

An Introduction to UML

The Business Process Model

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The Business Process Model

This paper describes how to model business processes in the UML using a custom extension to UML defined by Hans-Erik Eriksson and Magnus Penker. It explains both the notation and the process of using that notation to capture and refine business process models.

Introduction to UML

The Unified Modelling Language (UML) is, as its name implies, a modelling language and not a method or process. UML is made up of a very specific notation and the related grammatical rules for constructing software models. UML in itself does not proscribe or advise on how to use that notation in a software development process or as part of an object-oriented design methodology.

UML supports a rich set of graphical notation elements. It describes the notation for classes, components, nodes, activities, work flow, use cases, objects, states and how to model relationships between these elements. UML also supports the notion of custom extensions through stereotyped elements.

The UML provides significant benefits to software engineers and organisations by helping to build rigorous, traceable and maintainable models, which support the full software development lifecycle.

This paper focuses on custom extensions to the UML, which support the modelling of business processes. The purpose of these extensions, their graphical representation and where process modelling can be used in the software development lifecycle is discussed. Some examples are given.

You can find out more about UML from the books mentioned in the suggested reading section and from the UML specification documents to be found at the Object Management Groups UML resource pages: <http://www.omg.org/technology/uml/> and at <http://www.omg.org/technology/documents/formal/>

Modelling the Business Process

Modelling the business process is an essential part of any software development process. It allows the analyst to capture the broad outline and procedures that govern what it is a business does. This model provides an overview of where the proposed software system being considered will fit into the organisational structure and daily activities. It may also provide the justification for building the system by capturing the current manual and automated procedures that will be rolled up into a new system, and the associated cost benefit.

As an early model of business activity, it allows the analyst to capture the significant events, inputs, resources and outputs associated with business process. By connecting later design elements (such as Use Cases) back to the business process model through implementation links, it is possible to build up a fully traceable model from the broad process outlines to the functional requirements and eventually to the software artefacts actually being constructed.

As the Business Process Model typically has a broader and more inclusive range than just the software system being considered, it also allows the analyst to clearly map what is in the scope of the proposed system and what will be implemented in other ways (eg. a manual process)

Process Modelling Notation

A business process model typically defines the following elements:

- The Goal or reason for the process;
- Specific inputs;
- Specific outputs;
- Resources consumed;
- Activities that are performed in some order; and
- Events that drive the process.

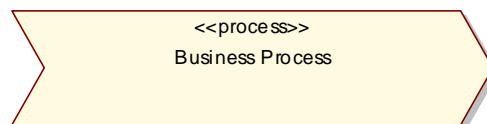
The business process:

- May affect more than one organisational unit.
- Have a horizontal organisational impact;
- Creates value of some kind for the customer. Customers may be internal or external

The Business Process

A business process is a collection of activities designed to produce a specific output for a particular customer or market. It implies a strong emphasis on how the work is done within an organisation, in contrast to a product's focus on what. A process is thus a specific ordering of work activities across time and place, with a beginning, an end, and clearly defined inputs and outputs: a structure for action.

The notation used to depict a business process is illustrated below.



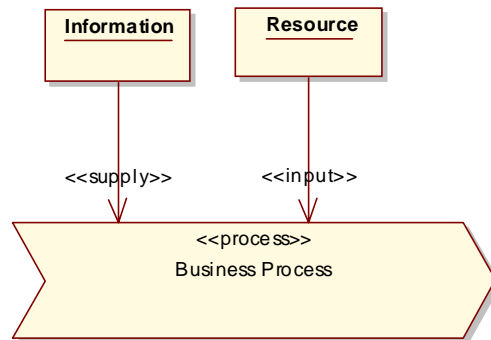
The process notation implies a flow of activities from left to right. Typically an event element is placed to the left of the process and the output to the right. To specifically notate the internal activities, UML activity elements may be placed inside the process element.

Inputs, Resources and Information

Business processes use information to tailor or complete their activities. Information, unlike resources, is not consumed in the process - rather it is used as part of the transformation process. Information may come from external sources, from customers, from internal organisational units and may even be the product of other processes.

A resource is an input to a business process, and, unlike information, is typically consumed during the processing. For example, as each daily train service is run and actuals recorded, the service resource is 'used up' as far as the process of recording actual train times is concerned.

The notation to illustrate information and resources is shown below.

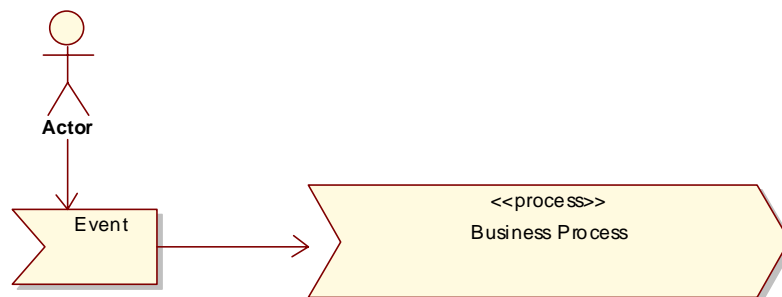


A supply link indicates that the information or object linked to the process is not used up in the processing phase. For example, order templates may be used over and over to provide new orders of a certain style - the templates are not altered or exhausted as part of this activity.

An input link indicates that the attached object or resource is consumed in the processing procedure. As an example, as customer orders are processed they are completed and signed off, and typically are used only once per unique resource (order).

Events

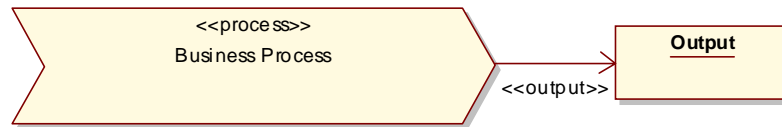
An event is the receipt of some object, a time or date reached, a notification or some other trigger that initiates the business process. The event may be consumed and transformed (for example a customer order) or simply act as a catalyst (e.g. nightly batch job).



Outputs

A business process will typically produce one or more outputs of value to the business, either for internal use or to satisfy external requirements. An output may be a physical object (such as a report or invoice), a transformation of raw resources into a new arrangement (a daily schedule or roster) or an overall business result such as completing a customer order.

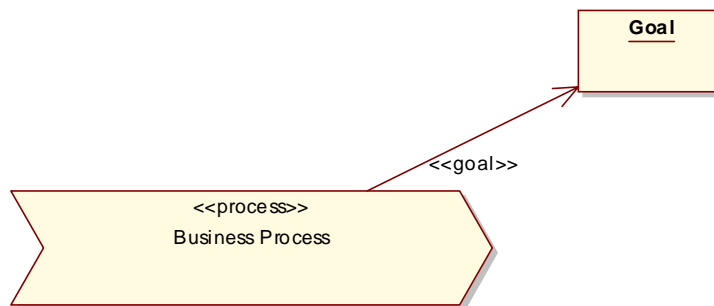
An output of one business process may feed into another process, either as a requested item or a trigger to initiate new activities.



An output link indicates that the business process produces some object (either physical or logical) that is of value to the organisation, either as an externally visible item or as an internal product (possibly feeding another process).

Goals

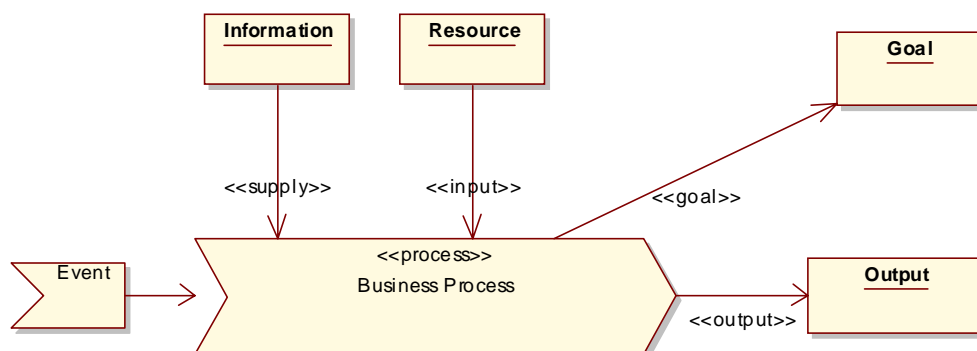
A business process has some well defined goal. This is the reason the organization does this work, and should be defined in terms of the benefits this process has for the organization as a whole and in satisfying the business needs.



A goal link indicates the attached object to the business process describes the goal of the process. A goal is the business justification for performing the activity.

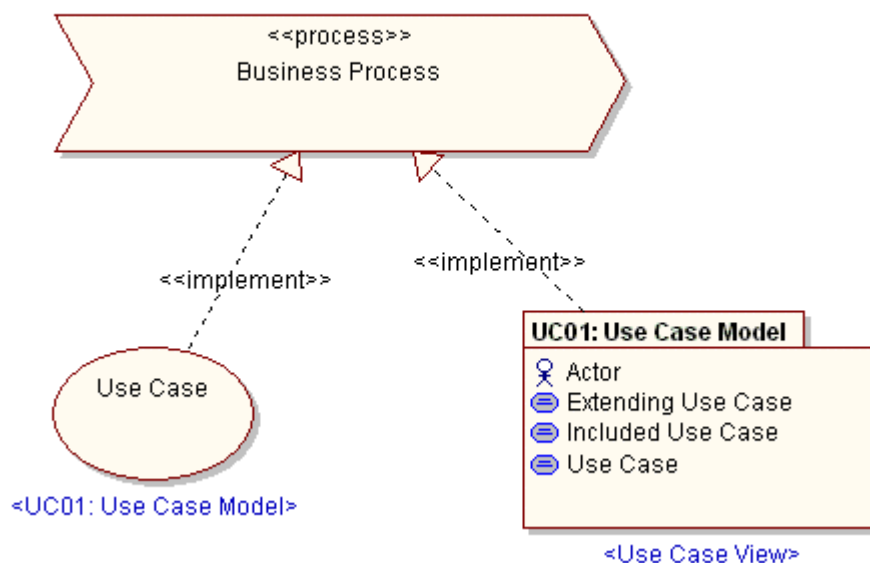
Putting it together

The diagram below illustrates how the various model elements may be grouped together to produce a coherent picture of a named business process. Included are the inputs, outputs, events, goals and other resources which are of significance.



Traceability

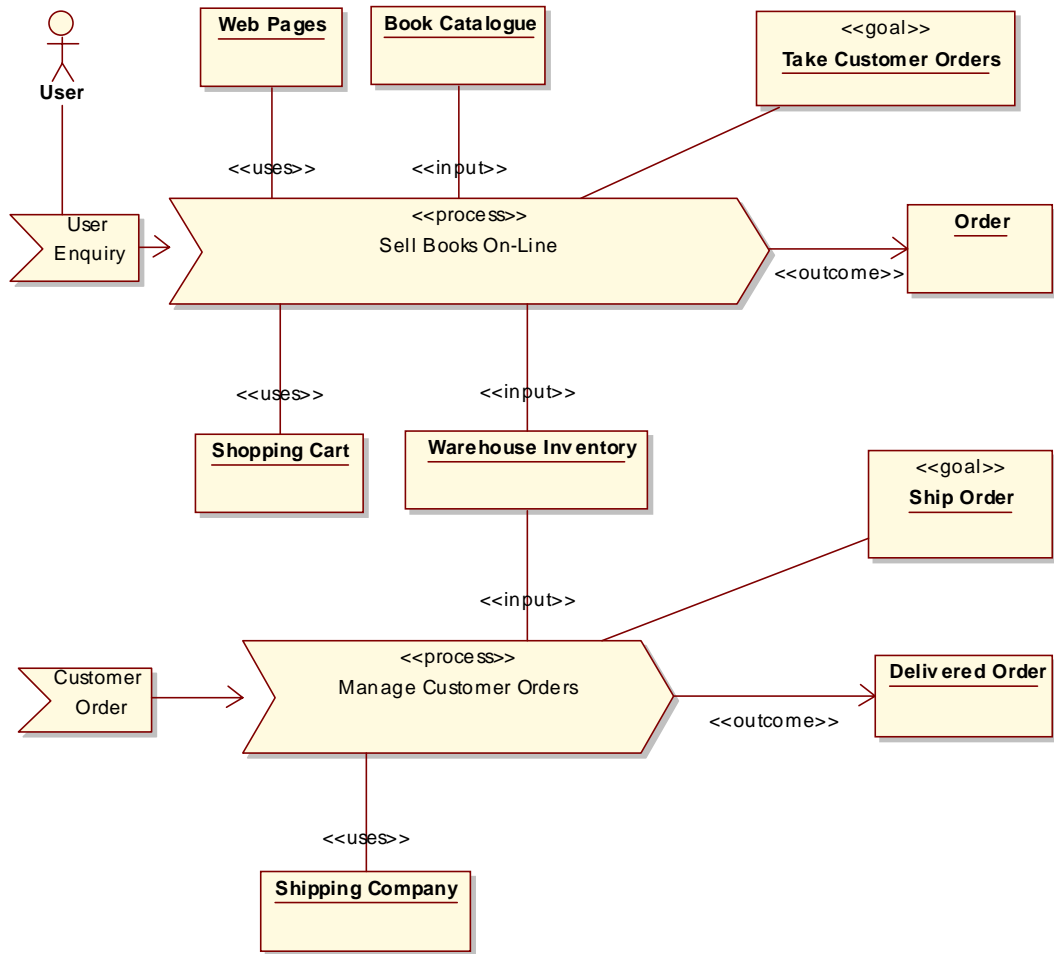
Traceability defines the way a given business process will be implemented in the proposed system. In an implementation diagram, use cases, packages and other model artefacts may be linked back to the business process with <<implementation>> links to signify the dependent relationship. The example below illustrates how a Business Process is implemented by a Use Case and a package. As the model develops and functional software components are built and linked to Use Cases, the business justification for each element can be derived from this model.



Note that this model also implies what is NOT being delivered. The Business Process will typically include a wide range of manual and automated procedures. This model illustrates exactly what functionality (Use Cases) will be built to service a particular business process: any missing functionality must come from other (manual or automated) systems and procedures.

An Example

The example below is an example of the kind of model that may be built up to represent a business process. In this model, the goal of the business process is to take customer orders and to ship those orders out. A user starts the process with an inquiry, which leads to the involvement of the Book Catalogue, Shopping Cart, On-line pages and warehouse inventory. The output of significance to the business is a customer order.



The second half of the process model is to respond to a customer order and ship the required items. The second process involves the warehouse inventory, shipping company and completes when an order is delivered to the customer.

Recommended Reading

Sinan Si Alhir, *UML in a NutShell*.

ISBN: 1-56592-448-7. Publisher: O'Reilly & Associates, Inc

Doug Rosenberg with Kendall Scott, *Use Case Driven Object Modeling with UML*.

ISBN:0-201-43289-7. Publisher: Addison-Wesley

Geri Scheider, Jason P. Winters, *Applying Use Cases*

ISBN: 0-201-30981-5. Publisher: Addison-Wesley

Ivar Jacobson, Martin Griss, Patrik Jonsson, *Software Reuse*

ISBN:0-201-92476-5. Publisher: Addison-Wesley

Hans-Erik Eriksson, Magnus Penker, *Business Modeling with UML*

ISBN: 0-471-29551-5. Publisher: John Wiley & Son, Inc

Peter Herzum, Oliver Sims, *Business Component Factory*

ISBN: 0-471-32760-3 Publisher: John Wiley & Son, Inc