Activity and Process Modeling

Inputs (Raw material or data) → Outputs (Product or Service)

Overall Activity (System of Activities)

Activity Modeling and Business Process ReEngineering

Company strategy (and objectives) is managed by activities. Success of strategies is directly related to the efficiency and effectiveness of activities.

Activities are like road maps to reach the destination (objectives).

Activity Modeling and Business Process Re-engineering

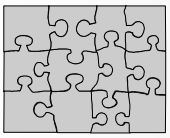
Company strategy covers 4 broad areas:

1. Market place chosen to be served
2. Identifying Services and products for this market
3. Marketing and Sales channels to access this market
4. *Activities and Processes to apply Strategies*

Activity (or Process Models)

Activities are hearts of organizations.

Activity Model: Defines the organization as a system of interrelated activities



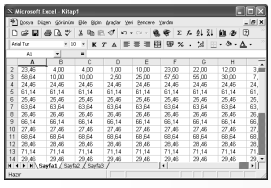
Activity (or Process Models)

Activities are hearts of organizations.

* Activities are difficult to express as texts.
* Activities should be clear and easy to understand
* Easy to change between high-level and low-level detail
* Graphics (visual representation) facilitate communication

Activity (or Process Models)

* Activities are difficult to express as texts.

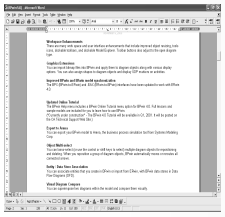


or

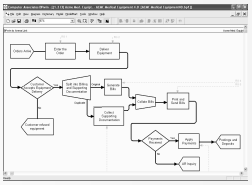
Which one is easier to understand?

Activity (or Process Models)

* Activities are difficult to express as texts.



or



Which one is easier to understand?

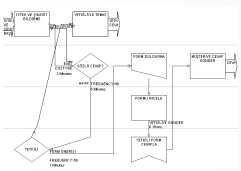
Activity Model vs Process Model

- In activity models, the job (business function) is more important than the actor who performs the job.
- In process models (or process flow models), the actor who performs the activity is also important (e.g. Process models in Oracle Designer).
- BPwin supports both methods

Why Modeling?

In all types of organizations, the quality and success result from the *processes, or activities.*

Why Modeling?



Modeling is essential to understand the interactions between the activities and communicate to make them more effective and efficient.

Using CASE tools, you can have automatic support for Information System Development.

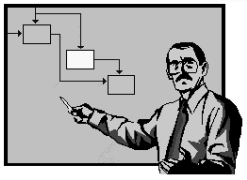
Why Modeling?

Helps the software developer in Form Design

Why Modeling?

Integration with Data Modeling

What is Process Modeling?



* An effective method to understand business rules and processes
* You can hide the details and focus on required parts
* Visual Objects (using graphics) facilitate communication
* A standard for Quality Management

History

* SADT (Structured Analysis and Design Technique) was developed by SofTech in 1960. It is the basis for IDEF0 notations.

* US Airforce accepted it as a standard in 1970s and DoD (Department of Defence) adopted as a standard

* In 1993, IDEF Users Group (Society of Enterprise Engineering) worked together with NIST and produced FIPS (Federal Information Processing Standards)

* IDEF3 was developed by Air Forces and DFD was developed independently.

Process Modeling using BPWin

Using BPWin;
You can
understand
analyze, and
document complicated processes

Process Modeling using BPWin

Using BPWin;
You can relate process models with ERwin data models.

Process Modeling using BPWin

Using BPWin;

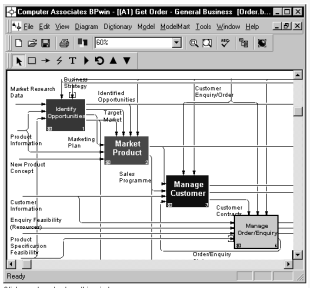
Activity models can be transferred to simulation modeling tools.

Process Modeling using BPWin

Benefits

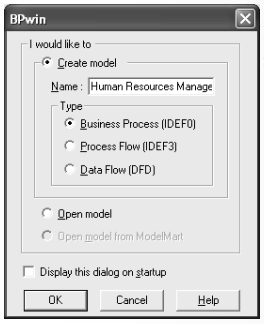
* Removing the activities which are repetitive and insufficient
* Reducing costs
* Increasing flexibility
* Increasing Customer relations

Process Modeling using BPWin



* Business activity diagrams
* Inputs, Controls, Outputs and Mechanisms
* Picture of all processes within the organization
* Necessary for Form Design

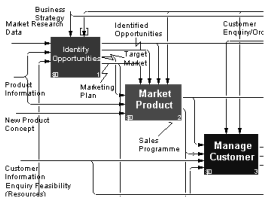
BPwin: Types of Process Modeling



BPwin supports 3 modeling methods.

- Business Process Modeling (IDEF0)
- Process Flow Modeling (IDEF3)
- Data Flow Modeling (DFD)

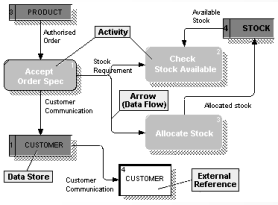
Business Process Modeling (IDEF0)



Example: A simple Business Process Diagram

* IDEF0 (Integration Definition Language) is activity modeling technique
* All system is described as set of interrelated activities and functions.
* System activities (actions) are examined independent of the objects which perform these activities

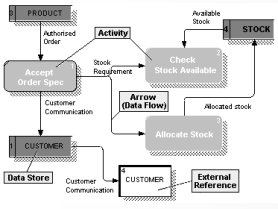
Data Flow Diagram (DFD)



Example: Data Flow Diagram

* Data Flow Diagrams are used to model data flow between data stores and activities

Data Flow Diagram (DFD)

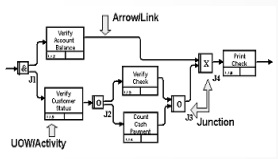


Example: Data Flow Diagram

Arrows in data flow diagrams show the movement of data between activities.

4 simple elements
* Arrows
* Data Store
* Activity (Process)
* External Reference (or entity) (Source/sink)

Process Flow Modeling (IDEF3)

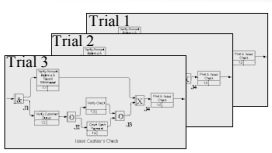


Example: Data Flow Diagram

It is also called Process Flow Modeling.

Main Objective: To model activities (processes) in forms of sequential events.

Process Flow Modeling (IDEF3)

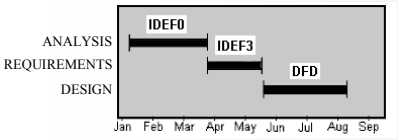


Example: Data Flow Diagram

Process Flow Models can be used in simulation modeling applications.

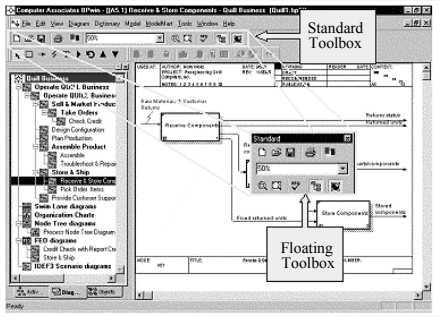
IDEF3 diagrams are similar to Business Process Models in Oracle Designer.

3 Models in SDLC

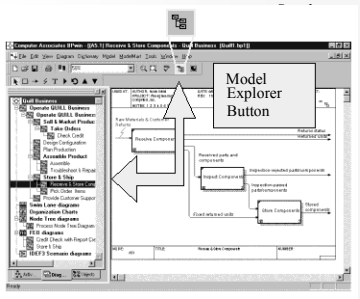


IDEF0: Suitable for Analysis and Logical Design. Can also be used for all modeling.
IDEF3: can be connected to IDEF0 diagrams
DFD : for Design purpose

BPwin Interface



BPwin Interface



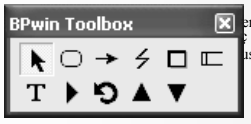
BPwin Interface

BPwin Toolboxes

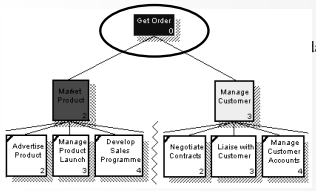
Toolbox for IDEF0

Toolbox for IDEF3

Toolbox for DFD



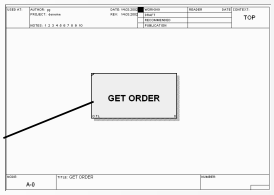
BPwin Context (Root) Diagram



Business Process Models
System is comprised of interrelated activities.

The top activity is called root (context) activity. Root activity defines the system. The lower diagrams in hierarchy called decomposition diagrams.

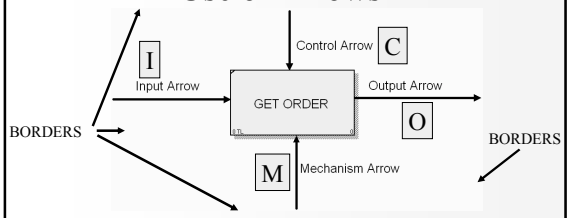
BPwin Context (Root) Diagram



A root activity for IDEFO

ROOT ACTIVITY DIAGRAM
Each activity name is combination of a verb and an object name describing the activity objective.

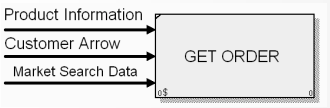
Use of Arrows



Use of Arrows ICOM (Input-Control-Output-Mechanism)

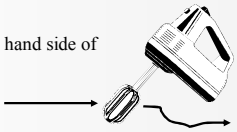
In IDEF0 diagrams, different arrow types are connected to activities. Arrows represent people, places, concepts or events. Arrows are labeled with different names and connected between activities and borders.

Use of Arrows



Input Arrows
Inputs represent material or information which are consumed or transformed to produce outputs.

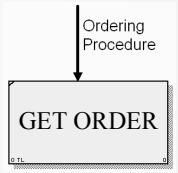
Inputs are connected from the left hand side of activities.

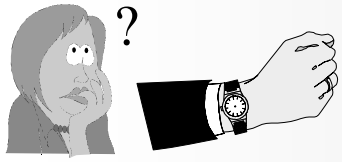


Use of Arrows

Control Arrows

Controls impose rules that regulate *how*, *when*, and if an activity is performed and *which* outputs are produced.



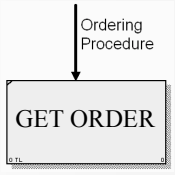


Use of Arrows

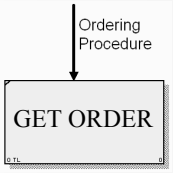
Control Arrows

Controls are often in the form of rules, regulations, policies, procedures, or standards.

Control arrows are like input arrows. If you are not sure whether the arrow is input or control, then model it as control.



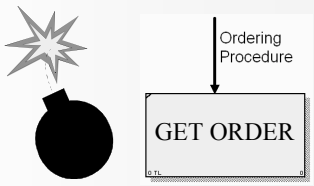
Use of Arrows



Control Arrows

While they affect the activity, they are never consumed or transformed.

Use of Arrows



Control Arrows

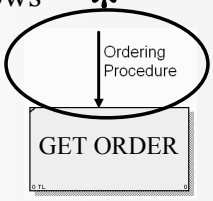
Controls can also be used to describe items that trigger an activity to start or finish. For example, the receipt of a Customer Order will trigger the Order Confirmation process.

Use of Arrows

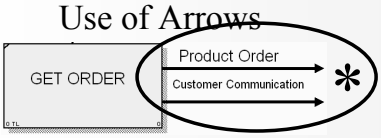
Control Arrows

Control arrows always enter the top side of an IDEF0 activity box.

Each activity should have at least one control arrow.



Use of Arrows



Output Arrows

Outputs are the material or information produced by the activity.

An *activity* that does *not produce* a definable output *should not be modeled* (or, at a minimum, should be a candidate for elimination).

Output arrows always exit from the right side of an IDEF0 activity box.

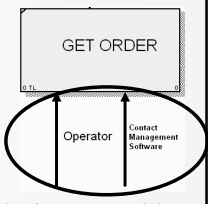
Each activity should have *at least one output* arrow.

The example above illustrates two different outputs produced by the *Get Order* activity.

Use of Arrows

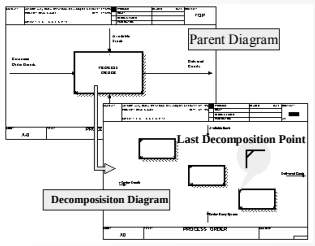
Mechanism Arrows

Mechanisms are physical resources that perform the activity. Mechanisms could be the important people, machinery, and/or equipment that provide and channel the energy needed to perform the activity.



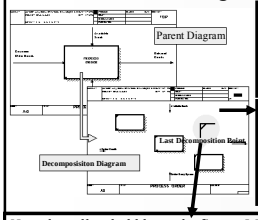
Mechanism arrows always enter the bottom side of an IDEF0 activity box. Unlike control arrows and output arrows, mechanism arrows are optional.

Decomposition Diagrams



Decompositions are used in business process modeling to break an activity into its constituent activities.

Decomposition Diagrams

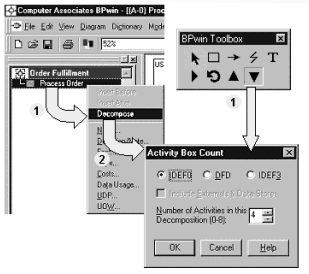


Decompositions are used in business process modeling to break an activity into its constituent activities. Each of these activities can in turn be decomposed into its own constituent activities.

Each time you decompose an activity, you create a decomposition diagram.The number of decomposition levels is entirely up to you, and depends on the level of complexity you need to model.

Note the yellow bubble on the figure. When an activity has not been decomposed, the "leaf" symbol will appear in the upper left corner of the activity box (called a "leaf-level" activity). After decomposition the leaf symbol is removed.

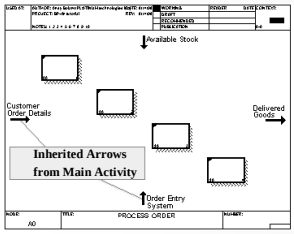
Decomposition Diagrams



Decomposing Activities into Components

1. First choose the activity to be decomposed and then choose *child* tool from the tool box.
2. Choose the method of decomposition diagram from the *Activity Box Count* dialog box.

Decomposition Diagrams



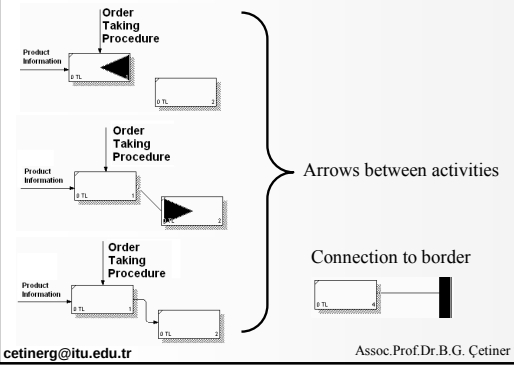
Decomposition Diagrams

Decomposed activity becomes main activity.

Arrows are inherited to the decomposition diagrams.

Arrows in decomposition diagrams are then connected to suitable activities.

Decomposition Diagrams



Use of Arrows

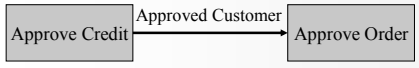
5 different usages are available.

1. Output-Input
2. Output-Control
3. Output-Mechanism
4. Output-Control Feedback
5. Output-Input Feedback

Use of Arrows

1. Output-Input

After Customer Credit Information is Approved, it is sent to *Approve Order* Activity to be approved.

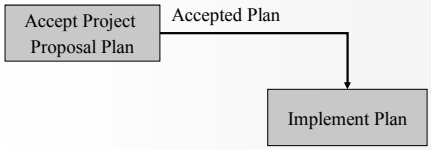


Use of Arrows

2. Output-Control

In this type, the first activity has an affecting (control) role on the second activity.

It controls the second activity on how to convert inputs (accepted plans) into outputs. In the following example, the accepted plan is not changed and it controls the implementation of plan.

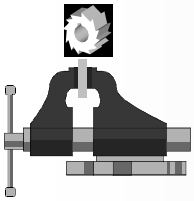


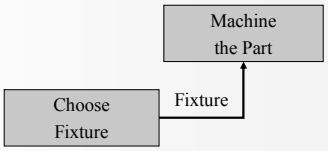
Use of Arrows

3. Output-Mechanism

This connection is very rare. It shows that output of an activity is a resource or method to perform another activity.

Following example illustrates that the fixture chosen after Choose Fixture activity is used as mechanism when machining the part.

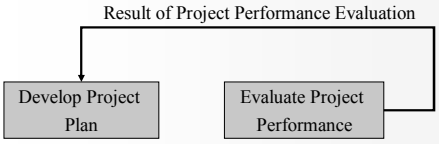




Use of Arrows

4. Output-Control Feedback

Output is used as feedback control. After evaluating the project performance the performance result is used as control in developing a new project plan.

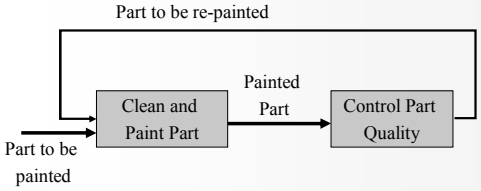


cetinerg@itu.edu.tr

Use of Arrows

5. Output-Input Feedback

Feedbacks of this kind are frequently used in recycling processes. In the following example, after controlling part quality the part to be re-painted is input to be cleaned and re-painted.



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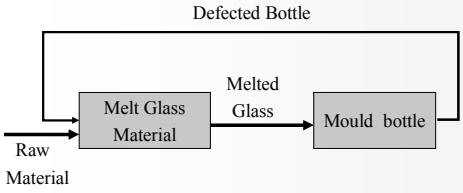
Use of Arrows

5. Output-Input Feedback

Using defected products to recycle with raw materials.



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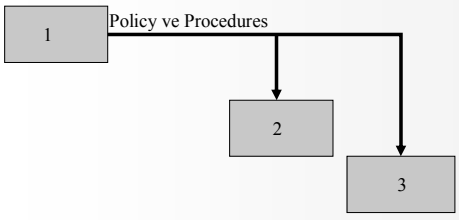
Splitting and Merging Arrows

Outputs of an activity may be used by one or more activities. Policy and Procedures obtained from activity 1 are used in activities 1 and 2.



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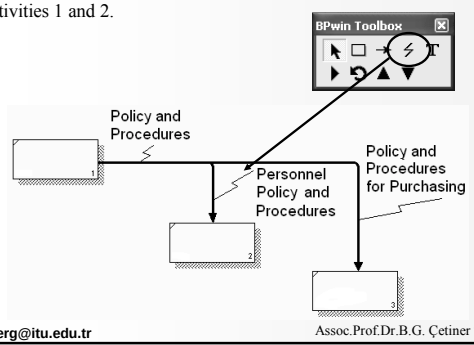
Splitting and Merging Arrows

Policy and procedures produced from activity 1 are used to control activities 1 and 2.



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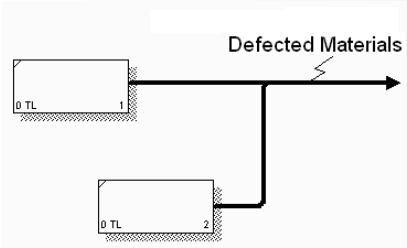
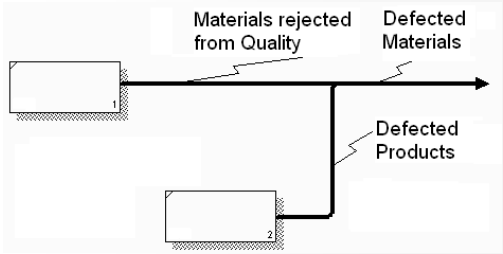
Splitting and Merging Arrows

Outputs of activities 1 and 2 are called Defected Materials.



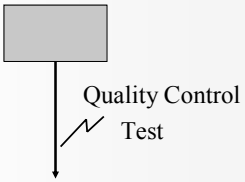
Splitting and Merging Arrows

Or as detailed.....



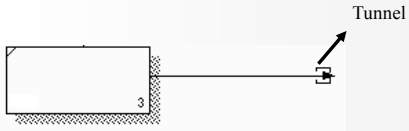
Call Arrows

Call arrows are used to refer to the other models or diagrams inside a model.



Tunnels

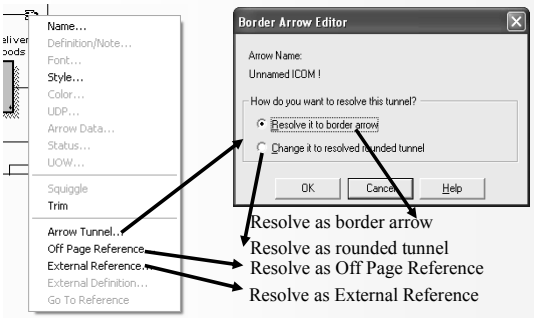
Tunnels are used to pass between decomposition and parent diagrams.



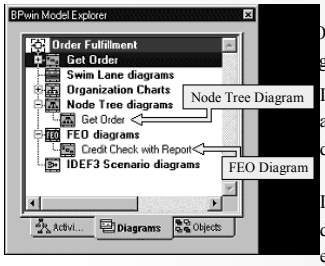
Tunnels have to be solved to obtain integrity inside Model.

Resolving Tunnels

They are resolved in 4 ways:



Other IDEF0 Diagrams

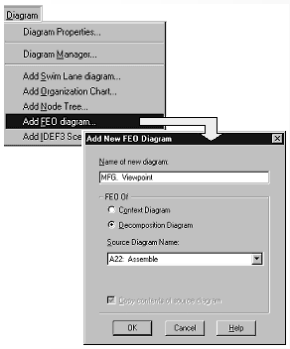


) (For Exposion Only)
gram

It is produced by copying all objects in main diagram.

It is used to produce different scenarios and evaluate different point of views.

Other IDEF0 Diagrams



FEO (For Exposion Only) Diagram

It can be added by Diagram/Add FEO Diagram.

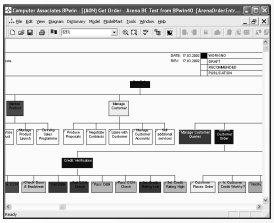
You can go to 'Sibling' FEO diagram.

Other IDEF0 Diagrams

Node Diagram

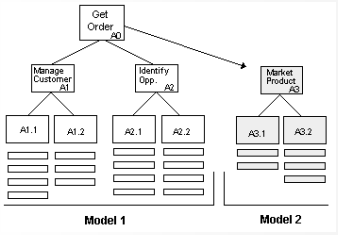
Showing the activities as Organization Chart

It gives overall picture of the whole model. The top activity is usually root diagram. But you can choose any activity as starting point.



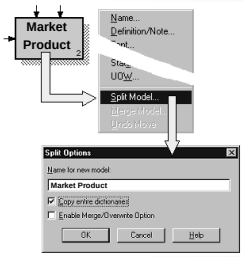
Splitting and Merging Diagrams

Activities to be modeled inside projects can be split into smaller parts according to project groups and then merged later.



Splitting and Merging Diagrams

Activities to be modeled inside projects can be split into smaller parts according to project groups and then merged later.



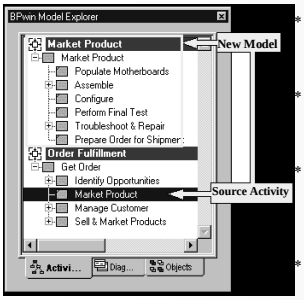
Splitting Model

1. Choose the activity to be split. This activity will be root activity.
2. Enter *Split Model* choice
3. Give the same activity name and then split it by using *Copy entire dictionaries* choice.

Splitting and Merging Diagrams

Splitting Model

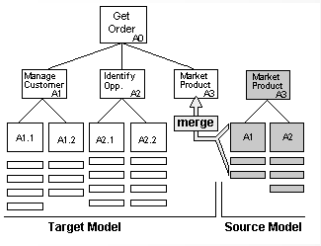
When you split a model, BPwin opens the new model in the workspace and,



* The "split" activity becomes the context level of the new model, complete with any connected arrows.
* A "placeholder" activity remains in the source model ("Market Product" in the illustration).
* BPwin draws a Call arrow from the source model activity to the bottom diagram border, and assigns the new model name to the arrow.
* Any decomposition diagrams of the source activity move to the new model.

Splitting and Merging Diagrams

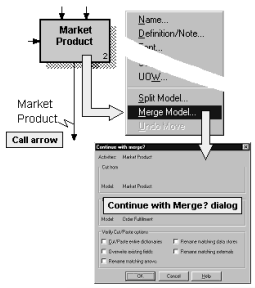
Merging Models



Models built separately can later be merged.

Splitting and Merging Diagrams

Merging Two Models



Use the following steps to merge two models together:

1. Open both the source and target models.

2. Right-click on the "placeholder" activity or the Call arrow in the target model where you want to insert the source model.

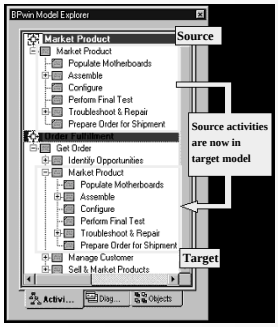
3. Select Merge Model on the shortcut menu.

4. Select the appropriate merge options in the Continue with merge? dialog.

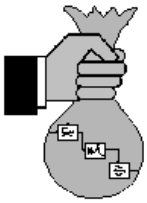
5. Click OK to finish.

Splitting and Merging Diagrams

Merging Two Models



Adding Value to Activities

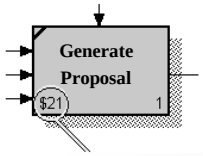


BPwin provides a framework of features that you can use to add value to your model. You can specify characteristics such as cost, time, and other properties you define.

There are two methods to specify such information:

* Activity-Based Costing (ABC)
* User Defined Properties (UDPs)

Adding Value to Activities

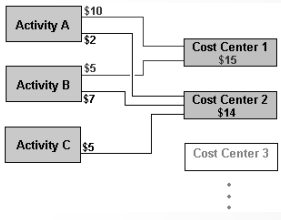


Activity Cost

Activity-based costing (ABC) is a technique for capturing and analyzing activity costs to determine the cost of the overall process. BPwin supports a simple implementation of ABC where you can assign costs to activities in terms of currency and time.

For example, you can use ABC to determine:
- The cost of production.
- The cost to support customers.
- The cost of proposed process changes.
- Where costs are accruing in your business processes.

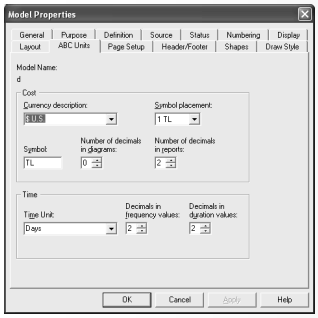
Adding Value to Activities



To calculate model costs using ABC, you must follow these basic steps:

1. Define the ABC units of measurement.
2. Define the ABC cost centers.
3. Apply costing estimates to all activities in the model.

Adding Value to Activities



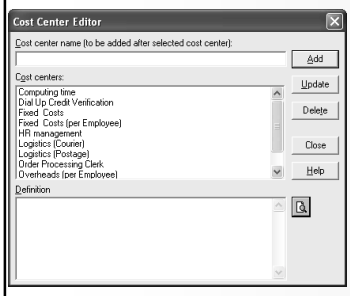
Defining the Units of Measurement

First, you must define the currency and time units to use in calculating costs. Currency units are usually measured in U.S. Dollars, though you can choose other forms of currency. Time units can be measured in seconds, minutes, hours, days, weeks months, or years.

These units are global for the model and are defined in the ABC Units tab of the Model Properties dialog.The units you select display on activities and reports.

Adding Value to Activities

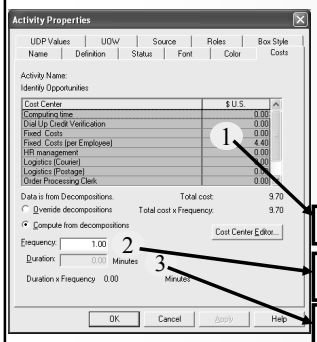
Define Cost Centers



Next you must create the ABC cost centers. Cost centers are categories of costs which are shared across all activities.

You can specify cost centers in the Cost Center Editor which can be opened from the Model menu.

Adding Value to Activities



Specify Activity Costs

After you define ABC units and cost centers, you can specify the cost of performing that activity for each cost center.

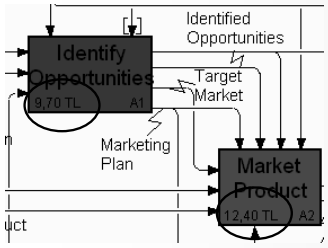
To assign activity costs, double-click the activity to open the Activity Properties dialog, and click the Costs tab. Then specify:

The cost per cost center.

How often the activity occurs (Frequency). This is usually set to 1.

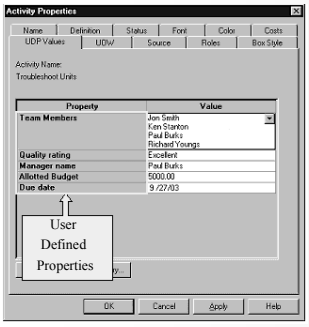
How long the activity takes to perform (Duration).

Adding Value to Activities



Costs for each process are calculated from the subordinate activities automatically

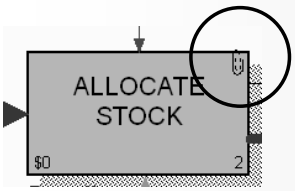
User Defined Properties (UDPs)



Objects such as Lists, Sources, Windows Commands can be defined in UDPs.

They can be defined using UDP Definition Editor and called from related activities.

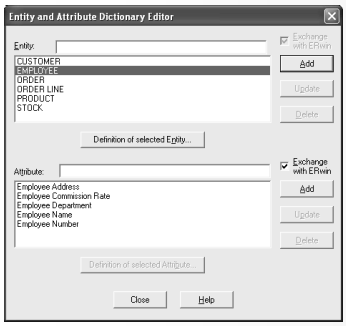
User Defined Properties (UDPs)



Activity containing UDP

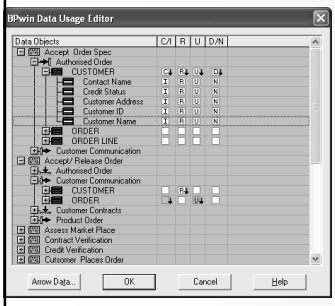
Swim Lane Diagrams can be constructed Using UDP Definitions

Entity-Attribute Definition inside BPwin



Defined entities and attributes can be exported to ERwin

Entity-Attribute Definition inside BPwin



Defining Data Usages

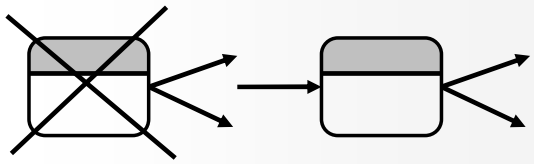
CRUD and IRUN Definitions

CRUD (for Entity)
C-Create
R-Retrieve
U-Update
D-Delete

IRUN (for Attribute)
I-Insert
R-Retrieve
U-Update
N-Nullify

DFD RULES

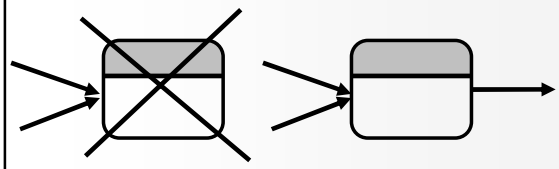
1



No process can have only outputs

DFD RULES

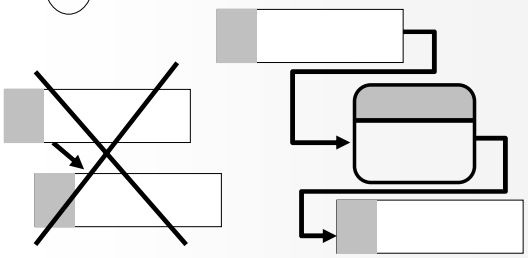
2



No process can have only inputs

DFD RULES

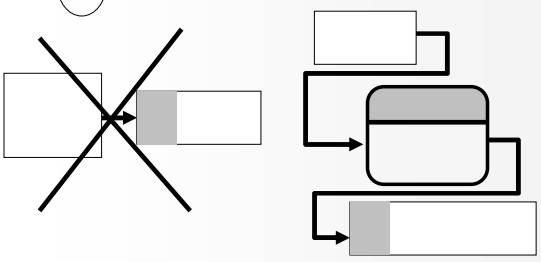
3



Data cannot move directly from one data store to another

DFD RULES

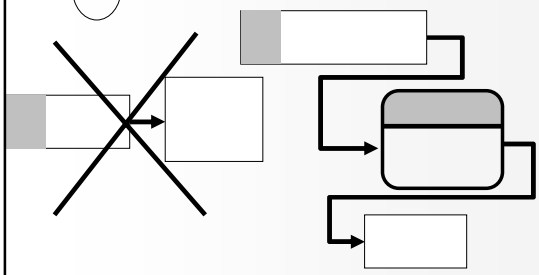
4



Data cannot move directly from an external entity to a data store

DFD RULES

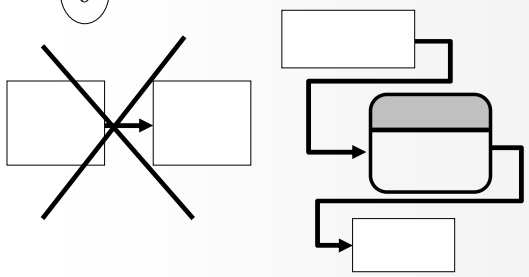
5



Data cannot move directly from a data store to an external entity (sink)

DFD RULES

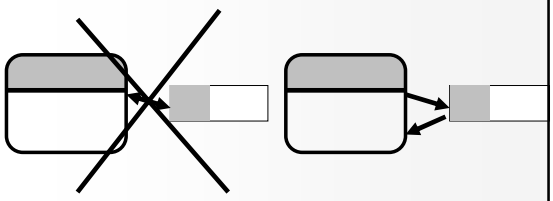
6



Data cannot move directly from an external source to an external sink

DFD RULES

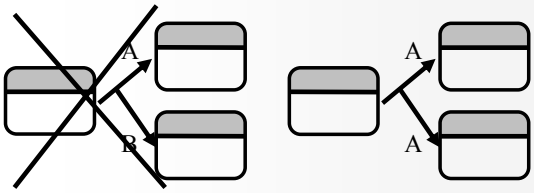
7



A data flow has only one direction of flow between symbols

DFD RULES

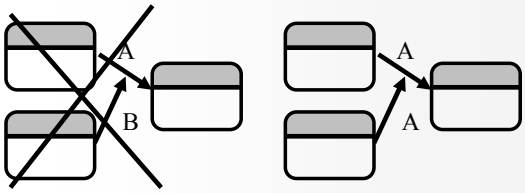
8



A fork in data flow means only the exactly same data goes from a common location to two or more different processes

DFD RULES

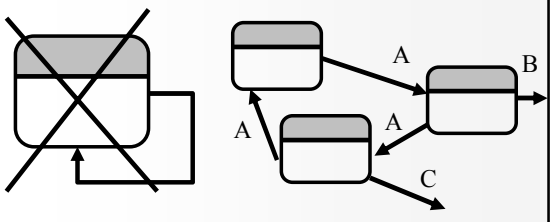
9



A join in a data flow means that exactly same data goes from any of two or more different processes, data stores to a common location

DFD RULES

10



No recursive data flow on a process

DFD RULES

11

A data flow to a data store means update (delete or change)

DFD RULES

12

A data flow from a data store means retrieve or use

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