e-SCOR
User's Guide
Version 5.1 Rev. 0

e-SCOR User's Guide, Version 5.1 Rev. 0

November 2015

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Although this software has been extensively tested, Gensym cannot guarantee error-free performance in all applications. Accordingly, use of the software is at the customer's sole risk.

Gensym Corporation
52 Second Ave.
Burlington, Massachusetts 01803
(781) 265-7100
FAX: (781) 265-7101

Part Number: DOC096-510

Contents Summary

Contents

Preface

Describes the purpose of this guide, the intended audience, and the typographic conventions.

About this Guide

This guide provides all the information you need to model, run, and analyze your supply chain, using e-SCOR. The chapters include:

Part I: Introduction

- Concepts and terminology of e-SCOR and SCOR (Supply Chain Operations Reference), upon which e-SCOR is based.
- Running e-SCOR, which describes how to start e-SCOR running and exit.
- Organizing models and controlling simulations, which provides an introduction to creating models and running simulations.
- Working with models through the e-SCOR user interface.

Part II: Basics of Using e-SCOR

- Creating a supply-chain model by configuring Level 1 roles, which are e-SCOR abstractions of Level 2 SCOR elements.
- Configuring Level 2 SCOR parameters for the simplest e-SCOR model, which supplies a single product to a single buyer, based on orders.

- Running a simulation and configuring how it runs.
- Viewing metrics that the model computes while it runs.
- What happens when a simulation runs.
- Creating reports for viewing static and time-series e-SCOR metrics and for entering e-SCOR parameters.
- Accessing databases by writing report data to a database and applying report data from a database.
- Using the Scenario Manager to run batch simulations and set parameter values during the simulation.

Part III: Building e-SCOR Models

- Modeling a distribution process, which delivers products to downstream buyers, either directly or by assembling components into kits.
- Modeling a manufacturing process, which makes finished products from components.
- Using stock planning strategies, which include replenishment, forecast, Q, and R-Q planning for sourcing and making stock products.
- Using alternative planning strategies, which include stock, make-to-order, and engineer-to-order for sourcing, making, and delivering products.
- Modeling a process with multiple suppliers to source identical products, using contracts.
- Configuring role details for sourcing, making, and delivering multiple products.
- Using pull and push planning modes for sourcing and delivering products.

In addition, this guide has two appendices that provide:

- Asset metrics formulas that e-SCOR uses to compute asset metrics for Level 1 roles.
- SCOR metrics for each e-SCOR metric and parameter that derives its definition from SCOR.

Audience

This guide is for e-SCOR users who want to understand the concepts and techniques required to create, run, and analyze supply-chain models, using e-SCOR. e-SCOR users are typically consultants or business people, who are familiar with supply-chain modeling and SCOR. Although users are expected to be familiar with SCOR, this guide gives a basic overview of the SCOR modeling

concepts that relate to e-SCOR. If you are not familiar with SCOR, visit *www.supply-chain.org*.

e-SCOR is built on ReThink, Gensym's graphical tool for modeling business processes. Therefore, knowledge of ReThink is also useful.

Conventions

This tutorial uses the following typographic conventions:

Example	Description
true	Parameter and metric values
role	Glossary terms
Order Fulfillment Lead Time	SCOR metrics
c:\Program Files\Gensym\g2-8.3r0\escor\kbs\e-scor.kb	Pathnames and filenames

Related Documentation

e-SCOR

- *e-SCOR Getting Started Tutorials*
- *e-SCOR User? Guide*
- *e-SCOR Quick Reference*

ReThink

- *Getting Started with ReThink*
- *ReThink User? Guide*
- *Customizing ReThink User? Guide*

G2 Core Technology

- *G2 Bundle Release Notes*
- *Getting Started with G2 Tutorials*
- *G2 Reference Manual*
- *G2 Language Reference Card*

- *G2 Developer? Guide*
- *G2 System Procedures Reference Manual*
- *G2 System Procedures Reference Card*
- *G2 Class Reference Manual*
- *Telewindows User? Guide*
- *G2 Gateway Bridge Developer? Guide*

G2 Utilities

- *G2 ProTools User? Guide*
- *G2 Foundation Resources User? Guide*
- *G2 Menu System User? Guide*
- *G2 XL Spreadsheet User? Guide*
- *G2 Dynamic Displays User? Guide*
- *G2 Developer? Interface User? Guide*
- *G2 OnLine Documentation Developer? Guide*
- *G2 OnLine Documentation User? Guide*
- *G2 GUIDE User? Guide*
- *G2 GUIDE/UIL Procedures Reference Manual*

G2 Developers' Utilities

- *Business Process Management System User? Guide*
- *Business Rules Management System User? Guide*
- *G2 Reporting Engine User? Guide*
- *G2 Web User? Guide*
- *G2 Event and Data Processing User? Guide*
- *G2 Run-Time Library User? Guide*
- *G2 Event Manager User? Guide*
- *G2 Dialog Utility User? Guide*
- *G2 Data Source Manager User? Guide*
- *G2 Data Point Manager User? Guide*
- *G2 Engineering Unit Conversion User? Guide*

- *G2 Error Handling Foundation User? Guide*
- *G2 Relation Browser User? Guide*

Bridges and External Systems

- *G2 ActiveXLink User? Guide*
- *G2 CORBALink User? Guide*
- *G2 Database Bridge User? Guide*
- *G2-ODBC Bridge Release Notes*
- *G2-Oracle Bridge Release Notes*
- *G2-Sybase Bridge Release Notes*
- *G2 JMail Bridge User? Guide*
- *G2 Java Socket Manager User? Guide*
- *G2 JMSLink User? Guide*
- *G2-OPC Client Bridge User? Guide*
- *G2-PI Bridge User? Guide*
- *G2-SNMP Bridge User? Guide*
- *G2-HLA Bridge User? Guide*
- *G2 WebLink User? Guide*

G2 JavaLink

- *G2 JavaLink User? Guide*
- *G2 DownloadInterfaces User? Guide*
- *G2 Bean Builder User? Guide*

G2 Diagnostic Assistant

- *GDA User? Guide*
- *GDA Reference Manual*
- *GDA API Reference*

Customer Support Services

You can obtain help with this or any Gensym product from Gensym Customer Support. Help is available online, by telephone, by fax, and by email.

To obtain customer support online:

➔ Access G2 HelpLink at *www.gensym-support.com*.

You will be asked to log in to an existing account or create a new account if necessary. G2 HelpLink allows you to:

- Register your question with Customer Support by creating an Issue.
- Query, link to, and review existing issues.
- Share issues with other users in your group.
- Query for Bugs, Suggestions, and Resolutions.

To obtain customer support by telephone, fax, or email:

➔ Use the following numbers and addresses:

	Americas	Europe, Middle-East, Africa (EMEA)
Phone	(781) 265-7301	+31-71-5682622
Fax	(781) 265-7255	+31-71-5682621
Email	*service@gensym.com*	*service-ema@gensym.com*

Part I

Introduction

Chapter 1: e-SCOR Concepts and Terminology

Describes the e-SCOR implementation of Level 1 and Level 2 SCOR modeling.

Chapter 2: Running e-SCOR

Describes how to start the server and connect the client.

Chapter 3: Organizing Models and Controlling Simulations

Describes how to use models, scenarios, and organizers to organize and control models.

Chapter 4: Working with Models

Describes how to work with models through the menus and toolbars.

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e-SCOR Concepts and Terminology

Describes the e-SCOR implementation of Level 1 and Level 2 SCOR modeling.

Introduction

e-SCOR is a dynamic decision support and management tool for supply chains. You use it to design and analyze your current supply chain; to model alternative supply chains; and to perform "what-if" analysis to monitor, compare, and report on the performance of various alternative supply chains.

e-SCOR is part of an overall methodology for modeling supply chains and refining their performance over time, which consists of all aspects of supply-chain design, analysis, optimization, and implementation. e-SCOR enables progressive refinement of your supply chain by allowing you to model the impact of implementing supply-chain planning and execution tools.

Traditional supply-chain planning tools help you optimize your supply chain. Supply-chain execution tools help you implement the logistical and operational functions of your supply chain. e-SCOR helps you determine which areas of your supply chain will benefit most from implementing these tools. Therefore, e-SCOR complements traditional supply chain management tools from companies such as SAP and i2.

e-SCOR provides graphical tools that let you:

- Configure, design, and map existing and alternative supply chains.
- Simulate performance of these supply chains over time.
- Report on supply-chain metrics.
- Model complex business rules used to manage supply chains.
- Detail and blueprint IT designs and specifications.

e-SCOR and SCOR

The Supply-Chain Council (SCC) (*www.supply-chain.org)* was established in 1997 as a non-profit organization whose charter was to develop a framework that allows companies to build a more competitive supply chain. To do this, SCC created the Supply Chain Operations Reference model (**SCOR**)[1], which provides common terminology and measurements that manufacturers and their vendors and distributors can use to evaluate the performance of their supply chains and to identify areas of improvement. The SCOR model is rapidly becoming the de facto, cross-industry standard for supply-chain management.

e-SCOR provides an implementation of the SCOR model by providing an interactive modeling environment that allows organizations to:

> *"proactively identify the needs of their supply chain processes and map the capabilities of supply-chain software products to them."*
>
> - *http://www.supply-chain.org*

SCOR identifies three levels of abstraction:

- **Level 1 SCOR** — The scope and content of the overall supply chain. You model this by configuring sets of Source-Make-Deliver processes, the products that each step in the supply chain processes, and the manufacturing resources that each step requires.

1. SCOR is freely available to all who wish to use the standard reference model. Council membership is open to all companies and organizations interested in applying and advancing state-of-the-art supply-chain management systems and practices. All who use the SCOR model are asked to acknowledge the SCC in all documents describing or depicting the SCOR model and its use. All who use SCOR are encouraged to join the SCC, both to further model development and to obtain the full benefits of membership.

- **Level 2 SCOR** — The configuration of the supply chain in terms of a number of SCOR **process categories**, which are specific configurations of each management process for each planning strategy. You model this by configuring the Level 2 SCOR categories that your supply-chain model uses and by configuring parameters for each category in the model.
- **Level 3 SCOR** — The operations strategy of each process category in terms of its inputs and outputs, performance metrics, and best practices.

You use Level 1 roles and SCOR metrics in e-SCOR to model and analyze your overall supply chain. You use the Level 2 SCOR features of e-SCOR to implement and analyze the particular configuration of your supply chain.

e-SCOR provides default implementations for numerous Level 3 SCOR features, which you can enhance or customize as needed. In general, when modeling in e-SCOR, you do not need to interact with the lower levels of SCOR directly.

Level 1 Roles

e-SCOR provides abstractions of the Level 2 SCOR model by implementing Level 1 "roles." e-SCOR provides these high-level capabilities, using Level 1 roles:

- Business-level analysis, from suppliers' suppliers to customers' customers.
- Product/product family identification.
- High-level resource identification.
- Export of metrics to spreadsheet for further analysis.
- Dynamic modeling to simulate behavior over time.
- Multiple planning and supply chain management modes.

Level 2 SCOR

e-SCOR provides a subset of Level 2 and Level 3 SCOR. e-SCOR provides these Level 2 SCOR features:

- Plan, Source, Make, Deliver, and Return process categories.
- Stock, make-to-order, and engineer-to-order planning strategies.
- Pull, push, replenishment, forecast, Q, and R-Q planning strategies.
- Material acquisition, vendor contracts, and payments.
- Production execution, which includes material acquisition, build order selection, manufacturing, packaging, and shipping.
- Order management, warehouse management, packing and shipping time, order selection, and inventory management.

- Performance metrics, based on orders, shipments, build orders, financials, costs, inventory, and contracts.
- Configurable parameters for categories relating to suppliers, orders, manufacturing, order selection, packing and shipping, and costs.
- Configurable parameters for products relating to order type, cost, inventory, and planning.
- "What-if" parameter changes.

e-SCOR does *not* implement these features of Level 2 SCOR:

- Demand/supply planning, including plan inventory, make/buy decisions, long-term capacity and planning, product phase-in/phase-out, product-line management.
- Logistics and scheduling of the delivery tasks of a supply chain.

SCOR Metrics

e-SCOR supports numerous SCOR metrics. The model computes these metrics and makes them available through dialogs and reports in the appropriate location in the model.

Some SCOR metrics are what e-SCOR considers **parameters**, which are values that the user enters into the model as variables.

Other SCOR metrics are what e-SCOR considers **metrics**, which are values that e-SCOR computes during the simulation.

e-SCOR refers to all inputs to the model as parameters and all outputs from the model as metrics, regardless of whether they are SCOR metrics.

Benefits of Using e-SCOR

e-SCOR offers these benefits to supply chain managers:

- Compare process performance to targets by:
  - Benchmarking metrics across multiple industries.
  - Comparing existing practices to industry best practices.
- Evaluate supply-chain management improvement alternatives by:
  - Identifying gaps in current processes.
  - Quantifying the potential benefits of specific process improvements.
  - Providing data for project financial justifications.
  - Analyzing impact of e-business on supply chains.

- Implement supply-chain process improvements by:
  - Integrating e-SCOR to augment ERP capabilities.
  - "Fine tuning" designs, based on pilot results and changing market needs.
- Increase the value of the model by:
  - Enhancing models to Level 4 and beyond.
  - Integrating with MRP and ERP systems.
  - Using Gensym database bridges for real-time access.
  - Deploying models across a network.

SCOR Modeling Concepts

To use e-SCOR, you need to understand these SCOR modeling concepts:

- Supply chain management.
- SCOR management processes.
- Source, make, and deliver process categories.

Supply Chain Management

A **supply chain** is a business process that describes the complete set of steps involved in obtaining raw materials, producing and assembling products, and delivering those products to consumers.

A supply chain consists of two general types of functions or "roles:"

- **Buyer —** A Level 1 role that obtains goods from upstream suppliers.
- **Supplier —** A Level 1 role that deliver goods to downstream buyers.

Numerous configurations of buyers and suppliers exist, depending on an organization's location in the supply chain. A buyer might purchase raw materials and supply manufactured products, purchase components and supply assemblies, or purchase and supply finished products.

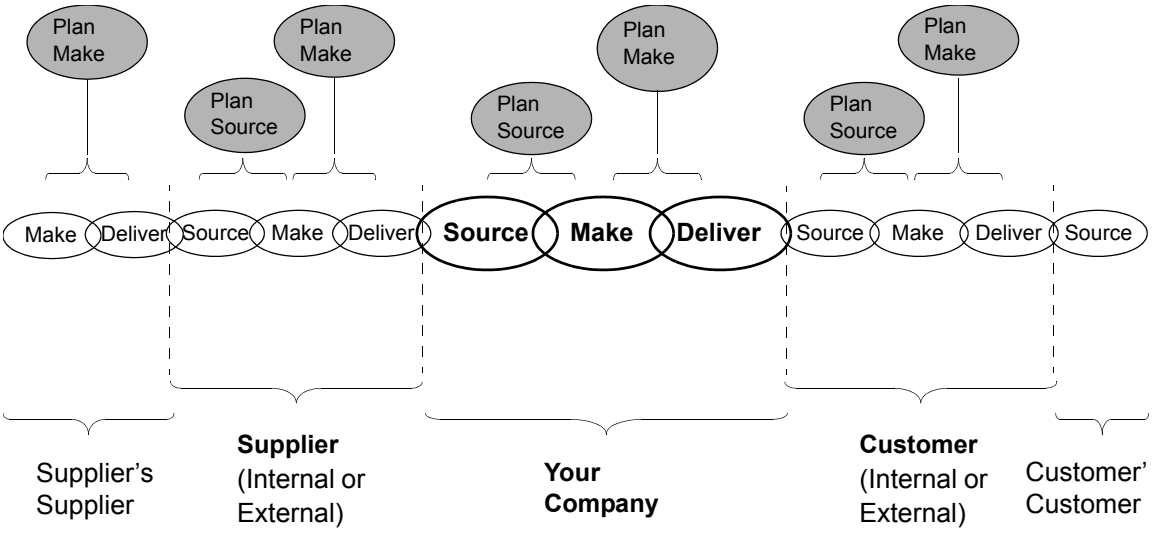
Supply chain management is the process of controlling the supply chain in the most efficient and effective manner possible. You measure efficiency in terms of various metrics, such as costs, asset turns, inventory days of supply, order fulfillment times, and fill rates.

SCOR Management Processes

A SCOR model consists of four distinct management processes:

- **Plan —** Plan supply and demand cycles.
- **Source —** Obtain materials from suppliers for manufacture, distribution, or consumption.
- **Make —** Produce manufactured products.
- **Deliver —** Distribute ordered products, manage orders, and ship products.

From a high level, a supply chain model consists groups of Plan, Source, Make, and Deliver processes for each distinct step in the supply chain, as this figure illustrates:



Source, Make, and Deliver Processes

The Level 2 SCOR process categories for the Source, Make, and Deliver processes use one of three **planning strategies**, which determine how the role computes order size and to whom it delivers products:

- **Stock —** Fills orders for stock products from inventory and replenishes inventory, based on inventory levels or forecasts; computes replenishment, based on inventory planning.
- **Make-to-order —** Fills orders for make-to-order products from inventory and replenishes inventory only when a buyer places an order; computes replenishment, based directly on orders, but ships products to any buyer that places an order.

- **Engineer-to-order** — Fills orders for engineer-to-order products by engineering and manufacturing custom products for a particular customer; maintains no inventory and ties shipped products to particular orders.

SCOR identifies each process category by letter—Source (S), Make (M), and Deliver (D)—and number, where the numbers represent planning strategies:

This number...	Represents...
1	Stock
2	Make-to-order (MTO)
3	Engineer-to-order (ETO)

You can combine planning strategies within the same role, depending on the role. For example, a Distributor role might source stock products and deliver make-to-order products. You can also combine planning strategies across roles. For example, a Manufacturer role might source make-to-order products, but its upstream distributor might deliver stock products.

e-SCOR Implementation of Level 2 SCOR

e-SCOR provides implementations of a subset of all the Level 2 SCOR process categories. In addition, e-SCOR provides additional categories that SCOR does not identify explicitly, which define boundary conditions in the supply chain. e-SCOR implements these types of Level 2 SCOR categories:

- Source process categories
- Make process categories
- Deliver process categories
- Return process categories
- Plan process categories
- Enable process categories
- Boundary conditions

Source Process Categories

e-SCOR provides the following Level 2 SCOR process categories to source stock, make-to-order, and engineer-to-order products:

Category	Description
S1: Source Stocked Product	Sources stocked products, based on inventory planning, and places them in inventory. The P2: Plan Source category determines how much to order.
S2: Source Make-to-Order (MTO) Product	Sources make-to-order products, based on orders, and places them in inventory. Inventory can go to any downstream Make or Deliver category.
S3: Source Engineer-to-Order (ETO) Product	Sources engineer-to-order products, based on orders, and sends them directly to the downstream Make or Deliver category; the Source category does not maintain an inventory. Products go to the buyer that placed the order.

Make Process Categories

e-SCOR provides the following Level 2 SCOR process categories to make stock, make-to-order, and engineer-to-order products:

Category	Description
M1: Make-to-Stock	Makes stock products, based on inventory planning, and places them in inventory. The P3: Plan Make category determines how much to make.
M2: Make-to-Order	Makes make-to-order products, based on orders, and places them in inventory. Inventory can go to any downstream Deliver category.
M3: Engineer-to-Order	Makes engineer-to-order products, based on orders, and sends them directly to the downstream Deliver category; the Make category does not maintain an inventory. Products go to the buyer that placed the order.

Deliver Process Categories

e-SCOR provides the following Level 2 SCOR process categories to deliver stock, make-to-order, and engineer-to-order products:

Category	Description
D1: Deliver Stocked Product	Delivers stock products from inventory, based on orders.
D2: Deliver Make-to-Order (MTO) Product	Delivers make-to-order products from inventory, based on orders. Inventory can go to any downstream buyer role.
D3: Deliver Engineer-to-Order (ETO) Product	Delivers engineer-to-order products, based on orders, and sends them directly to the downstream buyer; the Deliver category does not maintain an inventory. Products go to the buyer that placed the order.

Return Process Categories

e-SCOR provides the following Level 2 SCOR process categories to source and deliver defective products, MRO products, and excess products:

Category	Description
SR1: Source Defective Product	Sources defective products from inventory.
SR2: Source MRO Product	Sources products that need to be maintained, repaired, and/or overhauled.
SR3: Source Excess Product	Sources excess products from inventory.
DR1: Deliver Defective Product	Delivers defective products from inventory.
DR2: Deliver MRO Product	Delivers maintenance, repair, and overhaul (MRO) products from inventory.
DR3: Deliver Excess Product	Delivers excess products from inventory.

Plan Categories

e-SCOR provides three of the five Level 2 SCOR process categories to model planning:

Category	Description
P2: Plan Source	Plans and prioritizes material resource supply and availability. Specifies the frequency with which roles send orders to upstream suppliers.
P3: Plan Make	Plans and prioritizes demand requirements and inventory. Specifies the frequency with which roles make products for delivery to downstream buyers.
P5: Plan Return	Plans and prioritizes sourcing defective, excess, and maintenance, repair, and overhaul (MRO) products.

Enable Process Categories

Level 2 SCOR identifies an additional process category for each management process, called **enable process**, which manages the prerequisites for each process. For example, the enable process categories determine which suppliers can deliver which products. They also manage contracts when a buyer sources multiple identical products from multiple upstream suppliers.

e-SCOR provides two of the four Level 2 SCOR enable process categories:

Category	Description
ES: Enable Source	Awards contracts to upstream suppliers for orders that downstream buyers place. Orders can go to any number of suppliers. The order can be divided among multiple suppliers, based on proportion.
ED: Enable Deliver	Sends purchase responses to downstream suppliers, based on purchase requests, obtains net selling price and published lead time, and manages contracts with buyers.

Boundary Conditions

e-SCOR implements two additional process categories, which SCOR does not identify, to represent **boundary conditions**. These categories exist at the beginning and at the end of the supply chain, as follows:

Category	Description
Mb: Make Product	Initiates the process of manufacturing and delivering raw materials for the overall supply chain. This category is located in the Base Manufacturer role, which must be the first role upstream in the supply chain.
Input	Initiates the process of creating orders for finished products, which upstream suppliers deliver. This category determines how often to generate orders, the order size, and the timing of each order. This category is located in the Consumer role, which must be the last role downstream in the supply chain.
End	Signals the end of the supply chain, when a Consumer role receives and has paid for the products it has ordered.

e-SCOR Implementation of Level 1 Roles

e-SCOR provides four **Level 1 roles**, which are abstractions of the management processes implicit in Level 2 SCOR. e-SCOR refers to these roles as Level 1 roles, because they define a level of abstraction that is one level higher than the Level 2 categories that SCOR identifies.

Roles simplify the process of creating SCOR models. To build a model, you connect and configure a relatively small number of Level 1 roles, which automatically include the required Level 2 SCOR categories, which you then configure.

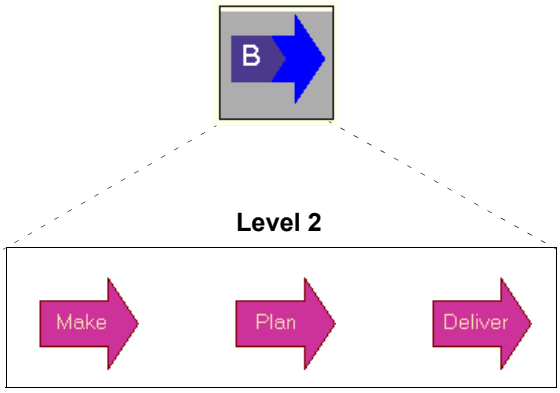
The Level 1 roles that e-SCOR implements correspond to the four basic functions in a supply chain:

- **Base Manufacturer role** — Represents the beginning of the supply chain by providing raw materials to downstream buyers for the overall supply chain.
- **Distributor role** — Sources components or finished products from upstream suppliers, and delivers those products to downstream buyers, either as complete products or by assembling components into "**kits**," which are simply finished products that do not require a manufacturing step.

- **Manufacturer role** — Sources raw materials from upstream suppliers, manufactures finished products, and delivers finished products to downstream buyers.
- **Consumer role** — Initiates the acquisition of the finished products in the overall supply chain and terminates the overall supply chain when those products have been received and paid for.

Each Level 1 role includes the appropriate Level 2 SCOR process categories, as the following figures show.

Base Manufacturer Role



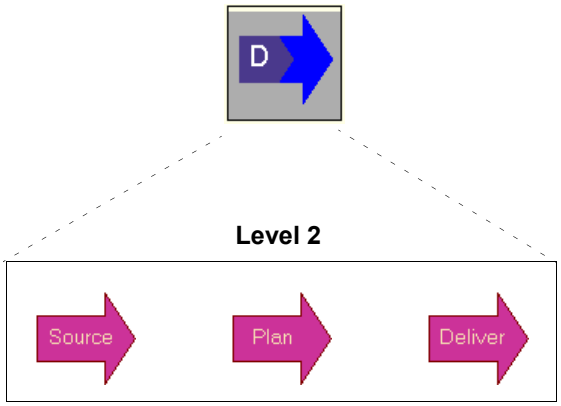
The Base Manufacturer role represents the beginning of the supply chain and must be the furthest upstream role in the model.

The Base Manufacturer role includes these Level 2 SCOR categories:

- Make
  - Mb: Make Product — Manufactures raw materials for the overall supply chain.
- Plan
  - P3: Plan Make — Determines the frequency with which the role manufactures raw materials and computes how much to make.
- Deliver
  - D1: Deliver Stocked Product — Delivers stock raw materials to downstream buyers.
  - D2: Deliver Make-to-Order Product — Delivers make-to-order raw materials to downstream buyers.

  - D3: Deliver Engineer-to-Order Product — Delivers engineer-to-order raw materials to downstream buyers.
  - ED: Enable Deliver — Manages contracts with buyers.
- Return
  - DR1: Deliver Defective Product — Delivers defective products to downstream buyers, based on returns.
  - DR2: Deliver MRO Product — Delivers MRO products to downstream buyers, based on returns.
  - DR3: Deliver Excess Product — Delivers excess products to downstream buyers, based on returns.

Distributor Role

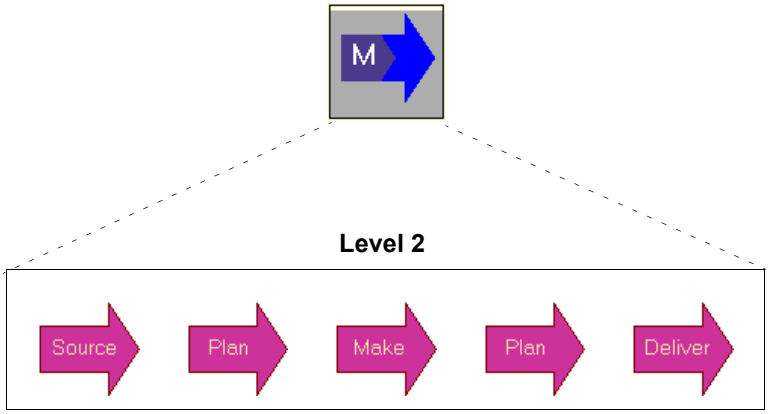


The Distributor role includes these Level 2 SCOR categories:

- Source
  - ES: Enable Source — Determines how the role chooses its suppliers.
  - S1: Source Stocked Product — Sources stock components or finished products from upstream suppliers.
  - S2: Source Make-to-Order Product — Sources make-to-order components or finished products from upstream suppliers.
  - S3: Source Engineer-to-Order Product — Sources engineer-to-order components or finished products from upstream suppliers.

- Plan
  - P2: Plan Source — Determines the frequency with which the role sources components or finished products from upstream suppliers, and computes how much to order.
  - P5: Plan Return — Determines the frequency with which the role sources defective products, MRO products, and excess inventory from upstream suppliers, based on returns, and computes how much to order.
- Deliver
  - D1: Deliver Stocked Product — Delivers stock components, kits from components, finished products, and/or components to downstream buyers.
  - D2: Deliver Make-to-Order Product — Delivers make-to-order components, kits from components, finished products, and/or components to downstream buyers.
  - D3: Deliver Engineer-to-Order Product — Delivers engineer-to-order components, kits from components, finished products, and/or components to downstream buyers.
  - ED: Enable Deliver — Manages contracts with buyers.
- Return
  - SR1: Source Defective Product — Sources defective products from upstream suppliers, based on returns.
  - SR2: Source MRO Product — Sources MRO products from upstream suppliers, based on returns.
  - SR3: Source Excess Product — Sources excess products from upstream suppliers, based on returns.
  - DR1: Deliver Defective Product — Sources defective products to downstream buyers, based on returns.
  - DR2: Deliver MRO Product — Sources MRO products to downstream buyers, based on returns.
  - DR3: Deliver Excess Product — Sources excess products to downstream buyers, based on returns.

Manufacturer Role

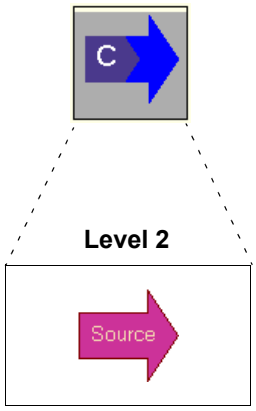


The Manufacturer role includes these Level 2 SCOR categories:

- Source
  - ES: Enable Source — Determines how the role chooses its suppliers and manages contracts with suppliers.
  - S1: Source Stocked Product — Sources stock components from upstream suppliers.
  - S2: Source Make-to-Order Product — Sources make-to-order components from upstream suppliers.
  - S3: Source Engineer-to-Order Product — Sources engineer-to-order components from upstream suppliers.
- Plan
  - P2: Plan Source — Determines the frequency with which the role sources components from upstream suppliers and computes how much to order.
  - P3: Plan Make — Determines the frequency with which the role manufactures finished products and computes how much to make.
  - P5: Plan Return — Determines the frequency with which the role sources defective products, MRO products, and excess inventory from upstream suppliers, based on returns, and computes how much to order.
- Make
  - M1: Make-to-Stock — Manufactures stock finished products.
  - M2: Make-to-Order — Manufactures make-to-order finished products.
  - M3: Engineer-to-Order — Manufactures engineer-to-order finished products.

- Deliver
  - D1: Deliver Stocked Product — Delivers stock finished products from components to downstream buyers.
  - D2: Deliver Make-to-Order Product — Delivers make-to-order finished products from components to downstream buyers.
  - D3: Deliver Engineer-to-Order Product — Delivers engineer-to-order finished products from components to downstream buyers.
  - ED: Enable Deliver — Manages contracts with buyers.
- Return
  - SR1: Source Defective Product — Sources defective products from upstream suppliers, based on returns.
  - SR2: Source MRO Product — Sources MRO products from upstream suppliers, based on returns.
  - SR3: Source Excess Product — Sources excess products from upstream suppliers, based on returns.
  - DR1: Deliver Defective Product — Sources defective products to downstream buyers, based on returns.
  - DR2: Deliver MRO Product — Sources MRO products to downstream buyers, based on returns.
  - DR3: Deliver Excess Product — Sources excess products to downstream buyers, based on returns.

Consumer Role



The Consumer role represents the end of the supply chain and must be the furthest downstream buyer role in the model.

The Consumer role includes these Level 2 SCOR categories:

- Source
  - ES: Enable Source — Determines how the role chooses its suppliers and manages contracts with suppliers.
  - S1: Source Stocked Product — Sources stock components from upstream suppliers.
  - S2: Source Make-to-Order Product — Sources make-to-order components from upstream suppliers.
  - S3: Source Engineer-to-Order Product — Sources engineer-to-order components from upstream suppliers.
- Return
  - SR1: Source Defective Product — Sources defective products from upstream suppliers, based on returns.
  - SR2: Source MRO Product — Delivers MRO products from upstream suppliers, based on returns.
  - SR3: Source Excess Product — Delivers excess products from upstream suppliers, based on returns.
- P5: Plan Return — Determines the frequency with which the role sources defective products, MRO products, and excess inventory from upstream suppliers, based on returns, and computes how much to order.
- Input — Initiates the process of creating orders for finished products for the overall supply chain.
- End — Terminates the overall supply chain process when finished products have been received and paid for.

Products

Each Level 1 role sources, makes, and/or delivers products, based on a **product specification**.

To model products in a supply chain, you create:

- A **product hierarchy**, or bill of materials (BOM), which is a hierarchical representation of the relationship between each product specification in the supply chain.
- **Product composites**, which determine the products each role sources and/or delivers.

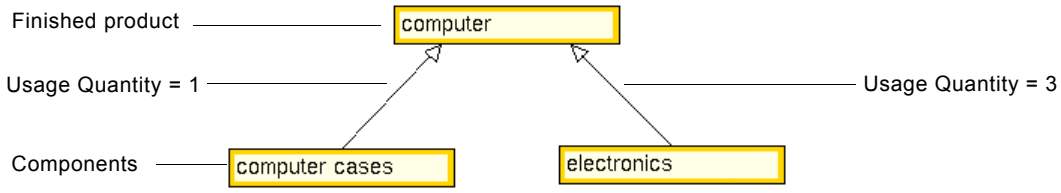
You create the product hierarchy on the detail of a **product structure organizer**.

Product Hierarchy

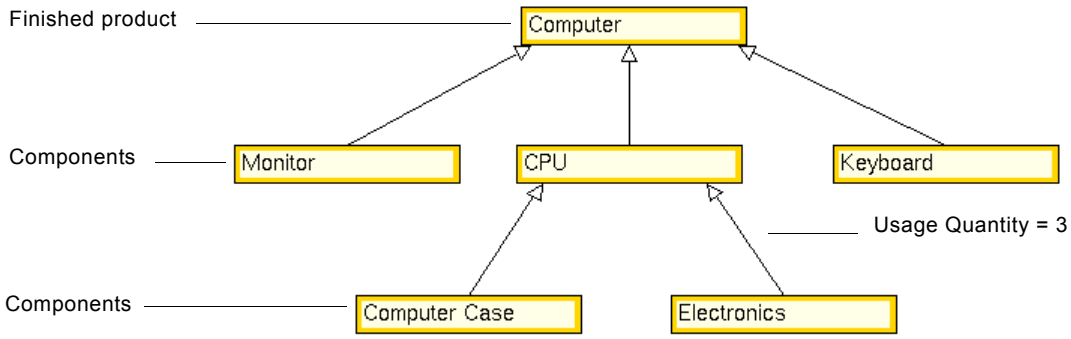
A product hierarchy consists of a high-level product specification, called a **finished product**, which might contain one or more lower-level product specifications, called **components**. The product hierarchy can describe as many levels of detail as needed.

You specify the number of components that each product represents by configuring the usage quantity of the connection between the products in the hierarchy. For example, a laptop finished product might consist of a computer case and 3 electronics components.

Here are two different product hierarchies. First is the product hierarchy for a computer finished product, which consists of a computer case component and 3 electronics components:



Next is the product hierarchy for a computer, which consist of a monitor, a keyboard, and a CPU component, where the CPU consists of a computer case component and 3 electronics components:



You can also configure the product hierarchy to model alternate products, whereby the model chooses between generic products and specific products, based on availability and priority.

You can create one or more product hierarchies, as needed, to describe the structure of each finished product that your supply chain sources and delivers.

Each role sources, makes, and/or delivers one or more products in the product hierarchy, as follows:

- A Base Manufacturer role makes and delivers components or finished products, which are raw materials for the overall supply chain.
- A Distributor role sources components and delivers finished products as kits, sources and delivers components, and/or sources and delivers finished products.
- A Manufacturer role sources components, and makes and delivers finished products.
- A Consumer role sources components or finished products.

Product Composites

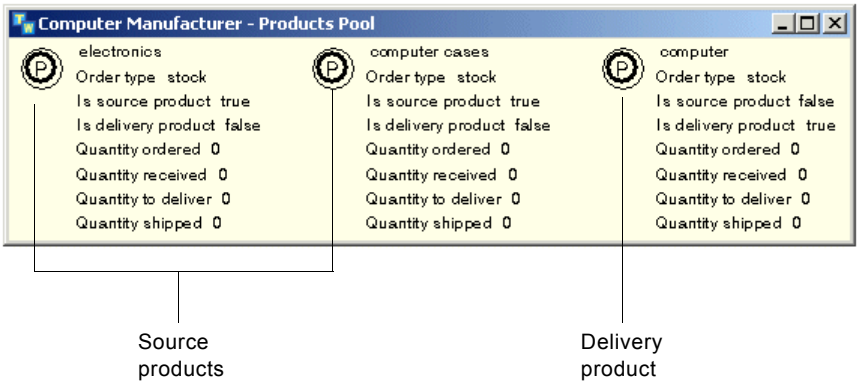
When you assign a product specification to a role, e-SCOR creates a product composite for each product that the role sources, makes, and/or delivers. e-SCOR creates two types of product composites:

- **Source product** — A product composite that a role sources from an upstream supplier.
- **Delivery product** — A product composite that a role delivers to a downstream buyer.

You configure various parameters for source and delivery products. Each source and delivery product also computes various metrics.

By creating product composites for each role, e-SCOR allows you to configure parameters and track metrics separately for each role's source and delivery products. For example, you might configure the inventory safety stock to be 100 for the source product of a downstream buyer role and 50 for the delivery product of the upstream supplier role. Similarly, you can track inventory levels separately for the source product of a buyer role and the delivery product of the upstream supplier role.

Here are the product composites for a Manufacturer role that sources computer cases and electronics components, and makes and delivers computer finished products:

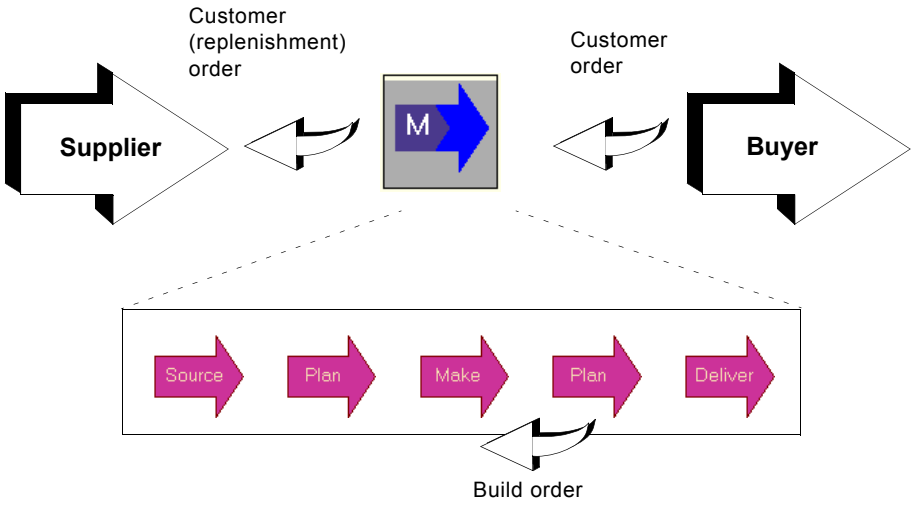


Orders

By default, e-SCOR uses a pull planning mode, which means downstream buyers place orders with upstream suppliers for source products. Conceptually, e-SCOR creates two basic types of orders when the model runs in pull mode:

- **Customer orders** — Orders for the source products of a Consumer, Distributor, or Manufacturer role, which initiate the order fulfillment process. The three types of customer orders are:
  - **Replenishment orders** — Customer orders that originate in a Distributor or Manufacturer role.
  - **Demand orders** — Customer orders for finished products in the overall supply chain, which originate in a Consumer role.
  - **Change orders** — Change orders for existing demand orders for finished products in the overall supply chain, which originate in a Consumer role.
- **Build orders** — Orders for the delivery products of a Base Manufacturer or Manufacturer role, which initiate the manufacturing process.

This diagram illustrates the various types of orders for a Manufacturer role:



e-SCOR creates and deletes orders as the model runs and stores these orders in pools on the role detail.

You can also configure individual roles to use a push planning mode, which means the upstream supplier pushes its delivery products to downstream buyers, based on forecasts.

Manufacturing Resources

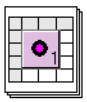
Each Level 1 role sources, makes, and/or delivers products, based on the capacity of its required resources. The model uses **resources** to represent the number of finished products a manufacturer role can make at one time. The model also uses resources to compute production cost.

e-SCOR models require manufacturing resources for Base Manufacturer and Manufacturer roles, only; Distributor and Consumer roles do not require resources.

e-SCOR automatically creates a single resource for each manufacturing role in your supply chain. The role then allocates available resources when it makes products. You can configure the capacity of an individual resource to enable the role to make more finished products.

You can model shared resources by associating the same resource with multiple roles in your supply chain, which further constrains the model's ability to make finished products.

Reporting



The SCOR model describes numerous metrics that measure the performance of the supply chain, including:

- Delivery performance and quality metrics, such as order fulfillment fill rates and lead times, and supplier on-time performance.
- Flexibility and responsiveness metrics, such as supply chain response time.
- Cost metrics, such as value-added productivity cost.
- Asset metrics, such as cash-to-cash cycle time and inventory days of supply.
- Financial metrics that compute regular collections and payments.

e-SCOR computes these and other performance metrics for roles, categories, and product composites. You can compute static values, time-series data, and time-weighted statistics, such as averages and moving averages.

The model computes metrics, based on input parameters that you configure for each role, category, and product composite in the model. You configure parameters to perform "what-if" analysis to test the performance of the model under different scenarios.

You view metrics and configure parameters, using several techniques:

- Dialogs for roles, categories, and product composites.
- Reports within e-SCOR.
- CSV (Comma Separate Values) files.
- Excel reports.
- Databases.

In addition, you can view key metrics in the Metrics toolbars, which automatically update as the simulation runs.

2

Running e-SCOR

Describes how to start the server and connect the client.

Introduction

e-SCOR is a client/server application. e-SCOR provides a batch file that, by default, starts the G2 server as a hidden process on the local machine at a default port (1111).

To run e-SCOR, you must connect the Telewindows client to the server. By default, Telewindows automatically connects to the server running on the local machine on the default port.

You can run e-SCOR in a secure G2 environment, which means users must provide a password before e-SCOR grants access to a KB. User names and passwords are stored in the `g2.ok` file. For details on how to configure e-SCOR to run in a secure G2 environment, see Chapter 54 "Licensing and Authorization" in the *G2 Reference Manual*.

Starting the Server and Connecting the Client

You can start the server and connect the client by using the Start menu.

To start the server and connect the client:

1 Choose Start > Programs > Gensym G2 2011 > G2 e-SCOR > Start G2 e-SCOR Server.

This menu choice starts the G2 server, using the *StartServer.bat* batch file, located in the *g2* directory of your e-SCOR installation directory. It starts the server on the local machine on TCP/IP port number 1111, and it automatically loads the KB named *e-scor.kb*.

When the server has been started, the G2 icon appears in the system tray. When the server is running, the icon looks like this: 

2 Once the server is running, connect the client in one of two ways:

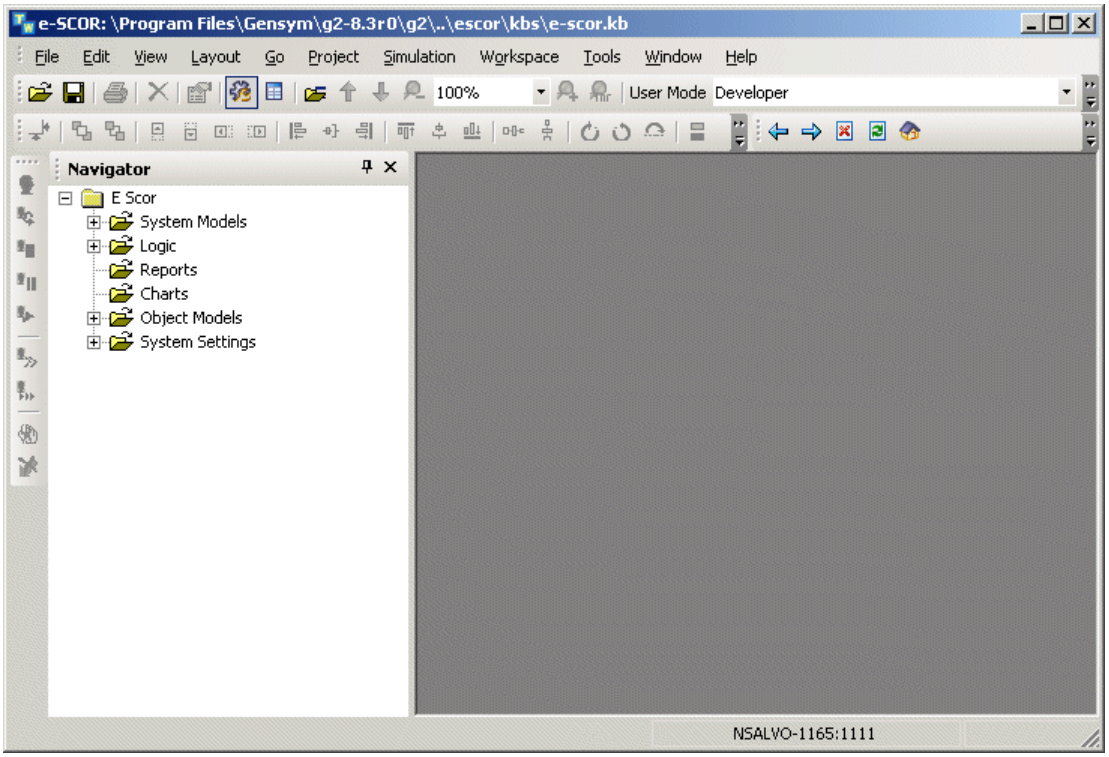
➔ To connect Telewindows to the server running on the default host and port, choose Start > Programs > Gensym G2 2011 > Telewindows Next Generation.

or

➔ To connect Telewindows to the server running on the local host on the current port, right-click the G2 icon in the system tray and choose Connect Telewindows.

The Telewindows client is now connected to the G2 server.

When the client is connected and all files have finished loading, you will see this window:



Connecting to a Specific Server at Startup

You can run the e-SCOR client and server on different computers, or multiple e-SCOR servers on the same computer.

You can:

- Connect the client directly to the server.
- Start the server on a specific port.
- Connect the client to a specific server.

Connecting the Client to the Default Server

To connect the client to the default server:

1. Start the e-SCOR server from the Start menu.

   By default, the server starts on the local host at port 1111. Each time you start a new server on the same machine, the port number increments by one. For example, if you start another server, the port number would be 1112.

2. To determine the host and port, hover the mouse over the G2 server icon in the system tray.

   For example, *MY-HOST:1111* means the server is running on the machine named *MY-HOST* at port 1111.

3. Right-click the G2 server icon in the system tray and choose Connect Telewindows.

The Telewindows client connects to the specific host and port of that server.

Starting the Server on a Specific Port

To start the server on a specific port:

1. Right-click the Start G2 e-SCOR Server menu choice in the Start menu and choose Create Shortcut.
2. Rename the shortcut and/or drag it to your desktop, as needed.
3. Display the properties dialog for the shortcut and click the Shortcut tab.
4. Configure the Target property in the dialog to be the specific port on which to start the server, using the *-tcpport* command-line option.

   For example, to start the server on port 1115, the shortcut would look like this:

   ```
   "C:\Program Files\Gensym\g2-2011\g2\StartServer.bat"
   -kb ..\escor\kbs\e-scor.kb -nowindow -tcpport 1115
   ```

Connecting the Client to a Specific Server

To connect the client to a specific server:

1. Create a shortcut to the *twng.exe* file located in the *g2* directory of your e-SCOR product installation, either directly or by creating a shortcut from the Telewindows Next Generation menu choice in the Start menu.
2. Display the properties dialog for the shortcut and click the Shortcut tab.

3 Configure the Target by appending the host and port of the e-SCOR server to which to connect, using this syntax: *host :port*.

For example, to connect to *my-host* at port *1115*, the shortcut would look like this:

```
"C:\Program Files\Gensym\g2-2011\g2\twng.exe"
   my-host:1115
```

Starting the Server with Your Application Loaded

By default, the server starts up with the default e-SCOR application running, *e-scor.kb*. Once you create an application, you might want to create a shortcut to the e-SCOR server that automatically loads your application at startup.

To start the server with your application loaded:

1 Copy the Start G2 e-SCOR Server shortcut from the Start menu.

You can rename the shortcut and drag it to your desktop, as needed.

2 Display the properties dialog for the shortcut and click the Shortcut tab.

3 Configure the application to load by editing the Target.

For example, to load the application named *escor-demo.kb* located in the *\escor\examples* directory, the Target should look like this:

```
"C:\Program Files\Gensym\g2-2011\g2\StartServer.bat"
-kb "c:\Program Files\Gensym\g2-2011\escor\examples\escor-demo.kb"
-nowindow
```

Exiting e-SCOR

To exit e-SCOR, you disconnect the client from the server, then shut down the server. By default, you can only exit the server directly from the client in Developer mode.

To disconnect the client from the server:

➔ Choose File > Close.

To exit the server:

➔ Right-click the G2 server icon in the system tray and choose Shut Down G2.

or

1 Choose Tools > User Mode > Developer.

2 Choose File > Exit.

3 Click Yes in the confirmation dialog.

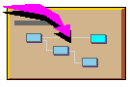
3

Organizing Models and Controlling Simulations

Describes how to use models, scenarios, and organizers to organize and control models.

Introduction

The first step in building a e-SCOR model is to create a new project. e-SCOR takes care of loading and saving all the required modules for you; therefore, we recommend that you always create a new project.



The next step is to create a **model**, which contains the blocks, resources, and instruments that describe your business process. You place these objects on the subworkspace of the model, which is called the **detail**.

A model typically has one or more **organizers**, which contain various types of objects that the model requires but that are not directly connected to the model, such as work object definition classes or resources. You place these objects on the organizer's detail.

Each model must define a **scenario**, e-SCOR's discrete event simulation engine, which tracks events by using a simulation clock. A scenario controls various aspects of the model, including the mode, status, and **simulation time**, which represents the current time at which the simulation is running.

Once you have created a model of your process, you typically experiment with alternative scenarios and processes to test the performance of the model under different conditions. For example, you might test the model under a heavy load and a light load to see how it performs, or you might test the same set of input parameters against a model with fewer resource constraints. Thus, scenarios serve as control centers for a model, allowing you to perform **"what-if" analysis**.

This topic describes how to:

- Work with projects.
- Configure the model environment.
- Control the simulation.
- Configure the scenario.
- View a summary of creating models and running simulations.
- View demonstration models.

Working with Projects

An e-SCOR project consists of a set of related files that form a knowledge base. Each file contains a stand-alone **module**, which together make up a **module hierarchy**. Each module is associated with its own *.kb* file, whose name typically corresponds to the module name. The module hierarchy consists of a top-level module and a number of lower-level modules. The top-level module requires the lower-level modules to run.

You can:

- Create a new project.
- Save a project.
- Open a project.

Creating a New Project

When creating a new project, e-SCOR creates a new, blank project with the name you enter. The new project is saved it in the *projects* directory of your e-SCOR installation directory.

Note Creating a new project replaces the existing model in memory. Therefore, before you create a new project, be sure to save the existing project, as necessary.

To create a new project:

1. Choose File > New.
2. Enter the name of the project.

   The project name cannot contain spaces.
3. Ensure that e-SCOR is chosen as the selected library.
4. Check or uncheck any additional libraries, depending on how your application needs to access external data.
5. Click OK.

e-SCOR displays the Operator Logbook as it creates a new project with the name you specify, then loads the new project and all required modules onto the server. When all modules have been successfully loaded, the menu bar updates. You must wait until the KB has finished loading in the server before you can access your project.

Saving a Project

Projects are stored in the *projects* directory of your e-SCOR installation directory.

e-SCOR saves the top-level module only; it does not save the required modules. Unless you are customizing e-SCOR, you do not generally need to save the required modules.

To save a project:

➔ To save a project to the project file that was loaded when you started the client, choose File > Save or click the equivalent toolbar button: ()

or

➔ To save the project to a different project file, choose File > Save As, enter a new project name, or choose an existing project name from the list of available projects on the server.

Opening a Project

To open a project, specify the project name associated with the top-level module in the module hierarchy.

Note Opening a new project replaces the existing application in memory. Therefore, before you open a new project, be sure to save the existing project, as necessary.

To open a project:

1. Choose File > Open or click the equivalent toolbar button () to display the Open Project dialog.
2. Enter or choose the project to open and click Open.
3. Click Yes in the confirmation dialog.

e-SCOR displays the Operator Logbook as it loads the project file and all required modules onto the server. When all modules have been successfully loaded, the menu bar updates. You must wait until the KB has finished loading in the server before you can access the application.

Configuring the Model Environment

You create your e-SCOR model by creating and configuring these objects within the model environment:

- **Model —** A container in which you build your e-SCOR model.
- **Scenario —** The discrete event simulation engine for controlling the simulation.
- **Organizer —** A container in which you place various objects in your model.

Note Every model must have a Scenario; otherwise, you cannot configure certain aspects of the model.

Creating a Model

You create and organize models through the Projects menu, in which case e-SCOR keeps track of where the model is located.

You can also create models directly from the e-SCOR toolbox and place them on a top-level workspace.

To create a model:

1 Do one of the following:

➔ Choose Project > System Models > Supply-Chain Processes > Manage, then click the New button ( ) to display the properties dialog for creating a new model.

or

➔ In the Navigator, expand System Models in the tree, mouse right on the Supply-Chain Processes node, and choose New Instance.

2 Configure the Label to name your model.

3 Configure the Best Practice URL, as needed.

The Best Practice URL can reference any HTML file, either on the World Wide Web or on the file system, or any RTF file on the file system, which describes the model. When this attribute is configured, choosing Show URL or clicking the model displays the file in a browser window.

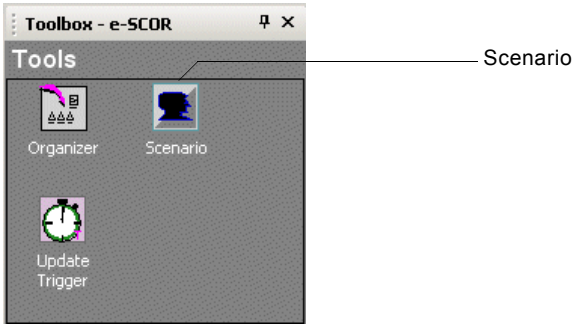
4 Configure the Model Version to be any number to uniquely identify the model.

5 Click OK to add the model to the Manage dialog and Navigator.

6 In the Manage dialog, select your model and click the Model button ( ) to show the model detail, or in the Navigator, mouse right on the model and choose Show Detail.

You create your model on this detail.

7 Choose View > Toolbox - e-SCOR and click the Tools button:

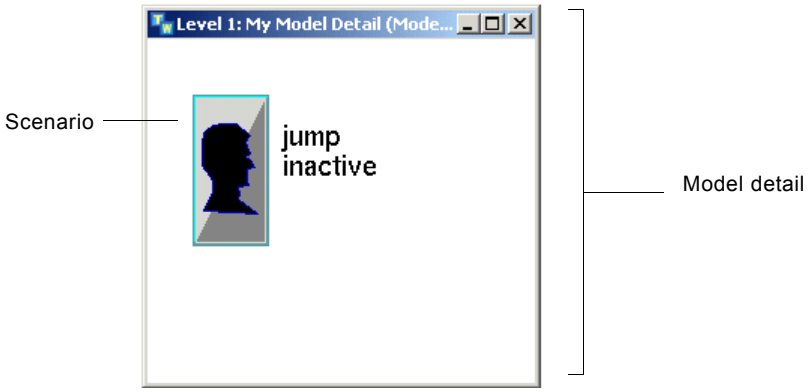


8 Select a Scenario and click to place it on the model detail.

9 Choose Layout > Shrink Wrap or click the equivalent toolbar button: 

The workspace and window size adjust to fit the model. Drag the Scenario to adjust the borders of the workspace.

The model detail should look similar to this:



Alternatively, to create a model and place it on a top-level workspace:

1 Choose Workspace > New.

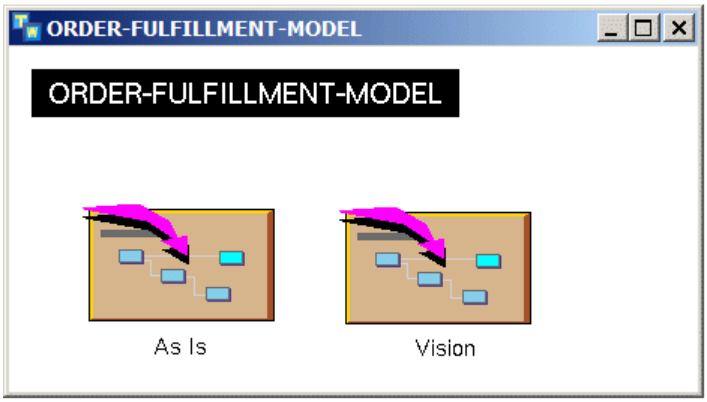
For more information, see Creating and Accessing Top-Level Workspaces.

2 Display the e-SCOR toolbox and click the Tools button.

3 Create a Model object and place it on the workspace.

4 Choose Show Detail on the model to show its detail.

For example, here is a top-level workspace with two models:



Creating an Organizer

When you create a model, you might want to use an Organizer to store miscellaneous objects such as the Scenario Manager or report objects. You use an organizer for any object that the model requires to run but that is not directly connected to the model.

To create an organizer:

1 Choose View > Toolbox - e-SCOR and click the Tools button:

2 Select an Organizer and click to place it on the model detail.

3 Choose Properties on the organizer.

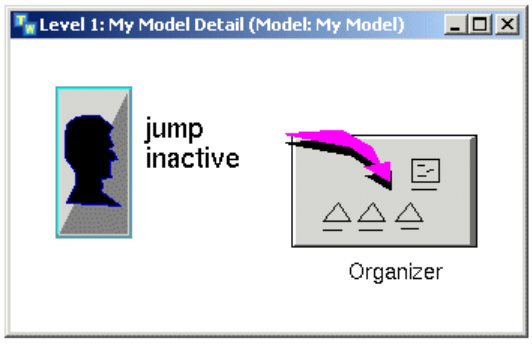
4 Edit the Label parameter to be any text, then drag the label to the desired location next to the organizer.

5 Choose Create Detail on the organizer.

The organizer detail appears in its own window. You place objects on this detail, as needed.

6 Choose Show Detail on the organizer to show the detail.

This figure shows a model with a scenario and an organizer on the model detail:



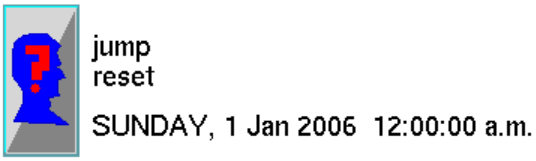
Controlling the Simulation

You control the simulation from the Simulation menu or toolbar. These menu choices and toolbar buttons affect the scenario, which is the control center for running the simulation. Every model must contain a scenario.

To control the simulation, you:

- Activate and deactivate the scenario.
- Start and stop the simulation.

The scenario shows the simulation mode, status, and current simulation time, for example:

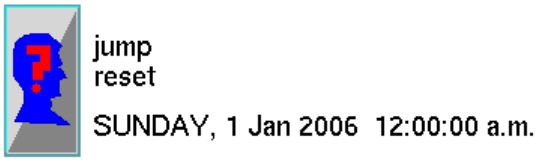


Activating and Deactivating the Scenario

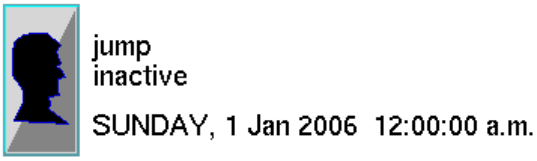
Before you can run a simulation, you must activate the Scenario. Certain menu choices, such as Show Scenario, are only available when the scenario is active.

The following figure shows an active and inactive scenario:

active



inactive



Note Starting the simulation automatically activates the scenario; therefore, typically, you do not need to activate the scenario explicitly.

To activate and deactivate a scenario:

➔ Display a model that contains a scenario, then choose Simulation > Activate or click the equivalent toolbar button ( ) to toggle activation.

Starting and Stopping the Simulation

You control the status of the simulation by using menu choices in the Simulation menu, by using keyboard shortcuts, or by clicking the equivalent toolbar button, as follows:

Menu Choice/ Shortcut	Toolbar Button	Status	Description
Start All		running	Start the simulation running.
Reset		resetting	Reset the simulation.
Pause		paused	Pause the simulation.
Continue		running	Continue running the paused simulation.

By default, the simulation runs in Jump mode, which advances the simulation clock continuously with each discrete event. For alternative ways to run the simulation, see Configuring the Simulation Mode.

To start and stop the simulation:

1 Start the simulation by choosing Simulation > Start All or by clicking the equivalent toolbar button.

Choosing Start All activates the scenario and resets the simulation before starting.

Resetting the simulation can take a period of time, depending on the size of the model and the speed of your computer. The status of the scenario is resetting.

After resetting, e-SCOR verifies that you have configured all roles correctly. Once role verification is complete, objects begin flowing through the model. These objects represent orders, product shipments, invoices, payments, and other objects that the model creates and deletes when the simulation runs. You can only see these objects as they flow through the model if animation is enabled. The model also begins computing metrics. The status of the scenario is running.

2 To pause the simulation, choose Simulation > Pause or click the equivalent toolbar button.

   Pausing the simulation stops the simulation clock, causes all objects to stop flowing through the model, and stops computing metrics. The status of the scenario is paused.

3 To resume running the simulation after pausing, choose Simulation > Continue or click the equivalent toolbar button.

   The simulation clock begins advancing again, objects begin flowing through the model, and the status of the scenario is running.

4 To reset the simulation, choose Simulation > Reset or click the equivalent toolbar button.

Resetting the simulation resets the simulation clock, deletes all objects that the model created, and resets all metrics to their initial values.

Configuring the Scenario

You can configure these features of the scenario:

- Simulation mode, which determines whether the simulation runs continuously, step-by-step, or in real time.
- Duration of the simulation.
- Version of the simulation.
- Start time of the simulation.
- Simulation speed.
- Animation.
- Speed at which objects flow along paths.
- Indicator arrow behavior.
- Computational behavior of the scenario.
- Random number generation.

Configuring the Simulation Mode

You can run the simulation in one of three modes by using the menu choices in the Simulation menu or the equivalent toolbar button, as this table describes:

Menu Choice	Toolbar Button	Mode	Description
Jump Mode		jump	The normal discrete event simulation mode. Events occur in their normal time sequence while a simulation is running, but the real-time clock advances non-linearly relative to the simulation clock. After each discrete event, e-SCOR immediately advances the simulation clock to the start time of the next event. Objects flow through the model without stopping.
Step Mode		step	The mode you use for careful examination of the model. e-SCOR pauses after each event so you can walk through the simulation one step at a time. When you continue running the simulation, the clock immediately advances to the start time of the next event, then stops.
Synch Mode		synch	The mode you use to help visualize the relative times between events. e-SCOR scales the simulation time to real time. For example, you can use this mode to run the simulation at one hour per second of real time. Most of the time when you are running a simulations, however, you let the simulation clock keep track of the time by using either jump or step mode.

You configure the simulation mode from the Simulation menu or toolbar, or on the properties dialog for the scenario.

Running the Simulation in Jump Mode

To run the simulation in jump mode:

1. Choose Simulation > Jump Mode, click the equivalent toolbar button, or display the properties dialog for the Scenario and configure the Mode to be Jump.
2. Choose Simulation > Start All or click the equivalent toolbar button to start the simulation

Running the Simulation in Step Mode

To run the simulation in step mode:

1. Choose Simulation > Step Mode, click the equivalent toolbar button, or display the properties dialog for the Scenario and configure the Mode to be Step.
2. Choose Simulation > Start All or click the equivalent toolbar button to take a single step in the simulation, then pause the simulation.
3. Choose Simulation > Continue or click the equivalent toolbar button to take a single step for each discrete event, then pause the simulation.

Running the Simulation in Synch Mode

When you run the model in synch mode, you must configure the proportion of simulation time to real time. The larger the number, the faster the overall execution time of the simulation. By default, the value is 1, which means the timing parameters contribute exactly the specified amount of simulation time to the simulation clock. A value of 2 means they contribute half the amount of time. For example, if a timing parameter specifies 10 minutes to perform a task, and the Seconds per Tick is 2, the parameter contributes 5 minutes of simulation time.

Note If your model is complex, e-SCOR may not be able to keep up with the specified synch rate. For example, if you specify a synch rate such that one minute of simulation time is equivalent to one year of real time, e-SCOR might require more than one minute to process a year-long simulation. If this is the case, e-SCOR gives no indication that the synch rate is too slow; however, the metrics that the simulation computes are correct.

To run the simulation in synch mode:

1. Display the properties for the scenario, click the Scenario tab, and configure Seconds per Tick to be a number greater than one.
2. Choose Simulation > Synch Mode, click the equivalent toolbar button, or display the properties dialog for the Scenario and configure the Mode to be Synch.
3. Choose Simulation > Start All to run the simulation.
4. Choose Simulation > Pause to pause the simulation.
5. Choose Simulation > Continue to continue running the simulation in synch mode.

Configuring the Duration of the Simulation

Depending on your model, you typically configure the scenario to run for a specific duration, such as a month, a year, or ten years. You do this by specifying the ending time of the simulation. A duration of 0 means the simulation will run for the maximum allowable simulation time, which is 17 years.

Tip To ensure accurate financial reporting, configure the duration of the simulation to be slightly longer than the end of the last financial period.

To configure the duration of the simulation:

➔ Display the properties dialog for the scenario, click the Scenario tab, and configure the Duration to be the amount of time the simulation should run, for example, 3 months or 2 years.

Configuring the Simulation Version

When performing "what-if" analysis, you often use different scenarios with the same or with different versions of the model. When using the Scenario Manager to run multiple simulations from a script, you typically output the data to a report. To identify which scenario was used to generate the data, you configure the version of the simulation, using a unique number.

To configure the simulation version:

➔ Display the properties dialog for the scenario, click the Scenario tab, and configure the Simulation Version to be a unique number.

For example, you might use 1.0, 1.1, and 1.2 for the scenario associated with three different versions of a model.

Configuring the Start Time of the Simulation

By default, e-SCOR uses January 1, 2006 as the start time of the simulation. You might want to start the simulation at a different time.

To configure the start time of the simulation:

➔ Display the properties dialog for the scenario, click the Start Time tab, and configure the Year, Month, Day, Hour, Minute, and/or Second to be the start time of the simulation.

When you reset the simulation, the new start time appears.

Configuring Simulation Speed

By default, the scenario is configured to run as fast as possible, which means that when you are running in jump or synch mode, the clock advances with each new event as fast as it can. This default configuration is desirable when:

- Running simulations from a script, using the Scenario Manager.
- You do not need to interact with the model while the simulation is running.
- You do not need to visualize the animation of objects as they flow through the model.

Depending on the speed of your computer, running the simulation as fast as possible often means that you will experience delays when interacting with the user interface while the simulation is running. For example, when you click the Pause button to pause the simulation, the simulation clock continues to advance until the processing has caught up with the user interaction. Similarly, you will experience delays when configuring values through the dialogs or reports while the simulation is running.

If you want to interact with the user interface while the simulation is running, for example, to configure parameter values, you should slow the simulation down to allow more time for the user interface to respond.

To slow the simulation down, you configure the simulation speed to be a larger number. Depending on the speed of your computer, you might try a simulation speed of 10 or 15.

Note Once you have configured your model, we recommend that you set the Simulation Speed to 0 for optimal performance, the default.

To configure the simulation speed:

➔ Display the properties dialog for the scenario, click the Options tab, and adjust the Simulation Speed, where the larger the number, the slower the speed.

Configuring Animation

e-SCOR can animate running simulations by physically moving objects along paths and highlighting blocks as they become active. If you are using your model as a communication tool to visualize work objects as they flow along paths, you might want to enable animation.

Depending on the speed of your computer, you might need to adjust the animation speed. In particular, if you have a relatively fast computer, you might need to slow down the animation speed to better visualize the flow of work

objects. However, keep in mind that performance degrades the slower the animation speed.

You configure animation speed, based on the number of milliseconds it takes to move an object from the beginning of a path to the end of a path. By default, it takes an object 5 milliseconds to move along a path. To slow down the animation, you might want to move an object along the path in 8 or 10 milliseconds.

Note Once you have configured your model, we recommend that you disable animation for optimal performance.

To enable animation for a simulation:

➔ Display the properties dialog for the scenario, click the Options tab, and click the Enable Animation option on.

When you run the simulation, objects move along paths and blocks animate as the simulation clock advances.

To adjust animation speed:

➔ Display the properties dialog for the scenario, click the Options tab, and adjust the Animation Speed, where the larger the number, the slower the speed.

Configuring Object Tracking

You can configure the scenario so that objects that flow through the model keep track of the blocks through which they have passed since they were created. When object tracking is enabled, you can pause the simulation and show tracking for any object. Object tracking is a useful way of verifying the model to ensure objects flow along the correct paths.

When showing object tracking, e-SCOR animates all the blocks upstream of the current block, in order, starting at the current block and ending at the block that created the object. e-SCOR repeats this process four times, by default. You can configure the color used for animating blocks when showing object tracking.

To configure object tracking:

1. Display the properties dialog for the scenario, click the Options tab, and click the Enable Tracking option on.
2. Configure the Animation Repeat Counter to be the number of times to animate the blocks when showing object tracking.
3. Configure the Animation Color to be the highlight color to use.

To show object tracking for an object:

➔ Pause the simulation, then choose Show Flow History on a object in the model.

Configuring the Behavior of Indicator Arrows

e-SCOR places indicator arrows next to objects when you show various objects associated with other objects, such as when you show the scenario associated with a role.

By default, the indicator arrow remains on the workspace until you explicitly hide it. You can clear all indicators automatically, or you can configure the scenario to clear indicators automatically after a certain number of seconds.

Note To clear all indicators, the scenario must be active, as described in Activating and Deactivating the Scenario.

To clear an individual indicator arrow:

➔ Left click the indicator arrow.

To clear all indicator arrows:

➔ Activate the scenario, then choose Simulation > Clear Indicators or click the equivalent toolbar button: 

To clear indicators associated with a scenario after a timeout period:

1. Display the properties dialog for the scenario, click the Options tab, and configure the Indicate Mode by choosing Timeout.
2. Configure the Timeout period after which indicators should automatically disappear, in seconds.

Configuring the Computation Behavior

To maximize performance, the scenario is configured to perform the minimum amount of computation necessary at Level 3, Level 4, and Level 5. If you are customizing the implementation of Level 2 categories, you can configure these parameters for a scenario related to computation behavior:

You can configure these parameters related to computation behavior:

Parameter	Description
Compute All Blocks	Enables the computation of Task blocks with detail. The default value is off, which means e-SCOR computes values for Task block details only; it does not compute values for the block itself.
Update Charts	Enables the updating of charts. The default value is off, which means that you must update charts manually or by using a button or a rule. For details, see "Updating Charts" in the *ReThink User's Guide*.
Enable Metrics Toolbar Update	Disables the updating of the Metrics toolbars. The default value is on, which means that the Metrics toolbars update once every half second.

Note The scenario computes metrics for all e-SCOR Level 1 roles and Level 2 categories and product composites in the model, regardless of how the Scenario is configured.

Note Once you have configured your model, we recommend that you disable updating of the Metrics toolbar for optimal performance.

To compute metrics for Task blocks with detail:

➔ Display the properties dialog for the scenario, click the Options tab, and enable the Compute All Blocks option.

To update charts automatically:

➔ Display the properties dialog for the scenario, click the Options tab, and enable the Update Charts option.

To disable metrics toolbar updating:

➔ Display the properties dialog for the scenario, click the Options tab, and disable the Enable Metrics Toolbar Update option.

Configuring the Scenario to Generate Identical Random Numbers

By default, the scenario generates random numbers that vary with each simulation by generating a new seed number for each simulation. You might want to run a simulation with identical random numbers to test different model configurations, using the same set of random numbers.

e-SCOR generates random numbers to compute mathematical distributions such as Random Normal, Random Exponential, or Random Triangular. You use these random distributions to generate values for attributes such as Demand Order Size, Demand Order Duration, Receiving Duration, Manufacturing Duration, and Order Entry Duration.

To configure the scenario to generate identical random numbers:

1. Display the properties dialog for the Scenario and, on the Scenario tab, configure the Seed Value to be an integer that holds the seed value, which e-SCOR uses as the basis for randomly generated numbers.

   By default, it generates a random number as the Seed Value.

2. Disable the Generate New Seed option to use the specified Seed Value for each simulation.

3. Reset the Scenario to use these new values.

Each time you run the simulation, using this scenario, e-SCOR uses the same set of randomly generated numbers.

Summary of Creating Models and Running Simulations

A typical model consists of these roles:

- Base Manufacturer role, which delivers components to the overall supply chain.
- Distributor role, which delivers its source products or which assembles components into kits.
- Manufacturer role, which sources components, and manufactures and delivers finished products.
- Consumer role, which sources finished products and/or kits from upstream suppliers.

To configure a model with Distributor and Manufacturer roles, you typically configure the product structure as a hierarchy, where finished products consist of

components, which might consist of other components. For example, a computer might consist of electronics and case components.

You configure Level 1 role and Level 2 SCOR parameters to determine the behavior of the model, such as:

- Timing and cost parameters for Source, Make, and Deliver categories.
- Planning parameters related to stock/replenishment, stock/forecast, make-to-order, and engineer-to-order planning strategies.
- Contract parameters for choosing suppliers when sourcing identical products from multiple suppliers.
- Pull and push planning mode parameters.

You can configure categories on the role detail to support alternative planning strategies—make-to-order and engineer-to-order—as well as different Level 2 SCOR parameters for multiple products assigned to the role.

You can create various types of reports for viewing metrics and configuring parameters.

When you run the simulation, you are primarily concerned with the metrics the model computes for roles, categories, and product composites. In addition, you can configure how the simulation runs by configuring the Scenario.

e-SCOR runs a number of processes when the simulation runs, which determine parameters, compute metrics, and create objects and place them in repositories.

To create a model and run a simulation:

1. Create a supply-chain model and configure Level 2 SCOR parameters for each category and product composite in the model.

   For details, see:

   - Working with Models.
   - Creating a Supply-Chain Model.
   - Configuring Level 2 SCOR.

2. Run the simulation.

   For details, see:

   - Running the Simulation.
   - Viewing Metrics.
   - What Happens When the Simulation Runs.

3. Create input and output reports for configuring parameters and viewing metrics.

   For details, see:

- Using Reports.
- Accessing External Databases.

4 Configure Distributor roles:

For details, see Modeling a Distribution Process.

5 Configure Manufacturer roles.

For details, see Modeling a Manufacturing Process.

6 Configure Level 2 SCOR parameters to use different stock planning strategies:

For details, see Using Stock Planning Strategies.

7 Configure Level 2 SCOR parameters to use alternative planning strategies—make-to-order or engineer-to-order.

For details, see Using Alternative Planning Strategies.

8 Configure the model to use contracts for sourcing identical products from multiple upstream suppliers.

For details, see Modeling a Process with Multiple Suppliers.

9 Add categories to the role details to source, make, and deliver multiple products.

For details, see Configuring Role Details for Multiple Products.

10 Configure the model to use a pull or push planning mode, as needed.

For details, see Using Pull and Push Planning Modes.

For information on how asset metrics are computed, see Appendix A, Asset Metrics Formulas.

For information on the SCOR parameters and metrics that e-SCOR supports, see Appendix B, SCOR Metrics.

11 Create scripts for running multiple simulations, using different parameters.

For details, see Using Batch Simulation.

Viewing Demo Models

e-SCOR provides a number of a tutorial models. For details, see the *e-SCOR Getting Started Tutorials*.

e-SCOR also provides demonstration models that you can view named `escor-demo.kb`, which includes examples of pull and push planning strategies, kitting, MTO, ETO, and product hierarchies.

These models are all located in the `escor\examples` directory of your e-SCOR product directory.

To view e-SCOR demo models:

➔ Choose File > Open and choose the file to open.

4

Working with Models

Describes how to work with models through the menus and toolbars.

Introduction

To work with e-SCOR models, you perform these tasks:

- Use the Project menu.
- Navigate models.
- Interact with workspaces.
- Use the menus.
- Use the e-SCOR toolbox.
- Use the G2 Toolbox.
- Interact with objects in the model.
- Use toolbars.
- Set and clear breakpoints and indicators.
- Switch user modes.
- View messages.
- Configure user preferences.
- Configure network interfaces.
- Configure message browsers.

You can also view a summary of command tasks.

Summary of Common Tasks

This section summarizes how to perform common tasks in e-SCOR:

To...	Do this...
Display the popup menu for an object on a workspace	Click the right mouse button on the object.
Display the properties dialog for an object on a workspace	Double-click the object, select the object and press the F4 key, or choose Properties from the object's popup menu. You can also select the item, then choose Edit > Properties or click the equivalent toolbar button: 

To...	Do this...
Display the detail for an object, such as a model or a role	Choose Show Detail from the popup menu for the object, choose View > Show Details, enter Ctrl + right click on the object, or click the equivalent toolbar button:
Display the e-SCOR toolbox	Choose View > Toolbox - e-SCOR.
Adjust the size of a workspace and its associated window to fit the contents of the workspace	Choose Shrink Wrap on the workspace, choose Layout > Shrink Wrap, or click the equivalent toolbar button:
Hide a workspace	Click the Minimize button on the window, choose Hide on the workspace, choose View > Hide, or enter Ctrl + right click on the workspace.
Go to the Products pool detail	Choose Show Products on a role.
Configure product composite parameters	Choose Products on a role, then choose the product to configure.

Using the Project Menu

You create, configure, and interact with e-SCOR objects to create a model by using the Project menu.

You can also create and interact with objects through the Navigator, and you can search for objects once they exist. For more information, see:

- Using the Navigator.
- Searching for Objects.

Using the Project Menu

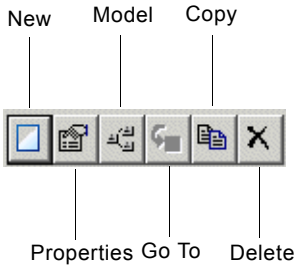
The Project menu allows you to create and manage the various objects you need to build an e-SCOR application.

For details, see Using the Project Menu.

Using the Manage Dialog

The Manage dialog allows you to create and configure new e-SCOR objects, show model details, copy and delete objects, and perform specific operations.

The Manage dialog provides these toolbar buttons:



The buttons in the Manage dialog are enabled or disabled, as appropriate, for the particular type of object.

The Go To button is disabled in Modeler mode because, typically, you interact with objects through properties dialogs and model details. You can go to objects directly through the Navigator or search, if desired.

For information about interacting with objects directly, see Interacting with Objects in Developer Mode.

To use the Manage dialog:

1. Choose a submenu from the Project menu and choose Manage.

   If the submenu has additional submenus, choose one of the submenus. The Manage dialog appears, which includes all objects in the submenu.

2. To create a new object, click the New button in the Manage dialog.

   A properties dialog appears for configuring the object. The default name is a unique, system-generated name.

3. Configure the properties, depending on the type of object, and click OK.

   For information on configuring the properties, see the various chapters in this guide.

   The object now appears in the Manage dialog.

4. Select an object in the list to enable the toolbar buttons, as appropriate for the type of object.

5 To display the properties dialog for an object, click the Properties button.

Note that the only way to configure the properties of a container object once it has been created is through the Manage dialog.

6 To display the detail associated with a container object, click the Model button.

This button is only available if the object has detail.

7 To copy an existing object, select the object you want to copy, then click the Copy button.

A properties dialog appears for configuring the copy. The default name is the existing object name with `-copy` appended.

8 To delete an object, select the object you want to delete and click the Delete button.

Using the Project Submenus

e-SCOR provides access to the various objects in a model through submenus of the Project menu. Selecting the menu choice for a configuration object displays the properties dialog for the object. Selecting the menu choice for a container object displays its detail.

To use the project submenus:

1 Choose a submenu from the Project menu.

If the submenu has additional submenus, choose a submenu until you see a submenu that includes the names of all objects of that type.

2 Choose an object from the submenu.

Navigating Applications

To navigate applications, you can:

- Use the Navigator.
- Search for objects.

For information on creating and managing objects through the Project menu, see Using the Project Menu.

Using the Navigator

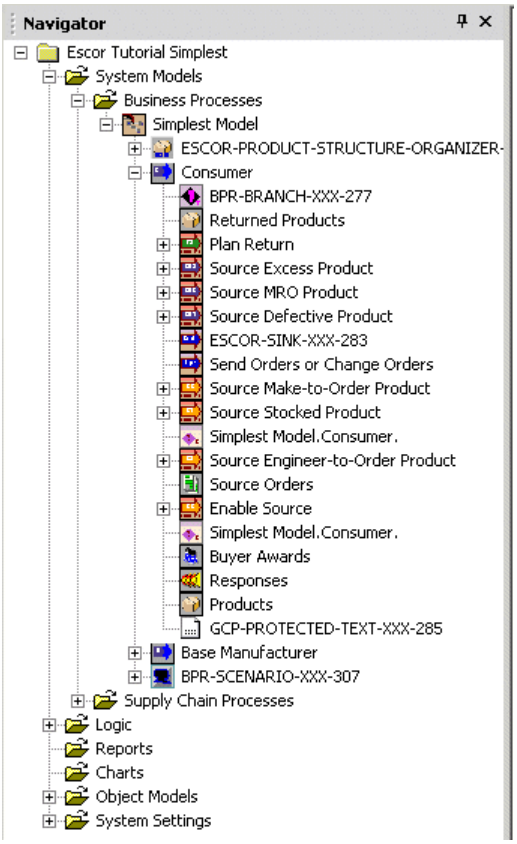
The Navigator displays all the elements of a project.

You can interact with objects in the Navigator, for example, showing its properties or going to the detail, depending on the type of object. You can also create new objects from the Navigator.

To display the Navigator:

➔ Choose View > Navigator or click the equivalent toolbar button ( ) and expand the tree view to the desired level.

Here is the Navigator for the Tutorial Simplest Model with the tree expanded to show Level 2 categories of the Consumer role:



To interact with objects in the Navigator:

➔ Right-click a node in the Navigator and choose the desired menu choice.

In addition to the menu choices that you normally get when you right-click the object, you can choose Go To to show the selected object. Depending on the type of object, you might go to the object on a detail or you might go to the object in a repository.

You can also choose New Instance on the Supply Chain Processes folder to create a new model directly from the Navigator.

Searching for Objects

You can search for specific types of objects, by matching text in the label field and/or the target class, depending on the type of object. You can also go directly to named objects.

To search for objects:

1. Choose Tools > Search and choose a category of object to be found.
2. Enter the Keyword text to match and, depending on the type of object, optionally, the Target Class.
3. Configure Search By to search for the keyword only, class only, keyword or class, or keyword and class.
4. Click the Search button.

   The search results include all objects whose label matches the specified text.
5. Select an object and click the Go To button.

An arrow appears next to the found object, if it exists; otherwise, the Search dialog display No Matches Found.

Depending on the type of object, you might go to the object on a detail or you might go to the object in a repository. You can interact with the object through its menu choices, for example, to go its detail or show its properties.

To go to a named object in the model:

➔ Enter the exact name of an object in the Go To type-in box on the toolbar:

A red arrow points to the named object on a workspace.

Interacting with Workspaces

You place all model objects on detail workspaces, which appear their own window. You display and interact with workspaces in these ways:

- Display a detail workspace.
- Hide a workspace.
- Delete a workspace.
- Create a detail workspace.
- Edit workspace properties.
- Scale a workspace.
- Shrink wrap a workspace to fit the enclosed elements.
- Show the superior object for a workspace.
- Print a workspace.
- Save a workspace as a JPEG file.
- Assign a background image to a workspace.
- Create and access top-level workspaces.

Displaying a Detail Workspace

A number of objects define detail, which is a workspace associated with the object on which you place other objects. For example, models, organizers, and roles all define detail.

To display detail for an object:

➔ Right-click the background of a workspace and choose Show Detail, choose View > Show Details, or click the equivalent toolbar button: ( )

or

➔ Press Ctrl + right-click on the object.

Hiding a Workspace

To hide a workspace:

➔ Right-click the background of a workspace and choose Hide or press Ctrl + right-click on the workspace.

Deleting a Workspace

Deleting a workspace permanently deletes it from the server, including all objects on the workspace.

To delete a workspace:

➔ Select a workspace and choose Edit > Delete, right-click the background of a workspace and choose Delete, or click the equivalent toolbar button: ()

Creating a Detail Workspace

If you delete a detail workspace associated with a model, you can create a new detail for an existing model.

To create a detail workspace:

1 Show the detail of a model.

For details, see Displaying a Detail Workspace.

2 Delete the detail workspace associated with the model.

For details, see Deleting a Workspace.

3 Show the Navigator.

For details, see Using the Navigator.

4 Right-click the model whose detail you deleted and choose Create Detail.

The model has a new detail workspace.

Editing Workspace Properties

You can edit the name of the workspace, as well as the background and foreground colors, and the margins around the objects at the edges of the workspace. By default, the background color is white and the foreground color is black.

For information about configuring the background image, see Loading Background Images.

To edit workspace properties:

1 Select a workspace and choose Edit > Properties, right-click the background of a workspace and choose Properties, or click the equivalent toolbar button: ()

2 Configure the Names to be any text.

The text is converted to a symbol, with hyphens in place of spaces when you accept the dialog.

3 Configure the Workspace Margin by entering the number of pixels.

4 Configure the Foreground Color and Background Color by choosing a color.

The name appears at the top of the workspace when you accept the dialog.

Scaling a Workspace

You can scale a workspace to fit the current window, or zoom a workspace in, out, or to a specific scale.

To scale a workspace:

➔ Choose View > Zoom In or Zoom Out, enter Ctrl + = to zoom in or Ctrl + - (minus) to zoom out, or click the equivalent toolbar buttons: ( )

or

➔ Choose View > Zoom, then choose or enter a zoom scale, or enter a specific zoom scale in the zoom scale on the toolbar: ()

or

➔ Choose View > Zoom to Fit or click the equivalent toolbar button: ()

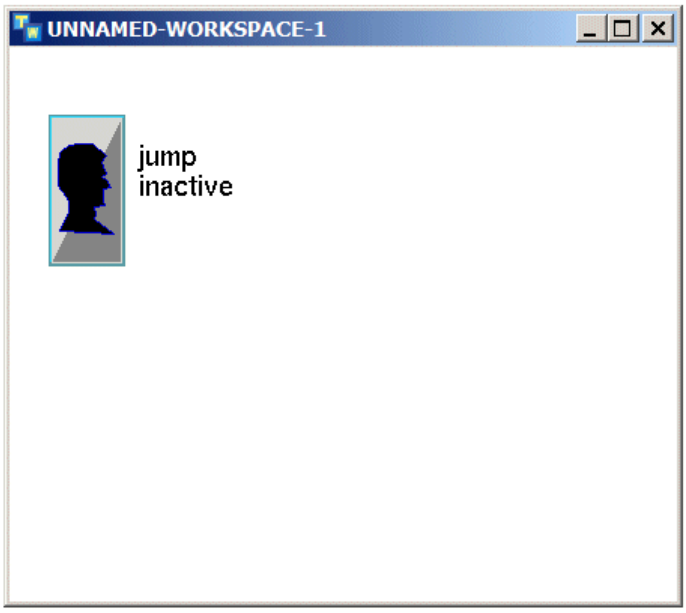
Shrink Wrapping a Workspace

When you move objects on a workspace beyond the visible borders, the borders adjust to fit the objects. When you move objects on a workspace such that the workspace contains extra space at its borders, you can adjust the borders by shrink wrapping the workspace. Shrink wrapping a workspace also adjusts the window size. You can resize the window to make it smaller to add scroll bars to the window.

To shrink wrap a workspace:

➔ Select a workspace and choose Layout > Shrink Wrap or click the equivalent toolbar button: ()

This figure shows a workspace that has extra space around its borders:



This figure shows the result of shrink wrapping the workspace:

This figure shows the result of dragging the object on the workspace so it has extra space around its borders, then adjusting the window size to make it smaller, which adds scroll bars:

Showing the Superior Object of a Detail Workspace

You can show the superior object of a detail workspace, for example, the detail of a Model .

To show the superior object of a detail workspace:

➔ Right-click the background of a workspace and choose Go to Superior, or select a detail workspace and choose View > Go to Superior or click the equivalent toolbar button: ( )

The workspace with the superior object is now on top with an indicator arrow next to the object.

Depending on the type of object, you might go to the object in a repository. You can interact with the object through its menu choices, for example, to show its properties.

Printing a Workspace

To print a workspace:

➔ Choose File > Print, or enter Ctrl + P or click the equivalent toolbar button ( ), and configure the Print dialog.

Saving a Workspace to a JPEG File

To save a workspace to a JPEG file:

➔ Choose File > Save as JPEG and specify a file name.

Loading Background Images

You can load one or more JPEG, XMB, or GIF files as the background for a workspace.

To load a single background image:

➔ Choose Workspace > Load Background Image, navigate to the image to use as the background, and click Open.

To load multiple background images:

1 Create one or more Image Definition objects from the Displays palette of the ReThink toolbox.

2 Configure the Image Name and File Name of Image, and optionally click Save Image Data with KB to save the image data as part of the KB.

3 Show the properties dialog for a workspace, click the Background tab, click the Add Background Image button to add one or more rows, choose an image definition from the list of existing definitions, and configure the X-Y position of each image.

To remove background images:

➔ Choose Workspace > Delete Background Image.

or

➔ Show the properties dialog for a workspace, click the Background tab, select a row, and click the Remove Background Image button.

Creating and Accessing Top-Level Workspaces

Typically, you create new workspaces when you create models through the Project menu. However, you can also create new workspaces directly through the Workspace menu, which are top-level workspaces that you can access by name.

For example, you might want to create models or organizers directly on the top-level workspace. The models you create on top-level workspaces appear in the Navigator and in the Project menu as if you had created them through the Project menu.

To create a new top-level workspace:

1 Choose Workspace > New.

The workspace is assigned a unique number, which starts with unnamed-workspace.

2 Configure the workspace properties as described in Editing Workspace Properties.

To access the top-level workspace:

1 Choose Workspace > Get or click the equivalent toolbar button: ()

A list of all top-level workspaces available in the current user mode appears.

2 Select a workspace and click OK.

Using the Menus

The top-level menu bar consists of these menus:

Menu	Description
File	Standard file operations, and print and export operations for workspaces.
Edit	Standard editing operations for objects on workspaces.
View	Display the various toolboxes and toolbars, display the Navigator, zoom workspaces, show details, and show superior objects.
Layout	Standard layout operations for objects on workspaces, including align, distribute, rotate, reflect, order, nudge, as well as shrink wrapping workspaces.
Go	Standard browser navigation operations and interaction with the server.
Project	Manage system models, object models, reports, charts, system settings, and user preferences.
Simulation	Activate and deactivate scenarios, control the simulation mode, start, reset, pause, and continue the simulation, and clear indicators and breaks.
Workspace	Create new and get existing workspaces, and edit background images for workspaces.
Tools	Find model objects, show users, and switch user modes.
Window	Control window positioning and choose the active window.
Help	Display online help.

The following sections summarize each of these menus.

For information about how to use specific menu choices, see the referenced sections.

For information about additional menu choices available in Developer mode, see the *Customizing ReThink User's Guide*.

Using the File Menu

The File menu allows you to perform basic file and module operations.

Menu Choice	Description
New	Creates a new project. See Working with Projects.
Open	Opens an existing project, replacing the one currently loaded.
Save	Saves the top-level module of the current project.
Save As	Saves the top-level module of the current project to a user filename. You save models to filenames with a *.kb* extension.
Save as JPEG	Exports the currently selected workspace as a *.jpg* file.
Print	Prints the currently selected workspace to a postscript printer.
Close	Exits the client.

Using the Edit Menu

The Edit menu allows you to perform basic edit operations for objects.

Menu Choice	Description
Delete	Deletes the selected object.
Transfer	Transfers the selected object to the mouse. Click on a workspace to transfer the object.
Clone	Transfers the selected object to the mouse. Click on a workspace to clone the object.

Menu Choice	Description
Select All	Selects all objects on a workspace.
Properties	Displays the properties dialog for the selected object.
Colors	Changes the colors of the icon regions of the selected objects.

Using the View Menu

The View menu allows you to show and hide toolboxes and toolbars, and to control the zoom scale.

For details about each of the toolboxes, see Using the e-SCOR Toolbox.

The View menu contains the menu choices in the following table:

Menu Choice	Description
Toolbars > Standard	Toggles the Standard toolbar, which contains standard buttons for file and edit operations.
Toolbars > Layout	Toggles the Layout toolbar, which contains buttons for performing standard layout operations for objects on workspaces.
Toolbars > Web	Toggles the Web toolbar, which contains standard buttons for browsing HTML and text pages.
Toolbars > Simulation	Toggles the Simulation toolbar, which contains buttons for controlling the simulation run state and mode.
Status Bar	Toggles the status bar, which displays the connection status to the server.
Message Board	Displays the G2 Message Board, which displays text messages.
Message Browser	Displays a message browser of operator messages.
Navigator	Toggles the display of a tree view of all objects in the current project. See Navigating Applications.

Menu Choice	Description
Toolbox - ReThink	Toggles the display of the ReThink toolbox, which contains all the objects you need to create a model and run a simulation, including Tools, Basic Activities, Instruments, Resources, and Reports.
Toolbox - e-SCOR	Toggles the display of the e-SCOR toolbox, which contains all the objects you need to create a model and run a simulation, including Tools, Roles, Products, Resources, Source, Make, Deliver, and Reports.
Asset Metrics Contract Metrics Financial Metrics Inventory Metrics Order Metrics Resource Metrics	Toggles the display of various reports containing metrics that the model computes when the simulation runs.
Zoom Zoom In Zoom Out Zoom to Fit	Scales the selected workspace.
Hide	Hides the currently selected workspace.
Go to Superior	Displays the superior object of the currently selected workspace.
Show Details	Shows the detail workspace of the currently selected object.

Using the Layout Menu

The Layout menu allows you to interact with objects on workspaces. For details, see Interacting with Objects.

Menu Choice	Description
Order >	Controls the stacking order of selected objects on workspaces.
Bring to Front	
Send to Back	
Nudge >	Micro-adjusts the position of selected objects in each direction.
Nudge Up	
Nudge Down	
Nudge Right	
Nudge Left	
Align or Distribute >	Aligns two or more selected objects along various axes. Distributes three or more selected objects vertically or horizontally.
Align Left	
Align Center	
Align Right	
Align Top	
Align Middle	
Align Bottom	
Distribute Horizontally	
Distribute Vertically	

Menu Choice	Description
Rotate or Flip >	Rotates and reflects the selected objects.
Normal	
90 Clockwise	
90 Counterclockwise	
180	
Flip Horizontally	
Flip Vertically	
Shrink Wrap	Adjusts the borders of the selected workspace to just fit the contained objects.

Using the Go Menu

The Go menu allows you to perform standard browser navigation and interact with the server.

Menu Choice	Description
Back	Provides standard browser operations for HTML and text pages.
Forward	
Stop	
Refresh	
Home	

Using the Project Menu

The Project menu allows you to interact with all the objects in the current project, as follows:

Menu Choice	Description
Initialize Application Uninitialize Application	Clears the Message Browser.
My User Preferences	Configures user preferences for the current user. See Configuring User Preferences.
System Models > Supply Chain Processes	Creates and manages e-SCOR supply chain process models.
Logic > Business Rules	Creates and manages business rules. See the *Business Rules Management System User's Guide*.
Reports	Creates and manages a variety of reports.
Charts	Creates and manages various types of charts.
Object Models > Business Objects Business Processes Supply Chain Processes	Creates and manages business objects and processes for use with business rules, and supply chain processes.
System Settings	Creates and manages the various system settings described below.

Menu Choice	Description
System Settings > Interfaces > SQL SMTP JMS HTTP	Creates and manages network and database interface objects for communicating with various types of external systems.
System Settings > Interface Pools > SQL SMTP JMS	Creates and manages network and database interface pools for communicating with various types of external systems.
System Settings > Message Browsers > Queues Events Messages Access Tables Templates	Creates and manages custom message browsers and queues.
System Settings > Users	Creates and manages user preferences. See Configuring User Preferences.
System Settings > System Performance	Enables, disables, and configures system performance metrics.
System Settings > Event and Alarm Metrics	Enables and disables event and alarm metrics.

Using the Workspace Menu

The Workspace menu allows you to interact with workspaces. For details, see Interacting with Workspaces.

Menu Choice	Description
New	Creates a new workspace.
Get	Displays a list of named workspaces, which you can display.
Load Background Image Delete Background Image	Loads and deletes background images for the selected workspace.

Using the Simulation Menu

The Simulation menu allows you to control the simulation.

Menu Choice	Description
Activate	Activates or deactivates the current scenario.
Start All	Starts all Source blocks associated with the current scenario.
Reset	Resets the simulation for the current scenario.
Pause	Pauses the simulation for the current scenario.
Continue	Continues running a paused simulation for the current scenario.
Jump Mode	Sets the scenario to jump mode, where the simulation clock advances continuously with each discrete event.
Step Mode	Sets the scenario to step mode, where the simulation clock pauses after each discrete event.
Synch Mode	Sets the scenario to synch mode, where the simulation clock is synchronized with real time, based on a scale factor.

Menu Choice	Description
Online Mode	Sets the scenario to online mode, where e-SCOR performs real-time transaction processing.
Clear Breaks	Clears all break points that have been set in the model.
Clear Indicators	Hides all indicator arrows in the model.

Using the Tools Menu

The Tools menu allows you to browse objects in the model.

Menu Choice	Description
Search	Allows you to search for objects in a model by name or label. See Searching for Objects.
Show Users	Shows the users currently logged into the server.
User Mode > Administrator System-Administrator Developer Modeler Operator	Changes the user mode. The default user mode is Modeler, which allows you to create models by copying, connecting, and configuring objects, and to run simulations. Operator mode allows end users to view models only. Developer mode allows developers to customize the application. **Note:** In general, you work in Modeler mode. Very occasionally, modelers need to switch to Developer, Administrator, or System Administrator mode to perform particular tasks. See Switching User Modes.

Using the Help Menu

The Help menu allows you to access online help that displays as a window within the client:

Menu Choice	Description
G2 Help Topics	Display the G2 online help.
e-SCOR Help Topics	Display the e-SCOR online help.
Server Information	Displays version information about the server.
About G2	Displays the G2 title block, which shows the current version.
About e-SCOR	Displays the e-SCOR title block, which shows the current version.
About SCOR	Displays the SCOR disclaimer.

You can view PDF versions of the following guides:

- *e-SCOR Getting Started Tutorials*
- *e-SCOR User's Guide*
- *e-SCOR Quick Reference*
- *ReThink User's Guide*
- *Customizing ReThink User's Guide*
- *Getting Started with ReThink*

To view the online manuals:

➔ Choose Start > Programs > Gensym G2 2011 > Documentation > G2 e-SCOR or G2 ReThink and choose the manual you want to view.

Using the e-SCOR Toolbox

The e-SCOR toolbox contains all of the objects that you use to create a model.

To display and interact with the e-SCOR toolbox:

1 Choose a toolbox from the View menu.

The toolbox appears with the first palette in the toolbox visible. The palettes are organized alphabetically. You access the various palettes in the toolbox by clicking the buttons at the bottom of the toolbox.

Here is the Deliver palette of the e-SCOR toolbox:

2 To access the various palettes in the toolbox, hover the mouse over a button to display its tool tip, then click the button to display the palette.

Depending on the size of toolbox, the toolbar at the bottom shows only a subset of the available buttons in the toolbox.

3 To display the additional buttons in the toolbox, click the configure button at the far right of the toolbar (»), then choose a palette.

4 To configure the buttons that are visible in the toolbar and associated configuration menu, choose Add or Remove Buttons to display a list of all palettes, then choose a button to add or remove.

Once you have configured the buttons you want, you can expand the buttons to show their labels for some or all of the buttons.

5 To show button labels in the toolbox, drag the divider at the bottom of the toolbox up to expose the buttons with their labels.

For example, here is the e-SCOR toolbox with button labels showing:

Once you have configured the buttons you want to appear in the toolbox, you can auto hide the toolbox by clicking the pin in the upper right corner of the toolbox.

Note Do not close the toolbox or the toolbox reverts to the default set of buttons.

6 Click the pin to autohide the toolbox, and move the mouse over the tab to display the toolbox after it has been hidden.

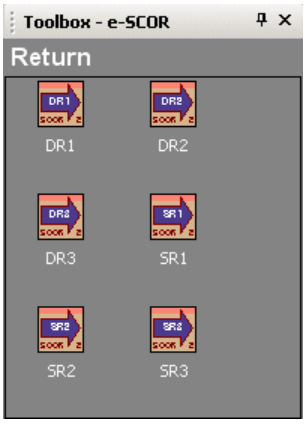
You can display, configure, and autohide multiple toolboxes, as needed, each of which will have its own toolbox tab.

Source, Make, and Deliver

For information on configuring categories, see Configuring Process Category Parameters.

For information on adding categories to the role detail, see Configuring Role Details for Multiple Products.

Return



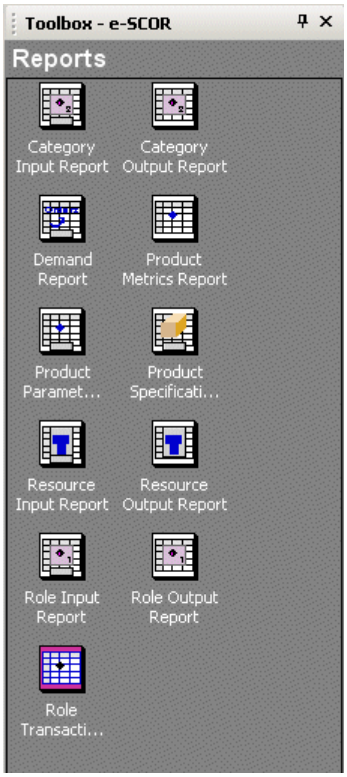
For information on configuring categories, see Configuring Process Category Parameters.

For information on adding categories to the role detail, see Configuring Role Details for Multiple Products.

Products

See Configuring the Products a Role Sources and Delivers.

Reports



See Using Reports.

Resources

See Configuring Resources.

Roles

See Creating a Supply-Chain Model.

Tools

See Organizing Models and Controlling Simulations.

Using the G2 and ReThink Toolbox

In general, you use the G2 and ReThink toolboxes when customizing models.

For details, see the *Customizing ReThink User's Guide*.

Interacting with Objects

You can interact with objects in a model by using the Edit menu, the object's popup menu, and the Layout menu. Many of the menu choices have shortcuts and/or equivalent toolbar buttons.

When you create a model, we recommend that first, you place the roles on the workspace, then you align and distribute them, using buttons on the Layout toolbar, then you connect them, as needed.

You configure attributes of objects through properties dialogs.

Selecting Objects

To select one or more objects:

➔ Click an object to select it.

or

➔ Click and drag a rectangular area to select all the objects in the rectangle.

or

➔ Use Shift key and click on an object to add or remove it to or from an existing selection.

or

➔ Use the Alt key and click on a connected network of objects to select all the connected objects.

To select all objects on a workspace:

➔ Choose the Edit > Select All or enter Ctrl + A.

Cutting, Copying, Pasting, and Deleting Objects

When you copy an object, the new object has the same property values as the existing object. If the object has details, the new object has the same details. You can transfer objects from one workspace to another.

To copy and paste objects:

➔ Select one or more objects to copy, choose Edit > Clone, then click on any workspace to paste the selected objects to the workspace.

To cut and paste objects:

➔ Select one or more objects to cut, choose Edit > Transfer, then click on any workspace to paste the selected objects to the new workspace.

To delete objects:

➔ Select an object, then choose Delete from the Edit menu or from the popup menu, press the Delete key, or click the equivalent toolbar button (), then click Yes to confirm the deletion.

Controlling the Layout of Objects

To adjust the order of objects:

➔ Select an object, then choose Layout > Order > Bring to Front or Send to Back or click the equivalent toolbar button: ( )

To rotate or flip objects:

➔ Select an object, choose Layout > Rotate or Flip, then choose the desired action from the submenu or click the equivalent toolbar button: 

To align objects:

➔ Select two or more objects, choose Layout > Align or Distribute, then choose the desired align action from the submenu or click the equivalent toolbar button: ()

To distribute objects:

➔ Select three or more objects, choose Layout > Align or Distribute, then choose the desired distribute action from the submenu or click the equivalent toolbar button: ()

To nudge an object up, down, right, or left:

➔ Select an object, choose Layout > Nudge, then choose the desired nudge action from the submenu; or hold down the Ctrl key while pressing the up, down, right, and left arrow keys to nudge the item in the desired direction; or click the equivalent toolbar button: 

For information on the Shrink Wrap toolbar button on the Layout toolbar, see Shrink Wrapping a Workspace.

Displaying the Properties Dialog for an Object

To display the properties dialog for an object:

➔ Double-click the object.

or

➔ Select the object and press the F4 key.

or

➔ Choose Properties from the object's popup menu.

or

➔ Select the object, then choose Edit > Properties or click equivalent toolbar button: ()

Resizing an Object

You might need to resize an object, for example, the category routers on the detail of a role when adding categories to the role detail.

To resize an object:

➔ Click an object to select it, and drag the selection handles to resize the object.

Editing Icon Color Regions

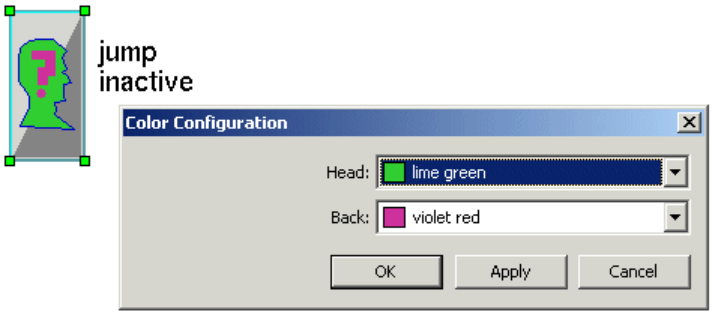
You can edit the color of any named region of any icon.

To edit icon colors:

1 Click an object to select it, and choose Edit > Colors.

2 Configure the color of the named icon region for the object, as desired.

For example:



Using the Toolbars

e-SCOR provides a number of toolbars that you can use to interact with models.

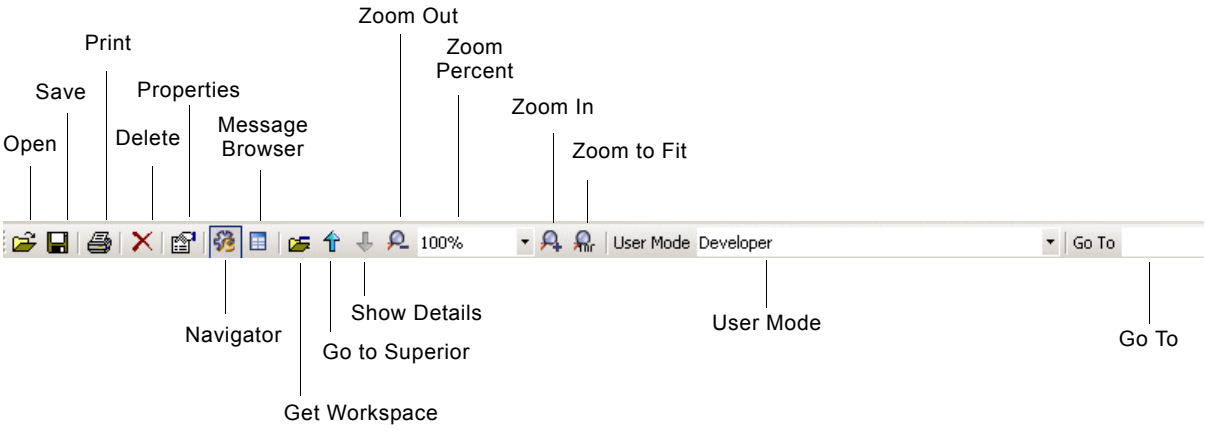
The toolbars are all docked, by default. You can drag the toolbar to a new location or off the toolbar to make it a floating toolbar.

The available toolbars are:

- Standard toolbar
- Simulation toolbar
- Web toolbar
- Layout toolbar
- Status bar

Standard Toolbar

The Standard toolbar contains many of the toolbar buttons that you need to work with the model:



To hide and show the Standard toolbar:

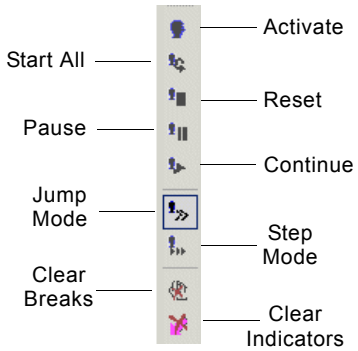
➔ Choose View > Toolbars > Standard.

For information on this button...	See...
Open	Opening a Project.
Save	Saving a Project.
Print	Printing a Workspace.
Delete	Cutting, Copying, Pasting, and Deleting Objects.
Properties	Displaying the Properties Dialog for an Object.
Navigator	Using the Navigator.
Message Browser	Viewing Messages.
Get Workspace	Creating and Accessing Top-Level Workspaces.
Go to Superior	Showing the Superior Object of a Detail Workspace.
Show Detail	Displaying a Detail Workspace.
Zoom In, Zoom Out, Zoom Percent, and Zoom to Fit	Scaling a Workspace.

For information on this button...	See...
User Mode	Switching User Modes.
Go To	Searching for Objects.

Simulation Toolbar

The Simulation toolbar contains toolbar buttons that you need to configure and run a simulation:



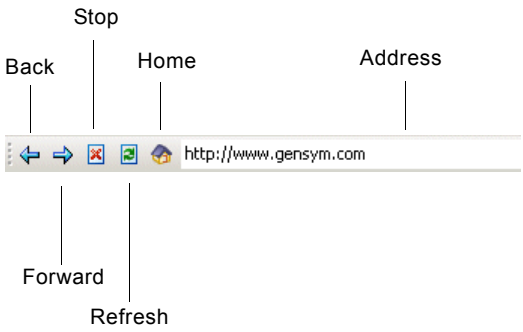
To hide and show the Simulation toolbar:

➔ Choose View > Toolbars > Simulation.

For information on this button...	See...
Activate	Activating and Deactivating the Scenario.
Start All, Reset, Pause, Continue	Starting and Stopping the Simulation.
Jump Mode and Step Mode	Configuring the Simulation Mode.
Clear Breaks	Setting and Clearing Breakpoints and Indicators.
Clear Indicators	Setting and Clearing Breakpoints and Indicators.

Web Toolbar

The Web toolbar provides the standard browser navigation buttons and commands for browsing HTML pages:



To hide and show the Web toolbar:

➔ Choose View > Toolbar > Web.

You can go to any URL, including any HTML file on the World Wide Web or on the file system, or any RTF file.

To go to an HTML file on the World Wide Web, you use the standard HTTP protocol, for example, *http://www.gensym.com*.

To go to an HTML or RTF file on the file system, you use this protocol:

file:\<drive>:\<directory>\<filename>

For example, to go to the readme file, you would use:

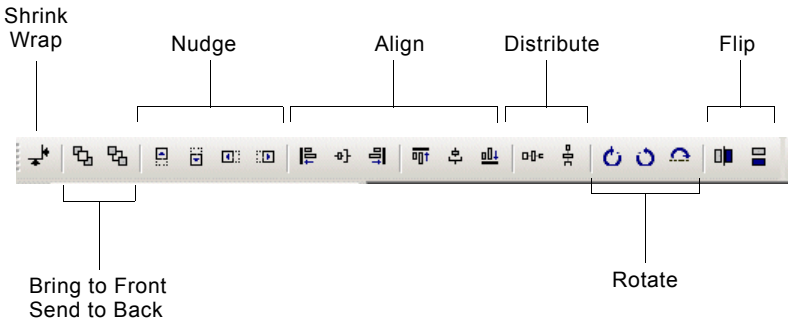
file:\C:\Program Files\Gensym\g2-2011\doc\escor\escor-readme.html

You navigate by using standard buttons in the Web toolbar or in the Go menu.

You configure the Home button URL in your user preferences. For more information, see Configuring User Preferences.

Layout Toolbar

The Layout toolbar contains toolbar buttons that you need to control the visual layout of objects on a workspace:



To hide and show the Layout toolbar:

➔ Choose View > Toolbars > Layout.

For information on this button...	See...
Shrink Wrap	Shrink Wrapping a Workspace.
Send to Front, Send to Back, Nudge, Align, Distribute, Rotate, Flip	Controlling the Layout of Objects.

Status Bar

The status bar shows various status information, such as the host and port of the client, the current file being loaded, and the progress bar.

By default, the status bar also shows the current message in the operator Message Browser. For information on how to disable this feature, see Configuring User Preferences.

To hide and show the status bar:

➔ Choose View > Status Bar.

Metrics Toolbars

The Metrics toolbars contain a variety of metrics for roles, product composites, and resources in the model.

To hide and show the Metrics toolbar:

➔ Choose View > Asset Metrics, Contract Metrics, Financial Metrics, Inventory Metrics, Order Metrics, or Resource Metrics.

For examples of each of these toolbars, see Viewing Simulation Metrics in a Toolbar.

For information about these metrics, see Viewing Metrics.

Setting and Clearing Breakpoints and Indicators

You can set breakpoints to pause the simulation at various points in the model. When you run the simulation with a breakpoint set, the simulation pauses at that point and an indicator arrow appears at the breakpoint.

To set a breakpoint:

➔ Show the detail of a role and choose Set Break on a router on the role detail, or show the detail of a category, then continue to show the detail of blocks until the Set Break menu choice appears on a block.

When you run the simulation, an indicator arrow appears at the breakpoint you set, and the simulation pauses. Click the indicator to continue running the simulation until it reaches the breakpoint again.

For information on controlling the behavior of indicators, see Configuring the Behavior of Indicator Arrows.

To clear breakpoints:

➔ Choose Simulation > Clear Breaks or click the equivalent toolbar button: 

To clear all indicators:

➔ Choose Simulation > Clear Indicators or click the equivalent toolbar button: 

Switching User Modes

You build and run applications in one of four built-in **user modes**, or you can define you own user mode. The user mode determines what you can and cannot do when you create your application and run it. For example, the user mode determines whether you can move, edit, and delete objects, and whether you can use the full set of G2 features in your model. For example, the user mode determines the parameters that you can configure.

e-SCOR supports the following user modes for these classes of users:

This type of user...	Works in this user mode...	Which allows you to...
Managers and end users	Operator	View pre-built applications without damaging them in any way. Operators cannot open, save, run, or configure applications.
Business analysts who create applications	Modeler	Create, connect, and configure Level 1 roles and Level 2 categories to create models and run simulations. This is the default user mode.
e-SCOR customizers experts and G2 programmers	Developer System-Administrator Administrator	Customize the behavior of the model at Level 3 and Level 4 SCOR. Developers have the full capabilities of ReThink, the underlying modeling toolkit upon which e-SCOR is based.

End users of fully developed applications generally work in Operator mode. Operator mode is restricted so that users may run a model but may not create, configure, or delete objects.

As a model developer, you will almost always be working in Modeler mode. This manual assumes you are working in Modeler mode, unless otherwise stated. Occasionally, as a model developer, you will also need to go into Developer mode to perform certain tasks.

If you are an expert who is customizing e-SCOR, you will be working mostly in Developer mode. The *Customizing ReThink User's Guide* assumes you are working in Developer mode.

The user mode that is available to you depends on your login privileges.

To switch to a different user mode:

➔ Choose Tools > User Mode or configure the User Mode on the toolbar.

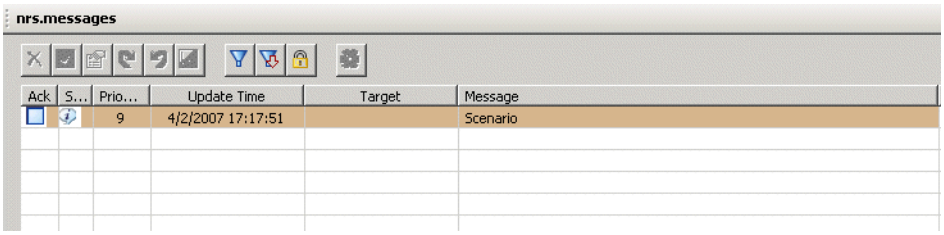
Viewing Messages

Various messages might occur when running a simulation, which you can view in the Message Browser or Message Board, depending on the type of message. By default, operator messages appear in the Message Browser, whereas error messages appear in the Message Board.

To view the Message Browser:

➔ Choose View > Message Browser or click the equivalent toolbar button: ( ).

Here is the Message Browser with a message that occurs when you choose Show Scenario on an object:



To interact with messages in the Message Browser:

➔ Select the message and click a button in the toolbar.

You can delete and acknowledge the message, show properties, show the target and initiator of the message, configure filters, and lock the view.

To delete all messages in the Message Browser:

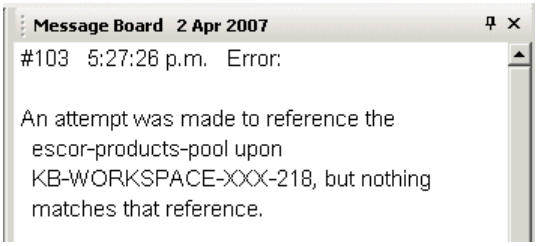
➔ Choose Project > Initialize Application.

To view the Message Board:

➔ Choose View > Message Board.

The Message Board remains open until you close it. You can also auto hide it by clicking the pin in the upper-right corner.

Here is the Message Board with an error message that results if you delete the product specification for a model and run the simulation:



Configuring User Preferences

e-SCOR allows you to configure different levels of access and default behavior for different categories of users. When a particular user starts e-SCOR, the user preference associated with that user restricts the access and provides default behavior, as appropriate for the given user.

You can configure the following preferences:

- The default user mode, which determines the level of access to e-SCOR features.
- Subscription to queues.
- Message filter to subscribed queues, for filtering messages based on priority, process map, type, category, target, assigned to, age, and acknowledgement status.
- Acknowledgement and deletion permission and behavior in the Message Browser.
- Client disconnection, server shutdown, and modeling configuration permissions, and whether the user is an administrator.
- The default behavior for interacting with objects through menus and showing the logbook.
- Email and mobile email addresses for use with the JMail interface.

Specifying User Preferences for Different Types of Users

e-SCOR creates a default user preference for the e-SCOR server to determine the level of access and default behavior for all users that log into the server. Similarly, e-SCOR creates one user preference for each user associated with a G2 login account. The name of the user preference corresponds with the user name specified in the *g2.ok* file. For more information, see Chapter 62 "Licensing and Authorization" in the *G2 Reference Manual*.

If you are logged in as the user named administrator, you are automatically configured to be the Administrative User and can create and configure user preferences for all users. If you are logged in as any other user, you can only configure your own user preferences. You can be logged in either to your windowing system or to the e-SCOR server through a secure G2 as administrator.

We recommend that the user preference for the server provide access to all available features, and that it use either Modeler or Developer mode. The user preferences for the clients should provide appropriate levels of access and should use the appropriate user mode, depending on the type of user. For example, you might configure user preferences as follows for these types of users:

For this type of user...	Use this default user mode...	And provide these permissions and defaults...
Operators, who interact with messages only	operator	• Disconnect permission • Acknowledge message permission • Show message in operator mode by default • Subscribe to appropriate queues, depending on the model
Modelers, who create models	modeler	• Disconnect permission • Configuration permission • Acknowledge message permission • Delete message permission • Subscribe to Messages queue
Developers, who use G2 to customize models	developer	• Indicate items upon menu selection • Disconnect permission • Shutdown permission • G2 Logbook • Acknowledge message permission • Delete message permission • Subscribe to all queues

For this type of user...	Use this default user mode...	And provide these permissions and defaults...
Administrators, who configure user preferences for all users, using the e-SCOR user interface	system-administrator	The same as developers, plus Administrative User.
Administrators, who configure user preferences for all users, using G2's user interface	administrator	**Note:** You must log in as administrator to enable the Administrative User option.

Configuring User Preferences

In Modeler mode, you can configure these attributes for each user preference. For information about additional attributes that you can configure in administrator mode, see the *Customizing ReThink User's Guide*.

Attribute	Description
General	
User Name	The user name of the user that starts either the server or the client, which is read-only. If you are an administrative user, you can create new user preferences for specific users. For details, see Configuring User Preferences.
Default User Mode	The default user mode for the specified user, which is modeler, by default. The options are: operator, modeler, developer, system-administrator, and administrator.
User Interface Theme	The Windows user interface theme. The default value is window-theme-2003.
Email Address Mobile Email	E-mail and mobile e-mail address of the specified user for sending email when a message occurs. For more information, see Delivering Messages by Email.

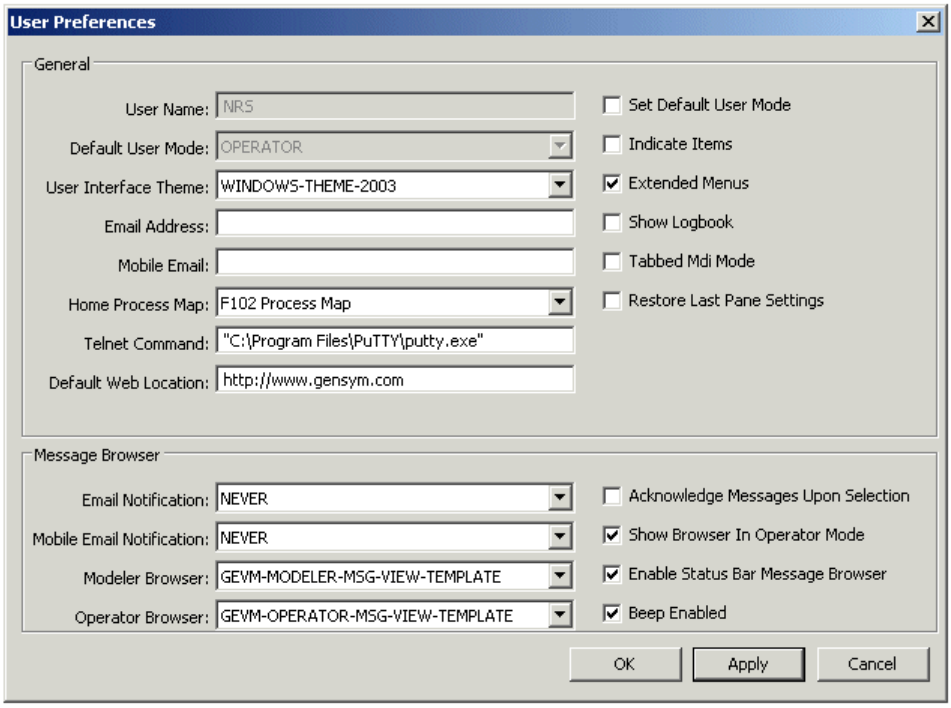
Attribute	Description
Home Process Map	A process map to use as the background in the operator interface. The default process map is default view, which is associated with the process map named guif-default-main-view. Click Select to display a list of all process maps in the KB and choose a map to use as the default background.
Telnet Command	The command for launching a Telnet session.
Default Web Location	The default URL when clicking the Home button in the Web toolbar.
Set Default User Mode	Whether the default user mode should be set upon startup.
Indicate Items	Configures the behavior when choosing items from the Project menu. By default, e-SCOR displays the properties dialog or the model detail, depending on the type of item. Developers who are familiar with G2 and prefer to work with the iconic representations of items might want to enable the Indicate Items option, in which case, choosing items from the Project menu goes directly to the item.
Extended Menus	Whether to display the complete list of objects in the Project submenus, the default. If your project has many domain models, for example, you might want to disable this option, in which case, selecting Project > System Models > Supply Chain Models displays the Manage dialog for interacting with object.
Show Logbook	Whether to show the G2 Logbook when errors occur. By default, the G2 Logbook does not appear. Modelers or developers who are familiar with G2 might want to enable the Show Logbook option. We recommend that you disable this option for operators and modelers who are not familiar with G2.
Tabbed Mdi Mode	Whether to display workspaces in tabs in the window.

Attribute	Description
Restore Last Pane Settings	Whether to restore the settings for panes upon connection.
Message Browser	
Email Notification Mobile Email Notification	The format when sending e-mail and mobile e-mail messages. By default, the value is never, which means email messages are not sent. For details, see Delivering Messages by Email.
Modeler Browser	The browser to use in Modeler mode. The default is gevm-modeler-message-view-template, which is the browser that appears when you choose View > Message Browser.
Operator Browser	The browser to use in Operator mode. The default is gevm-operator-message-view-template, which is the browser that appears when you are in Operator mode.
Acknowledge Messages Upon Selection	Whether to acknowledge messages automatically when the operator selects a message in the Message Browser view of the operator interface. By default, messages are not automatically acknowledged. When Ack Msg Upon Selection is enabled, Ack Msg Permission must also be enabled.
Show Browser in Operator Mode	Whether to show the Message Browser by default view in the operator interface, or whether to show the process map view. By default, the Message Browser appears as the default view in the operator interface.
Enable Status Bar Message Browser	Whether to show the most recent message in the status bar.
Beep Enabled	Whether to enable beeping when new messages arrive in the Message Browser, as well as when they are acknowledged and deleted. By default, beeping is enabled.

To configure user preferences for yourself:

➔ Choose Project > My User Preferences and configure the user preferences, as needed.

For example, here is the default user preferences dialog appears for the user named nrs:



To configure user preferences for other users:

➔ Choose Project > System Settings > Users and choose the user whose preferences you want to configure.

For information on creating new user preferences, see *Customizing ReThink User's Guide*.

Delivering Messages by Email

You can configure the user preference for individual users to provide an email address and a mobile email address, then configure rules for when to send email messages when an event occurs.

You can configure e-SCOR to format the message as short plain text, suitable for cell phones, for example, plain text with full message contents, or as an HTML document. You can also configure when to send a message, based on when it was created or updated, whether the user is currently connected to the server, and the priority of the message.

To deliver messages by email, you:

- Start the G2 JMail Bridge process.
- Create, configure, and connect a JMail Interface object.
- Configure e-SCOR to send email messages.
- Configure startup parameter for sending email.

Starting the G2 JMail Bridge Process

To deliver messages by email, you must start the G2 JMail Bridge process. You identify the host and port to which the bridge is connected for configuring in the JMail Interface object.

To start the G2 JMail Bridge process:

➔ Choose Start > Programs > Gensym G2 2011 > Bridges > G2 JMail Bridge.

The G2 JMail Bridge process appears in the command window.

To determine the bridge port:

➔ Open the command window for the bridge process.

The last line indicates the TPC/IP host and port number, for example:

```
TCP_IP:NSALVO-1165:22080
```

Creating, Configuring, and Connecting the JMail Interface Object

To deliver messages by email, you must create and configure a JMail Interface object, which specifies:

- A name.
- The host and port of the machine running the G2 JMail Bridge.
- Information about the SMTP mail server, including the user name, password, incoming and outgoing SMTP mail host, and SMTP protocol.

If the bridge process is running on the local machine, the host is localhost. The default port number is 22080, 22081, 22082, etc., depending on the number of clients that are currently connected on that port.

Note To configure a JMail Interface object, you must be in Developer mode.

Once you have configured the JMail interface object, you can connect it to the G2 JMail bridge process.

To create, configure, and connect a JMail Interface object:

1. Choose Tools > User Mode > Developer.
2. Choose Project > System Settings > Interfaces > SMTP > Manage and click the New button to create a new JMail Interface object.

   Alternatively, you can choose View > Toolbox - G2, click the Network Interfaces tab, and create a JMail Interface object.
3. In the properties dialog for the JMail Interface object, configure the Interface Name attribute to be any symbol, for example, my-jmail-interface.
4. Configure the Bridge Host and Bridge Port to be the host and port of the machine on which you started the G2 JMail Bridge process.
5. Configure the following additional information:

Attribute	Description
User Name	The user name of the account to which email should be sent.
Password	The password of the user account to which email should be sent.
Incoming Host	The name of the host computer used for incoming email.
Incoming Port	The port number of the host computer used for incoming mail.
Incoming Protocol	The SMTP protocol that the incoming mail host uses. The default is pop3.
Incoming Folder	The folder name of the user account to which to send email. The default is inbox.
Delete Messages on Server	Whether to delete the email message on the mail server after it is sent. By default, messages are not deleted.
Outgoing Host	The name of the host computer used for outgoing email.
Outgoing Port	The port number of the host computer used for outgoing mail.

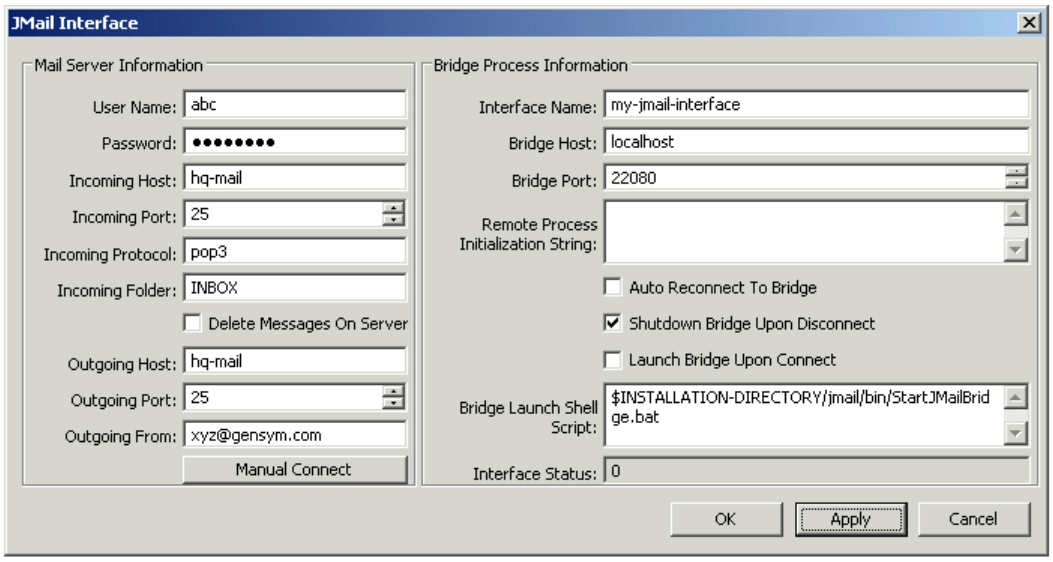
Attribute	Description
Outgoing From	The name to use as the From address when the email message is sent, which cannot contain spaces.
Auto Reconnect to Bridge	Whether to automatically reconnect if the connection goes down.
Shutdown Bridge Upon Disconnect	Whether to shutdown the bridge when the connection is closed.
Launch Bridge Upon Connect	Whether to launch the bridge when a connection is made.
Bridge Launch Shell Script	Pathname to script for launching the bridge.

6 Click Apply to apply these values.

7 Click the Connect button in the dialog to connect the interface to the bridge.

8 Choose Tools > User Mode > Modeler to return to Modeler mode.

For example:



Configuring e-SCOR to Send Email Messages

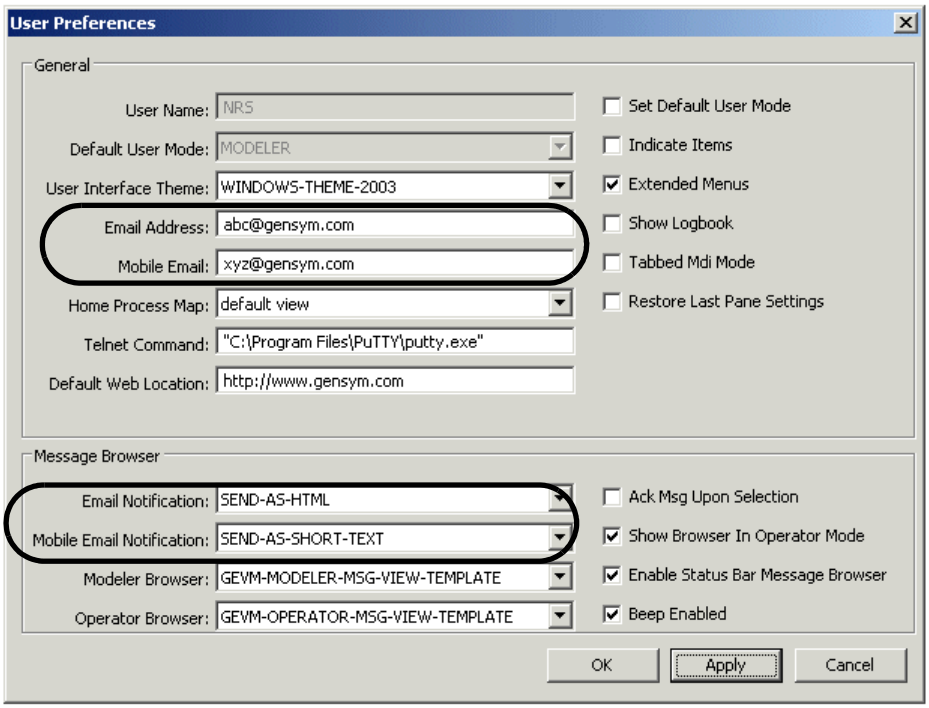
You configure e-SCOR to send email messages through the user preferences dialog.

To configure e-SCOR to send email messages:

1. Choose Project > My User Preferences.
2. Configure Email Address and/or Mobile Email.
3. Choose the rule to use for each of the configured email addresses, as follows:
   - never — Do not send e-mail messages. This is the default rule.
   - send-as-text — Send the message text and details as plain text.
   - send-as-short-text — Send the message text only as plain text.
   - send-as-html — Send the message text and details as HTML.
   - only-high-priority-as-text — Send the message text and details as plain text only if the priority is 1.
   - only-high-priority-as-short-text — Send the message text as plain text only if the priority is 1.
   - only-high-priority-as-html — Send the message text and details as HTML only if the priority is 1.
   - if-not-connected-send-short-text — Send the message text as plain text only if the user is not connected to the server.
   - if-not-connected-send-as-text — Send the message text and details as plain text only if the user is not connected to the server.
   - if-not-connected-send-as-html — Send the message text and details as HTML only if the user is not connected to the server.

When a message occurs, e-SCOR also sends an email to the specified addresses.

Here is the User Preferences dialog with both email addresses and rules configured:



Configuring Startup Parameter for Sending Email Messages

You can configure the following startup parameter in the configuration file:

JMAIL-INTERFACE-NAME=none

Specifies the default JMail interface to use for sending email messages.

For details about using the configuration file, see the *G2 Run-Time Library User's Guide*.

Configuring Network Interfaces

e-SCOR allows you to configure various types of network interfaces for communicating with external systems, using the Project > System Settings > Interfaces menu.

Note To configure network interfaces, you must be in Developer mode.

SQL interfaces provide communication with databases. For details, see Accessing External Databases.

You configure SMTP interfaces to send email when a message occurs. For details, see Delivering Messages by Email.

e-SCOR also allows you to send email messages, using a JMail Connection pool and to send messages to JMS message servers, using a JMS Connection pool. For details, see Sending Email and Using JMS Messaging.

Configuring Message Browsers

By default, all messages go to the Messages Browser, which you access by choosing View > Message Browser.

e-SCOR allows you to create and configure different message browsers and message queues. You do this by using the Project > System Settings > Message Browsers menu.

For details, see the *G2 Event Manager User's Guide*.

Part II

Basic e-SCOR Modeling

Chapter 5: Creating a Supply-Chain Model

Describes how to configure a model of your supply chain by creating and configuring Level 1 roles.

Chapter 6: Configuring Level 2 SCOR

Describes the default details for each role and how to configure category and product composite parameters.

Chapter 7: Running the Simulation

Describes how to run a simulation and configure the Scenario.

Chapter 8: Viewing Metrics

Describes the metrics the model computes for roles, categories, product composites, resources, and routers.

Chapter 9: What Happens When the Simulation Runs

Describes the basic processes that occur while the simulation runs.

Chapter 10: Using Reports

Describes how to view metrics and enter parameter values through various types of reports.

Chapter 11: Accessing External Databases

Describes how to access databases.

Chapter 12: Using Batch Simulation

Describes how to use run multiple simulations from a script.

5

Creating a Supply-Chain Model

Describes how to configure a model of your supply chain by creating and configuring Level 1 roles.

Introduction

This chapter describes the basic steps in creating your e-SCOR supply-chain model:

1 **Determine the level of detail to model**. The level of detail you model depends on the performance data you wish to analyze.

2 **Configure the product hierarchy**. The product hierarchy or bill of materials (BOM) describes the products that your supply chain sources, makes, and delivers.

3 **Configure the Level 1 roles**. Roles are the high-level entities that describe your supply chain. To configure Level 1 roles, you perform these tasks:

   a **Create the supply chain model**. Select roles from the e-SCOR toolbox to represent the sites in your supply chain and place them on your model workspace.

   b **Configure the products each role sources and delivers**. Assign product specifications to roles to create source and delivery products.

   c **Configure role parameters**. Configure role parameters to determine such things as when the role computes its financial metrics.

4 **Configure resources**. Resources determine the capacity of each role to manufacture finished products and are automatically assigned to each manufacturing role in your supply chain. You can modify parameters, as needed.

This chapter also describes how to upgrading models. When you install a new version of e-SCOR, you typically upgrade the model details to use the new default templates.

Determining the Level of Detail to Model

Before you begin creating your supply-chain model, you must think carefully about the level of detail you wish to model. The level of detail affects the amount of performance data you can obtain from the model; however, it also affects the level of complexity required to configure Level 2 SCOR.

Keep in mind that once you have created your supply-chain model by creating and configuring Level 1 roles, you must then configure these Level 2 SCOR aspects of the model:

- Parameters for the Level 2 categories on the detail of each role.
- Parameters for each source and delivery product that e-SCOR creates for each role when you assign product specifications to roles.

The task of configuring your model can rapidly become rather complex, given a detailed product specification and corresponding roles. On the other hand, the more detail your model includes, the more information it can provide for analyzing and improving its performance. Therefore, the first question you must ask when creating your supply-chain model is:

Q What performance data am I most interested in measuring?

The answer to this question determines the level of detail you need to model, including the number of products in your product hierarchy and the number of roles in the supply-chain model.

For example, suppose you are a distributor interested in understanding factors that affect your inventory. You would focus on modeling only those aspects of the supply chain that affect your inventory, such as safety stocks, turnaround times, and supplier lead times. You would avoid modeling the details of your upstream suppliers and downstream buyers except those parameters that affect your inventory.

Creating the Product Hierarchy

e-SCOR allows you to model and simulate a supply chain for a particular product hierarchy. To model the product hierarchy, you create one or more top-level finished products. Each finished product consists of one or more components and/or finished products, and each finished product consists of one or more components or finished products, and so on, until there are only components.

To create the product hierarchy, you:

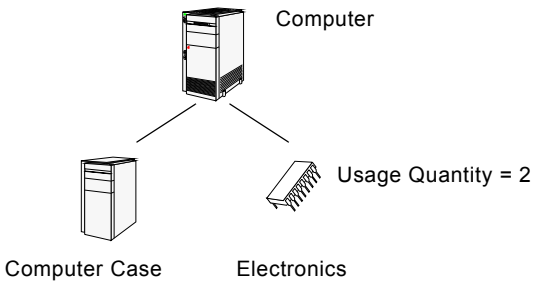
- Determine the level of detail in the product hierarchy.
- Depending on your bill of materials, you can create a product hierarchy with:
  - Components.
  - By-products.
  - Alternate products.

This section provides examples of product hierarchies and describes how to create the simplest product hierarchy, which consists of a single product specification. It then describes how to create a product hierarchy with components, by-products, and alternate products.

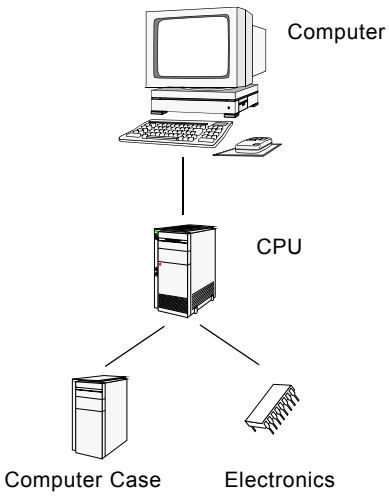
Examples of Product Hierarchies

Suppose you are a computer manufacturer that sources components from two suppliers, one for the electronics and one for the case. You model this by creating a finished product to represent the computer, which consists of two components, one representing the electronics and the other representing the case.

When you run the simulation, the manufacturer produces finished products by obtaining one of each component, by default. You can configure the number of components that each finished product requires, in which case, the role obtains the specified number of components. For example, a computer might require two electronics components.



This figure shows the product hierarchy for a supply chain that manufactures computers from two electronics components and a computer case.

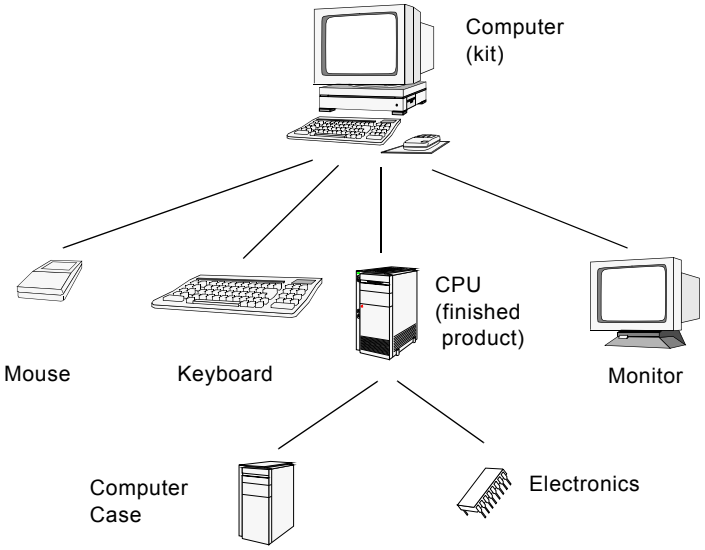


A finished product can be a component of some other product. In this figure, the CPU and the computer might be finished products of two different Manufacturer roles.

A Distributor role can assemble its components into a kit. The difference between a finished product and a kit is whether or not the role that delivers it adds value, as follows:

- A Manufacturer role changes components into finished products, thereby adding value in the supply chain by creating a completely new product.
- A Distributor role assembles components into kits, which does not change the original products.

In the following figure, a Manufacturer role might make and deliver the CPU finished product, and a Distributor role would assemble and deliver the computer kit from its four components:



Determining the Level of Detail in the Product Hierarchy

Suppose your supply chain sources five components, each of which has essentially the same characteristics, such as the type of order (stock or make-to-order), turnaround time, manufacturing yield, timing parameters, and inventory levels. In this case, you can create a single product specification to represent all five products. By creating a single product specification to represent multiple products, the model computes metrics for all products as a unit.

On the other hand, suppose your supply chain manufactures an entire product line, and you want to measure the relative performance of each product separately. In this case, the characteristics of each product are typically significantly different; therefore, you would create individual product specifications in the product hierarchy and assign each to the same or a different role. By creating individual product specifications, you can track separately metrics, such as inventory levels, orders received and shipped, lead time, and planning metrics.

Similarly, if your supply chain sources five components from five different vendors, you might be interested in comparing inventory levels and other metrics of each component separately.

See Also Creating the Product Hierarchy.

Viewing Metrics for Source and Delivery Products.

Creating a Product Hierarchy with a Single Product Specification

The product hierarchy for the simplest model consists of a single product specification. You use this technique to represent a single product or when each product in a product family behaves similarly in terms of its Level 2 SCOR parameters and when you do not need to track metrics for each product separately.

This section describes how to create a product hierarchy that consists of a single product specification. The next section shows how to create a product hierarchy with components.

Caution We recommend that you configure the product hierarchy *before* you create your supply chain and assign products to roles.

To create a product hierarchy with a single product specification:

1 Display the Products palette of the e-SCOR toolbox:

You typically place a product specification on the detail of a Product Structure Organizer, however, that is not a requirement.

2 Select a Product Structure Organizer from the palette and click to place it on your model detail.

3 Choose Show Detail on the product structure organizer to show its detail.

You create the product hierarchy on this detail.

4 Place a Product Specification on the detail and display its properties dialog.

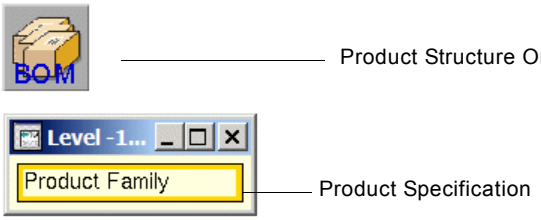
For shortcuts on displaying the properties dialog for items on a workspace, see Configuring the Model Environment.

5 Configure the Product Name for the product specification.

You can think of the product name as the SKU number for the product, which should be unique. For example, the product name for the simplest model might be Product Family. The text of the product specification updates.

6 Configure the Weight and Volume for the product specification, as needed.

Here is a Product Structure Organizer and its detail, which contains a single Product Specification for a product family:



Creating a Product Hierarchy with Components

You create a product hierarchy with components when modeling a Manufacturing process and when modeling a Distribution process that assembles components into kits.

To create a product hierarchy with components, you connect product specifications to form a product hierarchy. You can also configure the quantity that each component represents in the hierarchy. For example, a CPU component might require 2 electronics components.

To create a product hierarchy with components:

1 Create and configure a Product Specification on the detail of a Product Structure Organizer.

This product specification should represent the finished product in your supply chain and should be located at the top of the product hierarchy.

For details, see Creating a Product Hierarchy with a Single Product Specification.

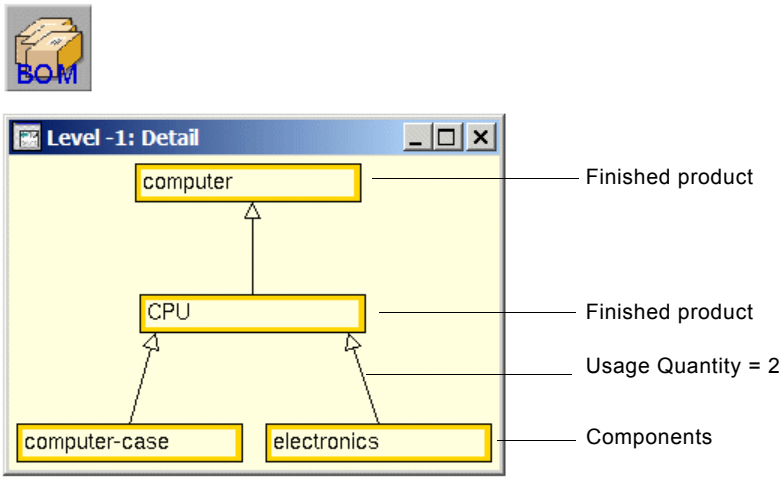
2 Create and configure additional product specifications, as needed, to describe the components, finished products, and/or kits that make up the finished product.

Place finished products and kits below the finished product, and place components below finished products and kits.

3 Starting at the bottom of the product hierarchy, choose Create Product Connection on each product specification to create a connection stub, then connect the stub to the next higher-level product specification in the hierarchy until all are connected.

4 If more than one product specification is required to manufacture a finished product or assemble a kit, configure the Usage Quantity on the connection between product specifications.

For example, the following figure shows a product hierarchy for a computer, which is a finished product. The computer consists of a CPU component, which is itself a finished product that consists of computer case and electronics components. The CPU requires 2 electronics components.



See Also Modeling a Distribution Process.

Modeling a Manufacturing Process.

Creating a Product Hierarchy with By-Products

Your product hierarchy can include by-products, which are extra products that the supply chain manufactures that are by-products of the primary process but that some other buyer sources.

You configure by-products by creating a by-product connection between product specifications in the product hierarchy, then configuring the output proportion of the by-product connection.

To create a product hierarchy with by-products:

1. Create and configure a Product Specification to represent the by-product of some other finished product in the supply chain, typically a finished product.

   For details, see Creating a Product Hierarchy with a Single Product Specification.

2. Create and configure the product from which the by-product is produced and place it below the by-product.

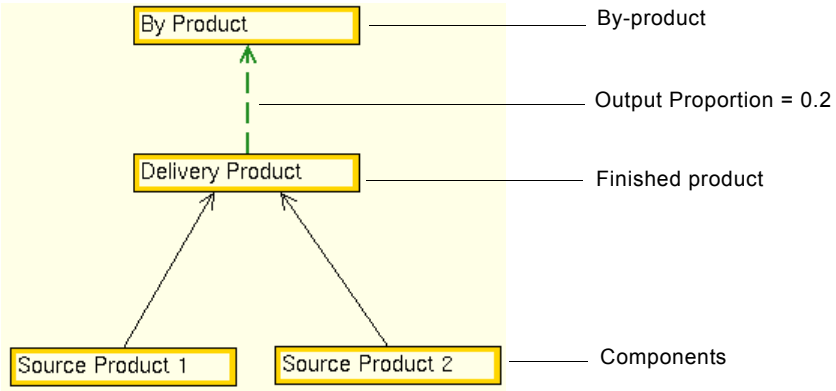
3. Choose Create By-Product Connection on the finished product, then connect the finished product to the by-product.

   A by-product connection is dashed green, as opposed to solid black.

4. Configure the Output Proportion on the connection between the finished product and its by-product to be the percentage of the finished product that results in a by-product.

5. Configure the rest of the product hierarchy normally, as described in Creating a Product Hierarchy with Components.

This example shows a product hierarchy with by-products, where the by-product represents 20% of the finished product:



Creating a Product Hierarchy with Alternate Products

Your supply chain model might source and deliver generic products, which the model can substitute with alternate products if the generic product is not available. For example, a computer supplier might deliver computer systems from a set of generic components such as a CPU, monitor, keyboard, and mouse. If the generic component is not available, the supplier can choose from one of several alternate products, which can, in turn, consist of one or more units. For example, the CPU might require a generic memory chip, if available; otherwise, it can use one 512K memory chip or two 256K memory chips.

You configure the priority of each alternate product on the connection between the alternate product and its corresponding generic product.

To use alternate products, assign the generic product as a source product of a role, then configure the Fulfillment Using Alternate Products parameter as true on the Supplier tab of the source product. For details, see Supplier Tab.

To create a product hierarchy with alternate products:

1. Display the Products palette of the e-SCOR toolbox, select a Generic Product Specification, place it on the detail of a product structure organizer, and configure its parameters.

   This product specification represents a generic product in the hierarchy.

   For details, see Creating a Product Hierarchy with a Single Product Specification.

2. Create and configure product specifications for each alternate product that can be used in place of the generic product, placing them below the generic product specification in the hierarchy.

3. Connect each alternate product to the generic product with a product connection.

4. Configure the Usage Quantity of the connection between each alternate product and its corresponding generic product, as needed.

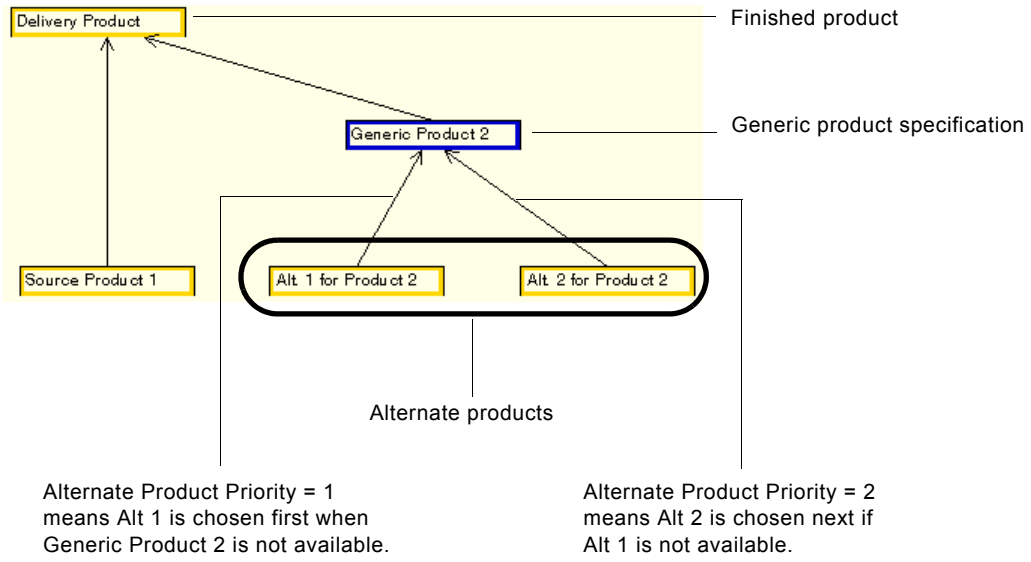
   For details, see Creating a Product Hierarchy with a Single Product Specification.

   By default, the model always chooses the generic product first, if it is available, and it chooses one of the alternate products at random. You can also configure a priority for each alternate product.

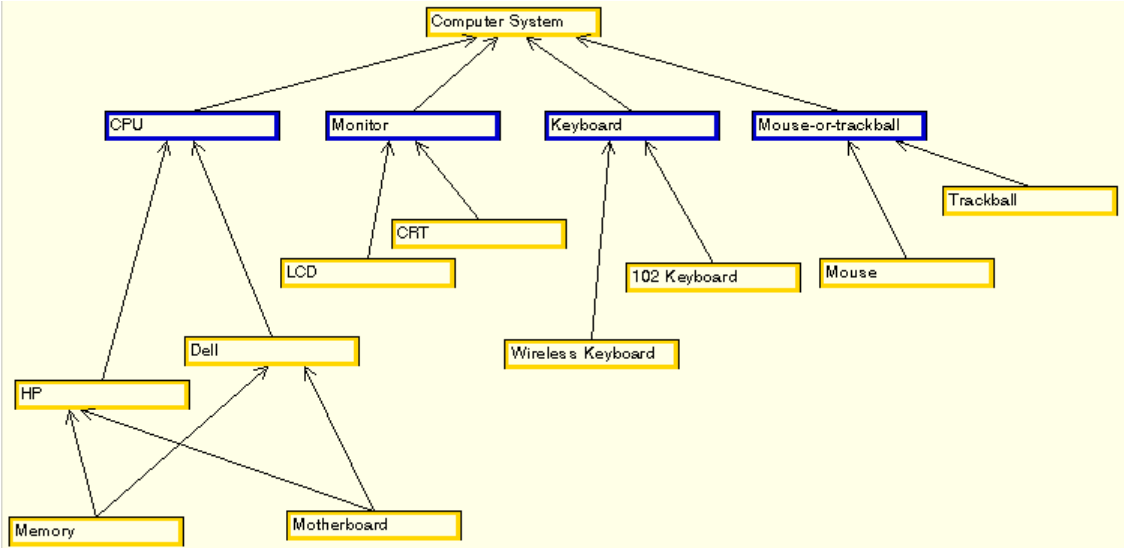
5. Configure the Alternate Product Priority of the connection between each alternate product and its corresponding generic product, as needed.

The default priority is 1, which means that if there are two alternate products, it chooses each product at random. If there are two alternate products, where one has a priority of 1 and the other has a priority of 2, it chooses the alternate product with a priority of 1 first, and if that one is not available, it chooses the alternate product with a priority of 2, and so on.

This figure shows a simple product hierarchy with alternate products. The Delivery Product consists of Source Product 1 and Generic Product 2. If Generic Product 2 is not available, the model choose Alt 1 for Product 2 first, based on its priority, and Alt 2 for Product 2 if Alt 1 is not available.



This figure shows a more complicated product hierarchy with alternate products, where the Computer System consists of generic CPU, Monitor, Keyboard, and Mouse-or-trackball components. Each generic product, in turn, has two alternate products. Each alternate CPU component consists of two components, which are shared between the alternate products.



Creating the Supply-Chain Model

Once you have created a product hierarchy, you can create the supply-chain model by creating roles to form a supply chain. A role can source, make, and/or deliver one or many products in the hierarchy.

In general, upstream supplier roles in the supply chain deliver lower-level products in the hierarchy, namely, components, and downstream buyer roles deliver higher-level products, namely, finished products.

When creating your supply chain, follow these guidelines:

- A Base Manufacturer role can deliver components or finished products; however, if it delivers finished products, it ignores any components that the finished product requires.
- A Distributor role can deliver components and/or finished products; if it delivers finished products, it can obtain either components or finished products from upstream suppliers.
- A Manufacturer role must source components and deliver finished products.
- A Consumer role can source components or finished products; however, it must source those products from a supplier that is immediately upstream in the supply chain.

In general, each product specification in the hierarchy must be associated with at least one role. The exception is a Base Manufacturer role that delivers finished products, in which case you do not need to assign the components to any roles. However, typically, you would only assign a finished product to a Base Manufacturer role if another role in the model also delivers the components; otherwise, you would not need to define components.

To create the supply-chain model, you:

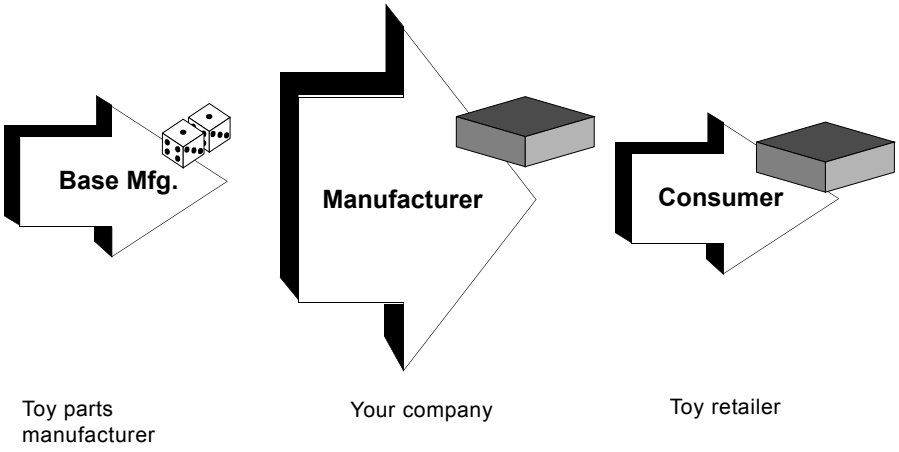
- Determine the number of roles to use.
- Create and, optionally, connect roles.

See Also Configuring Role Details for Multiple Products.

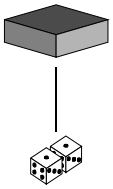
Examples of Supply-Chain Models

Suppose you are a toy manufacturer that sells games to a retail chain. As the manufacturer, you obtain all your parts from a single supplier, and the game requires 6 parts in all. The high-level model of the supply chain consists of a Base Manufacturer role, a Manufacturer role, and a Consumer role, where the Base Manufacturer role delivers components, the Manufacturer role delivers finished products, and the Consumer roles sources finished products.

A Toy Manufacturer's Supply Chain

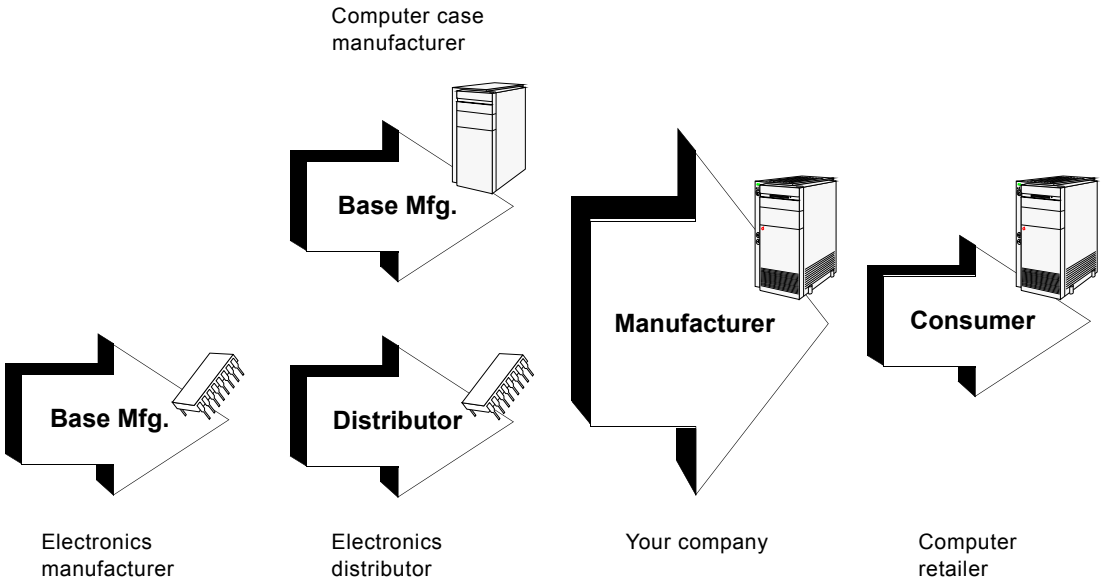


Product Hierarchy

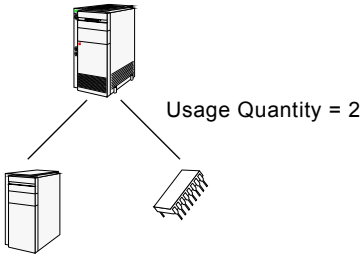


Suppose you are a computer manufacturer. You might have two Base Manufacturer roles, one for each major component of the computer: the electronics and the case. The electronics components might go through a distributor, while the case components might come directly from the manufacturer. The manufacturer makes computers, which the consumer then buys.

A Computer Manufacturer's Supply Chain

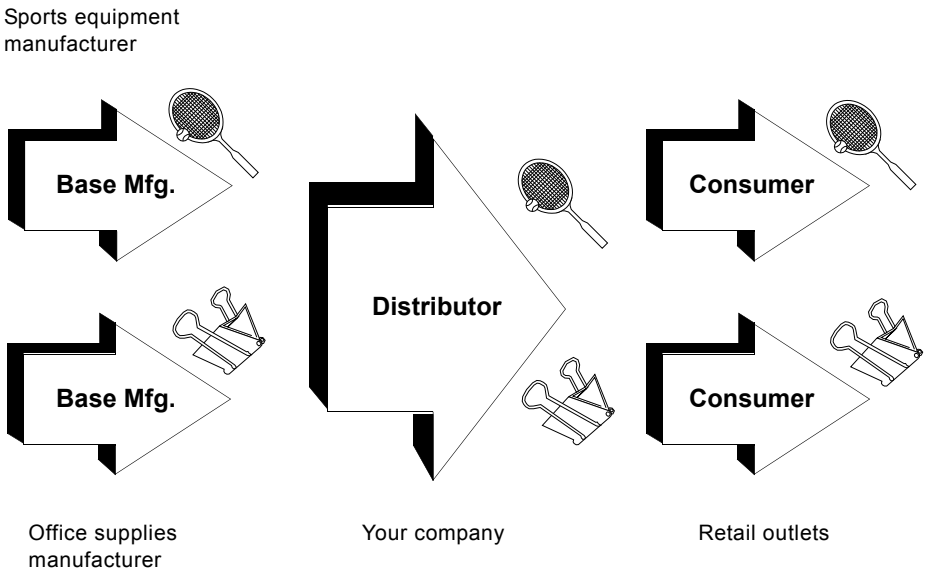


Product Hierarchy



Suppose you are a distributor of two major lines of products, sports equipment and office supplies. Your supply chain might look like this, where the product hierarchy consist of two finished products that are unrelated hierarchically.

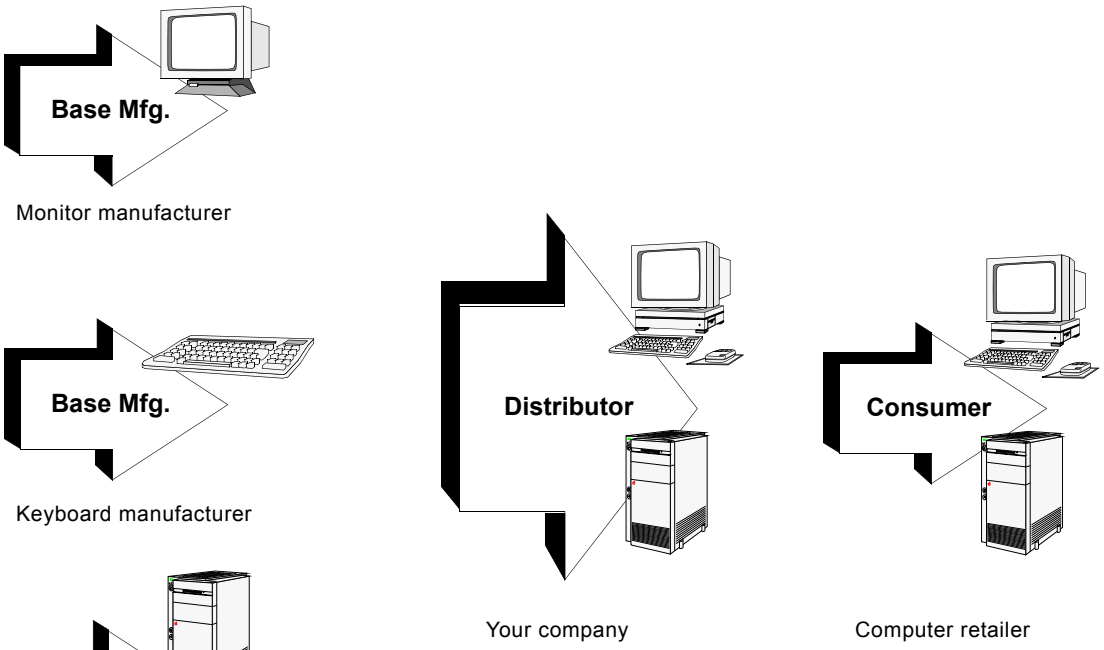
A Distributor's Supply Chain



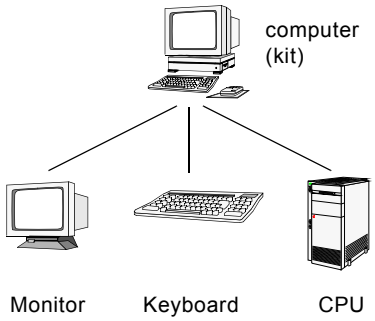
Product Hierarchy

Finally, suppose you are a distributor of computers and CPUs. You might have a primary supplier of the three basic components of the computer: the monitor, keyboard, and CPU. You might also have a secondary supplier of complete systems, which you use when the components are not available. In this case, the secondary supplier delivers complete systems, ignoring any components. The Distributor role assembles components into kits and distributes those kits, and it distributes CPUs. The Consumer role sources computers and CPUs.

A Computer and CPU Distributor



Product Hierarchy



Determining the Number of Roles to Use

Once you have determined the level of detail in the product hierarchy and configured the product hierarchy, you must determine the number of roles to use.

The most straightforward way to model your supply chain is to create separate roles for each product specification in the product hierarchy. This approach allows you to use a different financial model and to track cost, asset, and financial metrics for each product composite separately. However, this approach also means your model contains more roles, which means you must configure more Level 2 category parameters.

Often, your supply chain contains products that behave similarly at the role level. For example, a role that delivers multiple products might use the same financial model for all its products, and keep track of cost, asset, and financial metrics for all its products together. In this case, your supply chain can have fewer roles, where the same role sources, makes, and/or delivers multiple products.

To determine whether to create separate roles for each product specification in the product hierarchy, you must ask these questions:

- **Q Does the role use a different financial model to source and deliver its products?**
- **Q Do you need to measure asset metrics individually for each product that a role sources and delivers?**

If you answer yes to either of these questions, then you must create separate roles for each product whose asset metrics are distinct. If you answer no to both of these questions, then you can use a single role to source, make, and/or deliver multiple products.

Specifically, consider whether you want to configure the following parameters and track the following metrics together or separately for a role:

Parameters	Group/Metrics
Financial Period Financial Payment Terms	Resources Maximum Capacity Used
Statistical Metrics Period	Metrics Number of End Products
	General Number of Financial Periods
	Incoming Financial Bookings Financial Outstanding Financial Collections within Financial Period Financial Collections Total
	Outgoing Financial Obligations Financial Payments within Financial Period Financial Payments Total
	Days of Supply Raw Materials Work in Progress Finished Goods Inventory
	Metrics Asset Turns Cash-to-Cash Cycle Time Days Sales Outstanding Cash Flow Period
	General Order Management Costs

See Also Configuring Financial Parameters for Roles.

Viewing Metrics for Roles.

Creating and Connecting Roles

To create your supply-chain model, you place roles on the model detail in a configuration that describes your supply chain, given the product hierarchy. Typically, you align roles horizontally so that supplier roles are upstream of buyer roles. Each role name must be unique.

To provide a graphical indication of the direction of flow in the supply chain, you can optionally connect the roles, using paths. Connecting roles is not required.

When the simulation runs, the model create a variety of objects such as purchase requests, purchase responses, purchase awards, orders, invoices, product shipments, and payments.

To create and connect roles:

1 Display the Roles palette of the e-SCOR toolbox:

2 Place on the model detail as many roles as are required to describe your supply chain, given your product hierarchy.

Place Base Manufacturer roles on the left side of the workspace, Distributor and Manufacturer roles downstream of Base Manufacturer roles, and Consumer roles on the right side of the workspace.

3 Configure the Role Label parameter to be unique within the model.

Note The Role Label parameter is automatically configured with a unique label. It cannot be empty; otherwise, you cannot configure the potential suppliers of source products.

---

4 Optionally, choose Create Connection on an upstream supplier role to create an output connection stub on the downstream side of the role.

By default, the connection is diagonal with a filled arrow and solid line. You can also create orthogonal connections with a variety of arrow and line styles.

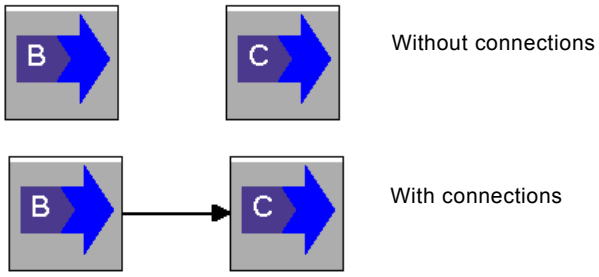
For details, see the chapter on connections in the *G2 Reference Manual*.

5 Click the connection stub to attach it to the mouse, then click anywhere on the upstream side of a downstream buyer role to create the connection.

Tip Click the mouse to create a junction in the connection, as needed.

6 To delete the connection between two roles, choose Delete on the connection, then drag the stubs into the roles to delete the stubs.

This figure shows the simplest supply-chain model, which consists of a Base Manufacturer role and a Consumer role, with and without connections:



Configuring the Products a Role Sources and Delivers

Once you have created the product hierarchy and the supply-chain model, you can configure the products a role sources and delivers by assigning product specifications to roles. You assign the delivery products of Base Manufacturer, Distributor, and Manufacturer roles, and you assign the source products of Distributor, Manufacturer, and Consumer roles.

e-SCOR creates the appropriate product composites—source or delivery products—and places them in the Products pool on the role's detail.

You configure parameters and view metrics for source and delivery products to determine how the role sources, makes, and delivers its products.

To configure the products a role sources and delivers, you:

- Assign product specifications to roles.
- Navigate to product composites.

See Also Configuring Product Composites.

Viewing Metrics for Source and Delivery Products.

Assigning Product Specifications to Roles

When assigning product specifications to roles, follow these guidelines:

- Assign each product specification in the product hierarchy to at least one role.
- A supplier role can deliver multiple products, and a Consumer role can source multiple products.
- Multiple roles can source, make, and deliver the same product.
- In general, you assign components to upstream supplier roles and finished products to downstream buyer roles.

Note We recommend that you finalize the product hierarchy *before* you assign products to roles. Changing the product hierarchy requires that you reconfigure the supply chain and reassign products to roles, which can be time-consuming if you have many roles.

You assign a product specification to a role by choosing the product specification in the role dialog.

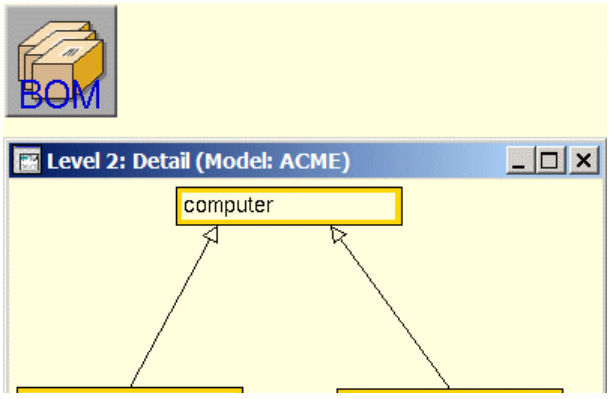
To assign a product specification to a role through the role dialog:

1 Display the properties dialog for a role and click the Product tab.

You will see a list of all available product specifications in the model.

2 Depending on the type of role, click a product specification in the All Products list and move it to the Source Products or Delivery Products list, as appropriate, to assign it to the role.

For example, suppose your product hierarchy consists of a computer finished product, and a computer case and electronics components:

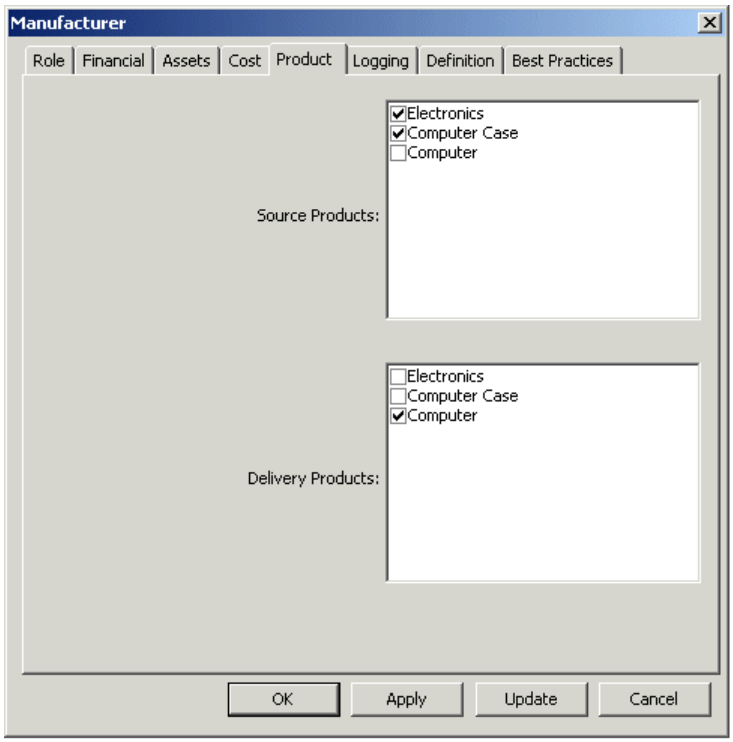


Product

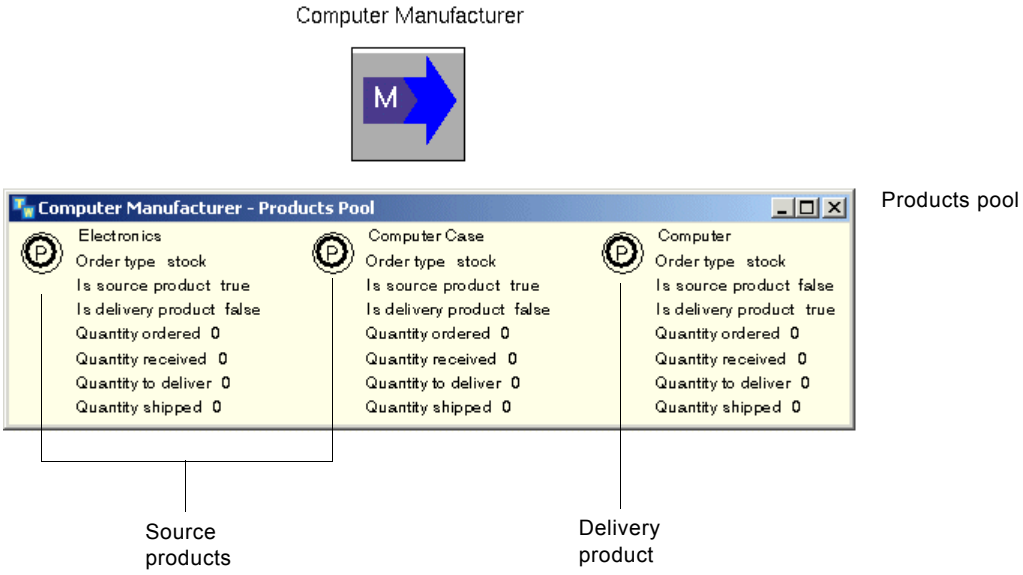
If you assign to Manufacturer role the computer as a delivery product, and the computer case and electronics as the source products, e-SCOR creates these product composites in the Products pool on the role detail:

- Computer case and electronics source products.
- Computer delivery product.

Here is the Product tab of the Manufacturer role, which sources electronics and cases, and delivers computers:



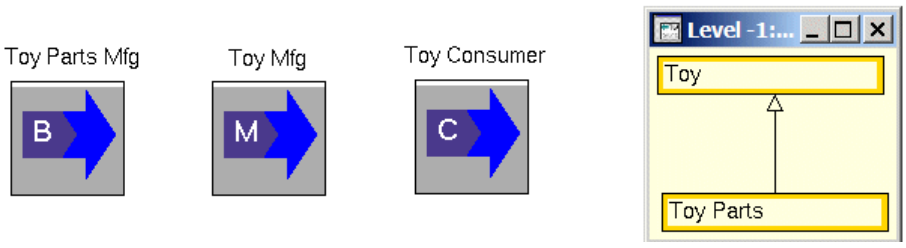
Here is the resulting Products pool for the Manufacturer role:



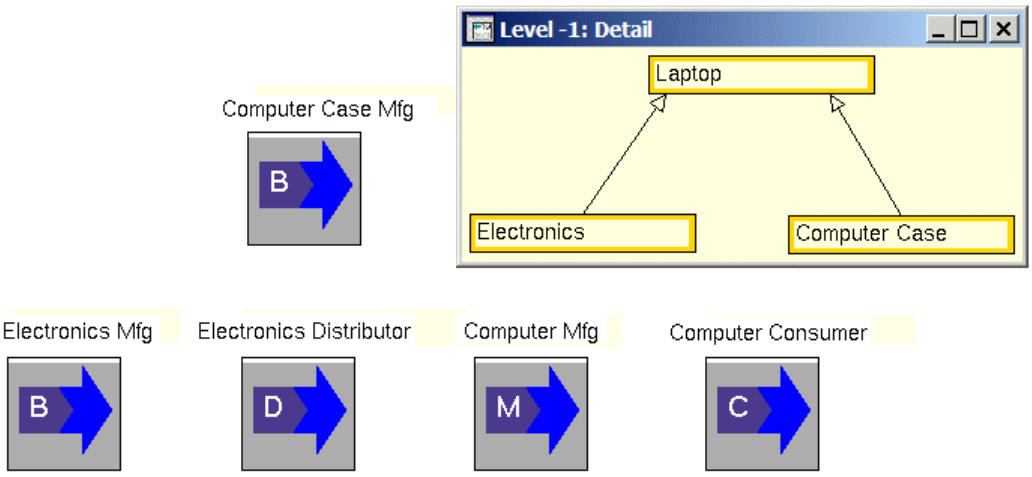
Examples of Assigning Product Specifications to Roles

The following examples show four supply-chain models and product hierarchies, which correspond to the four examples described in Examples of Supply-Chain Models.

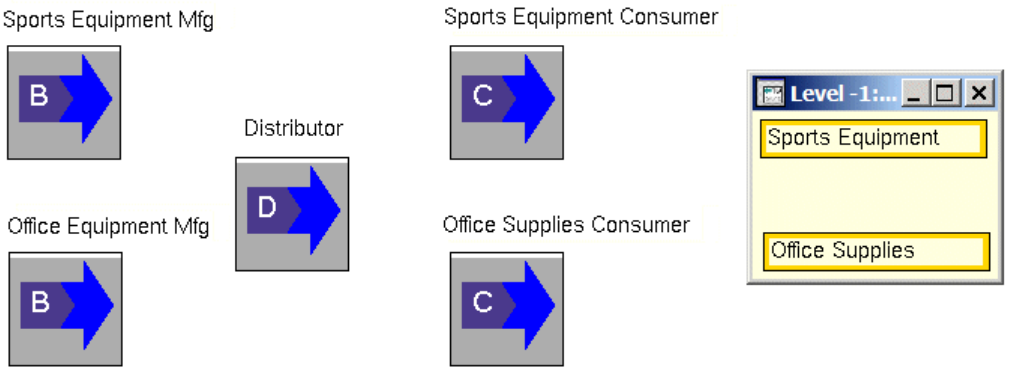
A Toy Manufacturer



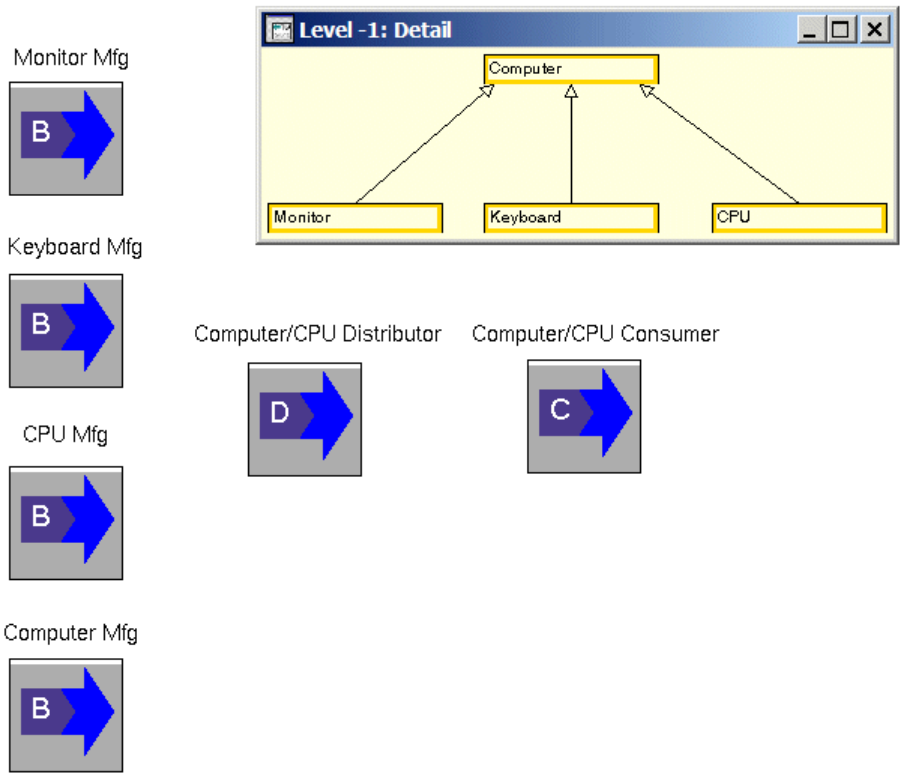
A Computer Manufacturer



A Distributor of Multiple Product Lines



A Computer and CPU Distributor



Navigating to Product Composites

You have several options for showing the Products pool for a role and showing the properties dialog for a product composite.

To show the Products pool for a role:

➔ Choose Show Products on a role to display the detail of the Products pool.

or

➔ Show the detail of a role, then show the detail of the Products pool.

The Products pool looks like this: 

The detail of the Products pool contains all the source and delivery products assigned to a role.

To show the properties dialog for a product composite:

➔ Show the Products pool for a role, then choose Properties on a product composite in the pool.

or

➔ Choose Products on a role, then choose a product composite to display its properties dialog directly.

Configuring Role Parameters

You configure these parameters for each role:

- General parameters that identify the role.
- Financial parameters that the role uses to compute financial metrics.
- The time period for computing time-weighted statistics, such as averages and moving averages.
- SCOR description and best practices.

You can also configure a role to use logging, which records every transaction that occurs between roles when the model runs. For details, see Logging Transactions that Occur Between Roles.

Configuring General Parameters for Roles

You can configure the following general parameters for a role:

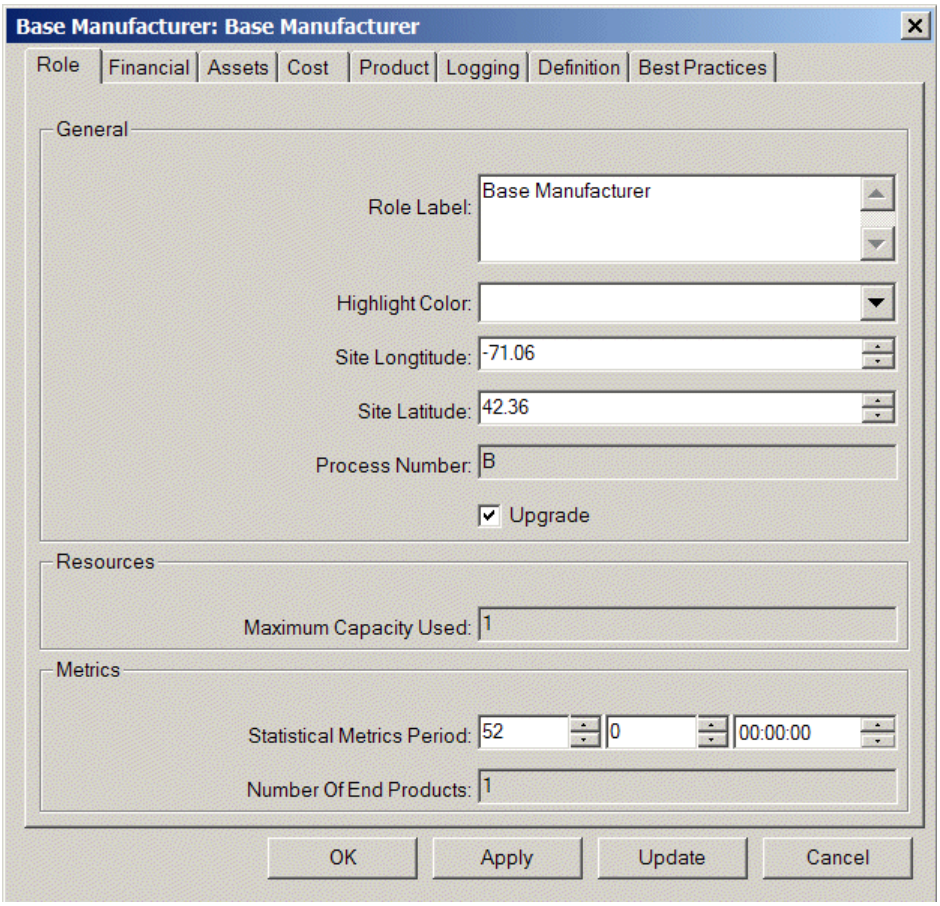
Parameter	Description
Role Label	The label to display with the role, which must be unique within the model. e-SCOR specifies a unique label when you initially create the role, which you can modify.
Highlight Color	A region of color on the role icon, which you can use to organize roles in the model. The default value is Transparent.

Parameter	Description
Site Longitude Site Latitude	The longitude and latitude of the site for locating on a map.
Upgrade	When installing a new version of e-SCOR, whether to upgrade the role, using the default role template ("on") or whether to leave the role as it is ("off"). The default value is "on". For details, see Upgrading Models.

To configure general role parameters:

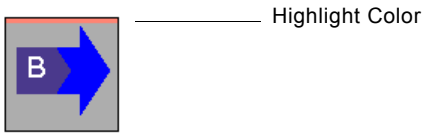
➔ Display the properties dialog for a role and configure the parameters on the Role tab as described in the table above.

This figure shows the Role tab of the dialog for a Base Manufacturer role:



Note The properties dialog for each role varies, depending on the type of role.

This figure shows a role whose Highlight Color has been configured:



Configuring Financial Parameters for Roles

For each role, you configure the following financial parameters, which the role uses to compute financial and asset metrics:

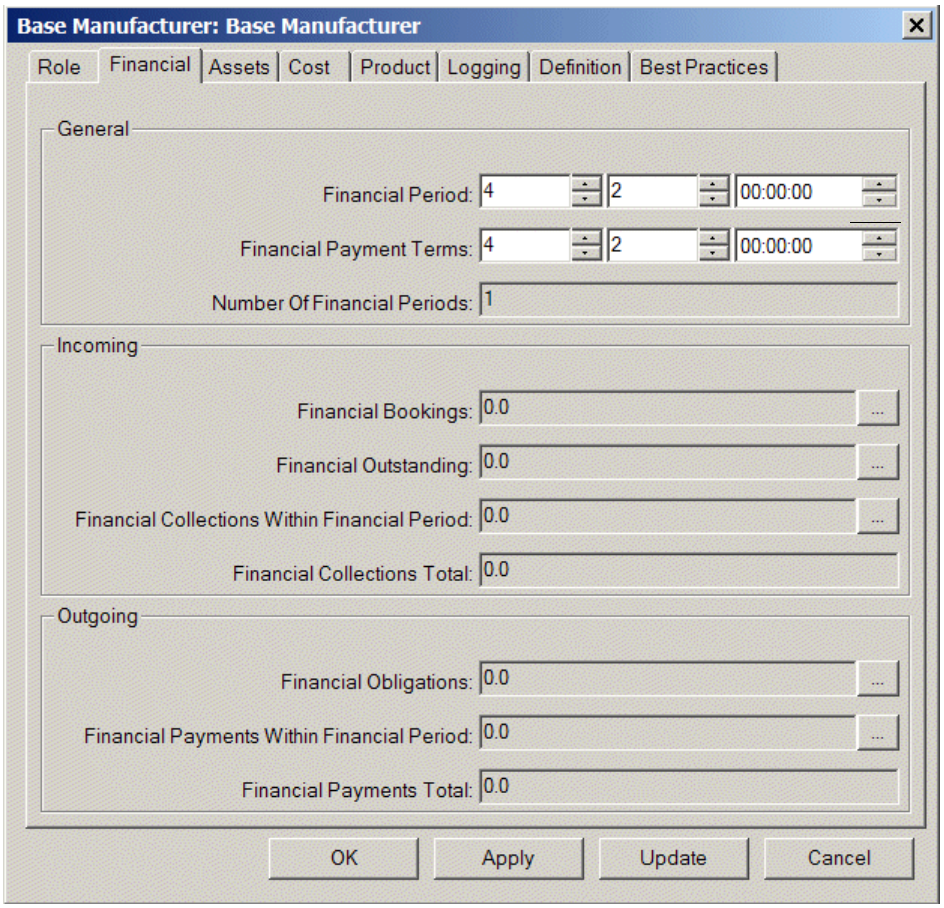
Parameter	Description
Financial Period	The time period for computing financial and asset metrics. The default value is 4 weeks and 2 days (30 days)
Financial Payment Terms	The time period for making payments from invoices. The Financial Payment Terms of the supplier role determines when the buyer role makes payments from invoices. The default value is 4 weeks and 2 days (30 days). **Note:** Financial Payment Terms is not relevant for a Consumer role because it is not a supplier.

To configure the role to make immediate payments, configure the Financial Payment Terms parameter to be zero. Immediate payments are common in e-commerce and mail order businesses.

To configure financial parameters for roles:

➔ Display the properties dialog for a role, click the Financial tab, and configure the parameters, as described in the table above.

This figure shows the Financial tab of the role dialog for a Base Manufacturer role:



Configuring the Time Period for Computing Time-Weighted Statistics

e-SCOR computes a variety of time-weighted statistics for various Level 2 category and product composite metrics, such as averages and moving averages. You can view these statistics in the Inventory Metrics and Order Metrics toolbars. You can also add these and other statistics the appropriate category output reports.

By default, e-SCOR computes time-weighted statistics, based on a yearly time period (52 weeks). This means, for example, that the average represents the average value over a year-long period. If you are running your simulation for a specific time period, such as three months, you might want to compute time-weighted statistics, based on the duration of the simulation. To do this, you configure the Statistical Metrics Period parameter for the role.

To configure the time period for computing time-weighted statistics:

➔ Display the properties dialog for a role, click the General tab, and configure the Statistical Metrics Period for the role to be the time period over which to compute time-weighted statistics for Level 2 metrics.

See Also Configuring the Attributes to Appear in a Report.

Viewing Simulation Metrics in a Toolbar.

Configuring the SCOR Definition and Best Practices

For each role, you can configure the following SCOR parameters:

Parameter	Description
Definition	A textual description of the role.
Best Practices	A list of URLs to best practices for the role.

The Best Practices URLs can be RTF or HTML files.

Note Currently, e-SCOR supports the display of HTML 3.2 and basic RTF formats only.

For example:

Protocol	Example
file:<*absolute-pathname*>	file:C:\\MyModel\\BestPractices\\Block52.rtf file:C:/MyModel/BestPractices/Block52.html
http://<*url*>	http://www.gensym.com/myModel/BestPractices/Block52.html
<*relative-pathname-from-installation-dir*>	BestPractices\Block52.rtf

To configure SCOR definition and best practices for roles:

1. Display the properties dialog for a role, click the Definition tab, and enter a textual description for the role.
2. Click the Best Practices tab, use the button to insert rows, and enter a URL for each best practice associated with the role.

Configuring Resources

Once you have configured the product hierarchy, configured the supply-chain model, assigned product specifications to roles, and configured role parameters, the last step in configuring Level 1 roles is to:

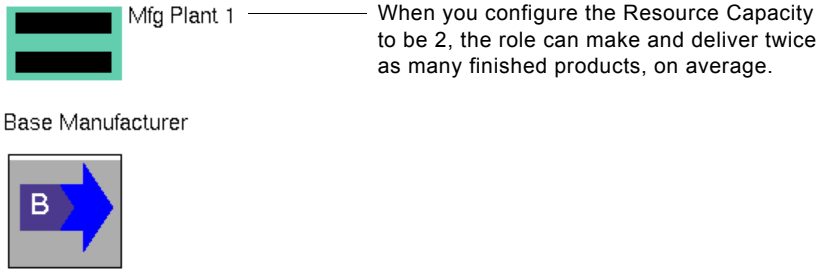
- Configure resources for manufacturing roles in your model.
- Share resources between roles, as needed.

You use resources to constrain the model by specifying the capacity of each manufacturing role to make its delivery products.

Note Only the Base Manufacturer and Manufacturer roles require resources.

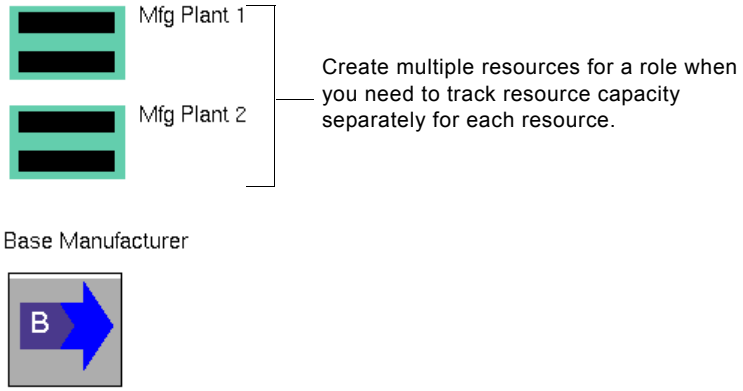
A single manufacturing resource represents one unit of capacity, by default. To increase capacity, you configure the Resource Capacity of individual resources to be a number greater than one, in which case the role can make as many products as there are resources.

For example, as a computer manufacturer, you might have multiple suppliers of electronics, in which case, you would configure the Resource Capacity of the manufacturing resource to be 2. The result is that now the role can produce twice as many products in the same amount of time, on average.



If you need to track resource utilization separately for individual resources, rather than configuring the resource capacity, you can assign multiple resources to a role. The role chooses resources at random, and you track resource utilization

separately for each resource. This figure shows multiple resources assigned to the same role:



You can also assign the same resource to multiple roles, in which case the roles must share the resources, which constrains the model even further.

Configuring Manufacturing Resources

e-SCOR automatically creates a single manufacturing resource for each manufacturing role in the model and places it on the detail of the Resources pool. You can configure these parameters on these tabs for each resource:

Tab/Attribute	Description
General Resource Label	he label to display with the resource, which must be unique.
General Resource Priority	The priority of the resource, where 1 is the highest.

Tab/Attribute	Description
Utilization Maximum Utilization	The maximum capacity of the individual resource, which must be a positive integer. You use this parameter to determine the number of batches of delivery products that a Base Manufacturer or Manufacturer role can make at one time. The default value is 1.
Utilization Efficiency Factor	A number that the model multiplies by the duration of an activity to determine the amount of time the resource is active manufacturing finished products. The default value is 1. You use this parameter to determine the relative amount of time it takes to make a batch of delivery products, which the model uses to compute resource utilization metrics.

To configure manufacturing resources:

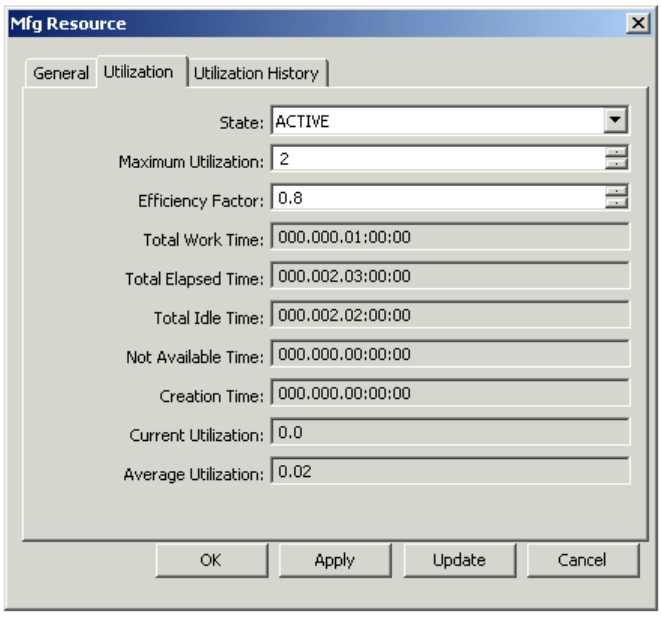
1 For each Base Manufacturer and Manufacturer role in the model, choose Resources to display a submenu of resources assigned to the role, then choose the default resource to show its properties dialog.

Tip You can choose Show Resources to show the detail of the Resources pool, then display the properties of the resource. You can also go to the Resources pool on the role detail and choose Show Detail. The Resources pool looks like this:

2 Configure the properties described above, as needed.

3 Optionally, to assign multiple resources to the role, display the Resources palette of the e-SCOR toolbox, select a Mfg Resource, place it on the detail of a Resources pool, and configure its properties.

Here is the Utilization tab for a manufacturing resource that represents two physical resources and has an 80% efficiency factor:



Resource represents 2 physical resources and has an 80% efficiency factor.

Sharing Resources Between Roles

To share a single manufacturing resource between two or more roles, you create a surrogate from an existing manufacturing resource and place the surrogate in the Resources pool of another role.

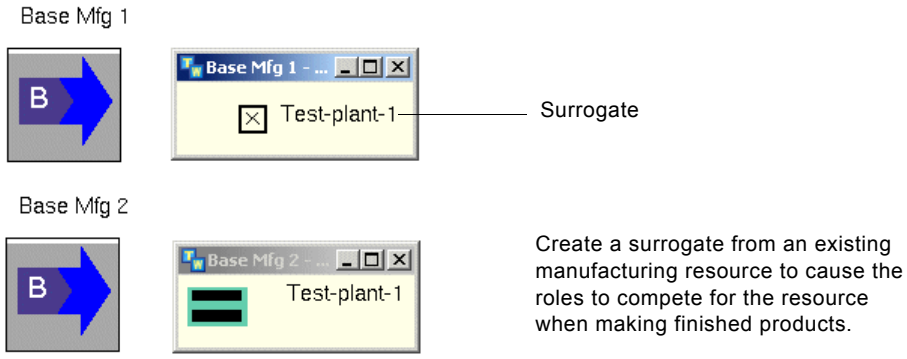
To share resources between roles:

1. Show the detail of the Resources pool of the role whose manufacturing resource you want to share.
2. Choose Create Surrogate on the resource in the pool.

   A surrogate appears in the pool.
3. Show the Resources pool of the role that should share the existing resource.
4. Choose Transfer on the surrogate in the first pool, and click in the second pool to transfer the surrogate.

For example, as a computer manufacturer, you might have two different manufacturing processes, one for laptop computers and one for desktop computers, each of which might compete for the same manufacturing resource.

To do this, you create a manufacturing resource surrogate and assign it to another manufacturing role, as this figure shows:



Upgrading Models

When you run a new version of e-SCOR, typically, you upgrade the details of all roles and categories in your project to use the new default templates. You can update roles and/or categories individually, or upgrade all models in your project at once.

If you have customized any aspect of the model details—an advanced feature—then you can choose not to upgrade individual roles and/or categories.

To upgrade all roles and categories in a model:

➔ Choose Simulation > Upgrade Models.

By default, all roles and categories in your project are upgraded to use the new default templates.

To avoid upgrading individual roles and/or categories in the model:

1 Disable the Upgrade parameter for individual roles and/or categories in the model whose details you have customized and do not want to upgrade.

2 Choose Simulation > Upgrade Models.

Only those roles and categories whose Upgrade parameter is enabled are upgraded.

To upgrade individual models, roles, and/or categories:

1. Configure the Upgrade parameter for individual roles and/or categories in the model, as needed, to determine whether or not to upgrade the details.
2. Do one of the following, depending on how much of the model you want to upgrade:

   ➔ To upgrade all roles and categories for a particular model, choose Upgrade Model on a Model object.

   or

   ➔ To upgrade individual roles and all categories on the role detail, choose Upgrade Block on individual roles in the model.

   or

   ➔ To upgrade individual categories on the role detail, choose Upgrade Block on individual categories on the role detail.

Tip To display the model object associated with a model, choose Go to Superior from the model detail.

6

Configuring Level 2 SCOR

Describes the default details for each role and how to configure category and product composite parameters.

Introduction

Once you have configured the supply-chain model by configuring Level 1 roles, you configure Level 2 SCOR by configuring parameters for each category and product composites associated with each role in the model.

The only Level 2 SCOR parameter you *must* configure before you can run the model is the Potential Supplier of each source product for each buyer role; otherwise, you can use the default values for all parameters. By default, the model uses these general defaults:

- Timing parameters are all configured to take exactly 1 hour.
- The Net Selling Price for all delivery products is $1, which means all financial and asset metrics are calculated based on this price.
- Cost parameters are all configured to be zero.

- All source and delivery products use a stock/replenishment planning strategy and a pull planning mode.
- The source products of a Consumer role are configured to order exactly 100 products once an hour.

You only need to configure parameters that are relevant for the particular planning strategy that each product uses. For example, when using an engineer-to-order planning strategy, you do not need to configure parameters related to stock inventory planning.

This chapter describes how to configure Level 2 SCOR for the simplest e-SCOR model, which consists of a Base Manufacturer role and a Consumer role. It shows sample dialogs for the categories and product composites in the simplest model. If the dialogs for other categories are significantly different, it shows sample dialogs for these categories, as well. The descriptions of each category parameter apply to all categories, unless otherwise indicated in the description.

To configure Level 2 SCOR, you:

- View the role details for each role.
- Configure process category parameters on the detail of each role, which includes the Plan, Source, Make, and Deliver categories.
- Configure product composite parameters for each source and delivery product on the detail of the Products pool for each role.

You can also configure demand and change orders through a Demand Report.

Viewing Role Details

This section describes:

- Standard objects on the role detail.
- Summary of all process categories.

Standard Objects on Role Details

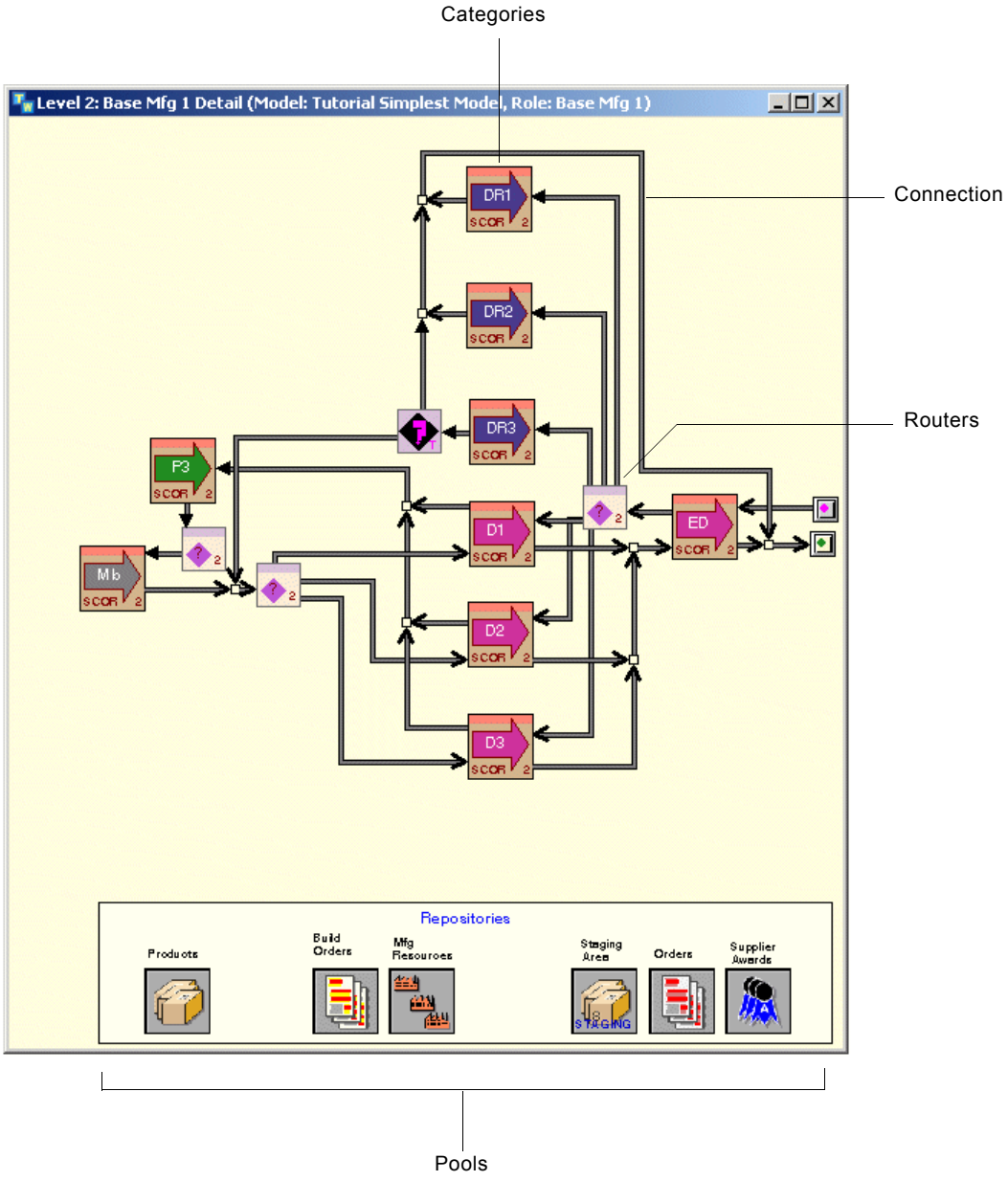
Each role detail includes Source, Make, and/or Deliver process categories appropriate to the role. These categories are connected by input and output paths, through routers, which send objects along the appropriate paths, both upstream and downstream in the model.

In addition, each role detail has one or more **category routers**, which appear on the detail and send objects to appropriate categories. When adding multiple categories to the role detail, you must connect the paths to these category routers.

Each role detail also includes a number of repositories or **pools** in which e-SCOR stores a variety of objects. The role detail contains two types of pools:

- Pools that store permanent objects. The Products pool contains source and delivery products associated with each role, and the Mfg Resources pool contains manufacturing resources required to make finished products.
- Pools that store transient objects, which e-SCOR creates and deletes when the simulation runs. For example, the Orders pool stores orders that buyers create when sourcing products from suppliers.

This figure labels each of these general types of objects on the detail of a Base Manufacturer role:



See Also Showing Transient Objects.

Process Category Summary

The following table indicates the roles on whose details each category can appear and provides a general description of what you need to configure for each category:

Category	Roles	Description
Plan		
P2: Plan Source 	Distributor Manufacturer Consumer	You configure the planning period for ordering source products and the time at which the first plan goes into effect. You can also configure the category to create replenishment orders on demand.
P3: Plan Make 	Base Manufacturer Manufacturer	You configure the planning period for making finished products and the time at which the first plan goes into effect. You can also configure the role to create build orders on demand and to compensate for the build yield.
P5: Plan Return 	Distributor Manufacturer Consumer	You configure the planning period for sourcing and delivering defective products, MRO products, and excess inventory, based on returns, and the time at which the first plan goes into effect.
Source		
S1: Source Stocked Product 	Distributor Manufacturer Consumer	You configure the time it takes to receive, verify, and transfer stock source products, and the costs associated with sourcing stock products.
S2: Source Make-to-Order Product 	Distributor Manufacturer Consumer	You configure the time it takes to receive make-to-order source products and the costs associated with sourcing make-to-order products.

Category	Roles	Description
S3: Source Engineer-to-Order Product 	Distributor Manufacturer Consumer	You configure the time it takes to receive engineer-to-order source products and the costs associated with sourcing engineer-to-order products.
Make		
M1: Make-to-Stock 	Manufacturer	You configure timing parameters related to creating build orders for stock delivery products, choosing which build order to manufacture first, taking raw materials from inventory, manufacturing batches, and transferring finished products to inventory. You also configure the cost of taking raw materials from inventory.
M2: Make-to-Order 	Manufacturer	You configure timing parameters related to creating build orders for make-to-order delivery products, choosing which build order to manufacture first, taking raw materials from inventory, manufacturing batches, and transferring finished products to inventory. You also configure the cost of taking raw materials from inventory.
M3: Engineer-to-Order 	Manufacturer	You configure timing parameters related to engineering delivery products, creating build orders for engineer-to-order products, choosing which build order to manufacture first, taking raw materials from inventory, manufacturing batches, and transferring finished products to inventory. You also configure the engineering cost and the cost of taking raw materials from inventory.

Category	Roles	Description
Deliver		
D1: Deliver Stocked Product 	Base Manufacturer Distributor Manufacturer	You configure timing parameters related to creating an order for stock delivery products, choosing which order to deliver first, picking delivery products from inventory, packing containers, and shipping containers. You also configure the costs associated with delivering products.
D2: Deliver Make-to-Order Product 	Base Manufacturer Distributor Manufacturer	You configure timing parameters related to creating an order for make-to-order delivery products, choosing which order to deliver first, picking delivery products from inventory, packing containers, and shipping containers. You also configure the costs associated with delivering products.
D3: Deliver Engineer-to-Order Product 	Base Manufacturer Distributor Manufacturer	You configure timing parameters related to creating an order for engineer-to-order delivery products, choosing which order to deliver first, picking delivery products from inventory, packing containers, and shipping containers. You also configure the costs associated with delivering products.
Enable Categories		
ES: Enable Source 	Distributor Manufacturer Consumer	The only parameters you configure for the ES category are the Label and Upgrade.
ED: Enable Deliver 	Base Manufacturer Distributor Manufacturer	The only parameters you configure for the ED category are the Label and Upgrade.

Category	Roles	Description
Source Returns Categories		
SR1: Source Defective Product 	Distributor Manufacturer Consumer	You configure the duration for transporting defective products, and the cost of transporting and holding defective products.
SR2: Source MRO Product 	Distributor Manufacturer Consumer	You configure the duration for transporting maintenance, repair, and overhaul (MRO) products, and the cost of transporting and holding MRO products.
SR3: Source Excess Product 	Distributor Manufacturer Consumer	You configure the duration for transporting excess inventory, and the cost of transporting and holding excess inventory.
Deliver Returns Categories		
DR1: Deliver Defective Product 	Base Manufacturer Distributor Manufacturer	You configure the duration for authorizing defective products, and the cost of authorizing and disposing of defective products.
DR2: Deliver MRO Product 	Base Manufacturer Distributor Manufacturer	You configure the duration for authorizing maintenance, repair, and overhaul (MRO) products, and the cost of authorizing and disposing of MRO products.
DR3: Deliver Excess Product 	Base Manufacturer Distributor Manufacturer	You configure the duration for authorizing the delivery of excess inventory, and the cost of authorizing and disposing of excess inventory.

Category	Roles	Description
End Conditions		
Mb: Make Product 	Base Manufacturer	For stock and make-to-order delivery products, you configure timing parameters related to creating build orders, choosing which build order to manufacture first, taking raw materials from inventory, manufacturing batches, and transferring finished products to inventory. You also configure the cost of taking raw materials from inventory. For engineer-to-order products, you also configure timing and cost parameters associated with engineering finished products. This category represents a boundary condition in the supply chain.
Input 	Consumer	This category initiates the process of creating customer orders and change orders for the finished products in the overall supply chain. This category represents a boundary condition in the supply chain and has no parameters to configure.
End 	Consumer	This category signals the end of the supply chain, when finished products have been received and paid for.

See Also Configuring Process Category Parameters.

Configuring Process Category Parameters

Category parameters apply to every product that the category sources, makes, or delivers and include:

- Timing parameters related to sourcing, making, and delivering products, such as the time it takes to enter an order for a source product, manufacture a finished product, and pick, pack, and deliver a product shipment.
- Cost parameters, such as the cost of acquiring materials, handling components during manufacturing, and entering and fulfilling an order.
- Parameters for choosing which order to manufacture or deliver first.

To configure process category parameters, you need to understand how to:

- Configure category parameters, in general.
- Configure the mathematical distribution the category uses to compute variation.

You configure Level 2 SCOR parameters for these categories:

- Plan categories
- Source categories
- Make categories
- Deliver categories
- Source Returns categories
- Deliver Returns categories

Note The ES: Enable Source category and the ED: Enable Deliver category have no configurable parameters except Label and Upgrade. For information on using the Upgrade option, see Upgrading Models.

See Also Viewing Metrics for Categories.

Configuring Role Details for Multiple Products.

Configuring Multipliers for Timing Parameters.

Configuring Category Parameters

You configure process category parameters on the detail of the specified role.

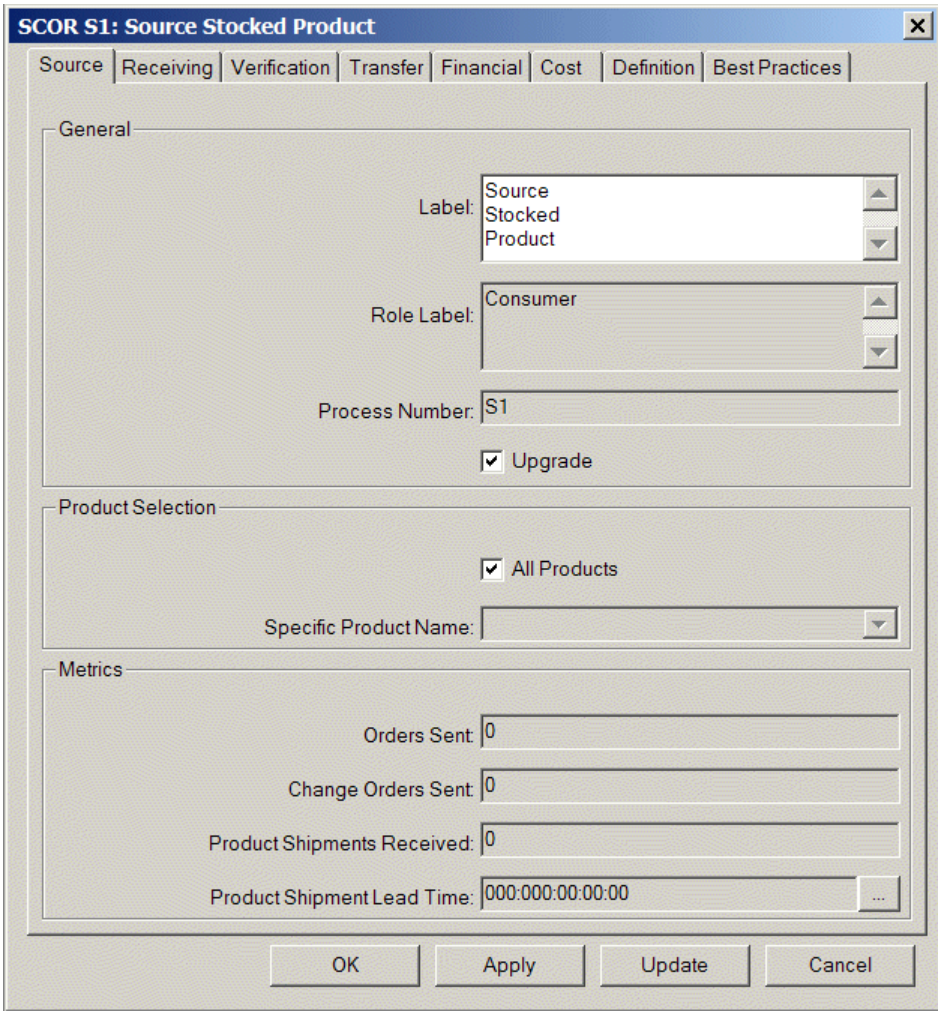
To configure category parameters:

1 Show the detail of a role.

2 Display the properties dialog for a process category on the role detail.

3 Configure the parameters on the tabbed dialog that appears.

This dialog shows the Source tab of the S1: Source Stocked Product category:



Configuring the Mathematical Distribution

By default, the timing parameters that you can configure for Source, Make, and Deliver categories, use a triangular distribution for computing variation. This means you configure the Min, Max, and Mode parameters of a triangular distribution, and the model computes a random value, based on these parameters.

You can configure the mathematical distribution the model uses to compute these parameters. To do this, you configure the Distribution Mode to be one of a number of mathematical distributions, and you configure the specific parameters required for that distribution.

You can configure the mathematical distribution for a variety of Level 2 category and product composite parameters, such as the Demand Order Duration and Demand Order Size of Consumer source products, the Receiving Duration of a Source category, Manufacturing Duration of a Make category, and Transportation Duration of a Deliver category.

When you configure the Distribution Mode, the dialog displays the appropriate parameters required to configure the mathematical distribution.

For information on the available distributions, see "Working with the Duration of Blocks" in Chapter 4 "Using Blocks" in the *ReThink User? Guide*.

To configure the mathematical distribution:

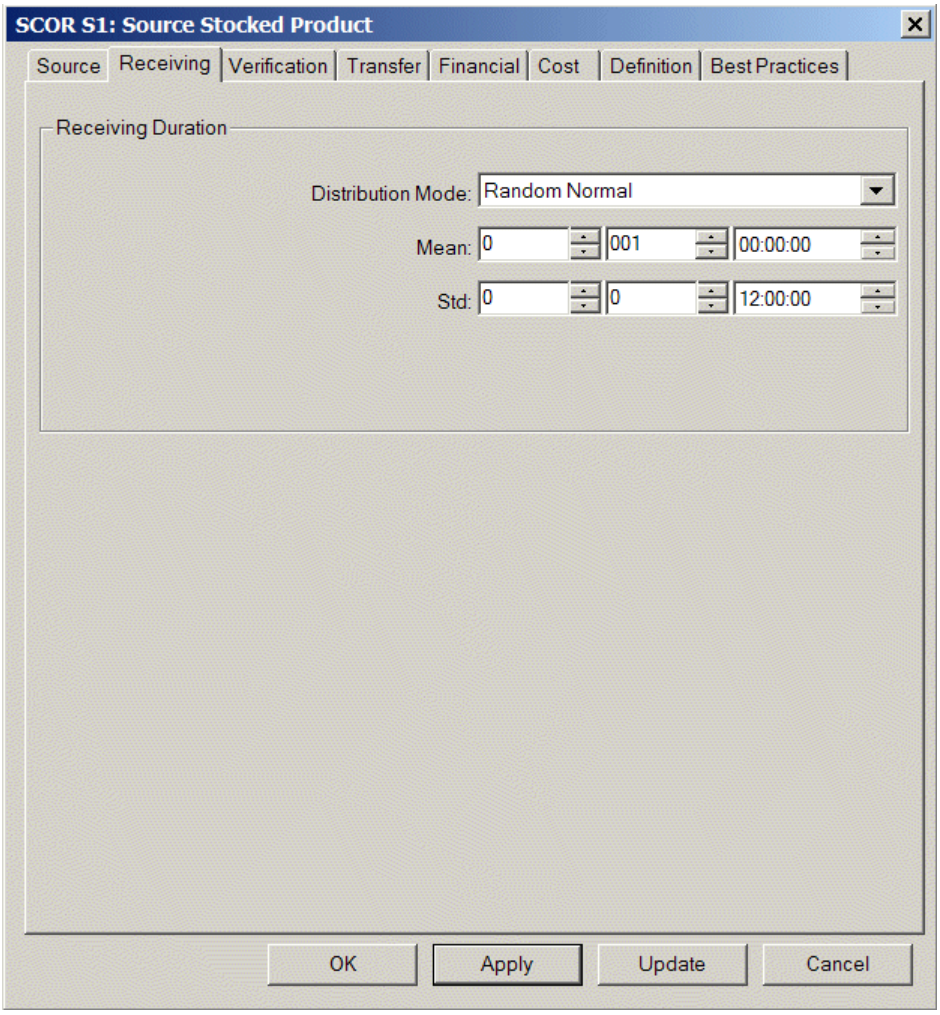
1. Configure the Distribution Mode parameter for one of the timing or initial order demand parameter listed above by choosing a mathematical distribution from the dropdown list.

   For information about configuring category parameters, in general, see Configuring Category Parameters.

   Once you choose the Distribution Mode, e-SCOR displays the parameters that you must configure for that mathematical distribution.

2. Configure the parameters associated with the distribution you choose.

For example, you might configure the Distribution Mode of the Receiving Duration parameter of the S1: Source Stocked Product category to be Random Normal, as follows:

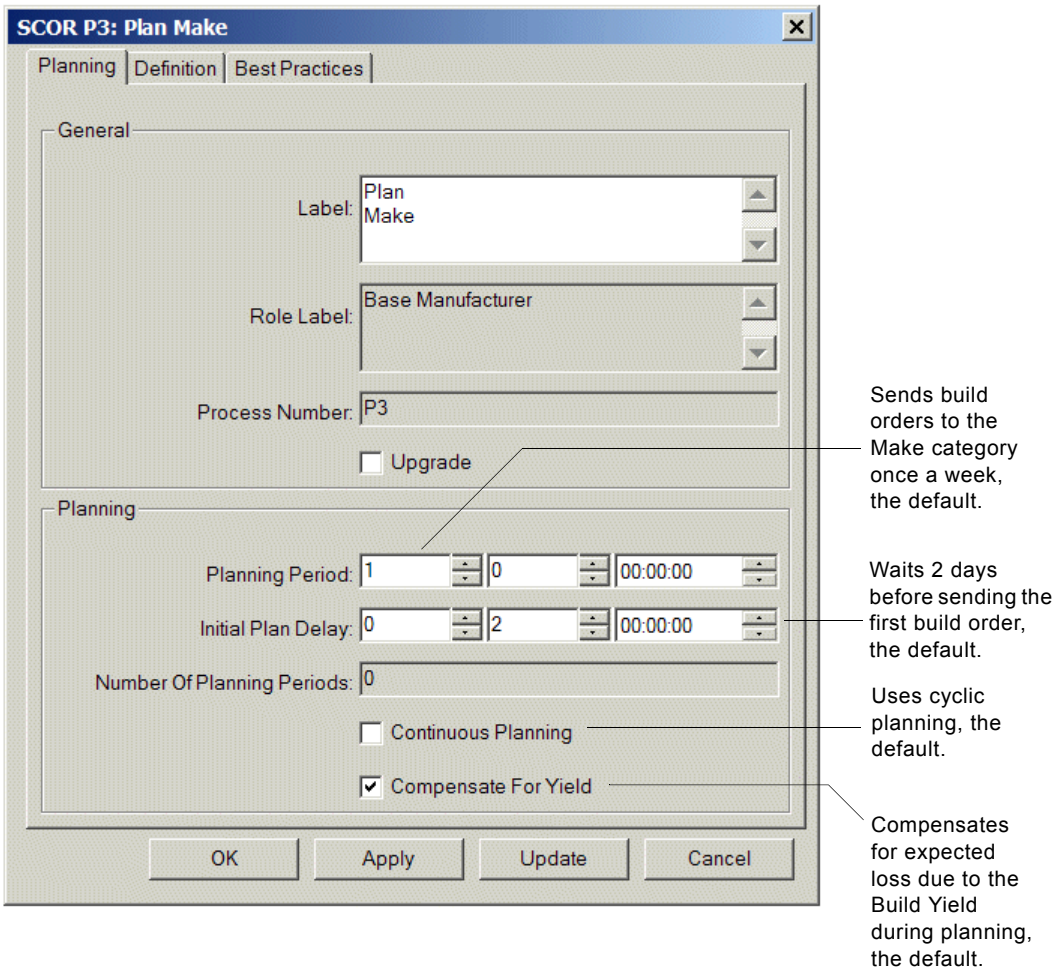


Takes an average of 1 day to receive shipments, +/- 12 hours.

Configuring the Plan Category

The properties dialogs for the P2: Plan Source, P3: Plan Make, and P5: Plan Return categories are identical except that the P3 category has the Compensate for Yield parameter.

The following figure shows the default properties dialog for the P3: Plan Make category of a Base Manufacturer role:



Group/ Parameter	Tab	Description
General Label	Planning	The label to display with the category. The default value is the SCOR category name.
General Upgrade	Planning	When using a new version of e-SCOR, whether to upgrade the category, using the default role template ("on") or whether to leave the category as it is ("off"). The default value is "on". For details, see Upgrading Models.
Planning Planning Period	Planning	The time interval between executing plans. For the P3: Plan Make category, each time a plan executes, the Plan category sends build orders to the Make category, which manufactures delivery products to satisfy current build orders. For the P2: Plan Source category, each time a plan executes, the Plan category sends replenishment orders to the Source category, which places orders for source products with upstream suppliers. The default value is 1 week. **Note**: You only need to configure the Planning Period for the P3 category when the upstream Make category uses a stock or make-to-order planning strategy. If the upstream Make category uses an engineer-to-order planning strategy, the Make category initiates its make planning process as soon as it can, based on available components. For details, see Using an Engineer-to-Order Planning Strategy.

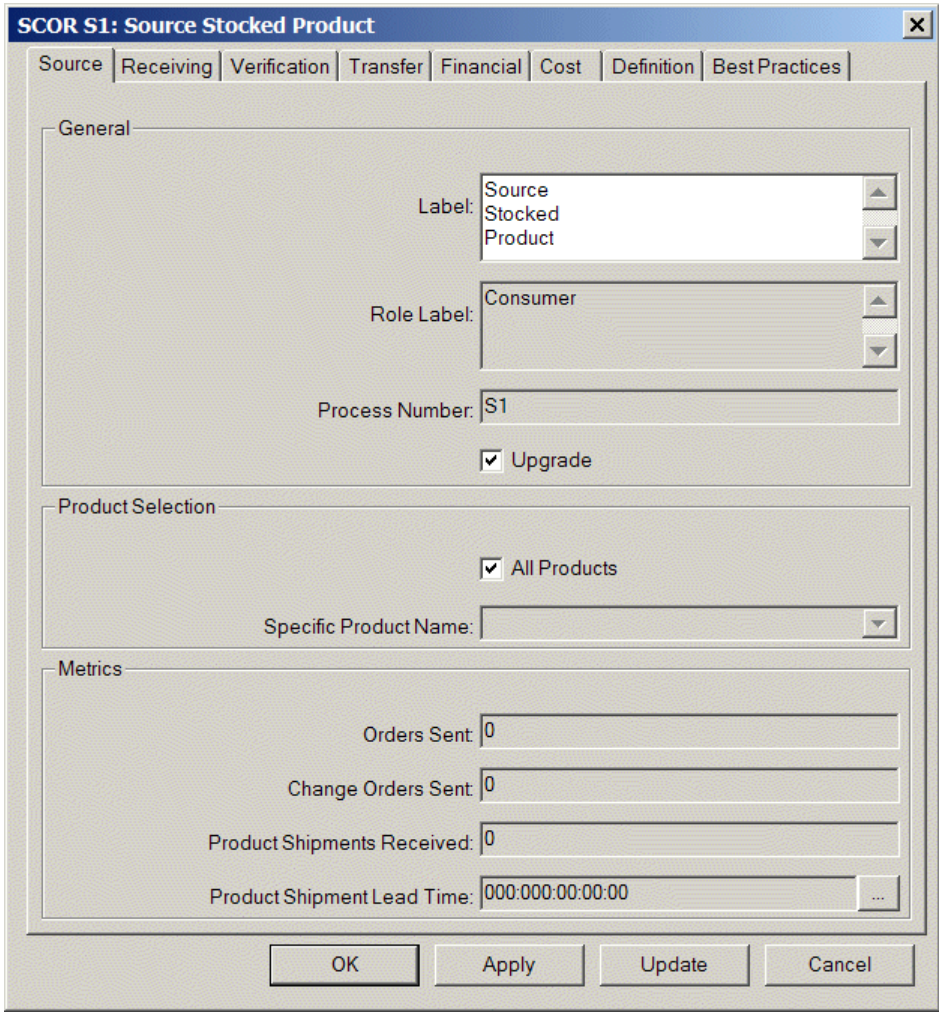
Group/ Parameter	Tab	Description
Planning Initial Plan Delay	Planning	The initial delay from the start time of the simulation to the time at which the first plan goes into effect. By default, planning occurs every Planning Period, thereafter. The default value is 2 days. You configure this parameter to coordinate source and make planning when the model contains Manufacturer roles. For details, see Coordinating Source and Make Planning.

Group/ Parameter	Tab	Description
Planning Continuous Planning	Planning	Whether the role uses cyclical planning, in addition to demand-based planning. By default, Continuous Planning is disabled, which means the role uses cyclical planning only, based on the Planning Period. When Continuous Planning is enabled, in addition to its normal cyclical planning, the role initiates a plan whenever the downstream category creates an order. The type of planning depends on the role and the Plan category, as follows: • For the P2 category of a Distributor role, source planning initiates whenever a downstream buyer role creates a replenishment order for the role's delivery products. • For the P2 category of a Manufacturer role, source planning initiates whenever the downstream Make category creates a build order for the role's delivery products. • For the P3 category of a Manufacturer role, make planning initiates whenever a downstream buyer role creates a replenishment order for the role's delivery products. To use demand-based planning only, configure the Planning Period to be a very large number so it never gets invoked. For more information, see Configuring the Stock Planning Strategy.
Planning Compensate for Yield	Planning	(P3) Whether the role takes into account the Build Yield parameter of the delivery product during the make planning process. When Compensate for Yield is enabled, the default, the P3 category increases the number of products it plans to make, due to expected loss. Disable Compensate for Yield to disregard the build yield during make planning.

Configuring the Source Category

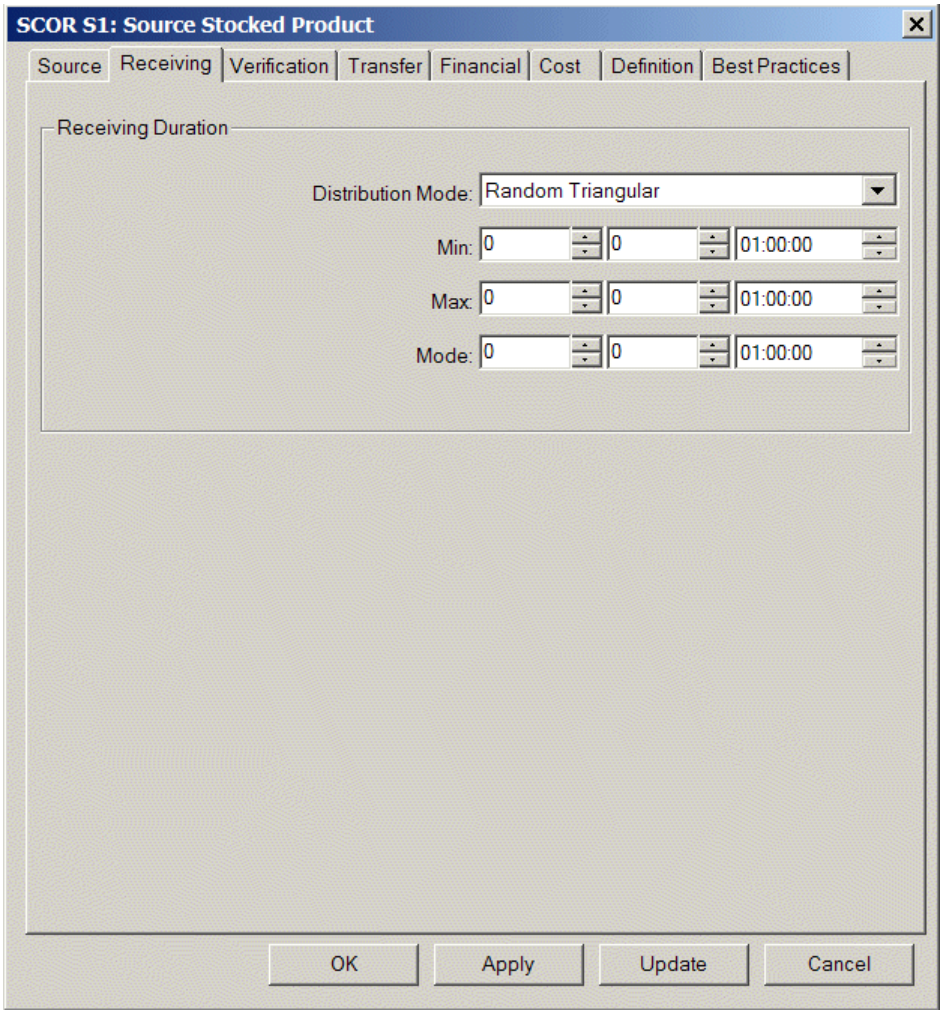
The properties dialogs for all the Source categories are the same.

The following figure shows the Source tab of the default properties dialog for the S1: Source Stocked Product category of a Consumer role:



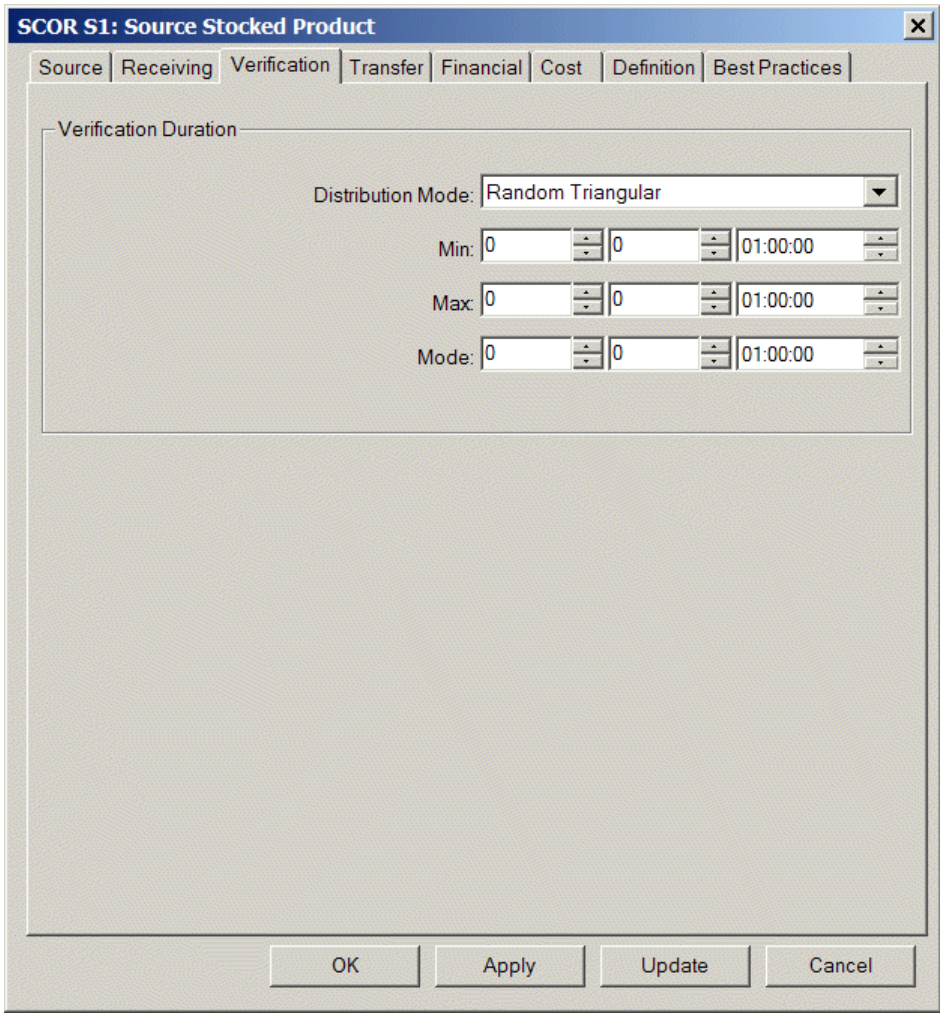
Parameters apply to all source products assigned to the role, the default.

The following figure shows the Receiving tab of the default properties dialog for the S1: Source Stocked Product category:



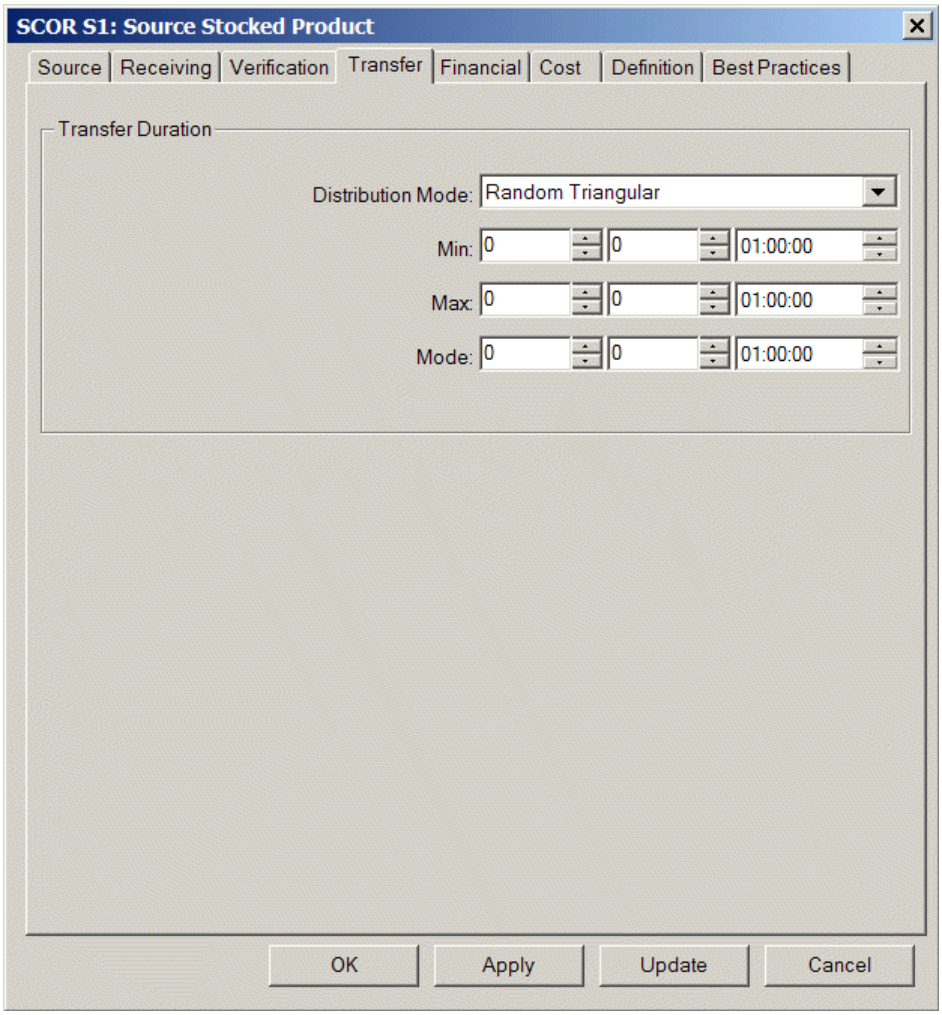
Takes 1 hour to receive shipments of source products, the default.

The following figure shows the Verification tab of the default properties dialog for the S1: Source Stocked Product category:



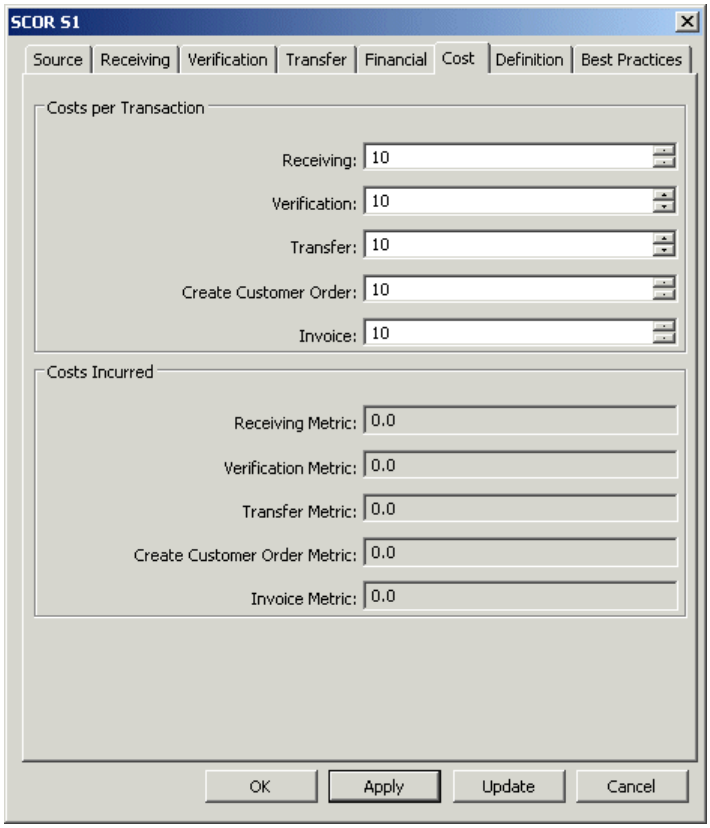
Takes 1 hour to verify shipments of source products, the default.

The following figure shows the Transfer tab of the default properties dialog for the S1: Source Stocked Product category:



Takes 1 hour to transfer shipments of source products to inventory, the default.

The following figure shows the Cost tab of a sample properties dialog for the S1: Source Stocked Product category:



Costs $10 to receive, verify, and transfer source products to inventory, create each order, and pay each invoice. By default, these costs are all 0.

Group/ Parameter	Tab	Description
General Label	Source	The label to display with the category. The default value is the SCOR category name.
General Upgrade	Source	When using a new version of e-SCOR, whether to upgrade the category, using the default role template ("on") or whether to leave the category as it is ("off"). The default value is "on". For details, see Upgrading Models.

Group/ Parameter	Tab	Description
Product Selection All Products Specific Product Name	Source	Whether the Source category parameters apply to all source products associated with the role or to a specific source product. By default, All Products is enabled. You configure these parameters when the Source category sources multiple products. When All Products is disabled, configure the Specific Product Name parameter to determine the specific source product to which the Source category parameters apply. For details, see Adding Multiple Categories to Role Details.
Receiving Duration Distribution Mode	Receiving	The time it takes from when the Source category receives source products to when it places them in inventory. For information on how to use other distributions, see Configuring the Mathematical Distribution. **Tip:** Assets transfer from supplier to buyer at the end of the Transportation Duration of the buyer role's Deliver category and before the Receiving Duration. To cause assets to transfer at shipment time, configure the Receiving Duration to be zero and configure the Transportation Duration to include the receiving time. The asset metrics for the supplier and buyer roles reflect this difference, as do the Supplier On-Time Performance and Delivery Performance metrics of the ES: Enable Source and ED: Enable Deliver categories, respectively.
Verification Duration Distribution Mode	Verification	The time it takes to verify shipments of source products before placing them in inventory. For information on how to use other distributions, see Configuring the Mathematical Distribution.

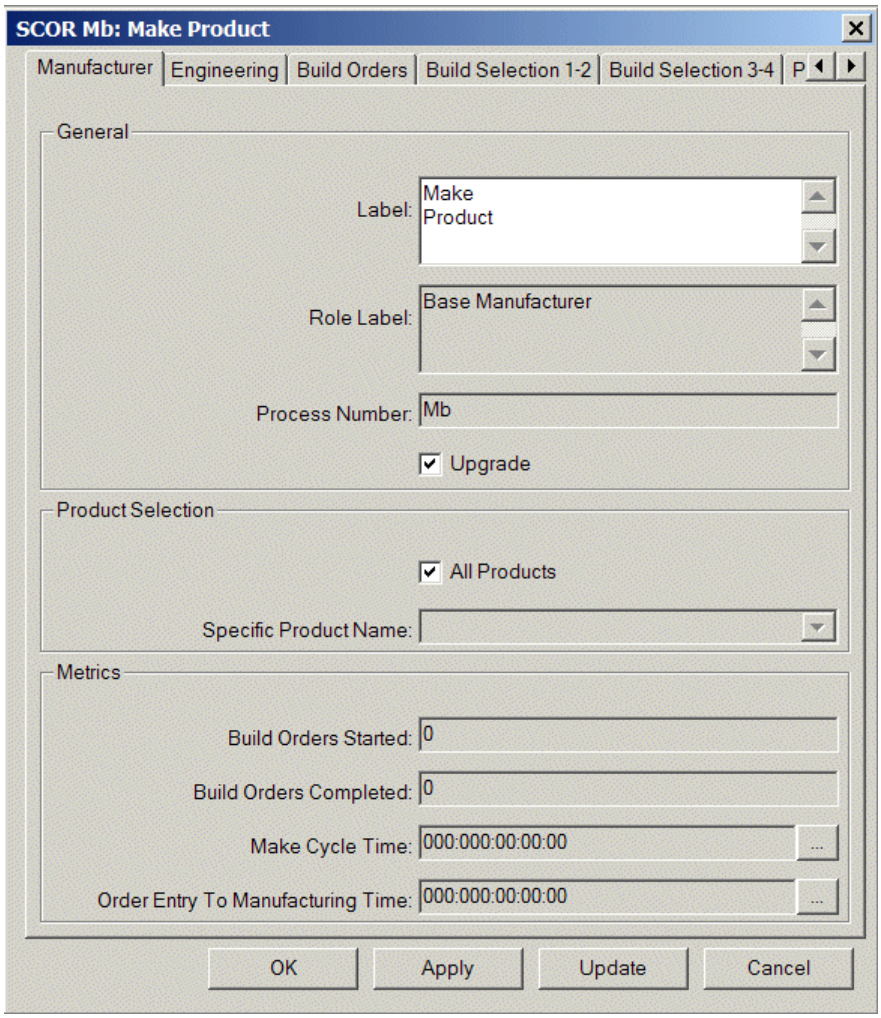
Group/ Parameter	Tab	Description
Transfer Duration Distribution Mode	Transfer	The time it takes to transfer shipments of source products to inventory. For information on how to use other distributions, see Configuring the Mathematical Distribution.
Costs per Transaction Receiving	Cost	The costs associated with receiving source products. The default value is 0.
Costs per Transaction Verification	Cost	The costs associated with verifying a shipment of source products. The default value is 0.
Costs per Transaction Transfer	Cost	The costs associated with transferring a shipment of source products to inventory. The default value is 0.
Costs per Transaction Create Customer Order	Cost	The costs associated with creating an order for source products. The default value is 0.
Costs per Transaction Invoice	Cost	The costs associated with paying invoices for source products. The default value is 0.

Configuring the Make Category

The properties dialogs for the Make categories have these parameter differences, by tab:

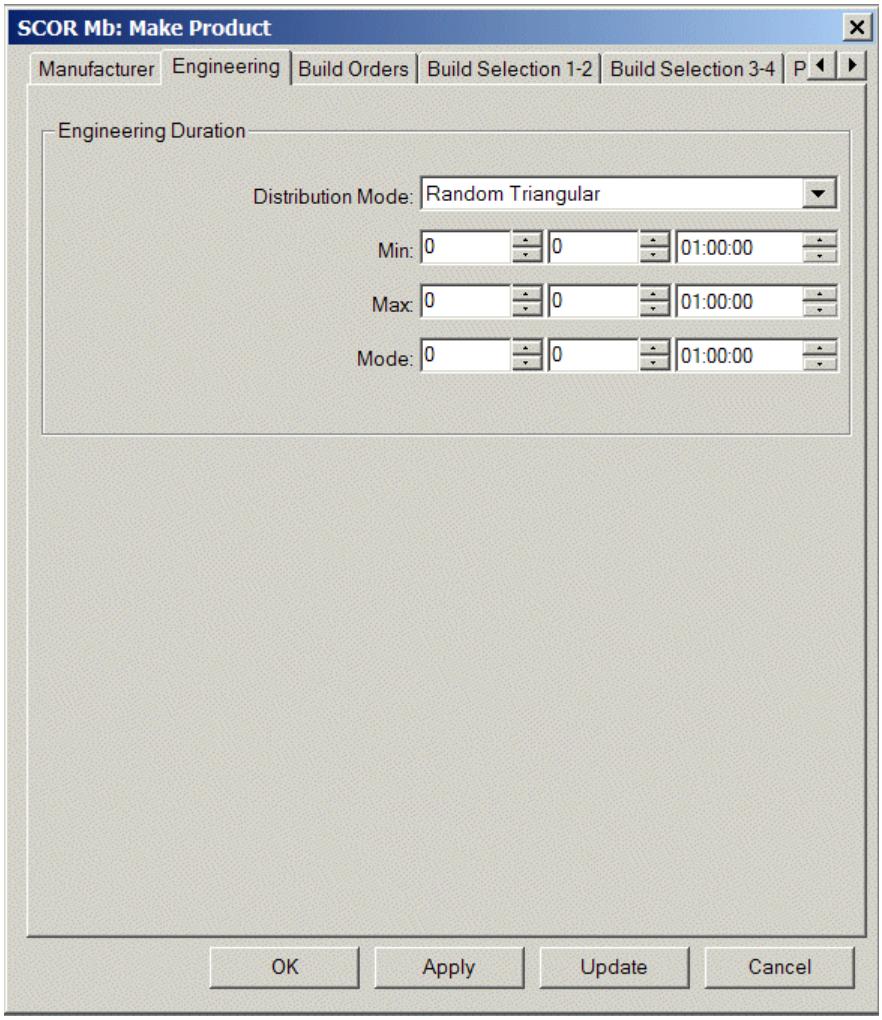
- Engineering tab: The Mb and M3 categories include the Engineering tab.
- Cost tab: The Mb and M3 categories include the ECO parameter.

The following figure shows the Manufacturer tab of the default properties dialog for the Mb: Make Product category of a Base Manufacturer role:



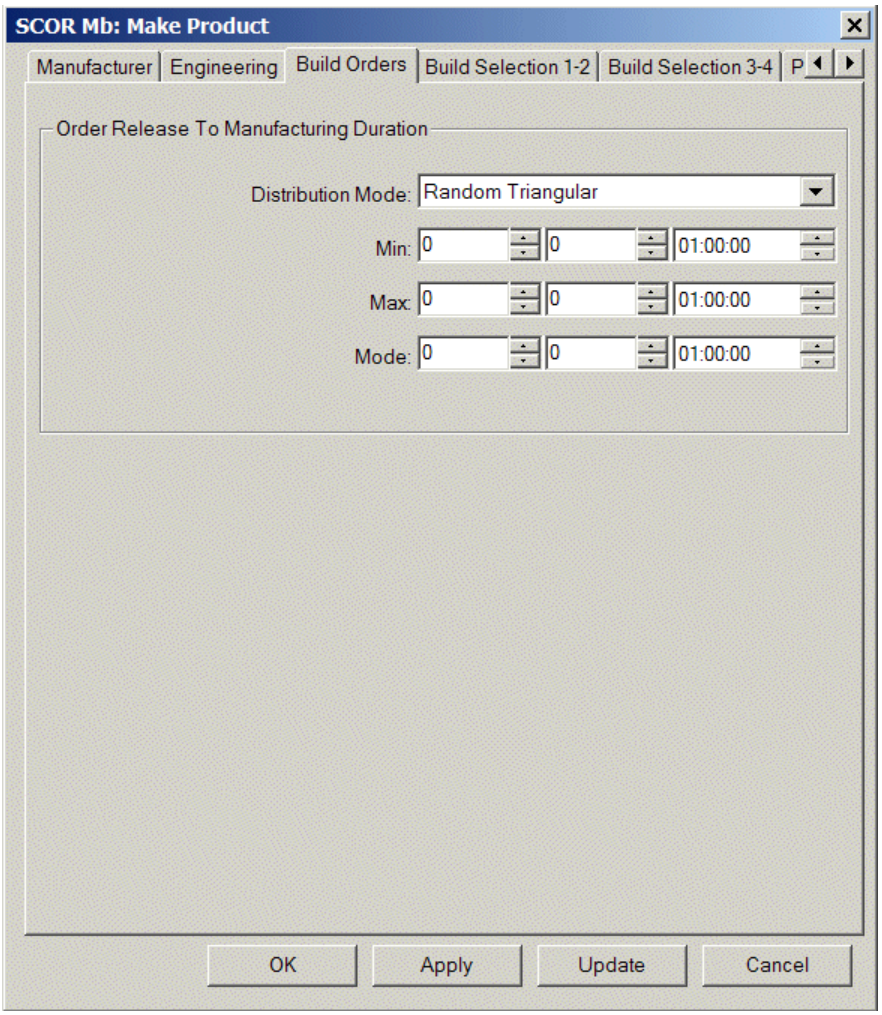
Parameters apply to all delivery products associated with the role, the default.

The following figure shows the Engineering tab of the default properties dialog for the Mb: Make Product category:



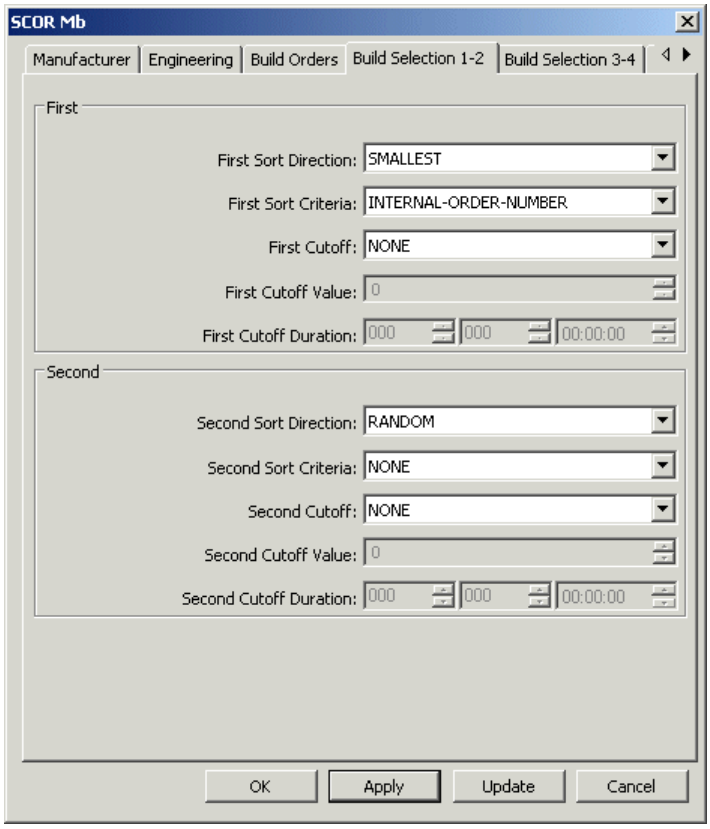
When the Order Type of the delivery product is ETO, takes 1 hour to engineer orders, the default.

The following figure shows the Build Orders tab of the default properties dialog for the Mb: Make Product category:



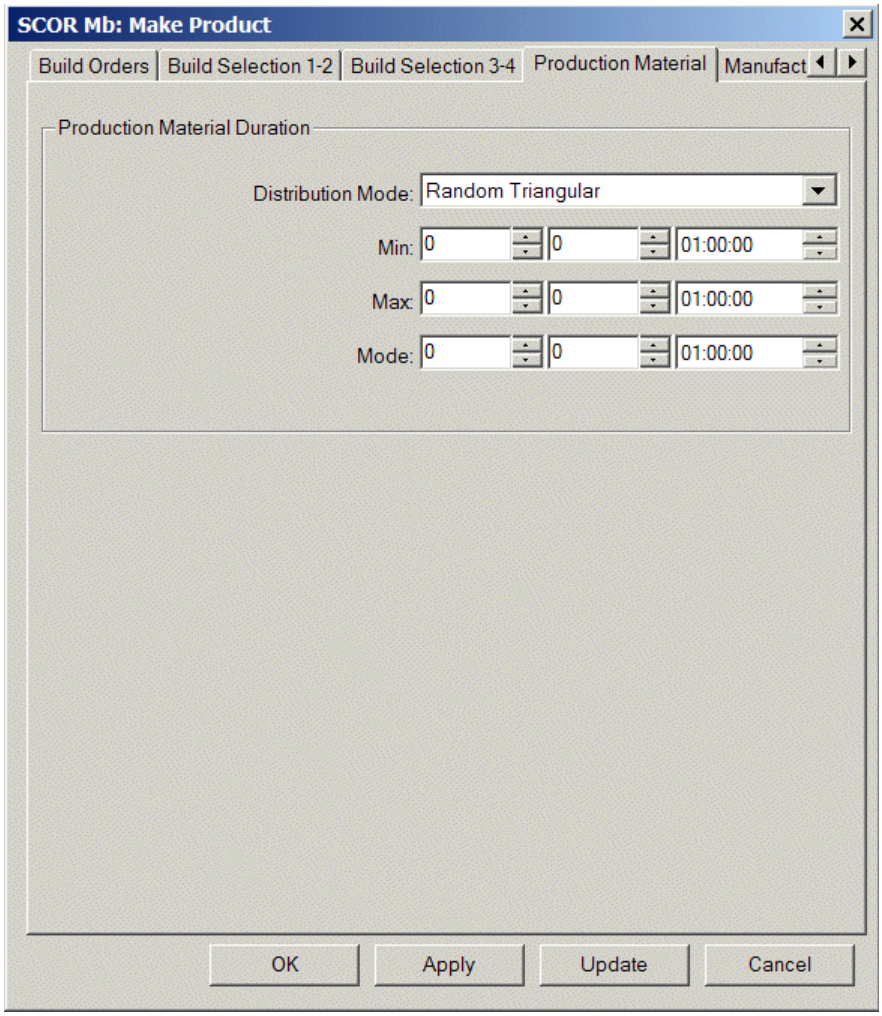
Takes 1 hour from when the Make category receives a build order to when it receives components, the default.

The following figure shows the Build Selection 1-2 tab of a sample properties dialog for the Mb: Make Product category. The Build Selection 3-4 tab is similar.



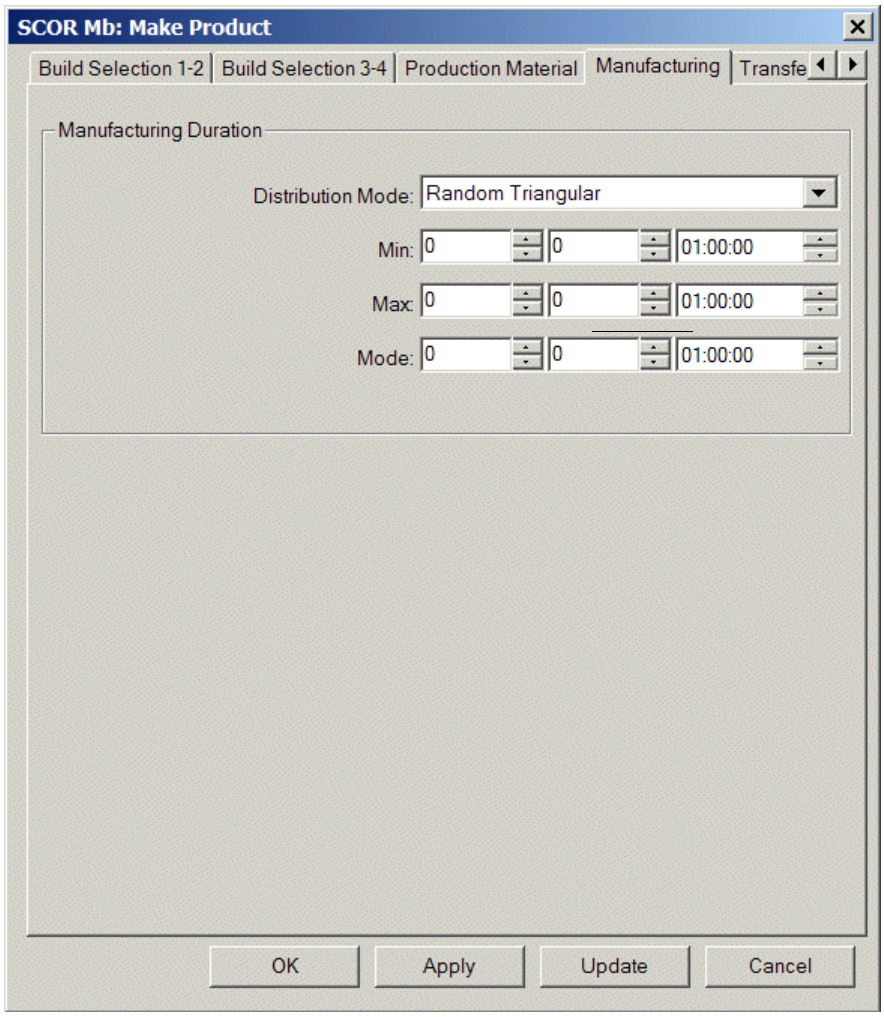
Sorts build orders on a FIFO basis, based on Internal Order Number. By default, it chooses build orders at random.

The following figure shows the Production Material tab of the default properties dialog for the Mb: Make Product category:



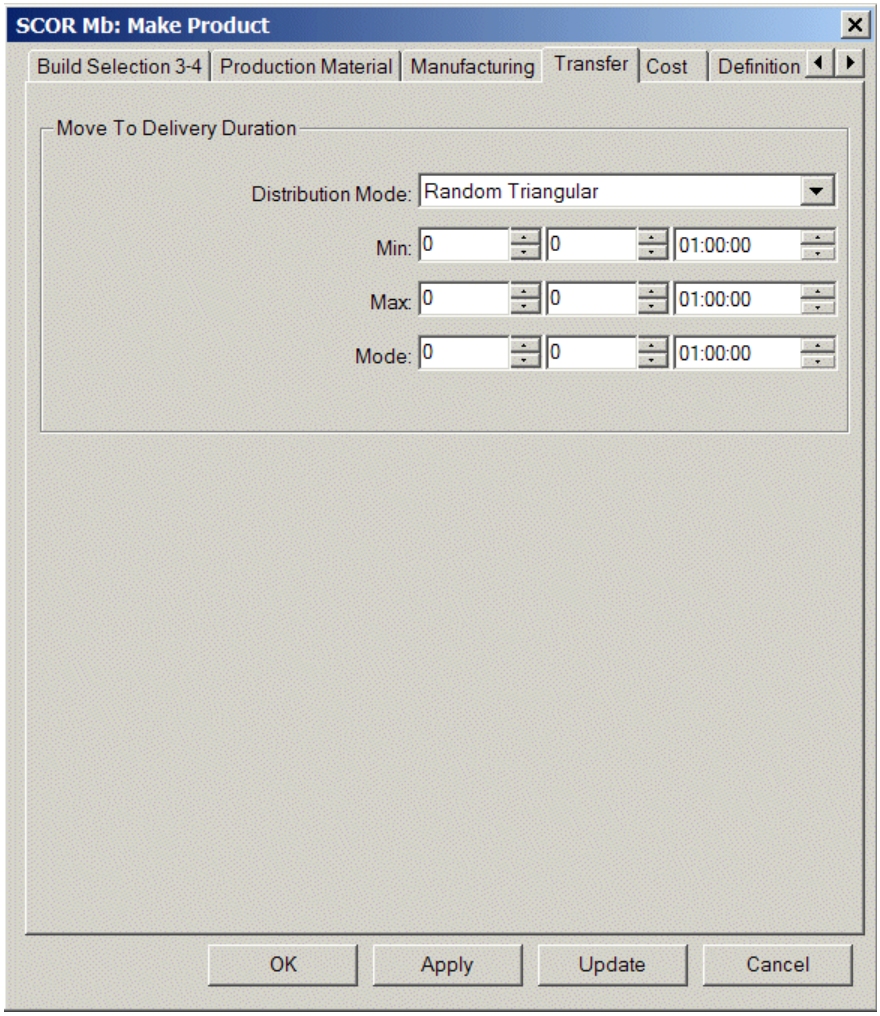
Takes 1 hour from when the Make category receives components to when it begins manufacturing batches of finished products, the default.

The following figure shows the Manufacturing tab of the default properties dialog for the Mb: Make Product category:



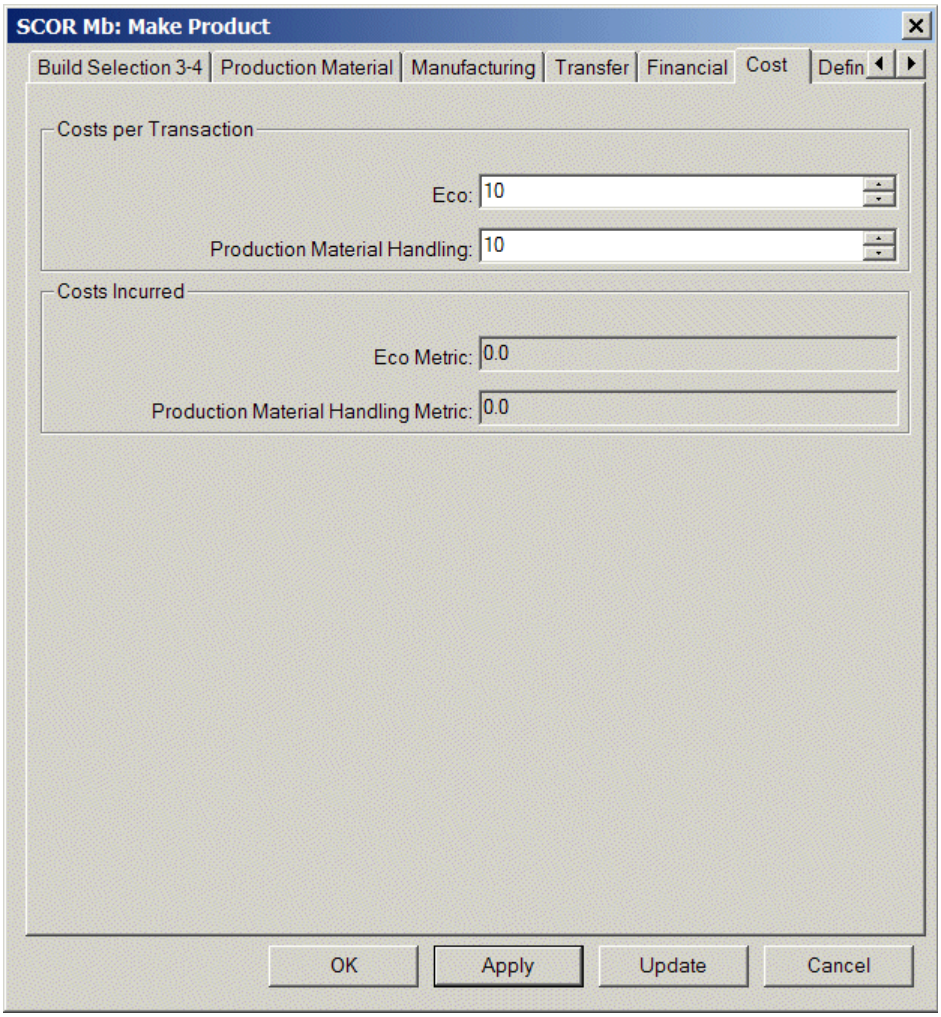
Takes 1 hour to manufacture one batch of finished products, the default.

The following figure shows the Transfer tab of the default properties dialog for the Mb: Make Product category:



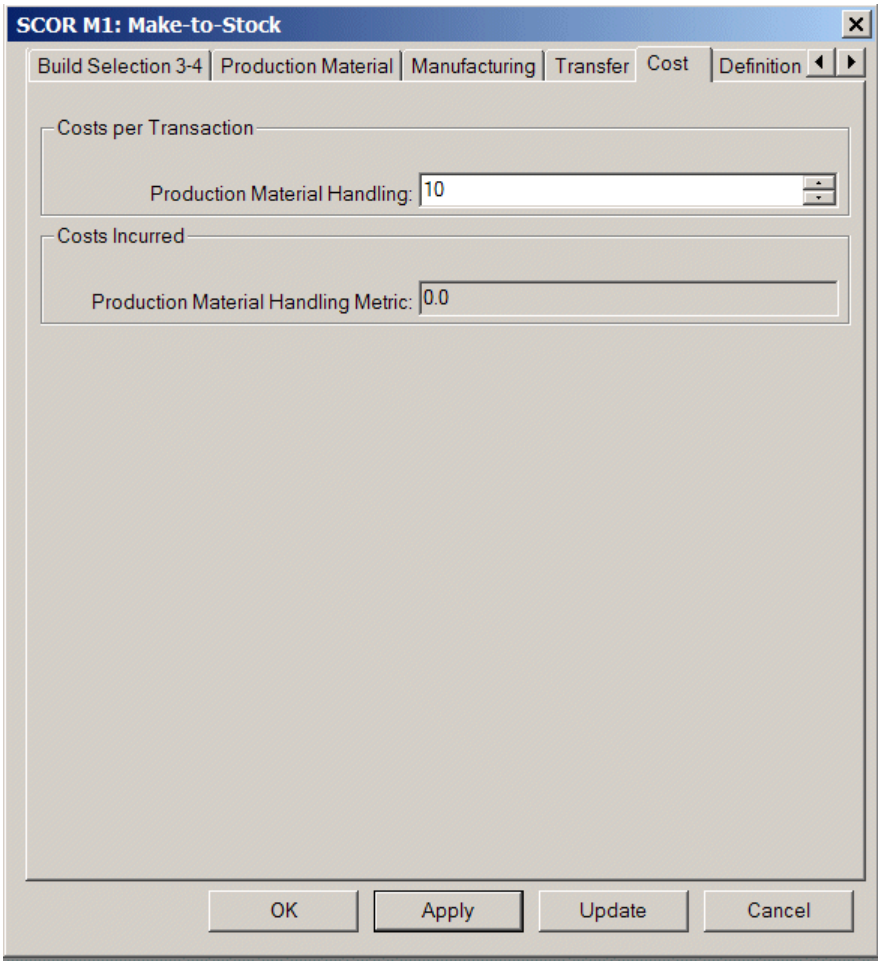
Takes 1 hour to transfer finished products from where they are built into inventory, the default.

The following figure shows the Cost tab of a sample properties dialog for the Mb: Make Product category:



Costs $10 to handle the components used to make finished products. When making engineer-to-order finished products, costs $10 to engineering products. By default, these costs are both 0.

The following figure shows the Cost tab of a sample properties dialog for the M1: Make-to-Stock category:



Costs $10 to handle components used to make finished products. By default, this cost is 0.

Group/ Parameter	Tab	Description
General Label	Manufacturer	The label to display with the category. The default value is the SCOR category name.
General Upgrade	Manufacturer	When using a new version of e-SCOR, whether to upgrade the category, using the default role template ("on") or whether to leave the category as it is ("off"). The default value is "off". For details, see Upgrading Models.

Group/ Parameter	Tab	Description
Product Selection All Products Specific Product Name	Manufacturer	Whether the Make category parameters apply to all delivery products associated with the role or to a specific delivery product. By default, All Products is enabled. When All Products is disabled, configure the Specific Product Name parameter to determine the specific delivery product to which the Make category parameters apply. You configure these parameters when the Make category manufactures multiple products. For details, see Adding Multiple Categories to Role Details.
Engineering Duration Distribution Mode	Engineering	(Mb and M3) The time it takes to engineer a single batch of engineer-to-order delivery products, regardless of the number of products in the batch. You configure this parameter only when the Order Type of the delivery product is ETO. For information on how to use other distributions, see Configuring the Mathematical Distribution.
Order Release to Manufacturing Duration Distribution Mode	Build Orders	The time it takes from when the Make category receives a build order to when it receives components. For information on how to use other distributions, see Configuring the Mathematical Distribution.

Group/ Parameter	Tab	Description
First Second Third Fourth Sort Direction Sort Criteria Cutoff Cutoff Value Cutoff Duration	Build Selection 1-2 Build Selection 3-4	The criteria that determines how to choose build orders for manufacturing. By default, the Make category chooses build orders at random, based on the Sort Criteria. The Make category sorts build orders waiting to be manufactured, based on up to four criteria of an order, which are numeric values. The Make category sorts build orders, based on the criteria in the First group. If two build orders have the same value for the specified criteria, it sorts build orders, based on the criteria in the Second group, and so on. For a description of the sort and cutoff parameters and examples of how to use them, see Configuring Build Selection Parameters.
Production Material Duration Distribution Mode	Production Material	The time it takes from when the Make category receives components to when it starts manufacturing batches of finished products. For information on how to use other distributions, see Configuring the Mathematical Distribution.
Manufacturing Duration Distribution Mode	Manufacturing	The time it takes from when the Make category starts to manufacture a single batch of delivery products to when it finishes manufacturing the batch. The Manufacturing Duration is the same, regardless of the number of products in the batch. For information on how to use other distributions, see Configuring the Mathematical Distribution.
Move to Delivery Duration Distribution Mode	Transfer	The time it takes from when the Make category finishes manufacturing a batch of delivery products to when the finished products are transferred to inventory. For information on how to use other distributions, see Configuring the Mathematical Distribution.

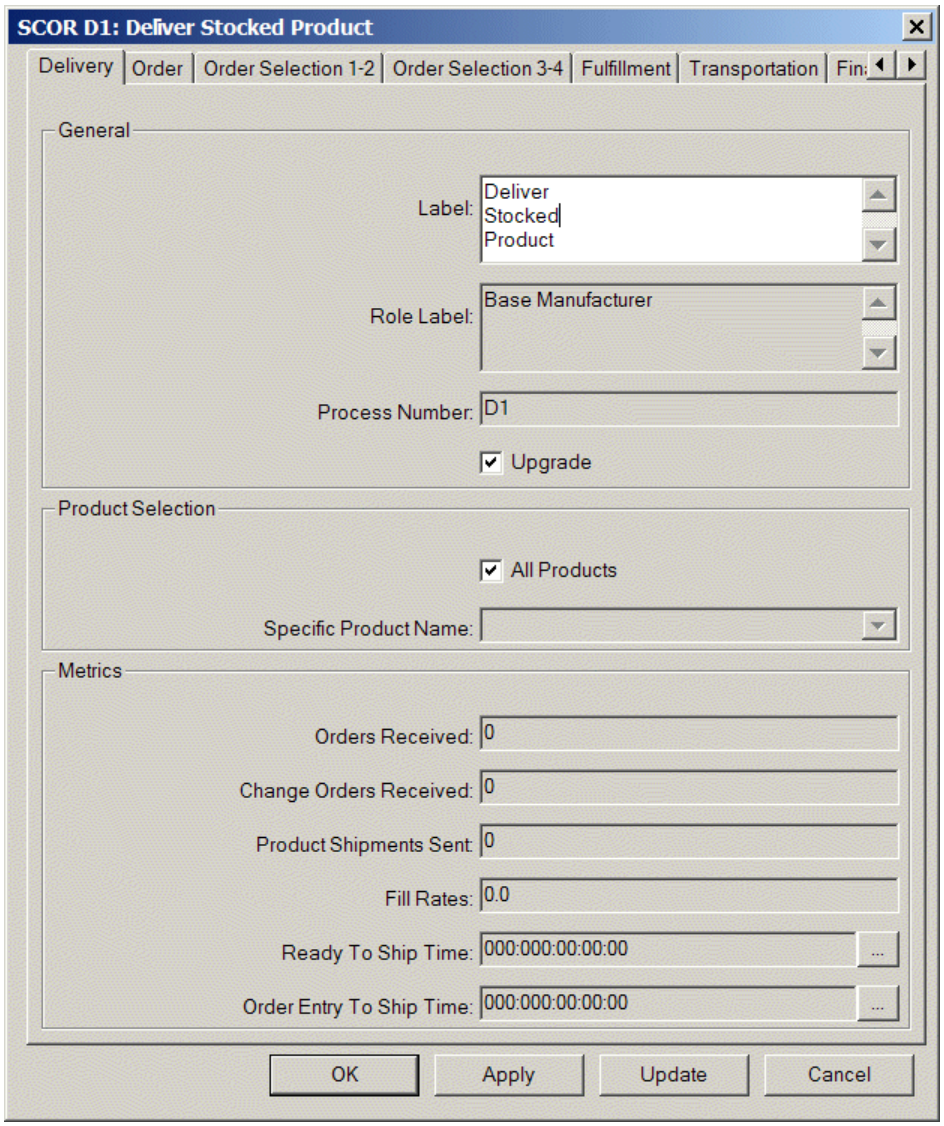
Group/ Parameter	Tab	Description
Costs per Transaction ECO	Cost	(Mb, M3) The costs associated with engineering change orders for engineer-to-order products. The default value is 0. **Note:** This parameter applies to ETO delivery products only.
Costs per Transaction Production Material Handling	Cost	The costs associated with handling the components the Make category uses to manufacture finished products. The default value is 0.

Configuring the Deliver Category

The properties dialogs for the Deliver categories have these parameter differences, by tab:

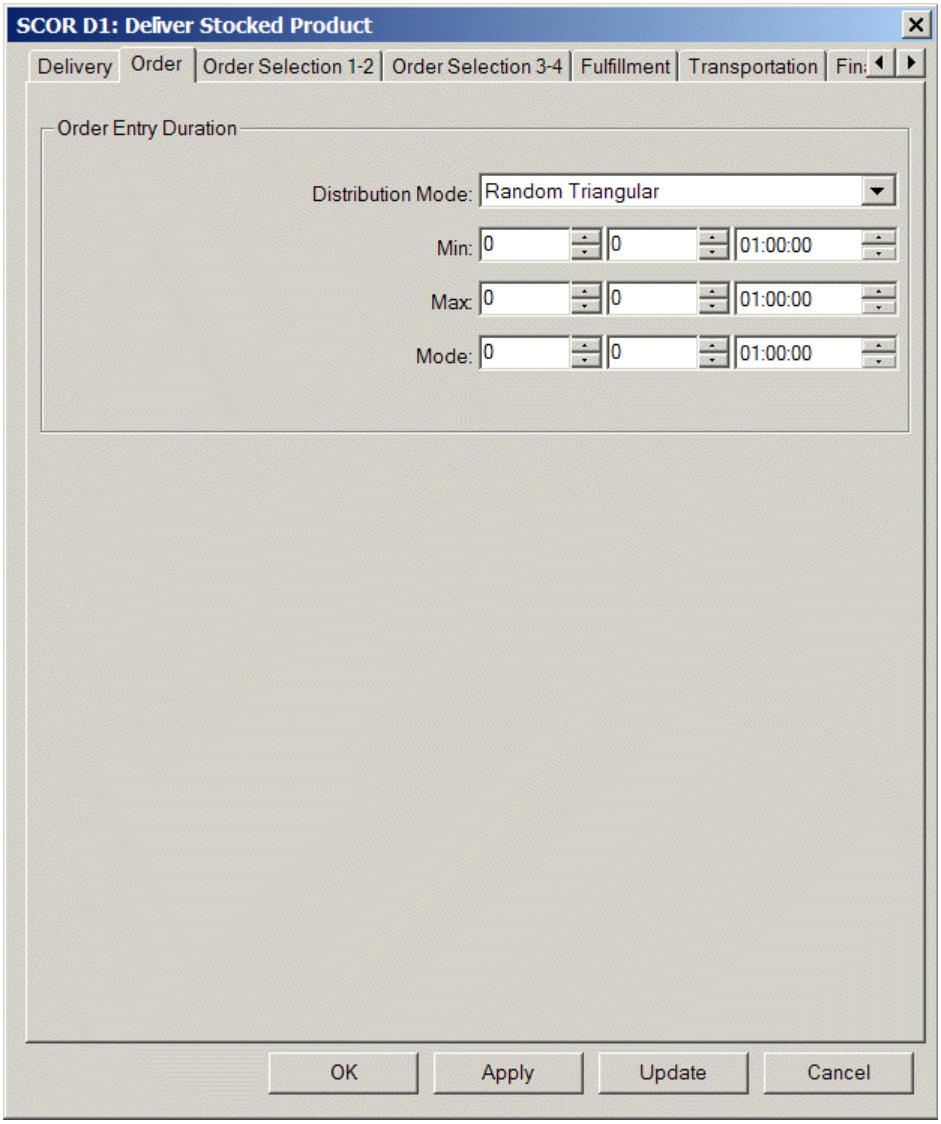
- Order tab: The D3 category does not have the Order Entry Duration parameter; therefore, the D3 category does not have the Order tab at all.
- Order Selection tab: The D3 category does not have the Order Selection tab.

The following figure shows the Delivery tab of the default properties dialog for the D1: Deliver Stocked Product category of a Base Manufacturer role:



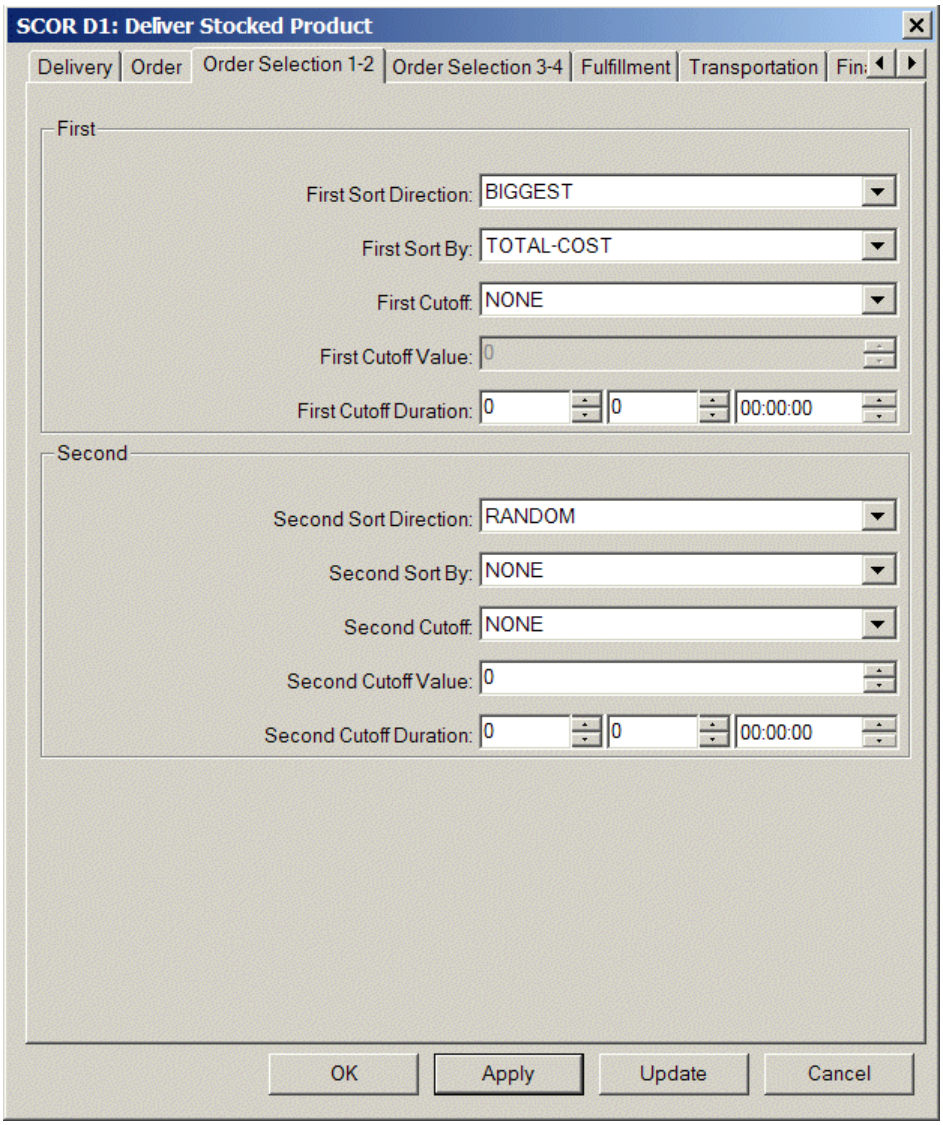
Parameters apply to all delivery products associated with the role.

The following figure shows the Order tab of the default properties dialog for the D1: Deliver Stocked Product category:



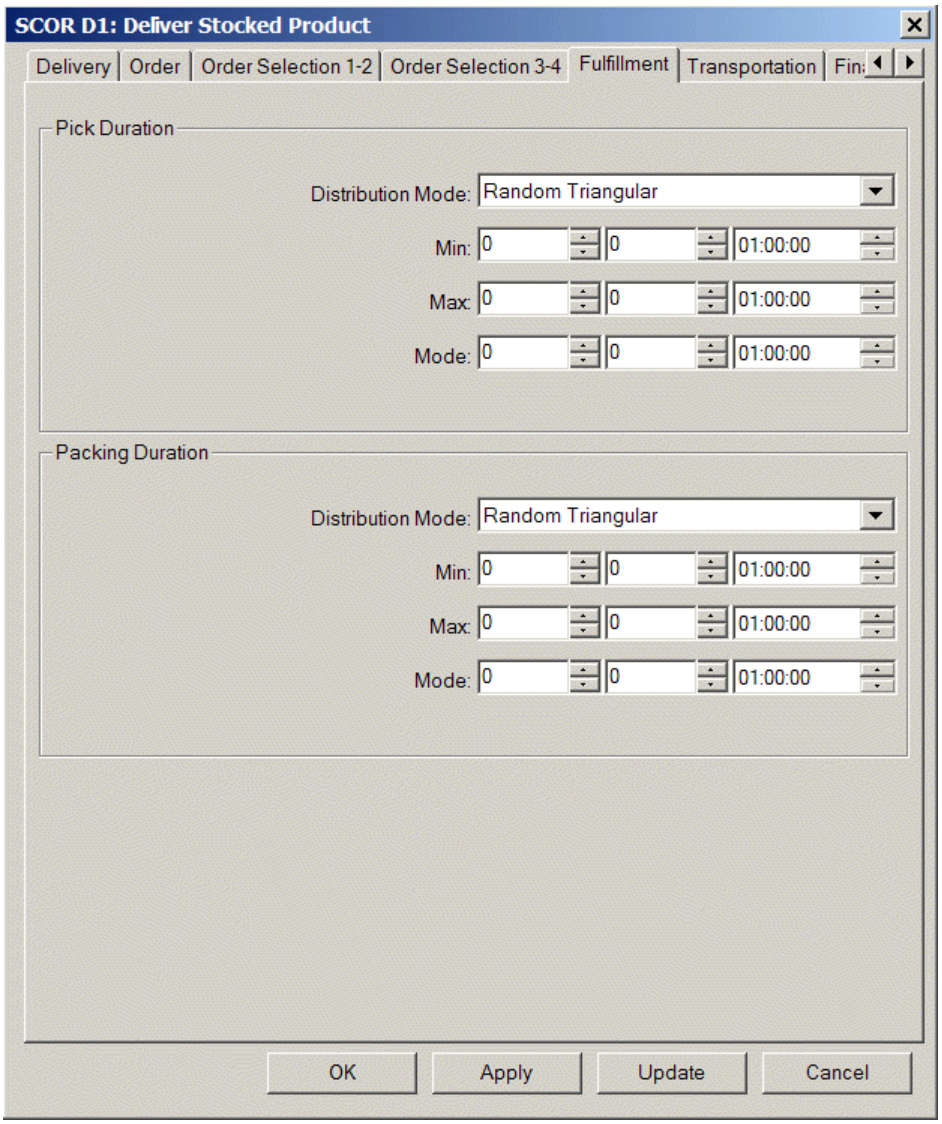
Takes 1 hour to enter an order, the default.

The following figure shows the Order Selection 1-2 tab of a sample properties dialog for the D1: Deliver Stocked Product category. The Order Selection 3-4 tab is similar.



Delivers the orders with the highest cost first. By default, it chooses orders at random.

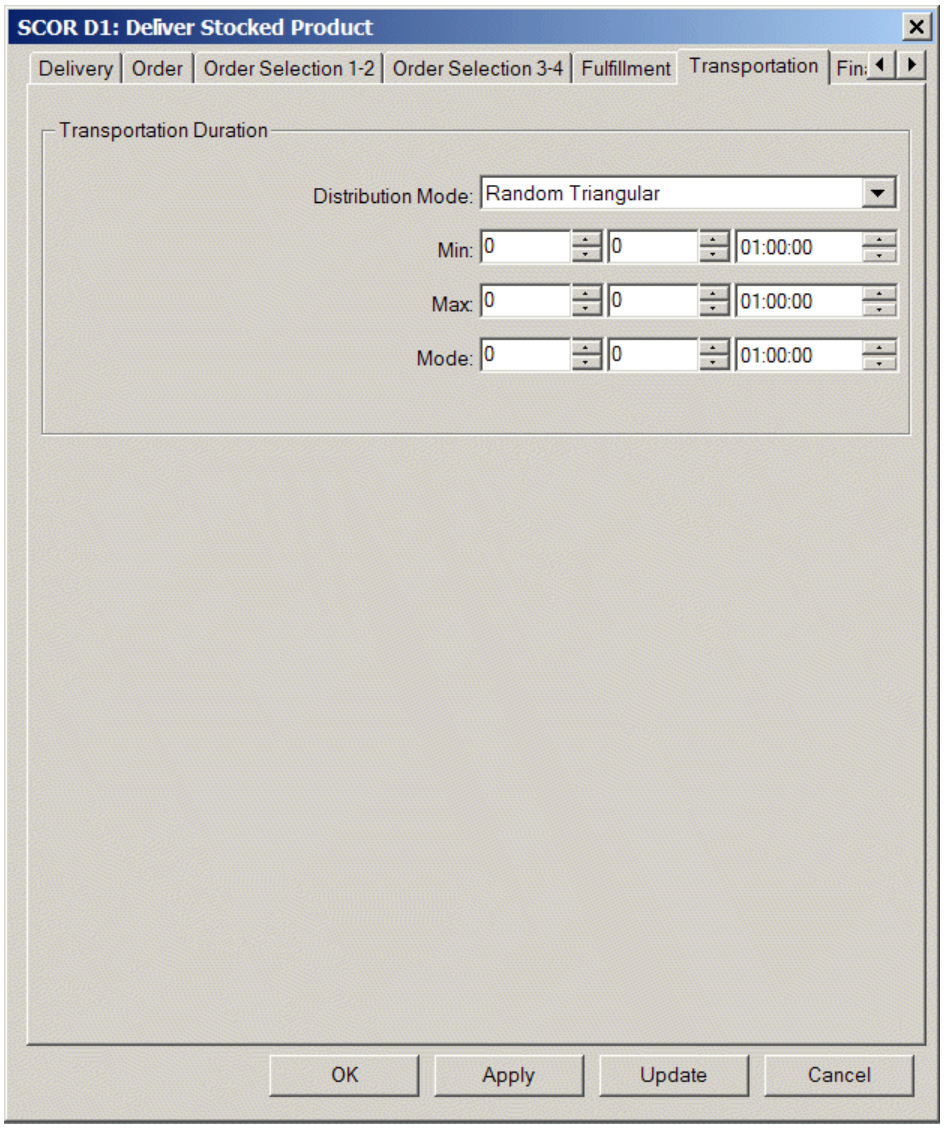
The following figure shows the Fulfillment tab of the default properties dialog for the D1: Deliver Stocked Product category:



Takes 1 hour to pick delivery products from inventory, the default.

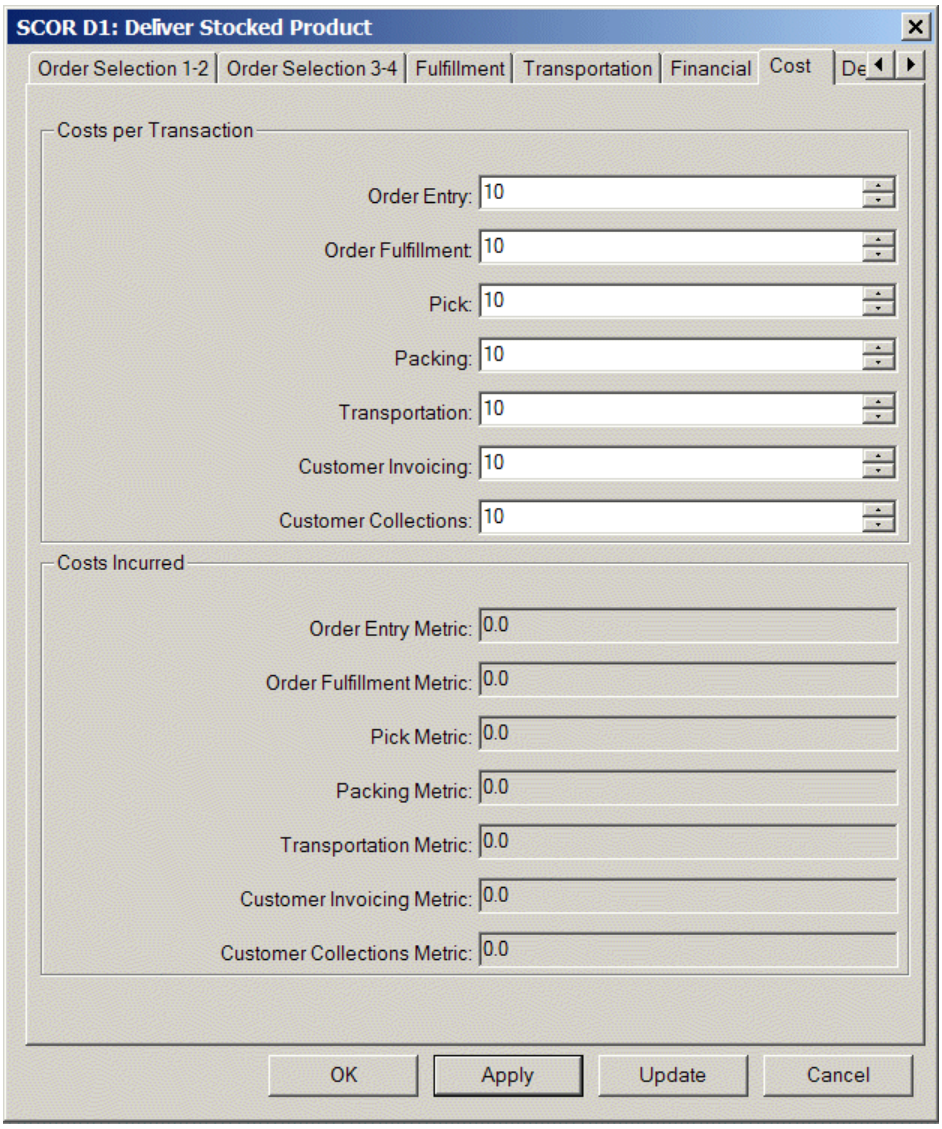
Takes 1 hour to pack a container with a shipment, the default.

The following figure shows the Transportation tab of the default properties dialog for the D1: Deliver Stocked Product category:



Takes 1 hour to ship an order, the default.

The following figure shows the Cost tab of a sample properties dialog for the D1: Deliver Stocked Product category:



Costs $10 per transaction to enter and fulfill an order, pick the shipment from inventory, pack the container for shipment, transport the shipment, and invoice and collect payments from the buyer.

Group/ Parameter	Tab	Description
General Label	Delivery	The label to display with the category. The default value is the SCOR category name.
General Upgrade	Delivery	When using a new version of e-SCOR, whether to upgrade the category, using the default role template ("on") or whether to leave the category as it is ("off"). The default value is "on". For details, see Upgrading Models.
Product Selection All Products Specific Product Name	Delivery	Whether the Deliver category parameters apply to all delivery products associated with the role or to a specific delivery product. By default, All Products is enabled. When All Products is disabled, configure the Specific Product Name parameter to determine the specific delivery product to which the Deliver category parameters apply. You configure these parameters when the Deliver category delivers multiple products. For details, see Adding Multiple Categories to Role Details.
Order Entry Duration Distribution Mode	Order	(D1, D2) The time it takes from when the Deliver category receives an order to when it enters the order. For information on how to use other distributions, see Configuring the Mathematical Distribution.

Group/ Parameter	Tab	Description
First Second Third Fourth Sort Direction Sort Criteria Cutoff Cutoff Value Cutoff Duration	Order Selection 1-2 Order Selection 3-4	(D1, D2) The criteria that determines how to choose orders for delivery. By default, the Deliver category chooses orders at random, based on the Sort Criteria. The Deliver category sorts orders waiting to be delivered, based on up to four criteria. You can sort orders, based on any numeric or time-based value of an order. The Deliver category sorts orders, based on the criteria in the First group. If two orders have the same value for the specified sort attribute, the Deliver category sorts orders, based on the criteria in the Second group, and so on. The D3: Deliver Engineer-to-Order Product category does not include order selection criteria. Instead, the build selection criteria for the M3: Engineer-to-Order category determines the criteria the role uses to deliver engineer-to-order products. For a description of the sort and cutoff parameters and how to use them, see Configuring Order Selection Parameters.
Pick Duration Distribution Mode	Fulfillment	The time it takes from when the Deliver category enters an order to when it picks delivery products from inventory for packing. For information on how to use other distributions, see Configuring the Mathematical Distribution.
Packing Duration Distribution Mode	Fulfillment	The time it takes from when the Deliver category picks delivery products from inventory to when it packs them into containers for shipment. For information on how to use other distributions, see Configuring the Mathematical Distribution.

Group/ Parameter	Tab	Description
Transportation Duration Distribution Mode	Transportation	The time it takes from when the Deliver category packs containers for shipment to when the buyer receives the shipment. By default, you specify the Min, Max, and Mode of a triangular function. The default values are 1 hour. For information on how to use other distributions, see Configuring the Mathematical Distribution. **Tip:** Assets transfer from supplier to buyer at the end of the Transportation Duration and before the Receiving Duration of the buyer role's Source category. To cause assets to transfer at shipment time, configure the Receiving Duration to be zero and configure the Transportation Duration to include the receiving time. The asset metrics for the supplier and buyer roles reflect this difference, as do the Supplier On-Time Performance and Delivery Performance metrics of the ES: Enable Source and ED: Enable Deliver categories, respectively.
Costs per Transaction Order Entry	Cost	The costs associated with entering an order. The default value is 0.
Costs per Transaction Order Fulfillment	Cost	The costs associated with fulfilling an order. The default value is 0.
Costs per Transaction Pick	Cost	The costs associated with picking delivery products from inventory. The default value is 0.
Costs per Transaction Packing	Cost	The costs associated with packing shipments for delivery. The default value is 0.
Costs per Transaction Transportation	Cost	The average shipping cost per shipment. The default value is 0.

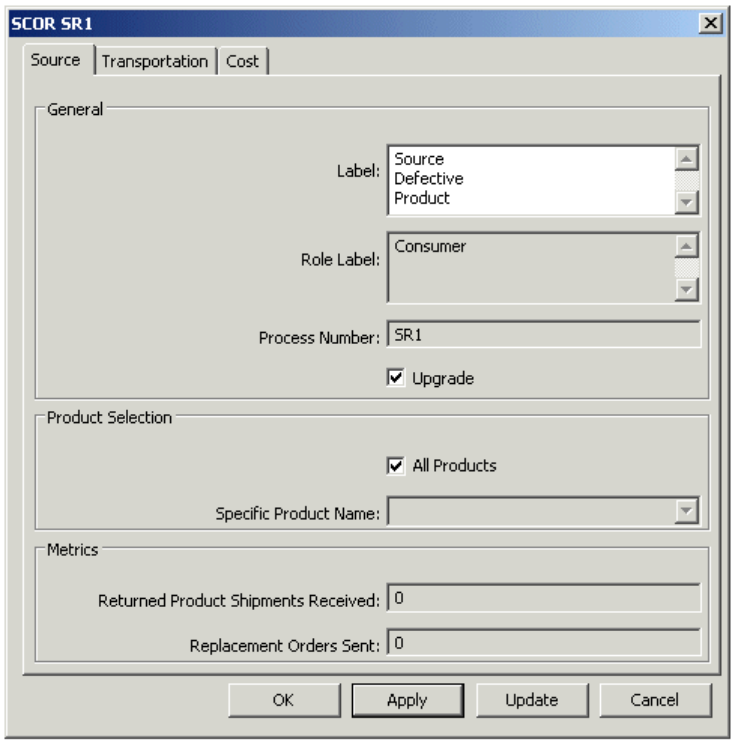
Group/ Parameter	Tab	Description
Costs per Transaction Customer Invoicing	Cost	The costs associated with invoicing the buyer. The default value is 0.
Costs per Transaction Customer Collections	Cost	The costs associated with collecting payments from the buyer. The default value is 0.

Configuring the Source Returns Category

The properties dialogs for the Source Returns categories have these parameter differences, by tab:

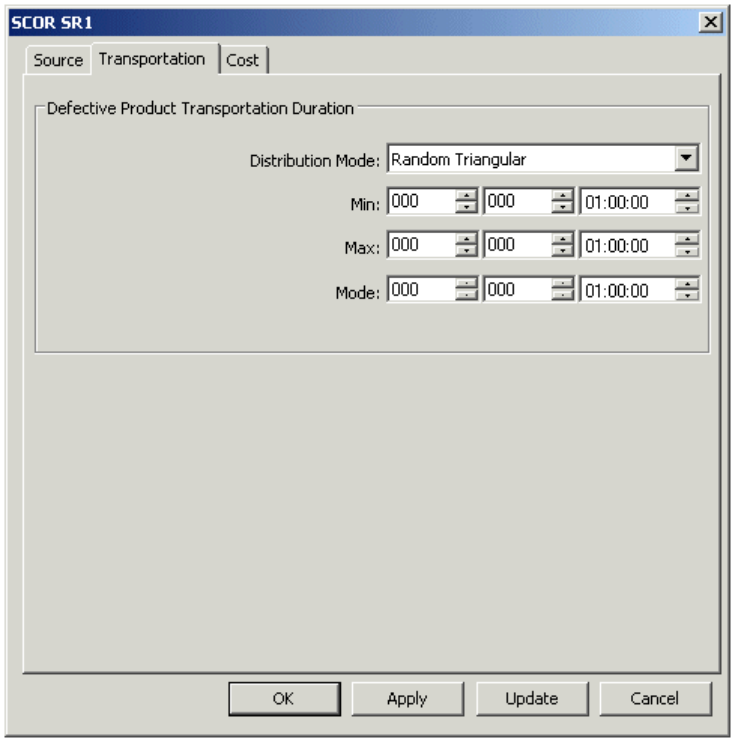
- Transportation tab: The label depends on the category — Defective Product Transportation Duration, MRO Product Transportation Duration, and Excess Product Transportation Duration.
- Cost tab: The label depends on the category, for example, Defective Product Transportation Cost, MRO Product Transportation Cost, and Excess Inventory Transportation Cost.

The following figure shows the Source tab of the default properties dialog for the SR1: Source Defective Product category of a Consumer role:



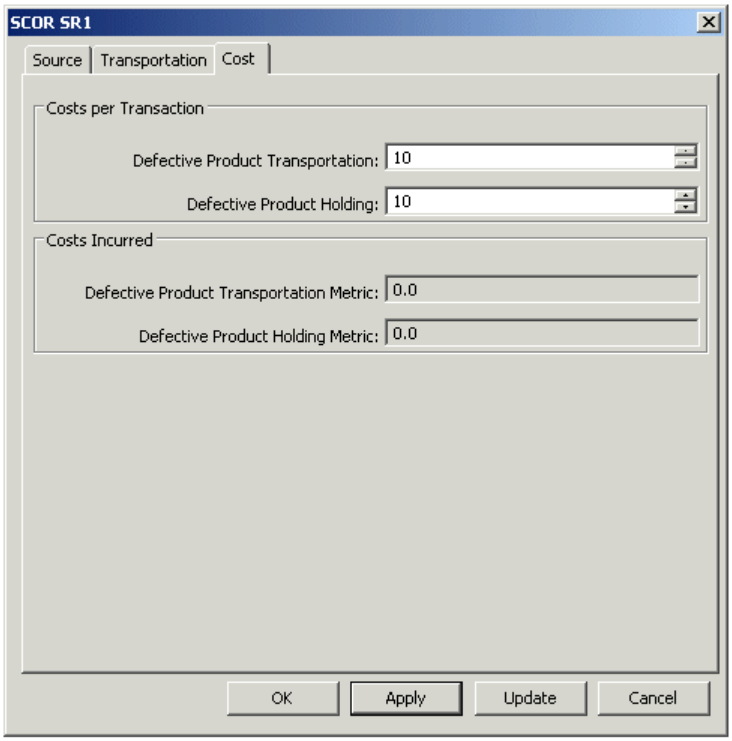
Parameters apply to all source products associated with the role.

The following figure shows the Transportation tab of the default properties dialog for the SR1: Source Defective Product category:



Takes 1 hour to ship returned defective products, the default.

The following figure shows the Cost tab of a sample properties dialog for the SR1: Source Defective Product category:



Costs $10 per transaction to ship and hold defective products.

Group/ Parameter	Tab	Description
General Label	Delivery	The label to display with the category. The default value is the SCOR category name.
General Upgrade	Delivery	When using a new version of e-SCOR, whether to upgrade the category, using the default role template ("on") or whether to leave the category as it is ("off"). The default value is "on". For details, see Upgrading Models.

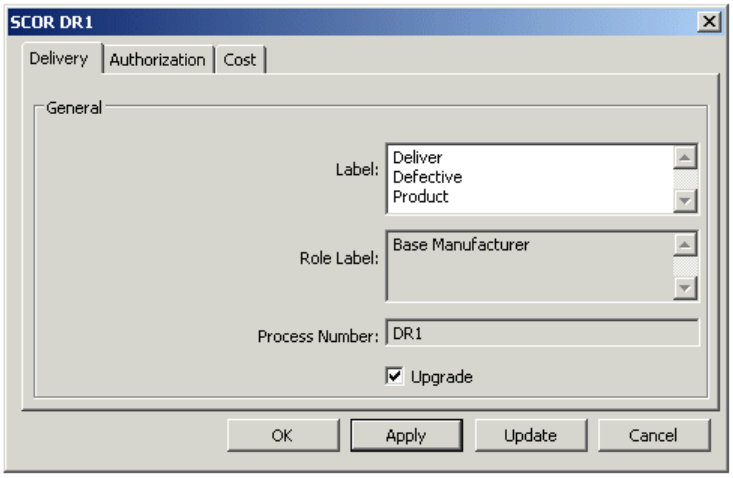
Group/ Parameter	Tab	Description
SR1: Defective Product Transportation Duration SR2: MRO Product Transportation Duration SR3: Excess Product Transportation Duration Distribution Mode Min Max Mode	Transportation	The time it transport products that are defective, excess or require MRO back to the relevant supplier. For information on how to use other distributions, see Configuring the Mathematical Distribution.
Costs per Transaction SR1: Defective Product Transportation SR2: MRO Product Transportation SR3: Excess Inventory Transportation	Cost	The costs associated with transporting defective products, MRO products, or excess inventory. The default value is 0.
Costs per Transaction SR1: Defective Product Holding SR2: MRO Product Holding SR3: Excess Inventory Holding	Cost	The costs associated with holding defective products, MRO products, or excess inventory. The default value is 0.

Configuring the Deliver Returns Category

The properties dialogs for the Deliver Returns categories have these parameter differences, by tab:

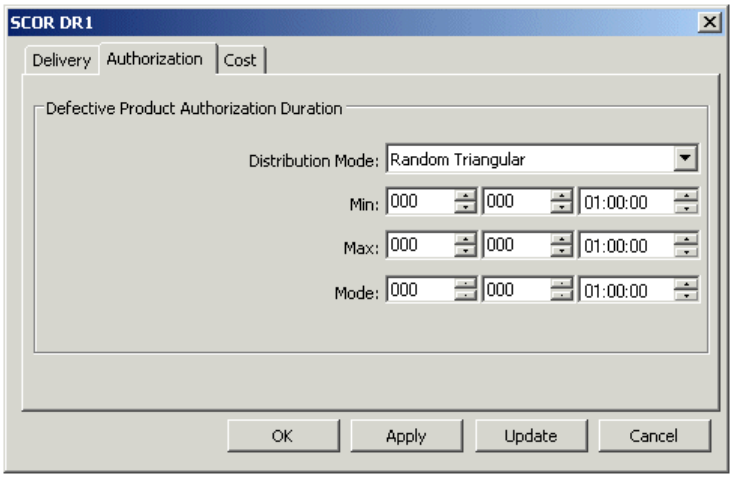
- Authorization tab: The label depends on the category — Defective Product Authorization Duration, MRO Product Authorization Duration, and Excess Inventory Authorization Duration.
- Cost tab: The label depends on the category, for example, Defective Product Authorization Cost, MRO Product Authorization Cost, and Excess Inventory Authorization Cost.

The following figure shows the Delivery tab of the default properties dialog for the DR1: Deliver Defective Product category of a Base Manufacturer role:



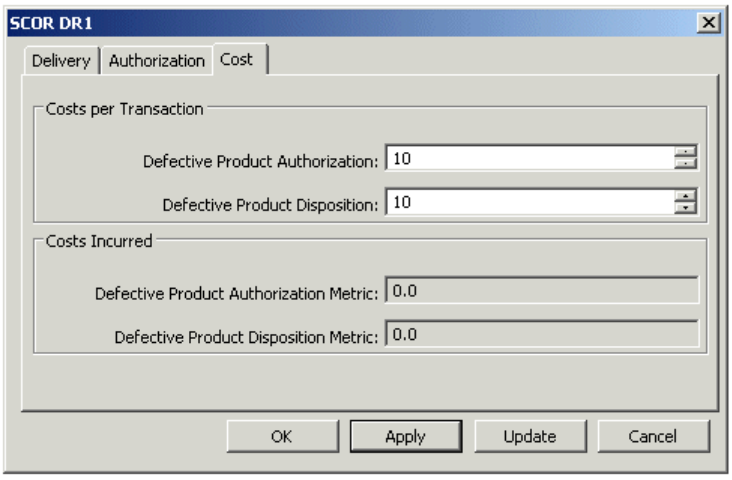
Parameters apply to all delivery products associated with the role.

The following figure shows the Authorization tab of the default properties dialog for the DR1: Deliver Defective Product category:



Takes 1 hour to authorize defective products, the default.

The following figure shows the Cost tab of a sample properties dialog for the DR1: Deliver Defective Product category:



Costs $10 per transaction to authorize and dispose of defective products.

Group/ Parameter	Tab	Description
General Label	Delivery	The label to display with the category. The default value is the SCOR category name.
General Upgrade	Delivery	When using a new version of e-SCOR, whether to upgrade the category, using the default role template ("on") or whether to leave the category as it is ("off"). The default value is "on". For details, see Upgrading Models.

Group/ Parameter	Tab	Description
DR1: Defective Product Authorization Duration DR2: MRO Product Authorization Duration DR3: Excess Inventory Authorization Duration Distribution Mode Min Max Mode	Authorization	The time it takes to authorize the delivery of defective products, MRO products, and excess inventory. For information on how to use other distributions, see Configuring the Mathematical Distribution.
Costs per Transaction DR1: Defective Product Authorization DR2: MRO Product Authorization DR3: Excess Inventory Authorization	Cost	The costs associated with authorizing defective products, MRO products, or excess inventory. The default value is 0.
Costs per Transaction DR1: Defective Product Disposition DR2: MRO Product Disposition DR3: Excess Inventory Disposition	Cost	The costs associated with disposing of defective products, MRO products, or excess inventory. The default value is 0.

Configuring Product Composites

The parameters for source and delivery products apply to individual products that a role sources, makes, or delivers. Compare these parameters with the parameters for categories, which, by default, apply to *every* product that the category sources, makes, or delivers. Source and delivery product parameters include the order type, starting inventory, inventory control strategy, safety stock, reorder quantities, desired turnaround, batch sizes, and net selling price.

To configure product composite parameters, you need to understand:

- The default source and delivery products for each role.
- How to configure product composite parameters, in general.
- How to configure multipliers for timing parameters.

You can configure parameters for:

- Source products.
- Delivery products.

The sections that describe the source and delivery product parameters include a sample properties dialog for the source product of a Consumer role and the delivery product of a Base Manufacturer role.

The parameters you configure for the source and delivery products of a Distributor and Manufacturer role are similar. Differences are noted in the descriptions of parameters.

A Base Manufacturer role has delivery products only, and a Consumer role has source products only.

See Also Configuring the Products a Role Sources and Delivers.

Default Source and Delivery Products for Each Role

This table describes the source and delivery products that you assign to each type of role:

For this type of role...	You assign...
Base Manufacturer	Delivery products that are the raw materials for the overall supply chain. If the product specification you assign has components, the Base Manufacturer ignores the components.
Distributor	Source and delivery products. When assembling components into kits, you assign components as source products and finished products as delivery products.
Manufacturer	Source products that are either components or finished products, and delivery products that are finished products, which use the source products as components.
Consumer	Source products that are the finished products for the overall supply chain.

Configuring Product Composite Parameters

You configure parameters for each source and delivery product that e-SCOR creates. Source and delivery products exist on the detail of the Products pool, which is located on the role detail.

To configure product composite parameters:

➔ Choose Products from a role, then choose a source or delivery product whose parameters you want to configure.

or

1 Do either of the following to go to the Products pool detail:

➔ Choose Show Products from a role.

or

➔ Show the detail of a role, then show the detail of the Products pool:

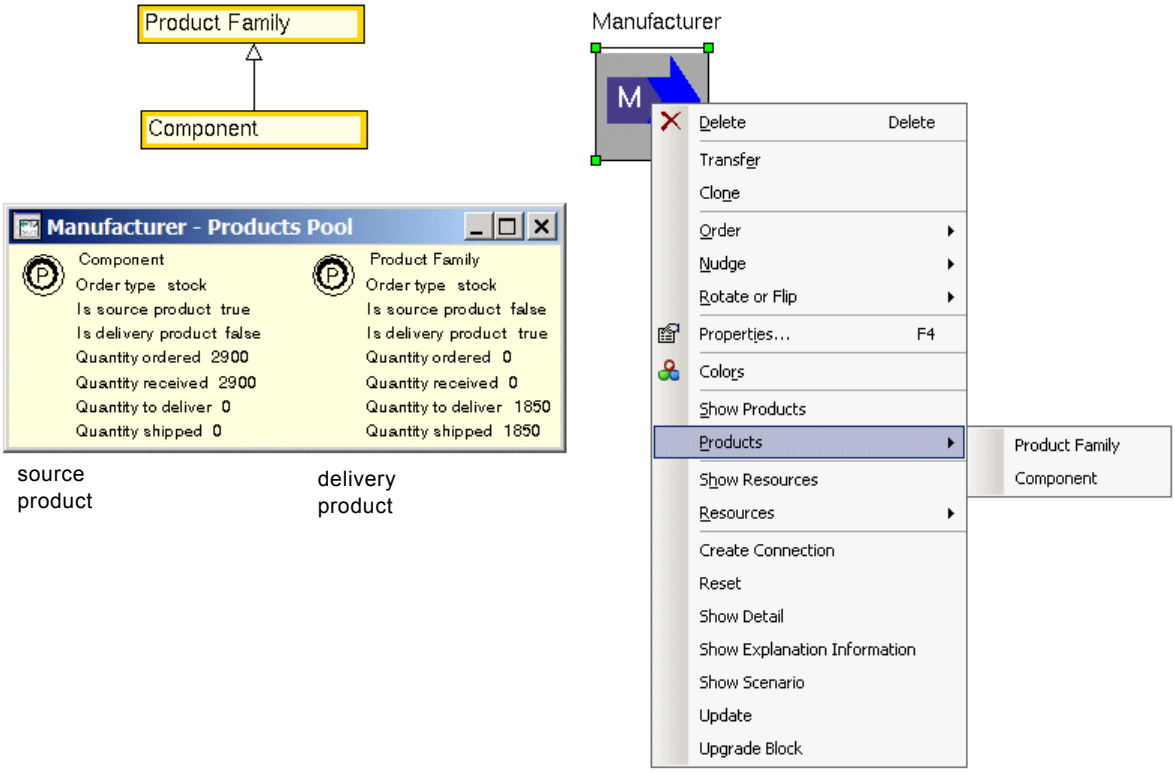
Each source and delivery product associated with the role appears in the pool.

2 Display the properties dialog for each source and delivery product to configure its parameters.

Note If no product composites appear in the Products pool, you have not yet assigned products specifications to the role. For details, see Configuring the Products a Role Sources and Delivers.

The Products pool shows the source and delivery products for a role. The product composite shows the Product Name, Order Type, and various order metrics. Source products specify Is Source Product as true, and delivery products specify Is Delivery Product as true. A product that is both a source and delivery product specifies both Is Source Product and Is Delivery Product as true.

This figure shows the product hierarchy, Products menu, and Products pool of a Manufacturer role that defines a source product named Component and a delivery product named Product Family:



Configuring Multipliers for Timing Parameters

By default, the timing parameters you configure for each Source, Make, and Deliver category on the role detail apply equally to each product composite associated with the role. For example, the Manufacturing Duration parameter of the Make category of a Manufacturer role applies equally to each delivery product the role makes. If you assign multiple product specifications to the role, each delivery product takes the same amount of time to build.

You might want to model variation in the timing parameters for Source, Make, and Deliver categories for different source and delivery products associated with a role. For example, a Manufacturer role might make two different finished products, where one product takes 25% longer than the other to make due to an extra assembly or finishing step.

One way to model this variation in build time is to configure a multiplier for the Manufacturing Duration parameter for each delivery product associated with the role. For example, the multiplier for one delivery product would be 1.0, the default, and the multiplier for the other delivery product would be 1.25.

To model variation in timing parameters for individual product composites, you configure the multipliers associated with the following Source, Make, and Deliver category parameters located on these tab pages:

Category	Tab	Parameter
Source category	Receiving	Receiving Duration
	Verification	Verification Duration
	Transfer	Transfer Duration
Make category	Engineering	Engineering Duration (raw materials)
	Build Orders	Order Release to Manufacturing Duration (raw materials)
	Production Material	Production Material Duration (raw materials)
	Manufacturing	Manufacturing Duration (finished goods)
	Transfer	Move to Delivery Duration (finished goods)

Category	Tab	Parameter
Deliver category	Order	Order Entry Duration
	Fulfillment	Pick Duration
	Fulfillment	Packing Duration
	Transportation	Transportation Duration

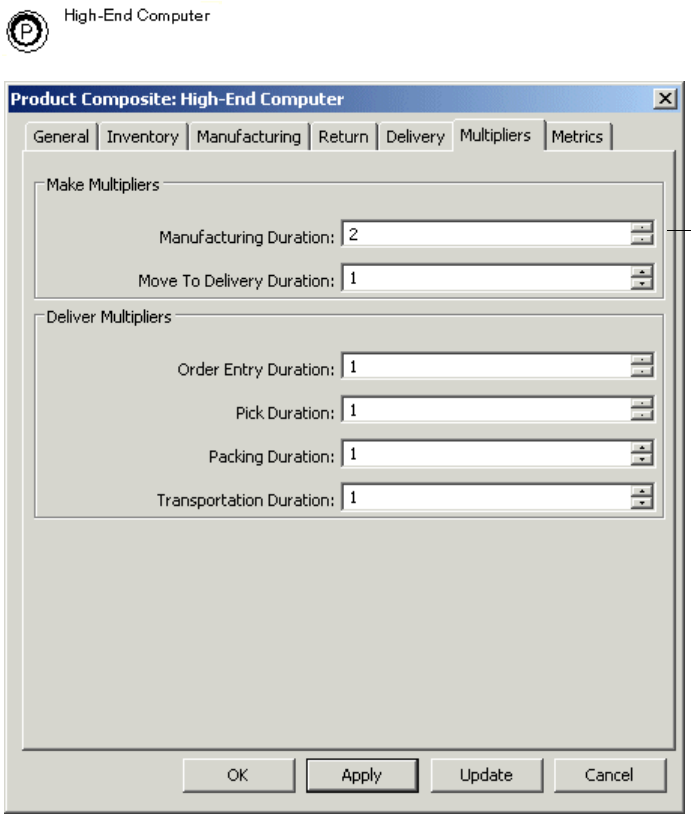
For information about an alternative technique for modeling variation among product composites, see Adding Multiple Categories to Role Details.

To configure multipliers for timing parameters:

➔ Display the properties dialogs for individual source or deliver products associated with a role, click the Multipliers tab, and configure the multiplier associated with the timing parameter whose value you want to vary.

Typically, you configure the multiplier associated with one product composite to be 1.0, the default, and the other to be a multiple or a fraction of 1.0, such as 1.25 or .85.

The following figures show how to configure the Manufacturing Duration Multiplier for a High-end Computer, which requires an extra assembly step:



The High-End Computer takes twice as long to manufacture than the Low-End Computer. To model this, configure the Manufacturing Duration Multiplier to be 2.

Configuring Parameters for Source Products

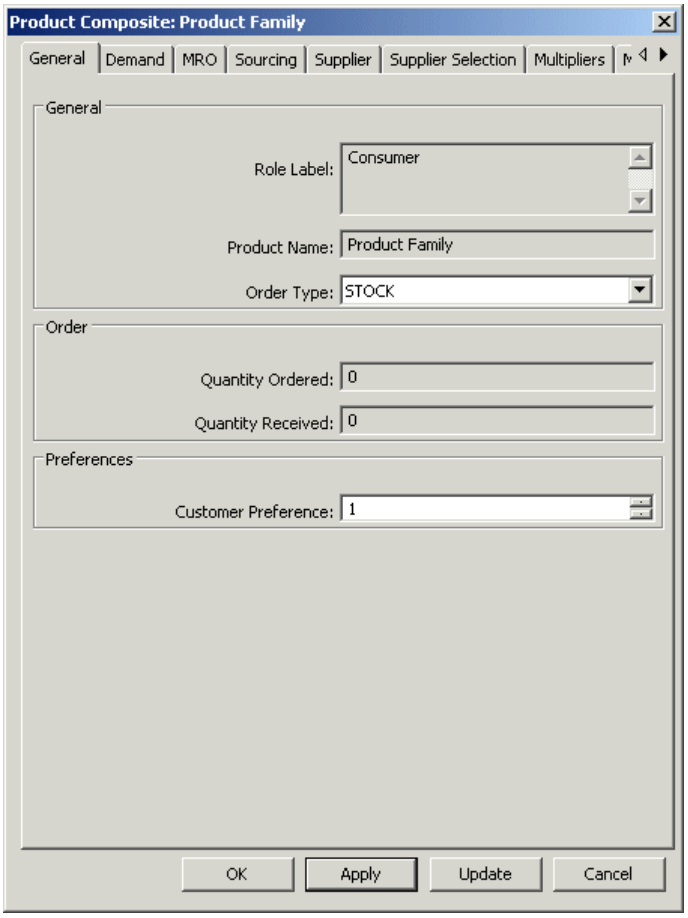
You configure parameters for source products on the following tabs of the product composite dialog:

- General tab
- Demand tab (Consumer role only)
- MRO tab
- Inventory tab (Distributor and Manufacturer roles only)
- Supplier tab
- Supplier Selection tab
- Multipliers tab

Each section below provides an example of the properties dialog tab page for the source product of a Consumer role and a description of each parameter.

General Tab

The following figure shows the General tab of the default properties dialog for the Product Family source product of a Consumer role:



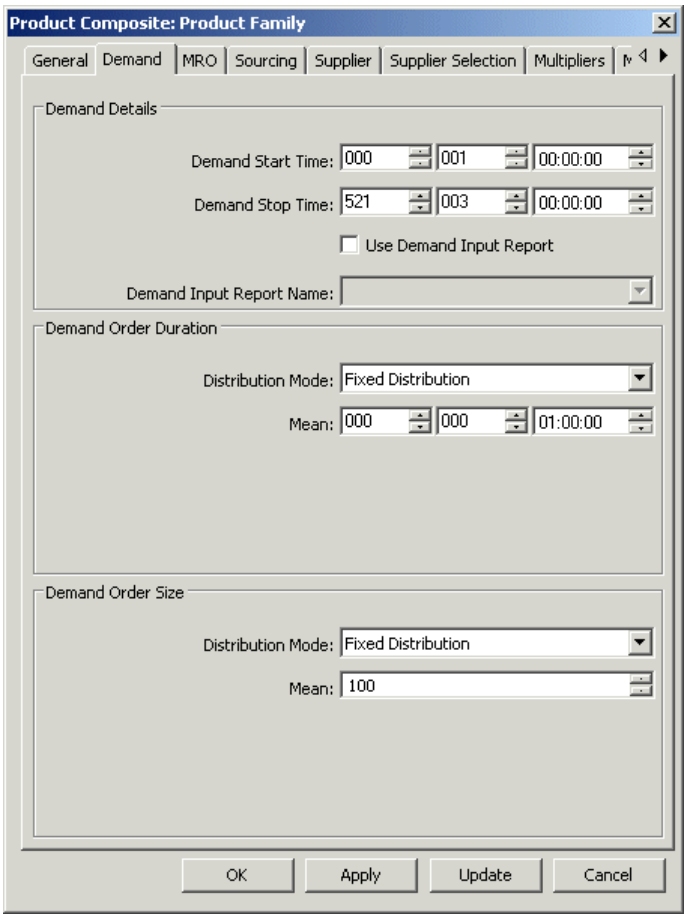
Uses a stock planning strategy, the default.

Uses the default preferences for the source product and the buyer role.

Group/ Parameter	Description
General Order Type	Determines whether to use a stock, mto (make-to-order), or eto (engineer-to-order) planning strategy when creating customer orders for source products. The default is stock. For details on each of these planning strategies, see Using Alternative Planning Strategies.
Preference Customer Preference	A number representing the priority of a downstream buyer's source product, where the lower number means a higher priority. The default value is 1. You can use this number to choose which delivery product to deliver first when configuring the Order Selection parameters of the Deliver category of the upstream supplier. For details, see Configuring Order Selection Parameters.

Demand Tab

The following figure shows the Demand tab of the default properties dialog for the source product of a Consumer role. You only configure parameters on the Demand tab for the source product of a Consumer role.



Creates the first demand order one day after the start of the simulation, the default, and uses the default stop time, which is 10 years.

Creates a demand order once an hour, the default.

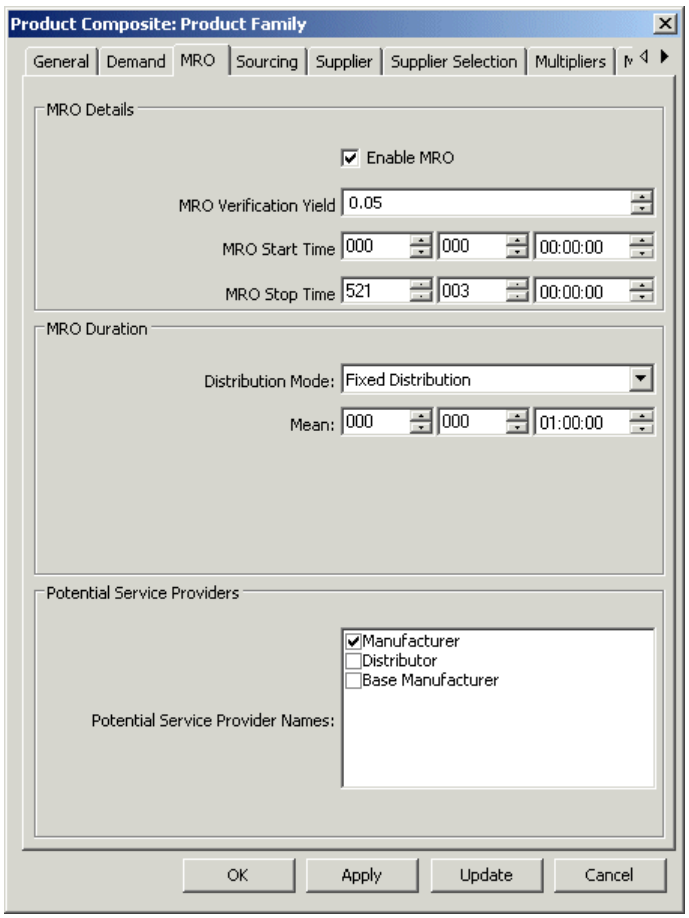
Creates a demand order for 100 source products, the default.

Group/ Parameter	Description
Demand Details Demand Start Time	The time at which a Consumer role creates its first demand order for source products, from the start time of the simulation. The default value is one day after the start of the simulation.
Demand Details Demand Stop Time	The time after which the Consumer role stops placing demand orders for source products, from the start time of the simulation. The default value is 521 weeks and 3 days, which is 10 years.

Group/ Parameter	Description
Demand Details Use Demand Input Report Demand Input Report Name	Whether to import order demand parameters from the specified report or use the Demand Order Start Time, Demand Order Stop Time, Demand Order Duration, and Demand Order Size from the dialog. By default, the Use Demand Input Report option is disabled. When the Use Demand Input Report option is enabled, you also configure the Demand Input Report Name. For details on configuring these parameters, see Configuring Demand and Change Orders through a Demand Report.
Demand Order Duration Distribution Mode Mean	The frequency with which the Consumer role creates demand orders for source products. By default, you specify the Mean of a fixed distribution. The default value is 1 hour. For information on how to use other distributions, see Configuring the Mathematical Distribution. For information on configuring these parameters through a report, see Configuring Demand and Change Orders through a Demand Report.
Demand Order Size Distribution Mode Mean	The number of units of source products that a Consumer role orders, which determines initial order demand for the overall supply chain. By default, you specify the Mean of a fixed distribution. The default value is 100. For information on how to use other distributions, see Configuring the Mathematical Distribution. For information on configuring these parameters through a report, see Configuring Demand and Change Orders through a Demand Report.

MRO Tab

The following figure shows the MRO tab of the default properties dialog for the source product of a Consumer role:



Enables maintenance, repair, and overhaul of source products, where 5% of the source products are returned.

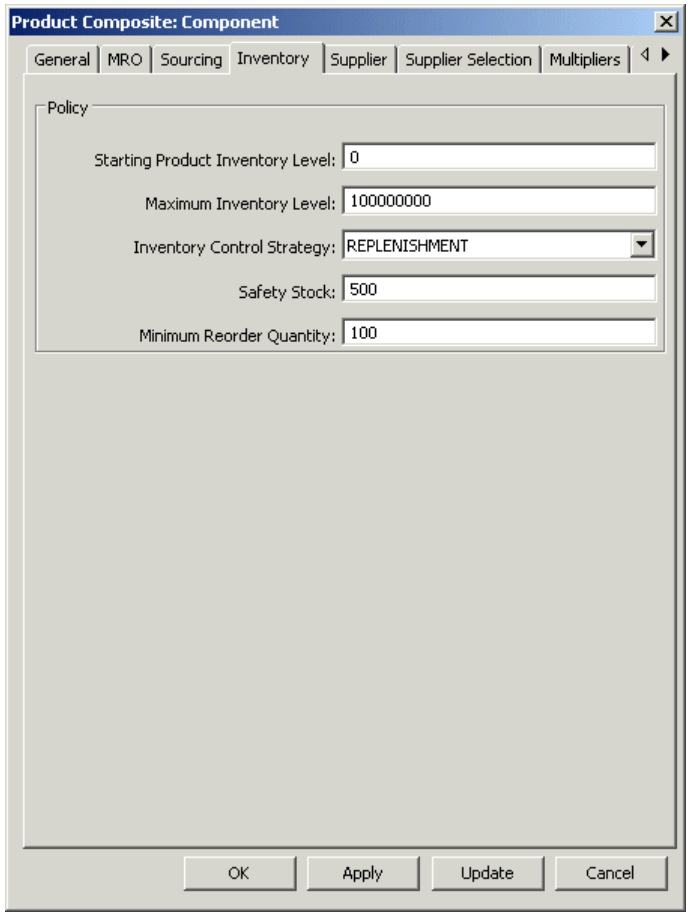
Sources replacement products from Manufacturer role.

Group/ Parameter	Description
MRO Details Enable MRO	Whether to enable the maintenance, repair, and overhaul of source products.
MRO Details MRO Verification Yield	The percentage of source products that are returned for maintenance, repair, and overhaul.
MRO Details MRO Start Time MRO Stop Time	The time at which to start and stop the maintenance, repair, and overhaul of source products.

Group/ Parameter	Description
MRO Duration Distribution Mode Mean	The time it takes to return source products for maintenance, repair, and overhaul.
Potential Service Providers Potential Service Provider Names	The list of potential suppliers that potentially accept MRO contracts.

Inventory Tab

The following figure shows the Inventory tab of the default properties dialog for the source product of a Manufacturer role. You do not configure inventory parameters for the source product of a Consumer role.

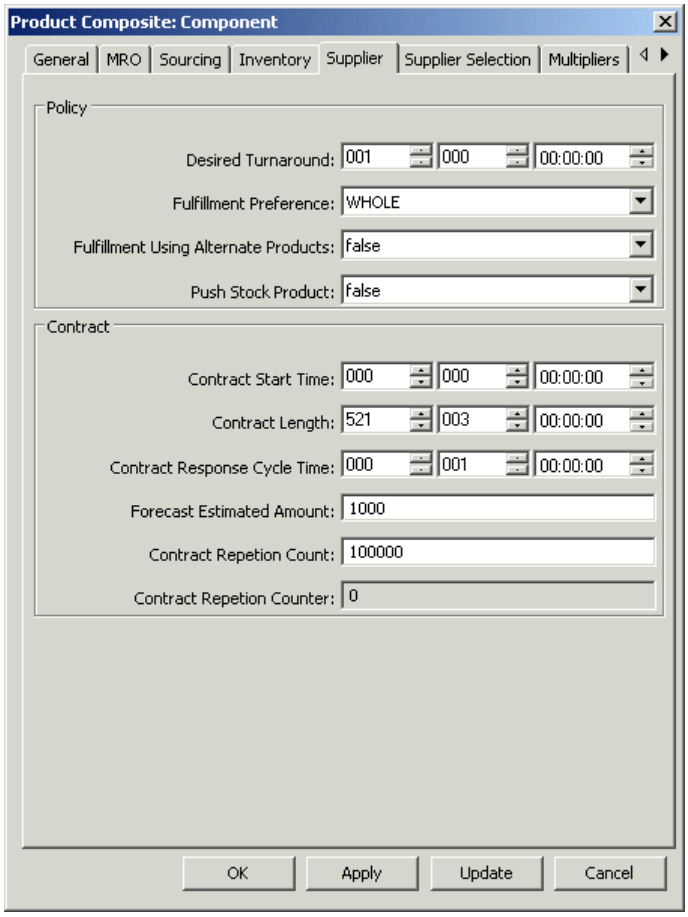


Uses a stock/replenishment planning strategy, the default, and the default starting and maximum inventory levels, safety stock, and minimum reorder quantity.

Group/ Parameter	Description
Policy Starting Product Inventory Level	The number of source products in inventory at the start of the simulation. Configure this parameter to avoid skewed order fulfillment lead times at startup while the model accumulates inventory. The default value is 0.
Policy Maximum Inventory Level	The maximum number of source products the role can accommodate in its inventory. If the Inventory Level exceeds this maximum, the role discards the excess. The default value is 100,000,000. The only time the inventory could potentially exceed this maximum is if a supplier pushes products onto a buyer, causing the buyer to exceeds its Maximum Inventory Level. For details, see Using Push Mode Planning.
Policy Inventory Control Strategy	When using a stock planning strategy in pull mode, the planning strategy to use for computing replenishment order size for stock source products. The options are: replenishment, forecast-customer, r-q, and q. The default is replenishment. For more information on using each of these planning strategies, see Using Stock Planning Strategies.
Policy Safety Stock	When using a stock/replenishment planning strategy in pull mode, the minimum number of source products the role needs to maintain in inventory before creating a new replenishment order for source products. The default value is 500. You configure this parameter when the Inventory Control Strategy is replenishment. For details, see Using Stock Planning Strategies.
Policy Minimum Reorder Quantity	When using a stock/replenishment planning strategy in pull mode, the minimum number of source products for which the role creates replenishment orders. The default value is 100. You configure this parameter when the Inventory Control Strategy is replenishment. For details, see Using Stock Planning Strategies.

Supplier Tab

The following figure shows the Supplier tab of the default properties dialog for the source product of a Consumer role:



Uses the default desired turnaround, fulfillment, and push planning parameters.

Uses the default contract parameters.

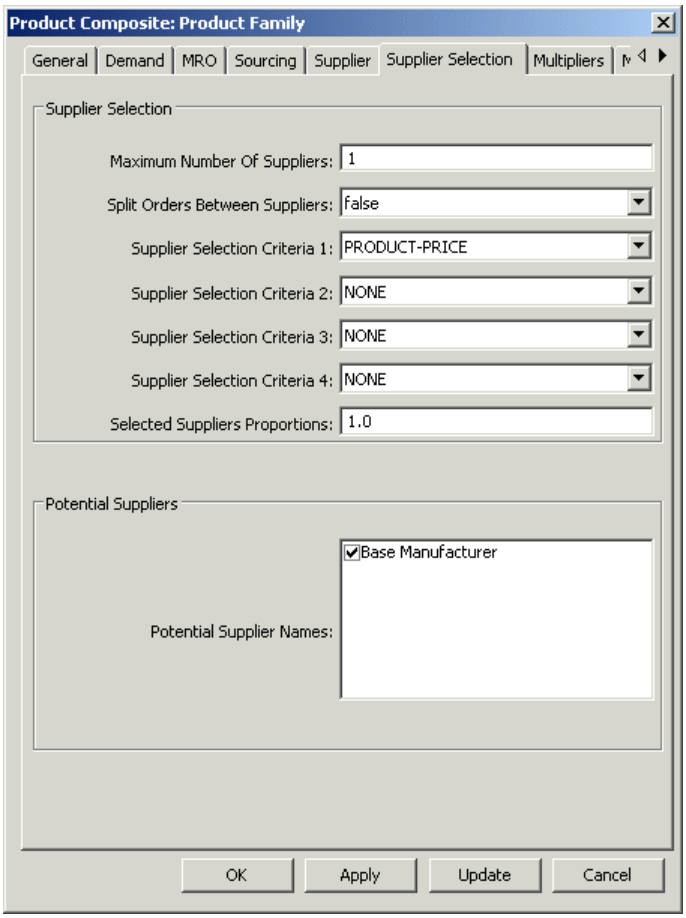
Group/ Parameter	Description
Policy Desired Turnaround	The desired amount of time from when a buyer role places customer orders for its source products to when the buyer receives the shipment. The role uses this parameter to compute the Product Shipment Lead Time of the Source category. The default value is 1 week. For details, see Viewing Metrics for Categories. For information on configuring this parameter through a report, see Configuring Demand and Change Orders through a Demand Report.
Policy Fulfillment Preference	Whether the role must receive complete shipments of the source products it orders (whole) or whether it can receive partial shipments (partial). The default value is whole. If the buyer requires whole shipments, the supplier waits to deliver shipments until it has enough delivery products for a complete order. If the buyer accepts partial shipments, the supplier delivers what it can when it can and creates back orders for the unfulfilled portion of the order. For information on configuring this parameter through a report, see Configuring Demand and Change Orders through a Demand Report.
Policy Fulfillment Using Alternate Products	Whether to fulfill orders for source products with alternate products when generic products are not available. The default value is false, which always uses the generic product. To use alternate products, set this option to true. For more information, see Creating a Product Hierarchy with Alternate Products.

Group/ Parameter	Description
Policy Push Stock Product	Whether to use a push planning mode when placing orders for source products. The default is false, which means the role uses a pull planning mode, whereby the buyer sources products from suppliers by placing orders, and a supplier delivers products to buyers, based on orders. Set this parameter to true to cause the supplier to push products onto buyers, based on contracts. The buyer simply receives those products from suppliers when the supplier pushes them. For more information, see Using Pull and Push Planning Modes.
Contract Contract Start Time	The time from the start of the simulation until the role sends its first purchase request to upstream suppliers for source products. The default value is the start time of the simulation. **Note**: This parameter is also used when using a stock/forecast planning strategy and when using a push planning mode. For details, see Modeling a Process with Multiple Suppliers and Using a Stock/Forecast Planning Strategy.
Contract Contract Length	The length of time during which the contract is valid. The default value is 521 weeks and 3 days (10 years). **Note**: This parameter is also used when using a stock/forecast planning strategy and when using a push planning mode. For details, see Modeling a Process with Multiple Suppliers and Using a Stock/Forecast Planning Strategy.
Contract Contract Response Cycle Time	The number of days the supplier has to respond to a purchase request with a purchase response. The default value is 1 day. **Note:** Orders that are sent when there is no valid contract are deleted. **Note**: This parameter is also used when using a stock/forecast planning strategy and when using a push planning mode. For details, see Modeling a Process with Multiple Suppliers and Using a Stock/Forecast Planning Strategy.

Group/ Parameter	Description
Contract Forecast Estimated Amount	An estimate of the number of source products the buyer expects to order over the life of the contract. The default value is 1000. **Note**: This parameter is only used when using a stock/forecast planning strategy and when using a push planning mode. However, when using contracts to choose suppliers, the Forecast Estimated Amount must be greater than zero. For details, see Using a Stock/Forecast Planning Strategy and see Modeling a Process with Multiple Suppliers.
Contract Contract Repetition Count	The number of times to repeat the contract during the lifetime of the simulation. The default is 100,000. **Note**: This parameter is also used when using a stock/forecast planning strategy and when using a push planning mode.

Supplier Selection Tab

The following figure shows the Supplier Selection tab of the default properties dialog for the source product of a Consumer role, which sources products from the Base Manufacturer role:



Obtains source products from a single upstream supplier, based on price, the default.

Obtains source products from the Base Manufacturer supplier role.

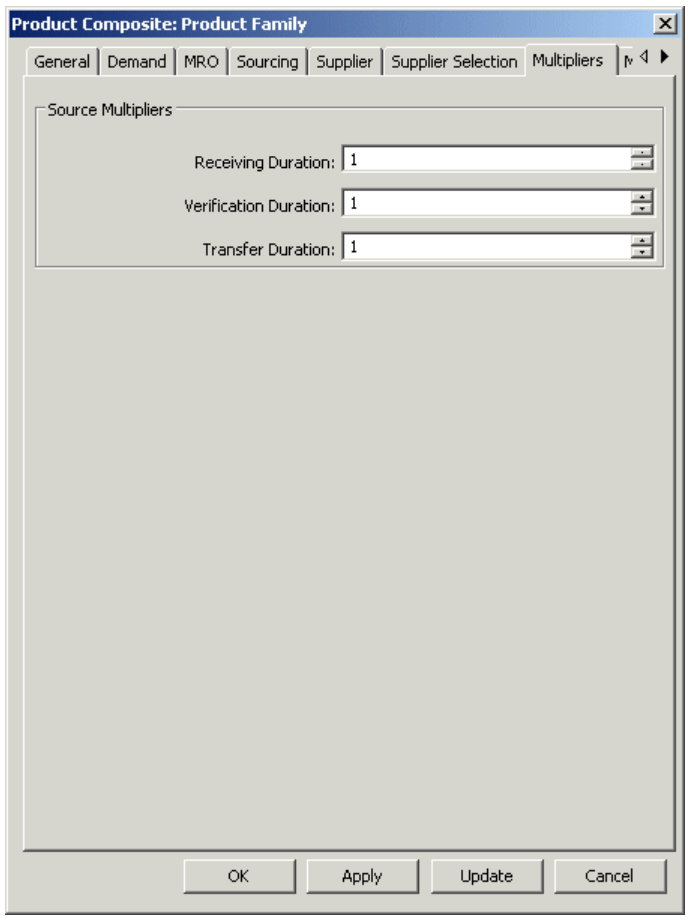
Group/ Parameter	Description
Supplier Selection Maximum Number of Suppliers	Specifies the number of qualified suppliers to which the buyer issues awards for its source products. The default value is 1. **Note:** You only need to configure this parameter when sourcing identical products from multiple suppliers. For details, see Configuring the Supplier Selection Criteria.
Supplier Information Split Orders Between Suppliers	Determines whether to send the order to a single supplier (false) or whether to split the order among the specified number of suppliers (true). The default value is false. **Note:** You only need to configure this parameter when sourcing identical products from multiple suppliers. For details, see Configuring the Supplier Selection Criteria.

Group/ Parameter	Description
Supplier Selection Supplier Selection Criteria 1 Supplier Selection Criteria 2 Supplier Selection Criteria 3 Supplier Selection Criteria 4	Determines how the buyer chooses qualified suppliers. The buyer chooses suppliers, based on the smallest value of the Supplier Selection Criteria 1. If two suppliers have the same value for the sort attribute, the buyer looks at Supplier Selection Criteria 2 to determine which supplier should receive an award, and so on. The options are: • product-price — The Net Selling Price of the supplier's delivery product. This is the default value. • supplier-preference — The Supplier Preference of the supplier's delivery product. • supplier-product-preference — The Product Preference of the supplier's delivery product. • negotiated-turnaround-cycle-time — The Desired Turnaround of the buyer's source product that has been negotiated with the supplier in the current contract. • supplier-published-delivery-lead-time — The Published Delivery Lead Time of supplier's delivery product. • supplier-available-inventory — The Inventory Level of the supplier's delivery product. • negotiated-customer-preference — The Customer Preference of the buyer's source product that has been negotiated with the supplier in the current contract. • negotiated-payment-terms — The buyer's Financial Payment Terms that has been negotiated with the supplier. **Note:** You only need to configure this parameter when sourcing identical products from multiple suppliers. For details, see Configuring the Supplier Selection Criteria.

Group/ Parameter	Description
Supplier Information Selected Suppliers Proportions	When Split Orders Between Suppliers is false and the Maximum Number of Suppliers is greater than 1, determines the percentage of the time, on average, that the order will go to each qualified supplier. When Split Orders Between Suppliers is true and the Maximum Number of Suppliers is greater than 1, determines the proportion of the order that goes to each qualified supplier. The percentage or proportions correspond to each chosen supplier, based on the Supplier Selection Criteria. The value is a comma-separated list of values, for example: .75, .25 **Note:** You only need to configure this parameter when sourcing identical products from multiple suppliers. For details, see Configuring the Supplier Selection Criteria.
Potential Suppliers Potential Supplier Names	The list of potential suppliers for the source product. **Note:** You must configure at least one potential supplier for all source products in the model; otherwise, the role will not generate orders for source products. When sourcing identical products from multiple suppliers, you can choose multiple potential suppliers, and the buyer chooses the supplier based on the various supplier information configured for the source product.

Multipliers Tab

The following figure shows the Multipliers tab of the default properties dialog for the source product of a Consumer role:



Uses the same Source category durations for all source products, the default.

Group/ Parameter	Description
Source Multipliers Receiving Duration	A number that the role multiplies by the Receiving Duration parameter of the Source category to determine the actual time it takes to receive source products. The default value is 1.0, which means it takes exactly the Receiving Duration. For details, see Configuring Multipliers for Timing Parameters.
Source Multipliers Verification Duration	A number that the role multiplies by the Verification Duration parameter of the Source category to determine the actual time it takes to verify source products. The default value is 1.0, which means it takes exactly the Verification Duration. For details, see Configuring Multipliers for Timing Parameters.
Source Multipliers Transfer Duration	A number that the role multiplies by the Transfer Duration parameter of the Source category to determine the actual time it takes to transfer source products to inventory. The default value is 1.0, which means it takes exactly the Transfer Duration. For details, see Configuring Multipliers for Timing Parameters.

Configuring Parameters for Delivery Products

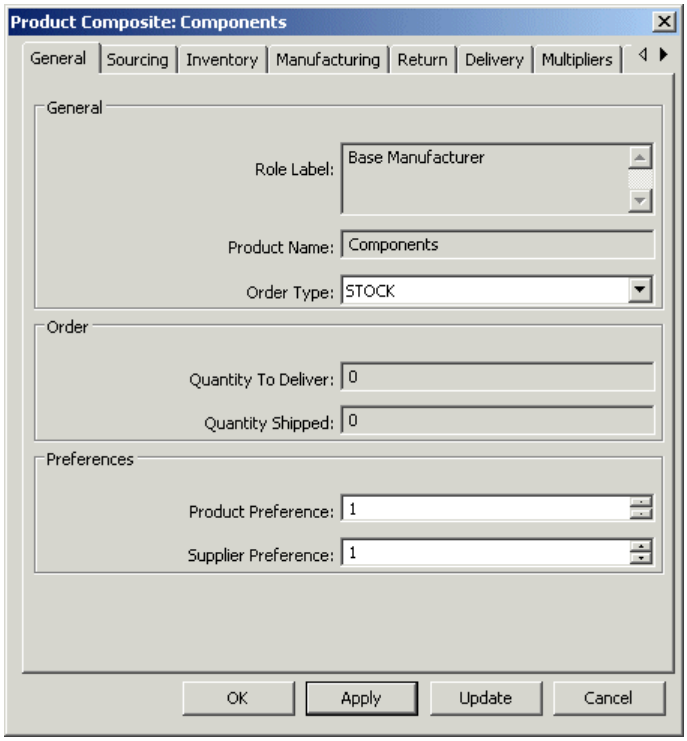
You configure parameters for delivery products on the following tabs of the product composite dialog:

- General tab
- Inventory tab
- Sourcing tab (Base Manufacturer role only)
- Manufacturing tab
- Return tab
- Delivery tab
- Multipliers tab

Each of the following sections provides an example of the properties dialog tab page for the delivery product of a Base Manufacturer role and a description of each parameter.

General Tab

The following figure shows the General tab of the default properties dialog for a delivery product of a Base Manufacturer role:



Uses a stock planning strategy, the default.

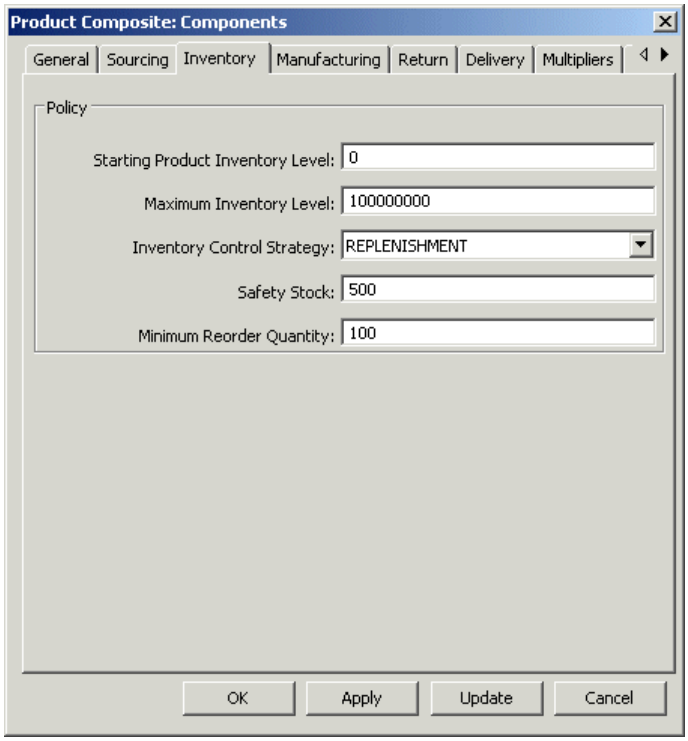
Uses the default preferences for the delivery product and the supplier role.

Group/ Parameter	Description
General Order Type	Determines whether the role uses a stock, mto (make-to-order), or eto (engineer-to-order) planning strategy when making and delivering its delivery products. The default is stock. For details on each of these planning strategies, see Using Alternative Planning Strategies.
General Is Kitted	For the delivery product of a Distributor role that assembles components into finished products, or kits, whether the finished product is a kit. You must explicitly enable this option to assemble components into kits. For details, see Configuring a Distributor to Assemble Components into Kits.

Group/ Parameter	Description
Preference Product Preference	A number representing the priority of the delivery product, where the lower number means a higher priority. The default value is 1. You can use this number to choose which delivery product to deliver first when configuring the Order Selection parameters of the Deliver category and which finished product to make first when configuring the Build Selection parameters of the Make category. For details, see Configuring Order Selection Parameters and Configuring Build Selection Parameters. You also use this number to determine which delivery products to deliver first when using a push planning strategy when a role makes and/or delivers multiple products and when components are shared. For details, see Configuring Which Delivery Products to Push First and Configuring the Amount to Push When Components are Shared.
Preference Supplier Preference	A number that represents the priority as a supplier of the role associated with this delivery product. The smaller the number, the more likely a downstream buyer will choose this supplier when issuing purchase awards, using contracts. The default value is 1. You only need to configure this parameter when choosing among multiple suppliers, using contracts. For details, see Configuring the Supplier Selection Criteria.

Inventory Tab

The following figure shows the Inventory tab of the default properties dialog for a delivery product of a Base Manufacturer role:



Uses a stock/replenishment planning strategy, the default, and the default starting and maximum inventory levels, safety stock, and minimum reorder quantity.

Group/ Parameter	Description
Policy Starting Product Inventory Level	The number of delivery products in inventory at the start of the simulation. Configure this parameter to avoid skewed order fulfillment lead times at startup while the model accumulates inventory. The default value is 0.
Policy Maximum Inventory Level	The maximum number of delivery products the role can accommodate in its inventory. If the Inventory Level exceeds this maximum, the role discards the excess. The default value is 100,000,000. The only time the inventory could potentially exceed this maximum is if a supplier pushes products onto a buyer, causing the buyer to exceeds its Maximum Inventory Level. For details, see Using Push Mode Planning.

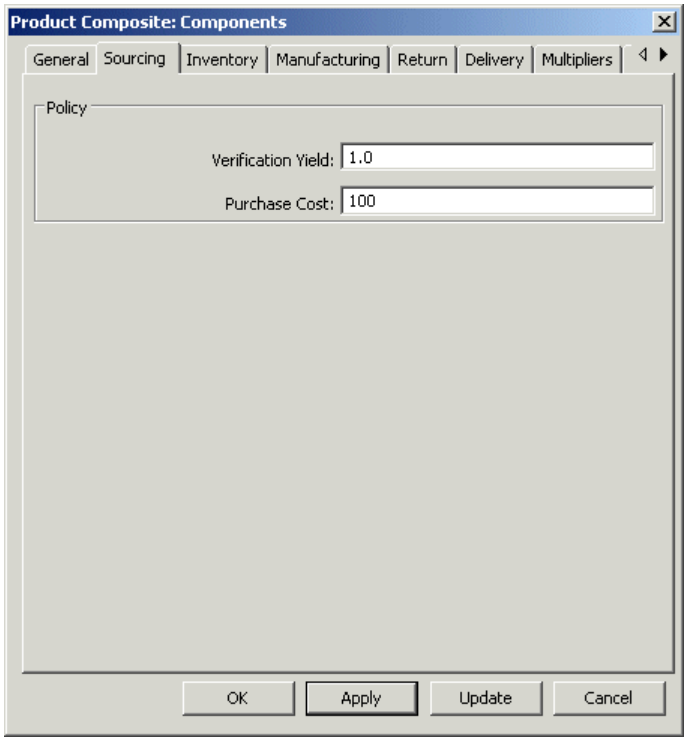
Group/ Parameter	Description
Policy Inventory Control Strategy	When using a stock planning strategy in pull mode, the inventory control strategy to use for computing build order size for stock delivery products. The options are: replenishment, forecast-customer, r-q, and q. The default is replenishment. For more information on using each of these planning strategies, see Using Stock Planning Strategies.
Policy Safety Stock	When using a stock/replenishment planning strategy in pull mode, the minimum number of delivery products the role needs to maintain in inventory before creating a new build order for delivery products. The default value is 500. You configure this parameter when the Inventory Control Strategy is replenishment. For details, see Using a Stock/Replenishment Planning Strategy.
Policy Minimum Reorder Quantity	When using a stock/replenishment planning strategy in pull mode, the minimum number of delivery products for which the role can create build orders. The default value is 100. You configure this parameter when the Inventory Control Strategy is replenishment. For details, see Using a Stock/Replenishment Planning Strategy.

Sourcing Tab

In general, the Sourcing tab contains the Purchase Cost metric, which is computed for source products, based on the Net Selling Price of the upstream supplier's delivery product.

However, because a Base Manufacturer does not order source products directly, you must configure the cost of raw materials for a Base Manufacturer role in the dialog for the role's delivery product. You do this by configuring the Purchase Cost parameter, located on the Sourcing tab.

The following figure shows the Sourcing tab of the properties dialog for a delivery product of a Base Manufacturer role:

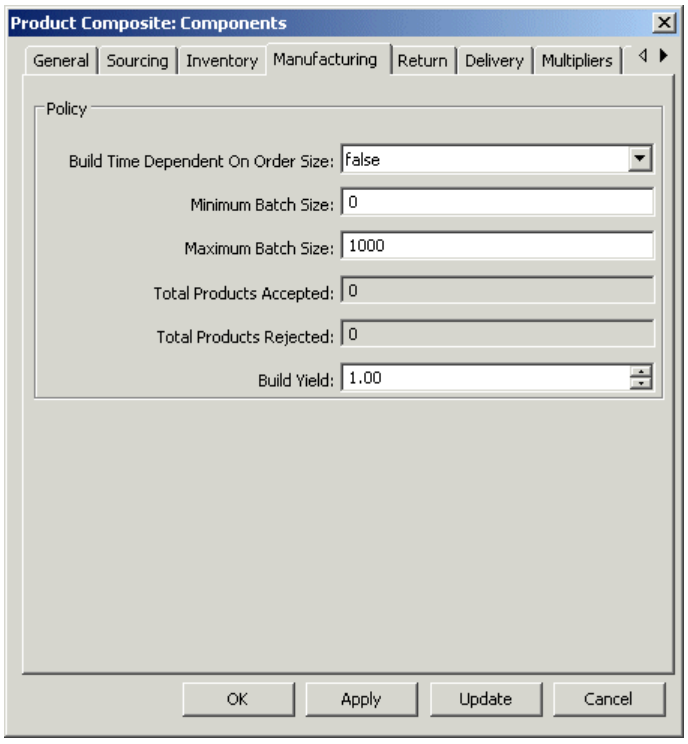


Costs $100 for the raw materials required to make the delivery product. The default value is 0.

Group/ Parameter	Description
Policy Purchase Cost	For a Base Manufacturer role only, the cost of raw materials to make one delivery product. The default value is 0. The model uses this cost to compute outgoing financial metrics for the Base Manufacturer role. **Note:** For all other roles, Purchase Cost is a metric, which the model computes by averaging the Net Selling Price of the delivery product from all its upstream suppliers.
Policy Verification Yield	The yield when verifying delivery products that are returned.

Manufacturing Tab

The following figure shows the Manufacturing tab of the default properties dialog for the delivery product of a Base Manufacturer role:

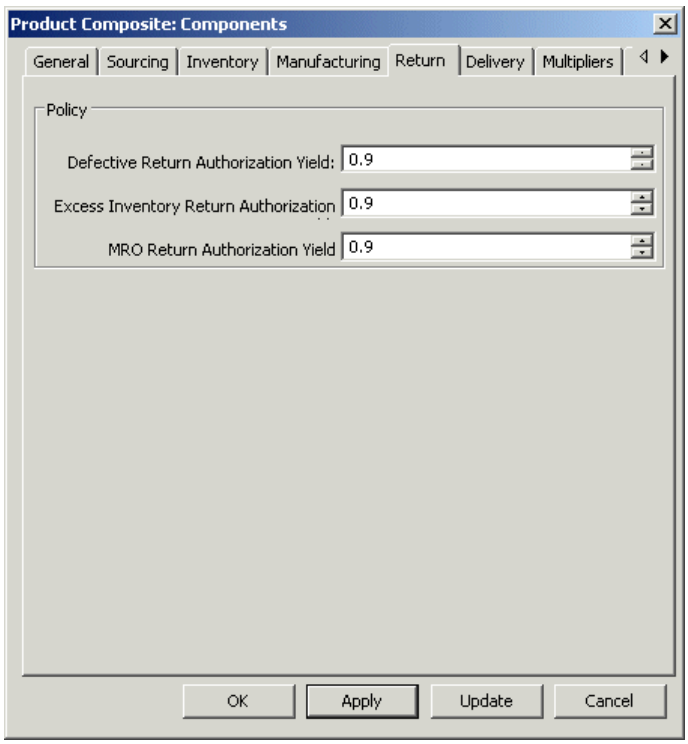


Uses the default parameters for build time, batch size, and build yield when creating build orders for delivery products.

Group/ Parameter	Description
Policy Build Time Dependent on Order Size	Whether the Manufacturing Duration parameter of the Make category depends on the actual size of a batch. If Build Time Dependent on Order Size is false, the default, the time it takes to manufacture a batch of products is the entire Manufacturing Duration, regardless of whether the batch is the maximum size. If Build Time Dependent on Order Size is true and the size of the build order is for less than the Maximum Batch Size, the actual time it takes to manufacture the batch is adjusted proportionally.
Policy Minimum Batch Size Maximum Batch Size	The minimum and maximum number of delivery products to manufacture in each batch. The role can only manufacture finished products if the build order size is greater than or equal to the Minimum Batch Size, and less than or equal to the Maximum Batch Size. The value of the Manufacturing Duration parameter of the Make category can be proportional to the batch size, based on the Build Time Dependent on Order Size option. The default values are 0 and 1000, respectively.
Policy Build Yield	A percentage of the batch size, which determines the number of delivery products the role can actually use to fulfill build orders. The rest is discarded. The default value is 1.0. By default, if you configure this number to be less than 1.0, the Make category creates additional build orders for delivery products to make up for the loss, based on the Compensate for Yield parameter of the M3: Make Category. For details, see Configuring the Plan Category.

Return Tab

The following figure shows the Return tab of the default properties dialog for a delivery product of a Base Manufacturer role:

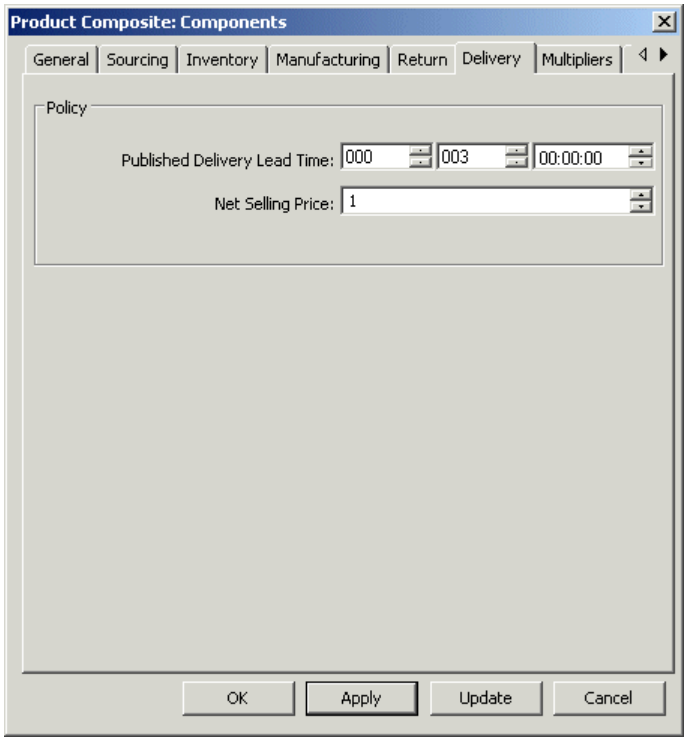


Delivers returned products based on a 90% yield for defective products, MRO products, and excess inventory.

Group/ Parameter	Description
Policy Defective Return Authorization Yield	The yield for defective product returns.
Policy Excess Inventory Return Authorization Yield	The yield for excess inventory returns.
Policy MRO Return Authorization Yield	The yield for MRO product returns.

Delivery Tab

The following figure shows the Delivery tab of the default properties dialog for the delivery product of a Base Manufacturer role:

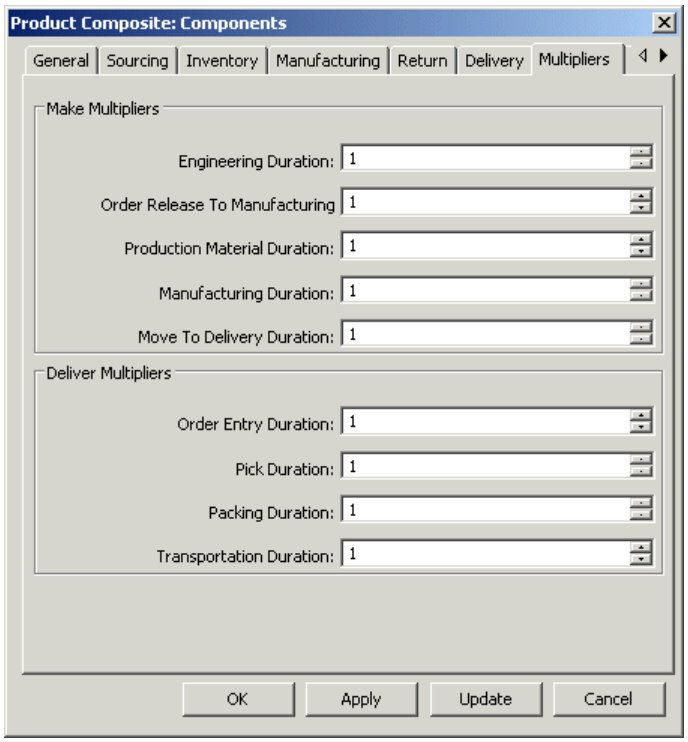


Uses the default published lead time and selling price for customer quotes.

Group/ Parameter	Description
Delivery Published Delivery Lead Time	The typical standard lead time that the role quotes to its customers for a delivery product. The default value is 3 days. You can use this parameter to choose suppliers when using contracts. For details, see Modeling a Process with Multiple Suppliers.
Delivery Net Selling Price	The net price suppliers charge customers for each delivery product. The default value is 1. The model uses this price to compute the Purchase Cost metric of the downstream buyer's source product. It also uses it to compute financial metrics, including Financial Payments Total and Financial Collections Total for the role. You can use this parameter as the supplier selection criteria for choosing suppliers when using contracts. For details, see Modeling a Process with Multiple Suppliers.

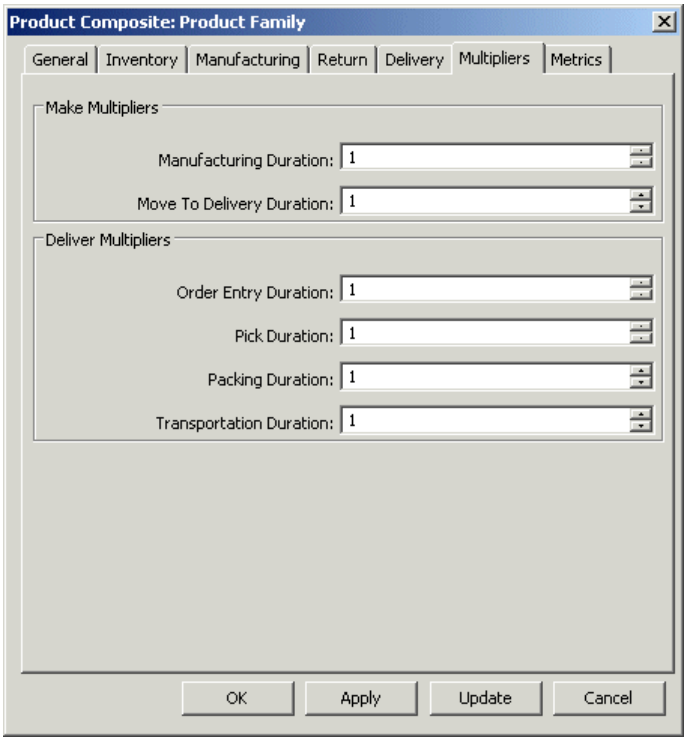
Multipliers Tab

The following figure shows the Multipliers tab of the default properties dialog for the delivery product of a Base Manufacturer role:



Uses the same Make and Deliver category durations for all delivery products, the default.

The following figure shows the Multipliers tab of the default properties dialog for the delivery product of a Manufacturer role:



Uses the same Make and Deliver category durations for all delivery products, the default.

Group/ Parameter	Description
Make Multipliers Engineering Duration	A number that the role multiplies by the Engineering Duration of the Mb: Make Product and M3: Engineer-to-Order category to determine the actual time it takes to engineer a single batch of engineer-to-order delivery products. The default value is 1, which means it takes exactly the Engineering Duration. **Note:** This parameter is only relevant for the source products of a Manufacturer role and the delivery products of a Base Manufacturer role whose Order Type is ETO. For details, see Configuring Multipliers for Timing Parameters.
Make Multipliers Order Release to Manufacturing Duration	A number that the role multiplies by the Order Release to Manufacturing Duration parameter of the Make category to determine the actual time it takes from when the Make category receives a build order for delivery products to when it receives components. The default value is 1, which means it takes exactly the Order Release to Manufacturing Duration. **Note:** This parameter is relevant for the source products of a Manufacturer role and the delivery products of a Base Manufacturer role. For details, see Configuring Multipliers for Timing Parameters.
Make Multipliers Production Material Duration	A number that the role multiplies by the Production Material Duration parameter of the Make category to determine the actual time it takes from when the role receives components to when it starts to manufacture delivery products. The default value is 1, which means it takes exactly the Production Material Duration. **Note:** This parameter is relevant for the source products of a Manufacturer role and the delivery products of a Base Manufacturer role. For details, see Configuring Multipliers for Timing Parameters.

Group/ Parameter	Description
Make Multiplier Manufacturing Duration	A number that the role multiplies by the Manufacturing Duration parameter of the Make category to determine the actual time it takes to make one batch of delivery products. The default value is 1, which means it takes exactly the Manufacturing Duration. **Note:** This parameter is relevant for the delivery products of a Base Manufacturer role and Manufacturer role. For details, see Configuring Multipliers for Timing Parameters.
Make Multiplier Move to Delivery Duration	A number that the role multiplies by the Move to Delivery Duration parameter of the Make category to determine the actual time it takes from when the Make category finishes manufacturing a batch of delivery products to when the finished build order is transferred to the delivery location. The default value is 1, which means it takes exactly the Move to Delivery Duration. **Note:** This parameter is relevant for the delivery products of a Base Manufacturer role and Manufacturer role. For details, see Configuring Multipliers for Timing Parameters.
Deliver Multiplier Order Entry Duration	A number that the role multiplies by the Order Entry Duration parameter of the Deliver category to determine the actual time it takes to enter an order for a delivery product. The default value is 1, which means it takes exactly the Order Entry Duration. For details, see Configuring Multipliers for Timing Parameters.
Deliver Multiplier Pick Duration	A number that the role multiplies by the Pick Duration parameter of the Deliver category to determine the actual time it takes to pick components from inventory for making a delivery product. The default value is 1, which means it takes exactly the Pick Duration. For details, see Configuring Multipliers for Timing Parameters.

Group/ Parameter	Description
Deliver Multiplier Packing Duration	A number that the role multiplies by the Packing Duration parameter of the Deliver category to determine the actual time it takes to pack containers for shipment with delivery products. The default value is 1, which means it takes exactly the Packing Duration. For details, see Configuring Multipliers for Timing Parameters.
Deliver Multiplier Transportation Duration	A number that the role multiplies by the Transportation Duration parameter of the Deliver category to determine the actual time it takes to ship a container of delivery products. The default value is 1, which means it takes exactly the Transportation Duration. For details, see Configuring Multipliers for Timing Parameters.

Configuring Demand and Change Orders through a Demand Report

By default, initial order demand for the overall supply chain is based on parameters that you configure for the source products associated with each Consumer category in the model.

You might have actual order-demand data for your supply chain, which you would like to use in your model. To do this, you can configure orders through a Demand Report.

When using a Demand Report, you can also configure change orders for existing orders that have not yet been fulfilled. To configure change orders, you enable change orders for a particular row in the report, then identify the demand order to change, using a unique order tag.

When you run the simulation, the model creates demand orders and change orders for the products you configured in the report, then stops. You configure the simulation time at which to generate each demand order or change order, which is offset from the start of the simulation. The duration can be a number, which the model interprets using the time unit of the report, or it can be a duration, which uses a format such as 4 weeks, 2 days, 1 hour, and 30 minutes. The role uses the simulation time configured in the report instead of the Demand Order Duration to determine when to generate orders. It uses the Demand Start Time and Demand Stop Time from the dialog.

You can configure values for the following parameters in a Demand Report:

- Simulation Time
- Consumer Label
- Product Name
- Demand Order Size
- Desired Turnaround
- Fulfillment Preference
- Order Tag

To configure demand and change orders through a report:

1 Create product specifications for each product whose orders you want to configure through a report, then assign each product specifications as the source product of a Consumer role in the model.

For example, if you are configuring demand orders through a report for computers and monitors, create one product composite named Computer and another named Monitor, then assign each as the source product of a Consumer role. You must also assign them as the delivery product of the appropriate upstream supplier roles.

2 Display the Reports palette of the e-SCOR toolbox and create a Demand Report on the model detail.

3 Choose Show Report on the Demand Report.

For details, see one of the following, depending on whether you want to create the report locally or in Excel:

- Creating Reports.
- Creating Reports in Excel.

4 To configure demand orders, configure the Simulation Time, Role Label, Product Name, Order Size, Desired Turnaround, and Fulfillment Preference for each demand order through the report.

Configure the Simulation Time according to the Time Unit of the report or as a duration such as 1 week, 2 weeks, 3 weeks and 2 days, and so on. The value you enter is converted to the Time Unit of the report.

Note The rows can be in any order in the report; they do not need to be sorted by the Simulation Time.

Configure the Desired Turnaround according to the Time Unit of the report.

To use the default value for a parameter, leave the cell empty.

5 To configure change orders, in addition to the parameters above, configure these parameters:

- Enable Change Order = true.
- Order Size = The change in order size, either positive or negative.
- Order Tag = A matching unique ID for both the order and the change order.

For example, to create a change order that adds 10 units to the original order, configure Enable Change Order as true, configure the Order Size to be 10, and configure the Order Tag for the change order and the original order to be a unique ID, such as order-id-1. To create a change order that removes 10 units from the order, configure the Order Size to be -10.

Note It is only necessary to configure the Order Tag for change orders and their associated order.

6 Apply the data to the model.

For details, see one of the following, depending on whether you created the report locally or in Excel:

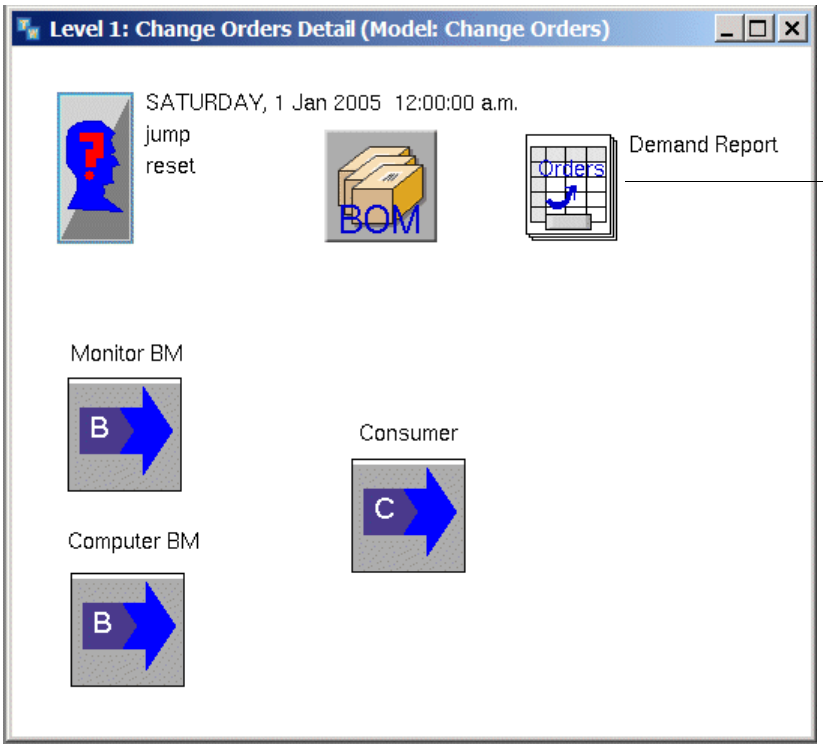
- Applying Input Report Data to the Model.
- Applying Input Report Data to the Model from Excel.

7 On the Demand tab of the source product of the Consumer role, enable the Use Demand Input Report option on the Demand tab.

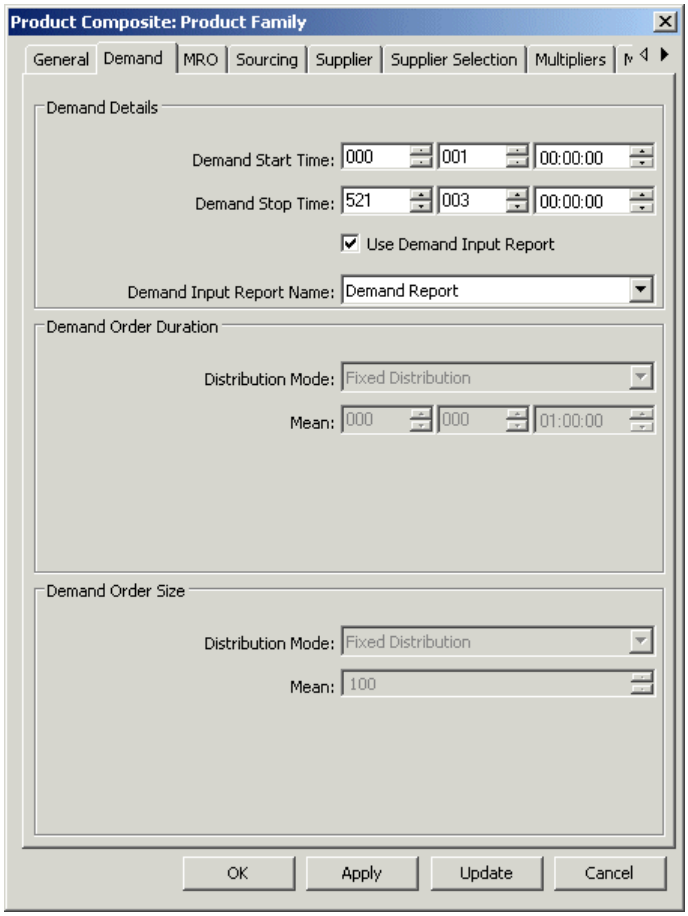
8 Configure the Demand Input Report Name to be the Demand Report that contains the order demand data to use.

Note You must reset the model to use the new report data before running the simulation.

This figure shows a simple model in which a Consumer role sources computers and monitors, using a Demand Report:



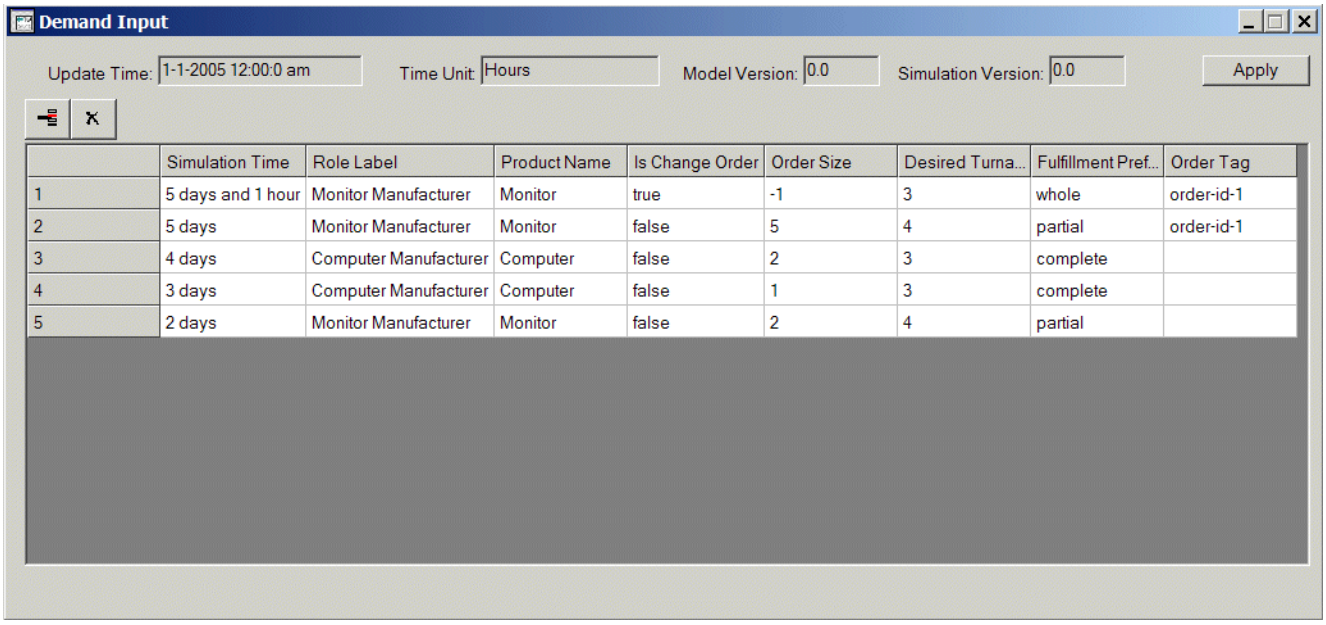
Here is the properties dialog for the Computer source product of the Consumer role, which uses a Demand Report:



Specifies order demand, using a report.

Here is a sample Demand Report, which creates orders for computers and monitors. The report generates orders at each time unit in sequence; it generates orders for 2 monitors 2 days into the simulation, for 1 computer 3 days into the simulation, for 2 computers 4 days into the simulation, and 5 monitors 5 days into the simulation. Finally, it generates a change order for the order whose Order Tag is order-id-1, changing the order size by -1, the Desired Turnaround to 3 days, and the Fulfillment Preference to whole. Computer orders have a Desired Turnaround of 3 days, and monitors have a Desired Turnaround of 4 days. Computers have an

Order Fulfillment Preference of complete, and monitors have an Order Fulfillment Preference of partial.



	Simulation Time	Role Label	Product Name	Is Change Order	Order Size	Desired Turna...	Fulfillment Pref...	Order Tag
1	5 days and 1 hour	Monitor Manufacturer	Monitor	true	-1	3	whole	order-id-1
2	5 days	Monitor Manufacturer	Monitor	false	5	4	partial	order-id-1
3	4 days	Computer Manufacturer	Computer	false	2	3	complete	
4	3 days	Computer Manufacturer	Computer	false	1	3	complete	
5	2 days	Monitor Manufacturer	Monitor	false	2	4	partial	

When the simulation runs, it generates orders for 3 computers (1 + 2) and 6 monitors (2 + 5 - 1) at the specified simulation times. Note that the change order takes effect only if the original order has not yet been fulfilled.

7

Running the Simulation

Describes how to run a simulation and configure the Scenario.

Introduction

Once you have configured Level 1 roles and Level 2 SCOR, you can run the simulation. To do this, you:

- Control the simulation by starting, pausing, continuing, and resetting the Scenario.
- Configure the scenario, which includes configuring the simulation mode, simulation start time and duration, animation, and behavior of indicators.
- Verify that the simulation is running correctly by viewing key metrics for roles, categories, and product composites.
- View a list of problems that can occur when running a simulation.

- View these objects while the simulation runs:
  - Transient objects in pools, which the model creates and deletes while it runs.
  - Resource representations, which show resource utilization.

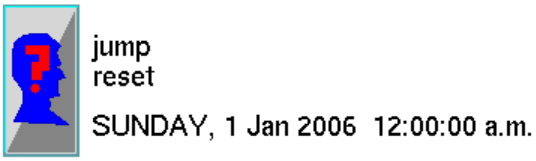
Controlling the Simulation

You control the simulation from the Simulation menu or toolbar. These menu choices and toolbar buttons affect the scenario, which is the control center for running the simulation. Every model must contain a scenario.

To control the simulation, you:

- Activate and deactivate the scenario.
- Start and stop the simulation.

The scenario shows the simulation mode, status, and current simulation time, for example:

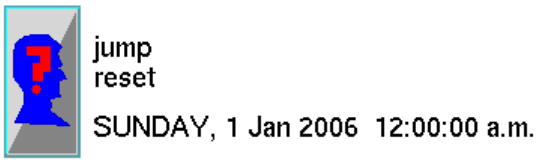


Activating and Deactivating the Scenario

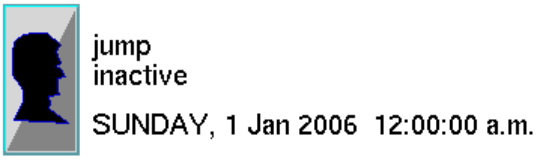
Before you can run a simulation, you must activate the Scenario. Certain menu choices, such as Show Scenario, are only available when the scenario is active.

The following figure shows an active and inactive scenario:

active



inactive



Note Starting the simulation automatically activates the scenario; therefore, typically, you do not need to activate the scenario explicitly.

To activate and deactivate a scenario:

➔ Display a model that contains a scenario, then choose Simulation > Activate or click the equivalent toolbar button ( ) to toggle activation.

Starting and Stopping the Simulation

You control the status of the simulation by using menu choices in the Simulation menu, by using keyboard shortcuts, or by clicking the equivalent toolbar button, as follows:

Menu Choice/ Shortcut	Toolbar Button	Status	Description
Start All		running	Start the simulation running.
Reset		resetting	Reset the simulation.
Pause		paused	Pause the simulation.
Continue		running	Continue running the paused simulation.

By default, the simulation runs in Jump mode, which advances the simulation clock continuously with each discrete event. For alternative ways to run the simulation, see Configuring the Simulation Mode.

To start and stop the simulation:

1 Start the simulation by choosing Simulation > Start All or by clicking the equivalent toolbar button.

Choosing Start All activates the scenario and resets the simulation before starting.

Resetting the simulation can take a period of time, depending on the size of the model and the speed of your computer. The status of the scenario is resetting.

After resetting, e-SCOR verifies that you have configured all roles correctly. Once role verification is complete, objects begin flowing through the model.

These objects represent orders, product shipments, invoices, payments, and other objects that the model creates and deletes when the simulation runs. You can only see these objects as they flow through the model if animation is enabled. The model also begins computing metrics. The status of the scenario is running.

2 To pause the simulation, choose Simulation > Pause or click the equivalent toolbar button.

Pausing the simulation stops the simulation clock, causes all objects to stop flowing through the model, and stops computing metrics. The status of the scenario is paused.

3 To resume running the simulation after pausing, choose Simulation > Continue or click the equivalent toolbar button.

The simulation clock begins advancing again, objects begin flowing through the model, and the status of the scenario is running.

4 To reset the simulation, choose Simulation > Reset or click the equivalent toolbar button.

Resetting the simulation resets the simulation clock, deletes all objects that the model created, and resets all metrics to their initial values.

Verifying that the Simulation is Running Correctly

e-SCOR provides a number of metrics that you can use to verify that the simulation is running correctly. These metrics indicate that the model is creating orders, delivering product shipments, generating invoices, and making payments.

If these metrics do not have values, you have not configured the Level 1 roles, Level 2 categories, or product composites correctly.

Note The model computes total financial collections and payments with each new event; therefore, these metrics are always current. The model computes financial collections and payments for the financial period at the end of each financial period; therefore, these metrics refer to collections and payments for the *previous* financial period.

This table summarizes the objects that define the metrics, the metrics to view, and the values:

Object	Metric	Values
Role	Number of End Products Number of Financial Periods Financial Payments within Financial Period Financial Payments Total Financial Collections within Financial Period Financial Collections Total	Positive.
Plan category	Number of Planning Periods	Positive.
ES category	Orders Sent Product Shipments Received Contracts Established	Positive and should match the sum of the Source category metrics of the same name.
Source category	Orders Sent Product Shipments Received	Positive.
Make category	Build Orders Started Build Orders Completed	Positive.
ED category	Orders Received Product Shipments Sent Contracts Established	Positive and should match the sum of the Deliver category metrics of the same name.
Deliver category	Orders Received Product Shipments Sent	Positive.
Source product	Quantity Ordered Quantity Received	Positive.
Delivery product	Quantity to Deliver Quantity Shipped Total Products Accepted	Positive.

See Also

Viewing Metrics for Roles.

Viewing Metrics for Categories.

Viewing Metrics for Source and Delivery Products.

Problems that Can Occur When Running a Simulation

The most common mistakes you can make when configuring a model are:

- You forget to assign product specifications to roles.
- You forget to configure the potential suppliers of source products.
- You do not label each role with a unique name, when multiple roles of the same type exist.

Other things to note when a simulation is running are:

- The simulation does not compute all metrics immediately. For example, it does not compute financial metrics for roles until one or two financial cycles have completed, due to the time lag in payments.
- The simulation should compute financial or asset metrics for a role after several financial periods have completed, based on the Net Selling Price parameter of the delivery products for the role, which is 1, by default. For a Base Manufacturer role, outgoing financial metrics are based on the Purchase Cost parameter for delivery products, located on the Sourcing tab.
- Occasionally, when you pause the simulation, certain metrics that should add up do not add up. This situation only occurs between clock ticks; it does not occur while the model is running.

See Also Creating and Connecting Roles.

Assigning Product Specifications to Roles.

Configuring the Products a Role Sources and Delivers.

Configuring the Scenario

You can configure these features of the scenario:

- Simulation mode, which determines whether the simulation runs continuously, step-by-step, or in real time.
- Duration of the simulation.
- Version of the simulation.
- Start time of the simulation.
- Simulation speed.
- Animation.

- Speed at which objects flow along paths.
- Indicator arrow behavior.
- Computational behavior of the scenario.
- Random number generation.

Configuring the Simulation Mode

You can run the simulation in one of three modes by using the menu choices in the Simulation menu or the equivalent toolbar button, as this table describes:

Menu Choice	Toolbar Button	Mode	Description
Jump Mode		jump	The normal discrete event simulation mode. Events occur in their normal time sequence while a simulation is running, but the real-time clock advances non-linearly relative to the simulation clock. After each discrete event, e-SCOR immediately advances the simulation clock to the start time of the next event. Objects flow through the model without stopping.
Step Mode		step	The mode you use for careful examination of the model. e-SCOR pauses after each event so you can walk through the simulation one step at a time. When you continue running the simulation, the clock immediately advances to the start time of the next event, then stops.
Synch Mode		synch	The mode you use to help visualize the relative times between events. e-SCOR scales the simulation time to real time. For example, you can use this mode to run the simulation at one hour per second of real time. Most of the time when you are running a simulations, however, you let the simulation clock keep track of the time by using either jump or step mode.

You configure the simulation mode from the Simulation menu or toolbar, or on the properties dialog for the scenario.

Running the Simulation in Jump Mode

To run the simulation in jump mode:

1. Choose Simulation > Jump Mode, click the equivalent toolbar button, or display the properties dialog for the Scenario and configure the Mode to be Jump.
2. Choose Simulation > Start All or click the equivalent toolbar button to start the simulation

Running the Simulation in Step Mode

To run the simulation in step mode:

1. Choose Simulation > Step Mode, click the equivalent toolbar button, or display the properties dialog for the Scenario and configure the Mode to be Step.
2. Choose Simulation > Start All or click the equivalent toolbar button to take a single step in the simulation, then pause the simulation.
3. Choose Simulation > Continue or click the equivalent toolbar button to take a single step for each discrete event, then pause the simulation.

Running the Simulation in Synch Mode

When you run the model in synch mode, you must configure the proportion of simulation time to real time. The larger the number, the faster the overall execution time of the simulation. By default, the value is 1, which means the timing parameters contribute exactly the specified amount of simulation time to the simulation clock. A value of 2 means they contribute half the amount of time. For example, if a timing parameter specifies 10 minutes to perform a task, and the Seconds per Tick is 2, the parameter contributes 5 minutes of simulation time.

Note If your model is complex, e-SCOR may not be able to keep up with the specified synch rate. For example, if you specify a synch rate such that one minute of simulation time is equivalent to one year of real time, e-SCOR might require more than one minute to process a year-long simulation. If this is the case, e-SCOR gives no indication that the synch rate is too slow; however, the metrics that the simulation computes are correct.

To run the simulation in synch mode:

1. Display the properties for the scenario, click the Scenario tab, and configure Seconds per Tick to be a number greater than one.
2. Choose Simulation > Synch Mode, click the equivalent toolbar button, or display the properties dialog for the Scenario and configure the Mode to be Synch.

3 Choose Simulation > Start All to run the simulation.

4 Choose Simulation > Pause to pause the simulation.

5 Choose Simulation > Continue to continue running the simulation in synch mode.

Configuring the Duration of the Simulation

Depending on your model, you typically configure the scenario to run for a specific duration, such as a month, a year, or ten years. You do this by specifying the ending time of the simulation. A duration of 0 means the simulation will run for the maximum allowable simulation time, which is 17 years.

Tip To ensure accurate financial reporting, configure the duration of the simulation to be slightly longer than the end of the last financial period.

To configure the duration of the simulation:

➔ Display the properties dialog for the scenario, click the Scenario tab, and configure the Duration to be the amount of time the simulation should run, for example, 3 months or 2 years.

Configuring the Simulation Version

When performing "what-if" analysis, you often use different scenarios with the same or with different versions of the model. When using the Scenario Manager to run multiple simulations from a script, you typically output the data to a report. To identify which scenario was used to generate the data, you configure the version of the simulation, using a unique number.

To configure the simulation version:

➔ Display the properties dialog for the scenario, click the Scenario tab, and configure the Simulation Version to be a unique number.

For example, you might use 1.0, 1.1, and 1.2 for the scenario associated with three different versions of a model.

Configuring the Start Time of the Simulation

By default, e-SCOR uses January 1, 2006 as the start time of the simulation. You might want to start the simulation at a different time.

To configure the start time of the simulation:

➔ Display the properties dialog for the scenario, click the Start Time tab, and configure the Year, Month, Day, Hour, Minute, and/or Second to be the start time of the simulation.

When you reset the simulation, the new start time appears.

Configuring Simulation Speed

By default, the scenario is configured to run as fast as possible, which means that when you are running in jump or synch mode, the clock advances with each new event as fast as it can. This default configuration is desirable when:

- Running simulations from a script, using the Scenario Manager.
- You do not need to interact with the model while the simulation is running.
- You do not need to visualize the animation of objects as they flow through the model.

Depending on the speed of your computer, running the simulation as fast as possible often means that you will experience delays when interacting with the user interface while the simulation is running. For example, when you click the Pause button to pause the simulation, the simulation clock continues to advance until the processing has caught up with the user interaction. Similarly, you will experience delays when configuring values through the dialogs or reports while the simulation is running.

If you want to interact with the user interface while the simulation is running, for example, to configure parameter values, you should slow the simulation down to allow more time for the user interface to respond.

To slow the simulation down, you configure the simulation speed to be a larger number. Depending on the speed of your computer, you might try a simulation speed of 10 or 15.

Note Once you have configured your model, we recommend that you set the Simulation Speed to 0 for optimal performance, the default.

To configure the simulation speed:

➔ Display the properties dialog for the scenario, click the Options tab, and adjust the Simulation Speed, where the larger the number, the slower the speed.

Configuring Animation

e-SCOR can animate running simulations by physically moving objects along paths and highlighting blocks as they become active. If you are using your model as a communication tool to visualize work objects as they flow along paths, you might want to enable animation.

Depending on the speed of your computer, you might need to adjust the animation speed. In particular, if you have a relatively fast computer, you might need to slow down the animation speed to better visualize the flow of work objects. However, keep in mind that performance degrades the slower the animation speed.

You configure animation speed, based on the number of milliseconds it takes to move an object from the beginning of a path to the end of a path. By default, it takes an object 5 milliseconds to move along a path. To slow down the animation, you might want to move an object along the path in 8 or 10 milliseconds.

Note Once you have configured your model, we recommend that you disable animation for optimal performance.

To enable animation for a simulation:

➔ Display the properties dialog for the scenario, click the Options tab, and click the Enable Animation option on.

When you run the simulation, objects move along paths and blocks animate as the simulation clock advances.

To adjust animation speed:

➔ Display the properties dialog for the scenario, click the Options tab, and adjust the Animation Speed, where the larger the number, the slower the speed.

Configuring Object Tracking

You can configure the scenario so that objects that flow through the model keep track of the blocks through which they have passed since they were created. When object tracking is enabled, you can pause the simulation and show tracking for any object. Object tracking is a useful way of verifying the model to ensure objects flow along the correct paths.

When showing object tracking, e-SCOR animates all the blocks upstream of the current block, in order, starting at the current block and ending at the block that created the object. e-SCOR repeats this process four times, by default. You can configure the color used for animating blocks when showing object tracking.

To configure object tracking:

1 Display the properties dialog for the scenario, click the Options tab, and click the Enable Tracking option on.

2 Configure the Animation Repeat Counter to be the number of times to animate the blocks when showing object tracking.

3 Configure the Animation Color to be the highlight color to use.

To show object tracking for an object:

➔ Pause the simulation, then choose Show Flow History on a object in the model.

Configuring the Behavior of Indicator Arrows

e-SCOR places indicator arrows next to objects when you show various objects associated with other objects, such as when you show the scenario associated with a role.

By default, the indicator arrow remains on the workspace until you explicitly hide it. You can clear all indicators automatically, or you can configure the scenario to clear indicators automatically after a certain number of seconds.

Note To clear all indicators, the scenario must be active, as described in Activating and Deactivating the Scenario.

To clear an individual indicator arrow:

➔ Left click the indicator arrow.

To clear all indicator arrows:

➔ Activate the scenario, then choose Simulation > Clear Indicators or click the equivalent toolbar button: 

To clear indicators associated with a scenario after a timeout period:

1 Display the properties dialog for the scenario, click the Options tab, and configure the Indicate Mode by choosing Timeout.

2 Configure the Timeout period after which indicators should automatically disappear, in seconds.

Configuring the Computation Behavior

To maximize performance, the scenario is configured to perform the minimum amount of computation necessary at Level 3, Level 4, and Level 5. If you are customizing the implementation of Level 2 categories, you can configure these parameters for a scenario related to computation behavior:

You can configure these parameters related to computation behavior:

Parameter	Description
Compute All Blocks	Enables the computation of Task blocks with detail. The default value is off, which means e-SCOR computes values for Task block details only; it does not compute values for the block itself.
Update Charts	Enables the updating of charts. The default value is off, which means that you must update charts manually or by using a button or a rule. For details, see "Updating Charts" in the *ReThink User? Guide*.
Enable Metrics Toolbar Update	Disables the updating of the Metrics toolbars. The default value is on, which means that the Metrics toolbars update once every half second.

Note The scenario computes metrics for all e-SCOR Level 1 roles and Level 2 categories and product composites in the model, regardless of how the Scenario is configured.

Note Once you have configured your model, we recommend that you disable updating of the Metrics toolbar for optimal performance.

To compute metrics for Task blocks with detail:

➔ Display the properties dialog for the scenario, click the Options tab, and enable the Compute All Blocks option.

To update charts automatically:

➔ Display the properties dialog for the scenario, click the Options tab, and enable the Update Charts option.

To disable metrics toolbar updating:

➔ Display the properties dialog for the scenario, click the Options tab, and disable the Enable Metrics Toolbar Update option.

Configuring the Scenario to Generate Identical Random Numbers

By default, the scenario generates random numbers that vary with each simulation by generating a new seed number for each simulation. You might want to run a simulation with identical random numbers to test different model configurations, using the same set of random numbers.

e-SCOR generates random numbers to compute mathematical distributions such as Random Normal, Random Exponential, or Random Triangular. You use these random distributions to generate values for attributes such as Demand Order Size, Demand Order Duration, Receiving Duration, Manufacturing Duration, and Order Entry Duration.

To configure the scenario to generate identical random numbers:

1. Display the properties dialog for the Scenario and, on the Scenario tab, configure the Seed Value to be an integer that holds the seed value, which e-SCOR uses as the basis for randomly generated numbers.

   By default, it generates a random number as the Seed Value.

2. Disable the Generate New Seed option to use the specified Seed Value for each simulation.

3. Reset the Scenario to use these new values.

Each time you run the simulation, using this scenario, e-SCOR uses the same set of randomly generated numbers.

Showing Transient Objects

The model creates and deletes a number of objects as the simulation runs. It sends these transient objects along the paths between categories and between roles. It also stores some of these objects in pools on the detail of the role. You can view these objects and their properties while the simulation is running by enabling animation.

Note Enabling animation causes the simulation to run much more slowly; therefore, we recommend that, in general, you run the simulation with animation off.

To facilitate viewing transient objects, you can run the simulation in step mode or you can set breakpoints in the model at appropriate locations.

Note Objects flow on paths on the detail of each category, as well as on the paths between categories and between roles. Therefore, depending on what you are viewing, you might or might not see any objects flowing through the model when you step through the simulation.

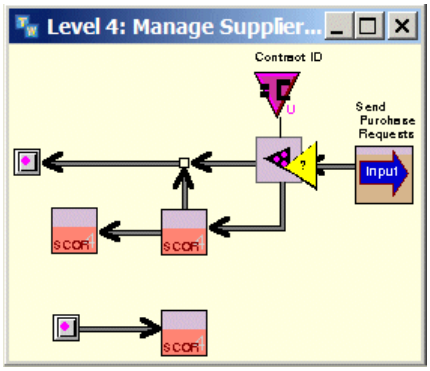
To show transient objects:

1. Show the details of the Consumer and Base Manufacturer roles so that both details are visible.
2. Enable animation for the Scenario.

   For details, see Configuring Animation.
3. Start the simulation running in step mode.

   For details, see Configuring the Simulation Mode.

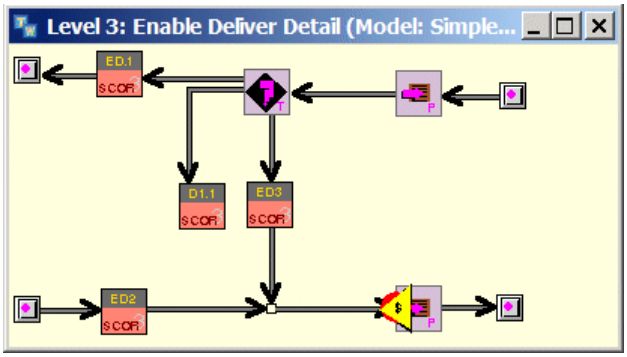
   The Input block of the downstream buyer role highlights, which indicates the beginning of the simulation.
4. Click the Continue button ( ) once until you see the ES category of the downstream buyer role highlight.
5. Continue stepping through the simulation until you see the P3, D1, and D2 categories of the upstream buyer role highlight, then return to their default state.
6. Continue stepping through the simulation until you see the ES category of the buyer role highlight again.
7. Drill down in the ES category to show the detail of each lower-level block that is highlighted.
8. Click Continue once until you see a purchase request on the subdetail of the Enable Source category:



The ES category generates a purchase request for its source products.

9 Continue stepping through the simulation and drilling down in the details to see the purchase request move from the ES category of the buyer to the ED category of the supplier.

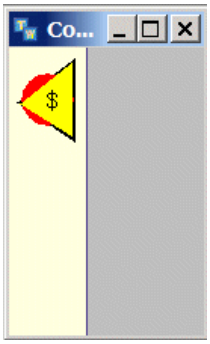
10 Continue stepping through the simulation and drilling down until you see a purchase response on a subdetail of the ED category of the supplier role:



If the upstream supplier role can deliver the requested product, the ED category of the supplier role generates a purchase response for its delivery products.

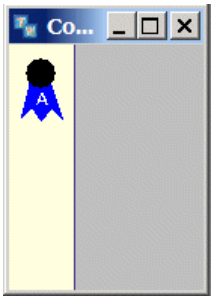
11 Show the detail of the Responses pool on the buyer role detail.

12 Continue stepping through the simulation to see the purchase response move from the ED category of the supplier to the ES category of the buyer, then into the Responses pool:



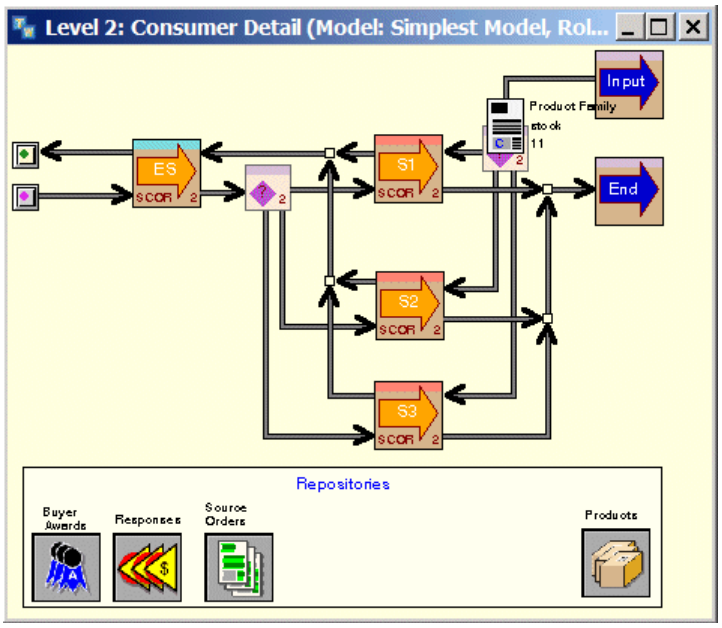
13 Show the properties dialog of the response and inspect the metrics that it computes, which is based on the parameters configured for the source product of the buyer role.

14 Show the detail of the Purchase Awards pool of the buyer role and continue stepping through the simulation until you see a purchase award in the pool:



The ES category of the buyer role generates a purchase award and sends it to the supplier that sent the purchase response.

15 Continue stepping through the simulation until you see a customer order on the detail of the Consumer role:



16 Show the detail of the Supplier Awards pool of the supplier role and continue stepping through the simulation until you see a purchase award in the pool.

17 Display the properties dialog of the ES category of the buyer role and the ED category of the supplier role.

Notice that the Contracts Established metric is now 1, indicating that a contract has been established between the buyer and supplier.

18 Choose Simulation > Jump Mode or click the equivalent toolbar button ( ).

19 Click the Continue button and observe the other types of objects that flow through the model for each of the other processes.

These include orders, invoices, payments, and product shipments.

20 Pause the simulation and continue in step mode to observe these objects more closely, if desired.

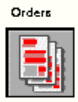
21 Reset the simulation and set it to run in jump mode.

22 Disable animation in the Scenario object.

Transient Objects in Pools

Each role has a number of pools in which various types of objects are stored as the simulation runs. This table describes the contents of each pool and the relevant roles:

This pool...	Exists for these roles...	And holds instances of...
Buyer Awards 	Distributor Manufacturer Consumer	Purchase awards that each ES: Enable Source category creates when it establishes contracts with available suppliers.
Build Orders 	Manufacturer	Build orders that each Make category uses to determine the number of batches to manufacture.
Responses 	Distributor Manufacturer Consumer	Purchase responses that each ED: Enable Deliver category creates when responding to purchase requests from buyers at startup and when contracts are in effect.
Staging Area 	Base Manufacturer Distributor Manufacturer	Delivery products that each Deliver category pulls from inventory before delivering product shipments.

This pool...	Exists for these roles...	And holds instances of...
Orders 	Base Manufacturer Distributor Manufacturer	Customer orders for delivery products that each Deliver category receives from buyers.
Source Orders 	Consumer	Customer orders for the finished products in the supply chain.
Supplier Awards 	Base Manufacturer Distributor Manufacturer	Purchase awards that each ED: Enable Deliver category creates when it establishes contracts with buyers. These are identical to the purchase awards stored in the Buyer Awards pool of the downstream buyer.

Transient Objects that Flow through the Model

In addition to the objects described in Transient Objects in Pools, a number of other objects also flow through the model when the simulation runs; however, the model does not save these objects in pools. This table describes the additional objects that flow through the model:

Object	Description
Order 	Buyers send customer and replenishment orders to suppliers for products ordered.
Invoice Payment 	Suppliers send invoices to buyers for products ordered. Buyers send payments to suppliers for product shipments received.
Product Ordered Product Container 	Buyers send products ordered to suppliers. Suppliers send product containers to buyers, when they are available.

Object	Description
Product Chit Order Chit 	Manufacturer roles generate product chits as part of the Build process when finished products have been manufactured and are available for delivery. Buyer roles generate order chits as part of the source planning process when source products arrive from suppliers and are available for manufacture or delivery, depending on the role.

Showing Resource Representations for a Role

Each Base Manufacturer and Manufacturer role has a pool that contains representations of the manufacturing resources assigned to the role.

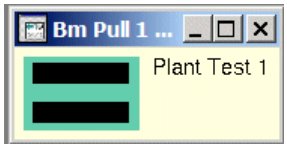
To show resource representations for a role:

➔ Choose Show Resources on a Base Manufacturer and Manufacturer role.

or

➔ Show the detail of the Mfg Resources pool:

The detail contains a representation for each manufacturing resource associated with the role. For example, here is the detail of the Mfg Resources pool for the Base Manufacturer role, which contains a single resource representation:



8

Viewing Metrics

Describes the metrics the model computes for roles, categories, product composites, resources, and routers.

Introduction

While running the simulation, you can analyze the performance of your supply chain by viewing metrics for these objects:

- Roles
- Categories
- Source and delivery products
- Resources

You can view metrics through:

- Properties dialogs
- Metrics toolbars
- Reports

The properties dialogs update automatically at regular intervals. By default, the Metrics toolbars also update automatically. When viewing metrics through dialogs, you can also update metrics manually. You configure reports to update at regular time intervals.

Metrics that are calculated based on histories allow you to view the statistics and histories and to configure SCOR performance metrics for comparative analysis.

This chapter describes how to view metrics through properties dialogs.

You can also view various types of metrics in toolbars.

See Also Viewing Simulation Metrics in a Toolbar.

Generating Output Report Data from the Model.

Updating Metrics

When you open a dialog, e-SCOR updates the metrics so they are current. e-SCOR continues to update metrics as the simulation runs once every few seconds. Once the dialog is open, you can also manually update the metrics.

Note The model computes total financial collections and payments with each new event; therefore, these metrics are always current. The model computes financial collections and payments for the financial period at the end of each financial period; therefore, these metrics refer to collections and payments for the *previous* financial period.

To manually update metrics in dialogs:

➔ Click the Update button in the dialog or choose Update on the block.

Viewing Statistics and Histories for Metrics

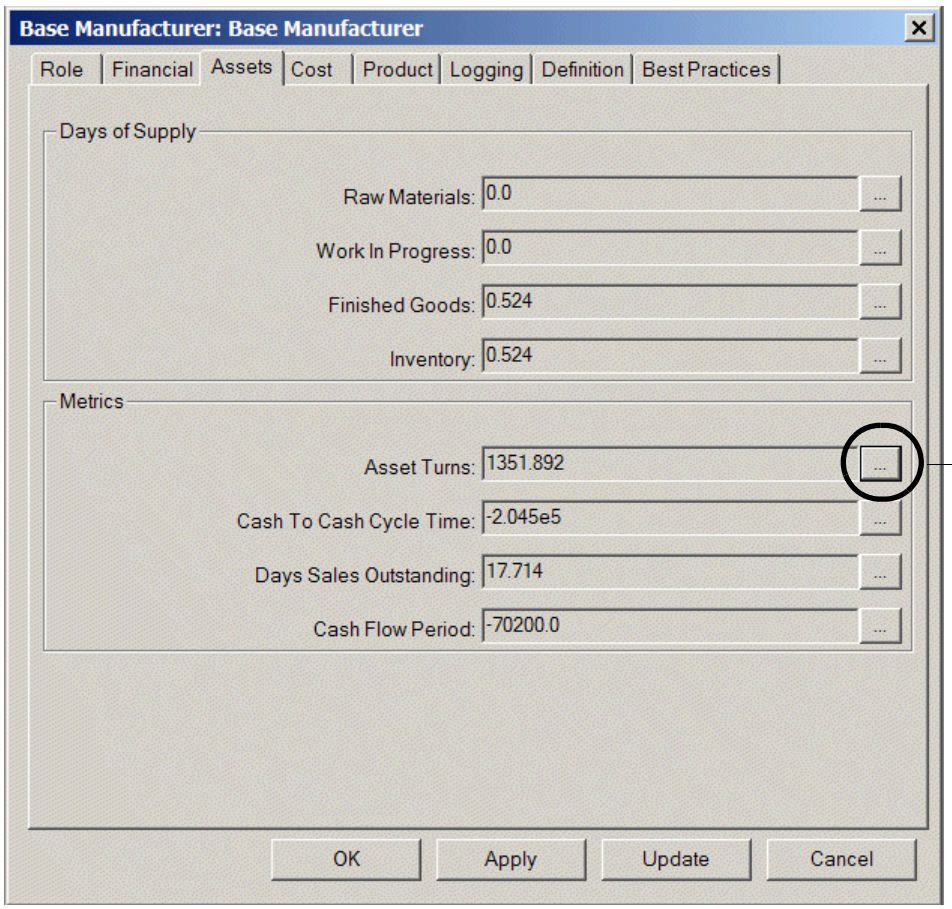
Metrics that are based on historical values calculate various statistics, including minimum and maximum values, average value, moving average, and time-weighted value. These metrics also allow you to view the histories. You can also configure various SCOR metrics, such as descriptions, performance attributes, metrics class, and target values, which you can use for comparative analysis.

The metrics that calculate statistics include financial, asset, and cost metrics for roles, performance metrics for categories such as Supplier On-Time Performance, and inventory and fulfillment time metrics for product composites.

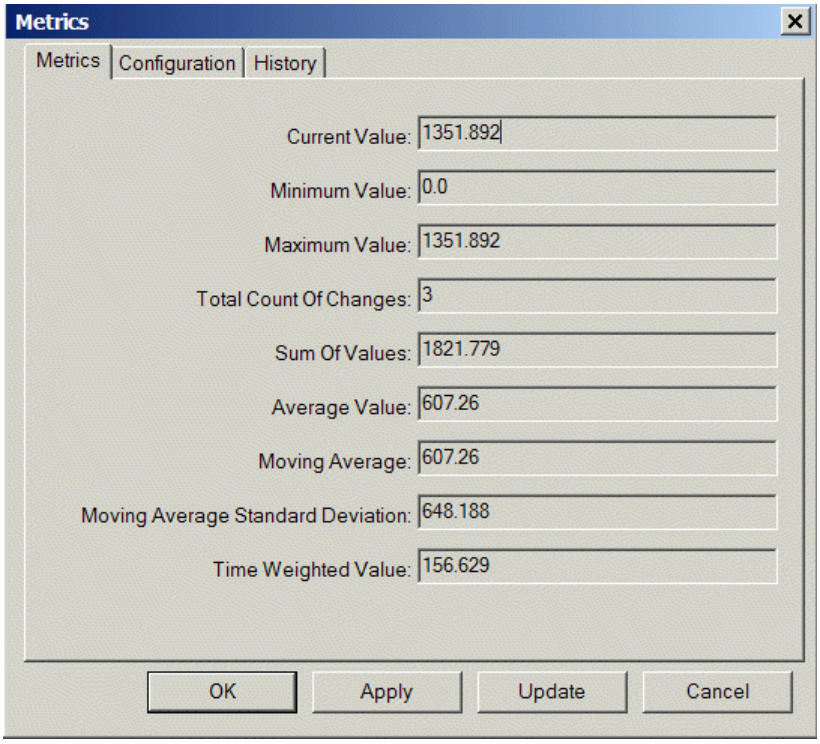
To view statistics and histories for metrics:

1 In the properties dialog for a role, category, or product composite, click the button next to the metric: ...

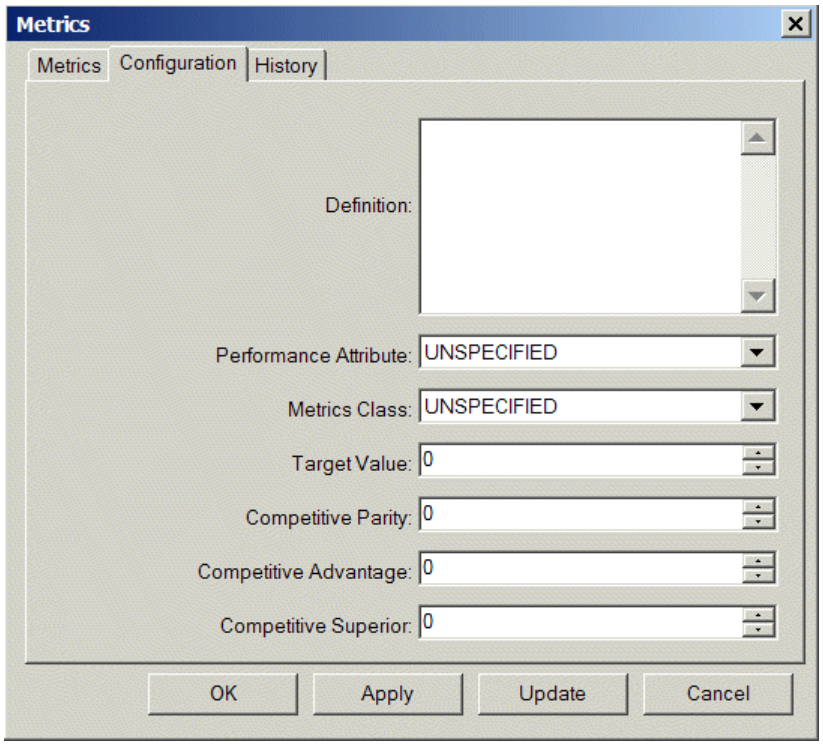
For example, here is the Assets tab of the role properties dialog for a Base Manufacturer role:



Here is the result of clicking the button next to the Asset Turns metric:



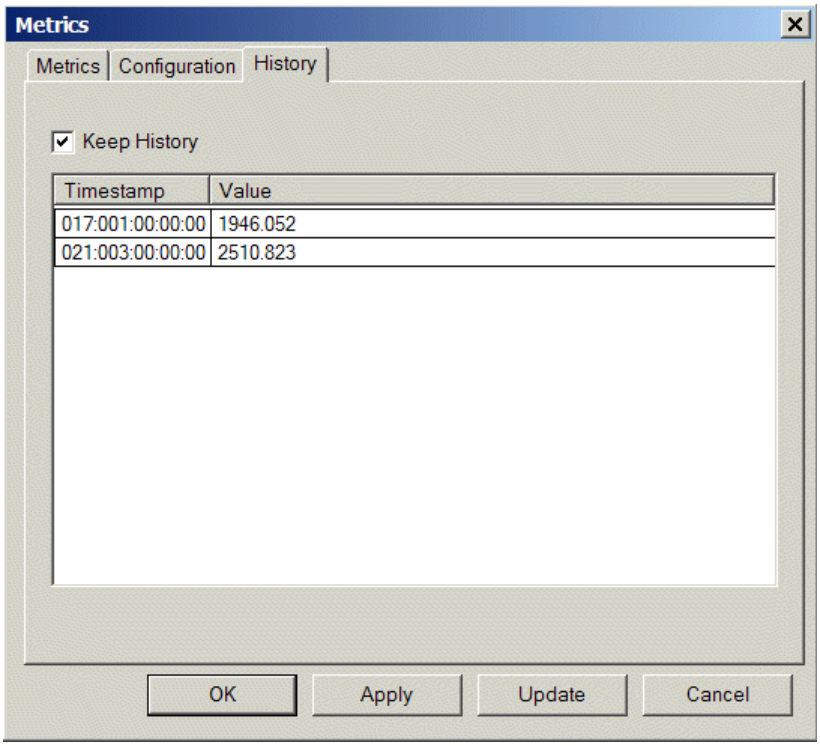
2 To configure metrics related to the calculated statistics, click the Configuration tab:



For information about these SCOR parameters, see the SCOR specification.

3 To keep a history, click the History tab and click the Keep History option.

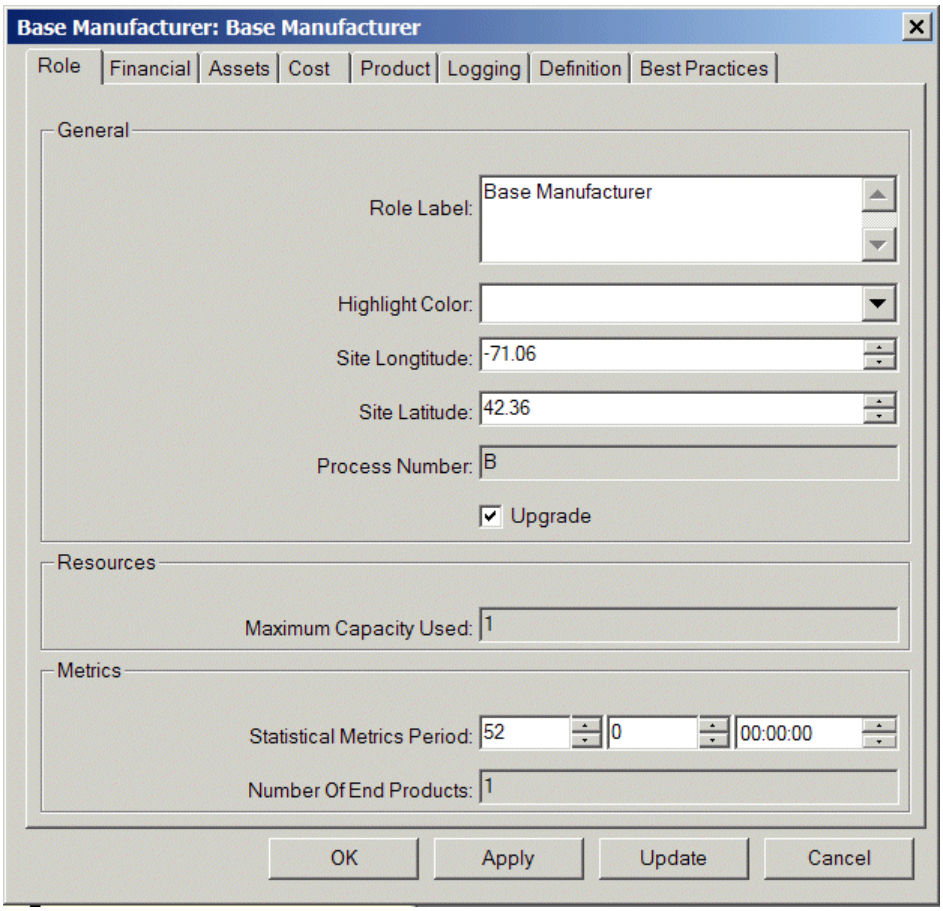
Here is the result of keeping a history for the Asset Turns metric, which creates an entry once per financial period:



Viewing Metrics for Roles

Each role in the model computes financial, asset, and cost metrics while the simulation runs. These metrics update once per financial period.

This figure shows the Role tab of a sample properties dialog for a Base Manufacturer role:

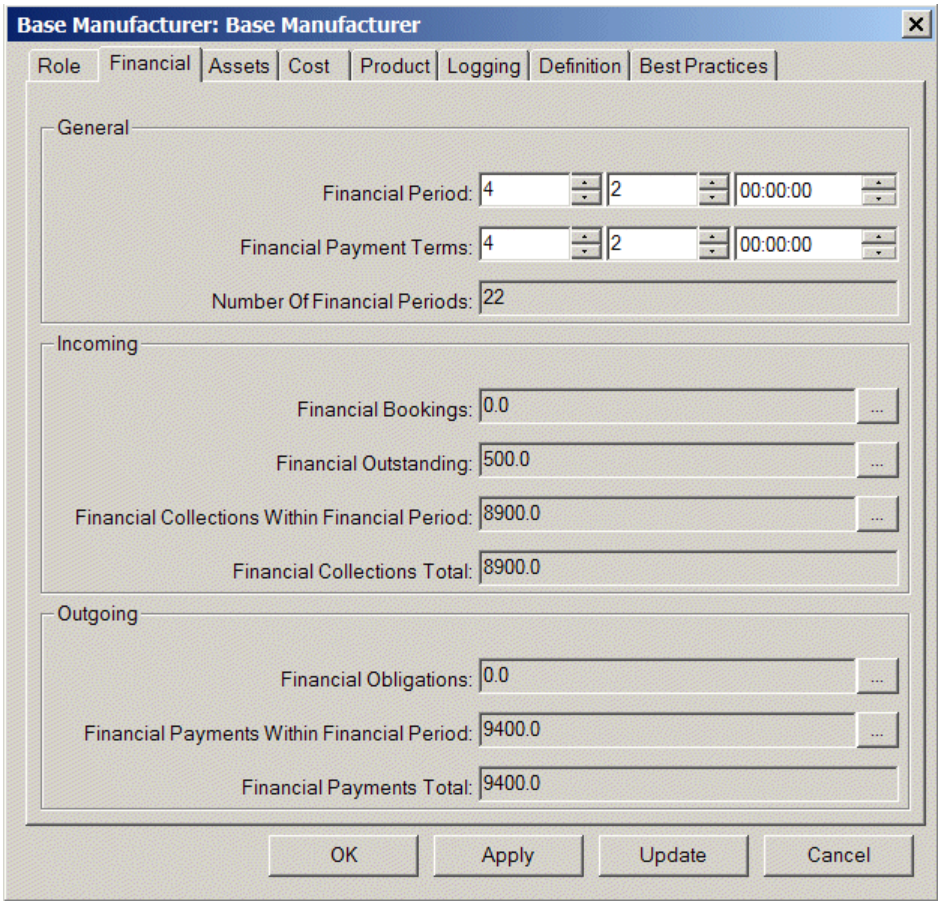


Maximum capacity of manufacturing resource used by the role.

The number of delivery products associated with the role.

This figure shows the Financial tab of a sample properties dialog for a Base Manufacturer role.

Note The Incoming financial metrics are not relevant for a Consumer role.

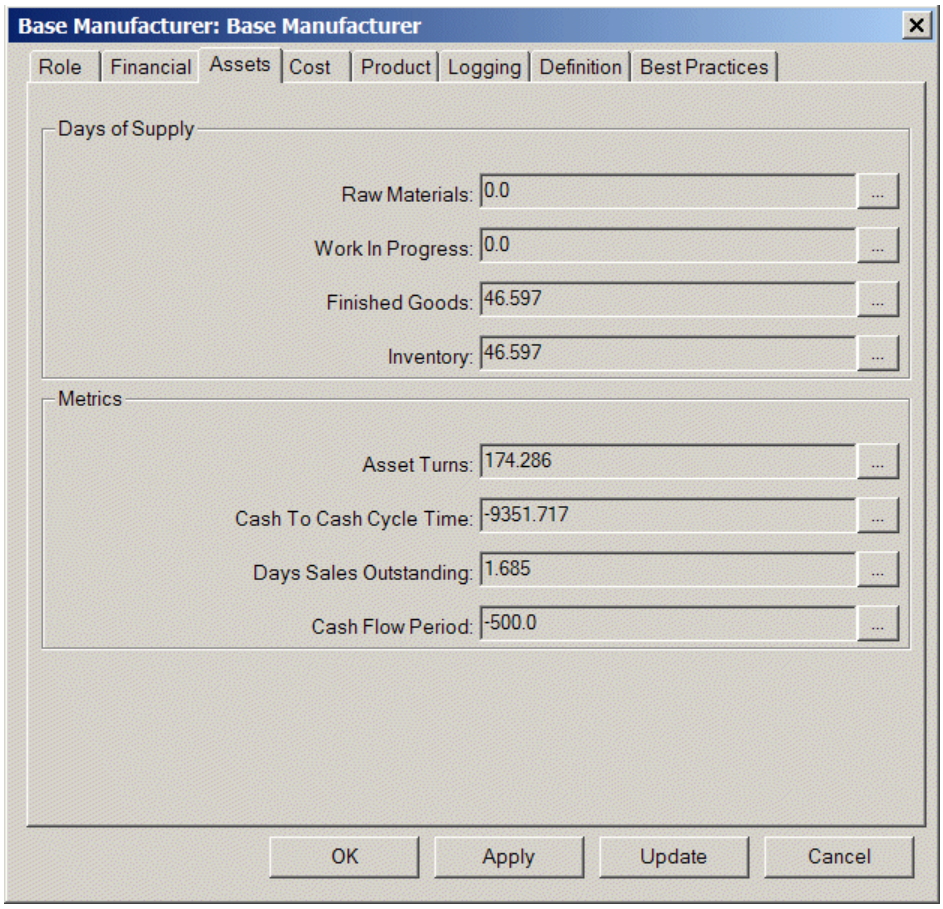


The money the supplier receives from buyers for shipments it has delivered, which is based on the Net Selling Price of the role's delivery products.

The money the supplier pays to its suppliers for source products, which is based on the Purchase Cost metric of the role's source products. For a Base Manufacturer, it is based on the Purchase Cost parameter of the role's delivery products.

This figure shows the Assets tab of a sample properties dialog for a Base Manufacturer role.

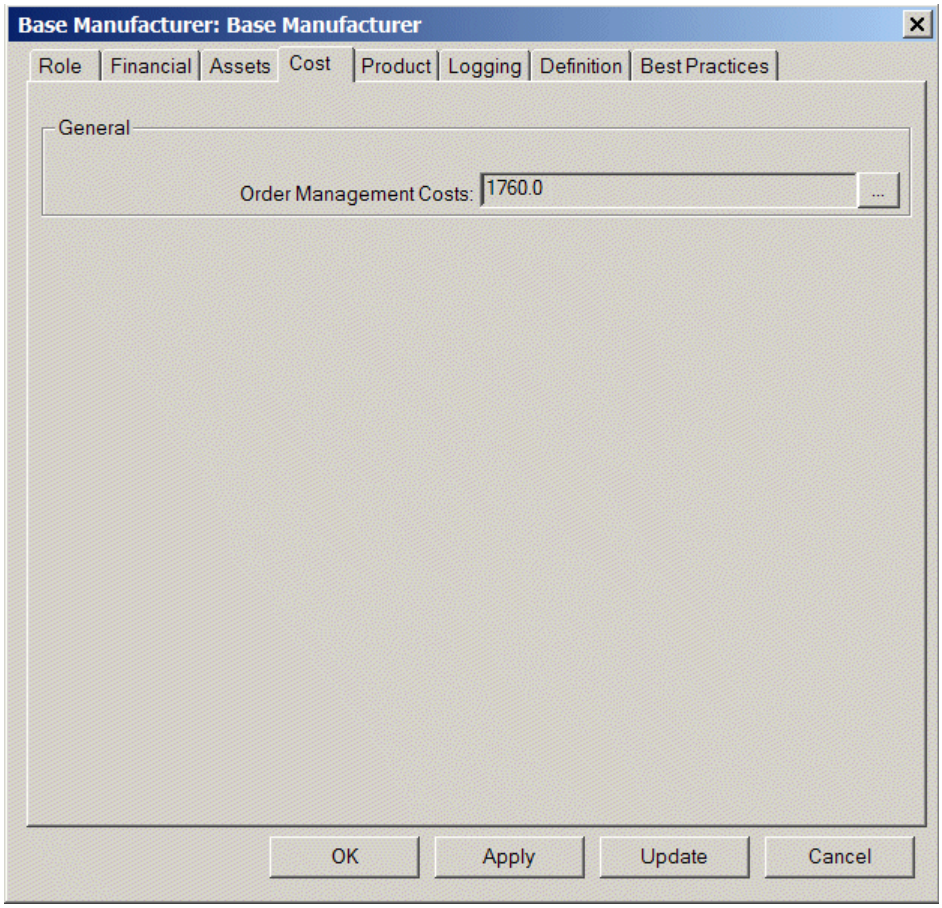
Note The Asset metrics are not relevant for a Consumer role.



Inventory days of supply for source products, work in progress, delivery products, and total inventory.

Standard asset calculations.

This figure shows the Cost tab of a sample properties dialog for a Base Manufacturer role:



The total cost of doing business for this role.

Group/Parameter	Tab	Description
General Process Number	Role	The label that appears on the role icon.
Resources Maximum Capacity Used	Role	The maximum number of resources that the role allocates during the simulation, based on the Resource Capacity of the resource. **Note:** This metric is only relevant for Base Manufacturer and Manufacturer roles.

Group/Parameter	Tab	Description
Metrics Number of End Products	Role	The number of delivery products assigned to the role. **Note:** This metric is not relevant for Consumer roles, because a Consumer role does not have any delivery products.
General Number of Financial Periods	Financial	The number of financial periods that have passed since the start of the simulation.
Incoming Financial Bookings	Financial	Supplier bookings for orders that buyers have placed with this supplier role but that the supplier has not yet invoiced. This metric includes bookings since the start of the simulation. **Note:** This metric is not relevant for a Consumer role.
Incoming Financial Outstanding	Financial	The amount of money outstanding for orders that buyers have placed with this supplier role but for which the supplier has not yet been paid. This metric includes outstanding money for orders since the start of the simulation. **Note:** This metric is not relevant for a Consumer role.
Incoming Financial Collections within Financial Period	Financial	The total amount of money that this supplier role has received from buyers during the *previous* collection period. **Note:** This metric is not relevant for a Consumer role.
Incoming Financial Collections Total	Financial	The total amount of money that this supplier role has received from buyers since the start of the simulation. **Note:** This metric is not relevant for a Consumer role.
Outgoing Financial Obligations	Financial	Buyer obligations for orders that this buyer role has placed with suppliers but has not yet paid. This metric includes obligations since the start of the simulation.

Group/Parameter	Tab	Description
Outgoing Financial Payments within Financial Period	Financial	The total amount of money that this buyer role has sent to its suppliers for product shipments received during the *previous* collection period.
Outgoing Financial Payments Total	Financial	The total amount of money that this buyer role has sent to its suppliers for product shipments received since the start of the simulation.
Days of Supply Raw Materials	Assets	The cost-weighted value of source product inventory at the end of the *previous* financial period, given current inventory and the consumption of source products during the financial period. **Note:** This metric is not relevant for a Consumer role.
Days of Supply Work in Progress	Assets	The cost-weighted value of work in progress at the end of the *previous* financial period, given current work in progress and the consumption of source products during the financial period. **Note:** This metric is not relevant for a Consumer role.
Days of Supply Finished Goods	Assets	The cost-weighted value of delivery product inventory at the end of the *previous* financial period, given current inventory and the amount of delivery product picked for delivery during the financial period. **Note:** This metric is not relevant for a Consumer role.
Days of Supply Inventory	Assets	The sum of Raw Materials, Work in Progress, and Finished Goods days of supply. **Note:** This metric is not relevant for a Consumer role.
Metrics Asset Turns	Assets	The number of days the role takes to turn over its inventory for delivery products, measured as a cost-weighted value in days. **Note:** This metric is not relevant for a Consumer role.

Group/Parameter	Tab	Description
Metrics Cash-to-Cash Cycle Time	Assets	The time it takes for money to flow from buyers to suppliers. A positive value indicates the role spends more money than it takes in. A negative value indicates the role takes in more money than it spends. This metric is weighted, based on the Financial Payment Terms of each buyer role and is measured in days. **Note:** This metric is not relevant for a Consumer role.
Metrics Days Sales Outstanding	Assets	The value of delivery product sales, which includes Financial Collections within Financial Period, Financial Bookings, and Financial Outstanding metrics for the *previous* financial period, measured in days. **Note:** This metric is not relevant for a Consumer role.
Metrics Cash Flow Period	Assets	The amount of money available during the *previous* financial period, which is equal to the Financial Collections within Financial Period minus the Financial Payments within Financial Period, which could be positive or negative. **Note:** This metric is not relevant for a Consumer role.
General Order Management Costs	Cost	The total cost of doing business since the start of the simulation, which includes these Cost Incurred metrics for these categories: • Source category: Create Customer Order Metric • Deliver category: Order Entry Metric Order Fulfillment Metric Pick Metric Packing Metric Transportation Metric Customer Invoicing Metric Customer Collections Metric

See Also Appendix A, Asset Metrics Formulas.

Viewing Metrics for Categories

Each category computes a number of metrics, which you can view as the simulation runs. This section describes the metrics for each category for the simplest e-SCOR model, which consists of a Base Manufacturer role and a Consumer role. Each section provides sample dialogs for the categories that appear in the simplest model. If the dialogs for other categories are significantly different, sample dialogs for these categories appear, as well.

The descriptions of each category metric apply to all categories, unless otherwise indicated in the description. For example, the ECO cost metric is only relevant for the Mb and M3 categories when the Order Type is eto.

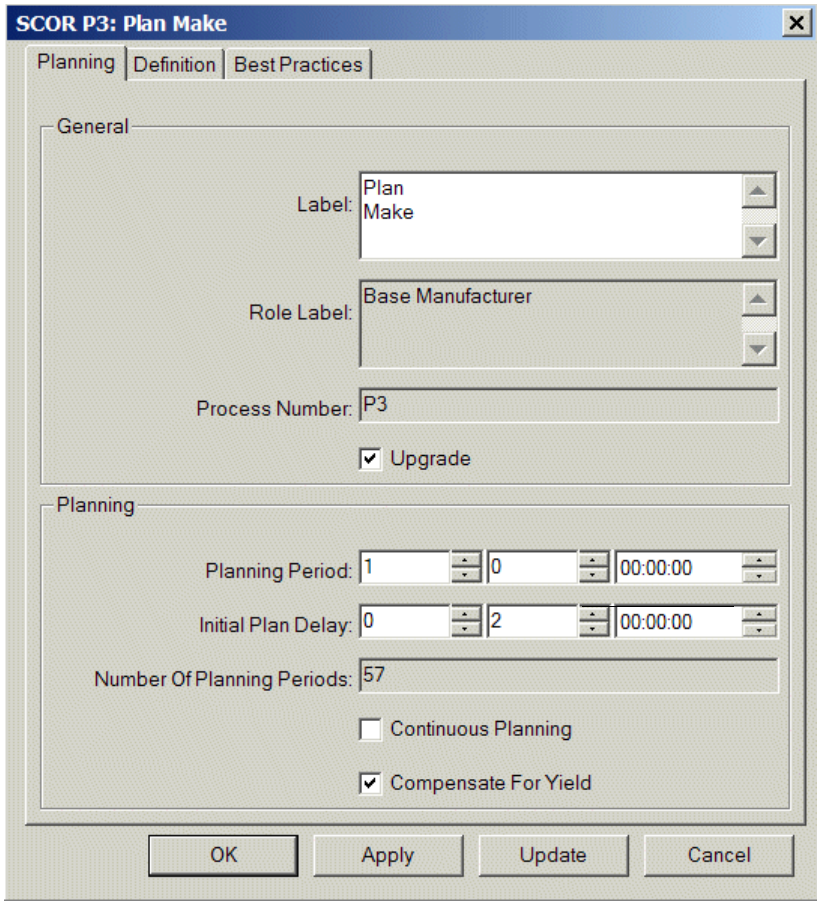
The following sections show sample dialogs and describe metrics that appear for the following categories:

- Plan categories
- ES: Enable Source category
- Source categories
- Make categories
- ED: Enable Deliver category
- Deliver categories
- Source Returns categories
- Deliver Returns categories

Viewing Metrics for the Plan Categories

The properties dialogs for the P2: Plan Source and P3: Plan Make categories are identical except that the P3 category has the Compensate for Yield parameter.

The following figure shows a sample properties dialog for the P3: Plan Make category of a Base Manufacturer role:

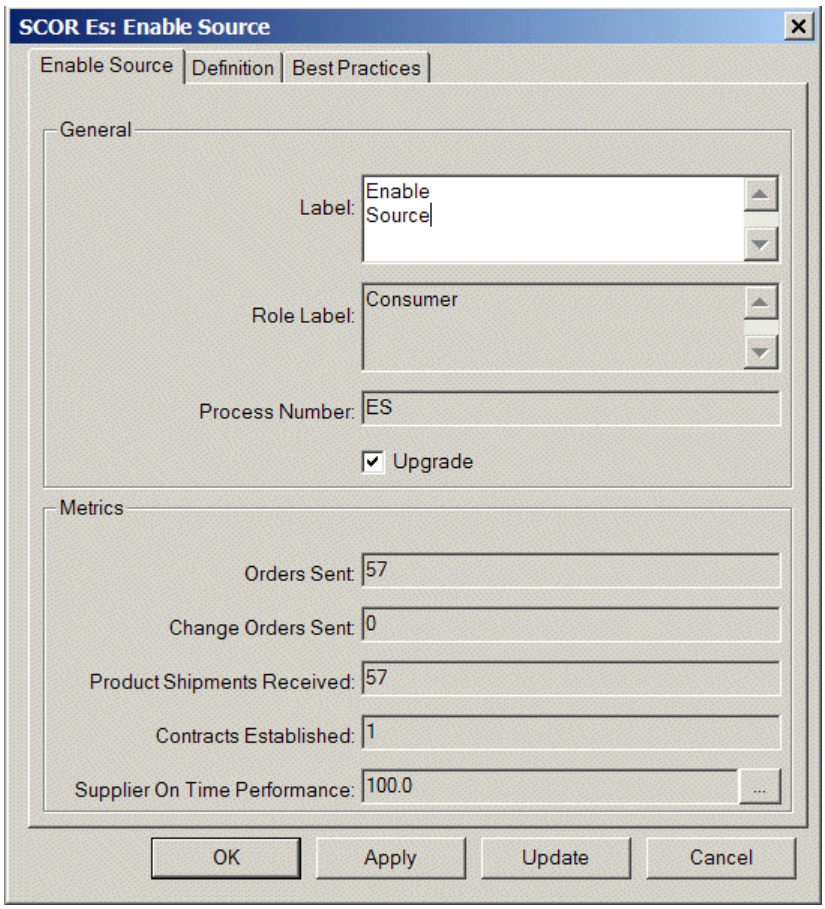


The number of planning periods that have completed since the start of the simulation.

Group/Parameter	Tab	Description
General Role Label	Planning	The label of the associated role. See Configuring General Parameters for Roles.
General Process Number	Planning	The SCOR process number.
Planning Number of Planning Periods	Planning	The number of planning periods that have passed since the start of the simulation, which the model computes, based on the Planning Period parameter. See Configuring the Plan Category.

Viewing Metrics for the ES: Enable Source Category

The following figure shows the Source tab of a sample properties dialog for the ES: Enable Source category of a Consumer role:



The number of orders and change order for source products the ES category has sent, the number of product shipments it has received, and the number of contracts it has established since the start of the simulation.

The percentage of orders that the ES category has received on or before the customer request date.

Note The metrics on the Enable Source tab include orders for all source products associated with the role.

Group/Parameter	Tab	Description
General Role Label	Enable Source	The label of the associated role. See Configuring General Parameters for Roles.
General Process Number	Enable Source	The SCOR process number.

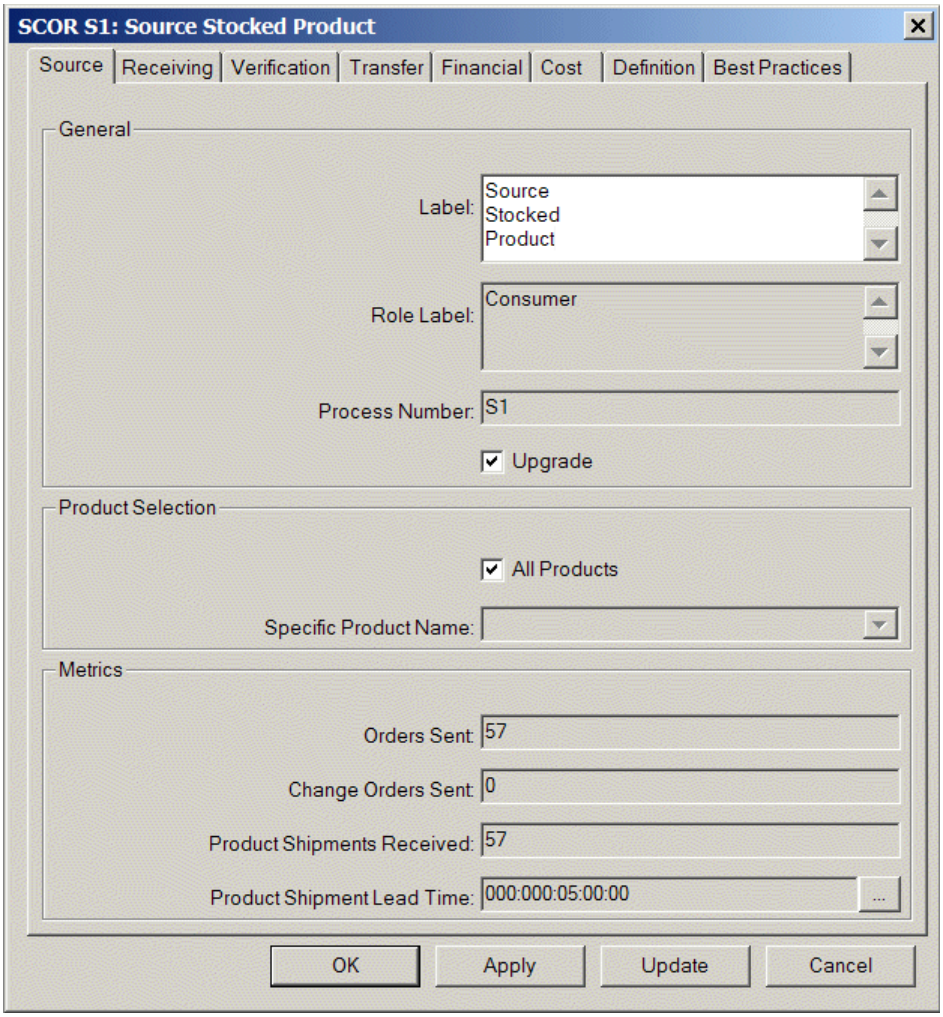
Group/Parameter	Tab	Description
Metrics Orders Sent	Enable Source	The total number of customer orders that the ES category has sent to suppliers since the start of the simulation.
Metrics Change Orders Sent	Enable Source	The total number of change orders that the ES category has sent to suppliers since the start of the simulation.
Metrics Product Shipments Received	Enable Source	The total number of product shipments that the ES category has received from suppliers since the start of the simulation.
Metrics Contracts Established	Enable Source	The total number of contracts for source products that the ES category has established with suppliers since the start of the simulation. When contracts have been established, one contract is established for every potential supplier role.
Metrics Supplier On-Time Performance	Enable Source	The percentage of product shipments that the ES category has received on or before the customer request date. The ES category computes this date from the Desired Turnaround parameter of all source products associated with the role.

Viewing Metrics for the Source Categories

The properties dialogs for the Source categories are the same.

The Receive, Verification, and Transfer tabs have no metrics.

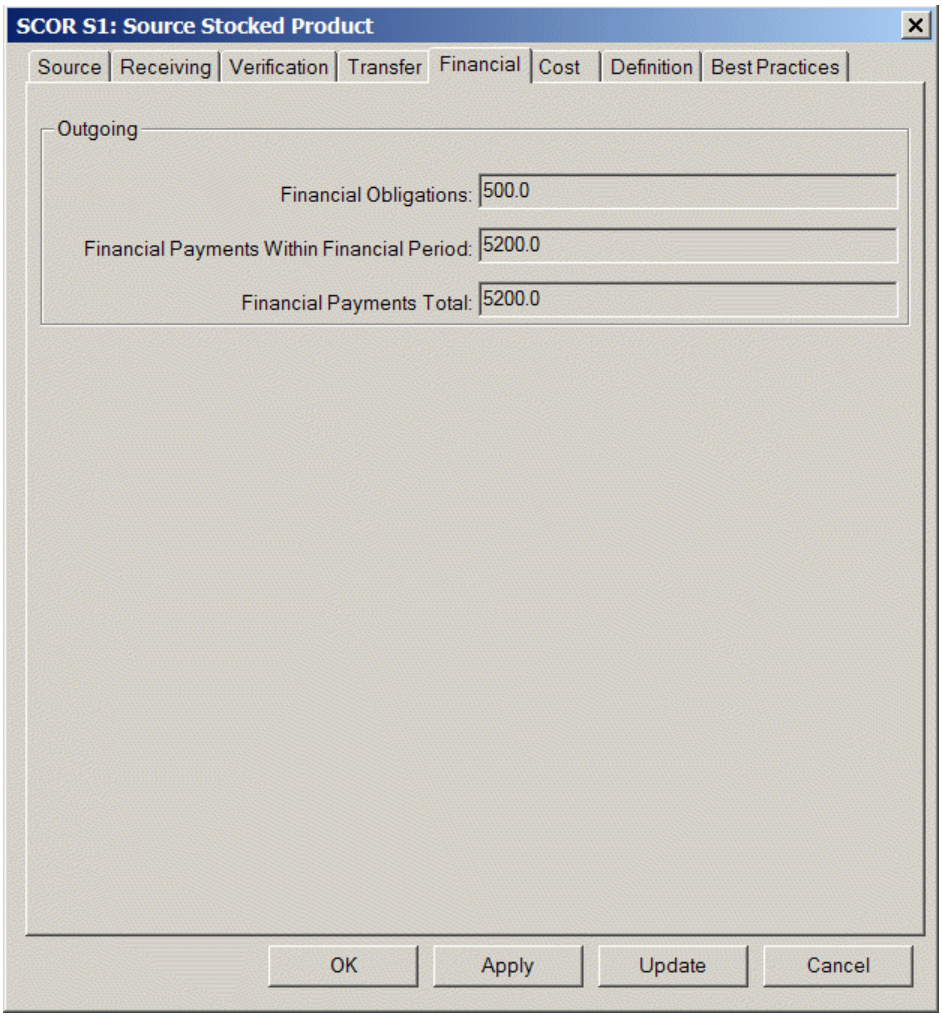
The following figure shows the Source tab of a sample properties dialog for the S1: Source Stocked Product category of a Consumer role:



The number of orders and change orders the Source category has sent, and the number of product shipments it has received since the start of the simulation.

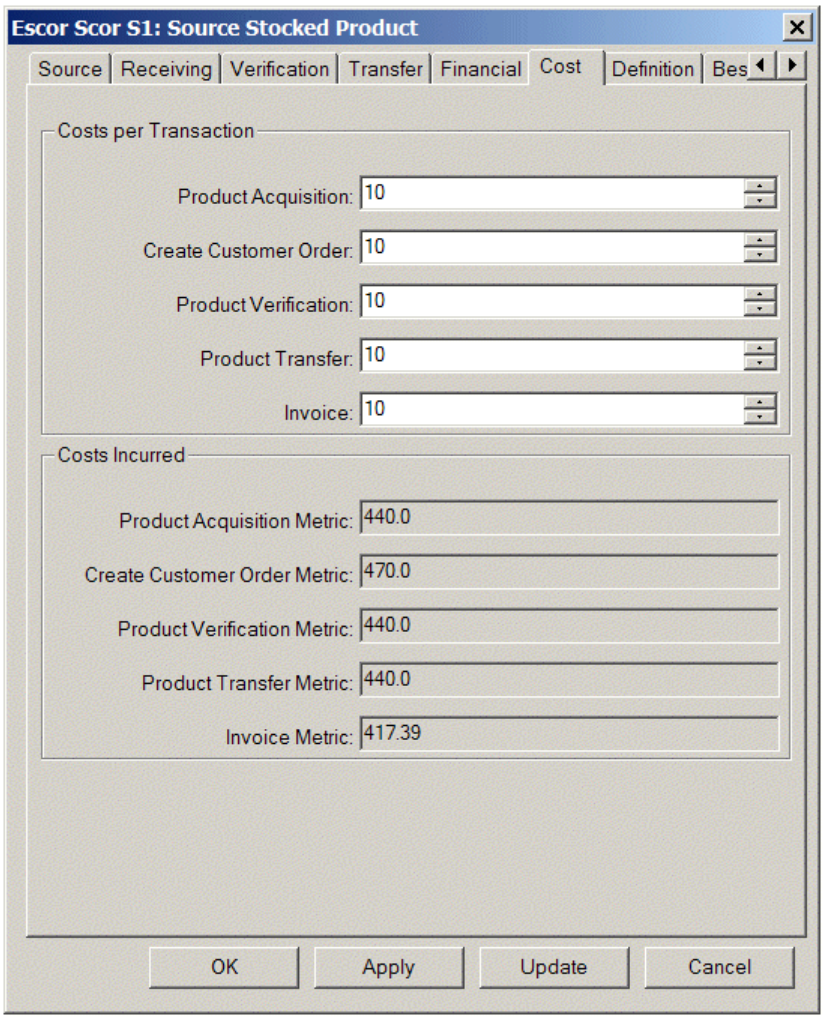
The average number of days by which product shipments are early or late.

The following figure shows the Financial tab of a sample properties dialog for the S1: Source Stocked Products category of a Consumer role:



The money the Source category has paid or will pay to suppliers for products received since the start of the simulation.

The following figure shows the Cost tab of a sample properties dialog for the S1: Source Stocked Product category of a Consumer role:



The costs the Source category has incurred since the start of the simulation.

Group/Parameter	Tab	Description
General Role Label	Source	The label of the associated role. See Configuring General Parameters for Roles.
General Process Number	Source	The SCOR process number.

Group/Parameter	Tab	Description
Metrics Orders Sent	Source	The total number of customer orders that the Source category has sent to suppliers since the start of the simulation. For details, see Configuring the Source Category.
Metrics Change Orders Sent	Source	The total number of change orders that the Source category has sent to suppliers since the start of the simulation.
Metrics Product Shipments Received	Source	The total number of product shipments the Source category has received from suppliers since the start of the simulation.
Metrics Product Shipment Lead Time	Source	The average change in time from the Desired Turnaround parameter of source products to the actual time at which the Source category receives product shipments. A positive number indicates product shipments are early, and a negative number indicates product shipments are late. For a description of the Desired Turnaround parameter, see Supplier Tab for a source product.
Outgoing Financial Obligations	Financial	Buyer obligations for customer orders that the Source category has placed with suppliers but has not yet received since the start of the simulation.
Outgoing Financial Payments within Financial Period	Financial	The total amount of money that the Source category has sent to suppliers for product shipments received during the *previous* collection period.
Outgoing Financial Payments Total	Financial	The total amount of money that the Source category has sent to suppliers for product shipments received since the start of the simulation.
Costs Incurred Receiving Metric	Cost	The total cost that the Source category has incurred for receiving source products since the start of the simulation.
Costs Incurred Verification Metric	Cost	The total cost that the Source category has incurred for verifying product shipments since the start of the simulation.

Group/Parameter	Tab	Description
Costs Incurred Transfer Metric	Cost	The total cost that the Source category has incurred for transferring product shipments to inventory since the start of the simulation.
Costs Incurred Create Customer Order Metric	Cost	The total cost that the Source category has incurred for creating customer orders since the start of the simulation.
Costs Incurred Invoice Metric	Cost	The total cost that the Source category has incurred for paying invoices for product shipments received since the start of the simulation.

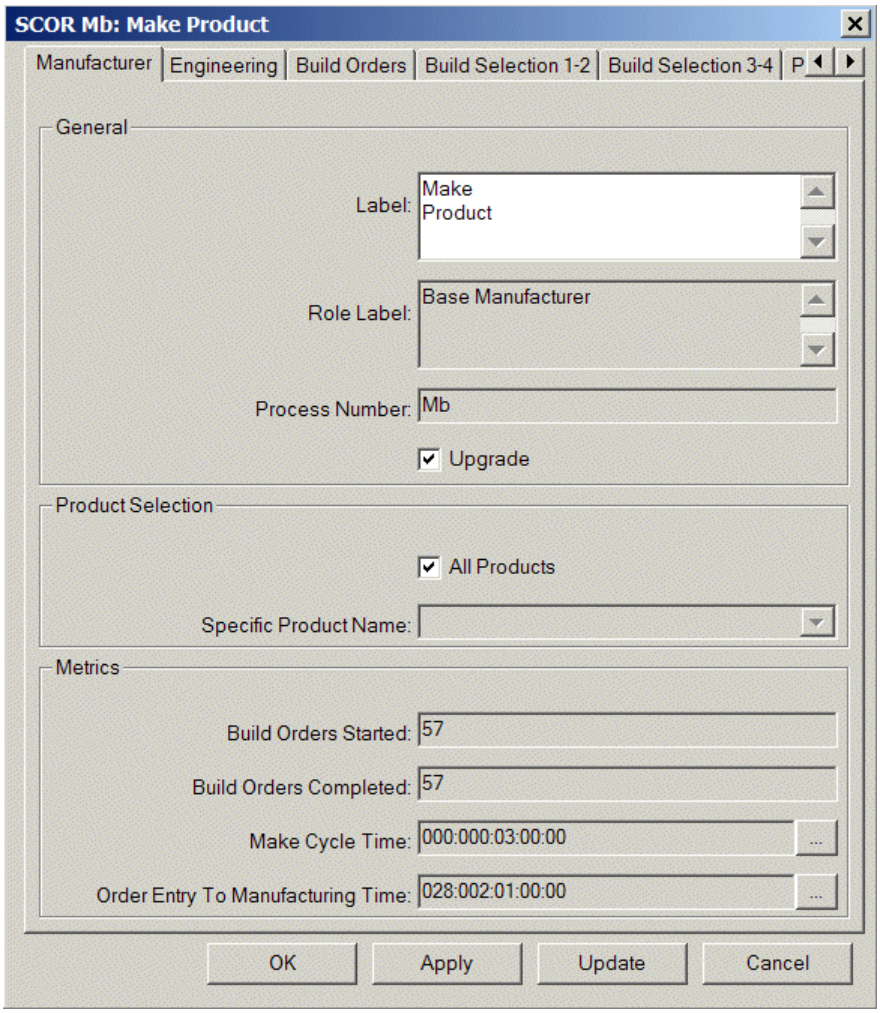
Viewing Metrics for the Make Categories

The properties dialogs for the Make categories have these differences for metrics, by tab:

- Manufacturer tab: The Mb and M3 categories include the Order Entry to Manufacturing Timemetric.
- Cost tab: The Mb and M3 categories include the ECO Metric.

The Build Orders, Build Selection, Production Material, Manufacturing, Transfer, and Engineering tabs have no metrics.

The following figure shows the Manufacturer tab of a sample properties dialog for the Mb: Make Product category of a Base Manufacturer role:

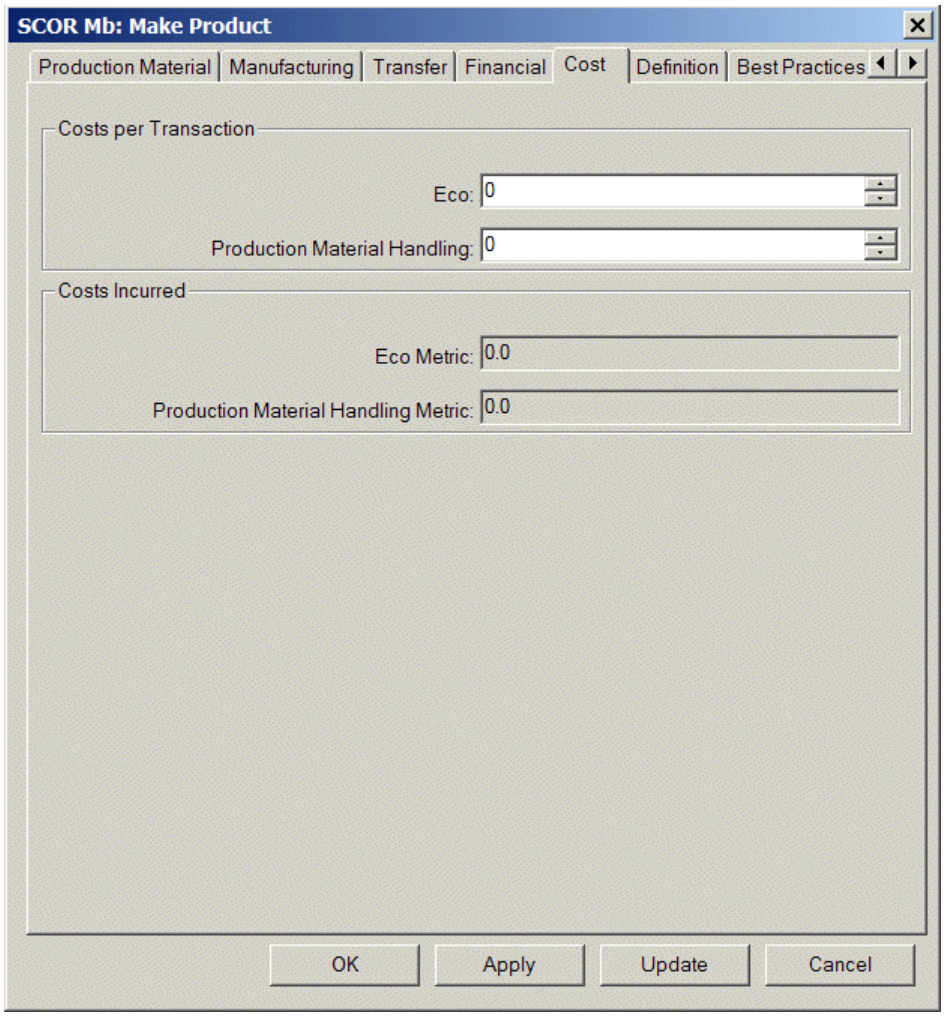


The number of build orders the Make category has started and completed manufacturing since the start of the simulation.

The average cycle time from when the Make category starts manufacturing build orders to when build orders are complete.

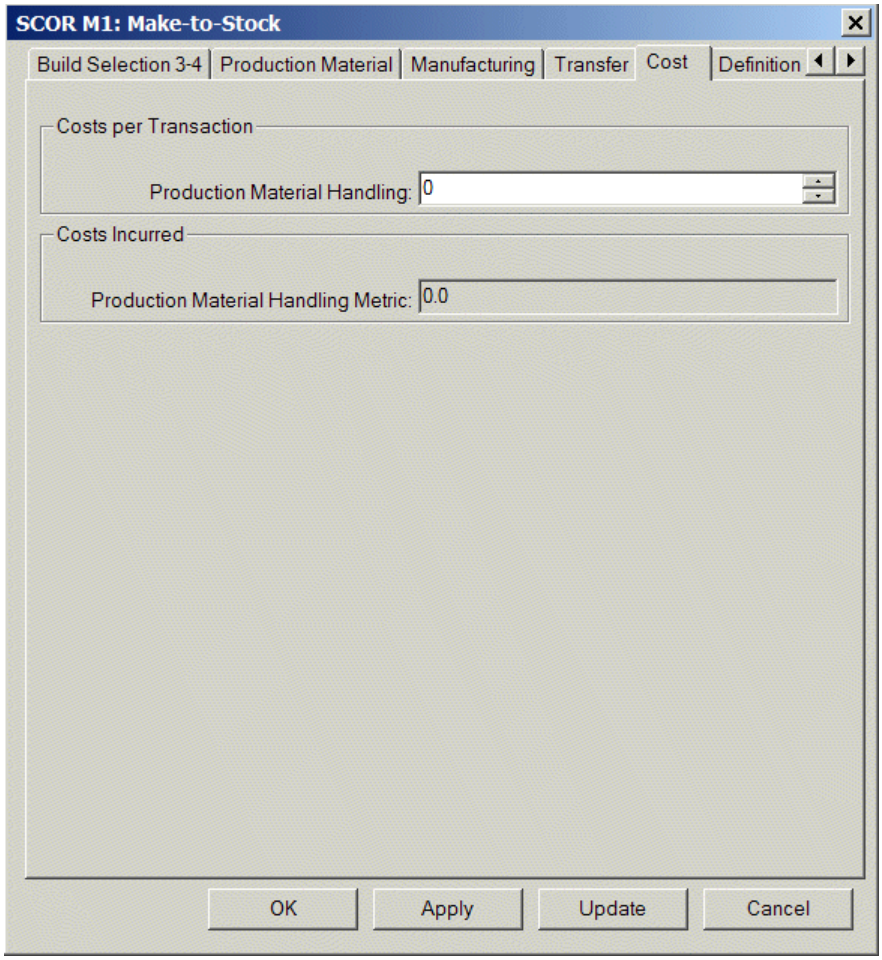
The average time from when the buyer places an order to when the Make category starts to manufacture the build order.

The following figure shows the Cost tab of a sample properties dialog for the Mb: Make Base Manufacturer category. The Cost tab for the M3: Engineer-to-Order is the same.



The costs incurred for engineering change orders (ECO) for engineer-to-order products and for handling raw materials.

The following figure shows the Cost tab of a sample properties dialog for the M1: Make-to-Stock category of a Manufacturer role:



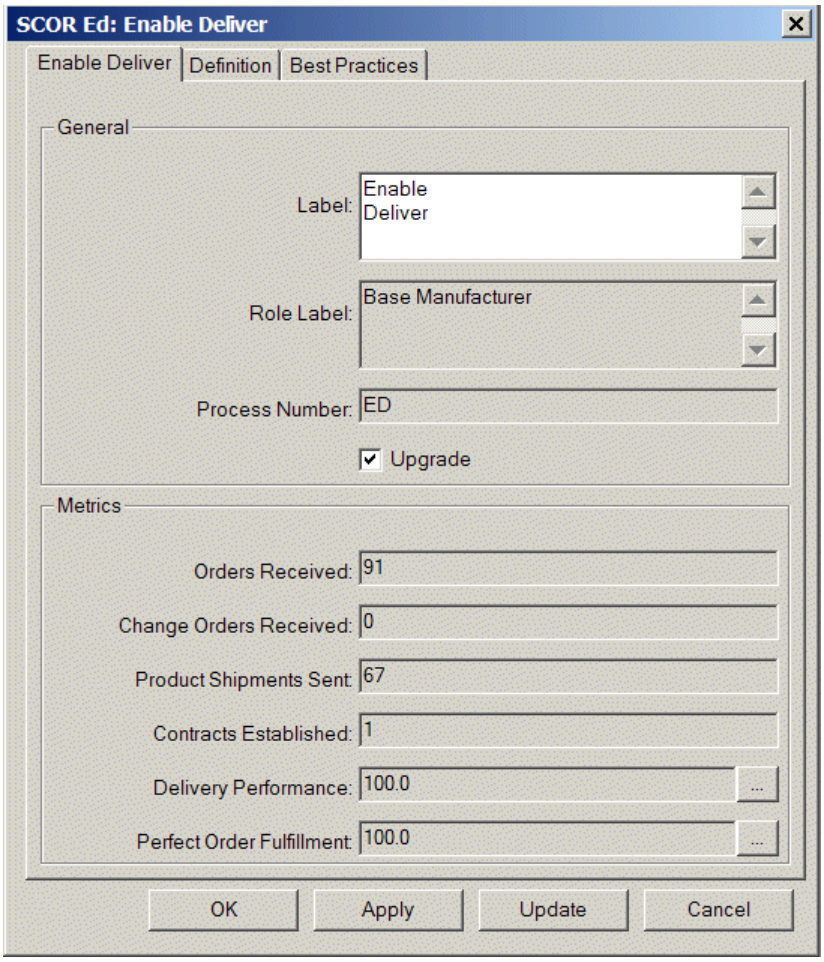
The costs incurred for handling the raw materials.

Group/Parameter	Tab	Description
General Role Label	Manufacturer	The label of the associated role. See Configuring General Parameters for Roles.
General Process Number	Manufacturer	The SCOR process number.

Group/Parameter	Tab	Description
Metrics Build Orders Started	Manufacturer	The total number of build orders the Make category has started to manufacture since the start of the simulation. The Make category starts manufacturing a build order when it receives a scheduled build order from the P3: Plan Make category and it has components.
Metrics Build Orders Completed	Manufacturer	The total number of build orders the Make category has completed manufacturing since the start of the simulation. A build order is complete when the Make category finishes its manufacturing step but before it releases the product.
Metrics Make Cycle Time	Manufacturer	The average cycle time from when the Make category starts to manufacture a build order to when it releases finished products for delivery.
Metrics Order Entry to Manufacturing Time	Manufacturer	(Mb, M3) The total amount of time from when the downstream Deliver category creates a replenishment order to when the Make category starts manufacturing the build order. This metric is only relevant for ETO products.
Costs Incurred ECO Metric	Cost	(Mb, M3) The total cost that the Make category has incurred for engineering change orders since the start of the simulation. **Note:** This metric applies to ETO delivery products only.
Costs Incurred Production Material Handling Metric	Cost	The total cost associated with handling the components used to manufacture finished products since the start of the simulation.

Viewing Metrics for the ED: Enable Deliver Category

The following figure shows a sample properties dialog for the ED: Enable Deliver category of a Base Manufacturer role:



The number of orders and changed orders for delivery products the ED category has received from buyers, the number of product shipments it has sent, and the number of contracts established since the start of the simulation.

Performance metrics relating to the supplier's delivery phase for all delivery products associated with the role.

Note The metrics on the Enable Deliver tab include orders for all delivery products associated with the role.

Group/Parameter	Tab	Description
General Role Label	Enable Deliver	The label of the associated role. See Configuring General Parameters for Roles.
General Process Number	Enable Deliver	The SCOR process number.

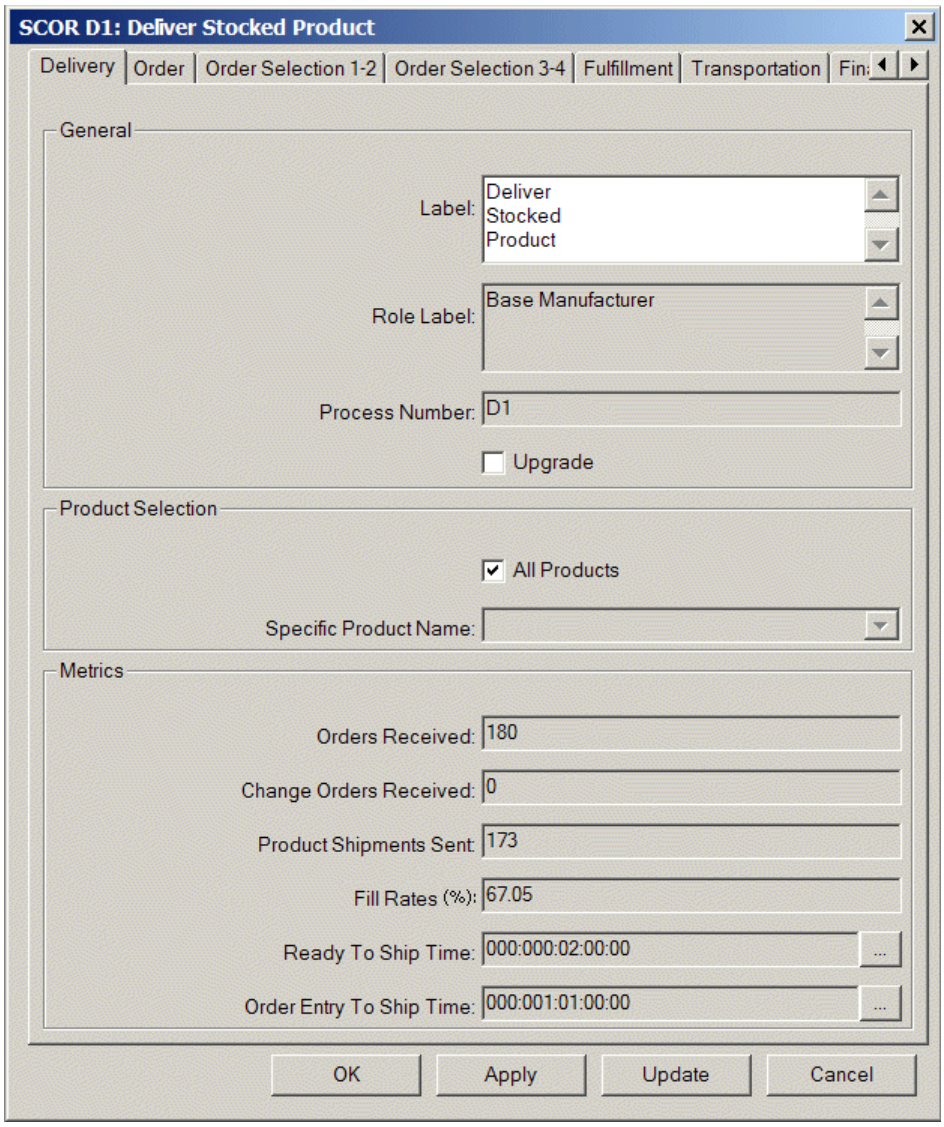
Group/Parameter	Tab	Description
Metrics Orders Received	Enable Deliver	The total number of customer orders that the ED category has received from buyers since the start of the simulation.
Metrics Change Orders Received	Enable Deliver	The total number of change orders that the ED category has received from buyers since the start of the simulation.
Metrics Product Shipments Sent	Enable Deliver	The total number of product shipments that the ED category has sent to buyers since the start of the simulation.
Metrics Contracts Established	Enable Deliver	The total number of contracts for delivery products that the ED category has established with buyers since the start of the simulation. When contracts have been established, one contract is established for every downstream buyer role.
Metrics Delivery Performance (%)	Enable Deliver	The percentage of product shipments that the ED category has delivered on or before the customer request date. The ED category computes this date from the Desired Turnaround parameter of the source product of the downstream buyer role.
Metrics Perfect Order Fulfillment (%)	Enable Deliver	The percentage of product shipments that the ED category has delivered on or before the customer request date and that are for the requested quantities. The ED category computes this date from the Desired Turnaround parameter of the source product of the downstream buyer role.

Viewing Metrics for the Deliver Categories

The properties dialogs for the Deliver categories are the same except that the D2 and D3 categories do not have the Fill Rates metric.

The Order, Order Selection, Fulfillment, and Transportation tabs have no metrics.

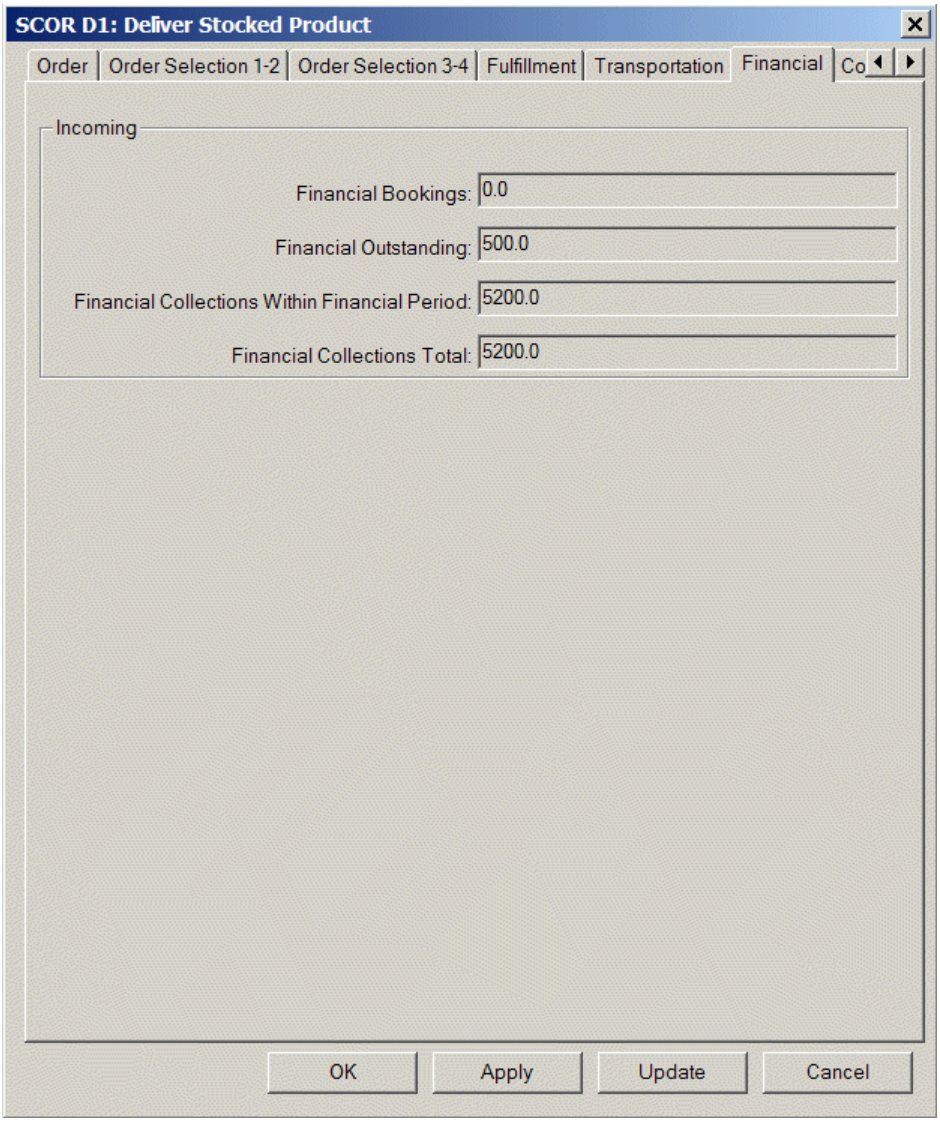
The following figure shows the Delivery tab of a sample properties dialog for the D1: Deliver Stocked Product category of a Base Manufacturer role:



The number of orders and change orders the Deliver category has received, and the number of product shipments it has sent since the start of the simulation.

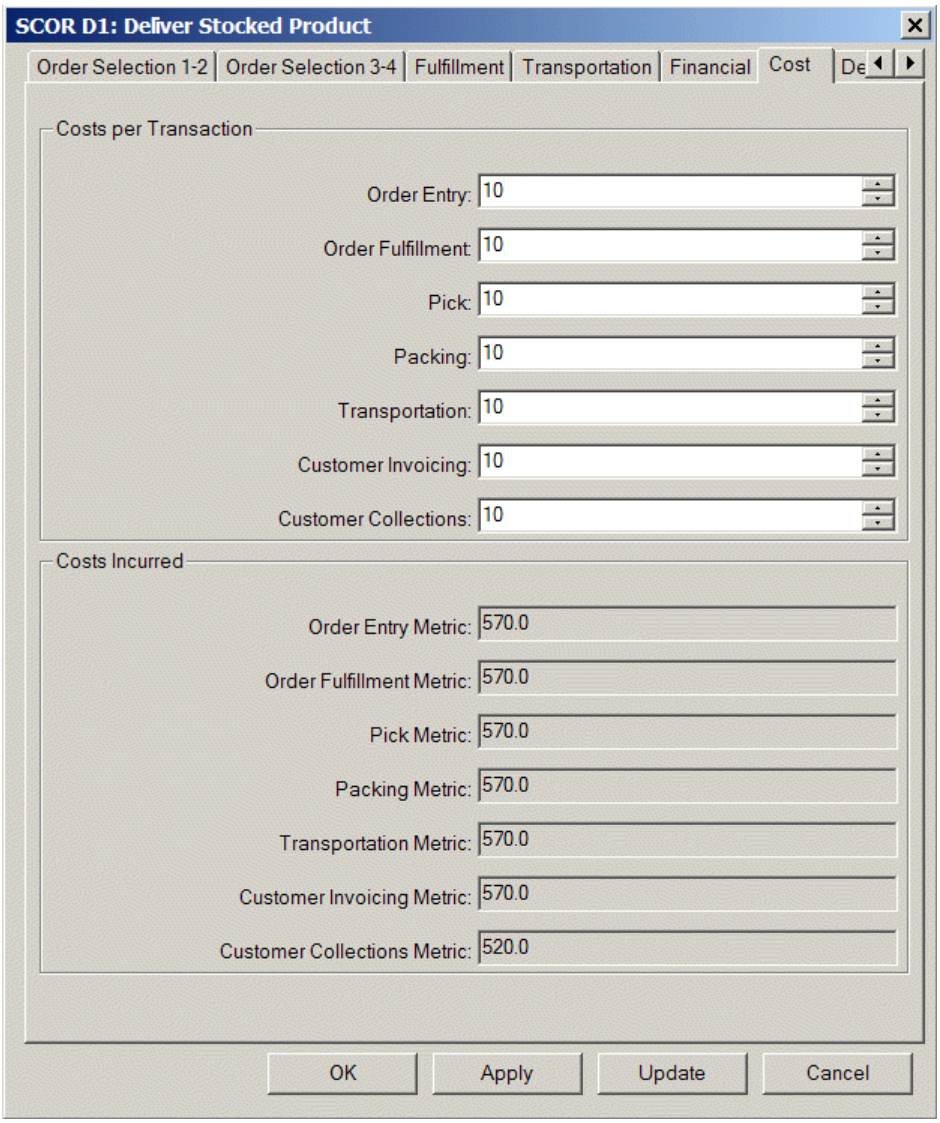
Performance metrics related to the supplier's delivery phase for this Deliver category.

The following figure shows the Financial tab of a sample properties dialog for the D1: Deliver Stocked Product category of a Base Manufacturer role:



The money that the Deliver category has received or will receive from buyers for products shipped.

The following figure shows the Cost tab of a sample properties dialog for the D1: Deliver Stocked Product category of a Base Manufacturer role:



The costs that the Deliver category has incurred since the start of the simulation.

Group/Parameter	Tab	Description
General Role Label	Delivery	The label of the associated role. See Configuring General Parameters for Roles.
General Process Number	Delivery	The SCOR process number.

Group/Parameter	Tab	Description
Metrics Orders Received	Delivery	The total number of valid customer orders the Deliver category has received from buyers since the start of the simulation.
Metrics Change Orders Received	Delivery	The total number of change orders the Deliver category has received from buyers since the start of the simulation.
Metrics Product Shipments Sent	Delivery	The total number of product shipments the Deliver category has delivered to buyers since the start of the simulation.
Metrics Fill Rates (%)	Delivery	(D1) The percentage of product shipments the Deliver category has delivered within 24 hours of receiving an order.
Metrics Ready to Ship Time	Delivery	The sum of the Pick Material Time and Pack Material Time parameters of the Deliver category. For details, see Configuring the Deliver Category.
Metrics Order Entry to Ship Time	Delivery	The average time from when the Deliver category enters a customer order to when the product shipment is ready to deliver.
Incoming Financial Bookings	Financial	Supplier bookings for customer orders that buyers have placed with the Deliver category but that the Deliver category has not yet invoiced.
Incoming Financial Outstanding	Financial	The amount of money outstanding for customer orders that buyers have placed with the Deliver category but for which the Deliver category has not yet been paid.
Incoming Financial Collections within Financial Period	Financial	The total amount of money for product shipments the Deliver category has received from buyers during the previous collection period.
Incoming Financial Collections Total	Financial	The total amount of money for product shipments the Deliver category has received from buyers since the start of the simulation.

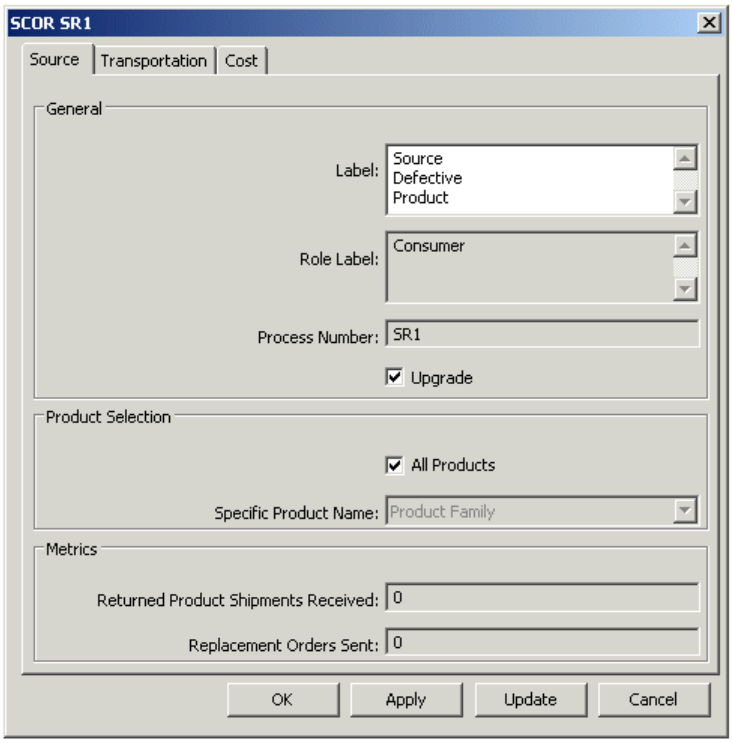
Group/Parameter	Tab	Description
Costs Incurred Order Entry Metric	Cost	The total cost that the Deliver category has incurred for entering customer orders since the start of the simulation.
Costs Incurred Order Fulfillment Metric	Cost	The total cost that the Deliver category has incurred for filling customer orders since the start of the simulation.
Costs Incurred Pick Metric	Cost	The total cost that the Deliver category has incurred for taking products out of inventory for distributing to buyers since the start of the simulation.
Costs Incurred Packing Metric	Cost	The total cost that the Deliver category has incurred for packing product shipments for buyers since the start of the simulation.
Costs Incurred Transportation Metric	Cost	The total cost that the Deliver category has incurred for transporting product shipments since the start of the simulation.
Costs Incurred Customer Invoicing Metric	Cost	The total cost that the Deliver category has incurred for invoicing customers since the start of the simulation.
Costs Incurred Customer Collections Metric	Cost	The total cost that the Deliver category has incurred for collecting payments from customers since the start of the simulation.

Viewing Metrics for the Source Returns Categories

The properties dialogs for the Source Returns categories are the same except that the cost metrics depend on the category, for example, Defective Product Transportation Cost Metric, MRO Product Transportation Cost Metric, and Excess Inventory Transportation Cost Metric.

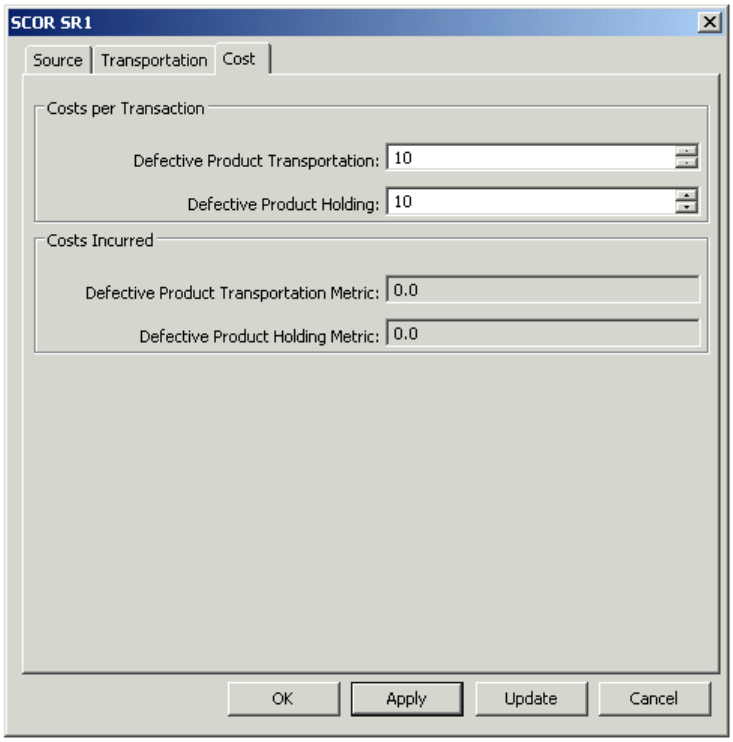
The Transportation tab has no metrics.

The following figure shows the Source tab of a sample properties dialog for the SR1: Source Defective Product category of a Consumer role:



No shipments have been returned.

The following figure shows the Cost tab of a sample properties dialog for the SR1: Source Returns category of a Consumer role:



The costs that the Source Returns category has incurred since the start of the simulation.

Group/Parameter	Tab	Description
General Role Label	Source	The label of the associated role. See Configuring General Parameters for Roles.
General Process Number	Source	The SCOR process number.
Metrics Returned Product Shipments Received	Source	The number of returned product shipments received, based on defective products, MRO products, and excess inventory.
Metrics Replacement Orders Sent	Source	The number of replacement orders sent to upstream suppliers.

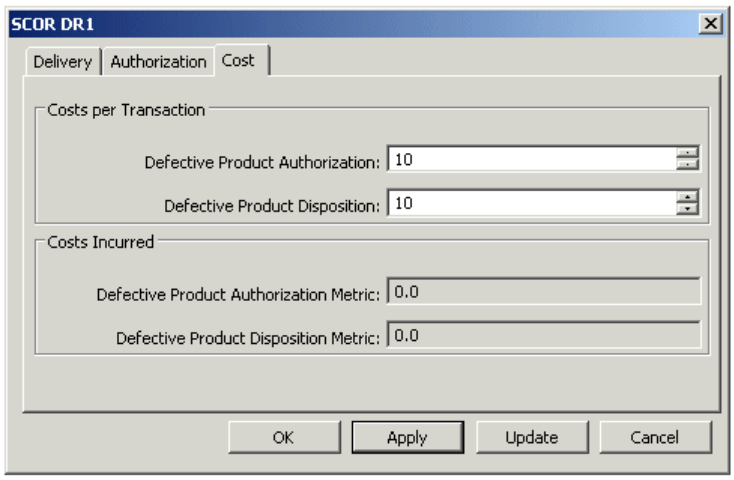
Group/Parameter	Tab	Description
Costs Incurred SR1: Defective Product Transportation Metric SR2: MRO Product Transportation Metric SR3: Excess Inventory Transportation Metric	Cost	The total cost that the Source Returns category has incurred for transporting defective products, MRO products, or excess inventory since the start of the simulation.
Costs Incurred SR1: Defective Product Holding Metric SR2: MRO Product Holding Metric SR3: Excess Inventory Holding Metric	Cost	The total cost that the Source Returns category has incurred for holding defective products, MRO products, or excess inventory since the start of the simulation.

Viewing Metrics for the Deliver Returns Categories

The properties dialogs for the Source Returns categories are the same except that the cost metrics depend on the category, for example, Defective Product Authorization Cost Metric, MRO Product Authorization Cost Metric, and Excess Inventory Authorization Cost Metric.

The Transportation tab has no metrics.

The following figure shows the Cost tab of a sample properties dialog for the DR1: Deliver Returns category of a Base Manufacturer role:



The costs that the Deliver Returns category has incurred since the start of the simulation.

Group/Parameter	Tab	Description
General Role Label	Delivery	The label of the associated role. See Configuring General Parameters for Roles.
General Process Number	Delivery	The SCOR process number.

Group/Parameter	Tab	Description
Costs Incurred DR1: Defective Product Authorization Metric DR2: MRO Product Authorization Metric DR3: Excess Inventory Authorization Metric	Cost	The total cost that the Deliver Returns category has incurred for authorizing defective products, MRO products, or excess inventory since the start of the simulation.
Costs Incurred DR1: Defective Product Disposition Metric DR2: MRO Product Disposition Metric DR3: Excess Inventory Disposition Metric	Cost	The total cost that the Deliver Returns category has incurred for disposing of defective products, MRO products, or excess inventory since the start of the simulation.

Viewing Metrics for Source and Delivery Products

Each product composite computes a number of metrics, which you can view as the simulation runs. Certain metrics are relevant for both source and delivery products, whereas other metrics are relevant for source products or delivery products only.

This section describes the metrics for the product composites defined for the simplest e-SCOR model, which consists of a Base Manufacturer role and a Consumer role. Each section provides sample dialogs for the product composites that appear in the simplest model.

You can view metrics for:

- Delivery products.
- Source products.

The metrics that you view for the source and delivery products of a Distributor and Manufacturer role are similar. However, note that the metrics that appear on the Metrics tab of a source and delivery product depend on the role.

A Base Manufacturer role has delivery products only, and a Consumer role has source products only.

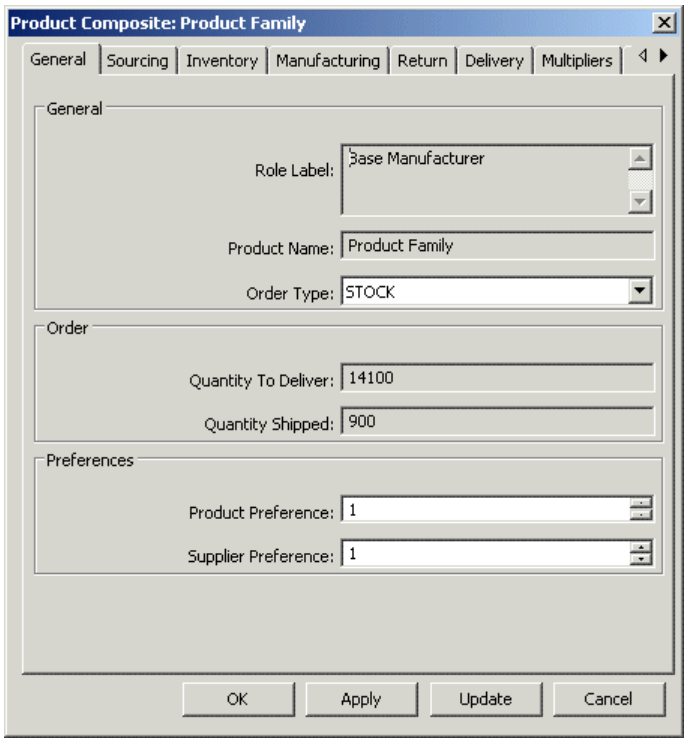
Viewing Metrics for Delivery Products

You can view metrics for delivery products on these tabs of the product composite dialog:

- General tab
- Manufacturing tab
- Metrics tab

General Tab

The following figure shows the General tab of a sample properties dialog for the delivery product of a Base Manufacturer role:

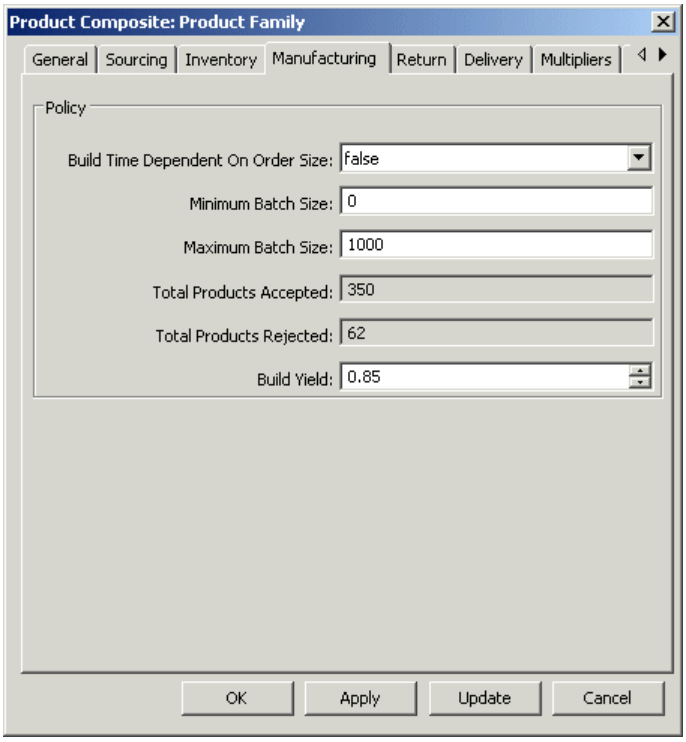


The number of delivery products for which the supplier has received orders, and the number of products shipped since the start of the simulation.

Group/Metric	Description
General Role Label	The label of the role on whose detail the product composite exists.
General Product Name	The name of the product specification in the product hierarchy. You can think of the Product Name as the SKU number for an item in inventory.
Metrics Quantity to Deliver	The total number of orders for delivery products that a supplier has received since the start of the simulation.
Metrics Quantity Shipped	The total number of delivery products that a supplier has shipped since the start of the simulation. See also Shipped Inventory Level on the Metrics tab.

Manufacturing Tab

The following figure shows the Manufacturing tab of a sample properties dialog for the delivery product of a Base Manufacturer role:

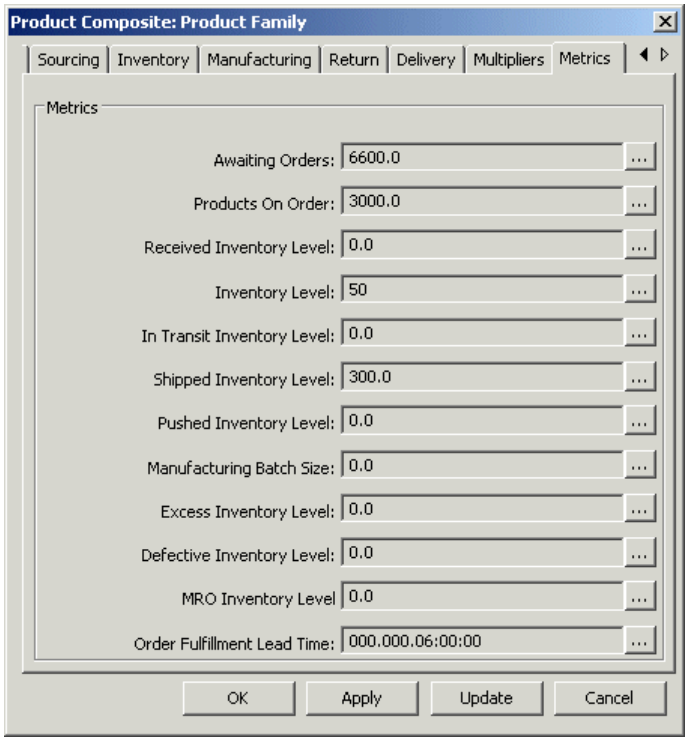


The number of delivery products the supplier has manufactured and rejected, based on the Build Yield parameter.

Group/Metric	Description
Metrics Total Products Accepted	The total number of delivery products that the role makes and accepts, then places in inventory for delivery.
Metrics Total Products Rejected	The total number of delivery products that the role rejects when the Build Yield parameter is a value less than 1.0.

Metrics Tab

The following figure shows the Metrics tab of a sample properties dialog for the delivery product of a Base Manufacturer role:



Group/Metric	Description
Metrics Awaiting Orders	For the delivery products of a Base Manufacturer, Manufacturer, or Distributor role, the number of delivery products that downstream buyers have ordered and the supplier role has entered but which the supplier has not yet delivered.
Metrics Products On Order	For the delivery products of a Manufacturer role, the number of delivery products for which the make planning process has created build orders but which the upstream supplier has not yet received. For the delivery product of a Base Manufacturer role, the number of delivery products for which the make planning process has created build orders but which it has not yet manufactured. For the delivery products of a Distributor role that assembles components into kits, the number of delivery products for which the source planning process has created replenishment orders but which the upstream supplier has not yet received.
Metrics Received Inventory Level	For the delivery products of a Base Manufacturer or Manufacturer role, or a Distributor role that assembles components into kits, the number of delivery products that the supplier role has manufactured or assembled into kits and has placed in inventory since the start of the simulation.
Metrics Incoming Inventory Level	For the delivery products of a Distributor role that assembles components into kits, the number of delivery products, or kits, that the role has assembled into kits but not yet placed in inventory.
Metrics Inventory Level	For the delivery products of a Base Manufacturer or Manufacturer, or a Distributor role that delivers its source products, the number of delivery products currently in inventory. **Note:** A Distributor role that assembles components into kits does not calculate the Inventory Level of its finished products.

Group/Metric	Description
Metrics In Transit Inventory Level	For the delivery products of a Base Manufacturer or Manufacturer role, the number of delivery products that the role has taken from inventory and is waiting to deliver. For the delivery products of a Distributor role that assembles is components into kits, the total number of delivery products that the role has assembled into kits and is waiting to deliver.
Metrics Shipped Inventory Level	For the delivery products of a Base Manufacturer or Manufacturer role, the number of delivery products that the role has manufactured and shipped since the start of the simulation. For the delivery products of a Distributor role that assembles is components into kits, the total number of delivery products that the role has assembled into kits and shipped since the start of the simulation.
Metrics Pushed Inventory Level	For the delivery products of a Base Manufacturer or Manufacturer role, or a Distributor role that assembles components into kits, the number of delivery products that the role has actually delivered to downstream buyers, using a push planning strategy, since the start of the simulation.
Metrics Manufacturing Batch Size	For the delivery products of a Base Manufacturer or Manufacturer role, or a Distributor that assembles components into kits, the size of the current batch of finished products or kits.
Metrics Excess Inventory Level	For the delivery products of a Base Manufacturer, Manufacturer, or Distributor role, the amount of excess inventory.
Metrics Defective Inventory Level	For the delivery products of a Base Manufacturer, Manufacturer, or Distributor role, the amount of defective inventory.

Group/Metric	Description
Metrics MRO Inventory Level	For the delivery products of a Base Manufacturer, Manufacturer, or Distributor role, the amount of maintenance, repair, and overhaul (MRO) inventory.
Metrics Order Fulfillment Lead Time	For the delivery products of a Base Manufacturer, Manufacturer, or Distributor role, the average amount of time from when the role receives an order for delivery products from downstream buyers to when the buyer receives the product shipment.

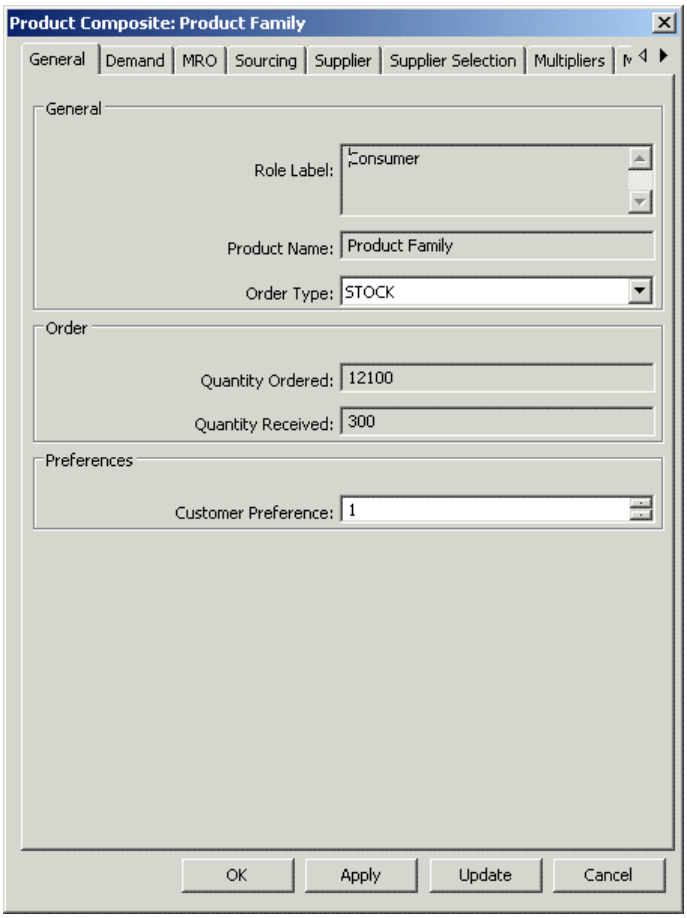
Viewing Metrics for Source Products

You can view metrics for source products on these tabs of the product composite dialog:

- General tab
- Sourcing tab
- Supplier tab
- Metrics tab

General Tab

The following figure shows the General tab of a sample properties dialog for the source product of a Consumer role:



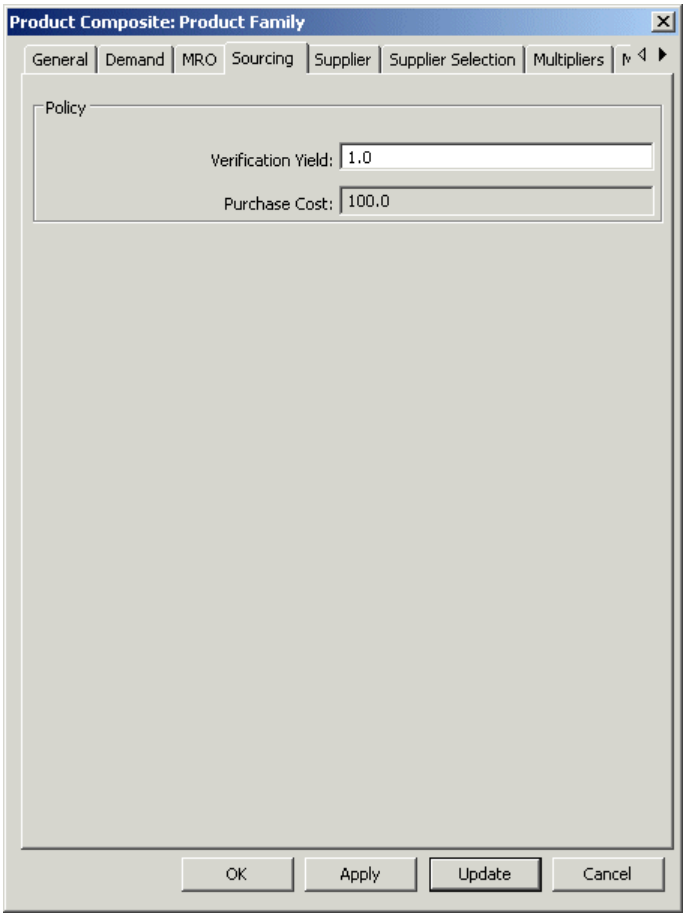
The number of source products the buyer has ordered and received since the start of the simulation.

Group/Metric	Description
General Role Label	The label of the role on whose detail the product composite exists.
General Product Name	The name of the product specification in the product hierarchy. You can think of the Product Name as the SKU number for an item in inventory.

Group/Metric	Description
Metrics Quantity Ordered	The total number of source products that a buyer has ordered from its suppliers since the start of the simulation.
Metrics Quantity Received	The total number of source products that a buyer has received from its suppliers since the start of the simulation. See also Received Inventory Level on the Metrics tab.

Sourcing Tab

The following figure shows the Sourcing tab of a sample properties dialog for the source product of a Consumer role:

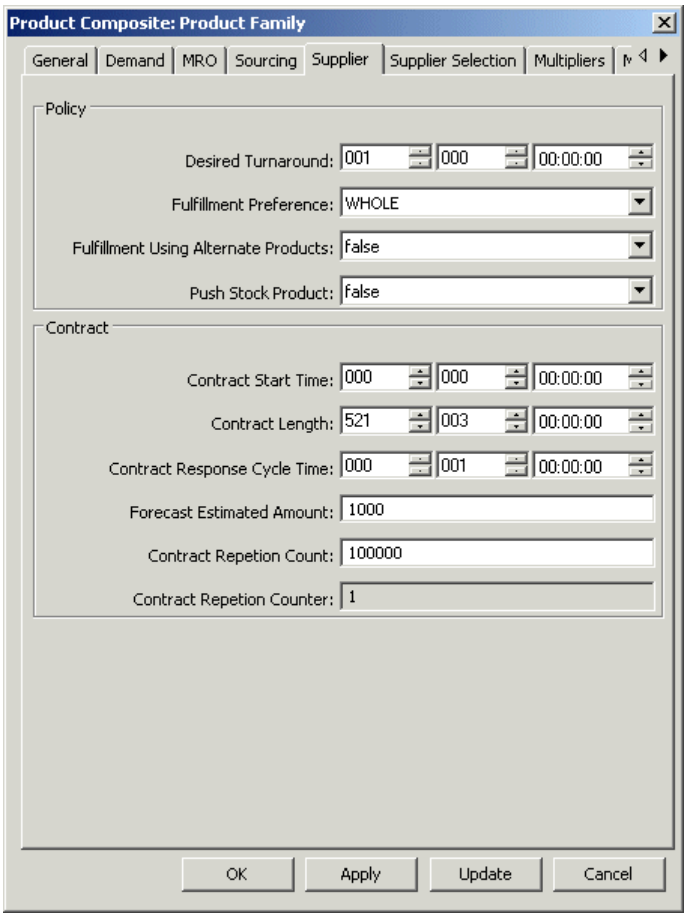


The weighted average of the price the buyer pays for its source products.

Group/Metric	Description
Metrics	
Purchase Cost	The weighted average of the price a buyer pays for its source products, which is based on the Net Selling Price parameter of the upstream supplier's delivery product and the number of units purchased. **Note:** For a Base Manufacturer, Purchase Cost is a parameter that you configure to determine the cost of raw materials for the role.

Supplier Tab

The following figure shows the Supplier tab of a sample properties dialog for the source product of a Consumer role:

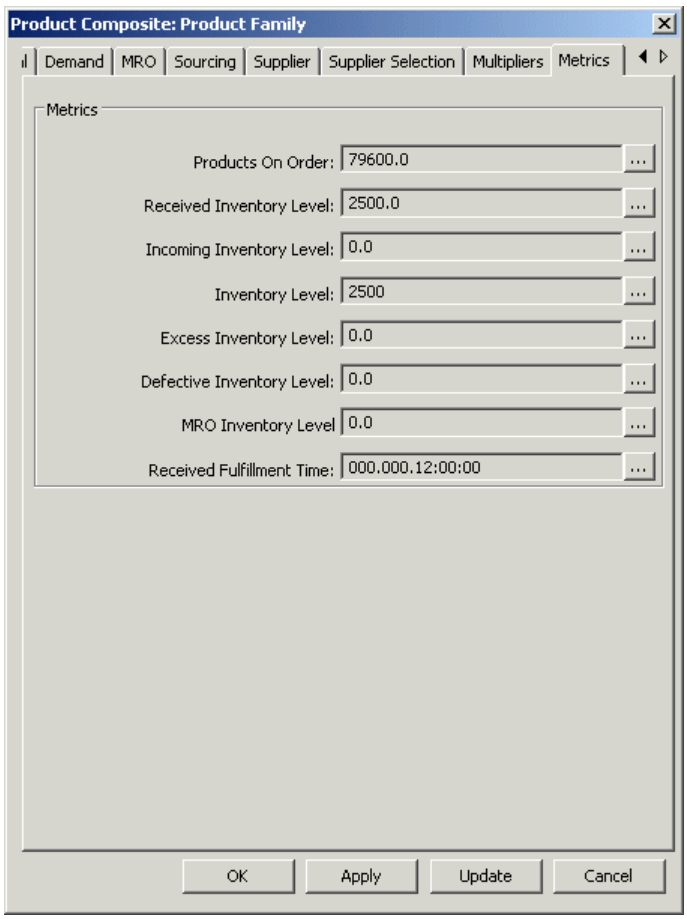


The number of contracts established since the start of the simulation.

Group/Metric	Description
Contract Contract Repetition Counter	The number of contracts that have been established since the start of the simulation.

Metrics Tab

The following figure shows the Metrics tab of a sample properties dialog for the source product of a Consumer role:

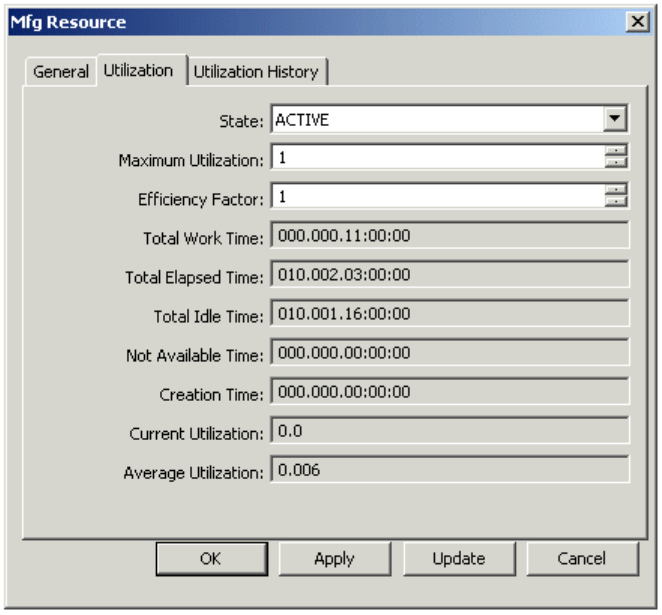


Group/Metric	Description
Metrics Awaiting Orders	For the source products of a Manufacturer role, the number of source products for which the role has created build orders but which the upstream supplier has not yet delivered.
Metrics Products On Order	For the source products of a Consumer, Manufacturer, or Distributor role, the number of source products for which the source planning process has created replenishment orders but which the upstream supplier has not yet delivered.
Metrics Received Inventory Level	For the source products of a Consumer, Manufacturer, or Distributor role, the number of source products that the buyer role has received and placed in inventory since the start of the simulation.
Metrics Incoming Inventory Level	For the source products of a Consumer, Manufacturer, or Distributor role, the number of source products that the buyer role has received but not yet placed in inventory.
Metrics Work in Progress	For the source products of a Manufacturer role, the number of source products that the role has taken from inventory and is waiting to manufacture into finished products.
Metrics Inventory Level	For the source products of a Consumer, Manufacturer, or Distributor role, the number of source products currently in inventory.
Metrics Excess Inventory Level	For the source products of a Consumer, Manufacturer, or Distributor role, the amount of excess inventory.
Metrics Defective Inventory Level	For the source products of a Consumer, Manufacturer, or Distributor role, the amount of defective inventory.
Metrics MRO Inventory Level	For the source products of a Consumer, Manufacturer, or Distributor role, the amount of maintenance, repair, and overhaul (MRO) inventory.
Metrics Received Fulfillment Time	For the source products of a Consumer, Manufacturer, or Distributor role, the average amount of time from when downstream buyers order source products to when the buyer receives product shipments.

Viewing Metrics for Resources

Each resource computes a number of metrics, which you can view for individual manufacturing resources as the model runs.

The following figure shows a sample properties dialog for a manufacturing resource of a Base Manufacturer role:



Performance metrics for individual manufacturing resources.

Metric	Description
Current Utilization	Whether the resource is currently allocated. A value of 0 means the resource is not currently allocated, and a positive number indicates that the resource is currently allocated.
Average Utilization	The amount of time the resource is allocated compared to the amount of time it is available, which is the Total Work Time divided by the Total Elapsed Time of the resource. This metric provides a measure of how intensively a role is using the resource to manufacture finished products.
Total Work Time	The total amount of time that the resource has been allocated since the start of the simulation.

Metric	Description
Total Elapsed Time	The total amount of time that has elapsed since the start of the simulation.
Total Idle Time	The total amount of simulation time that the resource has not been allocated since the start of the simulation.

9

What Happens When the Simulation Runs

Describes the basic processes that occur while the simulation runs.

Introduction

When you run a simulation, e-SCOR initiates and runs various **processes** or sequences of events. These processes interact to create the various objects the model requires to source, make, and deliver products. They store various transient objects, such as orders, in pools on the detail of each role. The processes are also responsible for determining parameters and computing metrics.

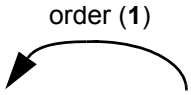
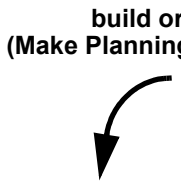
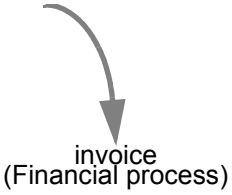
Each process triggers when a particular event occurs, such as receiving an order. Certain processes also trigger other processes and/or receive objects from other processes, which can trigger a particular step in the process.

This chapter provides a general description and high-level diagram of each process. The description lists the steps in the process as a numbered list. Each

numbered step appears in the diagram next to the appropriate role. The diagrams also show:

- Objects that flow through the process, with their associated step in parentheses.
- Triggering events.

The diagrams use these conventions:

Convention/Example	Description
	Representation of a buyer a role in the process.
	The objects that flow through the model during the process and the associated step in parentheses.
	The event that triggers the process.
	An event that triggers another process or an event that another process triggers within the current process.

When you run the simulation, e-SCOR runs the following processes:

- Contracts process
- Order/Product process
- Build process
- Financial process
- Make Planning
- Source Planning process

See Also Showing Transient Objects in the *e-SCOR User? Guide*.

Contracts Process

The **contracts process** is responsible for establishing contracts between downstream buyer roles and upstream supplier roles. By default, e-SCOR creates a single contract between each buyer and potential supplier in the model. The steps in the process are:

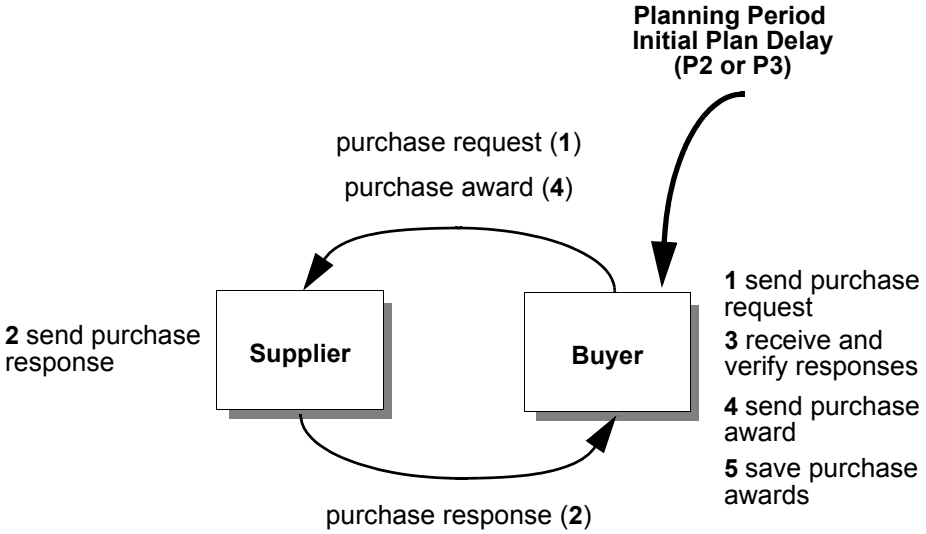
1. Send purchase requests to suppliers.
2. Send purchase responses to buyers in response to those purchase requests.
3. Receive and verify responses.
4. Send purchase awards to suppliers in response to purchase responses.
5. Save purchase awards in the Awards pool.

You can also configure a buyer role to use contracts when ordering identical source products from multiple upstream supplier roles, in which case multiple contracts can be established between buyers and suppliers.

You configure contract parameters for the source product of the buyer role to determine the contract length and amount, as well as how the buyer chooses its suppliers. When contracts are in effect, the buyer role determines the size of each replenishment order for source products, based on the estimated contract amount, rather than based on the source planning process.

The contracts process initiates on a regular planning cycle, based on parameters that you configure in the P3: Plan Make and P2: Plan Source categories.

This diagram shows a high-level representation of the steps in the contracts process, the objects associated with each step, and the triggering event:



The contracts process computes the Contracts Established metric for the ES: Enable Source and ED: Enable Deliver categories.

For a Distributor role, the contracts process initiates each source planning cycle. For a Manufacturer role, the contracts process initiates each make planning cycle.

The ES: Enable Source category of the downstream buyer role generates a purchase request for its source products, based on contracts.

The ED: Enable Deliver category of the supplier role generates a purchase response for its delivery products.

The ES: Enable Source category of the buyer role then chooses the desired supplier based on Supplier Selection parameters that you configure for the source product. It generates a purchase award and sends it to the chosen supplier.

The buyer role stores purchase awards in its Buyer Awards pool, and the supplier role stores purchase awards in its Supplier Awards pool. Additionally, the buyer role stores purchase responses in its Responses pool.

Order/Product Process

The **order/product process** is responsible for generating orders, fulfilling orders, and receiving shipments. The steps are:

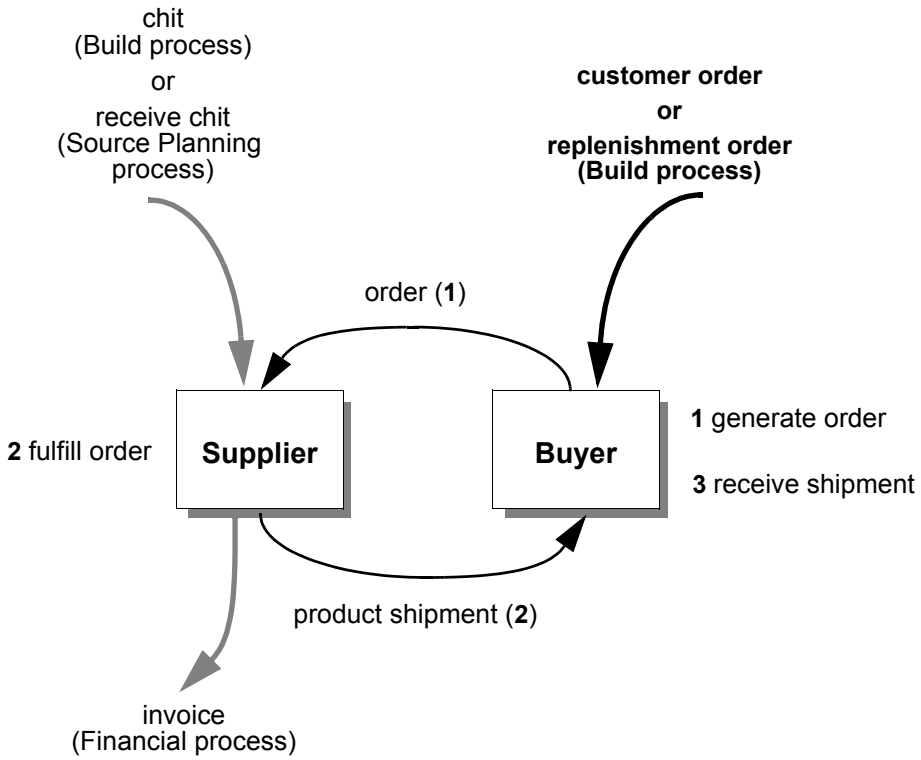
1. Generate customer or replenishment orders for source products with upstream suppliers.
2. Fulfill those orders, which includes entering the order, selecting the order, fulfilling the order, picking materials, packing the container, and sending the product shipment of delivery products to downstream buyers whenever they are available.
3. Receive product shipments from suppliers.

The process initiates when the buyer receives a customer or change order from the Input category on the Consumer role detail or when it receives a replenishment order from the source planning process of a Distributor or Manufacturer role.

The order fulfillment step (step 2) triggers when the buyer sends an order to the supplier or when the supplier receives a chit from either the build process or the source planning process. The build process generates a chit when finished goods have been manufactured and are available for delivery. The source planning process generates a chit when products have been received and are available for delivery.

When the order/product process delivers a shipment, it triggers the financial process, which sends an invoice to the downstream buyer role.

This diagram shows a high-level representation of the steps in the order/product process, the objects associated with each step, and the triggering events:



The order/product process computes performance and other metrics related to order entry and order fulfillment, such as Supplier On-Time Performance (%), Fill Rates (%), Delivery Performance (%), and Order Fulfillment Lead Time. It also computes inventory metrics for source products.

The S1: Source Stocked Product category of the downstream buyer role generates customer orders for its source products on a regular cycle, based on the Demand Order Duration parameter of the source product or a Demand Input Report. The size of each order is based on the Demand Order Size parameter of the source product. It sends those orders to the Deliver category of the upstream buyer role.

The Source category of a Distributor and Manufacturer role behaves similarly, except that these roles use source planning to determine order size and frequency.

Whenever it can, the Deliver category of the upstream supplier role delivers shipments of delivery products to the Source category of the downstream buyer role, based on customer orders.

The buyer role stores orders for delivery products in the Source Orders pool on the role detail.

Build Process: Base Manufacturer Role

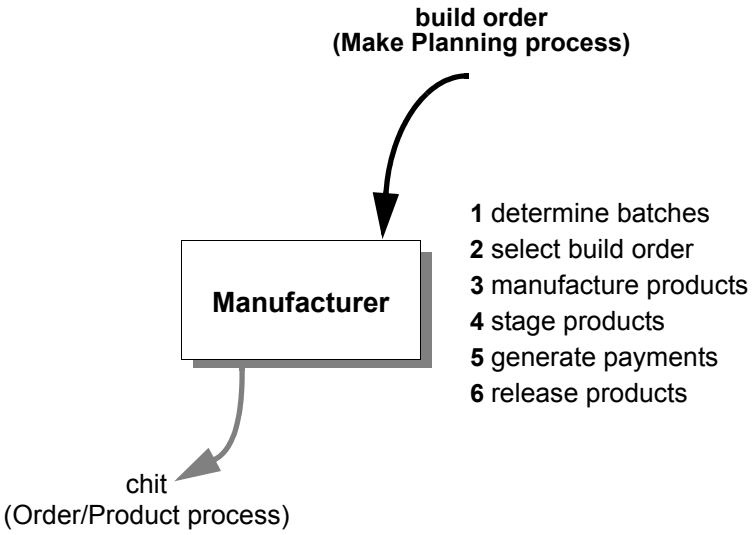
The **build process** is responsible for manufacturing finished products from components. The steps are:

1. Determine batches, based on the build order.
2. Select the build order to manufacture.
3. Manufacture finished products, based on build orders.
4. Stage finished products.
5. Generate and send payments for raw materials (Base Manufacturer role only).
6. Release finished products into inventory.

The process initiates when the manufacturer role receives a build order from the make planning process, which is based on customer or replenishment orders for its delivery products. For a Manufacturer role only, the process can also initiate when the Make category receives source products from the order/product process, indicating that additional components are available.

When the build process releases finished products into inventory, it generates a chit, which triggers the order-fulfillment step of the order/product process.

This diagram shows a high-level representation of the steps in the build process and the triggering events:



In general, the financial process is responsible for computing financial metrics for a buyer role when it sources components. However, because a Base Manufacturer role does not source components, the build process for a Base Manufacturer is responsible for computing financial metrics for the role, as well.

The build process computes performance and other metrics related to the build-order processing and manufacturing process, such as Make Cycle Time. It also computes inventory metrics for delivery products.

The Deliver category of the Base Manufacturer role receives orders for the product family, which the P3: Plan Make category turns into build orders. Each make planning cycle, based on the Planning Period, the Plan category sends the build orders to the Make category for manufacturing. The Make category determines how many batches it can make, then manufactures the finished products.

A Base Manufacturer role makes batches as soon as it can, based on available resources; it assumes its raw materials are always available. A Manufacturer role, however, makes batches as soon as it can, based on available source products and available resources.

When using a stock planning strategy, the default, the Make category makes just enough delivery products to maintain desired inventory levels, given current orders, based on replenishment planning.

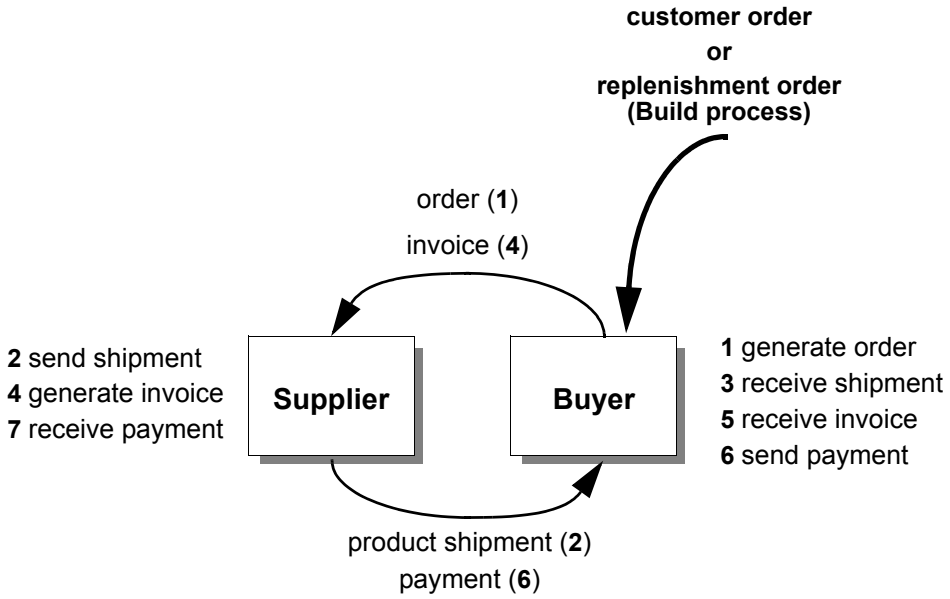
Financial Process

The **financial process** is responsible for generating invoices and making payments, based on orders for source products. The steps are:

1. Generate customer or replenishment orders for source products with upstream suppliers.
2. Send product shipments of delivery products to the downstream buyer role.
3. Receive product shipments from the upstream supplier role.
4. Generate invoices based on shipments of delivery products.
5. Receive those invoices.
6. Generate payments based on invoices.
7. Receive those payments.

The process initiates when the buyer receives a customer order from the Input: Send Orders or Change Orders source product of a Consumer role or a replenishment order from the Source Planning process of a Distributor or Manufacturer role.

This diagram shows a high-level representation of the steps in the Financial process, the objects associated with each step, and the triggering event:



The Financial process is also responsible for computing Financial Bookings, Financial Outstanding, and Financial Collections within Financial Period and Financial Collections Total for supplier roles and Deliver categories, and Financial Obligations, Financial Payments within Financial Period, and Financial Payments Total for buyer roles and Source categories. The Financial process computes these metrics each Financial Period of the role.

In addition, each financial period, the financial process computes these asset metrics for each role: Days of Supply metrics, Asset Turns, Cash-to-Cash Cycle Time, Days Sales Outstanding, and Cash Flow Period. It also computes the Order Management Costs metric for each role and the Costs Incurred metrics for each Source and Deliver category, as appropriate.

The Source category of the downstream buyer role generates customer orders for its source products on a regular cycle, based on the Demand Order Duration parameter of the source product. The size of each order is based on the Demand Order Size parameter of the source product. It sends those orders to the Deliver category of the upstream buyer role.

The Source category of the Distributor and Manufacturer roles behaves similarly, except that these roles use source planning to determine order size and frequency.

Whenever it can, the Deliver category of the upstream supplier role delivers shipments of delivery products to the Source category of the downstream buyer role, based on customer orders.

At the same time, the Deliver category of the supplier role generates an invoice for the cost of the order. The Net Selling Price parameter of the delivery product of the supplier role determines the cost to the buyer.

The Source category of the buyer role receives the invoice. It waits the entire Financial Payment Terms of the supplier role, then sends a payment to the supplier. The Deliver category of the supplier role then receives the payment.

Make Planning Process: Base Manufacturer Role

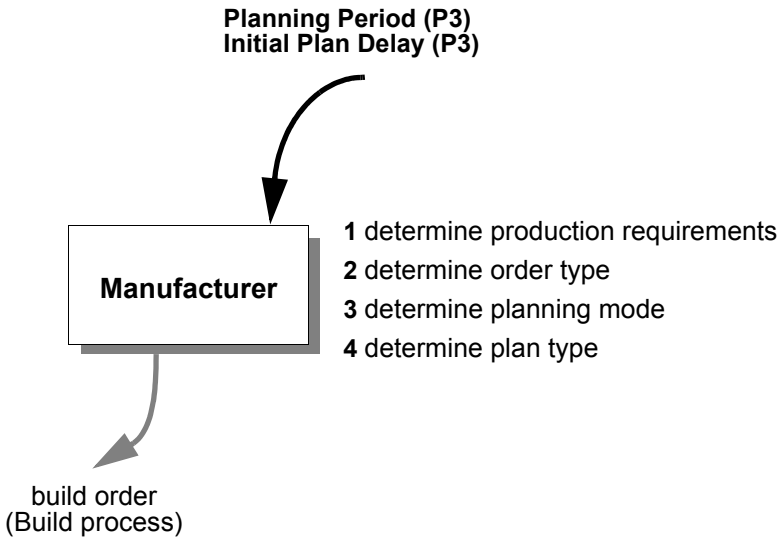
The **make planning process** determines when a Base Manufacturer or Manufacturer role creates build orders for delivery products and, thus, when it manufactures, and, implicitly, when it delivers those products. The steps are:

1. Determine the production requirements for finished products.
2. Determine the order type, which is stock, make-to-order, or engineer-to-order.
3. For stock orders, determine the planning mode, which is pull or push.
4. For pull planning, determine the inventory control strategy, which is replenishment, forecast, Q, or R-Q.

The make planning process initiates on a regular planning cycle, based on parameters that you configure in the P3: Plan Make category.

The make planning process generates a build order, which triggers the build process.

This diagram shows a high-level representation of the steps in the make planning process and the triggering events:



The make planning process computes planning metrics for delivery products, such as Awaiting Orders and Products On Order.

The P3: Plan Make category determines the frequency with which the role sends build orders to the Make category for manufacturing its delivery products.

The P3: Plan Make category also implicitly determines when the role delivers those products to downstream buyers; it delivers them when they are available from the upstream Make category.

Source Planning Process: Manufacturer and Distributor Roles

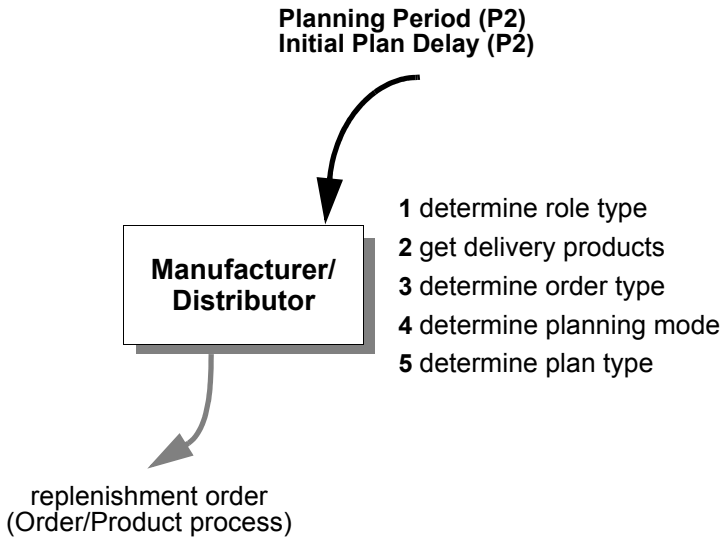
The **source planning process** determines when a Distributor or Manufacturer role creates replenishment orders for source products. The source planning process determines the order type and generates a plan differently, depending on the role:

- A Manufacturer role determines the order type and generates a plan for its source products.
- A Distributor role determines the order type and generates a plan for its delivery products first, then for its source products.

The source planning process initiates on a regular planning cycle, based on parameters that you configure in the P2: Plan Source category.

The source planning process generates a replenishment order, which triggers the order/product process and the financial process.

This diagram shows a high-level representation of the steps in the source planning process and the triggering events:



The source planning process computes planning metrics for source products, such as Awaiting Orders and Products On Order.

The P2: Plan Source category of the Distributor and Manufacturer roles determines the frequency with which these roles send replenishment orders for source products to the Source category, which places orders with upstream supplier roles.

For a Distributor role, the P2: Plan Source category also implicitly determines when the role delivers those products to downstream buyers; it delivers them when they are available from the upstream Source category.

10

Using Reports

Describes how to view metrics and enter parameter values through various types of reports.

Introduction

You determine the performance of your supply-chain model by viewing **metrics**, which are attributes that the model computes, based on **parameters**, which are attributes that you configure. You can perform the following reporting tasks:

- Create reports, including output reports for viewing metrics and input reports for configuring parameters.
- Update output reports at regular time intervals.
- Keep a history of data values.
- Chart report data.
- Configure report templates automatically.
- Filter the data to appear in a report.
- Configure the attributes to appear in a report.
- Create reports in Excel.
- Write to and read from CSV files.
- Write to and read from databases.
- Create specialized reports:
  - Demand Reports
  - Role Transaction Log Reports

Note When creating reports in Excel, be sure you have Excel installed on your computer before you attempt to create a report.

For information on reports that you can create through the Navigator, see the *G2 Reporting Engine User's Guide*.

Viewing Simulation Metrics in a Toolbar

When you run a simulation, e-SCOR displays key metrics for roles and product composites in the Metrics toolbars. The Metrics toolbars provides a quick way of verifying model performance. The toolbar updates once every half second of clock time.

The metrics toolbars include:

- Asset Metrics — Standard asset metrics for all roles in the model.
- Contract Metrics — Contract metrics for all product composites in the model.

- Financial Metrics — Incoming and outgoing financial metrics for all roles in the model.
- Inventory Metrics — Inventory metrics for all product composites in the model.
- Order Metrics — Order metrics for all source and delivery products in the model.
- Resource Metrics — Resource metrics for all manufacturing resources in the model.

To hide and show the Metrics toolbar:

➔ Choose View > Asset Metrics, Contract Metrics, Financial Metrics, Inventory Metrics, Order Metrics, or Resource Metrics.

The toolbars appear in separate tabs at the bottom of the window.

To view simulation metrics in a toolbar:

➔ Run the simulation and display the Metrics toolbars.

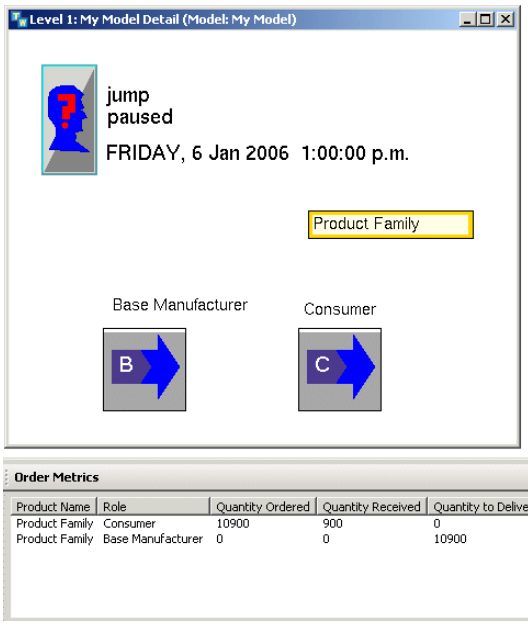
To sort data in the toolbar:

➔ Click the column header.

To configure the width of each column in the toolbar:

➔ Drag the border between each column left or right.

This figure shows the Order Metrics toolbars for the simplest e-SCOR model, which consists of two roles:



Order Metrics

Product Name	Role	Quantity Ordered	Quantity Received	Quantity to Deliver	Quantity Shipped	Order Fulfillment Lead Time	Received Fulfillment Time
Product Family	Consumer	10900	900	0	0	000.000.00:00:00	000.000.09:00:00
Product Family	Base Manufacturer	0	0	10900	900	000.000.08:00:00	000.000.00:00:00

Following are examples of all the metrics toolbars.

Asset Metrics

Asset Metrics

Role	Number of Financial Periods	Raw Material DOS	WIP DOS	Finished Good DOS	Inventory DOS	Asset Turns	Cash to Cash Cycle Time	Days Sales Outstanding	Cash Flow Period
Consumer	2	+Inf	0.0	0.0	+Inf	0.0	0.0	0.0	-3300.0
Base Manufacturer	2	0.0	0.0	8.483	8.483	35.498	1265.756	1257.273	3300.0

Asset Metrics | Contract Metrics | Financial Metrics | Inventory Metrics | Order Metrics | Resource Metrics

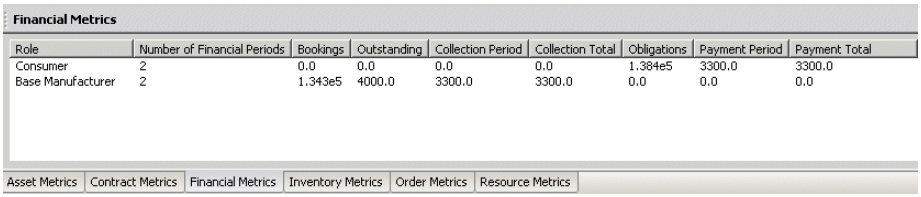
Contract Metrics

Contract Metrics

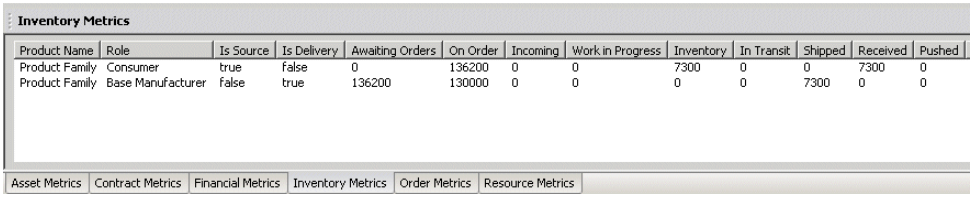
Supplier	Buyer	Product Name	Order Type	Push	Contract Start	Contract Length	Expired	Number of Orders	Quantity Ordered	Quantity Pushed
Base Manufacturer	Consumer	Product Family	STOCK	false	000.001.00:00:00	521.003.00:00:00	false	1435	143500	0
Base Manufacturer	Consumer	Product Family	STOCK	false	000.001.00:00:00	521.003.00:00:00	false	1435	143500	0

Asset Metrics | Contract Metrics | Financial Metrics | Inventory Metrics | Order Metrics | Resource Metrics

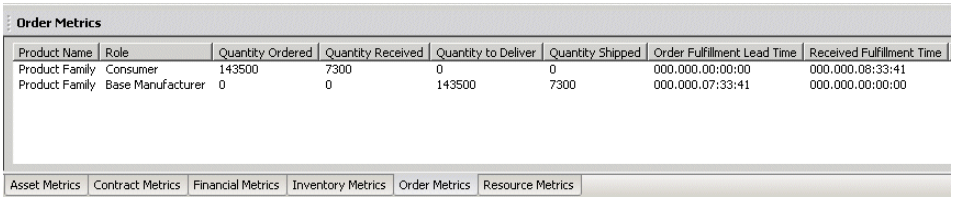
Financial Metrics



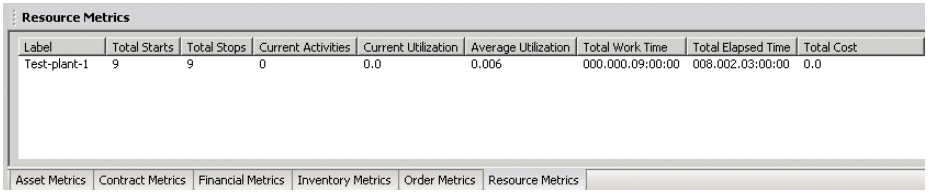
Inventory Metrics



Order Metrics



Resource Metrics



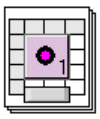
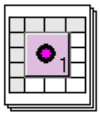
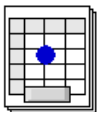
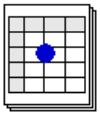
Creating Reports

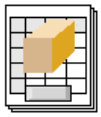
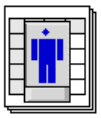
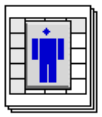
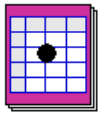
To create a report, you:

- Create a report for the desired type of input or output report.
- Depending on the type of report:
  - Generate output report data from the model.
  - Apply input report data to the model.

Summary of Input and Output Reports

This table summarizes the input and output reports you can create:

Report	Description
Role Input Report 	Role parameters, which determine the financial payment period and terms, and the time period for computing time-weighted statistics for each role in the model.
Role Output Report 	Role metrics, which display financial bookings, outstanding, collections, and payments, asset metrics, and total costs for each role in the model.
Category Input Report 	Parameters for each Plan, Source, Make, and Deliver category in the model.
Category Output Report 	Metrics for each Plan, Source, Make, Deliver, Enable Source, and Enable Deliver category in the model.
Product Parameters Report 	Parameters for each product composite in the model.
Product Metrics Report 	Metrics for each product composite in the model.

Report	Description
Demand Report 	Initial order demand parameters for the overall supply chain, including Demand Order Size and Demand Order Duration. You can also configure change orders through a Demand Report. You configure the source product of the Consumer role to read order demand parameters from the report.
Product Specifications Report 	Parameters for each product specification in the model.
Resource Input Report 	Parameters for each resource in the model, including resource capacity and efficiency.
Resource Output Report 	Metrics for each resource in the model, including resource utilization metrics.
Role Transaction Report 	Transactions that occur between roles, including orders, purchases, products, and financials.

Creating a Report

The first step in creating a report is to determine where to place the report in your model. By default, reports include data for all objects of the specified type on the current workspace and all details. You can place reports in a number of locations in the model, as follows:

To include data for...	Place the report object on...
All objects of the specified type in the model	The model detail.
All objects of the specified type associated with a particular workspace and any details	The detail of an organizer and choose the root workspace for the report object.

You place report objects on an organizer when you have many reports and placing them on the model detail would make the detail too cluttered. For information on creating organizers, see Creating an Organizer.

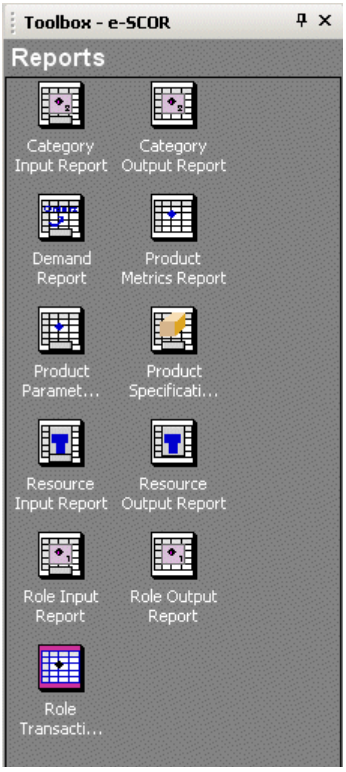
Once you place the report object in the appropriate location in your model, you can create the report. The report has a row for each object in the model that corresponds to the type of report. For example, a Role Output Report has a row for each role in the model, and a Product Composite Input Report has a row for each product composite.

The report includes a column for each parameter or metric that the report defines, depending on whether it is an input or output report. For example, the Role Input Report contains columns for configuring the Financial Payment Period, Financial Payment Terms, and other role parameters, and the Role Output Report contains columns for viewing the Financial Bookings, Financial Outstanding, and other role metrics.

The report identifies each object by its label; therefore, be sure to configure labels for all objects in the model before you create the report.

To create a report:

1 Display the Reports palette of the e-SCOR toolbox:



2 Create an input or output report object, based on the type of data you want to enter or compute, and place it in the desired location in the model.

For information on the types of reports you can create, see Summary of Input and Output Reports.

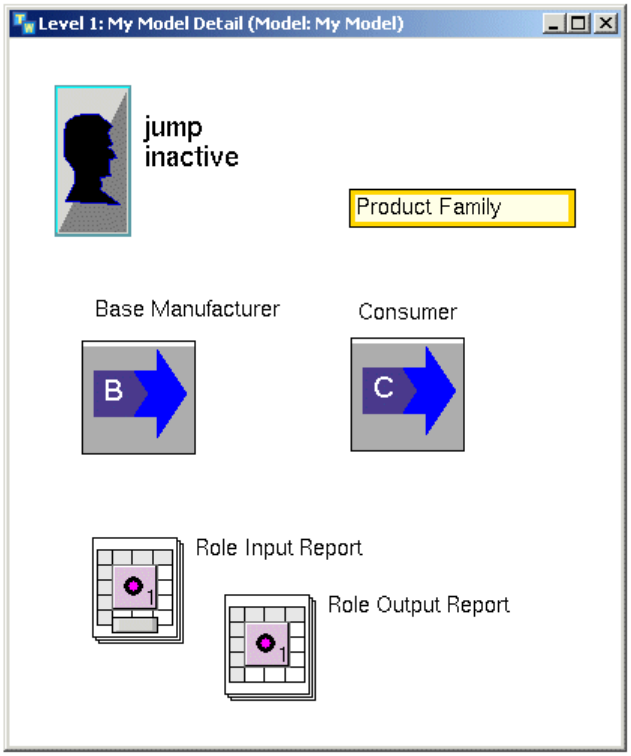
If you place the report object on the model detail or some other detail, you can skip the following step. Otherwise, if you place the report object on the detail of an organizer, you must choose the root workspace for the report object.

3 If necessary, choose Choose Root Workspace on the report object, then select the workspace to which the report object should apply and choose Select.

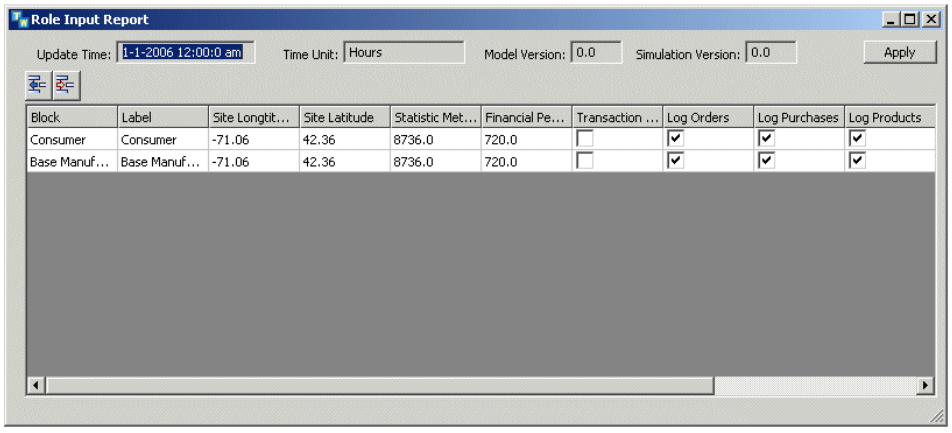
The report object applies to all objects of the specified type on the selected root workspace and all details.

4 To create the report, choose Show Report on the report object.

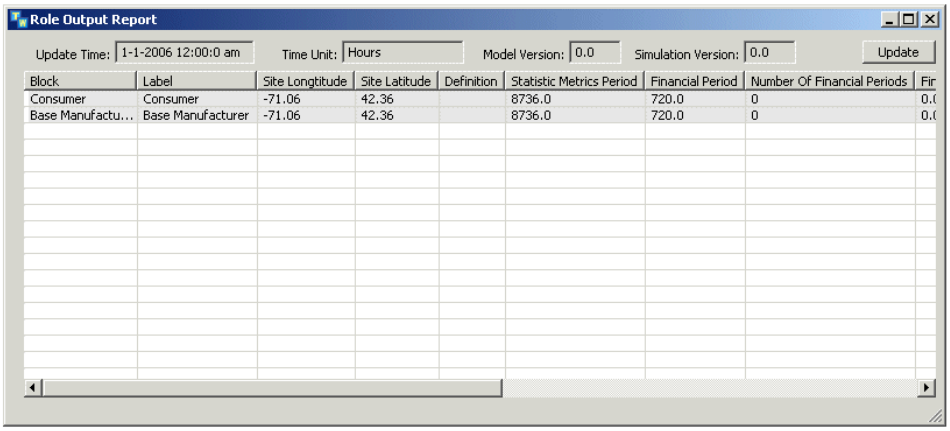
This figure shows a model with a Role Input Report and a Role Output Report on the same workspace as the model:



Here is the default report template for the Role Input Report:



Here is the default report template for the Role Output Report:



Generating Output Report Data from the Model

To generate output report data, you simply run the simulation and update the report. Each time the report updates, new data appears in the report.

By default, output reports are configured to update manually and output static data.

You can configure the report to update automatically, as described in Updating Output Reports at Regular Time Intervals.

You can also configure the report to output time-series data, as described in Keeping a History of Data Values.

To generate output report data from the model:

1 Run the simulation.

For details, see Controlling the Simulation.

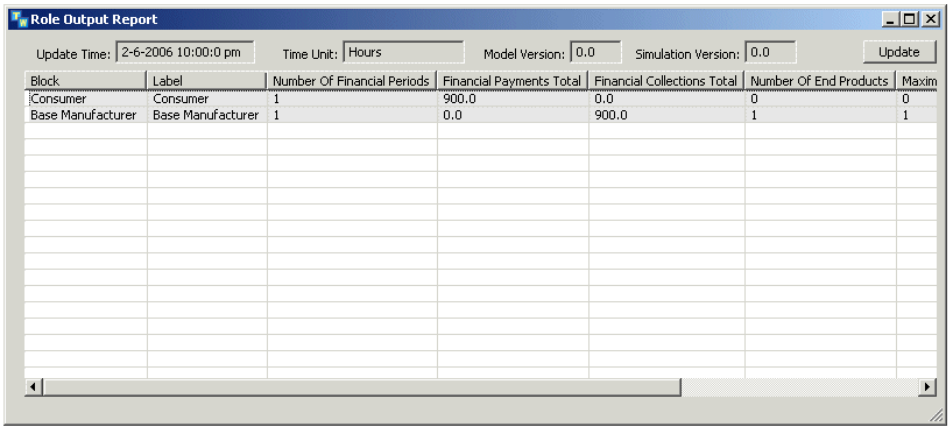
2 Update the report manually, using one of these techniques:

➔ Click the Update button at the top of the report.

or

➔ Choose Update Report on the report object.

Here is a Role Output Report, with several columns hidden, after running the simulation for one financial period:



Applying Input Report Data to the Model

To apply input report data, you enter data in the input report and apply the values to the model. Each time you apply new values, the parameters in the model update.

Configuring parameters through input reports provides an alternative to configuring the same parameters through properties dialogs and has these advantages:

- Configuring parameters for the same types of items in a single spreadsheet, for example, all source products or all delivery products.
- Running different configurations of the model, using different sets of input parameters and comparing the results.

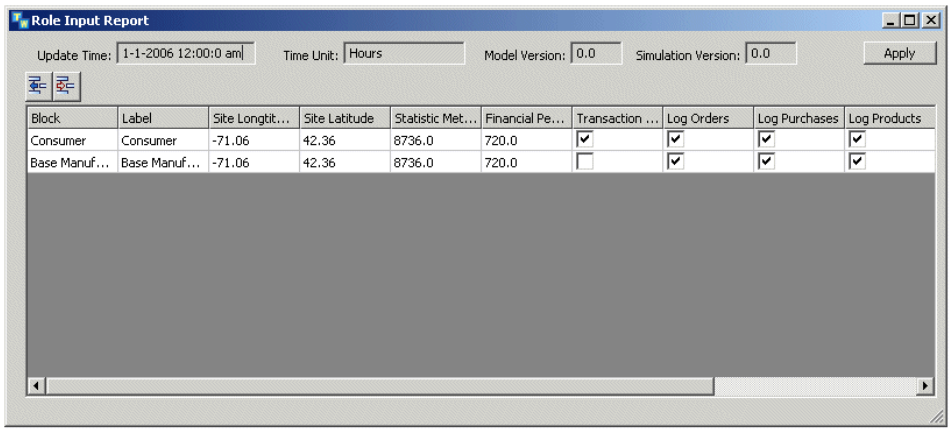
To apply input report data to the model:

1 Configure the report data for the specified parameters of the report objects.

2 Click the Apply button at the top of the report to apply the data to the model.

e-SCOR applies the values from the report to the appropriate parameters in the model.

Here is a Role Input Report with values specified:



Configuring the Time Unit

By default, reports display all time-based values in hours, which means:

- All time-based metrics display in units of an hour in output reports.
- You must enter all time-based parameter values in units of an hour in input reports.

For example, a value of 3 days displays in an output report as 72 hours, and you must enter 72 hours in an input report as the value for 3 days.

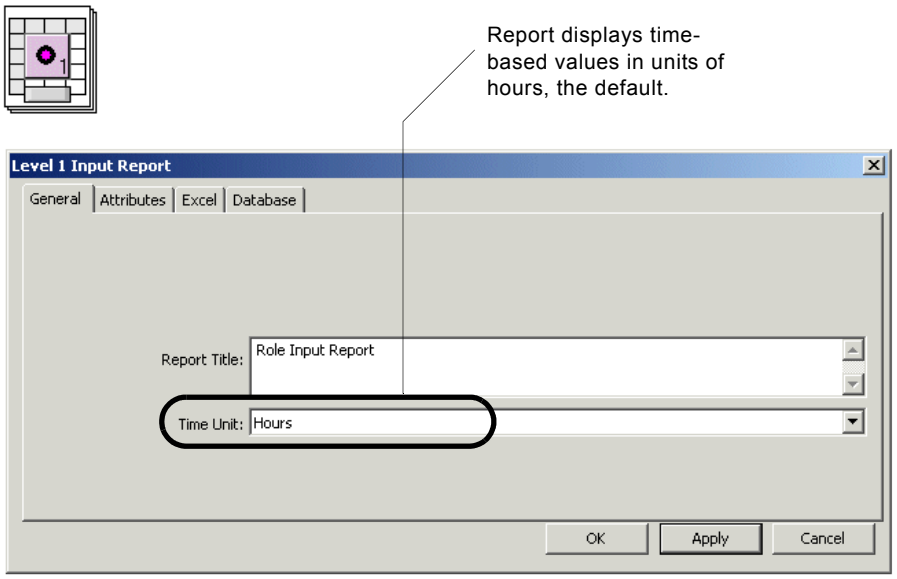
Depending on your model, you might want to use a different time unit, such as minutes, days, or weeks. Alternatively, you can configure the report to display all time-based parameters and metrics as durations, for example, one week, one day, one hour, one minute, and one second would be 001:001:001:001:001.

The report displays the current time unit at the top of the report.

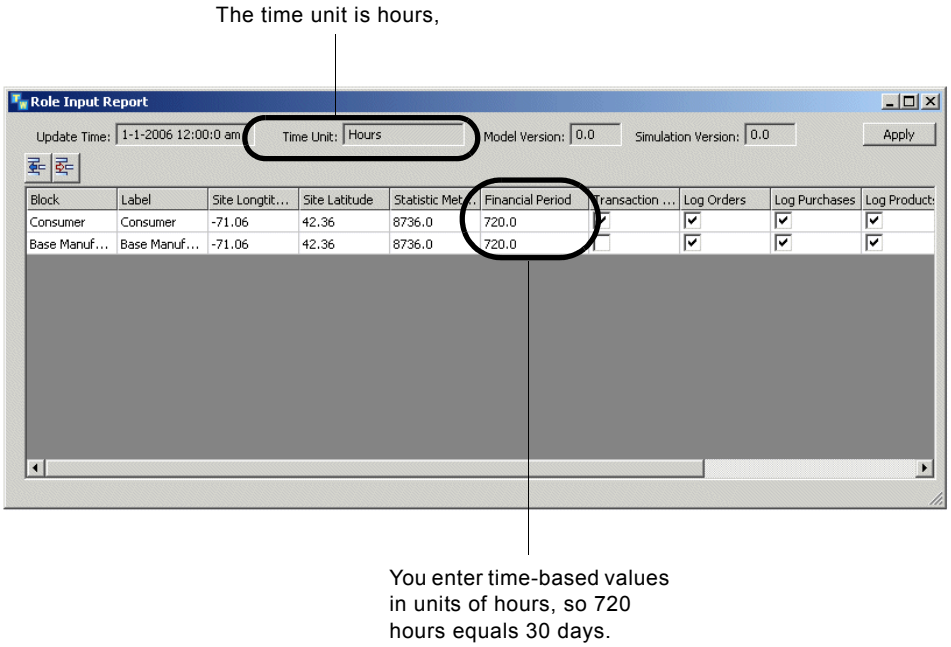
To configure the time unit:

➔ Display the properties dialog for the report and, on the General tab, configure the Time Unit to be seconds, minutes, hours, days, or weeks, or configure the Time Unit to be none to use a duration.

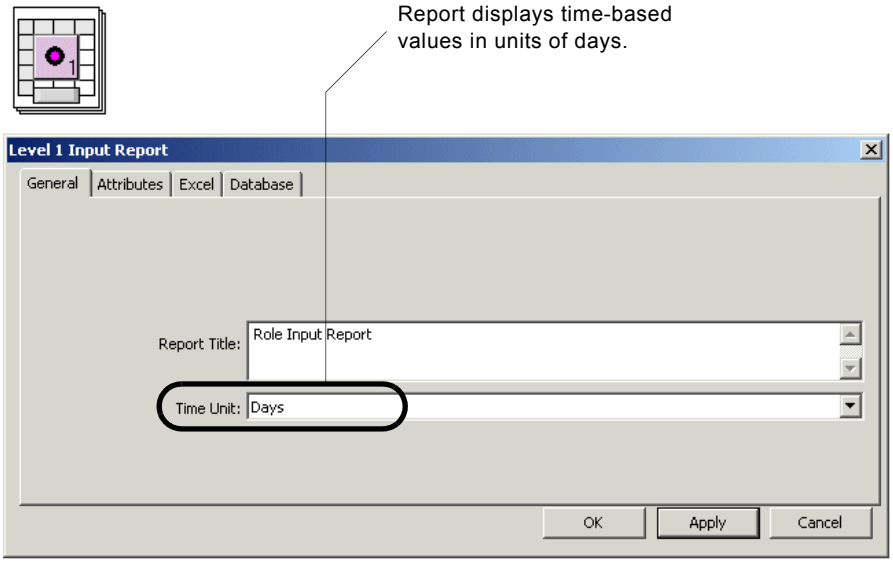
This figure shows the properties dialog for Role Input Report that is configured for entering time-based parameter values in units of hours, the default:



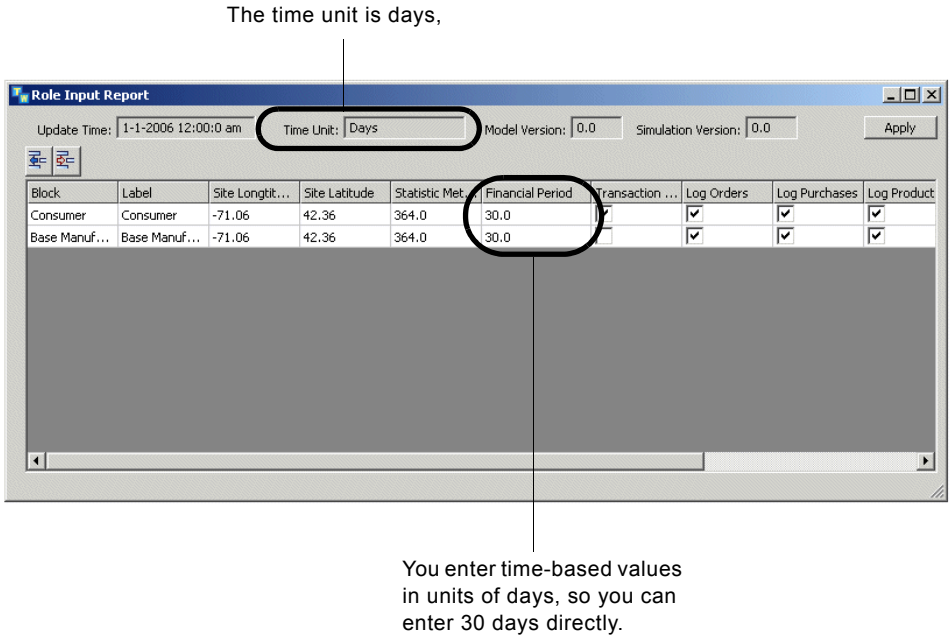
Here is the resulting report with the time unit specified as 1 hour and time-based values entered in hours:



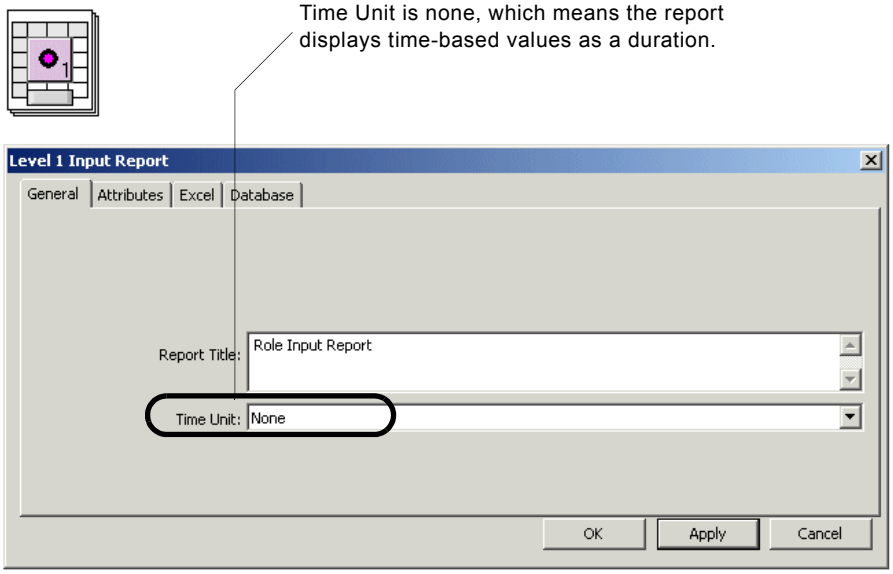
This figure shows the dialog for a Role Input Report that is configured for entering time-based parameter values in units of days:



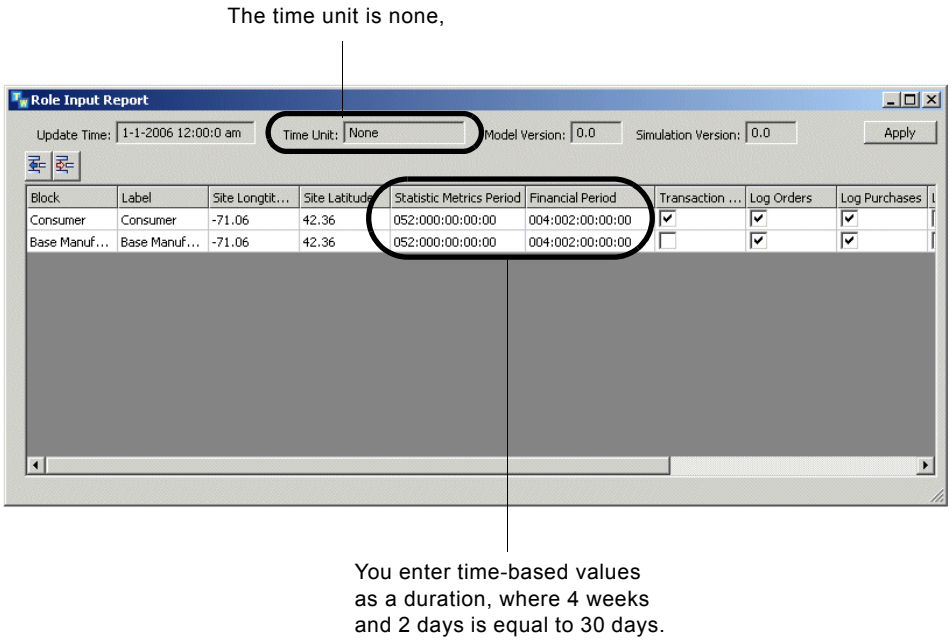
Here is the resulting report with time-based values entered in units of days:



This figure shows a Role Input Report that is configured for entering time-based parameter values as a duration:



Here is the resulting report with time-based values entered as a duration:



Updating Output Reports at Regular Time Intervals

By default, you update output report data manually. You can configure reports to update automatically at regular time intervals, based on:

- Simulation time.
- Clock time.

For example, you might want report data to update once a day, once a week, or once per financial period, based on the amount of simulation time that has passed. Alternatively, you might want the report data to update once every five seconds of real time, based on the computer clock.

Note When updating reports that include financial metrics, you should configure the report to update once per financial period. The report data updates at the end of the financial period so values are always accurate for the current financial period. To ensure that the report includes data for the last update period, you should run the simulation for slightly longer than the last update interval. For example, to include data from four weeks of simulation time, you should run the simulation for 29 days, which is four weeks plus a day. For details, see Configuring the Duration of the Simulation.

By default, output reports refresh their values each time the report updates. To improve performance, you can configure output reports to refresh at the end of the simulation and when you manually request an update only.

You can also trigger updates by using an Update Trigger tool, which allows you to trigger updates for multiple reports or based on model events. For details, see the *ReThink User's Guide*.

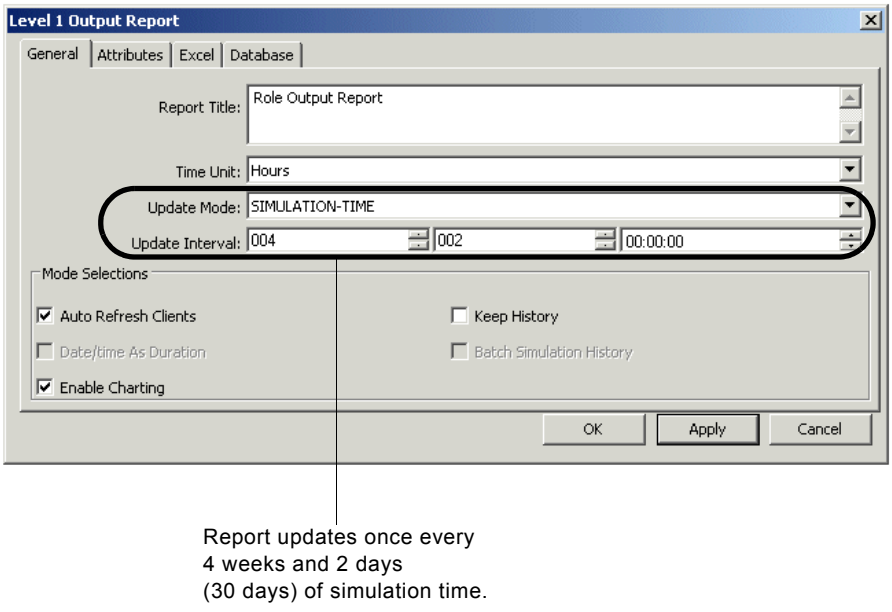
Configuring Output Reports to Update Regularly

The easiest way to trigger updates at regular time intervals is by configuring the report object.

To configure an output report to update regularly:

1. Display the properties dialog for the output report whose data you want to update regularly.
2. On the General tab, configure the Update Mode to be clock-time or simulation-time, depending on how you want to update the report.
3. Configure the Update Interval to be the time interval at which to update the report, based on the Update Mode.

This figure shows how to configure a Role Output Report to update once per financial period, based on simulation time, where the financial period is 30 days:



Triggering Updates Manually

When using an Update Trigger tool, you can trigger the update of all associated reports manually. You can also show all the items to update.

To trigger the update of all associated items manually:

➔ Choose the Update All Related Items menu choice on the Update Trigger.

To show items associated with the Update Trigger:

➔ Choose the Show Items to Update menu choice on the Update Trigger.

Configuring When Clients Refresh Their Data

By default, clients refresh their data each time the report updates. This means that reports that appear within the client, reports that are generated in CSV files and Excel, and reports that output their data to a database all refresh their data automatically each time new data is collected in the server.

Depending on the number of reports in your model, the number of clients of the server's data, and the interval at which reports update, performance can be degraded. To improve performance, you can disable the automatic refreshing of client data. When automatic refreshing is disabled, e-SCOR refreshes client data only when explicitly requested, using the Update menu choice or button, and automatically at the end of the simulation.

To disable automatic refreshing of client data:

1. Display the properties dialog for the output report object for which you want to disable client refreshing.
2. On the General tab, disable the Auto Refresh Clients option.

Keeping a History of Data Values

By default, output reports generate static data. To generate time-series data for any type of output report, you configure the report to keep a history of data values. Typically, you configure reports that keep a history to update at regular time intervals. Each time the report updates, e-SCOR outputs new values to the report for each metric so you can compare values over time. You can then output the data to a CSV file, to Excel, or to a database to perform analysis on the time-series data. For example, you might configure a Role Output Report to output financial data once per financial period.

Each data value in the history has an associated timestamp that indicates when the value was generated. You can format the timestamp as an absolute date and time or as a relative duration. By using relative durations, you can use the time-series data as input to the Demand Report, which provides initial order data to

the overall supply chain through a report. To do this, you must create an output report with the same visible attributes as the Demand Report. For more information, see Configuring Demand and Change Orders through a Demand Report.

When using the Scenario Manager to perform multiple simulations for the same model, you can configure the report to keep a history across all simulations. When keeping a history across multiple simulations, the output report has an additional column named Simulation Counter, which indicates the number of the simulation run. For details, see Using Batch Simulation.

To keep a history of data values:

1. Display the properties dialog for the output report object for which you want to keep a history.
2. Configure the report to update at regular time intervals.

   For details, see Updating Output Reports at Regular Time Intervals.
3. On the General tab, enable the Keep History option.

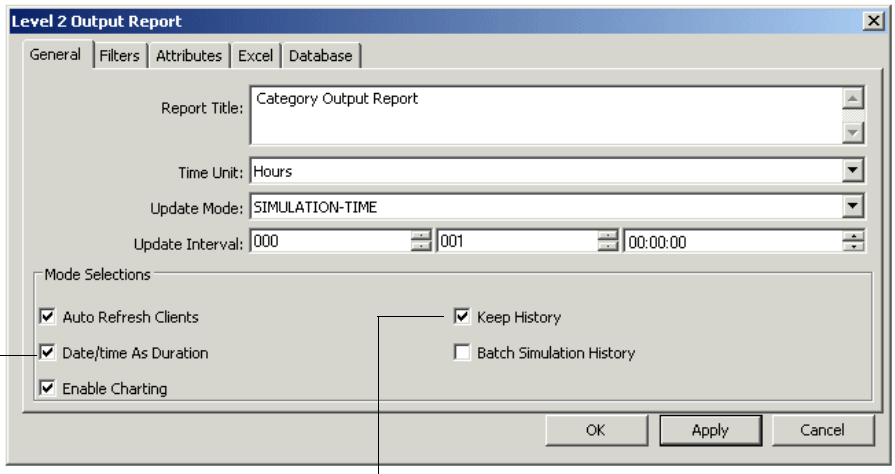
   By default, the timestamp the report generates uses an absolute time and date, based on simulation time. For example:

   1/1/02 0:00

   You can configure the timestamp to use a relative duration from the start of the simulation. For example:

   1 weeks, 2 days, 1 hour, 30 minutes, and 10 seconds
   2 weeks, 1 day, 30 minutes, and 30 seconds
   3 weeks and 1 hour
   etc.
4. Enable the Date/Time as Duration option to use relative timestamps, if desired.
5. When running batch simulations on the same model, using the Batch Simulation object, enable the Batch Simulation History option to keep a history across multiple models, if desired.

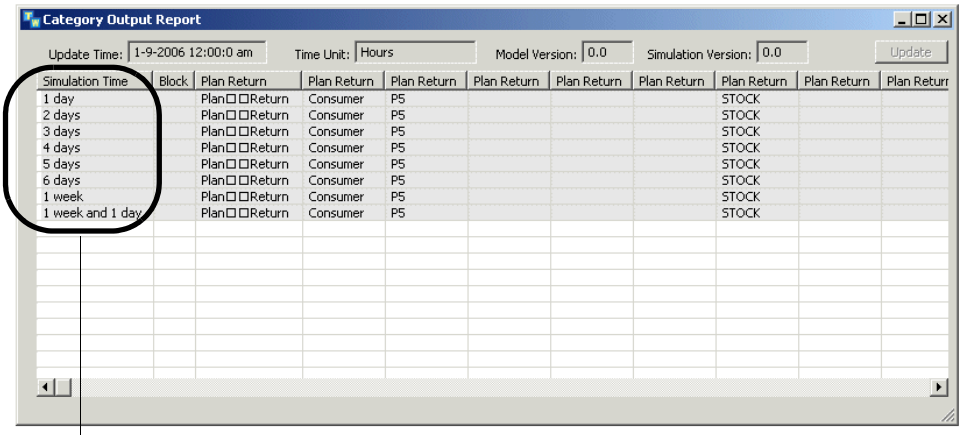
This figure shows how to configure a Category Output Report to generate time-series data once a days of simulation time, where the timestamps appear as durations:



Report generates time-series data each Update Interval, based on the Update Mode.

Report displays timestamps as relative durations.

When you run the simulation, e-SCOR generates data for each report metric each time the report updates. This figure shows a Category Output Report that keeps a history, uses durations as timestamps, and updates once a day of simulation time:



The Role Output Report includes a history of values, which are generated each time the report updates.

Charting Report Data

You can chart the data in a report in various types of charts. The chart updates according to the update setting of the report.

To chart report data:

1. Create and configure an output report.

   For details, see Creating a Report.

2. Configure the update interval for the report.

   For details, see Configuring Output Reports to Update Regularly.

3. Ensure that the Enable Charting option on the General tab of the properties dialog for the report is enabled, the default.

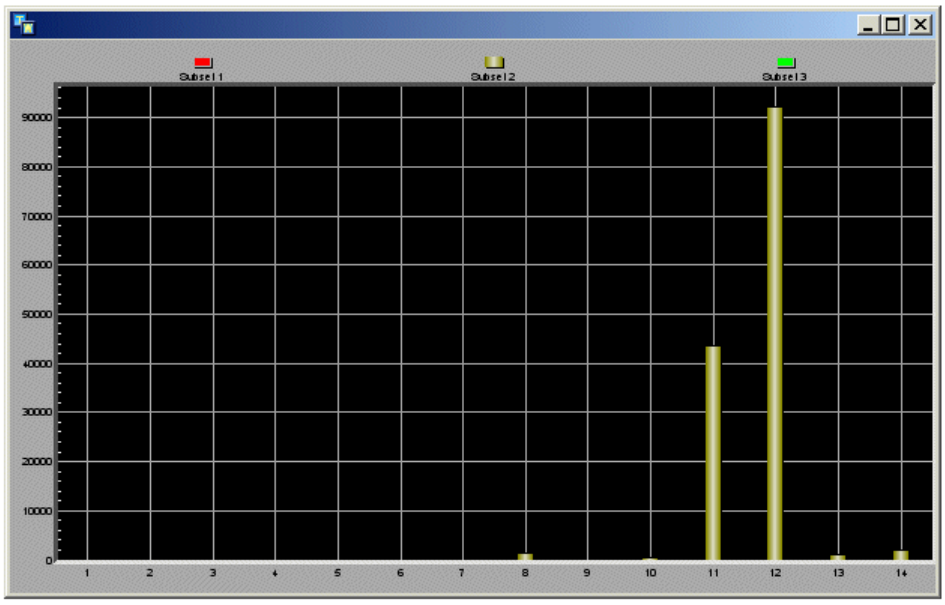
4. Enable the Update Charts option in the Scenario.

   For details, see Configuring the Computation Behavior.

5. Choose Show Report on the report to create the report.

6. Choose Show Chart on the report to show a chart of the report data.

For example, here is a chart for a Category Output Report:



Configuring Standard Report Templates

Most reports provide menu choices for automatically configuring standard report templates. These menu choices configure the report title, the report filters, and the attributes to appear in the report, depending on the type of report. The following menu choices are available:

Report Type	Menu Choices
Role Input Report	Setup Report As Default Role Input
Role Output Report	Setup Report As Default Role Output Setup Report As Role Asset Metrics Setup Report As Role Financial Metrics
Category Input Report	Setup Report As Default Category Input Setup Report As Deliver Parameters Setup Report As Make Parameters Setup Report As Plan Parameters Setup Report As Source Parameters
Category Output Report	Setup Report As Default Category Output Report Setup Report As Deliver Metrics Setup Report As Enable Deliver Metrics Setup Report As Enable Source Metrics Setup Report As Make Metrics Setup Report As Plan Metrics Setup Report As Source Metrics
Product Parameters Report	Setup Report As Product Parameters
Product Metrics Report	Setup Report As Product Inventory Metrics Setup Report As Product Metrics

To configure report templates automatically:

➔ Choose the appropriate menu choice on the report object.

The report title that appears next to the report updates to reflect the new report template.

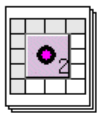
To verify the visible attributes and report filters for the template:

➔ Display the properties dialog for the report object and click the Attributes tab and/or the Filters tab.

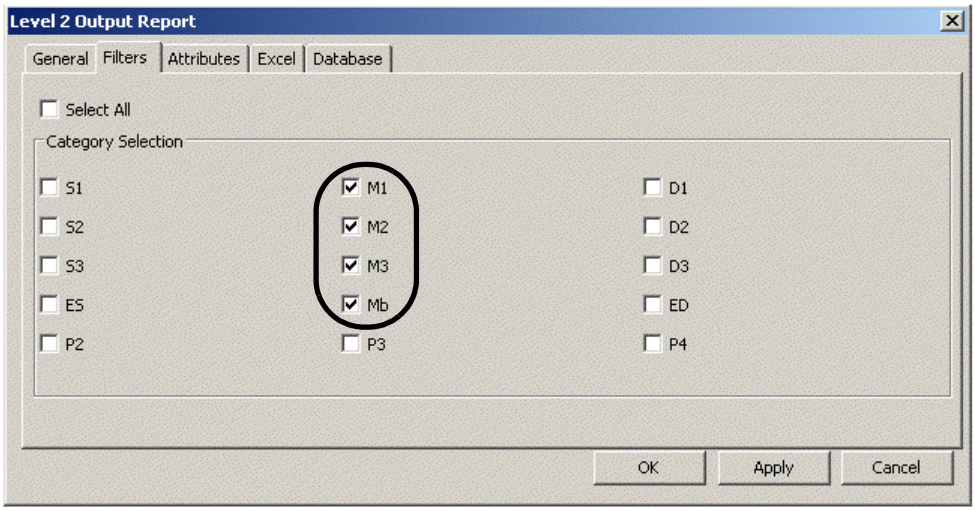
Note Only the Category Input and Output Reports have the Filters tab.

For more information about these tabs, see Filtering Report Data and Configuring the Attributes to Appear in a Report.

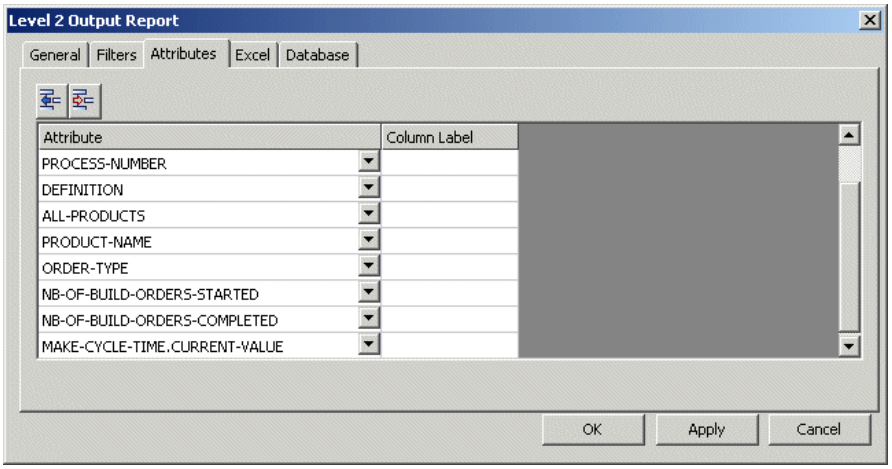
This figure shows the Filters tab for a Category Output Report that has been configured to use the Make Metrics template:



Make Metrics



This figure shows the Attributes tab for the Make Metrics report:



Filtering Report Data

The default category report templates include data for all types of categories: Plan, Source, Make, Deliver, Enable Source, and Enable Deliver categories.

You can filter the data that appears in a report. For example, you can create separate Category Input Reports for the Plan, Source, Make, and Deliver categories. You can filter report data for a Category Input or Output Report; you cannot filter data for a Role Input or Output Report or for a Product Composite Input or Output Report.

You can filter report data automatically by using a pre-defined template for the various types of reports. For details, see Configuring Standard Report Templates.

To filter category report data:

1. Create as many Category Input or Output Report objects as needed, depending on the objects to which each report should apply.
2. Display the properties dialog of each report object and click the Filters tab.

   By default, Select All is enabled, which includes data for all categories in the report.
3. Disable the Select All option, then click the categories to which the report should apply.

Configuring the Attributes to Appear in a Report

Each type of report includes a default set of parameters and/or metrics, depending on the type of report. You can configure the list of visible attributes through the report object.

When configuring the list of visible attributes, you can include time-weighted metrics that the model computes for categories and product composites, such as average and moving average.

You can configure the attributes to appear in reports automatically by using a pre-defined template for the various types of reports. For details, see Configuring Standard Report Templates.

To configure the list of visible attributes, you choose from a list of available attributes, depending on the type of report. Some attributes, such as timing

parameters, are defined within a group. For example, when the Category Input report is configured as a Source Parameters Report, it contains these attributes within these groups:

- Receiving Cycle Time Duration Subtable.min
  Receiving Cycle Time Duration Subtable.mode
  Receiving Cycle Time Duration Subtable.max
- Verification Cycle Time Duration Subtable.min
  Verification Cycle Time Duration Subtable.mode
  Verification Cycle Time Duration Subtable.max
- Transfer Cycle Time Duration Subtable.min
  Transfer Cycle Time Duration Subtable.mode
  Transfer Cycle Time Duration Subtable.max

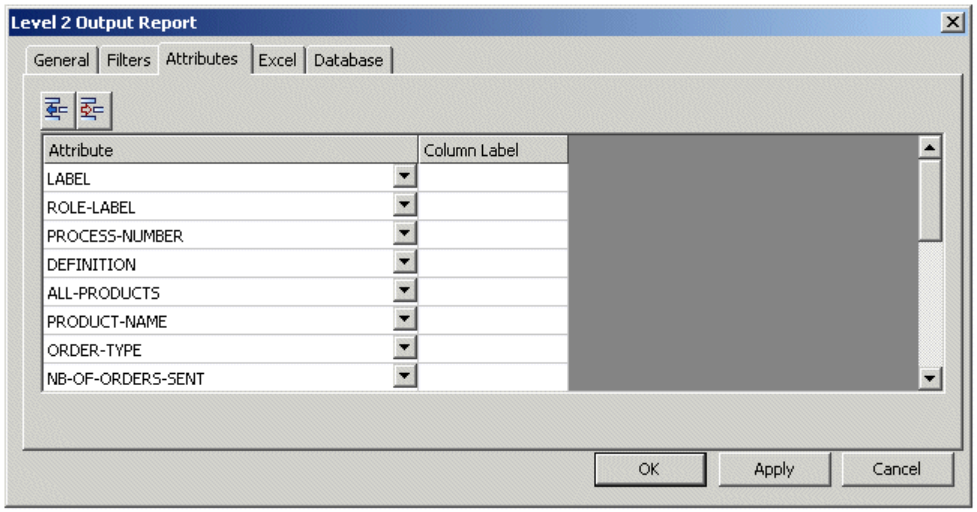
Note In addition to the default set of attributes, all input report include the GFR-UUID attribute, which uniquely identifies the object. This attribute must appear when creating reports in *.csv* files; otherwise, you cannot apply values to the model. When you create reports locally, this attribute is only required if the object labels are not unique.

To configure the list of visible attributes in a report:

1 Display the properties dialog for the report object and click the Attributes tab.

The dialog shows the attribute in the left column and the column label in the right column.

For example, here is the Attributes tab of the properties dialog for the default Category Output Report:



2 Add and remove attributes to and from the list, as needed:

- Click the Add Row button to add a row above the currently selected row.
- Click Delete Row to delete the selected row or rows.

Tip You can use the Shift key to select multiple rows.

3 To configure the attribute to appear in the report, double-click the attribute name in the left column to display a dropdown list of available attributes and their associated groups, where relevant, then choose an attribute.

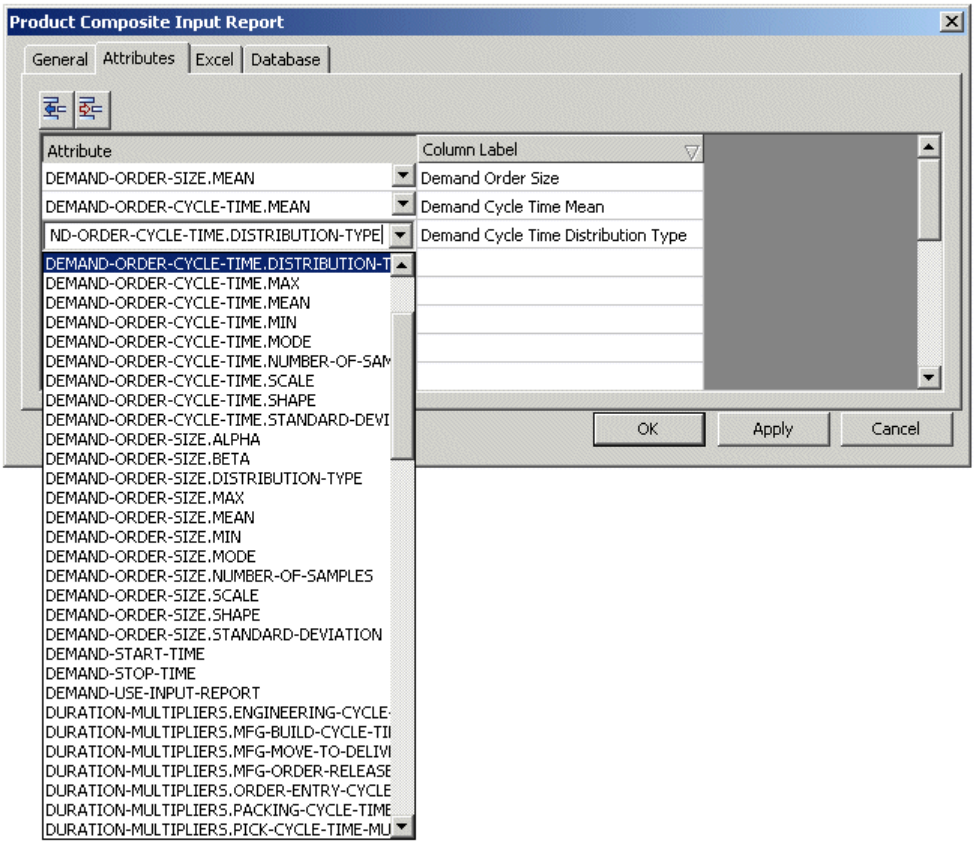
Tip Double-click the border between the column headers to expand the column width to just fit the longest attribute name.

By default, the attribute name and its associated group appear as the column header when you display the report. You can also enter a label for the column header.

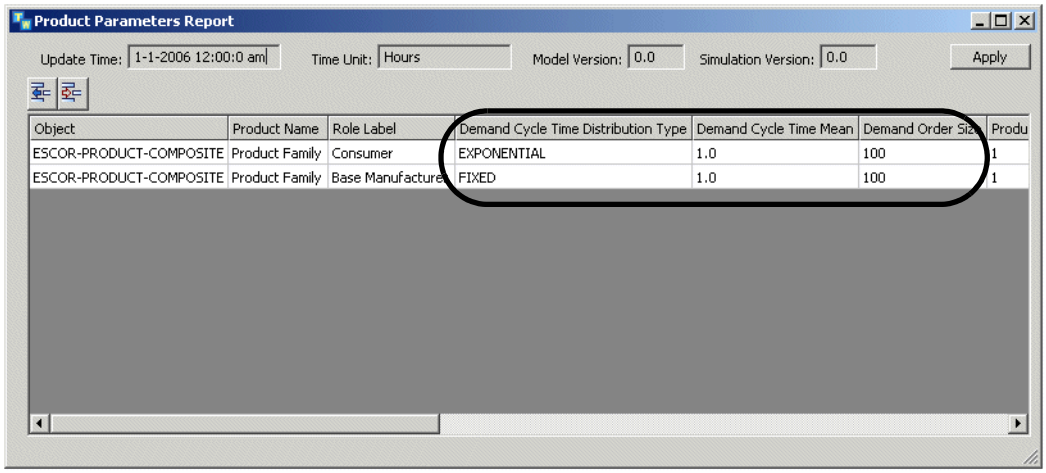
4 Enter a Column Label for the attribute, if desired.

The report contains the attributes and column labels you configured.

For example, this figure shows how to add several parameters associated with the demand order size and cycle time to the Product Composite Input Report, along with a column label:



Here is the resulting report template with the new columns added and some removed:



Creating Reports in Excel

You might want to create reports in Excel so you can perform further analysis on the data and generate graphics. Creating a report in Excel is similar to creating a report in the client, as follows:

- Create a report in Excel for the desired type of input or output report.
- Depending on the type of report, you:
  - Generate output report data from the model to Excel.
  - Apply input report data to the model from Excel.

When creating reports in Excel, you can:

- Filter report data in Excel.
- Control the simulation from Excel.
- Connect to and disconnect from the server from Excel.

Creating a Report in Excel

Before you can generate output report data or apply input report data, you must create a report in Excel. To do this, first, you create a report object in the model, then you create the report from the report object. You create the report in the following default Excel spreadsheet:

\escor\data\e-SCOR-Summary-Reports.xls

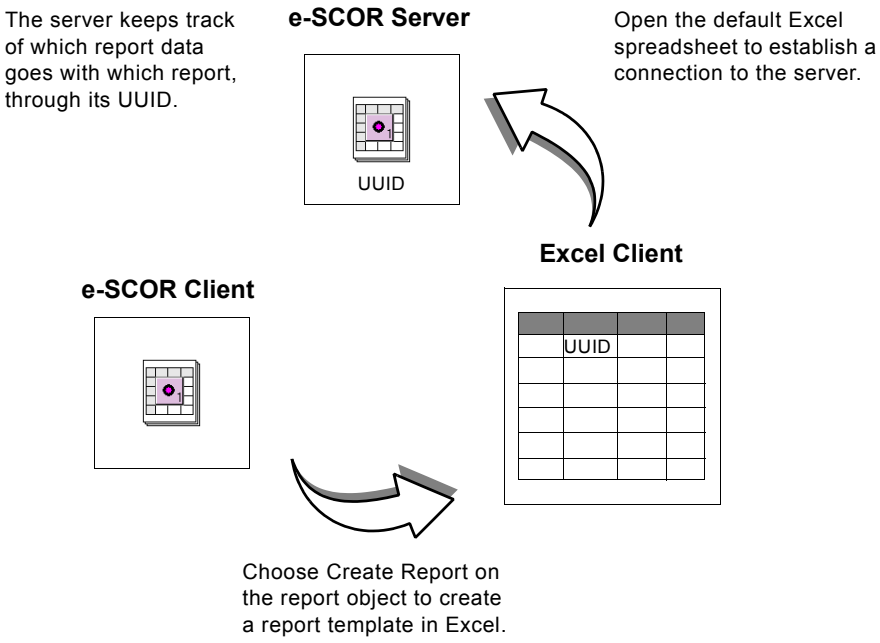
Each time you open the default Excel spreadsheet or a spreadsheet that is based on this default, the Excel client automatically attempts to establish a connection with the e-SCOR server. Excel can be running on the same computer as the server or on a different computer. By default, you must configure the location of the server each time you open the spreadsheet.

The e-SCOR server keeps track of which Excel spreadsheet corresponds to which report object, based on a unique identifier, called a UUID. The Excel spreadsheet need not be open to update an existing spreadsheet. The spreadsheet updates the next time you open it, based on changes cached in the server.

When you create a report, Excel formats the tab page associated with the report object to include the appropriate columns and rows for the particular report object and model. For example, if you create a Role Output report, the spreadsheet includes columns for all the financial, asset, and cost metrics associated with a role, and rows for each role in the model.

Once you have created the report, you typically format the rows and columns manually to suit your needs, then save the default spreadsheet to a new name. When you are ready to generate output report data or apply input report data, you simply open the spreadsheet you saved, which is automatically configured to communicate with the correct report in the server.

The following figure illustrates the process of creating a report in Excel:



To create a report in Excel:

1 Create an input or output report, based on the type of data you want to enter or compute, and place it in the desired location in the model.

For details, see Creating Reports.

If you place the report object on the model detail or some other detail, you can skip the following step. Otherwise, if you place the report object on the detail of an organizer, you must choose the root workspace for the report object, as the next step describes.

2 If necessary, choose Select Root Workspace on the report object, then select the workspace to which the report object should apply and choose Select.

The report object applies to all objects of the specified type on the selected root workspace and all details.

3 Display the properties dialog for the report object and configure the Report Title on the General tab to be a unique name.

4 In Excel, open *e-SCOR-Summary-Reports.xls*, located in the *escor\data* directory of your installation directory.

Shortcut You can open the default report by choosing Start > Programs > Gensym G2 2011 > Examples > G2 e-SCOR > e-SCOR Default Summary Reports.

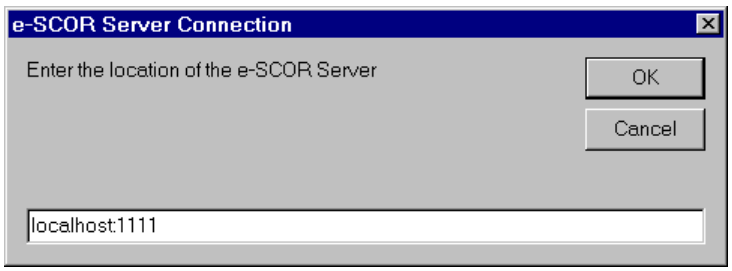
The report uses a default macro to format the cells. You must enable macros each time you open the default spreadsheet.

Tip To configure Excel to enable macros automatically, choose Options from the Excel Tools menu, click the General tab, and click the Macro Virus Protection option off.

---

5 Click the Enable Macros button in the confirmation dialog that appears.

The Excel client attempts to establish a connection to the e-SCOR server. By default, e-SCOR prompts you for the location of the server by displaying this dialog:



6 Enter the location of the computer on which the server is running, using the following syntax:

<host>:<port>

You only need to edit the value if you are running the server on a computer other than localhost:1111, such as my-host:1112.

The Excel client is now connected to the server.

7 In e-SCOR, choose Show Report on the report to create the report in the default Excel spreadsheet.

Excel formats the tab page associated with the report for the particular model by creating the appropriate rows and columns.

8 Reset the scenario.

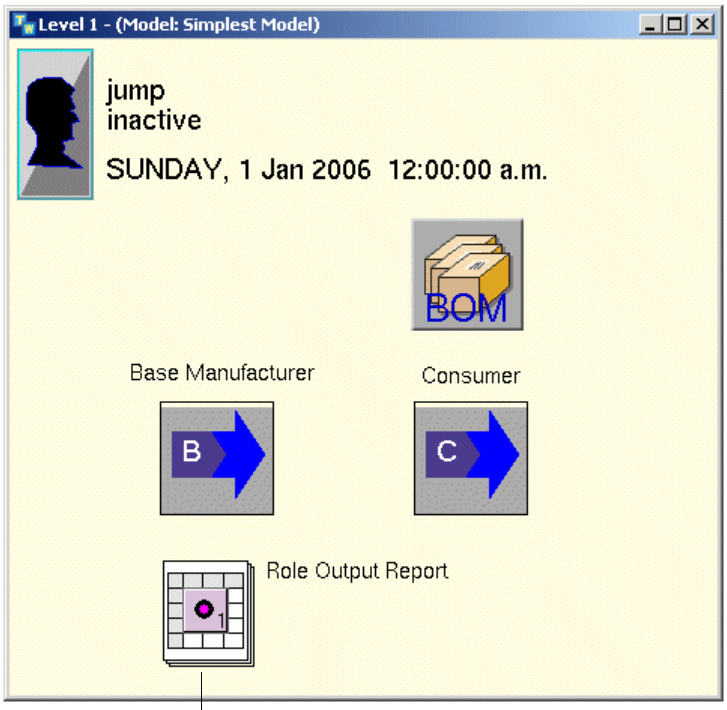
9 In Excel, format the rows and columns of the report to suit your needs.

For example:

- Choose Format > Row > Hide and Format > Column > Hide to hide rows and columns whose data you do not need to see.
- Choose Format > Column > Autofit Selection to adjust the column width to match the column headers.
- Click a cell and choose Window > Freeze Panes to define column and row borders that always remain visible, even when scrolling.

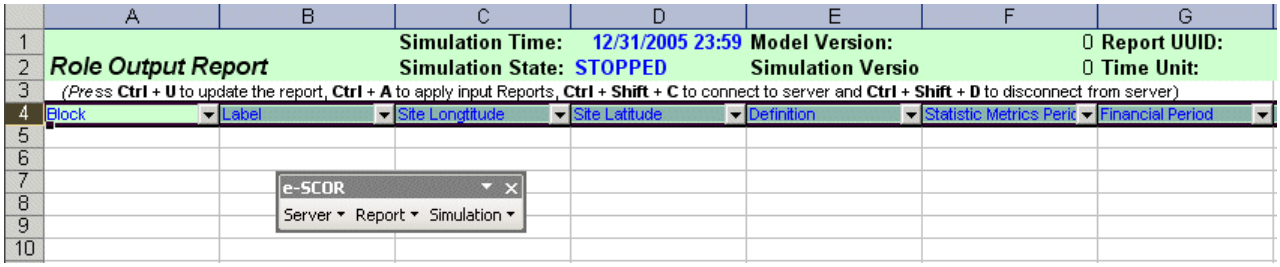
10 In Excel, save the report to a new file name, such as *My-Model-Summary-Report.xls*.

This figure shows a model with a Role Output Report:



Choose Show Report on the report object to create a template for the Role Output report in the default Excel spreadsheet.

This figure shows the resulting spreadsheet template in the default Excel spreadsheet:



Generating Output Report Data from the Model to Excel

Before you can generate output report data from the model, you must create a report in Excel for the output report whose data you want to generate.

To generate output report data, you simply run the simulation and update the report. Each time the report updates, new data appears in the report.

By default, output reports are configured to update manually and output static data.

You can configure the report to update automatically, as described in Updating Output Reports at Regular Time Intervals.

You can also configure the report to output time-series data, as described in Keeping a History of Data Values.

By default, Excel does not format the data when the report updates. You can create a macro in Excel to format report data. For details, see the *Customizing ReThink User's Guide*.

For information about reducing the amount of data that appears in the report, see Filtering Report Data in Excel.

To generate output report data from the model to Excel:

1 Open an Excel report that is based on the `e-SCOR-Summary-Reports.xls` spreadsheet.

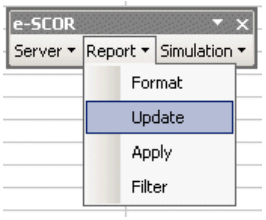
For details, see Creating a Report in Excel.

2 Run the simulation.

For details, see Controlling the Simulation.

3 Update the report manually, using one of these techniques:

➔ In Excel, choose Report > Update from the e-SCOR floating toolbar:



or

➔ In Excel, enter Ctrl + U.

or

➔ In e-SCOR, choose Update Report on the report.

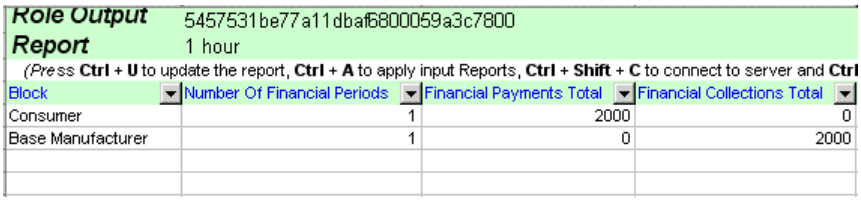
or

➔ In e-SCOR, select the report whose values you want to update and choose Reports > Update.

4 When you have finished running the simulation, sort the report data, as needed, by choosing Data > Sort in Excel.

Note Do not attempt to sort report data before the simulation has finished, because updating the report reverts to the default sort order.

For example, here is part of a Role Output Report for a model with a Base Manufacturer role and a Consumer role:



Role Output Report	5457531be77a11dbaf6800059a3c7800 1 hour		
(Press **Ctrl** + **U** to update the report, **Ctrl** + **A** to apply input Reports, **Ctrl** + **Shift** + **C** to connect to server and **Ctrl**			
Block	Number Of Financial Periods	Financial Payments Total	Financial Collections Total
Consumer	1	2000	0
Base Manufacturer	1	0	2000

Applying Input Report Data to the Model from Excel

Before you can apply input report data to the model, you must create a report in Excel for the input report whose data you want to apply.

To apply input report data, you simply enter data into the input report and apply the values to the model. Each time you apply new values, the parameters in the model update.

To apply input report data to the model from Excel:

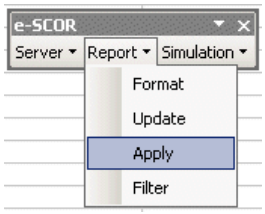
1 Open an Excel report that is based on the *Default-Summary-Reports.xls* spreadsheet.

For details, see Creating a Report in Excel.

2 Edit the spreadsheet cells for the specified parameters of the specified objects.

3 Apply the report data to the model, using one of these techniques:

➔ In Excel, choose Report > Apply from the e-SCOR floating toolbar:



or

➔ In Excel, enter Ctrl + A.

or

➔ In e-SCOR, select the report whose values you want to apply and choose Reports > Apply.

Excel applies the parameter values from the spreadsheet to the appropriate parameters of the appropriate objects in the model.

For example, here is part of a Product Parameters Report for a model that manufactures computers from electronics and components:

	A	B	C	D	E
1			**Simulation Time:**	**1/1/2006 0:00**	**Model Version:**
2	***Product Parameters Report***		**Simulation State:**	**RESET**	**Simulation Versio**
3	*(Press* **Ctrl + U** to update the report, **Ctrl + A** to apply input Reports, **Ctrl + Shift + C** to connect to server and **Ctrl + S**				
4	Object	Product Name	Role Label	Order Type	Is Source Product
5	ESCOR-PRODUCT-COM	Computer	Manufacturer 4	STOCK	FALSE
6	ESCOR-PRODUCT-COM	Electronics	Manufacturer 4	STOCK	TRUE
7	ESCOR-PRODUCT-COM	Components	Manufacturer 4	STOCK	TRUE
8	ESCOR-PRODUCT-COM	Electronics	Base Manufacturer	STOCK	FALSE
9	ESCOR-PRODUCT-COM	Components	Base Manufacturer	STOCK	FALSE

Filtering Report Data in Excel

If you have many objects in a model, you might want to filter report data to view or configure a subset of the data. You can filter the report data, based on values in any column of the report. For example, you might want to show the rows associated with particular resources or the rows with the Total Cost greater than a certain number.

Note Unlike filtering report data by object class, filtering data in Excel simply hides certain data from view; the data still exists and can be displayed at any time.

To filter report data in Excel:

➔ Click the dropdown list for a column header and choose the filter criterion, based on available column data.

Here is the column header dropdown list for the Role Label column of a Role Output Report:

To show all report data:

➔ Click the dropdown list for a column header and choose All.

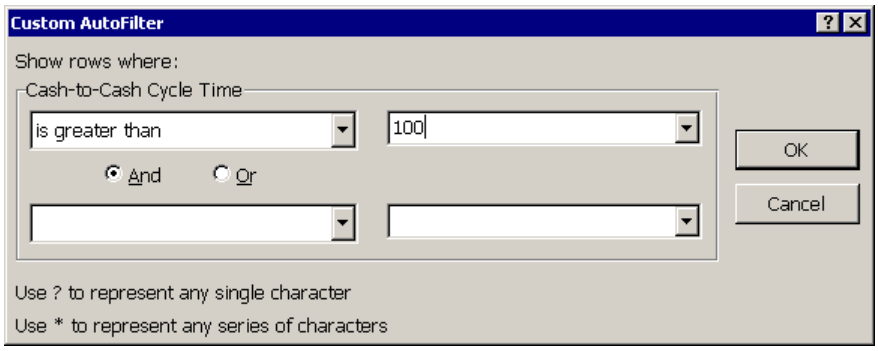
To show only the top ten rows of data:

➔ Click the dropdown list for a column header and choose Top 10.

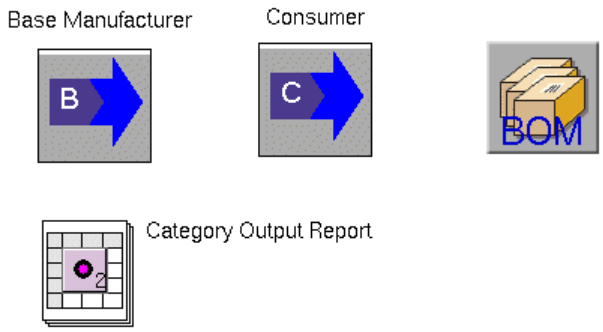
To filter report data based on custom criteria:

➔ Click the dropdown list for a column header, choose Custom, and configure the custom filter criteria.

For example, here is how you would configure the report data to show only those rows whose Cash-to-Cash Cycle Time is greater than 100:



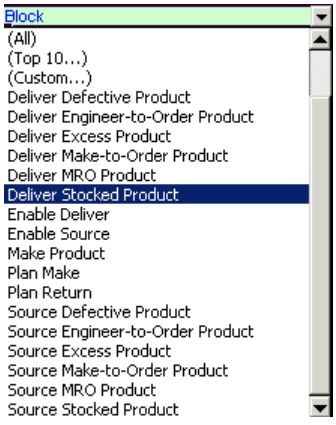
Here is a model with a Category Output Report:



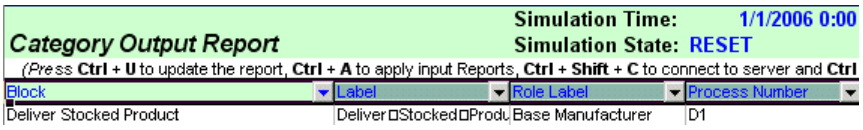
By default, the Category Output Report looks like this, with all categories visible:

	A	B	C	D
1			**Simulation Time:**	**1/1/2006 0:00**
2	***Category Output Report***		**Simulation State:**	**RESET**
3	*(Press* **Ctrl + U** to update the report, **Ctrl + A** to apply input Reports, **Ctrl + Shift + C** to conne			
4	Block	Label	Role Label	Process Number
5	Plan Return	Plan□Return	Consumer	P5
6	Source Excess Product	Source□Excess□Produ	Consumer	SR3
7	Source MRO Product	Source□MRO□Product	Consumer	SR2
8	Source Defective Produ	Source□Defective□Pro	Consumer	SR1
9	Source Make-to-Order F	Source□Make-to-Order	Consumer	S2
10	Source Stocked Produc	Source□Stocked□Produ	Consumer	S1
11	Source Engineer-to-Ord	Source□Engineer-to-Or	Consumer	S3
12	Enable Source	Enable□Source	Consumer	ES
13	Deliver Excess Product	Deliver□Excess□Produ	Base Manufacturer	DR3
14	Deliver MRO Product	Deliver□MRO□Product	Base Manufacturer	DR2
15	Deliver Defective Produ	Deliver□Defective□Proc	Base Manufacturer	DR1
16	Plan Make	Plan□Make	Base Manufacturer	P3
17	Enable Deliver	Enable□Deliver	Base Manufacturer	ED
18	Deliver Stocked Product	Deliver□Stocked□Produ	Base Manufacturer	D1
19	Deliver Make-to-Order P	Deliver□Make-to-Order	Base Manufacturer	D2
20	Deliver Engineer-to-Ord	Deliver□Engineer-to-Or	Base Manufacturer	D3
21	Make Product	Make□Product	Base Manufacturer	Mb

To show report data for individual categories, you would click the dropdown list for the Block column header and choose the desired category, for example, Deliver Stocked Product:

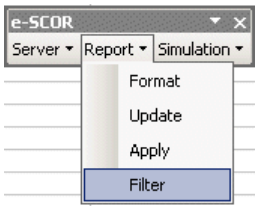


The resulting report shows report data for Deliver Stocked Products categories only:



To toggle the dropdown list buttons:

➔ Choose Report > Filter from the e-SCOR floating toolbar:

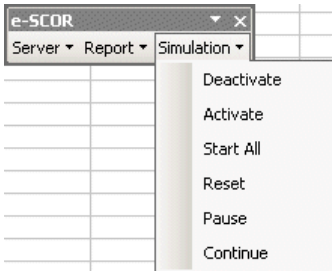


Controlling the Simulation from Excel

When creating Excel reports, you might want to control the simulation from Excel, rather than switching back to e-SCOR. You can activate, deactivate, start, reset, pause, or continue the simulation from Excel.

To control the simulation from Excel:

➔ In Excel, choose Simulation from the e-SCOR floating toolbar, then choose the command to control the simulation:



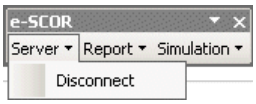
Connecting to and Disconnecting from the Server from Excel

When you first open the default report, e-SCOR automatically attempts to connect to the server. Exiting Excel automatically disconnects from the server.

You can manually connect and disconnect to the server, as well, for example, if for some reason you need to shut down e-SCOR while Excel is still open.

To connect to and disconnect from the server from Excel:

➔ In Excel, choose Server > Connect or Disconnect from the e-SCOR floating toolbar:



or

➔ Enter Ctrl + Shift + C to connect to the server.

Writing to and Reading from CSV Files

For any output or input report in the model, you can:

- Write output report data to an CSV file.
- Import input report data from an CSV file.

You use CSV (comma separated values) files to import report data into a graphics program or to perform further analysis on the data.

You also use CSV files when using the Batch Simulation object to run multiple simulations from a script. For more information, see Using Batch Simulation.

Writing Output Report Data to CSV Files

You can create a CSV file for any output report.

Caution Do not attempt to edit the CSV file while the simulation is running; otherwise, the model cannot write the data to the file.

To write output report data to an CSV file:

1. Display the properties dialog for the output report whose data you want to write to a CSV file and click the Excel tab.
2. Enable the Excel Report Enabled option.
3. Configure the report to update at the desired intervals.

   For details, see Updating Output Reports at Regular Time Intervals.
4. Configure the report to keep a history, if desired.

   For details, see Keeping a History of Data Values.
5. Configure the attributes to appear in the report.

For details, see Configuring the Attributes to Appear in a Report.

6 Configure the time unit, as needed.

For details, see Configuring the Time Unit.

7 Generate the output report data.

For details, see Generating Output Report Data from the Model.

For details, see Generating Output Report Data from the Model to Excel.

When you run the simulation and the report updates, e-SCOR writes the report data to a CSV file located in the `Output` directory of your installation directory with this format:

model-label `V`*model-version* `-` *report-title* `V`*scenario-version*`.csv`

For example, for the model named Simplest Model, the default CSV file name for a Role Output report is:

`Simplest Model V0.0 - Role Output V0.0.csv`

The *model-version* is the Model Version of the Model object, and the *scenario-version* is the Scenario Version of the Scenario object.

Importing Input Report Data from CSV Files

You can import data into the model from a CSV file.

To import data into the model from an CSV file:

1 Display the properties dialog for the input report whose data you want to import from a CSV file and click the Excel tab.

2 Enable the Excel Report Enabled option.

3 Configure the attributes to appear in the report.

For details, see Configuring the Attributes to Appear in a Report.

4 Configure the time unit, as needed.

For details, see Configuring the Time Unit.

5 Create the input report, which also creates the CSV file.

For details, see Creating a Report in Excel.

Tip To create a new CSV file, you must first delete the existing CSV file by choosing Delete CSV Report File on the report.

---

e-SCOR creates a CSV file located in the `Output` directory with this format:

model-label `V`*model-version* `-` *report-title* `V`*scenario-version*`.csv`

For example, for the model named Simplest Model, the default CSV file name for a Role Input report is:

```
Simplest Model V0.0 - Role Input V0.0.csv
```

The report contains a header row that identifies each input parameter to configure and rows for each object in the report. Each row contains default values for each parameter in the report.

6 Open the CSV file, edit the input report data, and save the data in CSV file format.

Note Be sure to save the file in CSV format; do not save the file in Excel format. Also, do not edit the first row of the report or the object labels that identify each row of the report.

---

7 Choose Import Data from File on the report.

Importing data from the CSV file automatically applies the data to the model.

Writing to and Importing from Databases

For any output or input report in the model, you can:

- Write output report data to a database.
- Import input report data from a database.

For details, see Using Reports to Access External Databases.

Creating Specialized Reports

You can create the following specialized reports:

- Demand Reports, which include order demand parameters for configuring demand parameters for the source product of a Consumer role, such as Demand Order Duration and Demand Order Size.
- Role Transaction Reports, which records transactions that occur between roles, including orders, purchases, products, and financials.

Creating Demand Reports

By default, you determine initial order demand for the overall supply chain by configuring parameters on the Demand Order tab for the source products of each Consumer category.

You might have actual order demand data for your supply chain, which you would like to use in your model. You might also want to simulate change orders

for existing orders. To do this, you configure initial order demand and change orders through a report by:

- Creating a Demand Report with the initial order demand and change order data.
- Importing order demand and specifying the report to use.

When you run the simulation, the model creates orders and change orders for as many products as you configured in the report, then stops.

For detailed information on creating a Demand Report, see Configuring Demand and Change Orders through a Demand Report.

Logging Transactions that Occur Between Roles

You can use the Role Transaction Report to record and analyze transactions that occur between roles. These transactions include:

- Customer orders that buyers send to suppliers.
- Product shipments that suppliers send to buyers.
- Invoices that suppliers send to buyers.
- Payments that buyers send to suppliers.
- Purchase requests that buyers send to suppliers.
- Purchase responses that suppliers send to buyers.
- Purchase awards that buyers send to suppliers.

Each transaction is on its own line in the report and includes:

- The time at which the transaction occurred, in seconds, measured from the beginning of the simulation.
- The model version, simulation version, and simulation run.
- The object that the role sent.
- The parameter values for the object at the time of the transaction.

Logging is useful for analyzing the model, based on transactions that occur. Whereas output reports generate data at particular times during the simulation, logging generates data when a model transaction occurs. For example, a report that updates once a week might show no change in the inventory level, whereas a log file shows orders going out and product shipments coming in at particular times during the simulation.

You configure logging to occur for individual roles. The report includes transactions that occur between the role and its upstream and downstream roles.

Each time you enable logging, e-SCOR appends the new log data to the existing report.

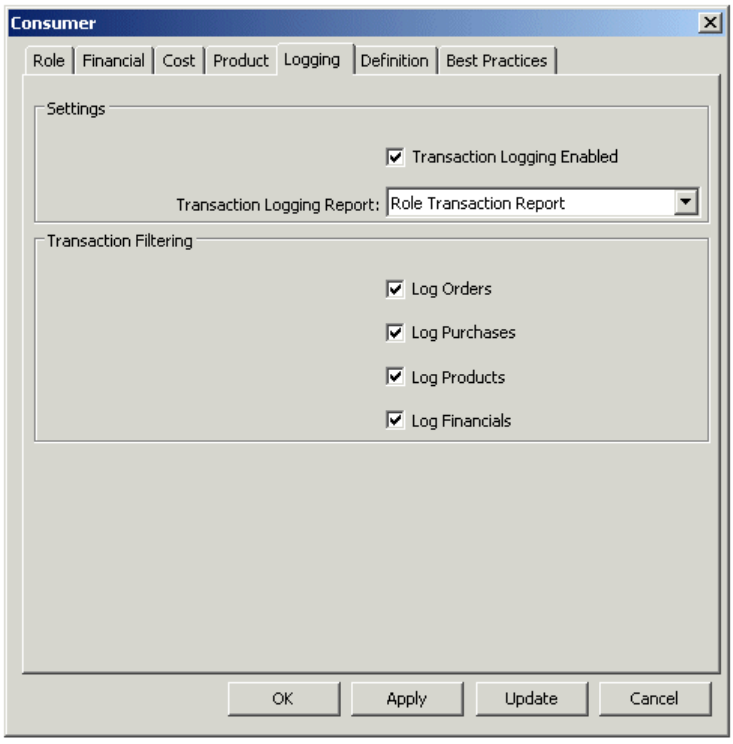
To log transactions that occur between roles:

1. Create a Role Transaction Report from the Reports palette of the e-SCOR toolbox and place it on the model detail.
2. Display the properties dialog for each role for which you want to log transactions and click the Logging tab.
3. Enable the Transaction Logging Enabled option.
4. Configure the Transaction Logging Report to be the report you created.
5. Enable the desired Transaction Filtering options, as follows:

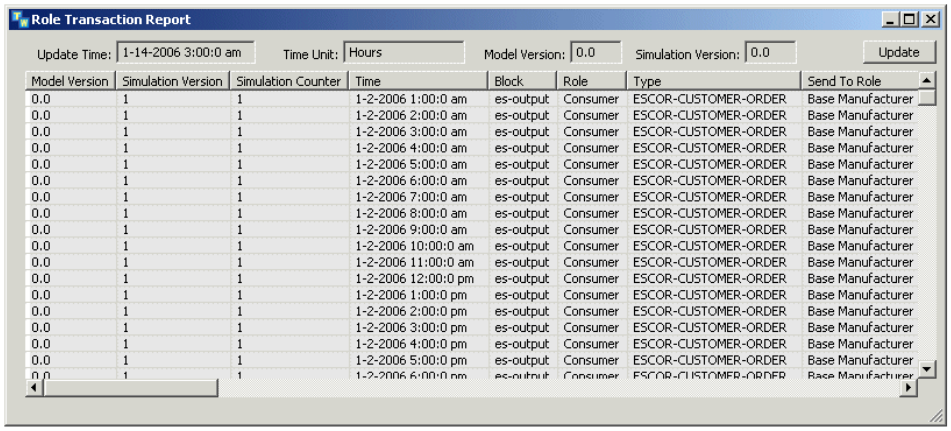
Logging Specification	Description
Log Orders	Logs orders that buyers send to suppliers.
Log Purchases	Logs purchase requests that buyers send to suppliers, purchase responses that suppliers send to buyers, and purchase awards that buyers send to suppliers.
Log Products	Logs product shipments that suppliers send to buyers.
Log Financials	Logs invoices that suppliers send to buyers and payments that buyers send to suppliers.

6. Run the simulation.

This figure shows how to configure the role dialog for logging all transactions:



Each role that has logging enabled generates report data that looks similar to the following. The left-hand column shows the type of object. The example also shows the timestamp at which the transaction occurred and the order type. The log file contains additional data for each parameter the object defines.



11

Accessing External Databases

Describes how to access databases.

Introduction

You can access external databases directly through e-SCOR to:

- Write report data to a database.
- Read report data from a database.

To access external databases, you must create a database and configure the ODBC data source. You then create and configure a Database Interface object as the link between the database and e-SCOR.

To configure a report for database access, you specify the database table and enable database reporting. When you run the simulation, e-SCOR writes output

report data to a database when the report updates. To read input report data from a database, you must explicitly import the data.

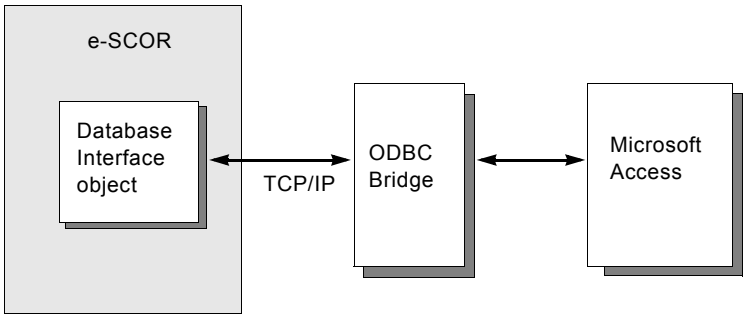
Note To configure ReThink for database access, you must be in Developer mode.

Configuring e-SCOR for Database Access

To access an external database, you must first start the ODBC Bridge and configure your computer to use the bridge. You can access any external database that the ODBC Bridge supports, including, Microsoft Access, Oracle, and SQL2000.

The ODBC Bridge allows e-SCOR to communicate with external databases via a Database Interface object and a TCP/IP connection.

This figure shows how e-SCOR communicates with a Microsoft Access database through the ODBC Bridge:



To configure e-SCOR for database access, you:

- Create the database.
- Configure the ODBC data source.
- Start the ODBC Bridge process.
- Create and configure a Database Interface object.
- Connect to the database.

Creating the Database

You create the database by using any database that the ODBC Bridge supports.

To write report data to a database or read report data from a database, you create the database manually, then you can create the database table directly from the report object.

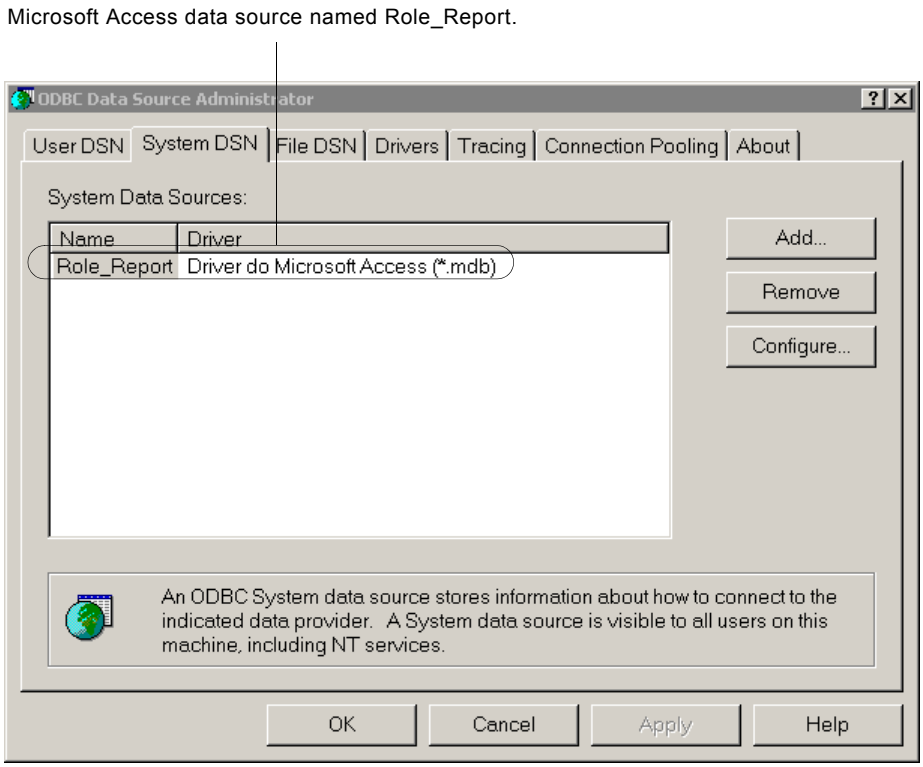
Configuring the ODBC Data Source

Once you have created your database, you must configure the ODBC data source on your computer to name the data source and point to your database. The following example shows how to configure the ODBC data source for a Microsoft Access database named *Role_Report.mdb*.

To configure the ODBC data source:

1. Display the ODBC Data Source Administrator dialog by choosing Start > Programs > Administrative Tools > Data Sources (ODBC).
2. Click the System DSN tab.
3. Click Add to add a new ODBC data source.
4. Choose the appropriate driver for the database you created, for example, Microsoft Access Driver (**.mdb*) and click Finish.
5. Configure the Data Source Name to be any name, for example, *Role_Report*.
6. Click the Select button, navigate to your database, and click OK.
7. Click OK in the ODBC Microsoft Access Setup dialog to create the new data source.

The ODBC Data Source dialog should have an entry for each data source. For example, the following dialog shows the *Role_Report* data source:



Starting the ODBC Bridge Process

Once you have configured the ODBC data source, you can start the ODBC Bridge process. You must identify the host and port to which the bridge is connected for configuring in the Database Interface object.

To start the ODBC Bridge process:

➔ Choose Start > Programs > Gensym G2 2011 > Bridges > G2 ODBC Bridge.

The ODBC Bridge process appears in the command window.

To determine the bridge port:

➔ Open the command window for the bridge process.

The last line indicates the TPC/IP host and port number, for example:

```
TCP_IP:NSALVO-1165:22041
```

Creating and Configuring the Database Interface Object

The Database Interface object specifies:

- A name, which the reports use to connect to the database.
- The ODBC source as a connect string.
- The host and port of the machine running the database bridge.

If the bridge process is running on the local machine, the host is localhost. The port number is 22041, or 22042, or 22043, and so on, depending on the number of clients that are currently connected on that port.

You create a Database Interface object for each database you want your model to access. Typically, you write data to one database and read data from another database, which means you must create two Database Interface objects.

Note To configure a Database Interface object, you must be in Developer mode.

To create and configure a database interface object:

1. Switch to Developer mode.

   For details, see Switching User Modes.

2. Choose Project > System Settings > Interfaces > SQL > Manage and click the New button to create a new Database Interface object.

   Alternatively, you can choose View > Toolbox - G2, click the Network Interfaces tab, and create a Database Interface object.

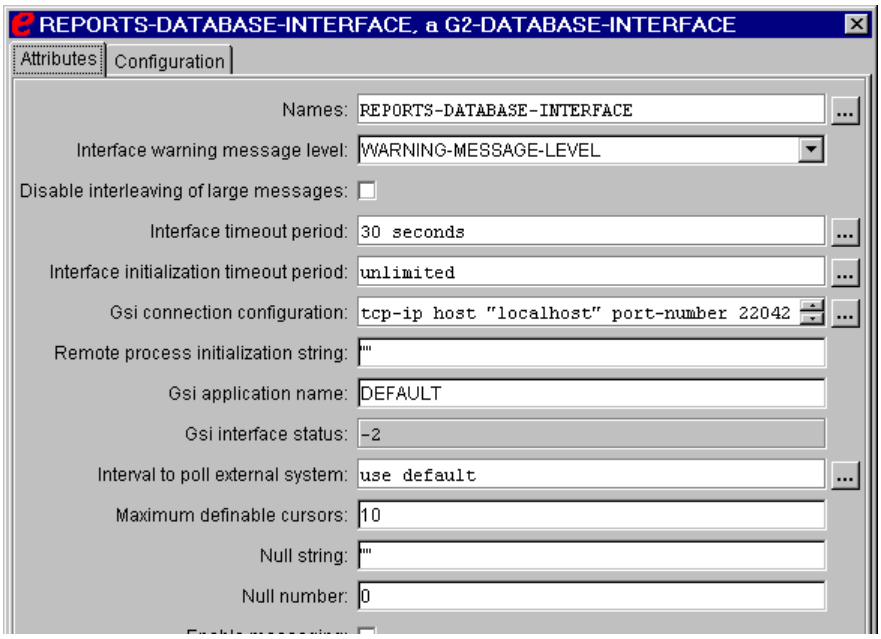
3. In the properties dialog for the Database Interface object, configure the Interface Name attribute to be any symbol, for example, orders-database-interface.

Tip This is the Database Interface Name you specify when you configure the report for database access.

4. Configure the Type of Database to be Access-ODBC.
5. Configure the Bridge Host and Bridge Port attributes to match the host and port of the machine running the bridge, localhost and 22041, by default.
6. Configure the Connect String attribute to be the name of the ODBC data source, for example: role_report.
7. Click Apply to apply these values.
8. Choose Tools > User Mode > Modeler to return to Modeler mode.

Here is a Database Interface object named reports-database-interface and its properties dialog:

REPORTS-DATABASE-INTERFACE



Connecting to the Database

Once you have started the ODBC bridge and configured the Database Interface object, you can connect to the database via the Database Interface object. You must be connected to write records to or read records from the database.

To connect to the database:

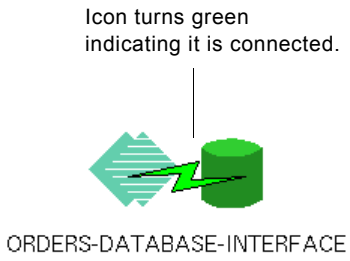
1 Switch to Developer mode.

For details, see Switching User Modes.

2 Choose Connect on the Database Interface object or click the Manual Connect and Log In button in the properties dialog.

The color of the Database Interface object turns to green and the Interface Status in the properties dialog becomes 2 to indicate it is connected.

Here is a Database Interface object that is currently connected to the database:



Using Reports to Access External Databases

For any output or input report in the model, you can:

- Configure the report object for database access.
- Write output report data to a database.
- Import input report data from a database.

Configuring Report Objects for Database Access

To configure a report object for database access, you must identify the Database Interface object that connects to the database. You must also identify the database table to access. You can create the database table from the report object if it does not exist.

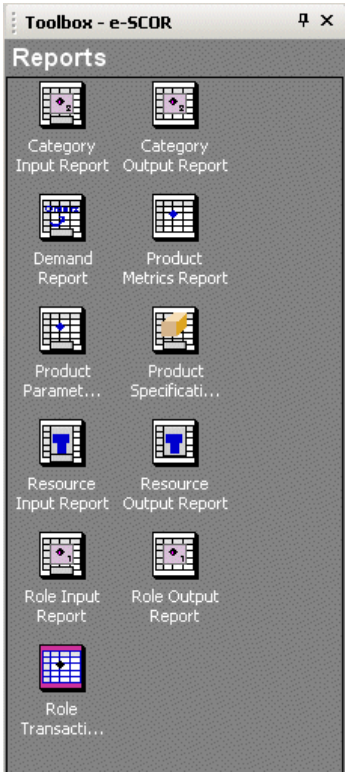
The resulting database provides columns for each attribute configured in the report. The resulting database also provides these standard columns, which you can use for querying data:

- Row_ID, which is a unique ID for the row.
- Model_Version, which is the value of the Model Version attribute of the associated Model tool.
- Simulation_Version, which is the value of the Simulation Version attribute of the associated Scenario tool.

Note To use reports to access external databases, you must be in System-Administrator mode.

To configure a report object for database access:

1 Display the e-SCOR toolbar and click the Reports tab:



2 Create and configure the report:

For details, see:

- Creating Reports.
- Configuring the Time Unit.
- Updating Output Reports at Regular Time Intervals.
- Keeping a History of Data Values.
- Filtering Report Data.
- "Configuring the Attributes to Appear in a Report" on page 372.

3 Click the Database tab of the properties dialog for the report object, then click the Database Reporting Enabled option on.

4 Configure the Database Interface Name to be the name of an existing database interface object.

For details, see Configuring e-SCOR for Database Access.

5 Configure the Database Table Name to be the name of an existing table in the database or a new name.

The table name must be a legal database table name, with no spaces or hyphens and no more than 32 characters, for example, role_output_report.

6 Click Apply to apply the values configured above.

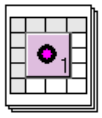
7 If you entered the name of a database table that does not exist, click the Create Database Table button to create the table.

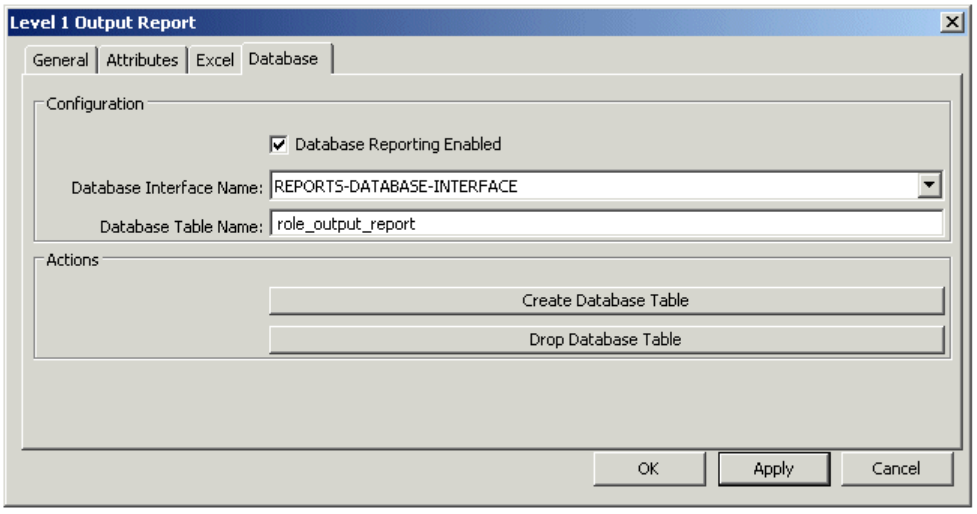
Note The report must already be configured for database reporting before you can create a table.

If you are using Microsoft Access, ensure that the database is closed before attempting to create the table.

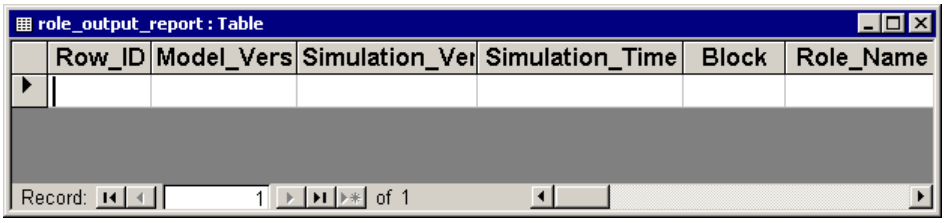
The database table now exists in the database with database fields for each attribute defined in the report object. You can click Drop Database Table to drop the table, as needed.

Here is the Database tab for a Role Output Report that is configured to access the ODBC data source defined by the reports-database-interface Database Interface object. The report writes data to the table named role_output_report.

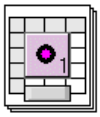


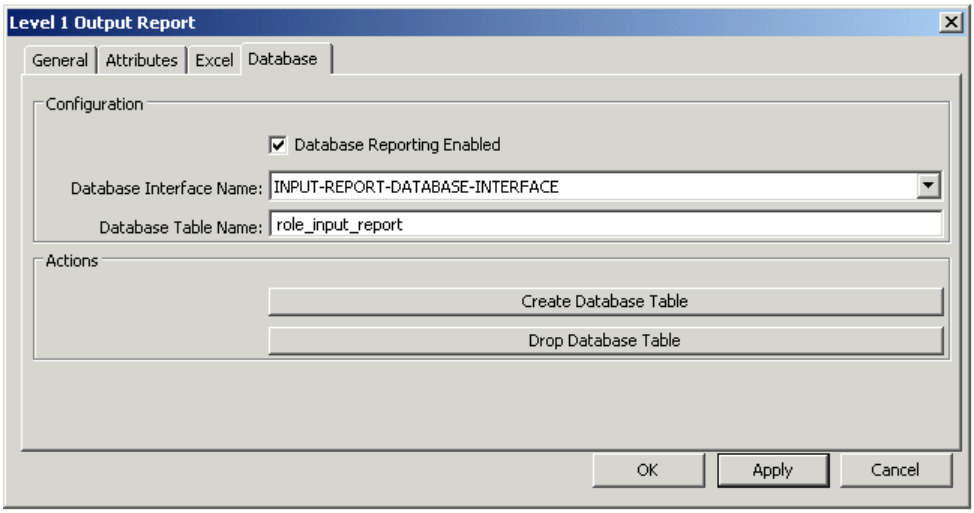


Here is the resulting Microsoft Access database table that is created for the default attributes of a Role Output Report *before* creating or updating the report:

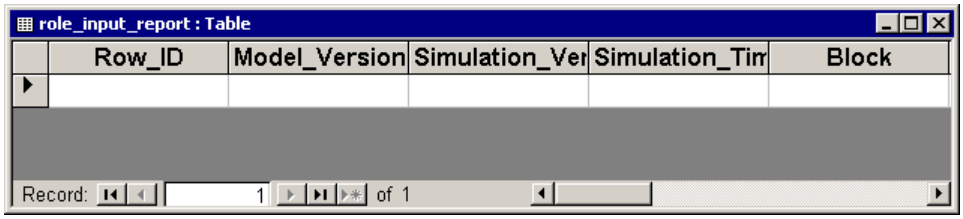


Here is the Database tab for a Role Input Report that is configured to access the ODBC data source defined by the input-report-database-interface Database Interface object. The report imports data from the table named role_input_report.





Here is the resulting Microsoft Access database table that is created for the default attributes of the Role Input Report *before* entering any data:



Writing Output Report Data to a Database

To write output report data to a database, you simply create the report and run the simulation. e-SCOR writes the report data to the database each time the report updates, either manually or based on clock time or simulation time, and at the end of the simulation.

To write output report data to a database:

1 Configure e-SCOR for database access.

For details, see Configuring e-SCOR for Database Access.

2 Configure the report object for database access.

For details, see Configuring Report Objects for Database Access.

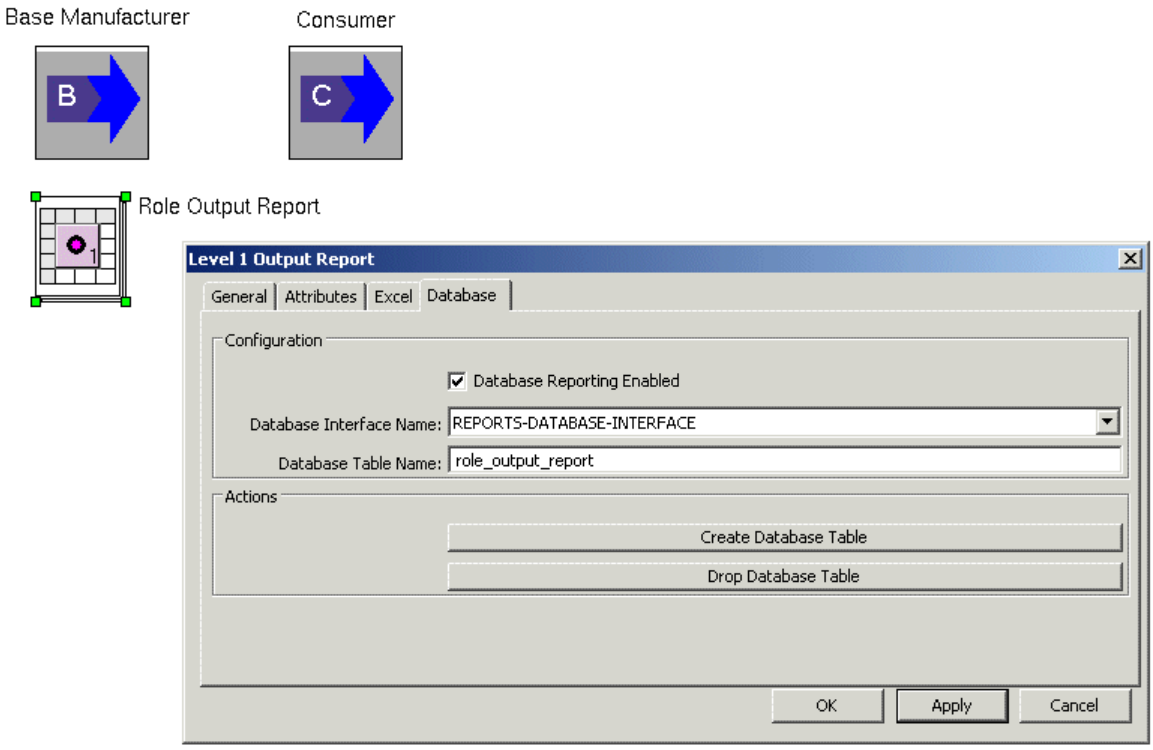
Note If you are using Microsoft Access, ensure that the database is closed before you run the simulation.

---

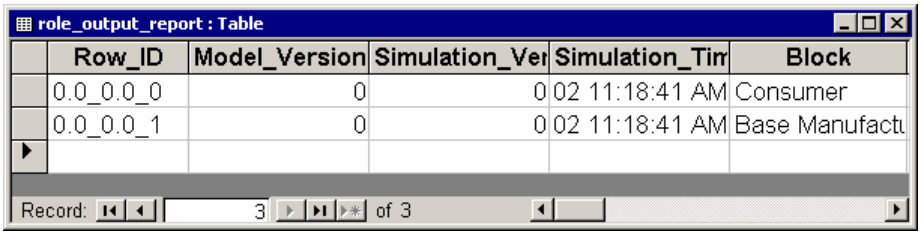
3 Run the simulation.

Typically, when writing report data to a database, you run the simulation for a fixed duration. For details, see Configuring the Duration of the Simulation.

This figure shows a model that is configured to write Role Output Report data to a database:



Here is the resulting Microsoft Access database table that is created for the two roles after creating or updating the report:



Importing Input Report Data from a Database

To import input report data from a database, you must populate the database table with data that corresponds to the report you create, then you import the data. Importing the data updates values in the model.

To import input report data from a database:

1. Configure e-SCOR for database access.

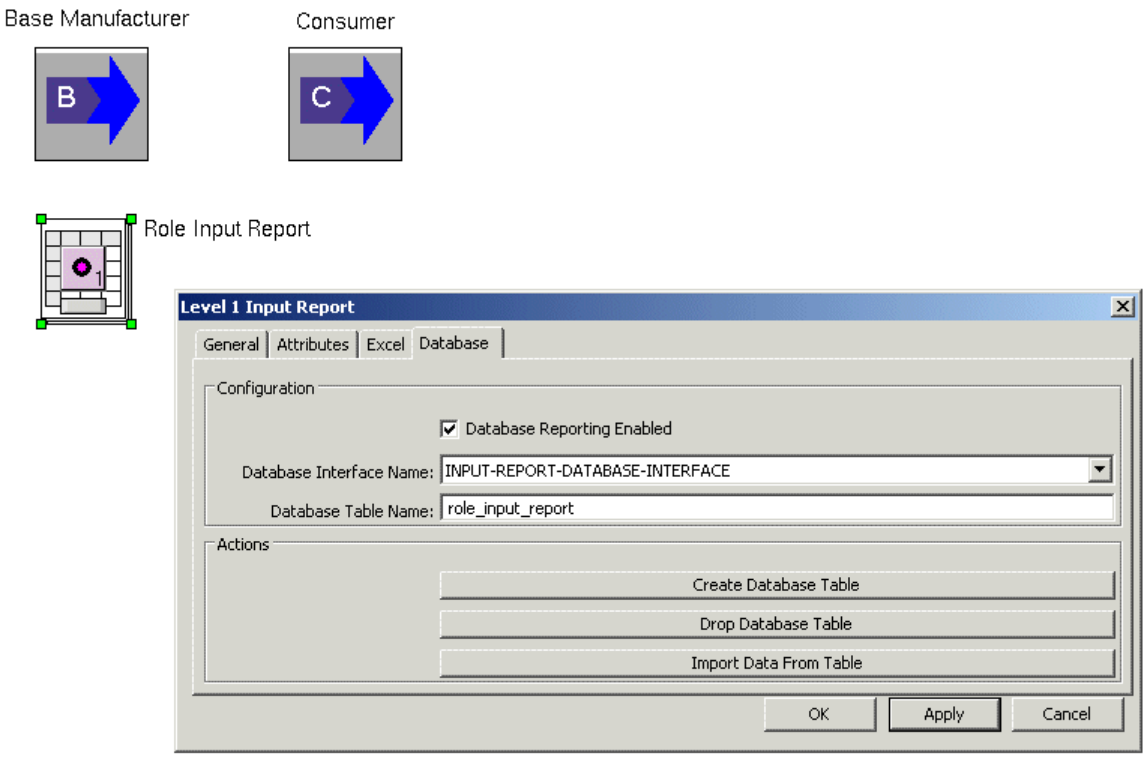
   For details, see Configuring e-SCOR for Database Access.

2. Configure the report object for database access.

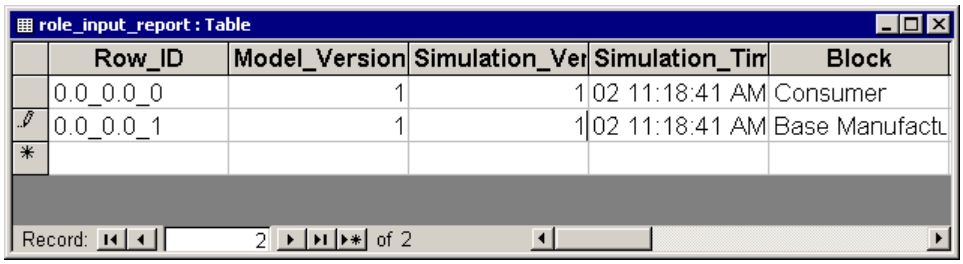
   For details, see Configuring Report Objects for Database Access.

3. Choose Import Data from Database on the report object, or on the Database tab of the Report object, click the Import Data from Table button.

This figure shows a model that is configured to import Role Input Report data from a database:



Here is the Microsoft Access database table from which the data is to be imported:



12

Using Batch Simulation

Describes how to use run multiple simulations from a script.

Introduction

You use the Batch Simulation object to:

- Run multiple simulations from a script.
- Change the value of any parameter in the model while the simulation is running.

For example, you can use the Batch Simulation object to optimize key parameters and metrics by running multiple simulations, using different parameter values for each simulation. You can then save the results to separate reports to analyze the results. You can also use the Batch Simulation object to determine the impact on the current model of changes in key parameters over time, such as those that determine initial order demand.

To use the Batch Simulation object, you create a script that consists of a number of keywords. The keywords identify the model to run and the various parameter values to set. You can set parameter values for roles, categories, and product

composites. You can save the results of a simulation to an Excel report, CSV file, or database associated with an output report.

The keywords that set parameter values correspond to the parameter names in the dialogs. For example, the *SET-PRODUCT-ACQUISITION-COST* keyword sets the Product Acquisition cost parameter of a Source category.

Each keyword may take the following arguments, which identify the object and value to set:

- The role label.
- The category label or product composite label, depending on the parameter.
- The new value.
- The simulation time at which to set the value, for example, *0*, which sets the value immediately after the Scenario has been reset, or *4 weeks*, which sets the value 4 weeks into the simulation.

The keywords that set timing parameters for categories take additional arguments that set the Distribution Mode parameter and associated keyword values. The keywords that set sort-order parameters, such as Sort Attribute 1 in the Award Criteria group of the Source category, take an additional argument for setting the parameter number.

The keywords and the arguments to keywords are not case-sensitive in the script. The script ignores extra spaces and carriage returns in labels. When entering time values, you may enter *hour* or *hours*, *minute* or *minutes*, and so on.

The script executes in the order in which the keywords appear.

This topic includes:

Using the Batch Simulation Object to Run Simulations

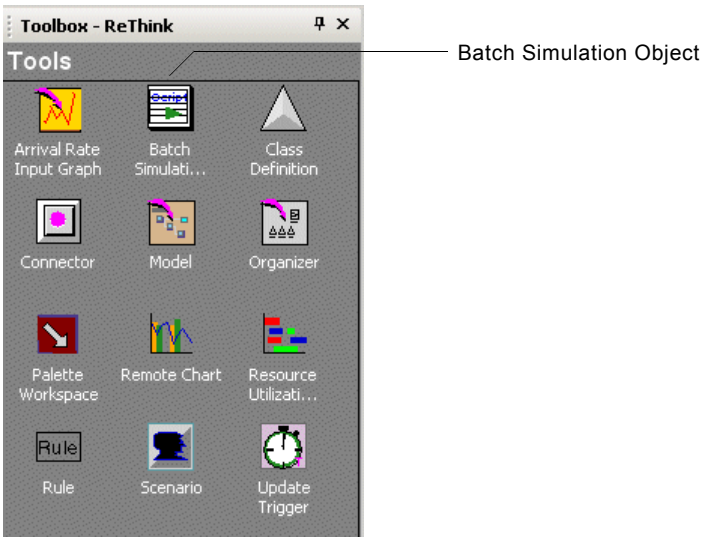
You might want to run several simulations for the same model, each with different values for the Safety Stock parameter. Alternatively, you might want to run a single simulation in which the value of the **Build Yield** parameter increases over time, which is common in many manufacturing processes.

You identify the simulation to run by referring to a unique scenario.

To use the Batch Simulation object to run simulations:

1 Display the properties dialog for the Scenario and configure the Label parameter to be a unique name.

2 Choose Toolbox - ReThink to display the ReThink toolbox, then click the Tools palette:



3 Select the Batch Simulation object and place it on the model detail or organizer detail.

4 Display the properties dialog for the Batch Simulation object and configure the script.

To do this, enter keywords and arguments in the Script field.

For information on the available keywords, see:

- Simulation Keywords.
- Report Keywords.
- Role Parameter Keywords.

- Cost Category Parameter Keywords.
- Timing Category Parameter Keywords.
- Sort-Order Category Parameter Keywords.
- Product Composite Parameter Keywords.

5 Add comments to the script, as needed, using the following syntax:

```
/* this is a comment */
```

6 To verify that you have entered the keywords in the script correctly, click the Check Script button: 

e-SCOR displays error messages and warnings in red and yellow, respectively, in the Log Book area.

For example, the Batch Simulation object generates an error if you have not named the scenario, if an object does not exist, or if you have entered a keyword that does not exist.

7 Click the Start button to start running the script: 

e-SCOR displays messages in green in the Log Book each time a keyword completes its execution, so you can follow the progress of the simulation.

8 To pause the simulation, click the Pause button: 

9 To resume the simulation, click the Resume button: 

10 To stop the simulation, click the Stop button: 

e-SCOR completes the execution of the currently active keyword before pausing or stopping the simulation. Normally, you let the script run by itself until it finishes.

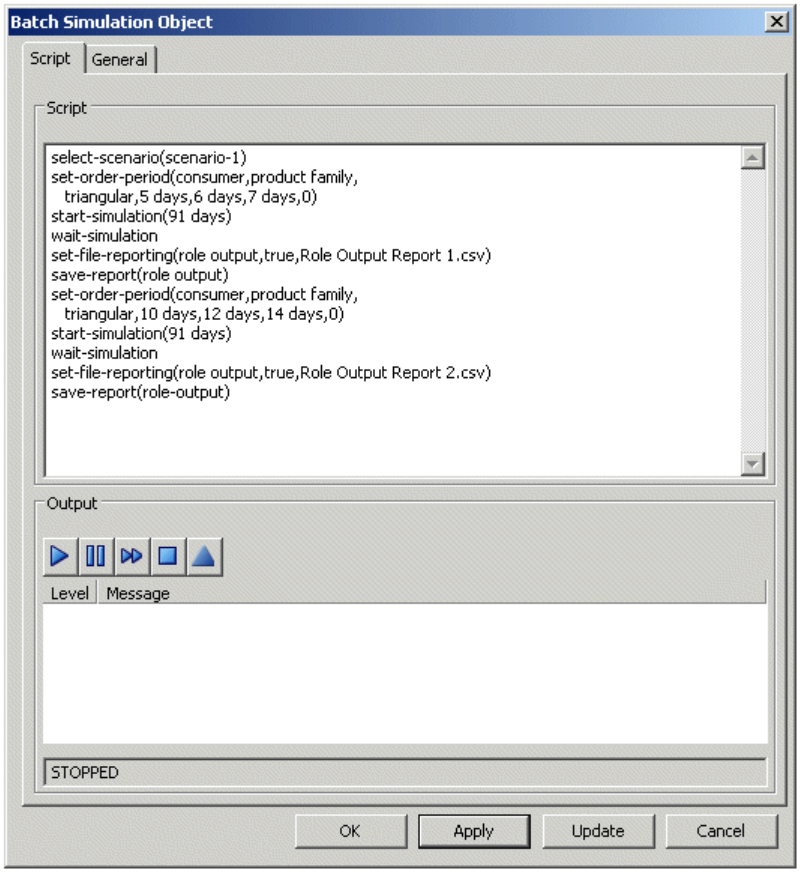
When the simulation finishes, it is as if you had run the simulation manually; metrics compute normally and reports update at the specified time intervals. If the script sets parameter values, the values update at the specified time and the simulation continues.

Typically, if you are running multiple simulations, you save report data at the end of one simulation, before starting the next one.

For example, this script runs the simulation associated with Scenario-1 for 91 days, saves a report, then sets the Order Period parameters to different values, runs the simulation again, then saves the report to a new file name. Notice that the keyword that sets the Order Period parameter comes before the *start-simulation* keyword.

```
select-scenario(scenario-1)
set-order-period(consumer,product family,
   triangular,5 days,6 days,7 days,0)
start-simulation(91 days)
wait-simulation
set-file-reporting(role output,true,Role Output Report 1.csv)
save-report(role output)
set-order-period(consumer,product family,
   triangular,10 days,12 days,14 days,0)
start-simulation(91 days)
wait-simulation
set-file-reporting(role output,true,Role Output Report 2.csv)
save-report(role-output)
```

Here is the Batch Simulation object dialog:



Example Scripts

This section provides example scripts that help you:

- Determine the impact of seasonal demand.
- Model changes in order demand over product life cycle.
- Determine optimal replenishment levels.

Determining the Impact of Seasonal Demand

Suppose you want to model seasonal demand by increasing initial order demand during the course of the simulation, for example, during the holiday season.

You could create a Batch Simulation object that runs a single simulation for one year, where the Order Size and Order Period parameters of product family increase after 11 months (44 weeks) into the simulation, as this script shows:

```
select-scenario(scenario-1)
set-order-size(consumer,product family,
   triangular,10,15,20,0)
set-order-period(consumer,product family,
   triangular,6 days,7 days,8 days,0)
set-order-size(consumer,product family,
   triangular,15,20,25,44 weeks)
set-order-period(consumer,product family,
   triangular,4 days,5 days,6 days,44 weeks)
start-simulation(45 weeks)
wait-simulation
set-file-reporting(level 2 output,true,
   Level 2 Output Report 1.csv)
save-report(role-output)
```

Modeling Changes in Order Demand Over Product Life Cycles

Suppose you want to model changes in order demand patterns over a product's life cycle. For example, in the first year, initial order demand might be relatively high with a high degree of variation, which you model by using a triangular distribution. After the first year, initial order demand might decrease around a more stable mean, which you model by using an exponential distribution. An exponential distribution generally has less variation, except very occasionally.

You could create a Batch Simulation object that changes the mathematical distribution of the Order Size and Order Period parameters over time, as follows:

```
select-scenario(scenario-1)
set-order-size(consumer,product family,
   triangular,10,15,20,0)
set-order-period(consumer,product family,
   triangular,6 days,7 days,8 days,0)
set-order-size(consumer,product family,
   exponential,10,52 weeks)
set-order-period(consumer,product family,
   exponential,10 days,52 weeks)
start-simulation(104 weeks)
wait-simulation
set-file-reporting(level 2 output,true,
   Level 2 Output Report 1.csv)
save-report(role-output)
```

Determining Optimal Replenishment Levels

Suppose you want to determine the optimal value for the Safety Stock parameter for the delivery product of a Distributor role. At the same time, you want to ensure that the **Supplier On-Time Performance** metric of the downstream Consumer role never falls below 100%.

You could create a Batch Simulation object that runs a number of simulations, using different values for Safety Stock, as this script shows:

```
select-scenario(scenario-1)
set-safety-stock-level(site a,product,1800,0)
set-safety-stock-level(site b,product,4000,0)
set-safety-stock-level(site c,product,1200,0)
set-safety-stock-level(central distributor,
   product,7000,0)
start-simulation(45 weeks)
wait-simulation
set-file-reporting(level 2 output,true,
   Level 2 Output Report 1.csv)
save-report(level 2 output)
set-safety-stock-level(site a,product,2000,0)
set-safety-stock-level(site b,product,5000,0)
set-safety-stock-level(site c,product,1400,0)
set-safety-stock-level(central distributor,
   product,8300,0)
start-simulation(45 weeks)
wait-simulation
set-file-reporting(level 2 output,true,
   Level 2 Output Report 2.csv)
save-report(level 2 output)
set-safety-stock-level(site a,product,2250,0)
set-safety-stock-level(site b,product,6000,0)
set-safety-stock-level(site c,product,1500,0)
set-safety-stock-level(central distributor,
   product,9750,0)
start-simulation(45 weeks)
wait-simulation
set-file-reporting(level 2 output,true,
   Level 2 Output Report 3.csv)
save-report(level 2 output)
```

Simulation Keywords

You use the Batch Simulation object to run a simulation for one or more scenarios and for a specified duration for each. To run multiple simulations, you must wait until the first simulation is finished running before starting another.

SELECT-SCENARIO(<scenario-label>)

Determines the scenario to use for all operations in the simulation, until a new scenario is selected. You must configure the Label parameter of the scenario to be a unique name.

Example:

```
SELECT-SCENARIO(Scenario 1)
```

START-SIMULATION(<duration>)

Starts the simulation and determines the duration of the simulation.

Note Always set parameter values *before* you start the simulation, even if you schedule the parameter values to be set during the simulation.

Example:

```
START-SIMULATION(52 weeks)
```

WAIT-SIMULATION

Waits until the scenario is finished running. Use this keyword to run multiple simulations for the same model, using different parameter values. This keyword has no arguments.

CREATE-NEW-SEED(<truth-value>)

Whether to create a new value for the simulation.

SET-NEW-SEED(<seed>)

Sets a new seed value for the simulation.

Report Keywords

The following keywords control various reporting functions that can occur during the simulation. All keywords specify the *<report-title>* argument to identify the report object. When you save a report, it writes the report data to an Excel report, CSV file, or database, depending on how the report is configured.

SET-FILE-REPORTING*(<report-title>,<excel-report-enabled>, <excel-report-filename>)*

Enables the creation of CSV files for reports and specifies the *.csv* file name to create, as if you had clicked the Excel Report Enabled option and specified the file name in the report dialog. This keyword sets the file name to save when you use the *SAVE-REPORT* keyword. Typically, you save report data to separate CSV files; otherwise, saving report data overwrites the file data.

Example:

```
SET-FILE-REPORTING(role output report,true,
   role summary report.csv)
```

UPDATE-REPORT*(<report-title>, <time>)*

Updates a report at the specified simulation time interval, as if you had manually updated the report while the simulation was running.

Example:

```
UPDATE-REPORT(role output report, 1 hour)
```

SAVE-REPORT*(<report-title>)*

Saves report data to the *.csv* file associated with the report that you set by using the *SET-FILE-REPORTING* keyword. To save reports to different filenames, use the *SET-FILE-REPORTING* keyword each time you use *SAVE-REPORT*.

If an Excel client is currently connected or if a report view is currently visible in the client, this keyword updates the report in Excel or the client.

If the report object is configured to output data to a database, this keyword saves the report data to the specified database. The database table includes columns for the Model_Version and Simulation_Version to uniquely identify data for each simulation run of each model.

Example:

```
SAVE-REPORT(role output report)
```

LOAD-REPORT*(<report-title>)*

Loads the *.csv* file associated with an input report, as if you had clicked the Import Data from File button in the report dialog.

Example:

```
LOAD-REPORT(role input report)
```

LOAD-REPORT-FROM-DATABASE *(<report-title>)*

Loads the data from the database associated with an input report, as if you had clicked the Import Data from Table button.

Example:

```
LOAD-REPORT-FROM-DATABASE(role input report)
```

Scenario and Model Parameter Keywords

These keywords set parameter values for Scenario and Model tools. The name of the keyword corresponds to the resource parameter to set.

You specify *<label>*, the *<new-value>* for the parameter and the *<time>*.

For example, the following keyword sets the Scenario Version parameter to 2 for the Scenario tool named my-scenario at the start of the simulation:

```
SET-SCENARIO-VERSION
   (my-scenario,2,0)
```

SET-SCENARIO-VERSION*(<scenario-label>,*
<new-value>, <time>)

SET-MODEL-VERSION*(<model-label>, <new-value>, <time>)*

Role Parameter Keywords

These keywords set parameters for roles. The name of the keyword corresponds with the role parameter to set.

You specify the *<role-label>*, a *<new-value>* for the parameter, and the *<time>*.

For example, the following keyword sets the Financial Period of the Computer Manufacturer role to be 90 days at the start of the simulation:

```
SET-FINANCIAL-PERIOD(computer manufacturer,90 days,0)
```

SET-STATISTICAL-METRICS-PERIOD(<*role-label*>,
<*new-value*>,<*time*>)

SET-FINANCIAL-PERIOD(<*role-label*>,
<*new-value*>,<*time*>)

SET-FINANCIAL-PAYMENT-TERMS(<*role-label*>,
<*new-value*>,<*time*>)

SET-SOURCE-PRODUCTS(<*role-label*>,
<*comma-separated list of source products*>,<*time*>)

SET-DELIVERY-PRODUCTS(<*role-label*>,
<*comma-separated list of delivery products*>,<*time*>)

SET-LOG-ORDERS(<*role-label*>,
<*new-value*>,<*time*>)

SET-LOG-PURCHASES(<*role-label*>,
<*new-value*>,<*time*>)

SET-LOG-PRODUCTS(<*role-label*>,
<*new-value*>,<*time*>)

SET-LOG-FINANCIALS(<*role-label*>,
<*new-value*>,<*time*>)

SET-ALLOW-TRANSACTION-LOGGING(<*role-label*>,
<*new-value*>,<*time*>)

SET-LOGGING-REPORT-NAME(<*role-label*>,
<*new-value*>,<*time*>)

Cost Category Parameter Keywords

These keywords set values for Level 2 category cost parameters for the Source, Make, and Deliver categories. The name of the keyword corresponds to the Level 2 category parameter to set.

You specify the <*role-label*> of the role on whose detail the category exists, the <*level-2-label*>, a <*new-value*> for the parameter, and the <*time*> at which the parameter should be set.

For example, the following keyword sets the Product Acquisition cost parameter of the S1: Source Stocked Products category on the Computer Manufacturer role detail at the start of the simulation:

SET-RECEIVING-COST(computer manufacturer,
s1: source stocked product,10,0)

The general category parameter keywords are organized as follows:

Source Category Keywords

SET-RECEIVING-COST(<role-label>,
<level-2-label>,<new-value>,<time>)

SET-VERIFICATION-COST(<role-label>,
<level-2-label>,<new-value>,<time>)

SET-TRANSFER-COST(<role-label>,
<level-2-label>,<new-value>,<time>)

SET-CREATE-CUSTOMER-ORDER-COST(<role-label>,
<level-2-label>,<new-value>,<time>)

SET-CREATE-INVOICE-COST(<role-label>,
<level-2-label>,<new-value>,<time>)

Make Category Keywords

SET-PRODUCTION-MATERIAL-HANDLING-COST(<role-label>,
<level-2-label>,<new-value>,<time>)

SET-ECO-COST(<role-label>,<level-2-label>,
<order-number>,<new-value>,<time>)

Deliver Category Keywords

SET-ORDER-ENTRY-COST(<role-label>,
<level-2-label>,<new-value>,<time>)

SET-ORDER-FULFILLMENT-COST(<role-label>,
<level-2-label>,<new-value>,<time>)

SET-PICK-COST(<role-label>,
<level-2-label>,<new-value>,<time>)

SET-PACKING-COST(<role-label>,
<level-2-label>,<new-value>,<time>)

SET-TRANSPORTATION-COST(<role-label>,
<level-2-label>,<new-value>,<time>)

SET-CUSTOMER-INVOICING-COST(<role-label>,
<level-2-label>,<new-value>,<time>)

SET-CUSTOMER-COLLECTIONS-COST(<role-label>,
<level-2-label>,<new-value>,<time>)

Plan Category Keywords

These keywords set values for Plan category parameters. The name of the keyword corresponds to the Plan category parameter to set.

You specify the <role-label> of the role on whose detail the category exists, the <level-2-label>, a <new-value> for the parameter, and the <time> at which the parameter should be set.

SET-PLANNING-PERIOD(<role-label>,
<level-2-label>,<new-value>,<time>)

SET-INITIAL-PLAN-DELAY(<role-label>,
<level-2-label>,<new-value>,<time>)

SET-CONTINUOUS-PLANNING(<role-label>,
<level-2-label>,<new-value>,<time>)

SET-COMPENSATE-FOR-YIELD(<role-label>,
<level-2-label>,<new-value>,<time>)

Timing Category Parameter Keywords

These keywords set values for Level 2 category timing parameters. You specify the <role-label> of the role on whose detail the category exists, the <level-2-label>, the <mode-type>, <mode-type-args>, and the <time>. The <mode-type> and <mode-type-args> is one of:

FIXED <mean>

EXPONENTIAL,<mean>

NORMAL,<mean>,<standard-deviation>

UNIFORM,<min>,<max>

TRIANGULAR,<min>,<mode>,<max>

BETA <min>,<max>,<alpha>,<beta>

ERLANG,<mean>

WEIBULL,<shape>,<scale>

LOGNORMAL,<mean>,<standard-deviation>

GAMMA,<alpha>,<beta>

For example, the following keyword sets the **Receiving Duration** parameter of the S1: Source Stocked Products category on the Computer Manufacturer role detail to a Triangular distribution, with a Min, Max, and Mode value of *1 hour*, *2 hours*, and *3 hours*, respectively, at the start of the simulation:

```
SET-RECEIVING-DURATION(computer manufacturer,
   s1: source stocked product,TRIANGULAR,1 hour,2 hours,
   3 hours,0)
```

The timing category parameter keywords are organized as follows:

- Source category keywords
- Make category keywords
- Deliver category keywords

Source Category Keywords

SET-RECEIVING-DURATION*(<role-label>,*
<level-2-label>,<mode-type>,<mode-type-args>,<time>)

SET-VERIFICATION-DURATION*(<role-label>,*
<level-2-label>,<mode-type>,<mode-type-args>,<time>)

SET-TRANSFER-DURATION*(<role-label>,*
<level-2-label>,<mode-type>,<mode-type-args>,<time>)

Make Category Keywords

SET-ORDER-RELEASE-TO-MANUFACTURING-DURATION*(<role-label>,*
<level-2-label>,<mode-type>,<mode-type-args>,<time>)

SET-PRODUCTION-MATERIAL-DURATION*(<role-label>,*
<level-2-label>,<mode-type>,<mode-type-args>,<time>)

SET-MANUFACTURING-DURATION*(<role-label>,<level-2-label>,*
<mode-type>,<mode-type-args>,<time>)

SET-MOVE-TO-DELIVERY-DURATION*(<role-label>,*
<level-2-label>,<mode-type>,<mode-type-args>,<time>)

SET-ENGINEERING-DURATION*(<role-label>,*
<level-2-label>,<mode-type>,<mode-type-args>,<time>)

Deliver Category Keywords

SET-ORDER-ENTRY-DURATION(<role-label>,
<level-2-label>,<mode-type>,<mode-type-args>,<time>)

SET-PICK-DURATION(<role-label>,
<level-2-label>,<mode-type>,<mode-type-args>,<time>)

SET-PACKING-DURATION(<role-label>,
<level-2-label>,<mode-type>,<mode-type-args>,<time>)

SET-TRANSPORTATION-DURATION(<role-label>,
<level-2-label>,<mode-type>,<mode-type-args>,<time>)

Sort-Order Category Parameter Keywords

This keyword sets values for Make and Deliver category parameters that determine sort order for selecting build orders and replenishment orders for Manufacturing and Distributor roles, respectively.

You specify the <role-label> of the role, the <level-2-label>, the <order-number> of the attribute to set, which is an integer between 1 and 4, the <new-value> for the parameter, and the <time>.

For example, the following keyword sets the first Build Selection criteria parameter of the M1: Make Stocked Product category of the Computer Manufacturer role to Total Cost at the start of the simulation:

```
SET-SORT-ORDER-CRITERIA
   (computer manufacturer,m1: make stocked product,1,
   total-cost,0)
```

SET-SORT-ORDER-DIRECTION(<role-label>,
<level-2-label>,<order-number>,<new-value>,<time>)

SET-ORDER-SORT-CRITERIA(<role-label>,
<level-2-label>,<order-number>,<new-value>,<time>)

SET-ORDER-CUTOFF(<role-label>,
<level-2-label>,<order-number>,<new-value>,<time>)

SET-ORDER-CUTOFF-VALUE(<role-label>,
<level-2-label>,<order-number>,<new-value>,<time>)

SET-ORDER-CUTOFF-DURATION(<role-label>,
<level-2-label>,<order-number>,<new-value>,<time>)

Product Composite Parameter Keywords

These keywords set parameter values for product composites. The name of the keyword corresponds to the product composite parameter to set.

For many keywords, you specify the *<role-label>* of the role in whose Products pool the product composite exists, the *<product-name>*, the *<new-value>* for the parameter, and the *<time>*.

For example, the following keyword sets the Product Preference parameter of the Computer delivery product for the Computer Manufacturer role to 1 at the start of the simulation:

```
SET-PRODUCT-PREFERENCE
   (computer manufacturer,computer,1,0)
```

The product composite category parameter keywords are organized as follows:

General Tab Keywords

SET-ORDER-TYPE(*<role-label>*,
<product-name>,*<new-value>*,*<time>*)

<new-order-type-value> is one of: *stock*, *mto*, or *eto*

SET-PRODUCT-PREFERENCE(*<role-label>*,
<product-name>,*<new-value>*,*<time>*)

SET-SUPPLIER-PREFERENCE(*<role-label>*,
<product-name>,*<new-value>*,*<time>*)

SET-CUSTOMER-PREFERENCE(*<role-label>*,
<product-name>,*<new-value>*,*<time>*)

Demand Tab Keywords

SET-DEMAND-START-TIME(<consumer-role-label>,
<product-name>,<new-value>,<time>)

SET-DEMAND-STOP-TIME(<consumer-role-label>,
<product-name>,<new-value>,<time>)

SET-ORDER-SIZE(<consumer-role-label>,<product-name>,
<mode-type>,<mode-type-args>,<time>)

SET-ORDER-PERIOD(<consumer-role-label>,<product-name>,
<mode-type>,<mode-type-args>,<time>)

SET-USE-DEMAND-INPUT-REPORT(<consumer-role-label>,
<product-name>,<new-value>,<time>)

SET-DEMAND-INPUT-REPORT-NAME(<consumer-role-label>,
<product-name>,<new-value>,<time>)

Sourcing Tab Keywords

SET-PURCHASE-COST(<base-mfg-role-label>,
<product-name>,<new-value>,<time>)

Supplier Tab Keywords

SET-DESIRED-TURNAROUND(<role-label>,
<product-name>,<new-value>,<time>)

SET-FULFILLMENT-PREFERENCE(<role-label>,
<product-name>,<new-value>,<time>)

SET-FULFILLMENT-USING-ALTERNATE-PRODUCTS(<role-label>,
<product-name>,<new-value>,<time>)

SET-PUSH-STOCK-PRODUCT(<role-label>
<product-name>,<new-value>,<time>)

SET-CONTRACT-START-TIME(<role-label>,
<product-name>,<new-value>,<time>)

SET-CONTRACT-LENGTH(<role-label>,
<product-name>,new-value>,<time>)

SET-CONTRACT-RESPONSE-TIME(<role-label>,
<product-name>,<new-value>,<time>)

SET-FORECAST-ESTIMATED-AMOUNT(<role-label>,
<product-name>,<new-value>,<time>)

SET-CONTRACT-REPETITION-COUNT(<*role-label*>,
<*product-name*>,<*new-value*>,<*time*>)

Supplier Selection Tab Keywords

SET-MAXIMUM-NUMBER-OF-SUPPLIERS(<*role-label*>,
<*product-name*>,<*new-value*>,<*time*>)

SET-SPLIT-ORDER-BETWEEN-SUPPLIERS(<*role-label*>,
<*product-name*>,<*new-value*>,<*time*>)

SET-SUPPLIER-SELECTION-CRITERIA(<*role-label*>,
<*product-name*>,<*criteria-number*>,<*new-value*>,<*time*>)

This keyword sets values for product composite parameters that determine sort order for selecting suppliers: Supplier Selection Criteria 1, Supplier Selection Criteria 2, etc., where <*criteria-number*> is an integer between 1 and 4, corresponding to the criteria number, and <*new-value*> is the attribute to use for the sort criteria.

SET-SELECTED-SUPPLIERS-PROPORTIONS(<*role-label*>,
<*product-name*>,<*comma-separated-list of supplier proportions*>,
<*time*>)

SET-POTENTIAL-SUPPLIERS(<*role-label*>,
<*product-name*>,<*comma-separated-list of potential suppliers*>
,<*time*>)

Multipliers Tab Keywords

SET-RECEIVING-DURATION-MULTIPLIER(<*role-label*>,
<*product-name*>,<*new-value*>,<*time*>)

SET-VERIFICATION-DURATION-MULTIPLIER(<*role-label*>,
<*product-name*>,<*new-value*>,<*time*>)

SET-TRANSFER-DURATION-MULTIPLIER(<*role-label*>,
<*product-name*>,<*new-value*>,<*time*>)

SET-ENGINEERING-DURATION-MULTIPLIER(<*role-label*>,
<*product-name*>,<*new-value*>,<*time*>)

SET-ORDER-RELEASE-TO-MANUFACTURING-DURATION-MULTIPLIER
(<*role-label*>,<*product-name*>,<*new-value*>,<*time*>)

SET-PRODUCTION-MATERIAL-DURATION-MULTIPLIER(<*role-label*>,
<*product-name*>,<*new-value*>,<*time*>)

SET-MANUFACTURING-DURATION-MULTIPLIER(<*role-label*>,
<*product-name*>,<*new-value*>,<*time*>)

SET-MOVE-TO-DELIVERY-DURATION-MULTIPLIER(<role-label>,
<product-name>,<new-value>,<time>)

SET-ORDER-ENTRY-DURATION-MULTIPLIER(<role-label>,
<product-name>,<new-value>,<time>)

SET-PICK-DURATION-MULTIPLIER(<role-label>,
<product-name>,<new-value>,<time>)

SET-PACKING-DURATION-MULTIPLIER(<role-label>,
<product-name>,<new-value>,<time>)

SET-TRANSPORTATION-DURATION-MULTIPLIER(<role-label>,
<product-name>,<new-value>,<time>)

Delivery Tab Keywords

SET-PUBLISHED-DELIVERY-LEAD-TIME(<role-label>,
<product-name>,<new-value>,<time>)

SET-NET-SELLING-PRICE(<role-label>,
<product-name>,<new-value>,<time>)

Inventory Tab Keywords

SET-STARTING-INVENTORY-LEVEL(<role-label>,
<product-name>,<new-value>,<time>)

SET-MAXIMUM-INVENTORY-LEVEL(<role-label>,
<product-name>,<new-value>,<time>)

SET-INVENTORY-CONTROL-STRATEGY(<role-label>,
<product-name>,<new-value>,<time>)

SET-SAFETY-STOCK-LEVEL(<role-label>,
<product-name>,<new-value>,<time>)

SET-MINIMUM-REORDER-QUANTITY(<role-label>,
<product-name>,<new-value>,<time>)

Manufacturing Tab Keywords

SET-YIELD(<role-label>,
<product-name>,<new-value>,<time>)

SET-MINIMUM-BATCH-SIZE(<role-label>,
<product-name>,<new-value>,<time>)

SET-MAXIMUM-BATCH-SIZE(<*role-label*>,
<*product-name*>,<*new-value*>,<*time*>)

SET-BUILD-TIME-DEPENDENT-ON-ORDER-SIZE(<*role-label*>,
<*product-name*>,<*new-value*>,<*time*>)

Resource Parameter Keywords

These keywords set parameter values for resources. The name of the keyword corresponds to the resource parameter to set.

You specify the <*role-label*> of the role, the <*plant-label*>, the <*new-value*> for the parameter, and the <*time*>.

For example, the following keyword sets the Resource Capacity parameter of the Headquarters plant for the Computer Manufacturer role to 10 at the start of the simulation:

```
SET-RESOURCE-CAPACITY
   (headquarters,10,0)
```

SET-RESOURCE-CAPACITY(<<*plant-label*>, <*new-value*>, <*time*>)

SET-RESOURCE-EFFICIENCY(<*role-label*>, <*plant-label*>,
<*new-value*>, <*time*>)

Part III

Building e-SCOR Models

Chapter 13: Modeling a Distribution Process

Describes how to build a model that includes a Distributor role, which can deliver its source products, assemble components into kits, and outsource finished products.

Chapter 14: Modeling a Manufacturing Process

Describes how to build a model that provides "value-added" to the process by including a Manufacturer role, which manufactures finished products from components.

Chapter 15: Using Stock Planning Strategies

Describes the two planning strategies available for sourcing and delivering stock products: replenishment, forecast, Q, and R-Q.

Chapter 16: Using Alternative Planning Strategies

Describes how to configure a role to source, make, and/or deliver stock, make-to-order, and/or engineer-to-order products.

Chapter 17: Modeling a Process with Multiple Suppliers

Describes how to build a model that sources identical products from multiple suppliers, using contracts.

Chapter 18: Configuring Role Details for Multiple Products

Describes how to configure the detail of supplier and buyer roles to source, make, and/or deliver multiple products.

Chapter 19: Using Pull and Push Planning Modes

Describes how to use pull and push planning modes to determine when to source, make, and deliver products, and how much to source, make, and deliver.

13

Modeling a Distribution Process

Describes how to build a model that includes a Distributor role, which can deliver its source products, assemble components into kits, and outsource finished products.

Introduction

You configure a Distributor role to deliver its source products, assemble components into kits, or outsource finished products.

A Distributor role uses source planning to determine when the role orders its source products and, implicitly, when it delivers its delivery products.

To model a distribution process, you:

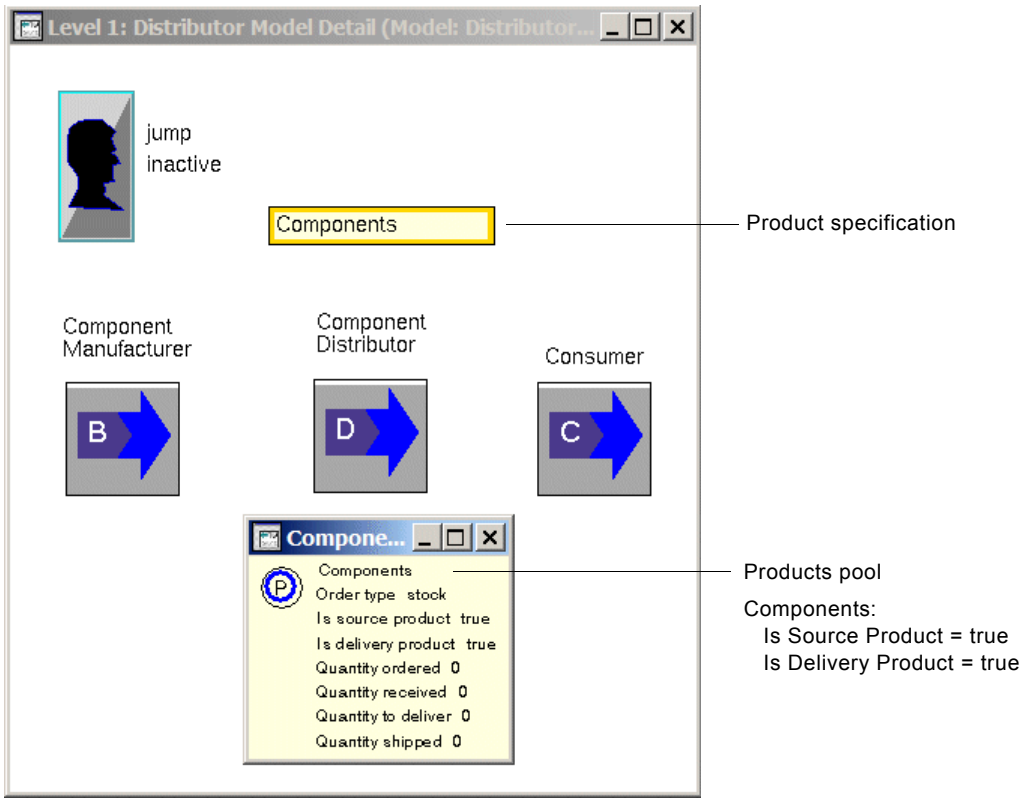
- Configure the Distributor role to use one of these techniques:
  - Deliver its source products, which are either components or finished products.
  - Assemble components into kits by sourcing components and delivering finished products.
  - Outsource finished products from a secondary supplier by sourcing and delivering both components and finished products.
- Configure Level 2 parameters for a Distributor role.
- Configure order selection parameters for the Deliver category to choose which orders to deliver first.
- Understand what happens when the simulation runs for a Distributor role.
- Analyze the performance of the distribution process by viewing metrics.

Configuring a Distributor to Deliver its Source Products

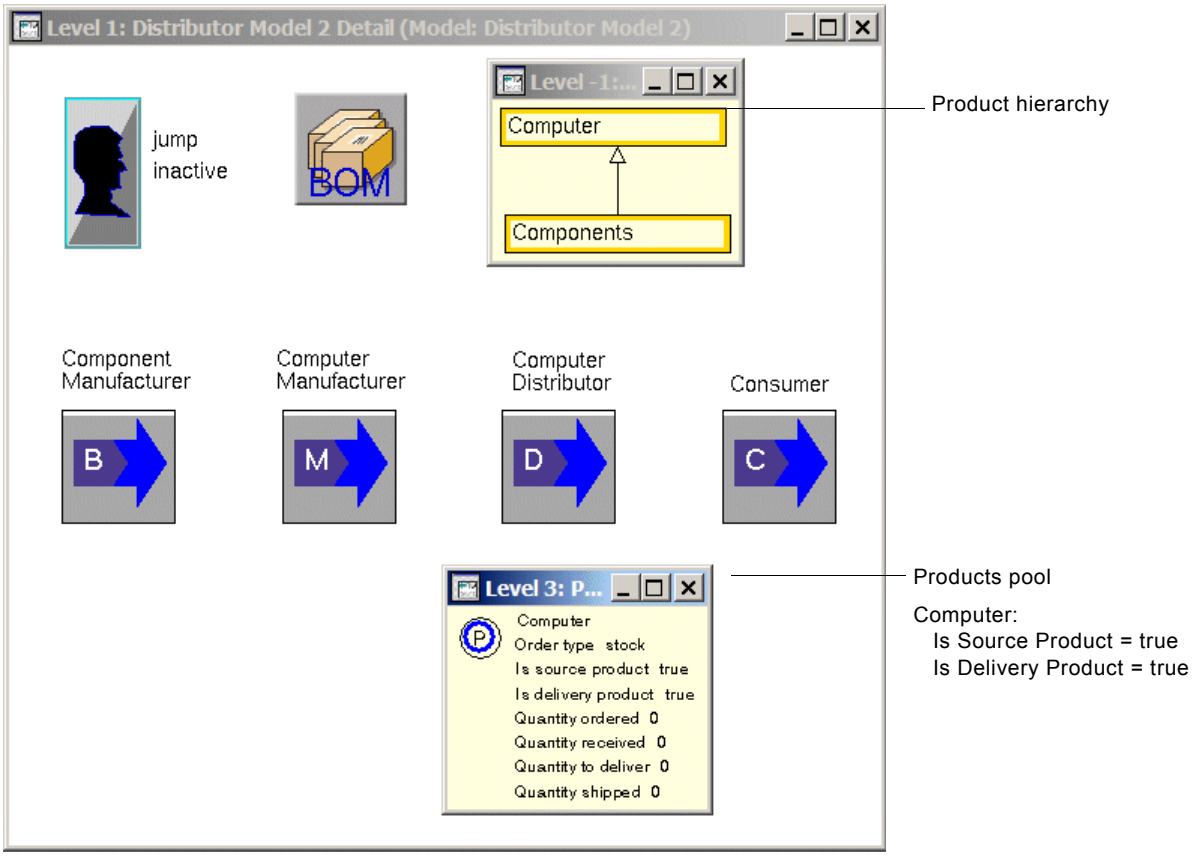
Your supply chain might have a Distributor role that delivers the products it receives from its upstream suppliers. These products can be components or finished products.

To configure a Distributor role to deliver its source products, you assign the same product specification as both the source product and the delivery product of the role. e-SCOR creates a single product composite in the Products pool for the product specification you assign, which is both a source product and a delivery product.

The following figure shows a model in which the Distributor role sources and delivers components. When you assign the components to the Distributor role, e-SCOR creates a single product composite, which is both a source product and a delivery product.



The next figure shows a model in which the Distributor role sources and delivers finished products. The Distributor role sources computers from the Manufacturer role, which manufactures them from components. When you assign the finished product to the Distributor role, e-SCOR creates a product composite for the finished product, which, again, is both a source product and a delivery product.



To configure a Distributor role to deliver its source products:

➔ Assign to a Distributor role components or finished products as both the Source Product and Delivery Product of the role.

For details, see Configuring the Products a Role Sources and Delivers.

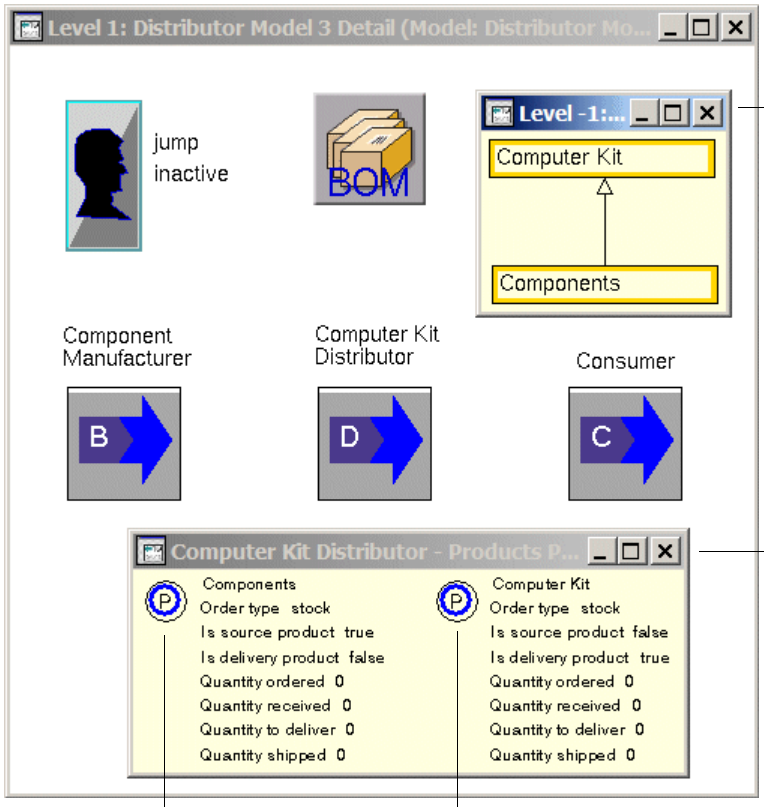
Configuring a Distributor to Assemble Components into Kits

Your supply chain might have a Distributor role that sources components, assembles those components into kits, and delivers the kits to a downstream buyer. To configure a Distributor role to assemble components into kits, you:

- Assign the components as the source product and the kits as the delivery product of the role.
- Configure the delivery product to be a kit.

This configuration is similar to that of a Manufacturer role that sources component, and makes and delivers finished products. However, the difference is that assembling components into a kit simply adds to the simulation clock the amount of time it takes to assemble the components, whereas manufacturing finished products from components adds both time and value to the process.

The following figure shows a model in which the Distributor role assembles components into kits. The Distributor role sources components from the Base Manufacturer role and assembles those components into computer kits. You assign the components and computer kit as the source and delivery products of the role, respectively. e-SCOR creates a source product for the components and a delivery product for the computer kit.


Level 1: Distributor Model 3 Detail (Model: Distributor Mo...
jump
inactive
BOM
Level -1:...
Computer Kit
Components
Component Manufacturer
Computer Kit Distributor
Consumer
B
D
C
Computer Kit Distributor - Products P...
Components
Order type stock
Is source product true
Is delivery product false
Quantity ordered 0
Quantity received 0
Quantity to deliver 0
Quantity shipped 0
Computer Kit
Order type stock
Is source product false
Is delivery product true
Quantity ordered 0
Quantity received 0
Quantity to deliver 0
Quantity shipped 0
Product hierarchy
Products pool
Components:
Is Source Product = true
Is Delivery Product = false
Computer Kit:
Is Source Product = false
Is Delivery Product = true

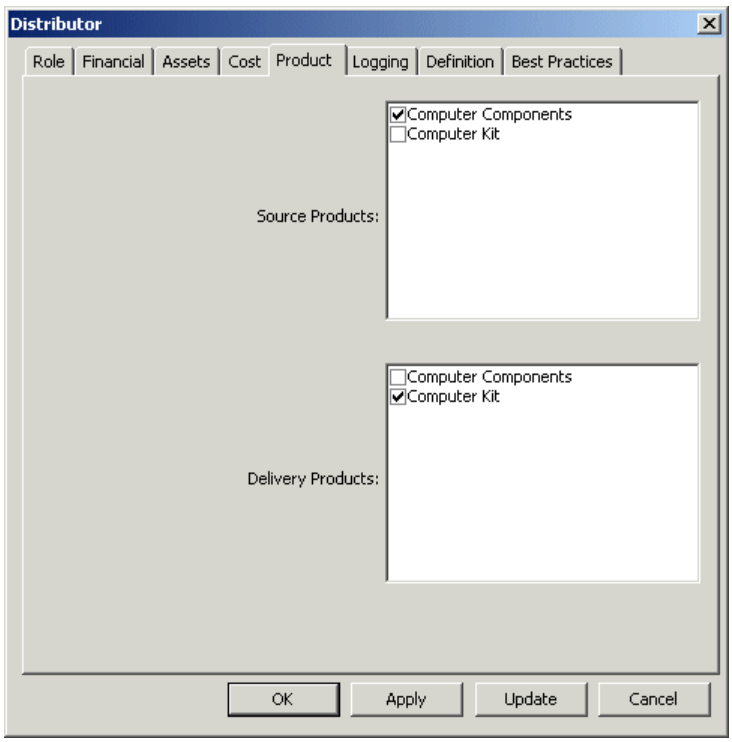
To configure a Distributor role to assemble components into kits:

1 Create a product hierarchy that contains a finished product with components.

For details, see Creating a Product Hierarchy with Components.

2 Assign to the Distributor role the components as the Source Product and the finished product kits as the Delivery Product.

In the example above, the Product tab of the Distributor role's dialog would look like this:

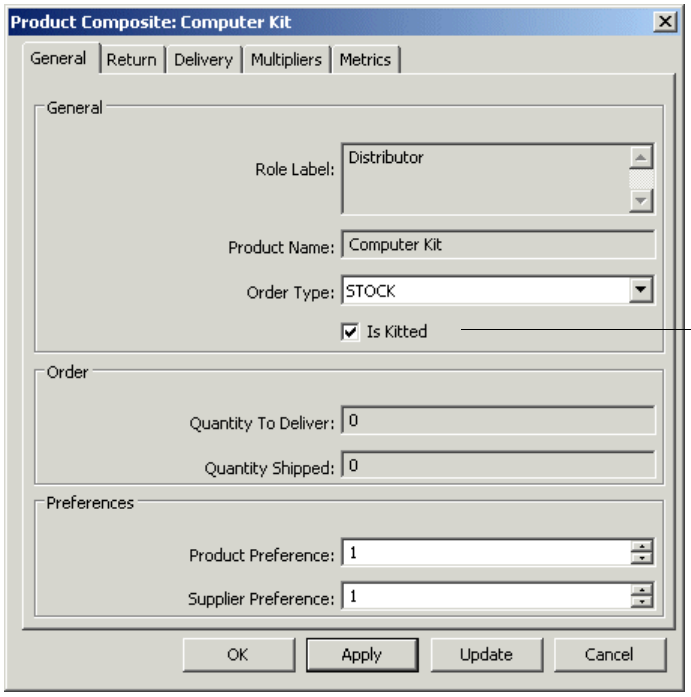


For details, see Configuring the Products a Role Sources and Delivers.

3 On the General tab of the properties dialog for the delivery product that is a kit, enable the Is Kitted option.

For information on configuring delivery products, see Configuring Parameters for Delivery Products.

Here is the properties dialog for the Computer Kit delivery product of the Distributor role:



Indicates the delivery product is assembled into a kit from components.

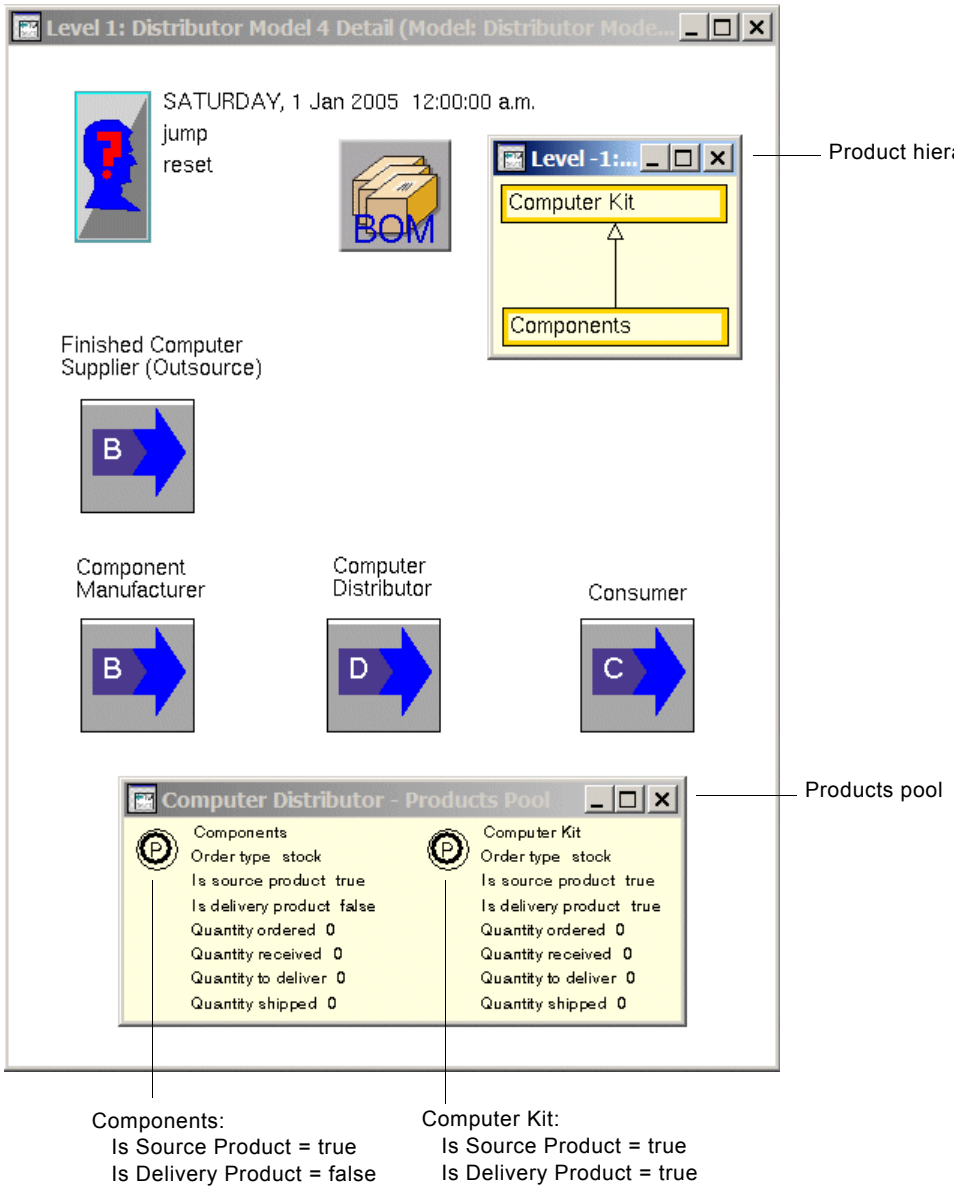
Configuring a Distributor Role to Outsource Finished Products

You might have a supply chain in which a Distributor role assembles components into kits, while at the same time outsources those same kits as finished products from a secondary supplier. You use this technique to address component shortages when assembling components into kits. You can specify whether the Distributor role prefers to deliver the kits that it assembles from components or the complete finished products that it outsources from a secondary supplier.

The following figure shows a model in which the Distributor role both assembles components into kits and outsources finished products. The Distributor role sources components from the Component Manufacturer role and assembles those components into computer kits. It also sources finished computers from the Finished Computer Supplier role by outsourcing.

You assign both the components and the computer kits as the source products of the role and the computer kit as the delivery product. e-SCOR creates two

product composites, one for the components, which is both a source and delivery product, and one for the computer kit, which is a delivery product.



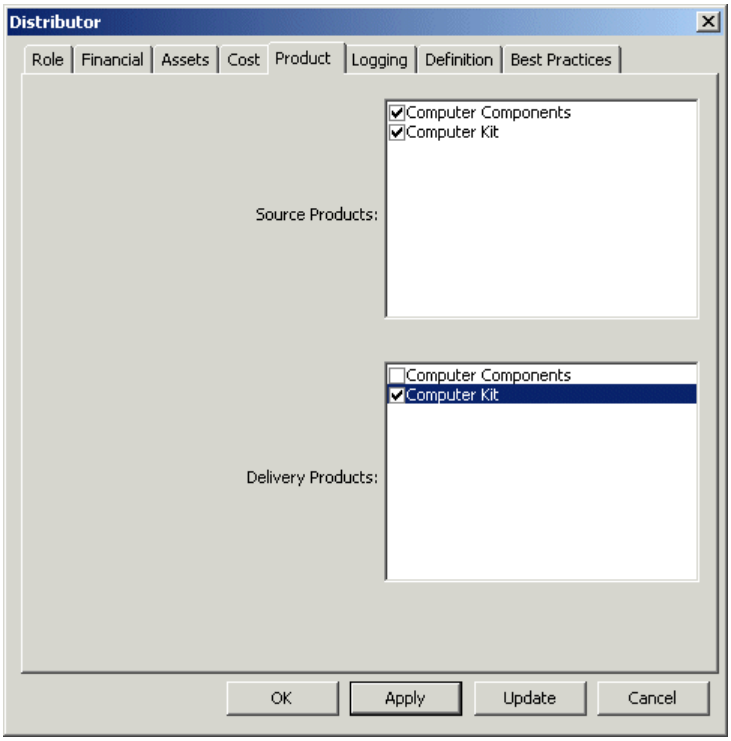
To configure a Distributor role to outsource finished products:

1 Create a product hierarchy that contains a finished product with components.

For details, see Creating a Product Hierarchy with Components.

2 Assign to the Distributor role the components as a Source Product, and the finished products as both a Source Product and a Delivery Product.

In the example above, the Product tab of the Distributor dialog would look like this:



For details, see Configuring the Products a Role Sources and Delivers.

3 On the General tab of the properties dialog for the delivery product that is a kit, enable the Is Kitted option.

Configuring Level 2 Parameters for a Distributor Role

To configure the Level 2 parameters of a Distributor role, it is helpful to think about the distribution process in terms of the upstream source and the downstream delivery subprocesses. Each of these subprocesses has parameters you can configure.

The following list of configurable parameters assumes a stock/replenishment planning strategy, a single delivery product, a single supplier for each source product, and a pull planning mode. See the referenced sections at the end of this section for information about additional parameters you must configure for each of these alternative modeling techniques.

- Upstream source subprocess

  Source category:

  - Receiving Duration
  - Verification Duration
  - Transfer Duration
  - Receiving, Verification, Transfer, Create Customer Order, and Invoice costs

  P2: Plan Source category:

  - Planning Period
  - Initial Plan Delay
  - Continuous Planning

  Source products:

  - Order Type
  - Customer Preference
  - Starting Product Inventory Level
  - Maximum Inventory Level
  - Inventory Control Strategy
  - Safety Stock
  - Minimum Reorder Quantity
  - Desired Turnaround
  - Fulfillment Preference
  - Fulfillment Using Alternate Products
  - Receiving Duration Multiplier, Verification Duration Multiplier, and Transfer Duration Multiplier

- Downstream delivery subprocess

  Deliver categories:

  - Order Entry Duration
  - Order Selection parameters
  - Pick Duration
  - Packing Duration

- Transportation Duration
- Order Entry, Order Fulfillment, Pick, Packing, Transportation, Customer Invoicing, and Customer Collections costs

Delivery products:

- Order Type
- Product Preference
- Starting Product Inventory Level
- Maximum Inventory Level
- Inventory Control Strategy
- Safety Stock
- Minimum Reorder Quantity
- Published Delivery Lead Time
- Net Selling Price
- Order Entry Duration Multiplier, Pick Duration Multiplier, and Packing Duration Multiplier

See Also

Configuring the Deliver Category.

Configuring Parameters for Delivery Products.

Configuring Parameters for Source Products.

Using Stock Planning Strategies.

Using Alternative Planning Strategies.

Configuring Role Details for Multiple Products.

Modeling a Process with Multiple Suppliers.

Using Pull and Push Planning Modes.

Configuring Order Selection Parameters

By default, a Distributor role chooses orders for delivery at random. You can control how a Distributor role sorts and selects orders for delivery, based on a set of order selection criteria. You do this to describe how your current distribution process works or to experiment with alternative techniques to enhance the performance of the delivery phase of your distribution process.

For example, if two product shipments are waiting to be delivered, you can configure the Deliver category to deliver the highest cost orders first, the oldest orders first (FIFO), orders that are within a certain size of the maximum or

minimum order first, or orders “just in time” to meet the buyer’s desired order fulfillment lead time.

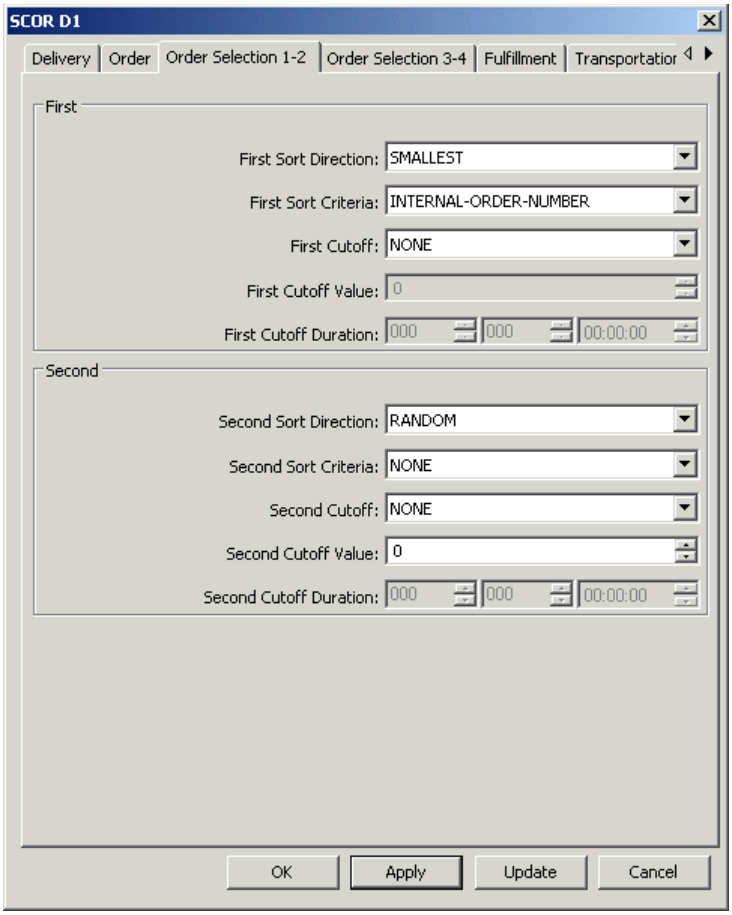
Note The Order Selection parameters are relevant for the D1: Deliver Stocked Product and D2: Deliver Make-to-Order Product categories only.

e-SCOR uses an exclusion strategy to identify the orders to fill. The Deliver category places all orders in the Orders pool into a list, then applies the first set of sort criteria to the orders in the list. If an order does not meet the sort criteria, the Deliver category removes the order from the list. If two orders have the same value for the set of sort criteria, the Deliver category applies the second set of criteria, and so on. You can configure the Deliver category to sort orders, based on up to four sets of sort criteria.

Each set of sort criteria specifies the direction of the sort (smallest or biggest) and the property of the order on which to sort. You can sort orders, based on numeric and time-based property values of an order. For example, to sort orders on a first-in, first-out (FIFO) basis, you would configure the sort direction to be smallest and the sort attribute to be the time at which the order was placed.

You can also configure the Deliver category to use a cutoff value, which lets you further restrict the orders that are candidates for delivery. For example, if you choose to deliver the biggest orders first, based on order size, small orders will accumulate in the Orders pool. To avoid this situation, you can configure a maximum delta acceptable cutoff to ensure that small orders also get delivered, but only after big orders.

The following figure shows the Order Selection tab of the properties dialog for a D1: Deliver Stocked Product category that sorts orders on a first-in first-out (FIFO) basis:



Chooses orders with the smallest Internal Order Number, which delivers orders on a FIFO basis.

To sort orders for delivery, configure the following order selection parameters for the Deliver category:

Parameter	Description
First Second Third Fourth Sort Direction	Determines whether to sort orders, based on the smallest or biggest value. You can also sort orders, based on a random value, which chooses an order at random, based on the specified Sort Criteria. The default value is random. For examples, see Sorting Orders with No Cutoff.
First Second Third Fourth Sort Criteria	Determines the value the Deliver category used to sort orders. The options include numeric and time-based properties of an order. The default value is none. The numeric options are: unit-price, total-cost, order-size, payment-terms, customer-order-number, internal-order-number, customer-preference, and product-preference. The time-based options are: order-placed-time, order-received-time, order-selected-time, and order-lead-time. For examples, see Sorting Orders with No Cutoff.

Parameter	Description
First Second Third Fourth Cutoff	Determines whether the Deliver category includes all orders in its sort (none) or whether it includes only those orders that meet an acceptable cutoff. If Sort Criteria is a numeric value, the options for Cutoff are: minimum-acceptable, maximum-acceptable, and maximum-delta-acceptable. If Sort Criteria is a time-based value, the options are: time-delta-acceptable and current-time-delta-acceptable. If Cutoff is maximum-delta-acceptable or time-delta-acceptable, Sort Direction must be smallest or biggest. If Cutoff is current-time-delta-acceptable, Sort Direction must be random and Sort Criteria must be order-lead-time. For examples, see Restricting the Orders to Sort Based on a Numeric Cutoff and Restricting the Orders to Sort Based on a Time Cutoff.
First Second Third Fourth Cutoff Value	When Cutoff is a value other than none and when Sort Criteria is a numeric value, specifies a value that determines whether an order is excluded from the sort. If the specified value of an order does not meet the cutoff criteria, the Deliver category does not fill the order. For examples, see Restricting the Orders to Sort Based on a Numeric Cutoff.
First Second Third Fourth Cutoff Duration	When Cutoff is a value other than none and Sort Criteria is a time-based value, specifies the value that determines whether an order is excluded from the sort. If the specified time of an order does not meet the cutoff criteria, the Deliver category does not fill the order. For examples, see Restricting the Orders to Sort Based on a Time Cutoff.

To configure order selection criteria:

1. Display the properties dialog for the Deliver category and click the Order Selection 1-2 tab to configure the first and second sort criteria.
2. Configure the parameters in the table above in the First group to configure the basic parameters that the Deliver category uses to sort orders.
3. Configure the parameters in the Second group to configure a second set of parameters, which the Deliver category applies after the first set of criteria.
4. Click the Order Selection 3-4 tab, and configure the parameters in the Third and Fourth group, as needed, to configure up to four sets of criteria, which the Deliver category applies after the first and second sets of criteria.

Sorting Orders with No Cutoff

The following table describes some of the most common strategies for sorting orders for delivery. These strategies sort all orders that a Deliver category receives; they do not use a cutoff.

To deliver...	Configure these parameters...
Orders based on when the model creates them, which is equivalent to using a FIFO delivery strategy	Sort Direction = smallest Sort Criteria = internal-order-number
The largest orders first	Sort Direction = biggest Sort Criteria = order-size
The most expensive orders first, where total-cost is the order size times the net selling price of the delivery product	Sort Direction = biggest Sort Criteria = total-cost
The highest priority products first, where the smaller the number the higher the priority	Sort Direction = smallest Sort Criteria = product-preference
Oldest orders first, based on when the buyer placed the order	Sort Direction = smallest Sort Criteria = order-placed-time
Orders based on the desired turnaround of the buyer's source product	Sort Direction = smallest Sort Criteria = order-lead-time

Restricting the Orders to Sort Based on a Numeric Cutoff

You can configure numeric cutoff values to restrict the orders that the Deliver category considers for delivery.

When you configure the Cutoff to be the maximum-acceptable or minimum-acceptable value, the Deliver category considers for delivery only those orders that meet the maximum or minimum value. For example, you might restrict orders to a minimum acceptable cost, so the supplier never delivers orders worth less than that minimum.

When you configure the Cutoff to be the maximum-acceptable-delta value, the Deliver category considers the Sort Direction, Sort Criteria, and Cutoff Value to determine which orders can be delivered. You configure the Cutoff Value as a fraction of the Sort Criteria property of the order. This fraction defines a range either above the biggest or below the smallest Sort Criteria value. If the value of the Sort Criteria property of an order falls within this range, the Deliver category attempts to fill the order from current inventory.

For example, suppose you have configured the order selection parameters as follows:

- Sort Direction = biggest
- Sort Criteria = order-size
- Cutoff = maximum-delta-acceptable
- Cutoff Value = 0.5

Now, suppose orders exist for 50, 30, and 10 units, and you have a current inventory of 35 units. The Deliver category tries to deliver the order for 50 units first, because it is the largest. However, because it cannot fill the order from current inventory, it calculates a maximum delta acceptable value of 25 (0.5 x 50). Because 30 lies in the range from 25 to 50 and the current inventory is sufficient to fill the order for 30 units, it delivers the 30 units. The current inventory is now 5. Now suppose the inventory goes up to 35. The Deliver category does not deliver the order for 10 units because it is too small (10 < (0.5 x 35)).

The following table describes two strategies for sorting orders, based on a numeric sort criteria, using a cutoff:

To deliver...	Configure these parameters...
The most expensive orders first, with a minimum acceptable cost of $100. If two orders have a value of more than $100, then deliver the most expensive order first. In this configuration, orders for less than $100 are never delivered.	First tab: Sort Direction = biggest Sort Criteria = total-cost Cutoff = minimum-acceptable Cutoff Value = 100
The largest orders first, based on current inventory. If the current inventory is not sufficient to fill the chosen order, then deliver orders that are at least 50% as big as the current order. In this configuration, all orders will be filled; however, smaller orders will be filled after larger orders.	First tab: Sort Direction = biggest Sort Criteria = order-size Cutoff = maximum-delta-acceptable Cutoff Value = .5

Restricting the Orders to Sort Based on a Time Cutoff

You can configure time-based cutoff values to restrict the orders that the Deliver category considers for delivery.

You can configure the cutoff to be a maximum acceptable time delta to determine which orders the Deliver category can fill. If the current order meets the sort criteria but cannot be filled from the current inventory, the Deliver category considers all other orders that meet the sort criteria and fall within the delta time. You can use this configuration to model a FIFO delivery strategy in which orders are considered for delivery if they fall within a given delta time relative to the order-placed time. The time-delta-acceptable cutoff behaves the same as the maximum-delta-acceptable cutoff.

You can also configure the cutoff to implement a just-in-time (JIT) deliver strategy. To do this, you configure the cutoff to be current-time-delta-acceptable, and you configure the Cutoff Duration to be the amount of time it takes to pick, pack, and ship an order. The Deliver category ships only those orders whose Order Fulfillment Lead Time is less than the current time plus the Cutoff Duration. The Order Fulfillment Lead Time contains a time in the future when the buyer expects to receive the order.

The following table describes two strategies for sorting orders, using a time-based sort criteria and a cutoff:

To deliver...	Configure these parameters...
Oldest orders first, based on when the buyer placed the order. The Deliver category considers equally all orders that meet the sort criteria that were placed within a day of the earliest order-placed time.	First tab: Sort Direction = smallest Sort Criteria = order-placed-time Cutoff = time-delta-acceptable Cutoff Duration = 1 day
Orders "just in time" to meet the buyer's desired turnaround, where the time it takes to pick, pack, and ship an order is 2 days. If two orders have the same order fulfillment lead time, then deliver the largest order first, based on current inventory. If the current inventory is not sufficient to fill the chosen order, then deliver orders that are within 25% of the largest order.	First tab: Sort Direction = random Sort Criteria = order-fulfillment-lead-time Cutoff = current-time-delta-acceptable Cutoff Duration = 2 days Second tab: Sort Direction = biggest Sort Criteria = order-size Cutoff = maximum-delta-acceptable Cutoff Value = .25

What Happens When the Simulation Runs

Similar to a Consumer role, a Distributor role orders source products from its upstream suppliers, and similar to a Base Manufacturer role, a Distributor role delivers product shipments to its downstream buyers. The similarities and differences are as follows. A Distributor role:

- Determines its available suppliers when the model initializes, just like a Consumer role.
- Can source components or finished products, depending on how you have configured the role, just like a Consumer role.
- Creates replenishment orders for its source products on a regular planning cycle, based on source planning. Compare this process with a Base Manufacturer role, which creates build orders for its delivery products, based on make planning, and a Consumer role, which orders source products on a regular cycle, based on parameters that you configure in the source products.

- Can deliver components or finished products, depending on how you configure the role, just like a Base Manufacturer role. However, a Distributor role can also assemble components into kits and deliver those kits, which a Base Manufacturer cannot do.
- Computes financial metrics on a regular cycle, just like a Base Manufacturer and Consumer role. A Distributor role computes both incoming and outgoing financial metrics, just like a Base Manufacturer role, whereas a Consumer role computes outgoing financial metrics only.

Analyzing the Performance of a Distributor Role

To analyze the performance of a Distributor role, you view:

- Level 1 metrics for the Distributor role.
- Level 2 metrics for the upstream source and downstream deliver subprocesses.

Level 1 Metrics to Analyze

At the role level, you can analyze the:

- Financial metrics that the Distributor role computes, based on the Net Selling Price parameter of the upstream supplier's delivery product.
- Asset metrics that the role computes, based on inventory levels.
- Cost metrics that the role computes, based on costs associated with the various source and delivery management tasks.

For details about these metrics, see Viewing Metrics for Roles.

Level 2 Metrics to Analyze

To analyze the performance of a distribution process at Level 2, it is helpful to think about the process in terms of the upstream source and the downstream delivery subprocesses. Each of these subprocesses has metrics you can analyze.

See Also Viewing Metrics for Categories.

Viewing Metrics for Source and Delivery Products.

- Upstream source subprocess

  ES: Enable Source category:

  - Orders Sent and Change Orders Sent
  - Product Shipments Received
  - Contracts Established
  - Supplier On-Time Performance (%)

  Source category:

  - Orders Sent and Change Orders Sent
  - Product Shipments Received
  - Product Shipment Lead Time
  - Financial Obligations, Financial Payments within Financial Period, and Financial Payments Total
  - Receiving Metric, Verification Metric, Transfer Metric, Create Customer Order Metric, and Invoice Metric costs

  P2: Plan Source category:

  - Number of Planning Periods

  Source products:

  - Quantity Ordered and Quantity Received
  - Purchase Cost
  - Products on Order, Received Inventory Level, Incoming Inventory Level, and Inventory Level
  - Received Fulfillment Time

- Downstream delivery subprocess

  ED: Enable Deliver category:

  - Orders Received and Change Orders Received
  - Product Shipments Sent
  - Contracts Established
  - Delivery Performance (%)
  - Perfect Order Fulfillment (%)

  Deliver categories:

  - Orders Received and Change Orders Received
  - Product Shipments Sent

- Fill Rates (%)
- Ready to Ship Time
- Order Entry to Ship Time
- Financial Bookings, Financial Outstanding, Financial Collections within Financial Period, and Financial Collections Total
- Order Entry Metric, Order Fulfillment Metric, Pick Metric, Packing Metric, Transportation Metric, Customer Invoicing Metric, and Customer Collections Metric costs

Delivery products:

- Quantity to Deliver and Quantity Shipped
- Awaiting Orders, Products On Order, Received Inventory Level, Incoming Inventory Level, Inventory Level, In Transit Inventory Level, Shipped Inventory Level, and Manufacturing Batch Size
- Order Fulfillment Lead Time

14

Modeling a Manufacturing Process

Describes how to build a model that provides "value-added" to the process by including a Manufacturer role, which manufactures finished products from components.

Introduction

You configure a Manufacturer role to make and deliver finished products from components. Because a Manufacturer role sources components and converts them into finished products, this role represents a value-added step in the supply chain. Compare this process with a Distributor role, which simply delivers its source products or assembles components into kits, which does not represent a value-added step in the supply chain.

A Manufacturer role uses two planning processes:

- Source planning, which determines when the role orders its components.
- Make planning, which determines when the role creates build orders for manufacturing its finished products and implicitly determines when it delivers its finished products.

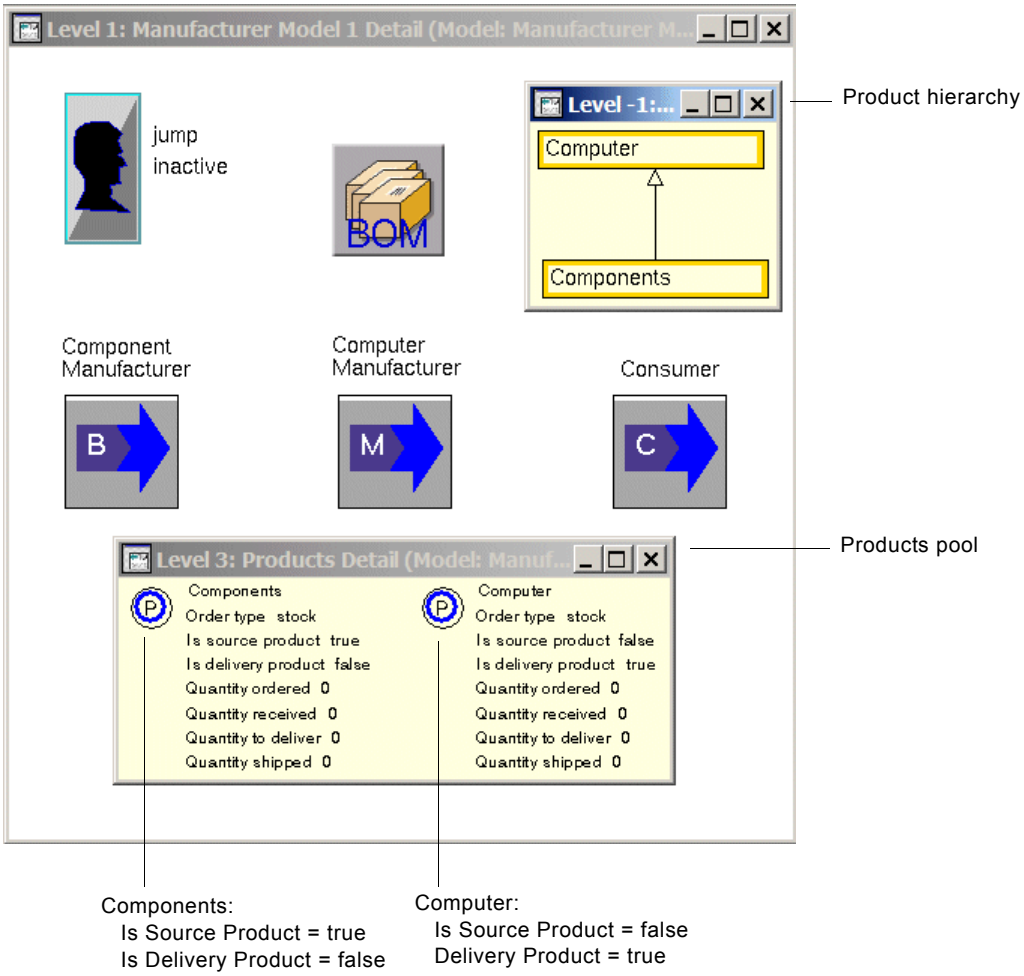
To model a manufacturing process, you:

- Configure the Manufacturer role.
- Configure Level 2 parameters for a Manufacturer role.
- Configure build selection parameters for the Make category to choose which build orders to manufacture first.
- Coordinate source and make planning for the Manufacturer role.
- Understand what happens when the model runs for a Manufacturer role.
- Analyze the performance of the manufacturing process by viewing metrics.

Configuring a Manufacturer Role

Your supply chain might include a manufacturing process, which sources components from upstream suppliers, and makes and delivers finished products. Unlike a Distributor role, which can source components or finished products, a Manufacturer role *must* source components and it *must* make and deliver finished products.

The following figure shows a model in which the Manufacturer role manufactures components into finished products. The Manufacturer role sources components from the Base Manufacturer role and manufactures finished computers. You assign the components as the source products and the finished product as the delivery product of the role.



To configure a Manufacturer role:

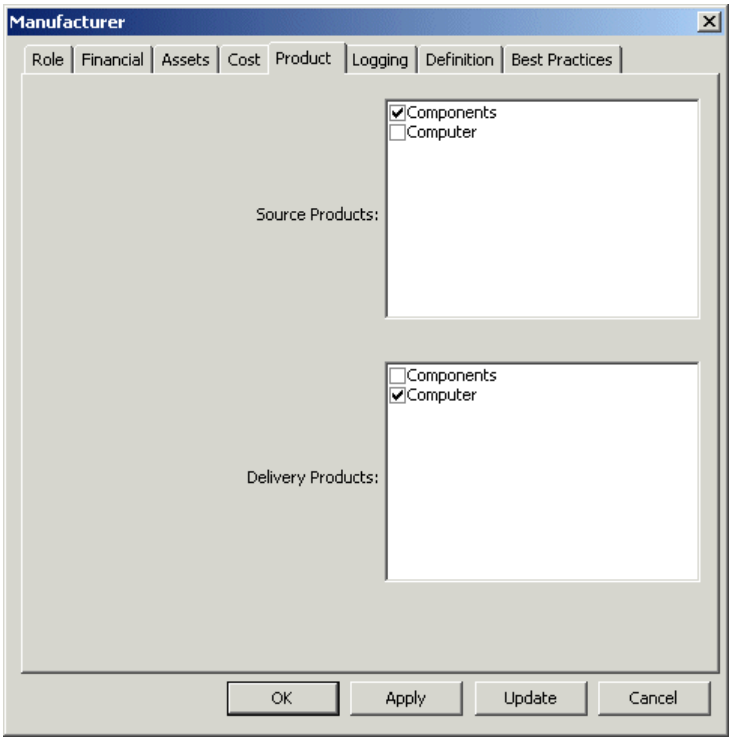
1 Create a product hierarchy that contains a finished product with components.

For details, see Creating a Product Hierarchy with Components.

2 Assign to the Manufacturer role the components as the Source Product and the finished products as the Delivery Product.

For details, see Configuring the Products a Role Sources and Delivers.

In the example above, the Product tab of the Manufacturer role's dialog would look like this:



Configuring Level 2 Parameters for a Manufacturer Role

To configure the Level 2 parameters of a Manufacturer role, it is helpful to think about the manufacturing process in terms of the upstream source, the make, and the downstream delivery subprocesses. Each of these subprocesses has parameters you can configure.

The following list of configurable parameters assumes a stock/replenishment planning strategy, a single delivery product, a single supplier for each source product, and a pull planning mode. See the referenced sections at the end of this section for information about additional parameters you must configure for each of these alternative modeling techniques.

- Upstream source subprocess

  Source category:

  - Receiving Duration
  - Verification Duration
  - Transfer Duration
  - Receiving, Verification, Transfer, Create Customer Order, and Invoice costs

  P2: Plan Source category:

  - Planning Period
  - Initial Plan Delay
  - Continuous Planning

  Source products:

  - Order Type
  - Customer Preference
  - Starting Product Inventory Level
  - Maximum Inventory Level
  - Inventory Control Strategy
  - Safety Stock
  - Minimum Reorder Quantity
  - Desired Turnaround
  - Fulfillment Preference
  - Fulfillment Using Alternate Products
  - Receiving Duration Multiplier, Verification Duration Multiplier, and Transfer Duration Multiplier

- Make subprocess

  Make categories:

  - Order Release to Manufacturing Duration
  - Build Selection parameters
  - Production Material Duration
  - Manufacturing Duration

- Move to Delivery Duration
- Production Material Handling cost

P3: Plan Make category:

- Planning Period
- Initial Plan Delay
- Continuous Planning
- Compensate for Yield

Source products:

- Order Release to Manufacturing Duration Multiplier and Production Material Duration Multiplier

Delivery products:

- Build Time Dependent on Order Size
- Minimum Batch Size
- Maximum Batch Size
- Build Yield
- Manufacturing Duration Multiplier and Move to Delivery Duration Multiplier

- Downstream delivery subprocess

  Deliver categories:

  - Order Entry Duration
  - Order Selection parameters
  - Pick Duration
  - Packing Duration
  - Transportation Duration
  - Order Entry, Order Fulfillment, Pick, Packing, Transportation, Customer Invoicing, and Customer Collections costs

  Delivery products:

  - Order Type
  - Product Preference
  - Starting Product Inventory Level
  - Maximum Inventory Level
  - Inventory Control Strategy

- Safety Stock
- Minimum Reorder Quantity
- Published Delivery Lead Time
- Net Selling Price
- Order Entry Duration Multiplier, Pick Duration Multiplier, and Packing Duration Multiplier

See Also

Configuring the Make Category.

Configuring the Deliver Category.

Configuring Parameters for Delivery Products.

Configuring Parameters for Source Products.

Using Stock Planning Strategies.

Using Alternative Planning Strategies.

Configuring Role Details for Multiple Products.

Modeling a Process with Multiple Suppliers.

Using Pull and Push Planning Modes.

Configuring Build Selection Parameters

By default, a Manufacturer role selects build orders for manufacturing randomly. You can control how a Manufacturer role sort and selects build orders, based on a set of sort criteria. You do this to describe how your current manufacturing process works or to experiment with alternative techniques to enhance the performance of the manufacturing phase.

For example, if two build orders are waiting to be manufactured, you can configure the Make category to manufacture the highest cost build orders first, the oldest build orders first, or the largest build orders first with a minimum batch size.

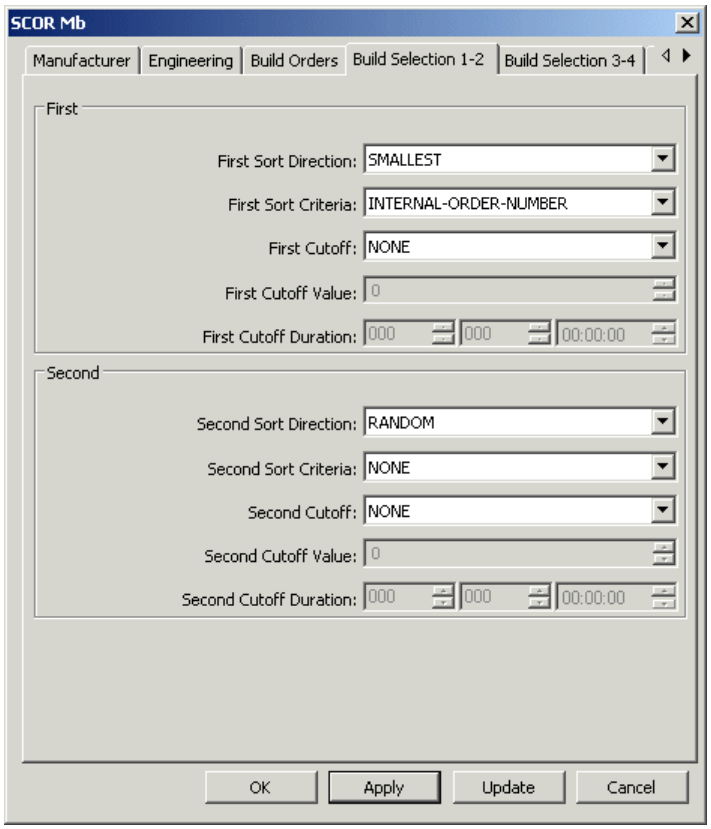
e-SCOR uses an exclusion strategy to identify the build orders to manufacture. The Make category places all build orders in the Build Orders pool into a list, then applies the first set of sort criteria to the build orders in the list. If a build order does not meet the sort criteria, the Make category removes the build order from the list. If two build orders have the same value for the set of sort criteria, the Make category applies the second set of criteria, and so on. You can configure the Make category to sort build orders, based on up to four sets of sort criteria.

Each set of sort criteria specifies the direction of the sort (smallest or biggest) and cutoff parameters, which are relative to the selected property of a build order.

You sort build orders, based on numeric values of an order. For example, if the property to sort by is the internal build order number and the sort direction is smallest, the Make category sorts build orders, based on a first-in, first-out (FIFO) basis.

You can also configure the Make category to use a cutoff value, which lets you further restrict the build orders that are candidates for manufacturing. For example, you can choose to manufacture only build orders of a certain size to guarantee minimum batch sizes.

The following figure shows the Build Selection tab of the properties dialog for an Mb: Make Product category that sorts build orders on a first-in first-out (FIFO) basis:



Chooses build orders with the smallest internal order number first, which manufactures build orders on a FIFO basis.

To sort build orders for manufacture, you configure the following build selection parameters for the Make category:

Parameter	Description
First Second Third Fourth Sort Direction	Determines whether to sort build orders, based on the smallest or biggest value. You can also sort build orders, based on a random value, which chooses a build order at random, based on the specified criteria. The default value is random. For examples, see Sorting Build Orders with No Cutoff.
First Second Third Fourth Sort Criteria	Determines the value the Make category uses to sort build orders. The options include numeric properties of a build order. The default value is none. The options are: unit-price, total-cost, order-size, payment-terms, customer-order-number, internal-order-number, customer-preference, and product-preference. For examples, see Sorting Build Orders with No Cutoff.
First Second Third Fourth Cutoff	Determines whether the Make category includes all build orders in its sort (none) or whether it includes only those build orders that meet an acceptable cutoff. The options for Cutoff are: minimum-acceptable, maximum-acceptable, and maximum-delta-acceptable. For examples, see Restricting the Orders to Sort Based on a Cutoff.
First Second Third Fourth Cutoff Value	When Cutoff is a value other than none, specifies the value that determines whether a build order is excluded from the sort. If the specified value of a build order does not meet the cutoff criteria, the Make category does not fill the order. For examples, see Restricting the Orders to Sort Based on a Cutoff.
First Second Third Fourth Cutoff Duration	When Cutoff is a duration, specifies the value that determines whether a build order is excluded from the sort. If the specified value of a build order does not meet the cutoff criteria, the Make category does not fill the order.

To configure build selection criteria:

1. Display the properties dialog for the Make category and click the Build Selection 1-2 tab to configure the first and second sort criteria.
2. Configure the parameters in the table above in the First group to configure the basic parameters that the Make category uses to sort build orders.
3. Configure the parameters in the Second group to configure a second set of parameters, which the Make category applies after the first set of criteria.
4. Click the Build Selection 3-4 tab, and configure the parameters in the Third and Fourth group, as needed, to configure up to four sets of criteria, which the Make category applies after the first and second sets of criteria.

Sorting Build Orders with No Cutoff

The following table describes some of the most common strategies for sorting build orders. These strategies sort all build orders that a Make category receives; they do not use a cutoff.

To manufacture...	Configure these parameters...
Build orders based on when the model creates them, which is equivalent to using a FIFO manufacturing strategy	Sort Direction = smallest Sort Criteria = internal-order-number
The largest build orders first	Sort Direction = biggest Sort Criteria = order-size
The most expensive build orders first, based on the net selling price of the delivery product	Sort Direction = biggest Sort Criteria = total-cost
The highest priority products first, where the smaller the number, the higher the priority	Sort Direction = smallest Sort Criteria = product-preference

Restricting the Orders to Sort Based on a Cutoff

You can configure numeric cutoff values to restrict the build orders the Make category considers for manufacturing.

For example, you might want to configure the cutoff to be a minimum acceptable value, based on the size of a batch. The Make category never manufactures batches that are less than the minimum acceptable value. However, the Make category combines batches so that it never makes more than one partial batch. By configuring the build order criteria such that the Make category never makes a batch that is smaller than a given size, you can guarantee minimum batch sizes.

The following table describes a strategy for sorting build orders, using a cutoff:

To manufacture...	Configure these parameters...
The largest batches first with a minimum acceptable batch size of 50 units. If two batches are both bigger than 50, then manufacture the most expensive build order first. In this configuration, the Make category always combines build orders for less than 50 units to make a larger batch; it never makes a batch that is smaller than 50 units.	First tab: Sort Direction = biggest Sort Criteria = order-size Cutoff = minimum-acceptable Cutoff Value = 50 Second tab: Sort Direction = biggest Sort Criteria = total-cost

Coordinating Source and Make Planning

A Manufacturer role uses source planning to determine when to place orders for its source products and the size of those orders. The role uses make planning to determine when to create build orders for its delivery products and the size of those orders.

You should coordinate source and make planning within the Manufacturer role to optimize performance as follows, depending on the planning mode:

If the planning mode is...	Configure the Initial Plan Delay to be...
Pull	Smaller for the P3: Plan Make category than for the P2: Plan Source category so that make planning occurs before source planning.
Push	Smaller for the P2: Plan Source category than for the P3: Plan Make category so that source planning occurs before make planning.

In pull mode, you want the Manufacturer role to determine build order size before it creates customer orders for its source products; whereas in push mode, you want the role to determine customer order size before it creates build orders for delivery products that it will push downstream.

Also, the Planning Period should either be the same for P2 and P3, or a multiple. For example, if the Planning Period for P2 is 3 weeks, the Planning Period for P3 should be 3 weeks, 6 weeks, 12 weeks, and so on.

See Also Manufacturer Role in Push Mode.

What Happens When the Simulation Runs

Similar to a Distributor role, a Manufacturer role orders source products from its upstream suppliers and delivers finished products to its downstream buyers. The similarities and differences are as follows. A Manufacturer role:

- Determines its available suppliers when the model initializes, just like a Distributor role.
- *Must* source components, whereas a Distributor role can source components or finished products.
- *Must* deliver finished products, whereas a Distributor role can deliver components or finished products.
- Uses source planning to determine when to order source products, just like a Distributor role.
- Uses make planning to determine when to make and implicitly delivery finished products, whereas a Distributor role delivers its delivery products whenever they are available.
- Computes incoming and outgoing financial metrics on a regular financial cycle, just like a Distributor role.

Analyzing the Performance of a Manufacturer Role

To analyze the performance of a Manufacturer role, you view:

- Level 1 metrics for the Manufacturer role.
- Level 2 metrics for the upstream source, the make, and the deliver subprocesses.

Level 1 Metrics to Analyze

At the role level, you can analyze the:

- Financial metrics that the Manufacturer role computes, based on the Net Selling Price parameter of the upstream supplier's delivery product.
- Asset metrics that the role computes, based on inventory levels.
- Cost metrics that the role computes, based on costs associated with the various source and delivery management tasks.

For details about these metrics, see Viewing Metrics for Roles.

Level 2 Metrics to Analyze

To analyze the performance of a manufacturing process at Level 2, it is helpful to think about the manufacturing process in terms of the upstream source subprocess, the make subprocess, and the downstream delivery subprocess. Each of these subprocesses has metrics you can analyze.

See Also Viewing Metrics for Categories.

Viewing Metrics for Source and Delivery Products.

- Upstream source subprocess

  ES: Enable Source category:

  - Orders Sent and Change Orders Sent
  - Product Shipments Received
  - Contracts Established
  - Supplier On-Time Performance (%)

  Source category:

  - Orders Sent and Change Orders Sent
  - Product Shipments Received
  - Product Shipment Lead Time
  - Financial Obligations, Financial Payments within Financial Period, and Financial Payments Total
  - Receiving Metric, Verification Metric, Transfer Metric, Create Customer Order Metric, and Invoice Metric costs

  P2: Plan Source category:

  - Number of Planning Periods

  Source products:

  - Quantity Ordered and Quantity Received
  - Purchase Cost
  - Products on Order, Received Inventory Level, Incoming Inventory Level, and Inventory Level
  - Received Fulfillment Time

- Make subprocess

  Make categories:

  - Build Orders Started and Build Orders Completed
  - Make Cycle Time
  - Production Material Handling Metric cost

  P3: Plan Make category:

  - Number of Planning Periods

  Source products:

  - Awaiting Orders
  - Work in Progress

  Delivery products:

  - Total Products Accepted
  - Total Products Rejected
  - Manufacturing Batch Size

- Downstream delivery subprocess

  ED: Enable Deliver category:

  - Orders Received and Change Orders Received
  - Product Shipments Sent
  - Contracts Established
  - Delivery Performance (%)
  - Perfect Order Fulfillment (%)

  Deliver categories:

  - Orders Received and Change Orders Received
  - Product Shipments Sent
  - Fill Rates (%)
  - Ready to Ship Time
  - Order Entry to Ship Time
  - Financial Bookings, Financial Outstanding, Financial Collections within Financial Period, and Financial Collections Total
  - Order Entry Metric, Order Fulfillment Metric, Pick Metric, Packing Metric, Transportation Metric, Customer Invoicing Metric, and Customer Collections Metric costs

Delivery products:

- Quantity to Deliver and Quantity Shipped
- Awaiting Orders, Products On Order, Received Inventory Level, Incoming Inventory Level, Inventory Level, In Transit Inventory Level, and Shipped Inventory Level
- Order Fulfillment Lead Time

15

Using Stock Planning Strategies

Describes the two planning strategies available for sourcing and delivering stock products: replenishment, forecast, Q, and R-Q.

Introduction

By default, each role uses a stock planning strategy to source, make, and deliver its products. A stock planning strategy means the role:

- Places source and delivery products in inventory.
- Delivers products to any buyer that places an order.

Note that a Distributor role that assembles components into kits has an inventory of its finished products, or kits, only when the kits are in transit to the buyer role.

By default, a role that uses a stock planning strategy uses a replenishment inventory control strategy, which means it determines order size based on desired inventory levels. You can also configure the inventory control strategy to use forecast, Q, or R-Q planning.

To configure the stock planning strategy, you:

- Configure the stock planning strategy for each role's source and/or delivery products.
- Configure the inventory control strategy of each role's source and delivery products to be:
  - Stock/Replenishment — Creates customer and build orders for as many source and delivery products, respectively, as are required to maintain desired inventory levels, given current orders for source and delivery products.
  - Stock/Forecast Customer — Creates customer and build orders for as many source and delivery products, respectively, as are required to meet forecasts, based on buyer contracts.
  - R-Q — Creates customer and build orders for a fixed quantity when the inventory level falls below desired inventory levels.
  - Q — Creates customer and build orders for a fixed quantity, plus an average demand, when the inventory level falls below desired inventory levels.
- Analyze the performance of the stock planning strategy by viewing metrics.

When using a stock planning strategy, you configure timing, cost, and other parameters for the S1: Source Stocked Product, M1: Make-to-Stock, and D1: Deliver Stocked Product categories, as appropriate for each role.

Configuring the Stock Planning Strategy

To determine the planning strategy for sourcing, making, and delivering stock products, you configure the Inventory Control Strategy of the role's source and/or delivery products, which has different effects on planning, as this table describes:

For this role...	You configure the Inventory Control Strategy of the...	Which determines...
Base Manufacturer	Delivery products	The size of build orders for delivery products, which determines how many delivery products the role makes and delivers. The role determines the size of build orders, based on the size of customer or replenishment orders for delivery products from downstream buyers.

For this role...	You configure the Inventory Control Strategy of the...	Which determines...
Distributor	Source products	The size of replenishment orders for source products, which determines how many delivery products the role delivers. The role determines the size of replenishment orders for source products, based on the size of customer or replenishment orders for delivery products from downstream buyers. **Note:** For a Distributor role that assembles components into kits, you cannot configure the Inventory Control Strategy of the delivery products, or kits, because the role does not keep an inventory of those kits.
Manufacturer	Source products	The size of replenishment orders for source products, which determines how many delivery products the role has available for making and delivering finished products. Thus, source planning is a separate planning cycle from make planning for a Manufacturer role.
	Delivery products	The size of build orders for delivery products, which determines how many delivery products the role makes and delivers. The role determines the size of build orders, based on the size of customer or replenishment orders for delivery products from downstream buyers.

Note By default, the Consumer role uses a stock planning strategy, which means it places its source products in inventory. A Consumer role determines the size of its replenishment orders and when to place those orders, based on demand parameters that you configure for the source product. Therefore, you do not configure the inventory control strategy of a Consumer role.

By default, when using a stock planning strategy, the role creates orders each source or make planning cycle, depending on the role. It waits to create replenishment orders for source products or build orders for delivery products until the next planning cycle, even if orders from downstream buyers come in during the planning cycle.

You can configure a role to create orders on demand, which means it creates replenishment orders for source products and build orders for delivery products whenever the role receives an order from a downstream buyer for delivery products. You can configure the role to create orders on demand in addition to creating orders each planning cycle or instead of each planning cycle.

To configure the stock planning strategy for a role:

1. Show the detail for each role in the model for which you want to configure the stock planning strategy.
2. Display the properties dialog for the source and/or delivery products for the role, according to the table above, and on the General tab, configure the Order Type to be stock, the default.
3. Click the Inventory tab and configure the Inventory Control Strategy parameter to be replenishment, forecast customer, r-q, or q.

   For details on which planning strategy to use, see:

   - Using a Stock/Replenishment Planning Strategy.
   - Using a Stock/Forecast Planning Strategy.
   - Using a Stock/R-Q and Q Planning Strategy.
4. Show the properties dialog for the P2: Plan Source and/or P3: Plan Make category of the role, according to the table above, and configure the Planning Period and Initial Plan Delay parameters to determine the frequency with which the role creates orders and when the first plan goes into effect.
5. To configure the role to create orders on demand, enable the Continuous Planning option for the P2: Plan Source and/or P3: Plan Make category, as appropriate for the role.
6. For Base Manufacturer and Manufacturer roles, to configure the role to compensate for expected loss due to build yield, enable the Compensate for Yield option for the P3: Plan Make category, the default.

Tip To configure the role to create replenishment orders on demand only, configure the Planning Period to be a very large number, such as 10 years, so that cyclical planning never takes place.

Using a Stock/Replenishment Planning Strategy

A role that uses a stock/replenishment planning strategy tries to keep extra source and delivery products available in inventory to maintain inventory levels.

When using a stock/replenishment planning strategy, a role:

- Creates replenishment orders for the number of source products required to maintain desired inventory levels, given current orders for delivery products.
- Creates build orders for the number of delivery products required to maintain desired inventory levels, given current orders for delivery products.
- Fulfills customer and replenishment orders from buyers from its inventory for delivery products.
- Whenever it can, delivers the exact number of delivery products required to fill an order.
- If the role does not have enough inventory of delivery products to fulfill a customer or replenishment order from a downstream buyer, and if the source product of the downstream buyer allows partial shipments (Fulfillment Preference = partial), the role delivers as many delivery products as it can. Otherwise, it creates a back order for the unfilled order.
- Delivers products to any downstream buyer that places an order, according to the Order Selection parameters of the role's Deliver category.

To use a stock/replenishment planning strategy, you need to:

- Configure product composites to use replenishment planning.
- Understand how the role computes order size for replenishment planning.

Configuring Product Composites for Replenishment Planning

When the Inventory Control Strategy is replenishment, the default, a role computes the size of each replenishment order for source products and each build order for delivery products, based on these parameters, which you configure for both source and delivery products:

Parameter	Description
Safety Stock	The minimum number of products the role needs to maintain in inventory before reordering.
Minimum Reorder Quantity	The minimum number of products for which the role creates orders, when the inventory dips below the Safety Stock. If necessary, the role can create orders for more than this quantity.

If the Inventory Level metric of the source or delivery product falls below the Safety Stock parameter, the role determines the size of the replenishment or build order, respectively, based on the Minimum Reorder Quantity parameter and the number of current orders.

A Consumer role determines order size and frequency, based on order demand parameters that you configure in the source product; it does not use source planning.

To configure a role to use a stock/replenishment planning strategy:

1. Show the detail of each Base Manufacturer, Distributor, and Manufacturer role whose source or delivery product is configured to use a stock/replenishment planning strategy.

   For details, see Configuring the Stock Planning Strategy.

2. Display the properties dialog for each source and delivery product, click the Inventory tab and configure the parameters described in the table above.

Understanding How the Role Computes Order Size for Replenishment Planning

e-SCOR computes the size of a replenishment or build order by comparing these values:

- The minimum number of products the role can reorder at one time (Minimum Reorder Quantity).
- The desired inventory level (Safety Stock) and current inventory (Inventory Level), given current orders (Products On Order and Awaiting Orders).

The role orders the maximum of these two values, unless the current inventory level can cover current orders, in which case, it orders nothing.

Formula for Computing Order Size for Replenishment Planning

The order size is based on the following formula:

```
if ( Inventory Level + Products On Order - Awaiting Orders) =<
     Safety Stock
then order size = 0
else order size = Max [Minimum Reorder Quantity,
                           (Safety Stock -
                            Inventory Level -
                            Products On Order +
                            Awaiting Orders ) ]
```

Metrics and Parameters Used in the Formula

The formula is based on the following metrics and parameters for source and delivery products:

Parameter/Metric	Description
Inventory Level	(Metric) The number of products that actually exist in inventory.
Products On Order	(Metric) For source products, the number of products that buyers have ordered but suppliers have not yet delivered. For delivery products, the number of products that buyers have ordered but suppliers have not yet entered or delivered.
Awaiting Orders	(Metric) The number of products that buyers have ordered and suppliers have entered, but suppliers have not yet delivered.
Safety Stock	(Parameter) The minimum number of products that need to be maintained in inventory before reordering.
Minimum Reorder Quantity	(Parameter) The minimum number of products to reorder, based on the Safety Stock.

Example: Order Size is Zero

Here is an example where the order size is 0, because the current inventory can cover the number of products on order:

```
Inventory Level 120
Safety Stock 100
Products On Order 10
Awaiting Orders 10
Minimum Reorder Quantity 30

120 - 100 + 10 = 30 (Inventory Level - Safety Stock +
                     Products On Order)

10 < 30 (Awaiting Orders < 30) therefore:

order size = 0
```

Example: Order Size is the Amount Needed to Maintain Current Inventory

Here is an example where the order size is the amount that is needed to maintain desired inventory levels, given current orders, because this amount is greater than the minimum reorder quantity:

```
Inventory Level 120
Safety Stock 100
Products On Order 30
Awaiting Orders 90
Minimum Reorder Quantity 30

120 - 100 + 30 = 50 (Inventory Level - Safety Stock +
                     Products On Order)

50 < 90 (50 < Awaiting Orders)

100 - 120 - 30 + 90 = 40 (Safety Stock - Inventory Level -
                          Products On Order + Awaiting Orders)

max [30, 40] (max [Minimum Reorder Quantity, 40] therefore:

order size = 40
```

Example: Order Size is the Minimum Reorder Quantity

Here is an example where the order size is the minimum reorder quantity, because the amount needed to maintain desired inventory levels is less than the minimum reorder quantity:

```
Inventory Level 120
Safety Stock 100
Products On Order 10
Awaiting Orders 50
Minimum Reorder Quantity 30

120 - 100 + 10 = 30 (Inventory Level - Safety Stock +
                     Products On Order)

30 < 50 (30 < Awaiting Orders)

100 - 120 - 10 + 50 = 20 (Safety Stock - Inventory Level -
                          Products On Order + Awaiting Orders)

max [30, 20] ( max [Minimum Reorder Quantity, 20] ) therefore:

order size = 30
```

Using a Stock/Forecast Planning Strategy

A role that uses a stock/forecast planning strategy tries to anticipate product demand by using forecast estimates, based on **contracts**, which determine the estimated amount of the order the role uses each planning period.

You use forecast planning to determine:

- The size of replenishment orders for the source products of a Distributor or Manufacturer role.
- The size of build orders for the delivery products of a Base Manufacturer and Manufacturer role.

When using a stock/forecast planning strategy, a role:

- Creates replenishment orders for the number of source products the role forecasts it will need, based on buyer contracts.
- Creates build orders for the number of delivery products the role forecasts it will need, based on buyer contracts.
- Adjusts replenishment order and build order size for the next planning cycle by comparing actual orders with contract estimates.
- Fulfills customer and replenishment orders from buyers from its inventory for delivery products.

- Whenever it can, delivers the exact number of products required to fill an order.
- If the role does not have enough inventory of delivery products to fulfill a customer or replenishment order from a downstream buyer, and if the source product of the downstream buyer allows partial shipments (Fulfillment Preference = partial), the role delivers as many products as it can. Otherwise, it creates a back order for the unfilled order.
- Delivers products to any buyer that places an order, according to the Order Selection parameters of the role's Deliver category.

To use a stock/forecast planning strategy, you need to:

- Configure buyer roles to use forecast planning by configuring contract parameters in the source product of the buyer role.
- Understand how the role computes order size for forecast planning.

The model also uses contracts to choose among multiple suppliers for the same source product and for push planning. For details, see Modeling a Process with Multiple Suppliers and Using Pull and Push Planning Modes.

Configuring Buyer Roles to Use Forecast Planning

When the Inventory Control Strategy of a role's source or delivery product is forecast, the role uses forecast planning to compute the size of replenishment orders for source products or the size of build orders for delivery products, depending on the role.

To use forecast planning, you configure contract parameters for the downstream buyer role's source product, as follows:

Parameter	Description
Contract Start Time	The time from the start of the simulation until the buyer sends its first purchase request to upstream suppliers for source products.
Contract Length	The length of time during which the contract is valid.
Contract Response Cycle Time	The length of time a supplier has to respond to a purchase request with a purchase response.
Forecast Estimated Amount	The estimated number of products the role plans to order over the life of the contract.
Contract Repetition Count	The number of times to repeat the contract during the lifetime of the simulation.

Note Orders sent while no contract is in effect are deleted.

To configure the model to use a stock/forecast planning strategy:

1 Show the detail of each Distributor, Manufacturer, or Consumer role that is downstream of the supplier role whose source or delivery product is configured to use a stock/forecast planning strategy.

For details, see Configuring the Stock Planning Strategy.

2 Configure the contract parameters for the buyer role's source product, as described in the table above.

Understanding How the Role Computes Order Size for Forecast Planning

When Inventory Control Strategy is forecast, the supplier role determines the size of its replenishment or build orders by estimating how much delivery product the role needs, based on awards for contracts from downstream buyers. The role assumes a linear order/build cycle over the lifetime of the contract; it does not look at inventory levels to determine order size.

For example, suppose a Manufacturer role has received a contract award for 100 units of its finished product. Suppose the length of the contract is 10 days and the role performs its make planning once a day. The role plans to build 10 units per day for the length of the contract. The role does not care whether it has actually received orders for this amount of finished product; it makes this amount for the life of the contract, regardless of orders. Assuming the downstream buyer always orders the amount of the contract, the role always has enough stock in inventory to fill orders, and it will never have too much stock.

Now, suppose the downstream buyer orders more than the amount of the contract. When the current contract expires, the Manufacturer role automatically makes just enough additional products to catch up with the orders during its next make planning cycle.

Similarly, suppose the downstream buyer orders less than the amount of the contract. Again, when the current contract expires, the Manufacturer role takes into account the extra products it has already made and makes that many fewer products during its next make planning cycle.

The Manufacturer role uses the same mechanism to determine the number of source products to order during its source planning cycle.

This table shows an example where the actual order amount varies with each new contract, which results in different build order sizes each contract period:

Contract	Forecast Estimated Amount	Amount Buyer Actually Orders	Amount Manufacturer Actually Makes
C_1	100	100	100
C_2	100	110	110
C_3	100	90	100
C_4	100	100	90

When using a forecast planning strategy, a supplier can maintain optimal inventory levels, while still reacting to order fluctuations. Keep in mind, however, that forecast planning assumes that the Forecast Estimated Amount that you configure for the buyer role's source product is relatively accurate. If not, the downstream buyer receives product shipments late, which can adversely affect turnaround time.

Using a Stock/R-Q and Q Planning Strategy

You can configure stock planning to use these additional inventory control strategies:

- R-Q — If the Inventory Level is less than the Safety Stock, the buyer orders a fixed quantity, which is the Minimum Reorder Quantity.
- Q — If the Safety Stock plus the average demand within the planning period plus the average lead time is less than the Inventory Level, the buyer orders a fixed quantity, which is the Minimum Reorder Quantity.

Note In the current version, the average demand within the planning period plus the average lead time is equal to the Forecast Estimated Amount specified in the Supplier tab of the product composite dialog. In future versions, it will rely on average demand from forecasts.

Analyzing the Performance of a Model that Uses Stock Planning

To analyze the performance of a model that uses a stock planning strategy, it is helpful to think about the process in terms of the upstream source subprocess, the make subprocess, and the downstream delivery subprocess. Each of these Level 2

subprocesses has metrics you can analyze to determine the performance impact of using a stock planning strategy.

See Also Viewing Metrics for Categories.

Viewing Metrics for Source and Delivery Products.

- Upstream source subprocess

  ES: Enable Source category:

  - Orders Sent and Change Orders Sent
  - Product Shipments Received
  - Contracts Established
  - Supplier On-Time Performance (%)

  Source category:

  - Orders Sent and Change Orders Sent
  - Product Shipments Received
  - Product Shipment Lead Time
  - Financial Obligations, Financial Payments within Financial Period, and Financial Payments Total
  - Receiving Metric, Verification Metric, Transfer Metric, Create Customer Order Metric, and Invoice Metric costs

  P2: Plan Source category:

  - Number of Planning Periods

  Source products:

  - Quantity Ordered and Quantity Received
  - Purchase Cost
  - Products on Order, Received Inventory Level, Incoming Inventory Level, and Inventory Level
  - Received Fulfillment Time

- Make subprocess

  Make categories:

  - Build Orders Started and Build Orders Completed
  - Make Cycle Time
  - Production Material Handling cost

P3: Plan Make category:

- Number of Planning Periods

Source products:

- Awaiting Orders
- Work in Progress

Delivery products:

- Total Products Accepted
- Total Products Rejected

- Downstream delivery subprocess

  ED: Enable Deliver category:

  - Orders Received and Change Orders Received
  - Product Shipments Sent
  - Contracts Established
  - Delivery Performance (%)
  - Perfect Order Fulfillment (%)

  Deliver categories:

  - Orders Received and Change Orders Received
  - Product Shipments Sent
  - Fill Rates (%)
  - Ready to Ship Time
  - Order Entry to Ship Time
  - Financial Bookings, Financial Outstanding, Financial Collections within Financial Period, and Financial Collections Total
  - Order Entry Metric, Order Fulfillment Metric, Pick Metric, Packing Metric, Transportation Metric, Customer Invoicing Metric, and Customer Collections Metric costs

  Delivery products:

  - Quantity to Deliver and Quantity Shipped
  - Awaiting Orders, Products On Order, Received Inventory Level, Incoming Inventory Level, Inventory Level, In Transit Inventory Level, Shipped Inventory Level, and Manufacturing Batch Size
  - Order Fulfillment Lead Time

16

Using Alternative Planning Strategies

Describes how to configure a role to source, make, and/or deliver stock, make-to-order, and/or engineer-to-order products.

Introduction

A role's planning strategy determines:

- *How much* the role sources, makes, and/or delivers, depending on the role.
- *To whom* the role delivers its products.

By default, each role uses a stock/replenishment planning strategy. For details, see Using Stock Planning Strategies.

e-SCOR supports the following two alternative planning strategies for sourcing, making, and/or delivering products:

- **Engineer-to-order** — Sources and makes exactly the number of source and delivery products, respectively, required to fill an order; delivers exactly those delivery products to the buyer that places the order; and maintains no inventory.
- **Make-to-order** — Sources and makes exactly the number of source and delivery products, respectively, required to fill an order; places both source and delivery products in inventory; and delivers products to any buyer that places an order.

The make-to-order planning strategy is based on the engineer-to-order; therefore, it is explained first.

Engineer-to-order, make-to-order, and stock/replenishment are reactive planning strategies, whereas stock/forecast is a proactive planning strategy.

A role can use the same planning strategy for its source and delivery products, depending on the role, or it can combine different planning strategies within the same role. The Order Type parameter of the role's source and delivery product determines which Level 2 category the role uses for each product.

To model alternative planning strategies, you need to:

- Determine which alternative planning strategy to use:
  - Engineer-to-order
  - Make-to-order
- Configure a role to use alternative planning strategies by configuring the process categories of the appropriate type on the role detail.
- Understand the rules for configuring the planning strategy of a role.
- Analyze the performance of the alternative planning strategy by viewing metrics.

Using an Engineer-to-Order Planning Strategy

When using an engineer-to-order (ETO) planning strategy, a role:

- Creates replenishment orders for the exact number of source products required to fill an order for delivery products.
- Creates build orders for the exact number of delivery products required to fill an order for delivery products.
- Fulfills customer and replenishment orders from buyers by placing delivery products directly into the Staging Area pool.

- Delivers the exact number of products required to fill an order.
- Delivers products to the exact customer that places the order.

While a role that uses an ETO planning strategy for sourcing products does maintain an inventory of its source products, the entire inventory is always allocated to making delivery products for specific buyers.

When using an ETO planning strategy, you configure these additional parameters for the Mb: Make Product and M3: Engineer-to-Order categories:

- Engineering Duration parameter
- ECO (Engineering Change Orders) cost parameter

When using an ETO planning strategy, a role ignores the Inventory Control Strategy parameter of its source and delivery products.

Using a Make-to-Order Planning Strategy

When using a make-to-order (MTO) planning strategy, a role:

- Creates replenishment orders for the exact number of source products required to fill an order for delivery products.
- Creates build orders for the exact number of delivery products required to fill an order for delivery products.
- Fulfills customer and replenishment orders from buyers from its inventory for delivery products.
- Delivers the exact number of products required to fill an order.
- Delivers products to any buyer that places an order.

While a role that uses an MTO planning strategy for sourcing and delivering products does maintain an inventory of both its source and delivery products, the entire inventory is always allocated to specific buyers.

An MTO planning strategy for sourcing and delivering products is identical to a stock/replenishment planning strategy, where the Safety Stock is 0 and the Minimum Reorder Quantity is 1.

When using an MTO planning strategy, a role ignores the Inventory Control Strategy parameter of its source and delivery products.

Configuring the Role to Use Alternative Planning Strategies

You configure a role to use alternative planning strategies by configuring the Order Type parameter of the source and/or delivery products for the role. The role sends orders, product shipments, invoices, and payments to the appropriate source, make, and/or deliver categories on the role detail, based on the Order Type.

By default, all product composites with the same Order Type use the same planning strategy. You can also configure the role detail to use different categories for product composites with the same Order Type by configuring the Specific Product Name parameter for the category.

For details, see Configuring Role Details for Multiple Products.

To configure the role to use alternative planning strategies:

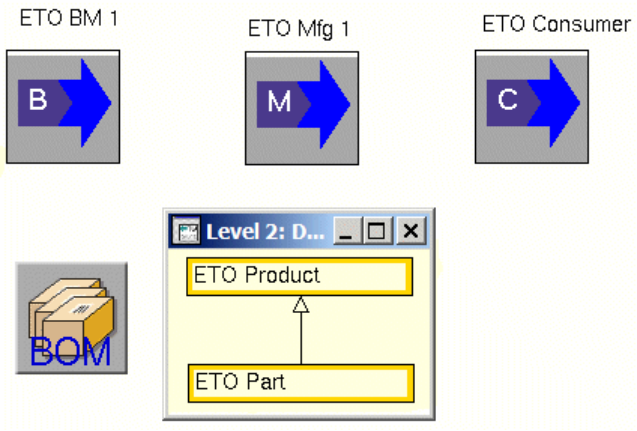
1. Configure the Order Type of the source and/or delivery product of a role to be stock, mto, or eto to determine the planning strategy the role uses for sourcing, making, and/or delivering products.

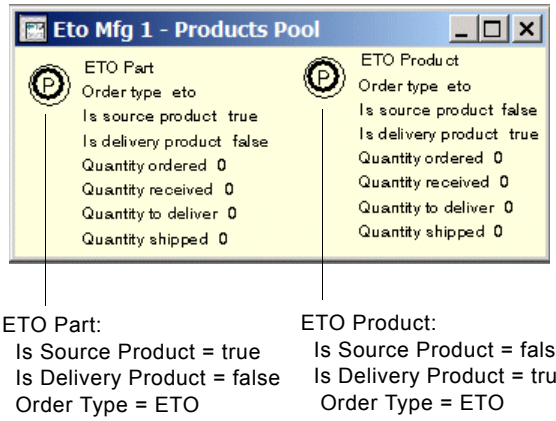
   For details and examples of valid combinations or planning strategies, see Rules for Configuring the Planning Strategy of a Role.

2. If the Order Type is eto, configure the additional Level 2 SCOR parameters for the M3: Engineer-to-Order category.

   For details, see Using an Engineer-to-Order Planning Strategy.

The following figure shows a model in which the Manufacturer role uses an ETO planning strategy for sourcing components and delivering finished products:





Manufacturer role's Products pool

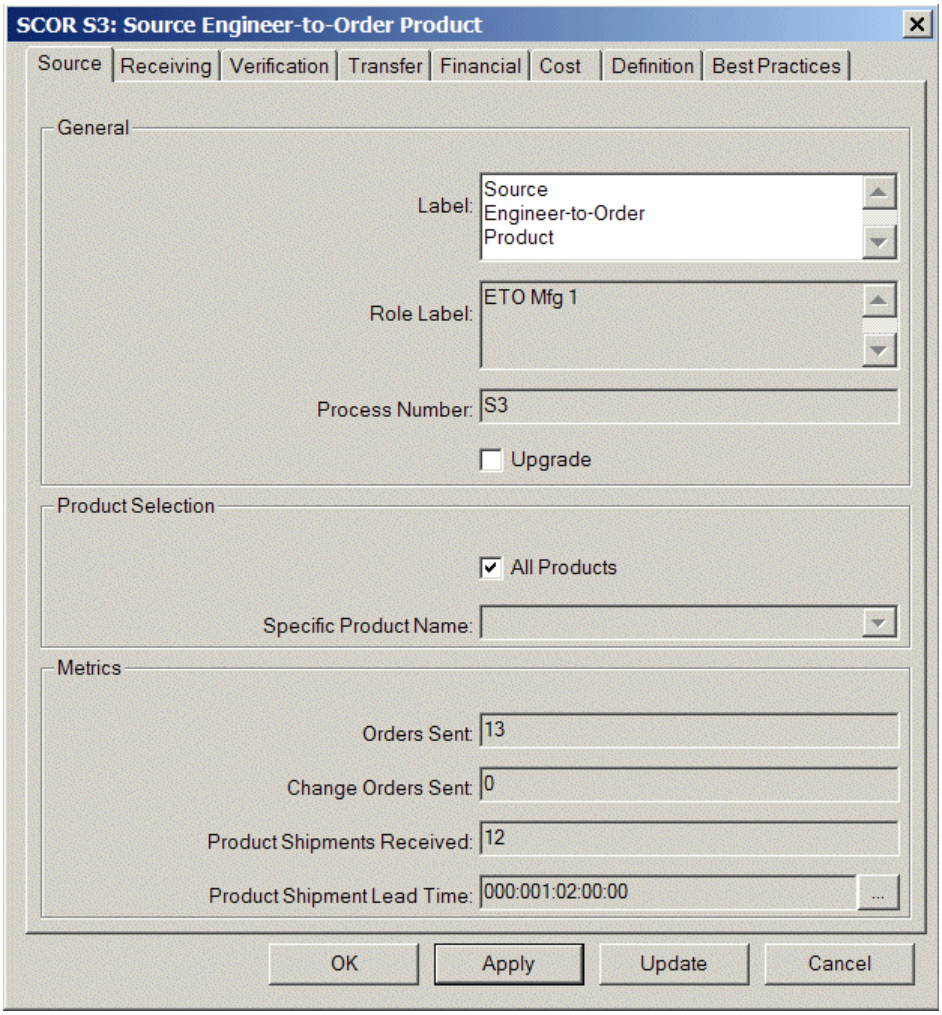
ETO Part:
Is Source Product = true
Is Delivery Product = false
Order Type = ETO

ETO Product:
Is Source Product = false
Is Delivery Product = true
Order Type = ETO

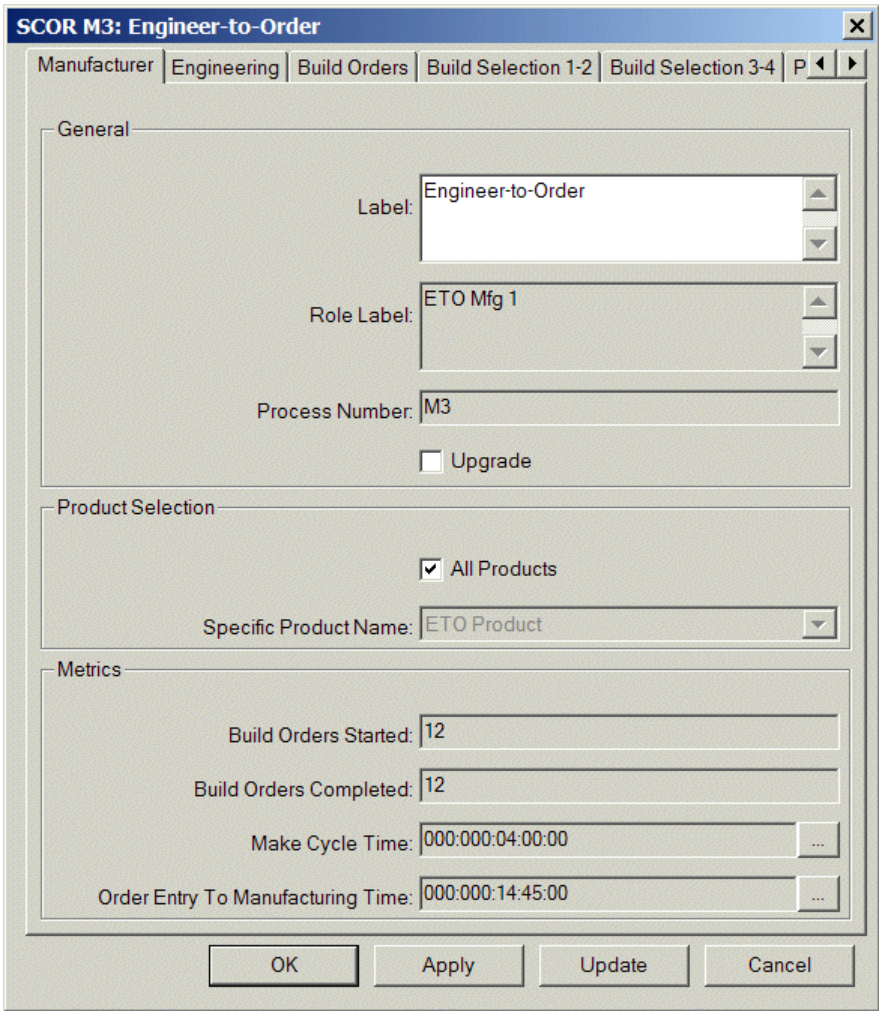
Note that the Order Type for the source and delivery product of the Manufacturer role does not need to be the same. Similarly, the Order Type for the source and delivery product of a Distributor role that assembles its components into kits does not need to be the same. A Distributor role that delivers its source products, however, uses the same Order Type for it source and delivery products.

Also, the Order Type for the delivery product of the Base Manufacturer role and the source product of the Consumer role does not need to correspond to the Order Type of the downstream and upstream roles, respectively.

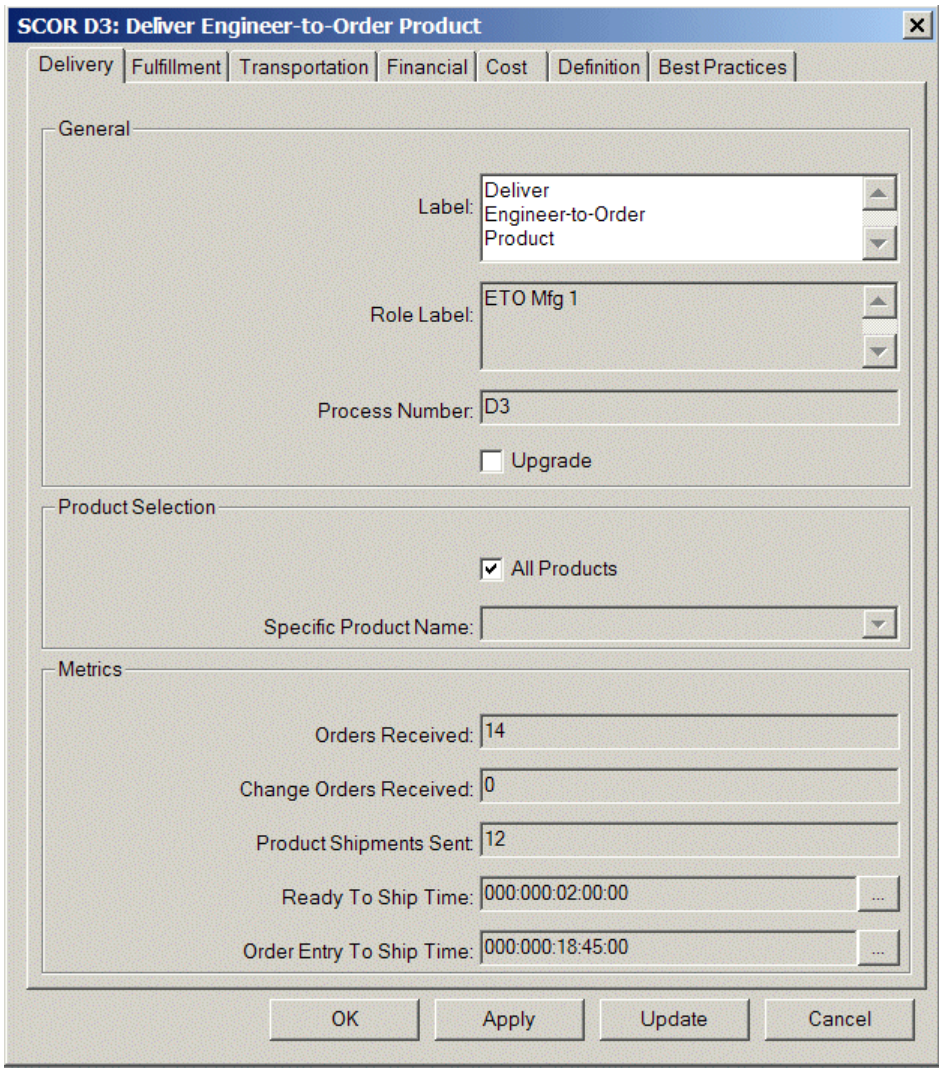
When you run the simulation, the S3: Source Engineer-to-Order Product category creates orders and receives shipments of ETO components:



The M3: Make Engineer-to-Order Product category creates build orders and manufactures ETO finished products:



The D3: Deliver Engineer-to-Order Product category receives orders and sends shipments of ETO finished products:



Rules for Configuring the Planning Strategy of a Role

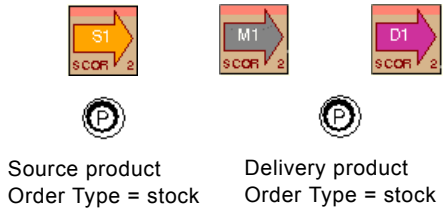
You must follow these rules when combining planning strategies for the source and delivery products of a role:

For this role...	Configure the planning strategy as follows...
Manufacturer role	The planning strategy for the source and delivery products can be the same or different, as follows: • If the same, the role uses the same planning strategy for sourcing components, and making and delivering finished products. • If different, the role uses the planning strategy of the source product for sourcing components, and it uses the planning strategy of the delivery product for making and delivering finished products.
Distributor role that delivers its source products	The role uses the same planning strategy for sourcing and delivering products.
Distributor role that assembles components into kits	The planning strategy for the source and delivery products can be the same or different, as follows: • If the same, the role uses the same planning strategy for sourcing components and delivering finished products as kits. • If different, the role uses the planning strategy of the source product for sourcing components, and it uses the planning strategy of the delivery product for delivering finished products as kits.

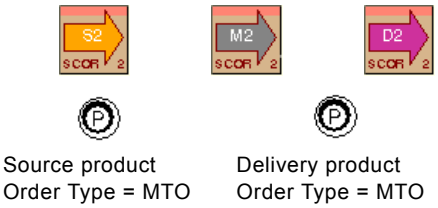
Examples of Valid Planning Strategy Combinations

Here are some examples of valid combinations of planning strategies for a Manufacturer role, a Distributor role that delivers its source products, and a Distributor role that assembles components into kits.

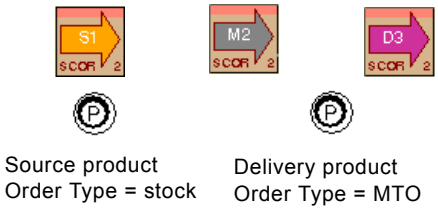
Valid Planning Strategy Combinations for a Manufacturer Role



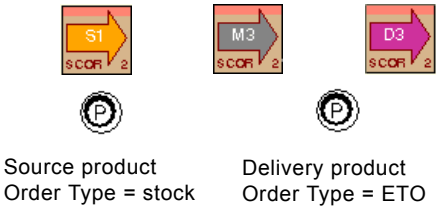
Default configuration, which sources, makes, and delivers stock products.



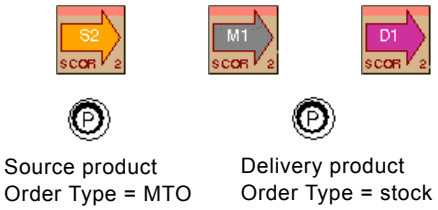
Sources, makes, and delivers make-to-order products.



Sources stock components, and makes and delivers make-to-order finished products.

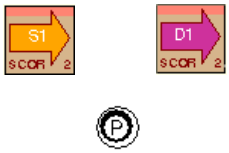


Sources stock components, and makes and delivers engineer-to-order finished products.



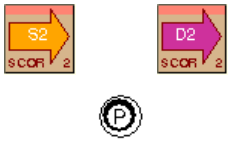
Sources make-to-order components, and makes and delivers stock finished products.

Valid Planning Strategy Combinations for a Distributor Role that Delivers its Source Products



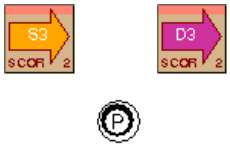
Default configuration, which sources and delivers stock products.

Source/ delivery product
Order Type = stock



Sources and delivers make-to-order products.

Source/ delivery product
Order Type = MTO



Sources and delivers engineer-to-order products.

Source/ delivery product
Order Type = ETO

Valid Planning Strategy Combinations for a Distributor Role that Assembles Components into Kits

Source product
Order Type = stock

Delivery product
Order Type = stock

Default configuration, which sources and delivers stock products.

Source product
Order Type = MTO

Delivery product
Order Type = MTO

Sources and delivers make-to-order products.

Source product
Order Type = stock

Delivery product
Order Type = MTO

Sources stock components and delivers make-to-order finished products as kits.

Source product
Order Type = MTO

Delivery product
Order Type = ETO

Sources make-to-order components and delivers engineer-to-order finished products as kits.

Analyzing the Performance of a Model that Uses Alternative Planning Strategies

To analyze the performance of a model that uses alternative planning strategies, it is helpful to think about the process in terms of the upstream source subprocess, the make subprocess, and the downstream delivery subprocess. Each of these Level 2 subprocesses has metrics you can analyze.

- Upstream source subprocess

  ES: Enable Source category:

  - Orders Sent and Change Orders Sent
  - Product Shipments Received
  - Contracts Established
  - Supplier On-Time Performance (%)

  Source category:

  - Orders Sent and Change Orders Sent
  - Product Shipments Received
  - Product Shipment Lead Time
  - Financial Obligations, Financial Payments within Financial Period, and Financial Payments Total
  - Receiving Metric, Verification Metric, Transfer Metric, Create Customer Order Metric, and Invoice Metric costs

  P2: Plan Source category:

  - Number of Planning Periods

  Source products:

  - Quantity Ordered and Quantity Received
  - Purchase Cost
  - Products on Order, Received Inventory Level, Incoming Inventory Level, and Inventory Level
  - Received Fulfillment Time

- Make subprocess

  Make categories:

  - Build Orders Started and Build Orders Completed
  - Make Cycle Time
  - Production Material Handling cost
  - Order Entry to Manufacturing Time of the Mb: Make Product and M3: Engineer-to-Order categories
  - ECO Metric of the M3: Engineer-to-Order category

  P3: Plan Make category:

  - Number of Planning Periods

  Source products:

  - Awaiting Orders
  - Work in Progress

  Delivery products:

  - Total Products Accepted
  - Total Products Rejected

- Downstream delivery subprocess

  ED: Enable Deliver category:

  - Orders Received and Change Orders Received
  - Product Shipments Sent
  - Contracts Established
  - Delivery Performance (%)
  - Perfect Order Fulfillment (%)

  Deliver categories:

  - Orders Received and Change Orders Received
  - Product Shipments Sent
  - Fill Rates (%)
  - Ready to Ship Time
  - Order Entry to Ship Time

- Financial Bookings, Financial Outstanding, Financial Collections within Financial Period, and Financial Collections Total
- Order Entry Metric, Order Fulfillment Metric, Pick Metric, Packing Metric, Transportation Metric, Customer Invoicing Metric, and Customer Collections Metric costs

Delivery products:

- Quantity to Deliver and Quantity Shipped
- Awaiting Orders, Products On Order, Received Inventory Level, Incoming Inventory Level, Inventory Level, In Transit Inventory Level, Shipped Inventory Level, and Manufacturing Batch Size
- Order Fulfillment Lead Time

17

Modeling a Process with Multiple Suppliers

Describes how to build a model that sources identical products from multiple suppliers, using contracts.

Introduction

You can configure your model such that a buyer has multiple suppliers for the same source product. By default, the buyer chooses a single supplier at random from among its qualified suppliers.

When a buyer role has multiple suppliers for the same source product, you can configure the buyer to choose its supplier(s), on a cyclic basis, based on contract parameters that you configure in the buyer role's source product. These parameters include: the maximum number of suppliers, whether to split the order among multiple suppliers, criteria for choosing the supplier, the length of the contract, and the estimated amount of the contract. For example, you might configure a buyer to choose the supplier with the highest priority, or you might configure a buyer to split its orders among multiple qualified suppliers, based on a specified proportion. Each time a contract expires, the buyer role chooses new suppliers, based on the contract parameters.

Contracts are relevant when a buyer role has multiple suppliers for the same source product. Contracts are also used when using a stock/forecast planning strategy and push planning. Otherwise, the model creates a single contract that is in effect for the entire duration of the simulation.

When using contracts, the model performs two distinct functions, in this order, each time a new contract is in effect:

1. The buyer issues purchase awards to qualified suppliers. The buyer determines qualified suppliers, based on supplier selection criteria and the specified number of suppliers.
2. The buyer determines the size of the order to send to each qualified supplier. The buyer determines order size, based on whether it sends the order to a single qualified supplier or splits the order, as follows:
   - If the buyer specifies a single supplier, it chooses the supplier, based on probabilities and sends the entire order to that supplier.
   - If the buyer splits the order, it determines order size for each supplier, based on proportions.

You can use contracts to analyze the performance impact on your supply chain of adding multiple suppliers for the same source product. You can experiment with choosing a single supplier or multiple suppliers, and you can experiment with using different criteria for choosing and disqualifying suppliers.

When modeling a process with multiple suppliers, you:

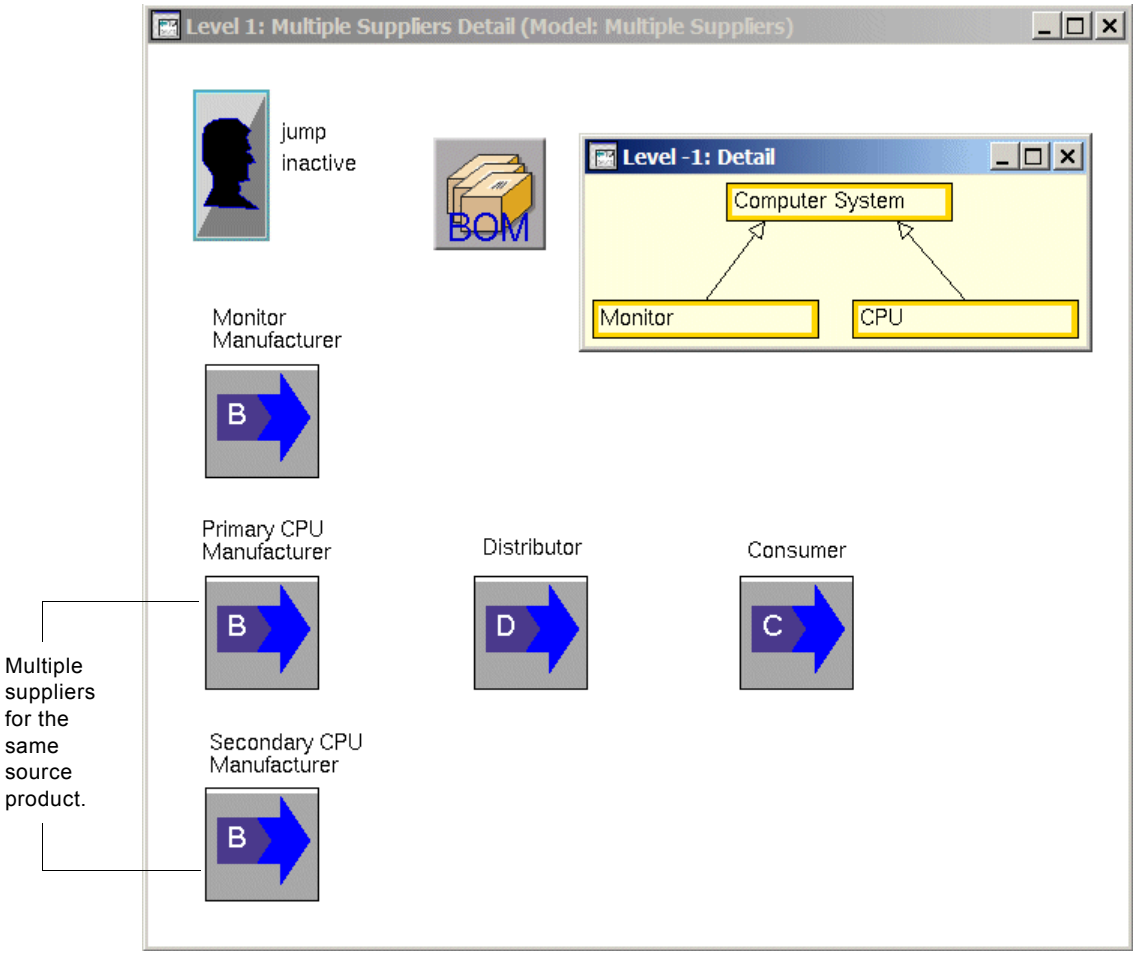
- Configure the model to source identical products from multiple suppliers.
- Configure contract parameters in the buyer.
- Configure the criteria a buyer uses for choosing its suppliers.
- Analyze the performance of a model with multiple suppliers.

See Also Using a Stock/Forecast Planning Strategy.

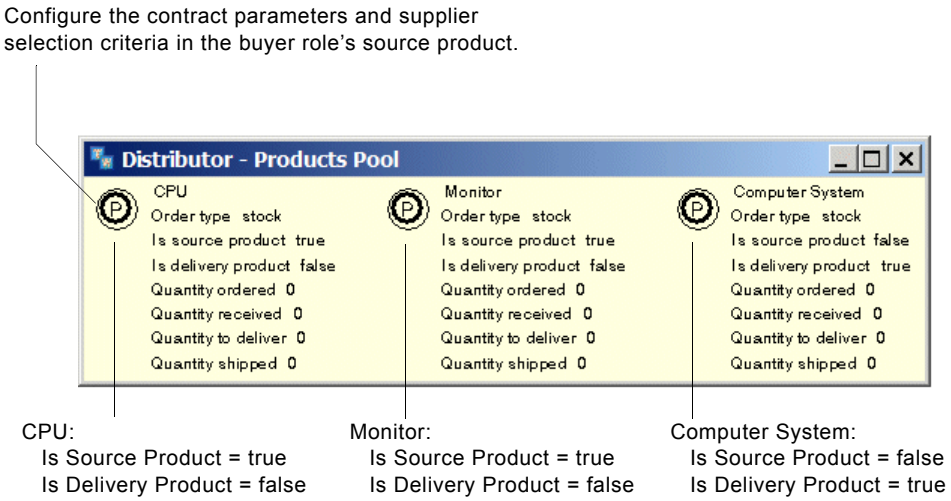
Sourcing Identical Products from Multiple Suppliers

To configure a model to source identical products from multiple suppliers, create multiple upstream suppliers that deliver the same product to a single downstream buyer.

This figure shows a model in which a Distributor role assembles computer system kits from monitor and CPU components. The role has three upstream suppliers, one of which delivers monitors and the other two of which deliver CPU components.



Here is the Products pool of the Distributor role, which defines the CPU and Monitor as source products, and the Computer System as a delivery product. You configure contract parameters and supplier selection criteria in the CPU source product, which has two potential suppliers.



Configuring Contract Parameters in the Buyer

To configure a buyer role to use contracts for choosing its suppliers, you configure the following contract parameters on the Supplier tab of the buyer role's source product:

Parameter	Description
Contract Start Time	The time from the start of the simulation until the buyer sends its first purchase request to upstream suppliers for source products.
Contract Length	The length of time during which the contract is valid.
Contract Response Cycle Time	The number of days a supplier has to respond to a purchase request with a purchase response.
Contract Repetition Count	The number of times to repeat the contract during the lifetime of the simulation.

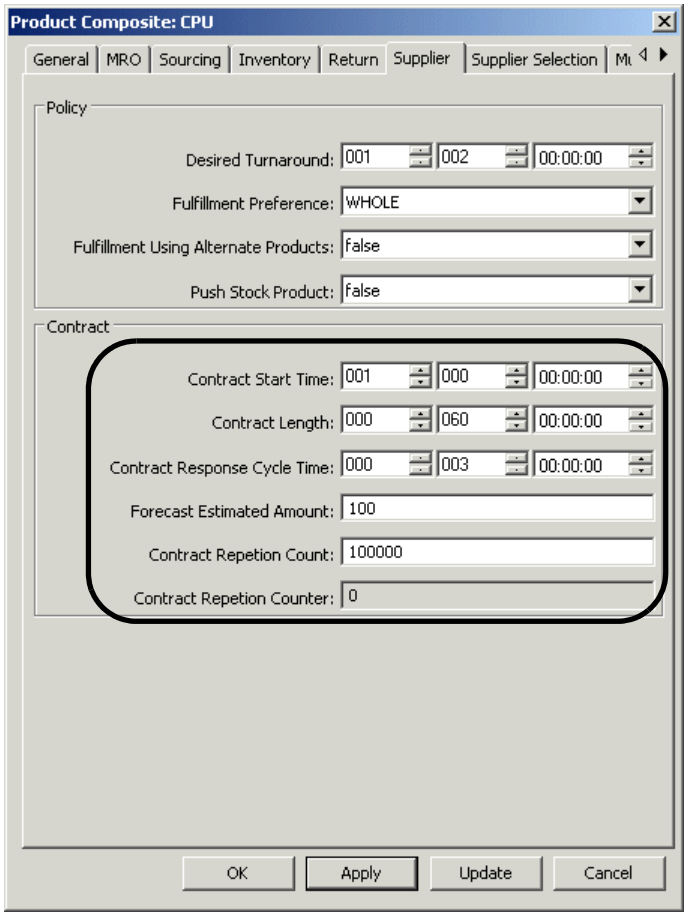
Note Orders sent while no contract is in effect are deleted.

You must also configure the supplier selection criteria, as described in Configuring Supplier Selection Criteria in the Source Product.

To configure contract parameters in the buyer:

1. Display the properties dialog for the source product of the buyer role that you want to use contracts.
2. Click the Supplier tab and configure the parameters in the table above.

The following figure shows the Source tab of the properties dialog for a source product of a Distributor role that uses contracts. The buyer waits one week before sending a purchase request for source products to the supplier. The contract is valid for 60 days. The supplier sends a purchase response within three days of receiving the request.



Configuring the Supplier Selection Criteria

When sourcing identical products from multiple upstream suppliers, you can configure the criteria for choosing suppliers. You can configure:

- The source product of the buyer to choose suppliers, as follows:
  - The maximum number of suppliers to which to issue awards.
  - Whether the buyer splits the order among the specified number of suppliers.
  - The criteria the role uses for choosing its suppliers.
  - When sending the order to a single supplier, the probability that the order will go to each qualified supplier; when splitting the order, the proportion of the order that goes to each qualified supplier.
- The supplier preference for the delivery product to rank suppliers, as needed.

For examples, see Examples of Configuring the Source Product for Choosing Suppliers.

Configuring Supplier Selection Criteria in the Source Product

To configure a buyer role to choose among multiple suppliers, you configure the following supplier selection parameters in the buyer role's source product:

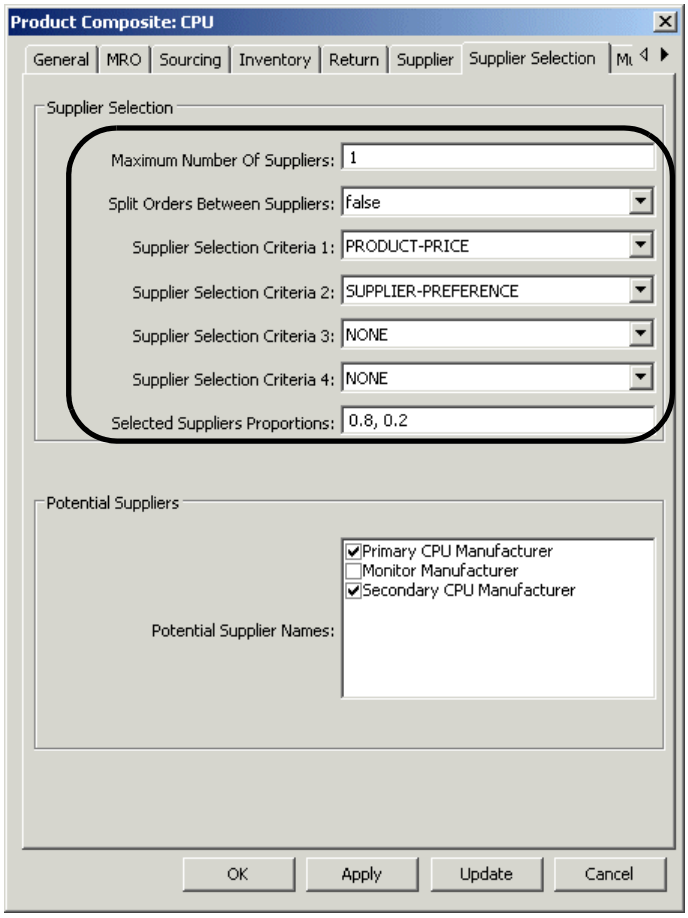
Parameter	Description
Maximum Number of Suppliers	The number of suppliers to which to issue awards.
Split Orders Between Suppliers	Whether to split the order between the specified number of suppliers.
Supplier Selection Criteria 1 - 4	The criteria for choosing among qualified suppliers, where you can specify up to four criteria.
Selected Suppliers Proportions	How to split the order between qualified suppliers, based on proportion or probability, depending on whether the order is split between multiple suppliers or not, respectively.

To configure supplier selection criteria in the source product:

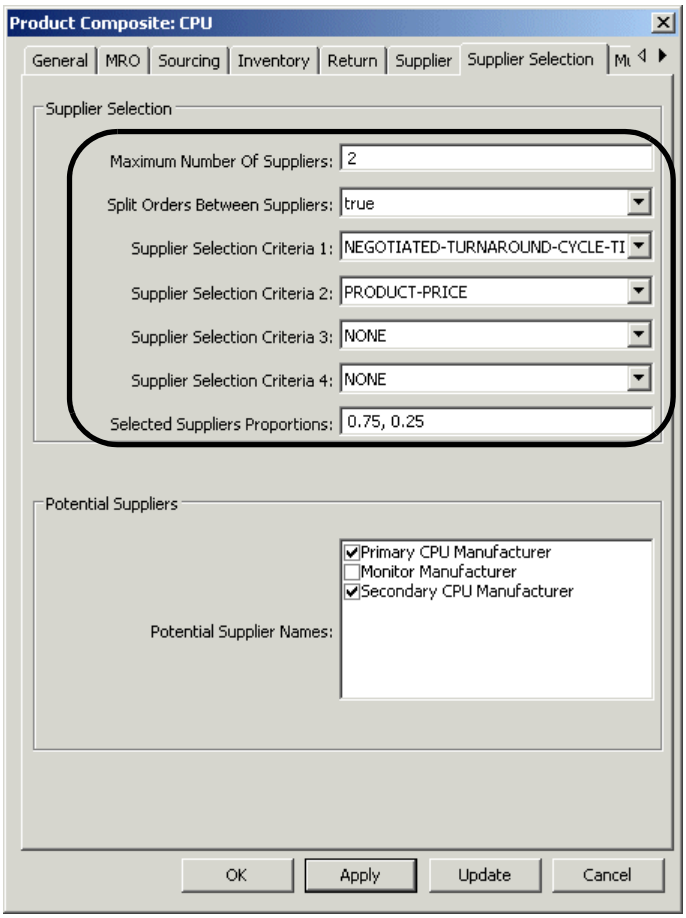
1. Display the properties dialog for the source product of the buyer role that sources identical products from multiple upstream suppliers.
2. Click the Supplier Selection tab and configure the Potential Suppliers to be the list of suppliers to which awards can be issued.

   This parameter must be configured for all source products in the model.
3. Configure the parameters for choosing among the potential suppliers, as described in the table above.

The following dialog shows the source product of a Distributor role that places the entire order with one of two potential suppliers, based on probabilities. The buyer chooses a single qualified supplier, first based on the product price, then based on the supplier preference. It chooses the first supplier 80% of the time and the second supplier 20% of the time.



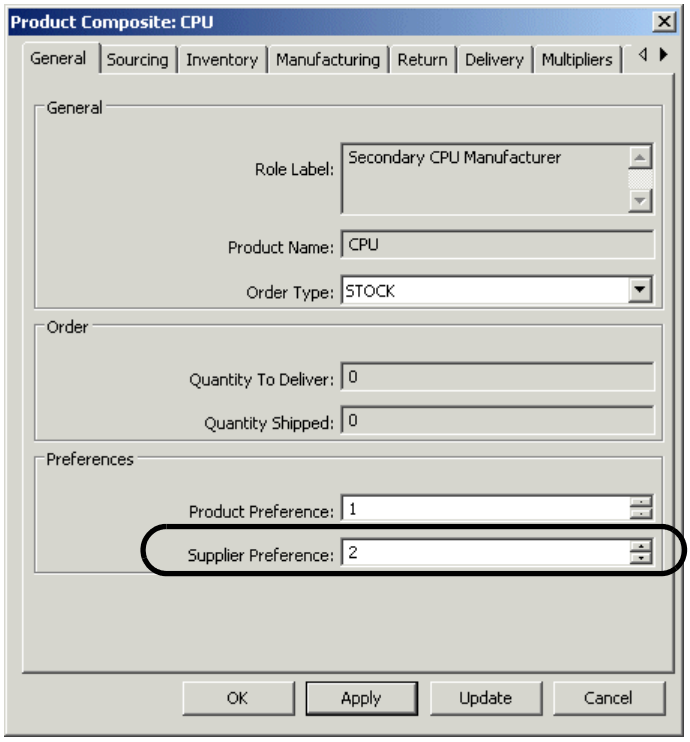
The following dialog shows the source product of a Distributor role that splits the order between two potential suppliers, based on proportions. The buyer chooses two suppliers, first based on the negotiated turnaround cycle time, then based on the product price. It orders 75% of the source products from the first supplier and 25% from the second.



Configuring the Supplier Preference for the Delivery Product

You can configure the Supplier Selection Criteria parameters of the buyer role's source product to choose suppliers, based on the Supplier Preference of the supplier's delivery product.

The following figure shows the properties dialog for a delivery product of the Secondary CPU Manufacturer role, which ranks this supplier second when choosing among potential suppliers:



To configure the supplier preference for the delivery product:

1 For each supplier, display the properties dialog for the delivery product.

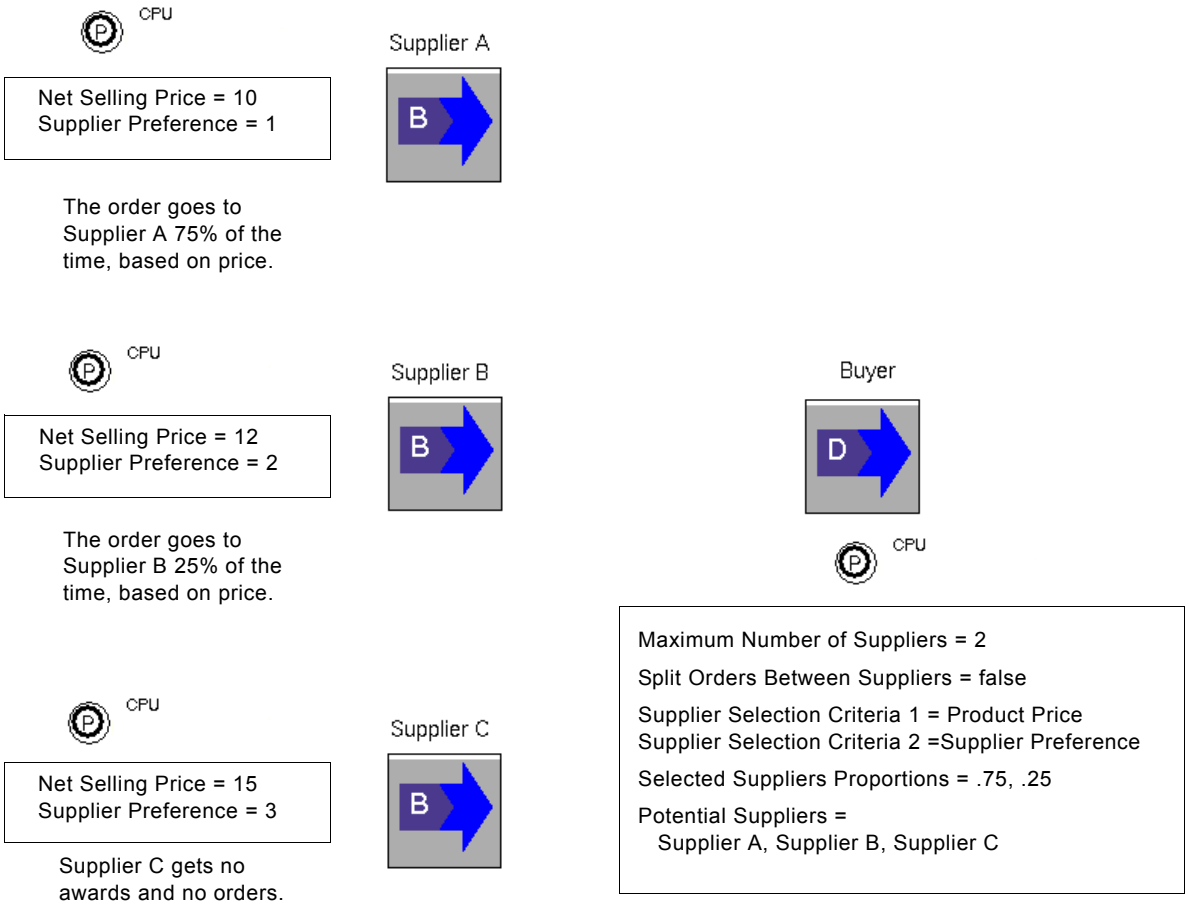
2 On the General tab, configure the Supplier Preference parameter to rank the supplier by preference, where the smaller the number, the more likely a downstream buyer will choose this supplier when issuing purchase awards

Examples of Configuring the Source Product for Choosing Suppliers

To illustrate how the model can choose among multiple suppliers, suppose you have three qualified suppliers for a given product, Supplier A, Supplier B, and Supplier C. The Supplier Preference of the delivery product associated with each supplier is 1, 2, and 3, respectively. Suppose you are issuing awards, based first on Product Cost, then on Supplier Preference.

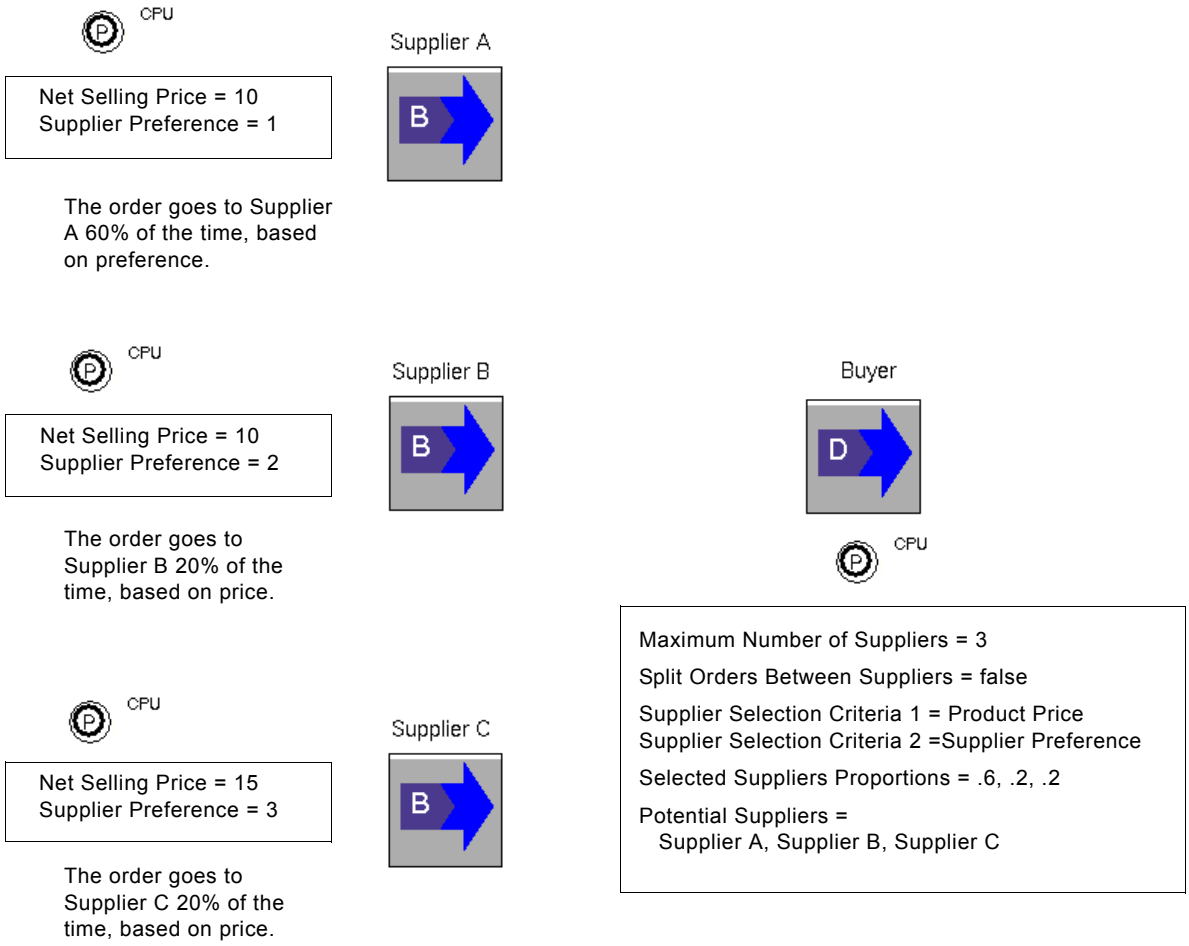
Suppose you want to issue awards to two suppliers, where the primary supplier gets the order 75% of the time and the secondary supplier gets the order 25% of the time. Assume Supplier A offers the lowest cost product, based on the Net Selling Price of its delivery product. Assuming Split Orders Between Suppliers is false, the default, the order goes to Supplier A 75% of the time, based on product cost and to Supplier B 25% of the time, based on product cost.

Issuing Awards to Two Suppliers and Placing an Order with a Single Supplier



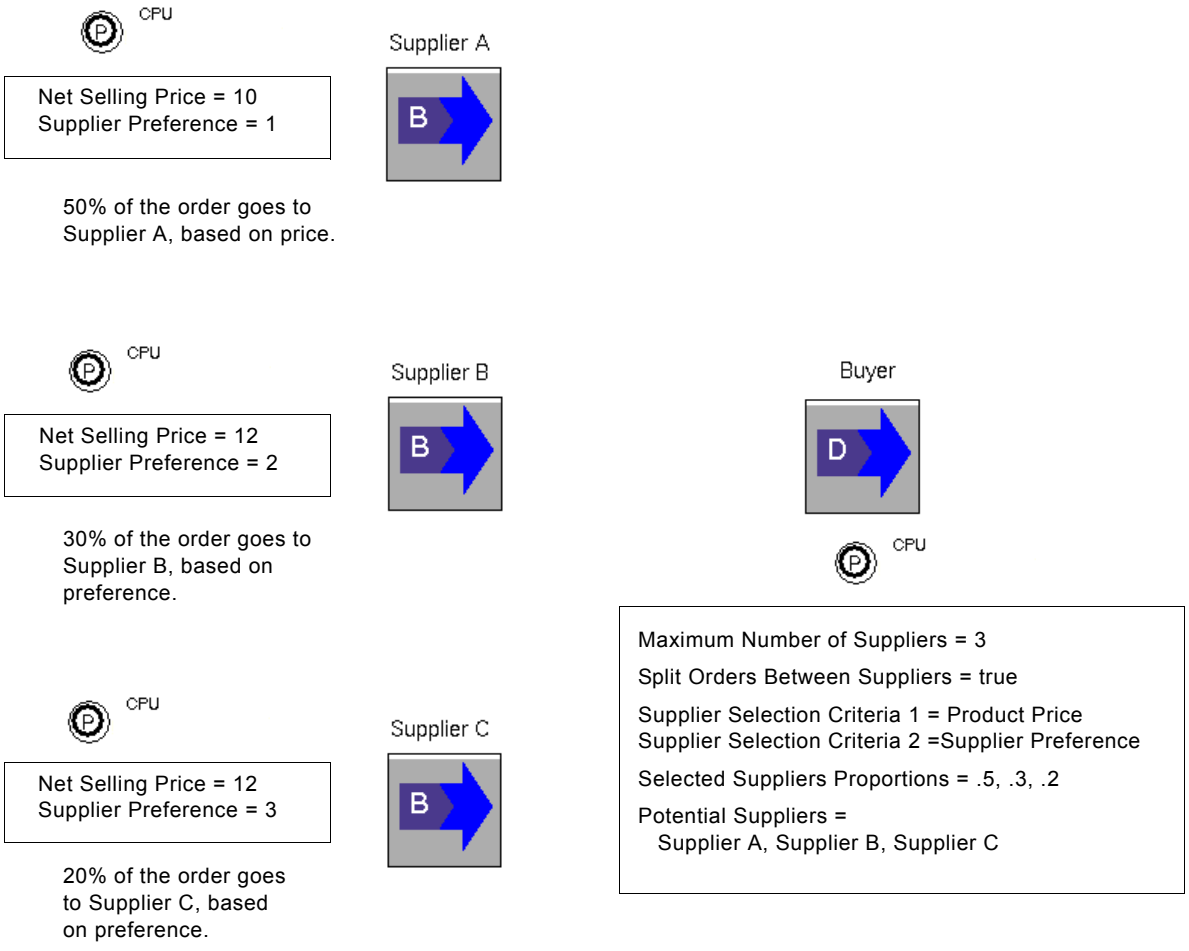
This example shows a similar situation in which the buyer issues awards to three potential suppliers, where two suppliers have the same Net Selling Price. In this case, the buyer sorts suppliers, based on the secondary sort attribute, which is Supplier Preference. The buyer places orders with a single supplier, based on probabilities.

Issuing Awards to Three Suppliers and Placing an Order with a Single Supplier



Suppose you decide to split the order among the three qualified suppliers, so you configure Maximum Number of Suppliers as 3 and Split Orders Between Suppliers as true. In this case, the Selected Suppliers Proportions parameter determines the proportion of the order that each supplier receives. Suppose you have specified the Selected Suppliers Proportions parameter such that 50% of the order should go to the first supplier, 30% should go to second supplier, and 20% should go to the third supplier. If Supplier A has the lowest product price and if Suppliers B and C have the same product price, the buyer gives 50% of the order to Supplier A, based on price, 30% of the order to Supplier B, based on preference, and 20% of the order to Supplier C, based on preference.

Issuing Awards to Three Suppliers and Splitting the Order Among All Suppliers



Analyzing the Performance of a Model with Multiple Suppliers

To view metrics specifically related to contracts, choose View > Contracts Metrics.

To analyze the performance of a model that uses multiple suppliers, it is helpful to think about the process in terms of the upstream source subprocess, the make subprocess, and the downstream delivery subprocess. Each of these Level 2 subprocesses has metrics you can analyze.

- Upstream source subprocess

  ES: Enable Source category:

  - Orders Sent and Change Orders Sent
  - Product Shipments Received
  - Contracts Established
  - Supplier On-Time Performance (%)

  Source category:

  - Orders Sent and Change Orders Sent
  - Product Shipments Received
  - Product Shipment Lead Time
  - Financial Obligations, Financial Payments within Financial Period, and Financial Payments Total
  - Receiving Metric, Verification Metric, Transfer Metric, Create Customer Order Metric, and Invoice Metric costs

  P2: Plan Source category:

  - Number of Planning Periods

  Source products:

  - Quantity Ordered and Quantity Received
  - Purchase Cost
  - Products on Order, Received Inventory Level, Incoming Inventory Level, and Inventory Level
  - Received Fulfillment Time

- Make subprocess

  Make categories:

  - Build Orders Started and Build Orders Completed
  - Make Cycle Time
  - Production Material Handling cost

  P3: Plan Make category:

  - Number of Planning Periods

  Source products:

  - Awaiting Orders
  - Work in Progress

  Delivery products:

  - Total Products Accepted
  - Total Products Rejected

- Downstream delivery subprocess

  ED: Enable Deliver category:

  - Orders Received and Change Orders Received
  - Product Shipments Sent
  - Contracts Established
  - Delivery Performance (%)
  - Perfect Order Fulfillment (%)

  Deliver categories:

  - Orders Received and Change Orders Received
  - Product Shipments Sent
  - Fill Rates (%)
  - Ready to Ship Time
  - Order Entry to Ship Time
  - Financial Bookings, Financial Outstanding, Financial Collections within Financial Period, and Financial Collections Total
  - Order Entry Metric, Order Fulfillment Metric, Pick Metric, Packing Metric, Transportation Metric, Customer Invoicing Metric, and Customer Collections Metric costs

Delivery products:

- Quantity to Deliver and Quantity Shipped
- Awaiting Orders, Products On Order, Received Inventory Level, Incoming Inventory Level, Inventory Level, In Transit Inventory Level, Shipped Inventory Level, and Manufacturing Batch Size
- Order Fulfillment Lead Time

18

Configuring Role Details for Multiple Products

Describes how to configure the detail of supplier and buyer roles to source, make, and/or deliver multiple products.

Introduction

By default, each role detail contains a single Source, Make, and/or Deliver category for each planning strategy—stock, make-to-order, and engineer-to-order. This means that if the role sources, makes, and/or delivers multiple products that use the same planning strategy:

- Each source product uses the same Source category parameters.
- Each delivery product uses the same Make and/or Deliver category parameters, depending on the role.

It also implies that each Source, Make, and/or Deliver category calculates performance, financial, and cost parameters for all source and/or delivery products together.

You might have a situation in which a source and/or delivery product uses the same planning strategy but different modeling parameters, such as build selection, order selection, or cost incurred parameters. You also might want to track category metrics separately for each product that a role sources and/or delivers, such as Inventory Level.

In these cases, you can add Source, Make, and/or Deliver categories to the role detail for each source and/or delivery product that the role sources or makes

and/or delivers. You then assign a specific product to each category on the role detail.

Note When adding categories to the role detail, you must create one category for each product composite that uses the same planning strategy; you cannot use the same category for some product composites and separate categories for others.

If the source and/or delivery products use the same planning strategy but different timing parameters only, you can configure multipliers for the timing parameters of each product composite. In this case, there is no need to add multiple categories to the role detail. For details, see Configuring Multipliers for Timing Parameters.

If the source and/or delivery products use different planning strategies only, you can use the existing categories on the role detail, as described in Using Alternative Planning Strategies.

To configure the role detail for multiple products, you add multiple categories to the role detail and connect multiple categories of the same type through the category routers on the role detail.

Caution Whenever you add categories to the role detail, you should click the Upgrade option for the role "off;" otherwise, when you install a new version of e-SCOR and upgrade the model, the new version will overwrite your changes to the role detail to use the default role template. For details, see Upgrading Models.

See Also Viewing Role Details.

Adding Multiple Categories to Role Details

If each delivery product associated with a Base Manufacturer, Distributor, or Manufacturer role has different values for its Make and/or Deliver category parameters, you can create multiple Make and/or Deliver categories on the role detail for each delivery product.

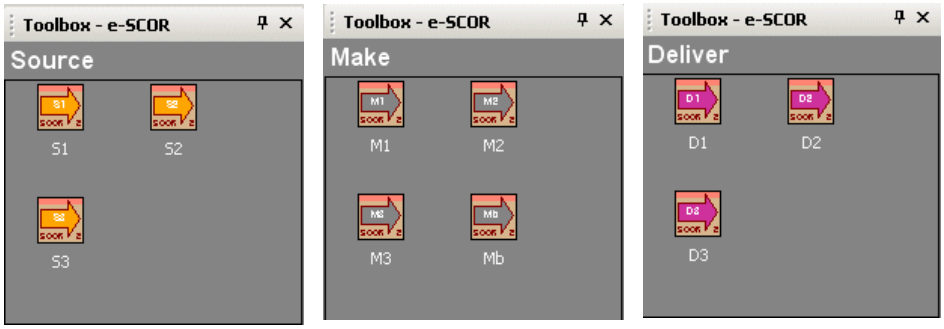
Similarly, if each source product associated with a Distributor, Manufacturer, or Consumer role has different values for its Source category parameters, you can create multiple Source categories on the role detail for each source product.

To add multiple categories to role details:

1 Configure a buyer or supplier role to source, make, and/or deliver multiple products, depending on the type of role.

For details, see Configuring the Products a Role Sources and Delivers.

2 Display the e-SCOR toolbox and display the appropriate palette — Source, Make, or Deliver:



3 Display the role detail.

4 For each source or delivery product, select from the palette a category that uses the same planning strategy as the existing category and place it just below the existing categories on the role detail.

For example:

- To configure a Base Manufacturer to make multiple delivery products, select an Mb: Make Product category.
- To configure a Distributor to deliver multiple stock products, select a D1: Deliver Stocked Product category.
- To configure a Consumer, Distributor, or Manufacturer role to source multiple stock products, select an S1: Source Stock Products category.
- To configure a Manufacturer to make and deliver multiple stock products, select an M1: Make-to-Stock category and a D1: Deliver Stocked Product category.

5 Connect the new category through the category routers and paths on either side of the existing categories.

A Base Manufacturer role has only a downstream category router on its detail, and a Consumer role has only an upstream category router.

Note Ensure that the input and output paths on the upstream and downstream sides of the category go in the same direction and connect to the same objects as the existing categories. For an example, see Example of Adding Multiple Categories to a Manufacturer Role.

6 For each category, configure the Product Selection parameters, as follows:

   a Click the All Products option off.

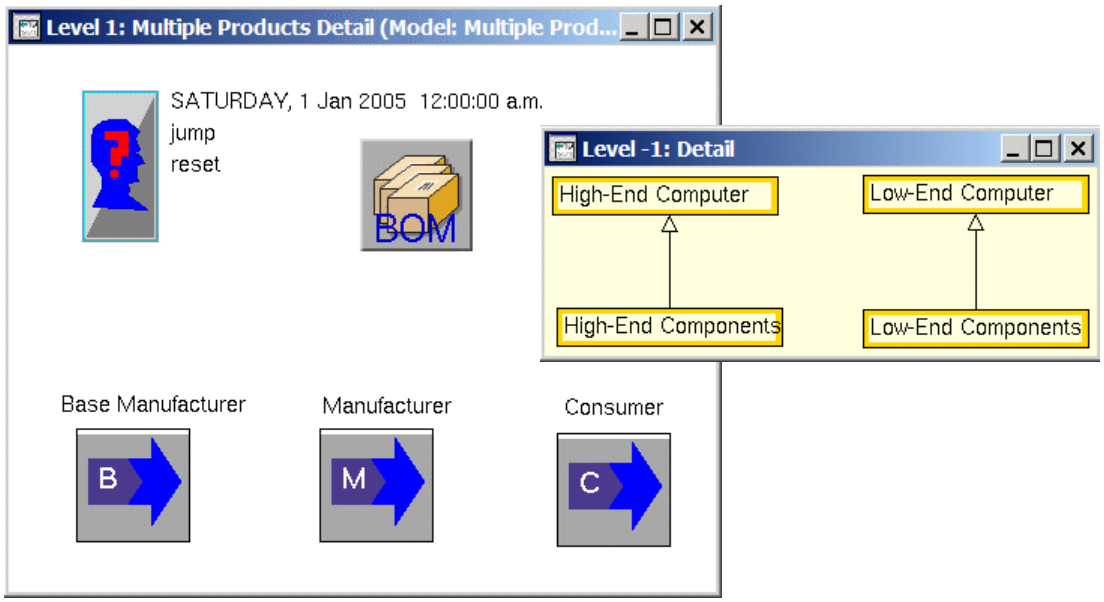
   b Configure the Specific Product Name parameter to be a unique source or delivery product by choosing a product from the dropdown list.

7 Configure the parameters of each category, as appropriate for the assigned source or delivery products.

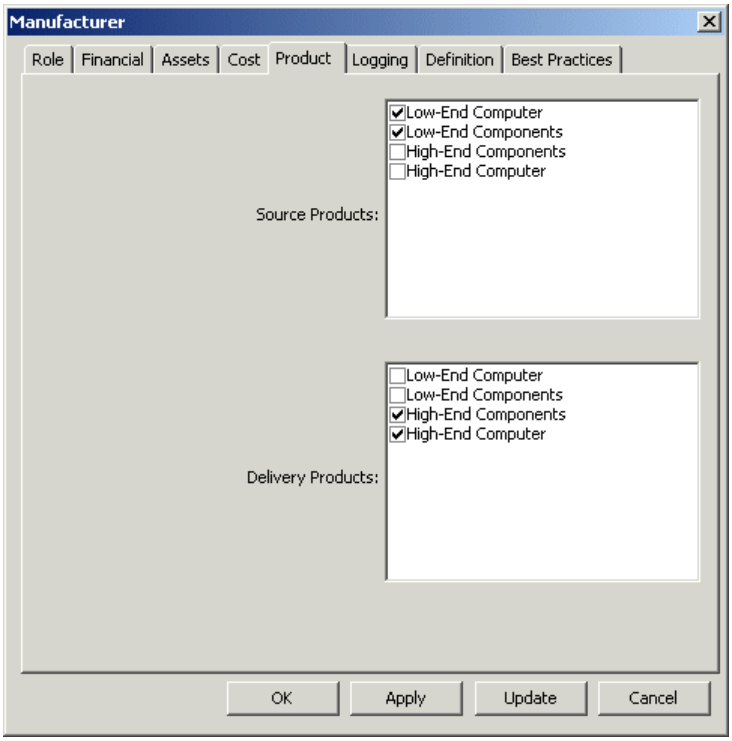
Note When adding multiple categories to the role detail, we recommend that you configure duration parameters separately for each category rather than configuring multipliers on the product composites.

Example of Adding Multiple Categories to a Manufacturer Role

This figure shows a model and associated product structure in which the Manufacturer role makes high-end and low-end computers from high-end and low-end components:



Here is the Product tab for the Manufacturer role, which sources high-end and low-end components, and delivers high-end and low-end computers:

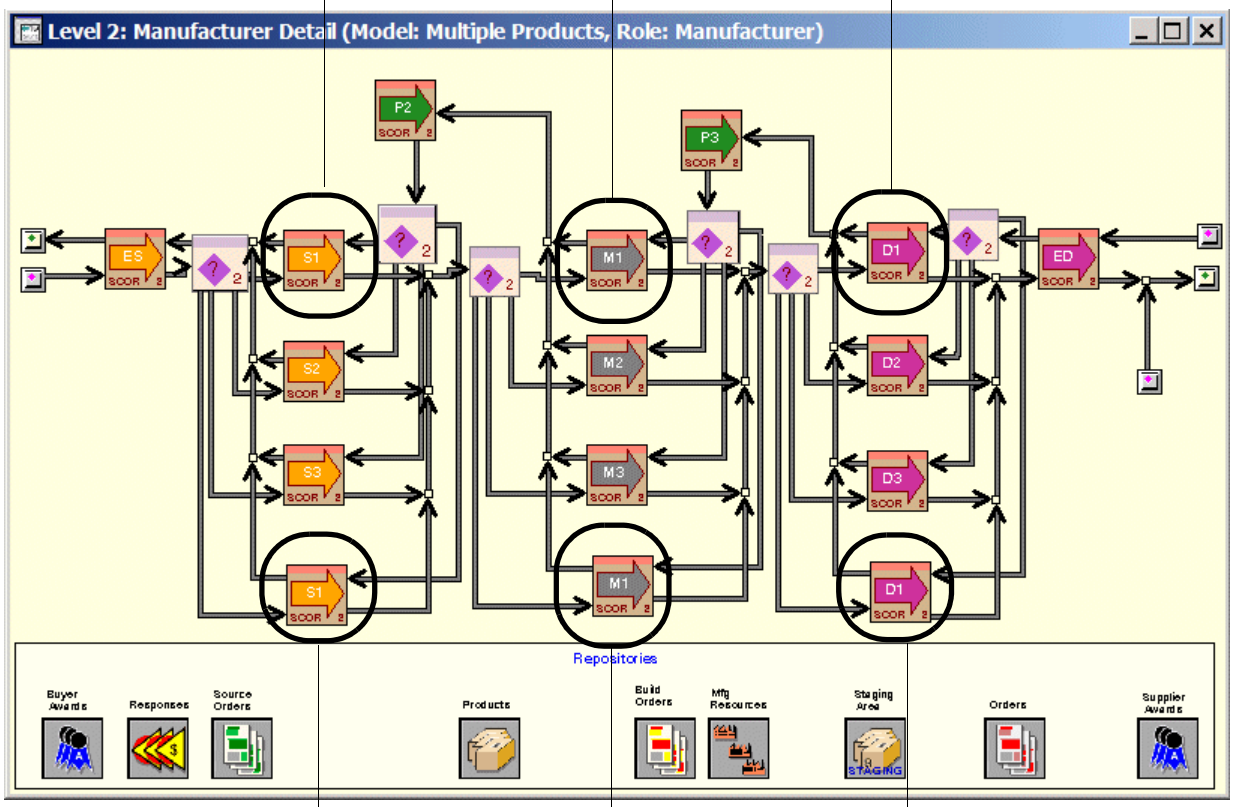


This figure shows the detail of the Manufacturer role, which uses separate S1 categories for high-end and low-end components, and separate M1 and D1 categories for the high-end and low-end computers. Each S1, M1, and D1 category configures the Specific Product Name and uses different values for various parameters.

Specific Product Name = Low-End Computer
Build Selection
First Sort Direction = Smallest
First Sort Criteria = Internal Order Number

Specific Product Name = Low-End Components
Receiving Cost = 5
Verification Cost = 5
Transfer Cost = 5

Specific Product Name = Low-End Computer
Order Selection
First Sort Direction = Smallest
First Sort Criteria = Internal Order Number



Specific Product Name = High-End Components
Receiving Cost = 10
Verification Cost = 10
Transfer Cost = 10

Specific Product Name = High-End Computer
Order Selection
First Sort Direction = Biggest
First Sort Criteria = Total Cost

Specific Product Name = High-End Computer
Build Selection
First Sort Direction = Biggest
First Sort Criteria = Total Cost

19

Using Pull and Push Planning Modes

Describes how to use pull and push planning modes to determine when to source, make, and deliver products, and how much to source, make, and deliver.

Introduction

The planning mode determines:

- *Which role* and, therefore, which *planning process* takes precedence in determining when to source products, and when to make and deliver products.
- *Which role* and, therefore, which *product composite* takes precedence in determining how many products to source, and how many delivery products to make and deliver.

The available planning modes are:

- Pull planning mode — A downstream buyer role's source planning takes precedence over an upstream supplier role's "delivery planning" by placing orders with upstream suppliers for its components.
- Push planning mode — An upstream supplier role's "delivery planning" takes precedence over a downstream buyer role's source planning by delivering finished products to its downstream buyers when they are available.

By "delivery planning," we mean the planning that determines when a role delivers products to buyers, which differs depending on the role. For a Distributor role, the role's source planning determines its "delivery planning," whereas, for a Base Manufacturer or Manufacturer role, the role's make planning determines its "delivery planning."

When you run the simulation, each role behaves differently in each planning mode. For each role, you need to:

- Understand what happens when the model runs in pull mode.
- Understand what happens when the model runs in push mode.

You can combine pull and push planning modes within a role, for example, a Manufacturer role might use pull mode to source components and push mode to deliver finished products, or vice versa.

The only planning strategy available in push mode is stock. The number of components a role sources in push mode depends on the forecast estimated amount parameter, which you configure for both the role's source product and for the delivery product of the upstream supplier role. The amount of finished product a role makes and delivers in push mode depends on the amount you configure in the role's delivery product.

Once you have configured the model to use pull or push planning, you can analyze the performance of the model that uses pull and push planning.

Using Pull Mode Planning

To use pull mode planning, you configure:

- Initial order demand for customer orders that originate in the Consumer role.
- Order parameters for product composites.
- Planning parameters for product composites, depending on the planning strategy: stock/replenishment, stock/forecast, stock/R-Q, stock/Q, make-to-order, or engineer-to-order.

- Planning parameters for the Plan categories, P2: Plan Source or P2: Plan Make categories, depending on the role.
- Cost parameters related to orders for Source and Deliver categories.

Configuring Initial Order Demand

In pull mode, you configure initial order demand for the overall supply chain, based on customer orders, which originate in each Consumer role in the model. The model uses source and make planning to generate replenishment and build orders throughout the supply chain, based on the initial order demand.

To configure initial order demand:

➔ Display the properties dialog of each source product of each Consumer role in the model, click the Demand tab, and configure these parameters:

- Demand Start Time
- Demand Stop Time
- Demand Order Duration
- Demand Order Size

For a description of these parameters, see Configuring the Source Category.

Configuring Order Parameters for Product Composites

In pull mode, you configure parameters related to orders for source and delivery products.

To configure order parameters for product composites:

1 Display the properties dialog for each source and delivery product in the model, click the General tab, configure this parameter to determine the planning strategy the role uses for sourcing, making, and delivering products:

Order Type

For a description of the Order Type parameter for delivery products, see General Tab, and for a description of Order Type for source products, see General Tab.

2 Display the properties dialog for each source product in the model, click the Supplier tab, and configure these parameters related to orders:

- Desired Turnaround
- Fulfillment Preference
- Push Stock Product = false

For a description of these parameters, see Supplier Tab.

Configuring Planning Parameters for Product Composites

In pull mode, when the model creates its initial customer orders, it uses source and make planning to determine the size of each replenishment or build order.

If a role uses a stock/replenishment planning strategy, the default, you configure planning parameters for source and delivery products related to inventory. If a role uses a stock/forecast planning strategy, you configure planning parameters for source products related to contracts.

If a role uses a make-to-order or engineer-to-order planning strategy for sourcing, making, and/or delivering products, the role computes replenishment and/or build order size, based on the order size of the downstream buyer role.

To configure planning parameters for product composites:

➔ Display the properties dialog for each source and delivery product in the model and configure these parameters, depending on the planning strategy:

- If a role uses a stock/replenishment, stock/R-Q, or stock/Q planning strategy, click the Inventory tab and configure these planning parameters for source and delivery products:
  - Starting Product Inventory Level
  - Maximum Inventory Level
  - Inventory Control Strategy
  - Safety Stock
  - Minimum Reorder Quantity

  For a description of these parameters, see Inventory Tab.
- If a role uses a stock/forecast planning strategy, click the Supplier tab and configure these planning parameters for source products:
  - Contract Start Time
  - Contract Length
  - Contract Response Cycle Time
  - Forecast Estimated Amount
  - Contract Repetition Count

  For a description of these parameters, see Supplier Tab.

See Also

Using an Engineer-to-Order Planning Strategy.

Using a Make-to-Order Planning Strategy.

Using a Stock/Replenishment Planning Strategy.

Using a Stock/Forecast Planning Strategy.

Configuring Planning Parameters for the Plan Category

In pull mode, roles uses source or make planning, depending on the role, to determine the size of replenishment and build orders for source and delivery products, respectively.

If the role uses a stock planning strategy, you configure planning parameters for the P2: Plan Source or P3: Plan Make categories, depending on the role, as described in Configuring the Stock Planning Strategy.

For a Manufacturer role, which uses both source and make planning, you must coordinate the timing of each type of planning, as described in Coordinating Source and Make Planning.

To configure planning parameters for the Plan category:

1. Show the detail of each Base Manufacturer, Distributor, and Manufacturer role in the model.
2. Display the properties dialog for the P2: Plan Source and/or P3: Plan Make categories on the role detail, depending on the role, and configure these parameters:
   - Planning Period
   - Initial Plan Delay
   - Continuous Planning
   - Compensate for Yield

For a description of these parameters, see Configuring the Plan Category.

Configuring Cost Parameters Related to Orders

In pull mode, you can configure the cost parameters related to orders.

To configure cost parameters related to orders:

1. For each Base Manufacturer, Distributor, and Manufacturer role in the model, show the detail of the role, display the properties dialog of the Deliver category, click the Cost tab, and configure the cost parameters.
2. For each Distributor, Manufacturer, and Consumer role in the model, show the detail of the role, display the properties dialog of the Source category, click the Cost tab, and configure the cost parameters.

For a description of these parameters, see Configuring the Deliver Category and Configuring the Source Category.

What Happens When the Simulation Runs in Pull Mode

In pull mode, each role sources, makes, and delivers products differently, as appropriate for the role to determine:

- *When* the role sources, makes, and/or delivers its products.
- *How much* product the role sources, makes, and delivers.

You need to understand what happens when the simulation runs in pull mode for these roles:

- Distributor role
- Manufacturer role
- Base Manufacturer role

The Consumer role determines when it sources products, based on demand order parameters that you configure in the source product.

The following sections provide a description of the behavior of each role in pull mode. They also provide a diagram that maps each of these planning tasks to the relevant process categories and to the source and delivery products of the role.

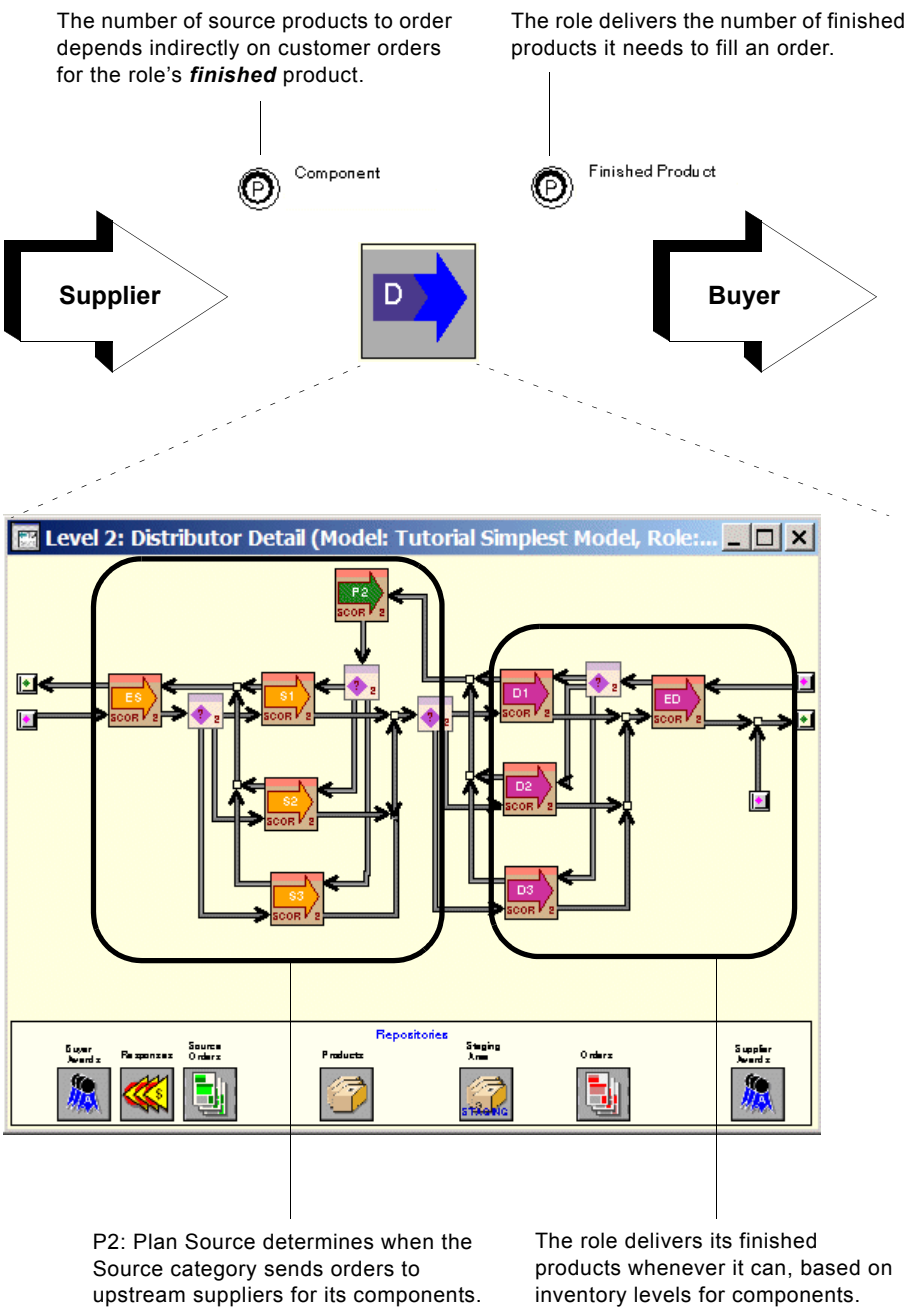
Distributor Role in Pull Mode

In pull mode, a Distributor role determines when to source its components and deliver its finished products, and how much to source and deliver, as follows:

Process Category	When	How Much
Source	Sources components, based on source planning cycle (P2: Plan Source).	The order size depends indirectly on orders or forecasts for finished products, which the Deliver category sends upstream as replenishment orders for components.
Deliver	Delivers finished products when it can, based on inventory levels for components.	The amount to deliver depends on customer or replenishment orders for finished products.

The following figure illustrates a Distributor role that uses pull mode:

Distributor Role in Pull Mode (Default)



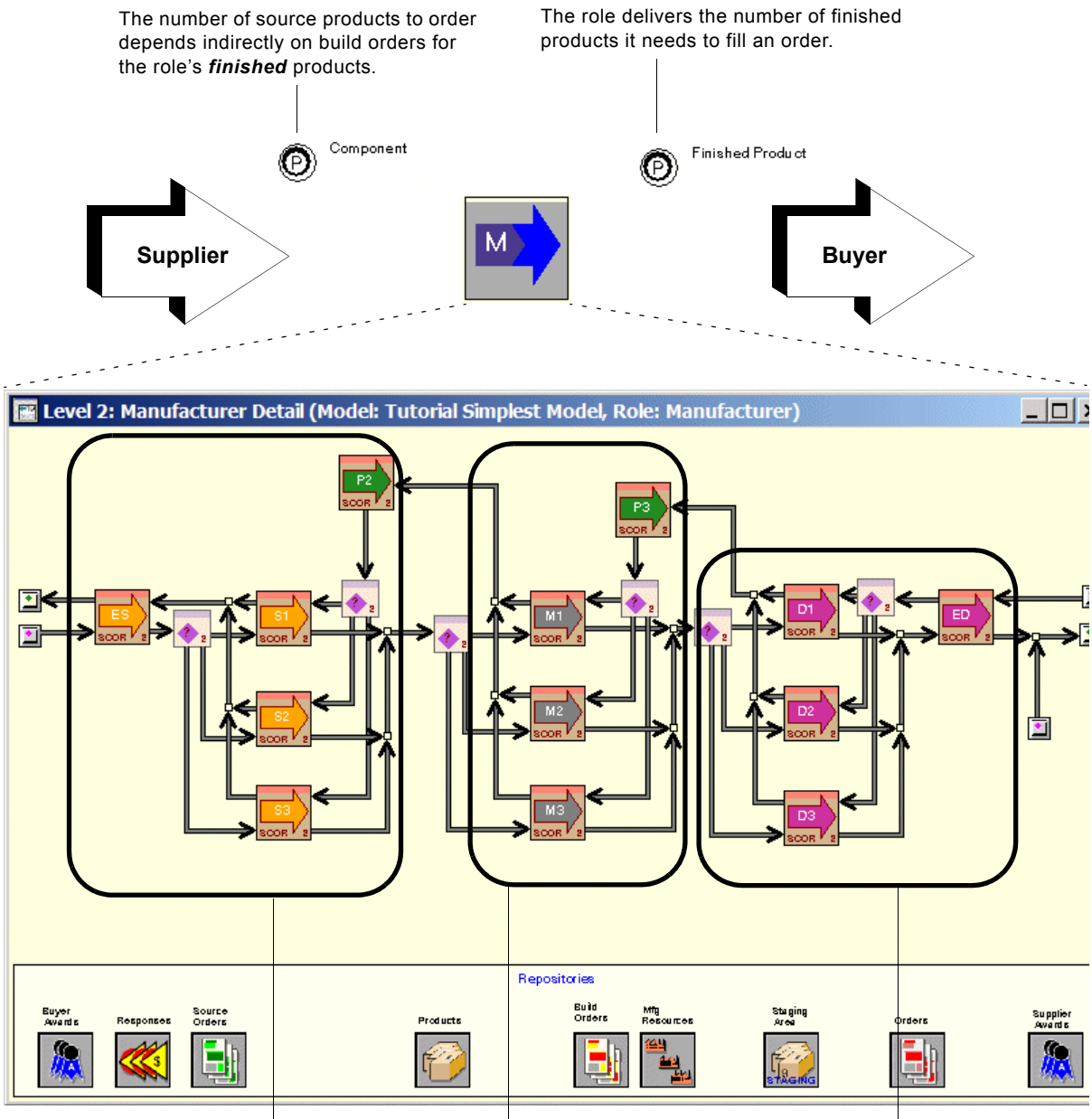
Manufacturer Role in Pull Mode

In pull mode, a Manufacturer role determines when to source its components, and make and deliver its finished products, and how much to source, make, and deliver, as follows:

Process Category	When	How Much
Source	Sources components, based on the source planning cycle (P2: Plan Source).	The order size depends indirectly on build orders for finished products, which the Make category sends upstream to the Source category as replenishment orders for components.
Make	Makes finished products, based on the make planning cycle (P3: Plan Make).	The amount to make depends indirectly on customer or replenishment orders for finished products, which the Deliver category sends upstream to the Make category as build orders for finished products.
Deliver	Delivers finished products whenever it can, based on inventory levels for finished products.	The amount to deliver depends on customer or replenishment orders for finished products.

The following figure illustrates a Manufacturer role that uses pull mode:

Manufacturer Role in Pull Mode (Default)



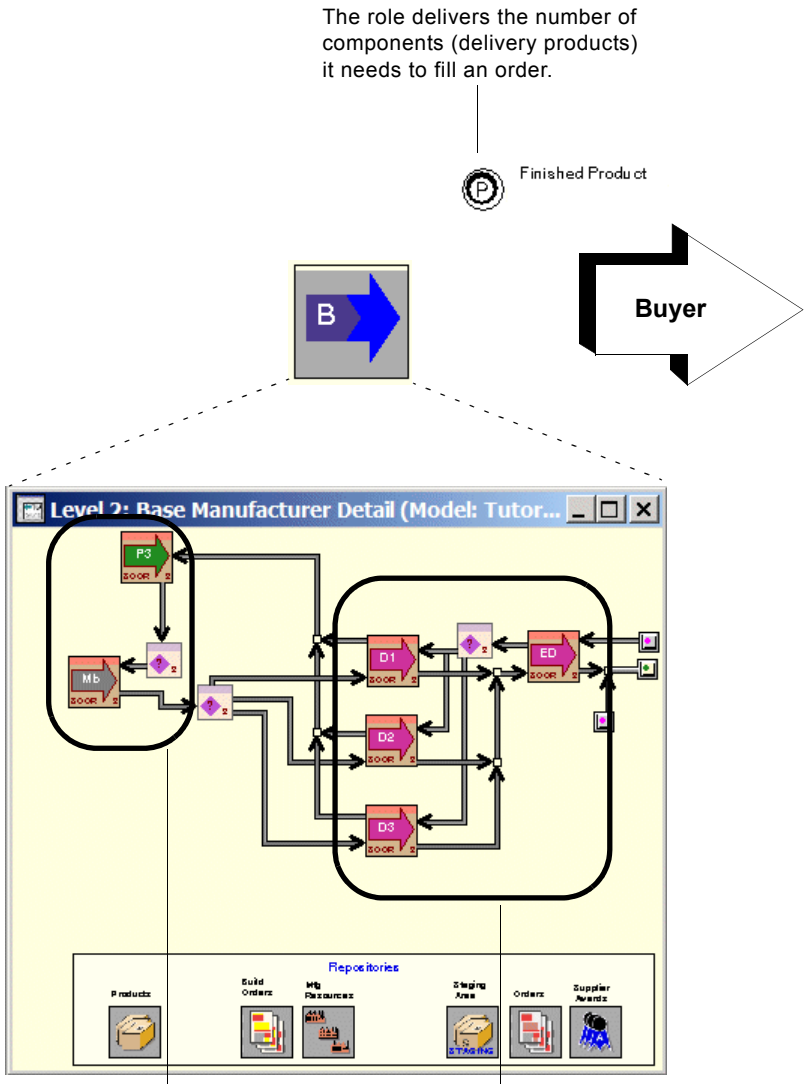
Base Manufacturer Role in Pull Mode

In pull mode, a Base Manufacturer role determines when to make and deliver its finished products, and how much to make and deliver, as follows:

Process Category	When	How Much
Make	Makes finished products, based on the make planning cycle (P3: Plan Make).	The amount to make depends indirectly on customer or replenishment orders for finished products, which the Deliver category sends upstream to the Make category as build orders for finished products.
Deliver	Delivers finished products whenever it can, based on inventory levels for finished products.	The amount to deliver depends on customer or replenishment orders for finished products.

The following figure illustrates a Base Manufacturer role that uses pull mode:

Base Manufacturer Role in Pull Mode (Default)



P3: Plan Make determines when the Deliver category sends build orders to the Make category for its finished products.

The number of finished products to build depends indirectly on customer or replenishment orders for the role's finished products.

The role delivers its finished products whenever it can, based on inventory levels for finished products.

Using Push Mode Planning

To use push mode planning, you configure:

- The number of delivery products to push to downstream buyers.
- Which delivery products to push first, given a supplier that pushes multiple delivery products to downstream buyers.
- The amount to push when components are shared among multiple delivery products.

The model computes how much is pushed for delivery products.

The only planning strategy available in push mode is stock, which behaves differently depending on the finished products being pushed and the number of downstream buyers.

Configuring the Amount to Push

You configure the number of delivery products a supplier role pushes to a buyer role by configuring:

- Contract parameters in the downstream buyer role's source product.
- Planning parameters in the upstream supplier role's P2: Plan Source or P3: Plan Make categories, depending on the role.

The supplier pushes the calculated amount each planning period.

The supplier computes the amount to push, based on the Forecast Estimated Amount and Contract Length of the buyer role's source product, and the Planning Period of the supplier role's Plan category, according to this formula:

(Planning Period / Contract Length) x Estimated Forecast Amount

For example, suppose the buyer specifies an 8 week contract and an estimated amount of 800 products, and suppose the supplier has a 1 week planning period. Assuming the contract coincides with the planning period, the supplier would push 100 products each week for 8 weeks. If the contract does not coincide with the planning period, the supplier pushes the balance of the calculated amount during the next planning period.

You explicitly configure the source product of the buyer role to use push planning.

When configuring a role to use push mode, the role's source product must use stock planning.

To configure the amount to push:

➔ Display the properties dialog of the source product for the buyer role, click the Supplier tab, and configure these parameters:

- Push Stock Product = true
- Contract Start Time
- Contract Length
- Contract Response Cycle Time
- Forecast Estimated Amount
- Contract Repetition Count

For a description of these parameters, see Supplier Tab.

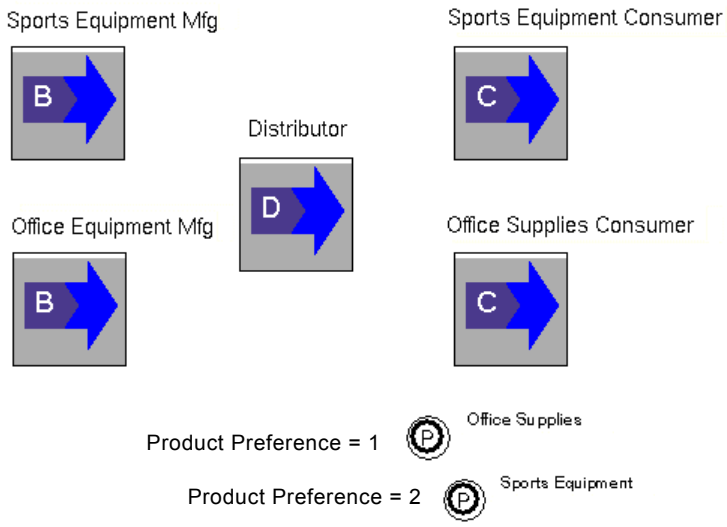
Configuring Which Delivery Products to Push First

By default, if a supplier is pushing multiple delivery products to downstream buyers, the supplier pushes products in a random order. You can configure the Product Preference parameter of the supplier's delivery product to determine which product to deliver first. The Product Preference is a number that represents the priority of the delivery product of the supplier role, where the lower the number the higher the priority.

If a supplier is pushing multiple delivery products downstream and those products are available at the same time, the supplier determines which finished product to deliver first, based on the Product Preference parameter of each delivery product. It pushes products with a higher Product Preference (smaller number) before products with a lower Product Preference (larger number).

In the following figure, a Distributor role delivers office supplies and sports equipment. If both finished products are available at the same time, the role

delivers office supplies before sports equipment, because office supplies has a higher Product Preference.



To configure the amount to push given multiple delivery products:

➔ Display the properties dialog of the delivery product of the supplier role that is pushing products to downstream buyer roles, click the General tab, and configure this parameter of each delivery product to determine the relative priority of each product:

Product Preference

For a description of this parameter, see General Tab.

Configuring the Amount to Push When Components are Shared

Suppose a buyer is delivering multiple products that share one or more components, and upstream suppliers are pushing these components downstream onto the buyer. By default, the buyer uses the shared components to deliver finished products in a random order. You can configure the Product Preference parameter of the buyer's delivery product to determine which components the buyer uses first.

The Product Preference is a number that represents the priority of the buyer's delivery product, where the lower the number the higher the priority

If the number of components that the upstream supplier pushes exceeds the requirements of the downstream buyer, the buyer places the excess in inventory, which the buyer might or might not use. If the upstream supplier does not push

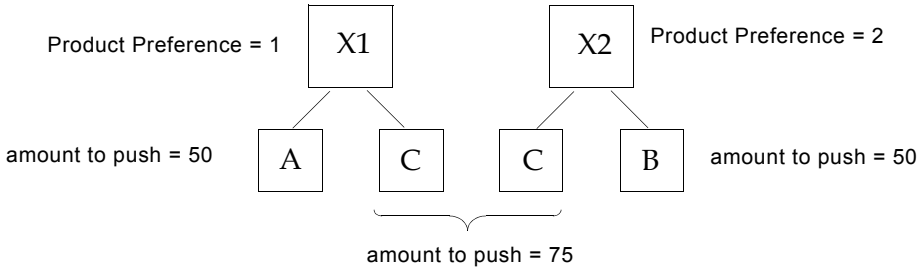
enough components onto the buyer, the buyer cannot deliver the desired number of finished products.

To illustrate, suppose your model has a Distributor role that delivers two finished products, X1 and X2, and sources three components, A, B, and C. The product specification for X1 requires components A and C, and the product specification for X2 requires components B and C; therefore, component C is shared.

Assume you configure the Product Preference for X1 to be 1 and the Product Preference for X2 to be 2. This means the component requirements for X1 determine the number of C components the supplier pushes downstream.

Suppose the suppliers for products A, B, and C attempt to push their products downstream, given a calculated amount to push of 50, 50, and 75, respectively.

This figure illustrates the product hierarchy, product preference, and amount to push for this situation, where component C is shared:



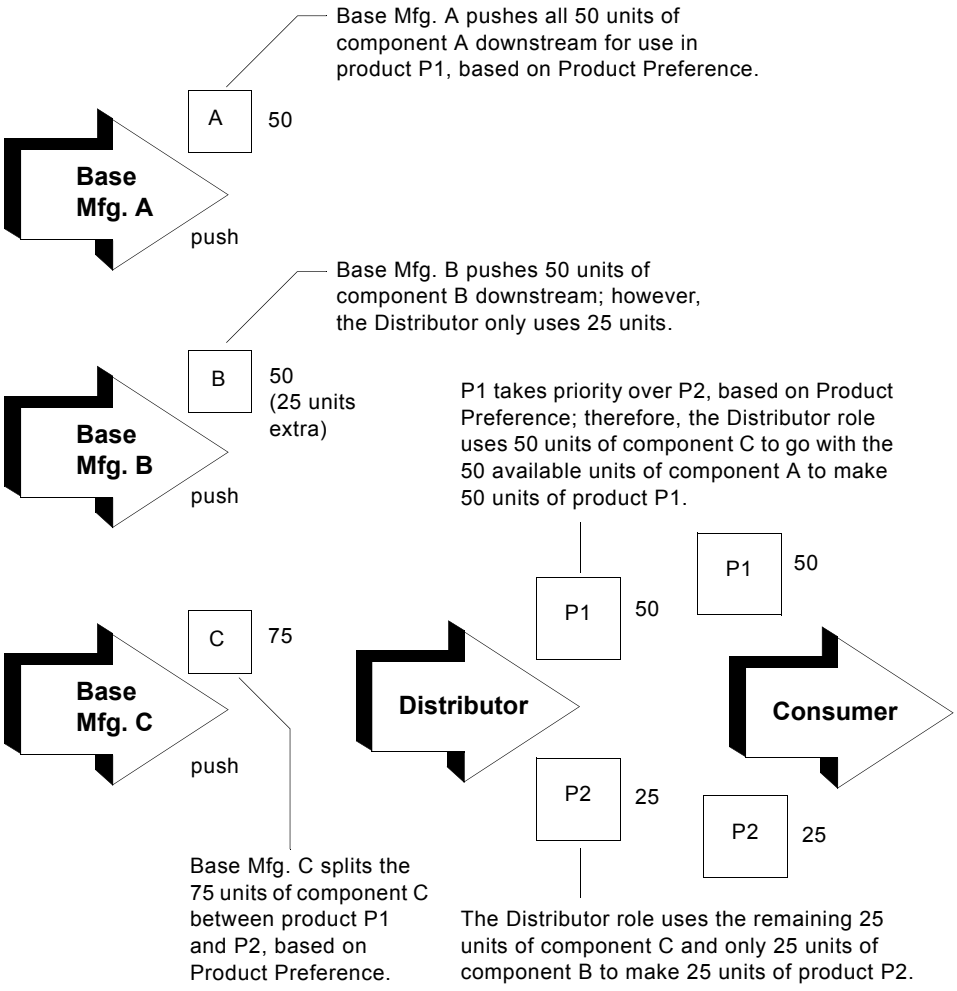
Given this configuration, the questions are:

- How many C components does product X1 use compared with product X2?
- How many X1 and X2 products does the Distributor role deliver?
- How many B components does the Distributor role actually use?

The results are as follows:

- The Distributor role uses 50 C components to assemble product P1 and only 25 C components to assemble product P2, based on Product Preference.
- The Distributor role delivers 50 P1 products, but it delivers only 25 P2 products, because that is all it can assemble from the remaining C components.
- Base Manufacturer B pushes 50 B components downstream; however, the Distributor role only uses 25 B components to assemble P2 products. The rest go into inventory.

The following figure illustrates the number of components each Base Manufacturer role pushes and the resulting number of finished products the Distributor role delivers, given the shared component C:



To configure the amount to push given shared components:

1 Configure the downstream buyer role's source products to be pushed by its upstream supplier roles.

For details, see Configuring the Amount to Push.

2 Display the properties dialog of the downstream buyer role's delivery products, click the General tab, and configure this parameter to determine the relative priority of each delivery product, which determines the amount of each source product the buyer actually uses, given the calculated amount to push:

Product Preference

For a description of this parameter, see General Tab.

Determining How Much is Pushed

The model computes the Pushed Inventory Level metric for delivery products, which is the number of products that an upstream supplier actually pushes onto a downstream buyer.

To determine how much gets pushed:

➔ Display the properties dialog of the delivery product of the supplier role that is pushing products to downstream buyers, click the Metrics tab, and view the Pushed Inventory Level metric.

For a description of this parameter, see Metrics Tab.

What Happens When the Simulation Runs in Push Mode

In push mode, each role sources, makes, and delivers products differently, as appropriate for the role to determine:

- *When* the role sources, makes, and/or delivers its products.
- *How much* product the role sources, makes, and delivers.

You need to understand what happens when the simulation runs in push mode for these roles:

- Distributor role
- Manufacturer role
- Base Manufacturer role

The Consumer role simply accepts the number of products that the supplier pushes.

The following sections provide a description of the behavior of the role in push mode. They also provide a diagram that maps each of these planning tasks to the relevant categories and to the source and delivery products of the role.

The descriptions of the behavior of the role in push mode make the following assumptions:

- The supplier is pushing its products to a single downstream buyer.
- The supplier is pushing a single product downstream.
- The buyer is delivering a single product to its downstream buyers.

For information on what happens under different sets of assumptions, see:

- Configuring Which Delivery Products to Push First.
- Configuring the Amount to Push When Components are Shared.

Distributor Role in Push Mode

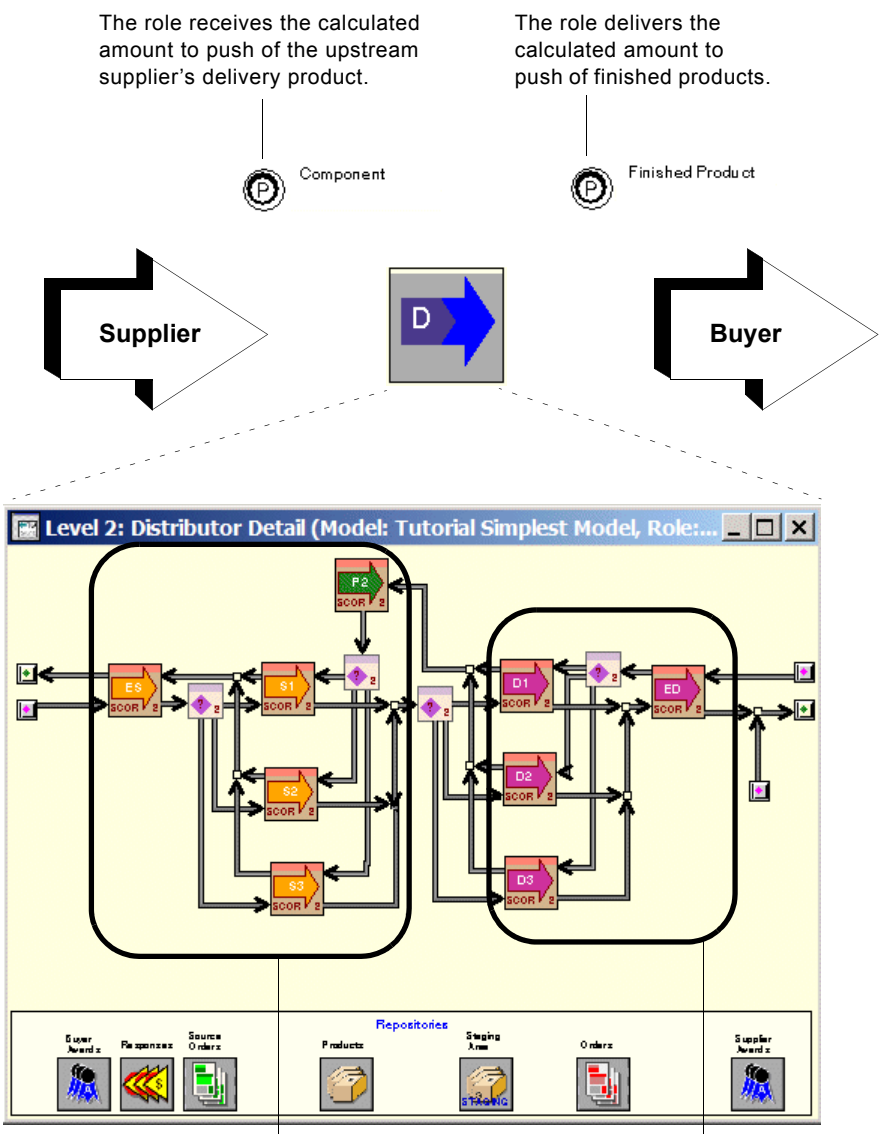
In push mode, a Distributor role determines how many components to source, when to deliver finished products, and how much to deliver, as follows:

Process Category	When	How Much
Source	Source planning is ignored. Instead, the role receives components whenever the upstream supplier pushes them downstream.	Receives the calculated amount to push of the upstream supplier's delivery product.
Deliver	Creates internal replenishment orders for finished products, based on the source planning cycle (P2: Plan Source). Delivers finished products, based on inventory levels for components.	Delivers the calculated amount to push of the role's delivery product, given default assumptions.

The following figure illustrates a Distributor role that uses push mode for sourcing components and delivering finished products. The numbers represent

the sequence of events that occur when sourcing and delivering products in push mode for a Distributor role.

Distributor Role in Push Mode



Manufacturer Role in Push Mode

In push mode, a Manufacturer role determines how many components to source, when to make and deliver finished products, and how many finished products to make and deliver, as follows:

Process Category	When	How Much
Source	Source planning is ignored. Instead, the role receives components whenever the upstream supplier pushes them downstream.	Receives the calculated amount to push of the upstream supplier's delivery product. The number of components the role receives indirectly determines how many finished products the role makes and delivers.
Make	Creates internal build orders for finished products, based on available components and the make planning cycle (P3: Plan Make).	Makes as many finished products as it has build orders, which depends indirectly on inventory levels for components.
Deliver	As it creates internal build orders, creates internal replenishment orders for finished products, based on build-order size, which takes place on the same make planning cycle (P3: Plan Make) as the build orders. Delivers finished products whenever it can, based on inventory levels for finished products.	Delivers as much as it can, based on build orders for finished products, which depends indirectly on inventory levels for components.

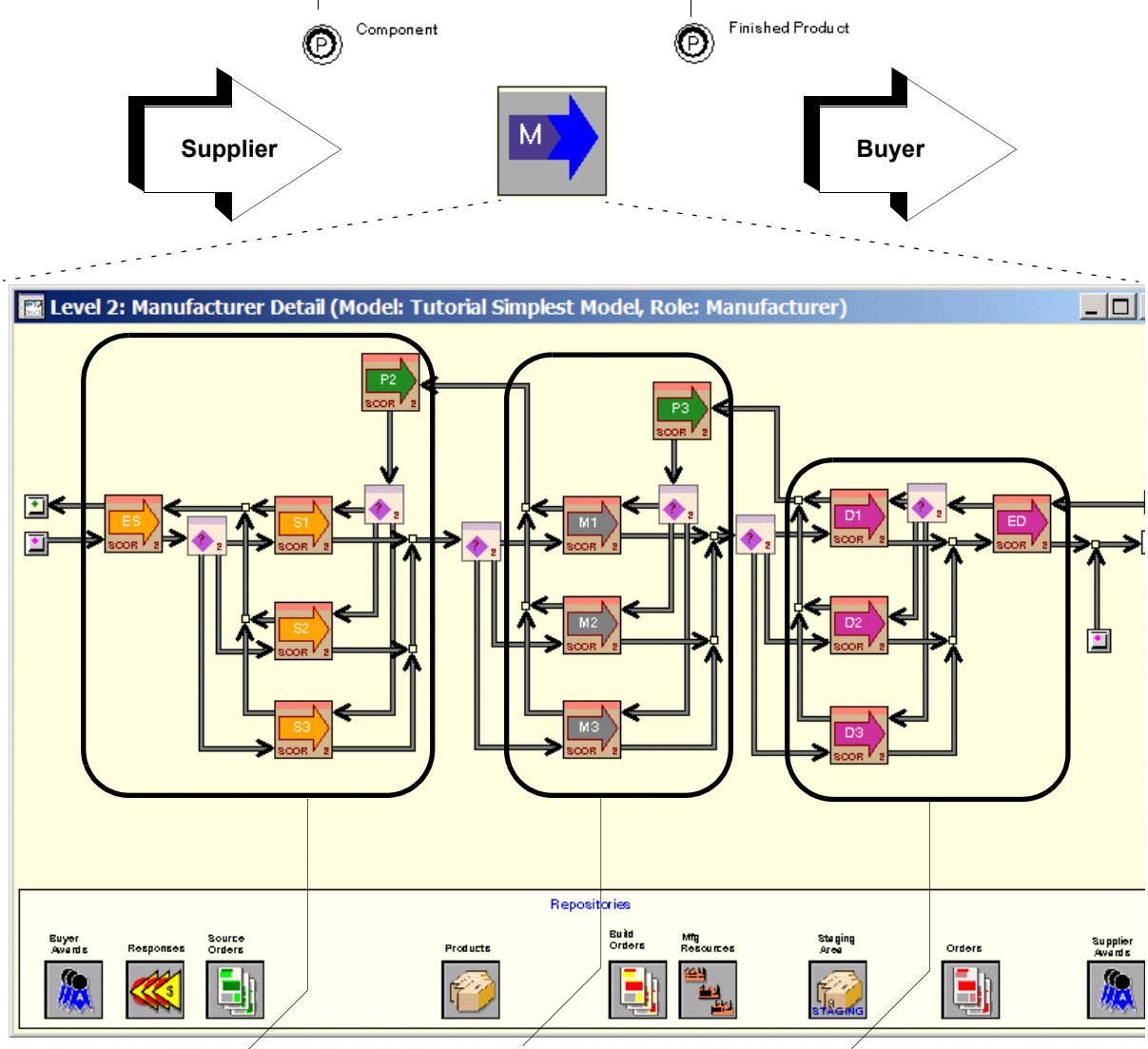
The following figure illustrates a Manufacturer role that uses push mode for sourcing components and delivering finished products. The numbers represent

the sequence of events that occur when sourcing, making, and delivering products in push mode for a Manufacturer role.

Manufacturer Role in Push Mode

The role accepts the calculated amount to push of the upstream supplier's delivery product, which indirectly determines how much the role makes and delivers.

The role delivers as much as it can, based on internal customer orders for finished products.



1) P2: Plan Source is ignored. The role accepts components whenever the upstream supplier delivers them.

2) The role creates internal build orders for finished products, based on available components, which takes place based on the P3: Plan Make planning cycle.

4) The role makes as many finished products as it has build orders.

3) The role creates internal replenishment orders for its finished products, based on build orders for its finished products, which takes place based on the same P3: Plan Make planning cycle as the build orders.

5) The role delivers as many finished products as it can whenever it can.

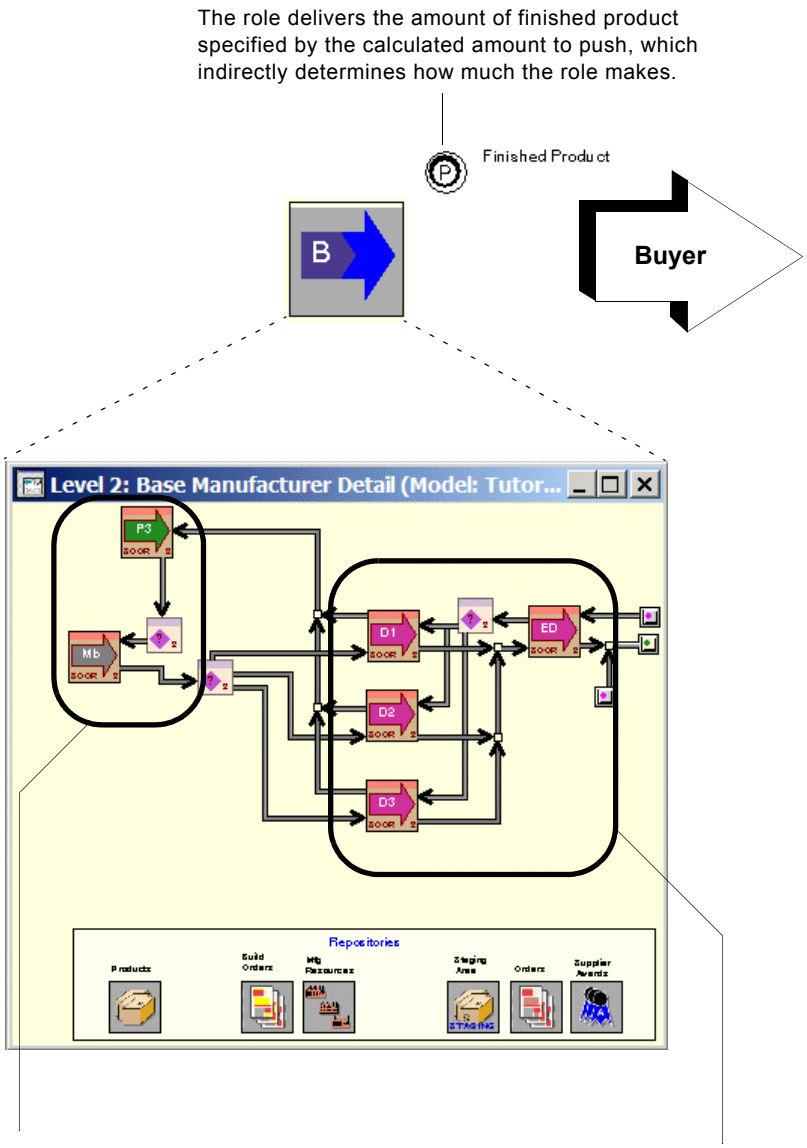
Base Manufacturer Role in Push Mode

In push mode, a Base Manufacturer role determines when to make and deliver finished products, and how much to make and deliver, as follows:

Process Category	When	How Much
Make	Creates internal build orders for finished products, based on its internal replenishment orders, which takes place based on its make planning cycle (P3: Plan Make). Makes finished products, based on the make planning cycle (P3: Plan Make).	Makes as much as it can, based on build orders for its finished products, which depends indirectly on the calculated amount to push of the delivery product.
Deliver	Creates internal replenishment orders for finished products, based on the Push Amount of the role's delivery product, which takes place based on its make planning cycle (P3: Plan Make). Delivers finished products whenever it can, based on inventory levels for finished products.	Delivers the calculated amount to push of the role's delivery product, given the default set of assumptions.

The following figure illustrates a Base Manufacturer role that push mode. The numbers represent the sequence of events that occur when making and delivering products in push mode for a Base Manufacturer role.

Base Manufacturer Role in Push Mode



2) The role creates internal build orders for its finished products, based on its internal replenishment orders, which takes place based on the P3: Plan Make planning cycle.

3) P3: Plan Make determines when the role makes its finished products, based on its build orders.

4) The role makes as much as it has build orders.

1) The role creates internal replenishment orders for its finished products, based on the calculated amount to push, which takes place based on the P3: Plan Make planning cycle.

5) The role delivers its finished products whenever it can, based on inventory levels for finished products.

Combining Pull and Push Mode within a Role

In addition to combining pull and push across roles, you can combine pull and push planning modes within the same role. You can use these combinations of pull and push for each role:

- Distributor role that uses pull-push.
- Distributor role that uses push-pull.
- Manufacturer role that uses pull-push.
- Manufacturer role that uses push-pull.

Distributor Role that Uses Pull-Push

The following table describes the behavior of a model in which a Distributor role's uses pull mode for sourcing components and push mode for delivering finished products. The numbers represent the order in which the planning events occur. In this case, push mode of the delivery phase takes precedence over pull mode of the source phase in terms of when planning takes place.

Note The role must use a stock/replenishment planning strategy for its Deliver category; stock/forecast, make-to-order, and engineer-to-order are not valid.

Process Category	When	How Much
Deliver (push)	1) Creates internal replenishment orders for finished products, based on the source planning cycle (P2: Plan Source). Delivers finished products whenever it can, based on inventory levels for components.	Delivers the calculated amount to push of the role's delivery product, given default assumptions.
Source (pull)	2) Creates internal replenishment orders for components, based on orders for finished products, which takes place based on the same source planning cycle (P2: Plan Source) as the internal replenishment orders for finished products. Sources components, based on source planning cycle (P2: Plan Source).	Sources components, based on customer or replenishment orders for finished products, combined with the Safety Stock and current inventory level of the source product.

Distributor Role that Uses Push-Pull

The following table describes the behavior of a model in which a Distributor role uses push mode for sourcing components and pull mode for delivering finished products. The numbers represent the order in which the planning events occur. Push mode of the source phase takes precedence over pull mode of the delivery phase in terms of when planning takes place.

Process Category	When	How Much
Source (push)	1) Source planning is ignored. Instead, the role receives components whenever the upstream supplier pushes them downstream.	Receives the calculated amount to push of the upstream supplier's delivery product.
Deliver (pull)	2) Delivers finished products whenever it can, based on inventory levels for components.	The amount to deliver depends on customer or replenishment orders for finished products.

Manufacturer Role that Uses Pull-Push

The following table describes the behavior of a model in which a Manufacturer role uses pull mode for sourcing components and push mode for delivering finished products. The numbers represent the order in which the planning events occur. Push mode of the delivery phase takes precedence over pull mode of the source phase in terms of when planning takes place.

Process Category	When	How Much
Make (push)	1) Creates internal build orders for finished products, based on the calculated amount to push, which takes place based on its make planning cycle (P3: Plan Make).	Makes as many finished products as it has build orders, which depends indirectly on inventory levels for components.
Deliver (push)	2) Creates internal replenishment orders for finished products, based on internal build orders, which takes place based on the same make planning cycle (P3: Plan Make) as the internal build orders for finished products. 3) Delivers finished products whenever it can, based on inventory levels for finished products.	Delivers as many finished products as it has replenishment orders, which depends indirectly on inventory levels for components.
Source (pull)	4) Sources components, based on the source planning cycle (P2: Plan Source).	Sources components, based on build orders for finished products. Determines the amount to source, based on customer orders for finished products, the Safety Stock, and the current inventory level of the source product.

Manufacturer Role that Uses Push-Pull

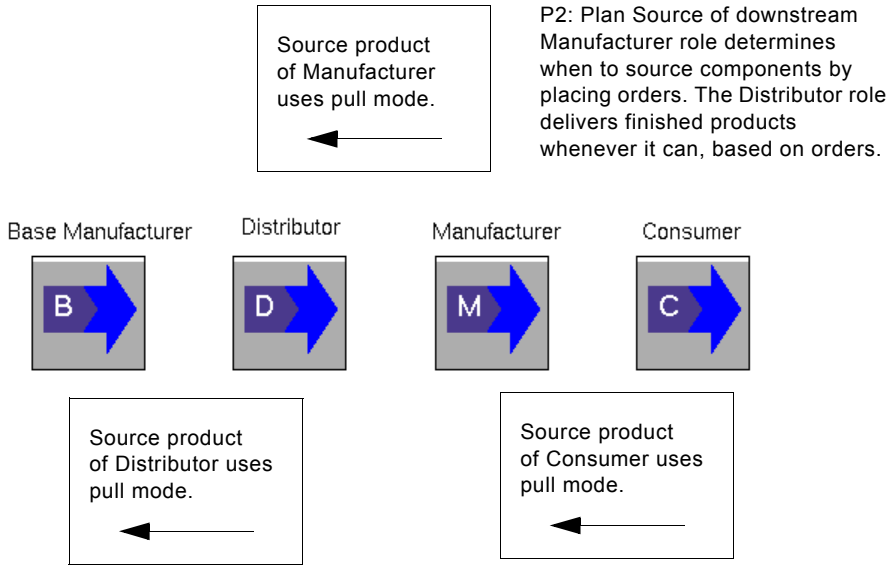
The following table describes the behavior of a model in which a Manufacturer role that uses push mode for sourcing components and pull mode for delivering finished products. The numbers represent the order in which the planning events occur. Push mode of the source phase takes precedence over pull mode of the delivery phase in terms of when planning takes place.

Process Category	When	How Much
Source (push)	1) Source planning is ignored. Instead, the role receives components whenever the upstream supplier pushes them downstream.	Receives the calculated amount to push of the upstream supplier's delivery product. The number of components the role receives indirectly determines how many finished product the role makes and delivers.
Make (pull)	2) Makes finished products, based on make planning cycle (P3: Plan Make).	The amount to make depends indirectly on customer or replenishment orders for finished products, which the Deliver category sends upstream to the Make category as build orders for finished products.
Deliver (pull)	3) Delivers finished products whenever it can, based on inventory levels for finished products.	The amount to deliver depends on customer or replenishment orders for finished products.

Examples of Combining Pull and Push Mode

The following figures illustrate various combinations of pull and push modes for various roles. The figures indicate which Plan category takes precedence for each combination of pull and push.

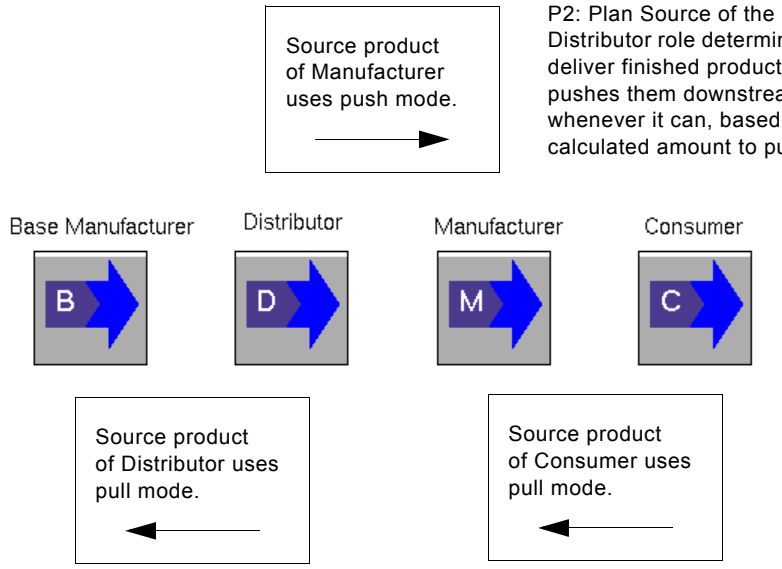
Default Configuration of Source and Delivery Type (Pull)



P2: Plan Source of downstream Distributor role determines when to source components by placing orders. The Base Manufacturer role delivers finished products whenever it can, based on orders.

Source product of downstream Consumer role determines when to source components by placing orders. The Manufacturer role delivers finished products whenever it can, based on orders.

Distributor Role Pushing Its Finished Products Downstream

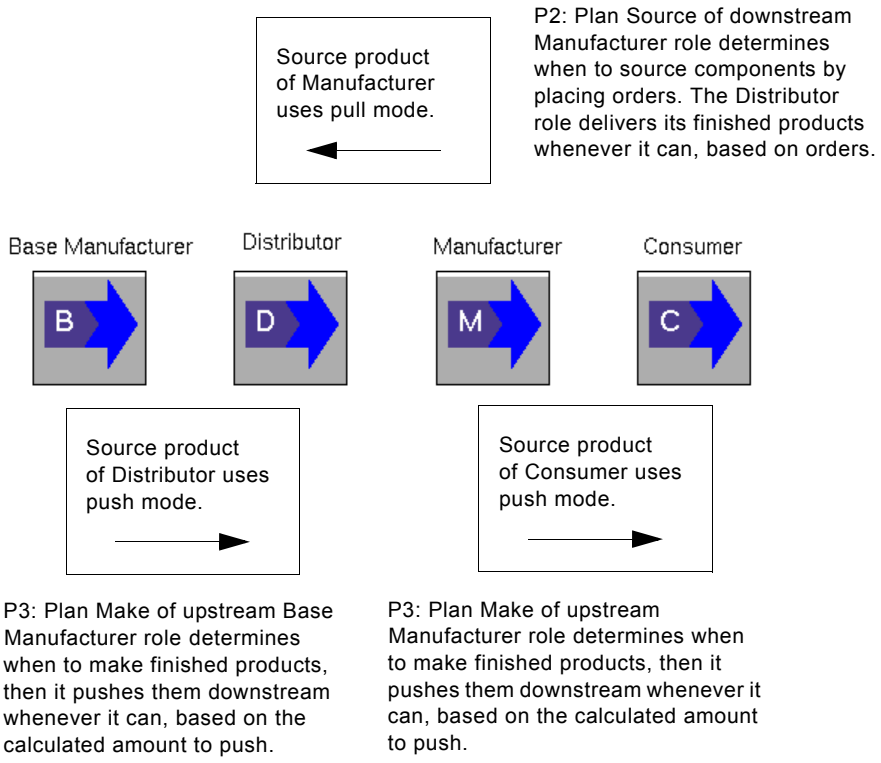


P2: Plan Source of the upstream Distributor role determines when to deliver finished products, then it pushes them downstream whenever it can, based on the calculated amount to push.

P2: Plan Source of downstream Distributor role determines when to source components by placing orders. The Base Manufacturer delivers finished products whenever it can, based on orders.

Source product of downstream Consumer role determines when to source components by placing orders. The Manufacturer role delivers finished products whenever it can, based on orders.

Base Manufacturer and Manufacturer Roles Pushing Finished Products



Analyzing the Performance of a Model that Uses Pull and Push Planning Modes

To analyze the performance of a model that uses pull or push planning modes, it is helpful to think about the process in terms of the upstream source subprocess, the make subprocess, and the downstream delivery subprocess. Each of these Level 2 subprocesses has metrics you can analyze.

See Also Viewing Metrics for Categories.

Viewing Metrics for Source and Delivery Products.

You analyze these metrics for pull and push modes:

- Upstream source subprocess

  ES: Enable Source category:

  - Orders Sent and Change Orders Sent
  - Product Shipments Received
  - Contracts Established
  - Supplier On-Time Performance (%)

  Source category:

  - Orders Sent and Change Orders Sent
  - Product Shipments Received
  - Product Shipment Lead Time
  - Financial Obligations, Financial Payments within Financial Period, and Financial Payments Total
  - Receiving Metric, Verification Metric, Transfer Metric, Create Customer Order Metric, and Invoice Metric costs

  P2: Plan Source category:

  - Number of Planning Periods

  Source products:

  - Quantity Ordered and Quantity Received
  - Purchase Cost
  - Products on Order, Received Inventory Level, Incoming Inventory Level, and Inventory Level
  - Received Fulfillment Time

- Make subprocess

  Make categories:

  - Build Orders Started and Build Orders Completed
  - Make Cycle Time
  - Production Material Handling cost

  P3: Plan Make category:

  - Number of Planning Periods

Source products:

- Awaiting Orders
- Work in Progress

Delivery products:

- Total Products Accepted
- Total Products Rejected

- Downstream delivery subprocess

  ED: Enable Deliver category:

  - Orders Received and Change Orders Received
  - Product Shipments Sent
  - Contracts Established
  - Delivery Performance (%)
  - Perfect Order Fulfillment (%)

  Deliver categories:

  - Orders Received and Change Orders Received
  - Product Shipments Sent
  - Fill Rates (%)
  - Ready to Ship Time
  - Order Entry to Ship Time
  - Financial Bookings, Financial Outstanding, Financial Collections within Financial Period, and Financial Collections Total
  - Order Entry Metric, Order Fulfillment Metric, Pick Metric, Packing Metric, Transportation Metric, Customer Invoicing Metric, and Customer Collections Metric costs

  Delivery products:

  - Quantity to Deliver and Quantity Shipped
  - Awaiting Orders, Products On Order, Received Inventory Level, Incoming Inventory Level, Inventory Level, In Transit Inventory Level, Shipped Inventory Level, and Manufacturing Batch Size
  - Pushed Inventory Level
  - Order Fulfillment Lead Time

Part IV

Appendix, Glossary, and Index

Appendix A: Asset Metrics Formulas

Describes the formulasfor computing the standard asset metrics for roles and special considerations when using these metrics.

Appendix B: SCOR Metrics

Provides the SCOR definition of each SCOR metric that is used in e-SCOR.

Glossary

A

Asset Metrics Formulas

Describes the formulasfor computing the standard asset metrics for roles and special considerations when using these metrics.

Introduction

This appendix describes the specific formulas e-SCOR uses to compute the following asset metrics for roles:

- Days of Supply
  - Raw Materials
  - Work in Progress
  - Finished Goods
  - Inventory
- Asset Turns
- Cash-to-Cash Cycle Time
- Days Sales Outstanding

Note Asset metric values can appear differently in dialogs and in Excel reports due to differences in the way in which e-SCOR and Excel interpret binary numbers. For example, a dialog might display a value of 1.9999 when a report displays the same value as 2.0.

Days of Supply

The Days of Supply metrics are measured in days of supply of inventory for source products, work in progress, delivery products, and total inventory. The metrics include Days of Supply for *all* source products, delivery products, and work in progress for the role.

The Days of Supply metrics are cost-weighted values, based on the Purchase Cost metric for source products and the Net Selling Price parameter for delivery products. The Days of Supply metrics assume the Purchase Cost and Net Selling Price are both non-zero; otherwise, the Days of Supply metrics will be zero.

The Days of Supply metrics assume the Inventory Level metric for a source or delivery product is non-zero; otherwise, the Days of Supply metrics will be zero.

The Days of Supply metrics assume the role consumes a certain amount of source or delivery products during the current financial period. If the consumption is zero for a given financial period, the Days of Supply metrics will equal infinity, implying that the role has an infinite supply for the financial period.

A consumption of zero has different effects on the Inventory Days of Supply and Cash-to-Cash Cycle Time metrics.

Caution A value of infinity appears in a dialog as the symbol +inf; however, a value of infinite appears in a report as 65,536 or 2^{16}. Be sure to take into account infinite numbers when interpreting results in Excel reports, for example, when averaging values over time.

e-SCOR computes the Days of Supply metrics, based on a time-weighted average of actual values over time. This means the e-SCOR Days of Supply metrics are more accurate than standard computations for Days of Supply, which normally use averages based on samples taken during the financial period.

Raw Materials

The sum of the cost-weighted values of each source product in inventory at the end of the financial period, given current inventory and the consumption of source products during the financial period.

Raw Materials Days of Supply is only relevant for a Manufacturer role and a Distributor role that assembles components into kits. It is not relevant for a Distributor role that delivers its source products or for a Base Manufacturer or Consumer role.

$$\left(\frac{\Sigma(\mathrm{PurchaseCost} \times \mathrm{SourceAssets})}{\Sigma(\mathrm{PurchaseCost} \times \mathrm{Consumption})}\right) \times \mathrm{FinancialPeriod}$$

Term	Description
PurchaseCost	The value of the Purchase Cost metric for each source product.
SourceAssets	The sum of the Inventory Level metric and the Incoming Inventory Level metric for each source product.
Consumption	The amount of each source product that the role has consumed during the Financial Period.
FinancialPeriod	The value of the Financial Period parameter for the role.

Work in Progress

The sum of the cost-weighted values of the work in progress of each source product at the end of the financial period, given current work in progress and the consumption of source products during the financial period.

Work in Progress Days of Supply is only relevant for a Manufacturer role. It is not relevant for a Base Manufacturer, Distributor, or Consumer role.

$$\left(\frac{\Sigma(\mathrm{PurchaseCost} \times \mathrm{WorkInProgress})}{\Sigma(\mathrm{PurchaseCost} \times \mathrm{Consumption})}\right) \times \mathrm{FinancialPeriod}$$

Term	Description
PurchaseCost	The value of the Purchase Cost metric for each source product.
WorkInProgress	The value of the Work in Progress metric for each source product.
Consumption	The amount of each source product that the role has consumed during the Financial Period.
FinancialPeriod	The value of the Financial Period parameter for the role.

Finished Goods

The sum of the cost-weighted values of each delivery product in inventory at the end of the financial period, given current inventory and the amount of delivery product picked for delivery during the financial period.

Finished Goods Days of Supply is relevant for a Base Manufacturer, Distributor, and Manufacturer role. It is not relevant for a Consumer role.

$$\left(\frac{\Sigma(\mathtt{NetSellingPrice} \times \mathtt{DeliveryAssets})}{\Sigma(\mathtt{PurchaseCost} \times \mathtt{Consumption})}\right) \times \mathtt{FinancialPeriod}$$

Term	Description
NetSellingPrice	The value of the Net Selling Price parameter for each delivery product.
DeliveryAssets	The sum of the Inventory Level metric and the In Transit Inventory Level metric for each delivery product.
PurchaseCost	The value of the Purchase Cost metric for each source product.
Consumption	The amount of each delivery product that the role has picked for delivery during the Financial Period.
FinancialPeriod	The value of the Financial Period parameter for the role.

Inventory

The sum of the Raw Materials, Work in Progress, and Finished Goods Days of Supply metrics.

If any of these values is infinite due to a zero consumption, the Inventory Days of Supply metric ignores the infinite term. If all three of the values are infinite, the Inventory Days of Supply metric is also infinite.

Inventory Days of Supply is relevant for a Base Manufacturer, Distributor, and Manufacturer role. It is not relevant for a Consumer role.

$$RawMaterials + FinishedGoods + WorkInProgress$$

Term	Description
RawMaterials	The value of the Raw Materials Days of Supply metric for the role.
FinishedGoods	The value of the Finished Goods Days of Supply metric for the role.
WorkInProgress	The value of the Work in Progress Days of Supply metric for the role.

Asset Turns

The number of days the role takes to turn over its inventory for delivery products, measured as a cost-weighted value.

Asset Turns is relevant for a Base Manufacturer, Distributor, and Manufacturer role. It is not relevant for a Consumer role.

$$\left(\frac{FinancialCollectionsPeriod}{AssetValue}\right) \times \left(\frac{365}{FinancialPeriod}\right)$$

AssetValue is defined as follows:

$$\begin{aligned} &(\Sigma\ (SourceProductInventory + WorkInProgress + IncomingAmount) \\ &\quad \times\ PurchaseCost) \\ &+\ (\Sigma\ (DeliveryProductInventory + InTransitAmount) \\ &\quad \times\ NetSellingPrice) \end{aligned}$$

Term	Description
FinancialCollectionsPeriod	The value of the Financial Collections within Financial Period metric for the role.
FinancialPeriod	The value of the Financial Period parameter for the role.
SourceProductInventory	The value of the Inventory Level metric for each source product.
DeliveryProductInventory	The value of the Inventory Level metric for each delivery product.
WorkInProgress	The value of the Work in Progress metric for each source product.
IncomingAmount	The value of the Incoming Inventory Level metric for each source product.
InTransitAmount	The value of the In Transit Inventory Level metric for each delivery product.
PurchaseCost	The value of the Purchase Cost metric for each source product.
NetSellingPrice	The value of the Net Selling Price parameter for each delivery product.

Cash-to-Cash Cycle Time

The time it takes for money to flow from buyers to suppliers. A positive value indicates the role spends more money than it takes in. A negative value indicates the role takes in more money than it spends. This metric is weighted, based on the Financial Payment Terms of each buyer role and is measured in days.

If any one of the values that make up the Cash-to-Cash Cycle Time is infinite, the value of the metric is also infinite.

Caution A value of infinite appears in a dialog as the symbol +inf. However, a value of infinite appears in a report as 65,536 or 2^{16}. Be sure to take into account infinite numbers when interpreting results in Excel reports, for example, when averaging values over time.

Cash-to-Cash Cycle Time is relevant for a Distributor and Manufacturer role. It is not relevant for a Base Manufacturer or Consumer role.

$$\text{InventoryDaysOfSupply} + \text{DaysSalesOutstanding} - \text{FinancialPaymentsPeriod}$$

Term	Description
InventoryDaysOfSupply	The value of the Inventory Days of Supply metric for the role.
DaysSalesOutstanding	The value of the Days Sales Outstanding metric for the role.
FinancialPaymentsPeriod	The value of the Financial Payments within Financial Period metric for the Source category.

Days Sales Outstanding

The value of delivery product sales, which includes Financial Collections within Financial Period, Financial Bookings, and Financial Outstanding metrics for the current financial period, measured in days.

Days Sales Outstanding is relevant for a Base Manufacturer, Distributor, and Manufacturer role. It is not relevant for a Consumer role.

$$\frac{\text{FinancialBookings} + \text{FinancialOutstanding}}{\left(\frac{\text{FinancialCollectionsPeriod}}{\text{FinancialPeriod}}\right)}$$

Term	Description
FinanicalBookings	The value of the Financial Bookings metric for the role.
FinancialOutstanding	The value of the Financial Outstanding metric for the role.
FinancialCollectionsPeriod	The value of the Financial Collections within Financial Period metric for the role.
FinancialPeriod	The value of the Financial Period parameter for the role.

B

SCOR Metrics

Provides the SCOR definition of each SCOR metric that is used in e-SCOR.

Introduction

The following table alphabetically lists each of the SCOR metrics that e-SCOR supports and provides the SCOR definition for the metric. If the e-SCOR parameter or metric name is different from the SCOR metric name, the e-SCOR name appears in parentheses below the SCOR metric name. If e-SCOR does not fully support the SCOR definition, the part of the definition that is not supported appears with a strike-through.

The table also lists the location in which the SCOR metric is defined in e-SCOR, whether it is an e-SCOR metric or parameter, and where to go for the e-SCOR definition.

These definitions are reprinted by permission by the Supply-Chain Council (SCC) (*www.supply-chain.org*).

SCOR Definitions

SCOR Metric (Metric)	SCOR Definition	Location	Definition
Asset Turns	Total gross product revenue ÷ Total net assets.	Role, Assets tab (Metric)	
Capacity Utilization	A measure of how intensively a resource is being used to produce a good or service. Some factors that should be considered are internal manufacturing capacity, constraining processes, direct labor availability, and key components/materials availability.	Resource (Metric)	
Cash-to-Cash Cycle Time	Cash-to-cash cycle time = inventory days of supply + days sales outstanding – average payment period for materials (time it takes for a dollar to flow back into a company after its been spent for raw materials).	Role, Assets tab (Metric)	
Create Customer Order Costs (Create Customer Order Metric)	Includes costs for creating and pricing configurations to order and preparing order documents.	Source category, Cost tab (Metric)	
Customer Invoicing/ Accounting Costs (Customer Invoicing Metric and Customer Collections Metric)	Includes costs for invoicing, processing customer payments, and verifying customer satisfaction.	Deliver category, Cost tab (Metric)	
Days Sales Outstanding	5 point annual average of gross accounts receivable ÷ (total gross annual sales ÷ 365)	Role, Assets tab (Metric)	

SCOR Metric (Metric)	SCOR Definition	Location	Definition
Delivery Performance to Customer Request Date (Delivery Performance (%))	The percentage of orders that are fulfilled on or before the customer's requested date.	ED: Enable Delivery category (Metric)	
ECO Costs (ECO Metric)	Costs incurred from revisions to a blueprint or design released by engineering to modify or correct a part. The request for the change can be from a customer or from production quality control or another department.	Mb, M3 category, Cost tab (Metric)	
Fill Rates (Fill Rates (%))	The percentage of ship-from-stock orders shipped within 24 hours of order receipt.	D1 category, Delivery tab (Metric)	
Finished Goods Inventory Days of Supply (Finished Goods)	Finished goods inventory days of supply are calculated as gross finished goods inventory ÷ (value of transfers/365 days).	Role, Assets tab (Metric)	
Inventory Days of Supply (Inventory)	Total gross value of inventory at standard cost ~~before reserves for excess and obsolescence. Only includes inventory on company books, future liabilities should not be included~~. 5 point annual average of the sum of all gross inventories (raw materials & WIP, plant FG, field FG, field samples, other) ÷ (COGS ÷ 365).	Role, Assets tab (Metric)	

SCOR Metric (Metric)	SCOR Definition	Location	Definition
Make Cycle Time (Make Cycle Time)	The sum of the following average times: Order release to start actual build + Total build cycle + End build to leaves plant (i.e., moves to on/off-site distribution or goes to customer). For continuous and mixed processes, manufacturing cycle time is calculated as the average number of units (doses, kilos, pounds, gallons, etc.) in process divided by the average daily output in units.	Make category, Manufacturer tab (Metric)	
Number of End Products/SKUs (Number of End Products)	Total number of unique end item product offerings. End items are individually planned and managed.	Role, Role tab (Metric)	
Order Entry and Maintenance Costs (Order Entry Metric)	Includes costs for ~~maintaining the customer data base~~, credit check, accepting new orders and adding them to the order ~~system as well as later order modifications~~.	Deliver category, Cost tab (Metric)	
Order Entry Complete to Start Manufacture Time (Order Entry to Manufacturing Time)	Time from completion of order entry to that of the release to manufacturing, in calendar days.	Mb, M3 categories, Manufacturer tab (Metric)	
Order Entry Complete to Order Ready for Shipment Time (Order Entry to Ship Time)	Including release to manufacturing, order configuration verification, production scheduling, build, pick/pack, and prepare for shipment time, in calendar days.	Deliver category, Delivery tab (Metric)	

SCOR Metric (Metric)	SCOR Definition	Location	Definition
Order Fulfillment Costs (Order Fulfillment Metric)	Includes costs for processing the order, allocating inventory, ~~ordering from the internal or external supplier,~~ scheduling the shipment, ~~reporting order status~~ and initiating shipment.	Deliver category, Cost tab (Metric)	
Order Fulfillment Lead Time	The average actual lead times consistently achieved, from Customer Signature/ Authorization to Order Receipt, Order Receipt to Order Entry Complete, Order Entry Complete to Start-Build, Start Build to Order Ready for Shipment, Order Ready for Shipment to Customer Receipt of Order, and Customer Receipt of Order to Installation Complete.	Product composite, Metrics tab (Metric)	
Order Management Cost	The aggregation of the following cost elements (contained in this glossary): • Create Customer Order Costs • Order Entry and Maintenance Costs • ~~Contract/Program and Channel Management Costs~~ • ~~Installation Planning Costs~~ • Order Fulfillment Costs • Pick Costs • Packing Costs • Transportation Costs • Installation Costs • Customer Invoicing/Collections Costs	Role, Cost tab (Metric)	

SCOR Metric (Metric)	SCOR Definition	Location	Definition
Order Receipt to Order Entry Complete Time (Order Entry Duration)	Time required, in calendar days, for order revalidation, configuration check, credit check, and scheduling of received orders.	D1, D2 categories, Order tab (Parameter)	
Order Ready for Shipment to Customer Receipt of Order Time (Transportation Duration)	Including total transit time (all components to consolidation point), consolidation, queue time, and additional transit time to customer receipt of order, in calendar days.	Deliver category, Transportation tab (Parameter)	
Pack Product Cycle Time (Packing Duration)	Includes activities such as sorting/combining the products, packing/kitting the products, pasting labels and barcodes, and delivering the products to the shipping area for loading.	Deliver category, Fulfillment tab (Parameter)	
Perfect Order Fulfillment (Perfect Order Fulfillment)	A "perfect order" is defined as an order that meets all of the following standards: Delivered complete; all items on order are delivered in the quantities requested Delivered on time to customer's request date, using your customer's definition of on-time delivery Documentation supporting the order including packing slips, bills of lading, invoices, etc., is complete and accurate Perfect condition: Faultlessly installed (as applicable), correct configuration, customer-ready, no damage	ED: Enable Delivery category (Metric)	

SCOR Metric (Metric)	SCOR Definition	Location	Definition
Pick Product Cycle Time (Pick Duration)	Includes time for retrieving orders to pick, determining inventory availability, building the pick wave, picking the product, recording the pick and delivering product to packing area in response to an order.	Deliver category, Fulfillment tab (Parameter)	
Product Acquisition Costs (Receiving Metric)	Material acquisition costs include costs incurred for production materials: sum of materials management and planning, supplier quality engineering, inbound freight and duties, receiving and material storage, incoming inspection, material process engineering and tooling costs.	Source category, Cost tab (Metric)	
Product Packing Costs (Packing Metric)	Includes costs for ~~selecting carrier~~ and staging products/systems.	Deliver category, Cost tab (Metric)	
Product Picking Costs (Pick Metric)	Includes costs for ~~warehouse space and management, finished goods receiving and stocking~~, processing shipments, picking and consolidating, ~~selecting carrier~~, and staging products/systems.	Deliver category, Cost tab (Metric)	
Product Structure	Recipes / formulas / BOMs / that define the composition of a product	Product Structure	
Production Material Cycle Time (Production Material Duration)	Time required moving material to point of use.	Make category, Production Material tab (Parameter)	

SCOR Metric (Metric)	SCOR Definition	Location	Definition
Production Material Handling Cost (Production Material Handling Metric)	Cost of handling/movement of materials used to support production.	Make category, Cost tab (Metric)	
Published Delivery Lead Time	The typical standard lead time (after receipt of order) currently published to customers by the sales organization. For typical orders only, not standing/re-supply orders.	Product composite, Delivery tab (Parameter)	
Raw Material or Product Days-of-Supply (Raw Materials)	Raw material inventory days of supply are calculated as gross raw material inventory ÷ (value of transfers/365 days).	Role, Assets tab (Metric)	
Receiving and Putaway Cycle Time (Receiving Duration)	The total amount of time required to move materials from an inbound location to an internal storage location.	Source categories, Receiving tab (Parameter)	
SKU (Product Name)	Stock Keeping Unit	Product specification (Parameter)	
Supplier On-Time Delivery Performance (Supplier On-Time Performance (%))	The percentage of orders that are fulfilled on or before the original customer requested date (suppliers performance measured by the customer).	ES: Enable Source category, (Metric)	
Supply Chain Finance Costs (Invoice Metric)	Costs associated with paying invoices, ~~auditing physical counts, performing inventory accounting, and collecting accounts receivable~~. (Does not include customer collections costs.)	Source category, Cost tab (Metric)	

SCOR Metric (Metric)	SCOR Definition	Location	Definition
Total Build Time (Manufacturing Duration)	Total build time is the average time for build-to-stock or configure-to-order products from when production begins on the released work order until the build is completed and unit deemed shippable.	Make category, Manufacturing tab (Parameter)	
Transportation Costs (Transportation Metric)	Includes all company paid freight and duties from point of manufacture to end-customer or channel.	Deliver category, Cost tab (Metric)	
Total WIP Inventory DOS (Work in Progress)	Total WIP inventory days of supply are calculated as gross WIP inventory ÷ (value of transfers/365 days).	Role, Assets tab (Metric)	
Yield (Build Yield)	The ratio of usable output from a process to its input.	Product composite, Manufacturing tab (Parameter)	

Glossary

B

Base Manufacturer role: A Level 1 role that makes and delivers raw materials for the overall supply chain. A Base Manufacturer role uses make planning to determine when to make raw materials and how much to make. A Base Manufacturer role requires a resource.

boundary condition: A Level 2 process category that SCOR does not identify, which exists at the beginning and at the end of the supply chain. The Mb: Make Product category of a Base Manufacturer role, and the Input and End categories of a Consumer role represent boundary conditions.

build order: Orders for delivery products of a Base Manufacturer or Manufacturer role, which initiates the build process.

build process: A process that creates build orders and manufactures finished products from components. The build process initiates, based on a cyclical make planning process or by receiving source products, based on order/product process, and triggers the order/product process when the finished product is released.

buyer: Any Level 1 role that sources products from upstream suppliers.

C

category: A specific configuration of the Plan, Source, Make, and Deliver management processes for each planning strategy. For example, the S1: Source Stocked Product category sources products, using a stock planning strategy.

category router: An object that appears on the role detail between certain categories, which send appropriate objects to appropriate categories when the simulation runs.

change orders: Orders for existing demand orders for the finished products in the overall supply chain that represent a change in the original order, which originate in a Consumer role.

component: A product specification that a Manufacturer role requires to manufacture finished products or that a Distributor role requires to assemble into kits.

Consumer role: A Level 1 role that initiates the acquisition of finished products, which determines initial order demand for the overall supply chain.

contracts process: A process in which buyers issue awards to suppliers, based on contracts and supplier selection criteria. The contracts process initiates when the simulation begins, as well as based on the source planning process.

contract: A mechanism for determining how a buyer chooses its suppliers when sourcing identical products from multiple suppliers. Contracts also determine the estimated order size the role uses when using a stock/forecast planning strategy and push planning.

customer order: An order for the source product of a Consumer role, which initiates the order/product process for the overall supply chain.

D

Deliver category: A Level 2 category that distributes ordered products, manages orders, and ships products.

delivery product: A product composite that a supplier delivers to a downstream buyer.

demand orders: Customer orders for the finished products in the overall supply chain, which originate in a Consumer role.

detail: A workspace associated with an object on which you place and view other objects. Most objects have detail, such as a model, a role, and a category.

Distributor role: A Level 1 role that sources products from upstream suppliers and delivers those products to downstream buyers. A Distributor role can also assemble components into kits. A Distributor role uses source planning to determine when to order source products and when to deliver product shipments.

downstream: Toward the Consumer role end of the supply chain.

E

enable process: A Level 2 process category for each management process, which manages the prerequisites for each process. The enable process categories are ES: Enable Source and ED: Enable Deliver.

engineer-to-order (ETO) planning strategy: A planning strategy that fills orders for engineer-to-order products by engineering and manufacturing custom products for a particular customer; maintains no inventory; and delivers shipments to the exact buyer that places an order.

F

financial process: A process in which a role performs accounting of financial collections and payments, both ongoing and per financial period; updates asset metrics, based on costs and inventory per financial period; and computes overall

costs. The financial process initiates based on customer orders from the Consumer role or replenishment orders from the source planning process.

finished product: A product specification in the product hierarchy that requires components to manufacture.

forecast planning strategy: See stock/forecast planning strategy.

K

KB: A top-level application file that contains one or more models. A KB file has a *.kb* file extension.

kit: A finished product that a Distributor role assembles from components. Unlike a Manufacture role, however, a Distributor role that assembles components into kits does not represent value-added in the supply chain.

L

Level 1 role: *See* role.

Level 2 SCOR: The configuration of the supply chain in terms of SCOR process categories, which are specific configurations of each management process for each planning strategy.

Level 3 SCOR: The operations strategy of each process category in terms of its inputs and outputs, performance metrics, and best practices.

M

make-to-order (MTO) planning strategy: A planning strategy that fills orders for make-to-order products from inventory; replenishes inventory only when a buyer places an order; computes order size, based directly on orders; and ships products to any buyer that places an order.

make planning process: A process in which a Base Manufacturer and Manufacturer role plans when to make delivery products. The make planning process initiates on a regular planning cycle and triggers the build process.

Make category: A Level 2 category that manufactures finished products and places them into inventory.

Manufacturer role: A Level 1 role that sources components from upstream suppliers, manufactures finished products, and delivers finished products to downstream buyers. A Manufacturer role uses make planning to determine when to make finished products and how much to make. A Manufacturer role requires a resource.

metric: A value that e-SCOR computes during the simulation.e-SCOR provides a number of SCOR metrics, as well as a number of e-SCOR metrics.

model detail: The detail of a Model object on which you create a supply-chain model.

model: A container in which you build a model. You build the model on the model detail.

O

order/product process: A process in which a buyer sends orders to a supplier for source products, and a supplier processes and fulfills those orders by sending product shipments to buyers. The order/product process initiates based on customer orders from the Consumer role or replenishment orders from the source planning process. The order/product process triggers the financial process when products are shipped to buyers. The build process can also initiate the process of selecting orders for shipment when finished products become available from manufacturing.

P

parameter: A value that you enter into the model as a variable. e-SCOR provides a number of SCOR metrics as parameters, as well as a number of e-SCOR parameters.

Plan category: A Level 2 category that plans supply and demand cycles in the supply chain. The two Plan categories are P2: Plan Source, which is responsible for creating replenishment orders for source products, and P3: Plan Make, which is responsible for creating build orders for delivery products.

planning mode: Determines whether a role uses pull or push planning to source and deliver its products. A buyer can source products by placing orders with suppliers (pull) or simply receive products from suppliers when the role delivers them (push). A supplier can deliver products, based on orders (pull) or simply deliver a specified number of finished products (push).

planning strategy: Determines how a role computes order size and determines to whom it delivers products. The available planning strategies are: stock/replenishment, stock/forecast, stock/R-Q, stock/Q, make-to-order, and engineer-to-order.

pool: An object on the role detail that stores permanent objects, such as product composites, or transient objects, such as orders.

process category: *See* category.

product composite: A representation of each product a role sources and each product a role delivers. There are two types of product composites in the Products pool: source products and delivery products.

product hierarchy: A hierarchical representation of the products that a supply chain sources, makes, and delivers. The product hierarchy consists of a high-level

product specification, which is a finished product, and one or more lower-level product specifications, which are components. Components, in turn, can consist of other components.

product specification: A representation of each product in the product hierarchy. You assign a product specification to each role in the model to determine the products the role sources and/or delivers, which creates product composites in the Products pool.

pull planning mode: A buyer sources products from suppliers by placing orders, and a supplier delivers finished products to buyers, based on those orders.

push planning mode: A supplier pushes a fixed number of products onto buyers, and a buyer simply receives those products from suppliers when the supplier pushes them.

R

replenishment order: A customer order for the source product of a Distributor or Manufacturer role, used to replenish the inventory of source products.

replenishment planning strategy: See stock/replenishment planning strategy.

resource: A representation of the capacity a role has for manufacturing finished products. Base Manufacturer and Manufacturer roles require resources.

role: An abstraction of the management processes implicit in Level 2 SCOR, which describes the scope and content of the overall supply chain. A role consists of sets of Plan-Source-Make-Deliver processes. You create and connect roles to form a supply-chain model. You assign product specifications to roles to create source and delivery products. You assign resources to roles that manufacture finished products. The Level 1 roles are: Base Manufacturer role, Distributor role, Manufacturer role, and Consumer role.

S

scenario: The discrete event simulation engine for controlling the simulation.

SCOR: The Supply Chain Operations Reference model that the Supply Chain Council has developed. SCOR identifies common terminology and measurements that manufacturers and their vendors and distributors can use to evaluate the performance of their supply chains and identify areas of improvement. e-SCOR implements many of the features of SCOR.

source planning process: A process in which Distributor and Manufacturer roles plan when to create replenishment orders for source products. The source planning process initiates on a regular planning cycle and triggers the order/product process.

source product: A product composite that a buyer sources from an upstream supplier.

Source category: A Level 2 category that places orders for source products from suppliers and places those products in inventory.

stock planning strategy: A planning strategy that fills orders for stock products from inventory and replenishes inventory, based on inventory levels or forecasts.

stock/forecast planning strategy: A planning strategy that sources and makes as many source and delivery products, respectively, as the role forecasts it needs. Forecasts are based on estimated amounts from downstream buyers for delivery products.

stock/replenishment planning strategy: A planning strategy in which a role sources and makes as many source and delivery products, respectively, required to maintain the desired inventory level, given current orders.

supplier: Any Level 1 role that delivers products to downstream buyers.

supply chain management: The process of controlling the supply chain in the most efficient and effective manner possible.

supply chain: A business process that describes the complete set of steps involved in obtaining raw materials, producing and assembling products, and delivering those products to consumers.

U

upstream: Toward the Base Manufacturer role in the supply chain.

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