diagrams

Communication associations

- line drawn between an actor and a use case
- can have **arrow heads to show where the communication is initiated** (arrow points away from the initiator)
- represent communication link between an instance of the use case and an instance of the actor

Notation used in Use Case Diagrams

Sub-systems

- drawn as a rectangle around a group of use cases that belong to the same sub-system
- in a CASE tool (rational Rose), use cases for different sub-systems are usually placed in separate use case diagrams, and the rectangle is redundant

Notation used in Use Case Diagrams

Dependencies

A dependency is a relationship between two modelling elements where a change to one will probably result to a change in the other. Represented by a dashed line with a arrow head pointing at the element on which the other is dependent.

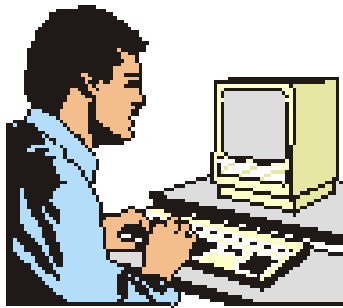
- Extend and Include relationships **between use cases**
- shown as stereotyped dependencies
- stereotypes are written as text strings in guillemots: **«extend»** and **«include»**

Actor v user

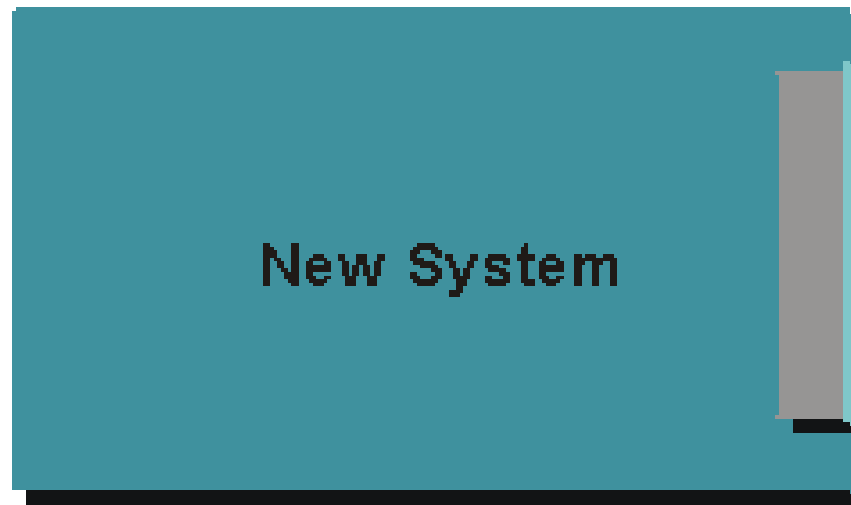
- An actor represents a type of business user rather than a real physical user.
- Several physical users of a business can play the same role.
- The same user can act as several different actors.
- A business actor should be given a name that reflects its role towards the business. The name should be applicable to any person—or any information system—playing the role.

Potential actors

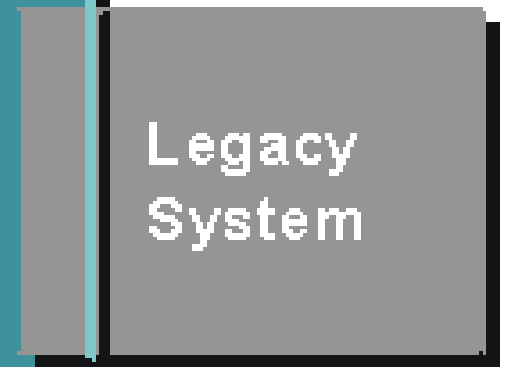
Other Systems



Users



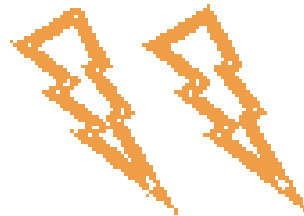
New System



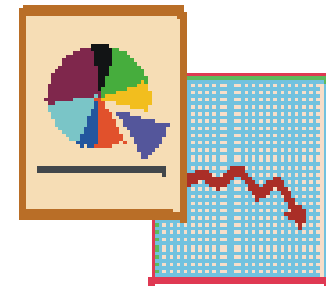
Legacy System



Maintenance



Communications



Reports

Picking actors

- What in the system's surroundings will become actors to the system?
- Start by thinking of individuals who will use the system. How can you categorize them? It is often a good habit to keep a few individuals (two or three) in mind and make sure that the actors you identify cover their needs.

Actors

- Help define system boundaries
 - Actors should interact directly with the system.
 - Business actors may not be system actors.
 - eg In an airline booking system, what would the actor be? This depends on whether you are building a airline booking system to be used by a travel agent, or whether you are building a system to which the passenger can connect directly through Internet.

If you are building an airline booking system to be used at a travel agent, the actor would be travel agent. The traveler doesn't interact directly with the system, and is therefore business actor and not a system actor

If you are building a booking system that will allow users to connect via the Internet, the traveler will interact directly with the system and is therefore a system actor to it.

Identifying Actors

- Who uses the system?
- Who starts up / shuts down the system?
- Who maintains the system?
- What other system(s) use this system?
- Who gets information from the system?
- Who provides information to the system?
- Does anything happen automatically at a preset time? (*A time / date can be an actor*).

Third Party Claims Example

Model the following system as a use case diagram.

A company owns a fleet of buses on which it carries fare-paying passengers. On occasions, the buses are involved in accidents or incidents which may incur liability on the company. The company handles small claims internally and refers any larger claims to an underwriting firm. When an incident occurs, it is the driver's duty to report it to the company claims section. If a third party wishes to make a claim, they also approach the claims section and report the claim to the incident , to the claim section staff, giving date, time and location of the incident and nature of the claim. If the incident has not yet been reported, this is done on the spot, and later confirmed with the driver. The claim is then passed on to a claims assessor, who decides if the claim should result in a payment. This process sometimes involves the use of an expert witness, who will advise on the impact of the injury to the person or property. If the claim amount is too large, it will be referred on to the underwriting company.

Pick Out the Actors

A company owns a fleet of buses on which it carries fare-paying passengers. On occasions, the buses are involved in accidents or incidents which may incur liability on the (company). The company handles small claims internally and refers any larger claims to an underwriting firm. When an incident occurs, it is the driver's duty to report it to the (company claims section). If a third party wishes to make a claim, they also approach the claims section and report the claim to the claim section staff, giving date, time and location of the incident and nature of the claim. If the incident has not yet been reported, this is done on the spot, and later confirmed with the driver. The claim is then passed on to a claims assessor, who decides if the claim should result in a payment. This process sometimes involves the use of an expert witness, who will advise on the impact of the injury to the person or property. If the claim amount is too large, it will be referred on to the underwriting company.

Pick Out the Tasks

A company owns a fleet of buses on which it carries fare-paying passengers. On occasions, the buses are involved in accidents or incidents which may incur liability on the company. The company handles small claims internally and refers any larger claims to an underwriting firm. When an incident occurs, it is the driver's duty to report it to the company claims section. If a third party wishes to make a claim, they also approach the claims section and relate to the claim section staff. the claim to the incident, giving date, time and location of the incident and nature of the claim. If the incident has not yet been reported, this is done on the spot, and later confirmed with the driver. The claim is then passed on to a claims assessor, who decides if the claim should result in a payment. This process sometimes involves the use of an expert witness, who will **advise** on the impact of the injury to the person or property. If the claim amount is too large, it will be referred on to the underwriting company.

Do We Know Enough?

- Q: What does the specifier mean by
 - The claims assessor ... *decides*...?
- A: The claims assessor views the claim details and does one of four things.
 - Refers to Expert Witness
 - Rejects
 - Accepts
 - Removes to Underwriter ...

Either:

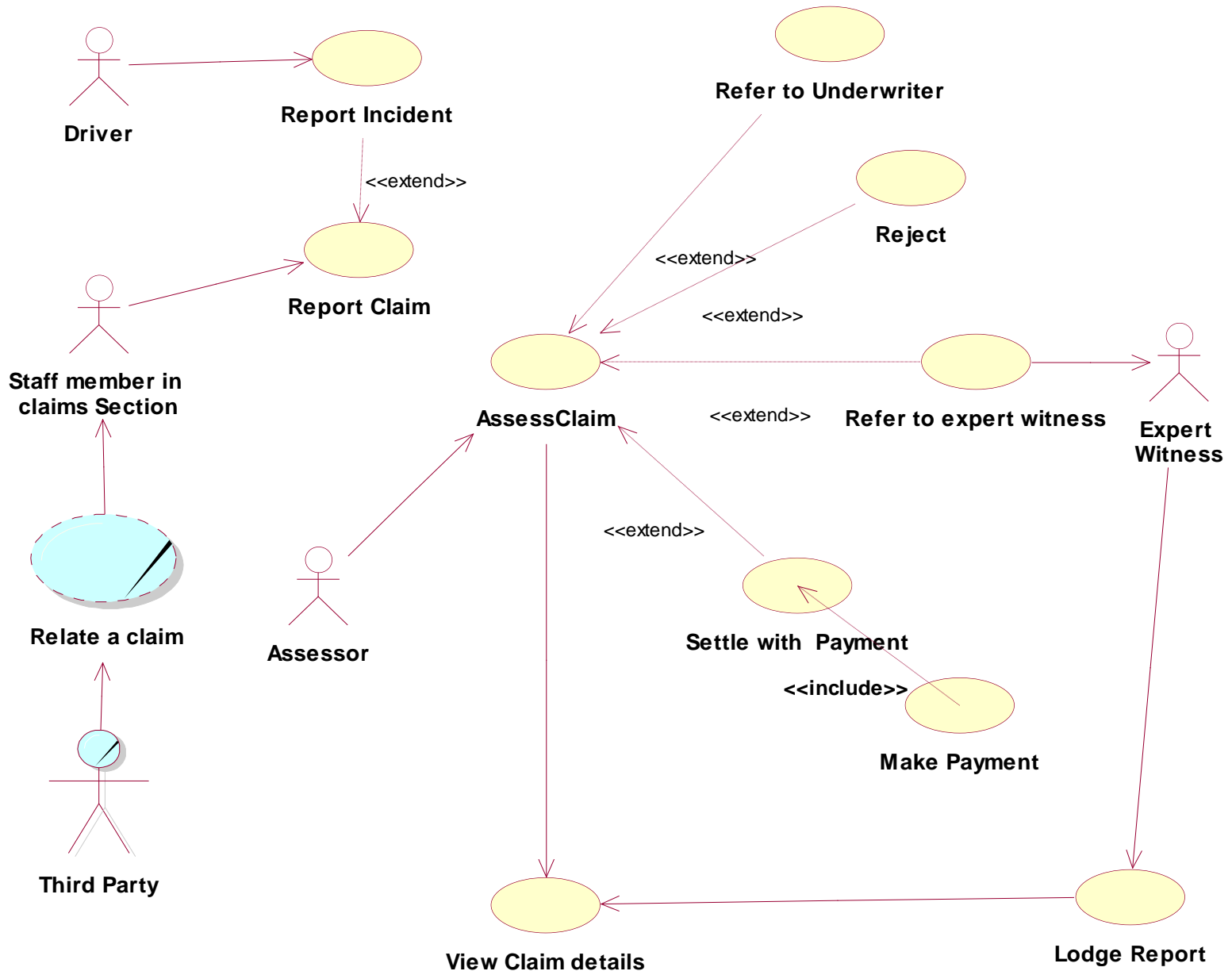
- **Pays up**, changing the claim status from ‘reported’ to ‘settled’.
 - This includes the company’s standard ‘make a payment’ task, giving it the name and address of the payee (i.e. the claimant) and the amount of the payment.
- **Rejects the claim**, changing the status from ‘reported’ to ‘rejected’.
 - This sends a standard letter to the claimant.
- **Refers the claim to the expert witness.**
 - The expert witness then submits a report which becomes part of the claim details and the assessor sees it when viewing the claim.
- **Refers the claim to the underwriters.**
 - This removes responsibility for the claim from the company. Full documentation is sent to the underwriter.

Do We Know Enough?

- The expert witness ... advises...?
 - The expert witness then submits a report which becomes part of the claim details and the assessor sees it when viewing the claim.
- The claim is ...referred...?
 - This removes responsibility for the claim from the company. Full documentation is sent to the underwriter.

What Else Do We Need to Know?

- Which actors
 - Initiate a task?
 - Receive *direct* communication from a task?
- Which tasks
 - Are primary (event triggered) tasks?
 - Are secondary, reused tasks?
- Are secondary tasks
 - Always included in the task?
 - Optionally used by the task (i.e. Do they extend the task's behaviour)?



Rational Rose Diagram

Rational Rose

