

# e-SCOR

## Getting Started Tutorials

Version 5.1 Rev. 0



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

Part Number: DOC096-510

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# Preface

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*Describes the purpose of these tutorials, the intended audience, and the typographic conventions.*

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## About this Tutorial

This tutorial teaches you how to create, run, and analyze models in e-SCOR. First, it provides an [introduction](#) to SCOR modeling and how it relates to e-SCOR. Next, it teaches you how to create and analyze three models of varying complexity:

- The **simplest e-SCOR model**, which consists of a Base Manufacturer role that manufactures and distributes a product family and a Consumer role that sources the product family.
- The **ACME model**, which is a more complex model that manufactures computers from components. The Manufacturer role sources cases directly from a Base Manufacturer role and electronics through a Distributor role.
- The **VMI model** presents a case study of a real-world business problem involving a central pharmaceutical distributor and three distribution sites. You create, run, and analyze the model to determine optimal inventory replenishment levels to ensure that each downstream customer always receives its shipments on time.

If you are just starting out with e-SCOR, we recommend that you read this tutorial sequentially and perform each exercise in order. This table summarizes how long each part of the tutorial should take to read and perform the exercises:

<b>Model</b>	<b>Time Estimate</b>
Simplest e-SCOR Model	1 hour
ACME Model	4 hours
VMI Model	4 hours

If you have some familiarity with e-SCOR, you can go to specific topics in this tutorial. Topics that appear later in this tutorial provide references to earlier topics that explain specific steps in more detail, where relevant.

In addition, most tutorial topics provide references to related topics in the *e-SCOR User? Guide*.

## Audience

This tutorial is for new e-SCOR users who want step-by-step instructions that teach you how to build, run, and analyze e-SCOR models. It is also a good place to start to see examples of the kinds of models you can build and the kinds of problems you can solve, using e-SCOR.

Users should be familiar with supply-chain modeling and have some familiarity with SCOR.

If you are not familiar with SCOR, visit [www.supply-chain.org](http://www.supply-chain.org).

## Conventions

This tutorial uses the following typographic conventions:

<b>Example</b>	<b>Description</b>
true	Parameter and metric values
<b>role</b>	Glossary terms
<b>Order Fulfillment Lead Time</b>	SCOR metrics
<i>c:\Program Files\Gensym\ g2-8.3r0\escor\ kbs\e-scor.kb</i>	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/UII 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*

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### **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:

	<b>Americas</b>	<b>Europe, Middle-East, Africa (EMEA)</b>
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<b>Fax</b>	(781) 265-7255	+31-71-5682621
<b>Email</b>	<a href="mailto:service@gensym.com">service@gensym.com</a>	<a href="mailto:service-ema@gensym.com">service-ema@gensym.com</a>



# e-SCOR Methodology

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*Describes the e-SCOR methodology for SCOR modeling.*

Introduction 2

Deciding What You Want to Model 3

Mapping SCOR Processes to e-SCOR Roles 4

Learning How to Build Models in e-SCOR 7

Using the Tutorial Models 8



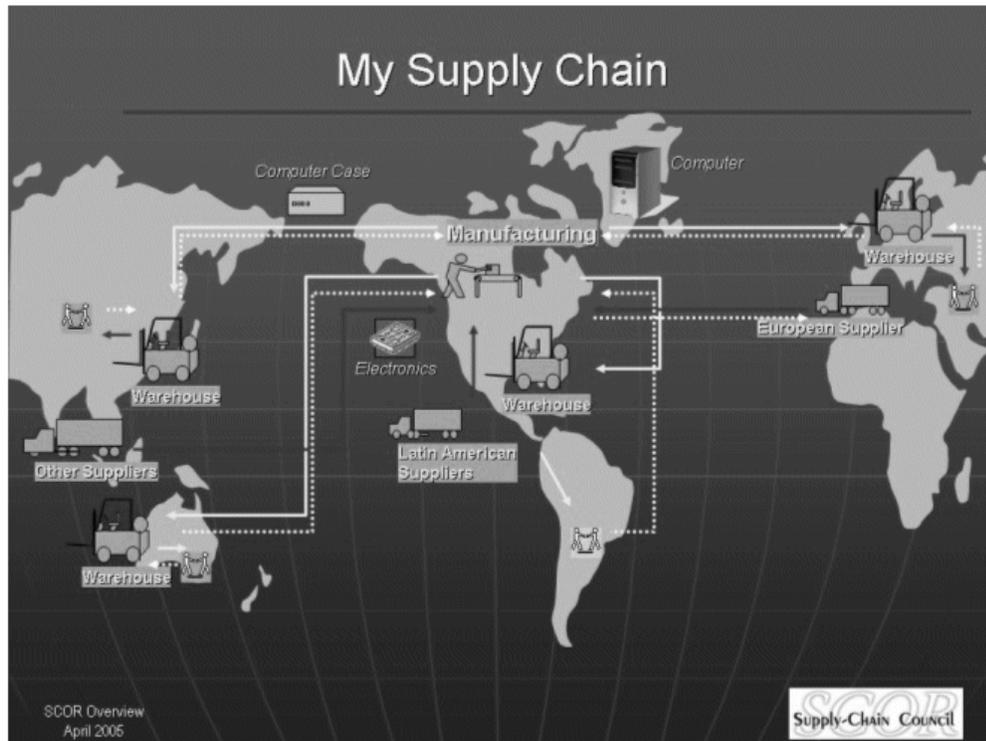
# Introduction

e-SCOR allows you to quickly build SCOR-based, supply-chain simulation models by connecting supply-chain nodes, called “roles,” Manufacturers, Distributors, and Consumers, entering configuration data, and running scenarios. In e-SCOR, supply-chain roles correspond to logical combinations of SCOR model process types. For example, a e-SCOR Distributor role comprises SCOR Source, Make, and Deliver process types. These combinations are useful aggregations of SCOR process types and correspond to SCOR “Level 0.”

As described in the Supply Chain Council SCOR Version 7.0 Overview, SCOR is a process “reference” model that differs from classic process “decomposition” models. In a process decomposition model, a process is described in layers with higher level process layers having detail layers that describe sub-processes composing the higher level process. SCOR uses this idea in formulation of the model, but also allows for multiple “levels” at the same process “layer.” Specifically, in SCOR, Levels 1 and 2 are different configurations at the same process layer.

The Supply Chain Council SCOR Version 7.0 Overview booklet (see <http://www.supply-chain.org/site/scor7booklet.jsp>) describes a 7-step process for creating a SCOR model. This chapter shows how you can use e-SCOR to create a standard SCOR model, such as one you might create in the SCOR course.

The following figure is a typical map of a supply chain that you might already have or that you could develop quickly. The map shows material flow along with the location of suppliers, distribution centers or warehouses, manufacturing sites, and customers. By convention, customers are always located to the right on the map and suppliers of raw materials are located to the left on the map.



The following sections describe how you can quickly convert this map into a e-SCOR model and begin conducting analyses.

## Deciding What You Want to Model

Before you begin creating your map, you have to decide on the business entities you want to model, their geographic locations, and the relevant product set. In thinking about the product set, consider grouping products into categories of families or types such that the relevant products are represented. By “relevant,” we mean products that behave similarly in the supply chain or that are directly involved in the issue you want to examine.

For example, you might have hundreds of products but one or two are representative of the issue you want to address. Another example might be a situation where you have 100,000 SKUs in your supply chain, but you are only concerned with 10 product types or product families. Be parsimonious in your selection of a product set so you focus your analysis on what matters most to you.

e-SCOR is most valuable to organizations that want to examine supply chain resilience. Resilience relates to supply chain robustness and agility issues such as:

- The *responsiveness* of your supply chain.  
What would happen if the demand for a product increased or decreased by a certain percentage? Would I have sufficient manufacturing capacity? Would I be able to respond fast enough?
- The *flexibility* of your supply chain.  
What would happen if my distribution network was disrupted? Would I be able to meet customer service requirements by shifting to other sources? Would manufacturing capacity be available and could they gear-up for production fast enough?
- The *impact of fast changes or variability* in product, processing, or distribution.  
How do I deal with changing product life cycles? What is the impact on my supply chain of moving from one product to the next? What if product characteristics change that impact production or other suppliers? What if my supplier(s) are inconsistent in their delivery? What if the production lines have quality or yield problems? What if the transit time from role to role is inconsistent?

## Mapping SCOR Processes to e-SCOR Roles

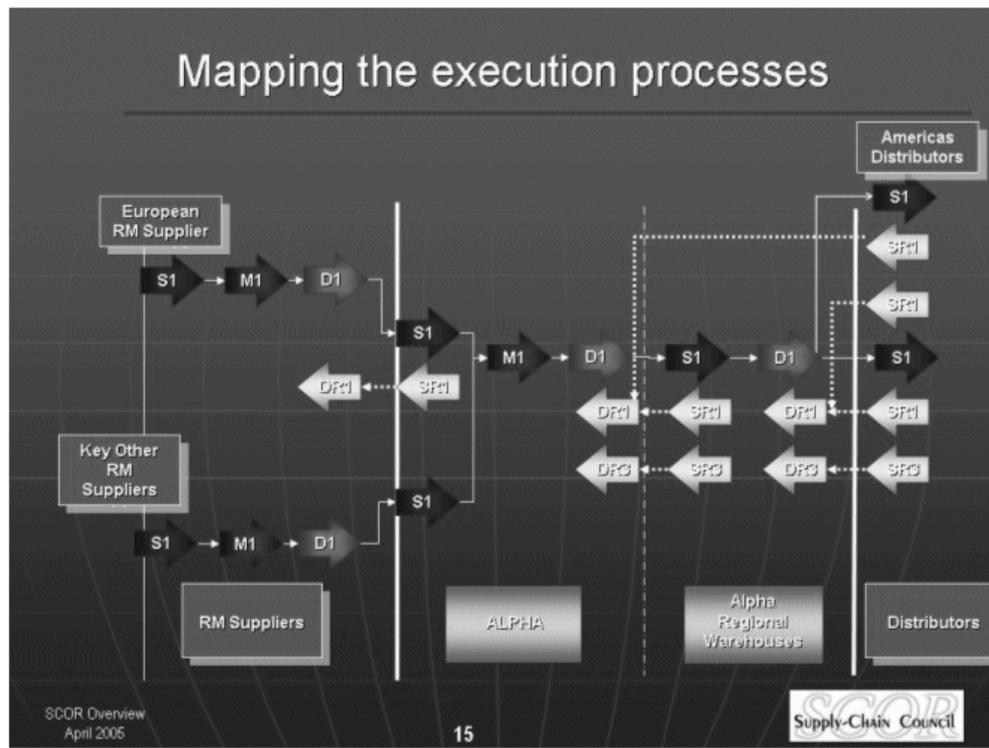
Once you have identified the features of your supply chain that you want to examine, you can map the SCOR processes to the e-SCOR roles.

In developing a map of your supply chain, you will have explicitly identified the sites, materials and transit lanes, and organizational entities involved in your supply chain. With this information, you can decide where to place the Source, Make, Deliver, and Plan process types on your map. Initially, you do not need to worry about whether each site on your map is a Stocked, Make-to-Order or Engineer-to-Order node. For simplicity, assume they are all Stocked types.

e-SCOR provides a convenient way to group SCOR process types, as follows:

- A supplier role, which we call a Base Manufacturer, occupies the left-most position in a supply chain and comprises Make and Deliver types. A supplier does not need a Source process type because we assume the sourcing processes further to the left are not relevant.
- A manufacturer role comprises Source, Make, Deliver, and Plan types.
- A distributor role comprises Source, Deliver, and Plan types. Distributors may assemble products into “kits,” but they do not have a Make process type.
- A customer role comprises only a Source type. Customers occupy the right-most position in a supply chain.

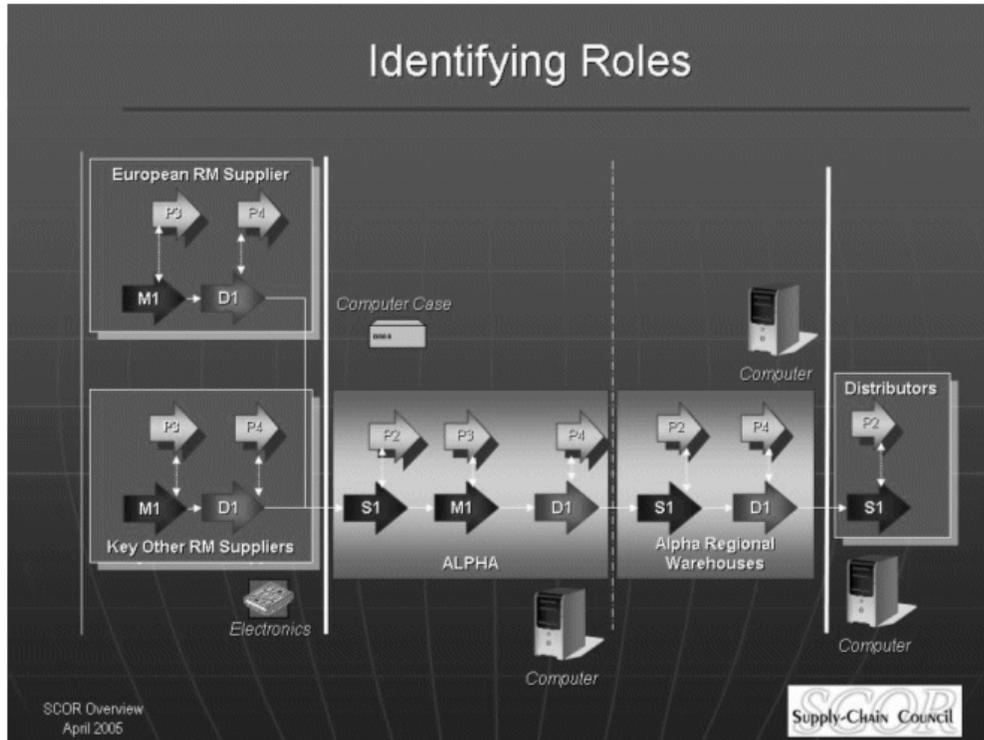
With this information, you can create a SCOR process map that looks like this:



Note how the groups of SCOR process types combine into e-SCOR roles:

- The European RM Supplier and Key Other RM Suppliers are Base Manufacturer roles.
- The ALPHA node is a Manufacturer role.
- The ALPHA Regional Warehouses is a Distributor role.
- The American Distributors and Distributors are Customer roles because they exert a demand on the upstream supply chain.

With this information, you can create a map that translates directly into a e-SCOR model. The e-SCOR map corresponding to the supply chain in the figure above looks like this:



To simplify the supply chain, this map assumes that each role has its own Plan Source, Plan Make, and Plan Deliver capabilities. This diagram also shows the finished good produced or distributed by each role:

- The European RM Supplier produces Computer Cases.
- The Key Other RM Suppliers produce Electronics.
- The Alpha Regional Warehouses distribute Computers.
- The customer (Distributors) buys Computers.

With this information, you can now build the ACME model in e-SCOR and experiment with different scenarios, which you will do later in this tutorial.

# Learning How to Build Models in e-SCOR

First, this tutorial describes the mechanics of how to create and configure a simple supply-chain model so you become familiar with the modeling environment. It then explains in detail how to create and configure the ACME model. Finally, it describes how to build a more complex model called the VMI model.

This tutorial teaches you how to build these models:

- The **simplest e-SCOR model**, which consists of a Base Manufacturer role that manufactures and distributes a product family, and a Consumer role that sources the product family. The simplest model teaches you how to:
  - [Configure the model environment](#), which consists of a model and an associated Scenario.
  - [Configure Level 1 roles](#), which involves creating the supply-chain model, configuring role parameters, assigning products to roles, and configuring the potential suppliers.
  - [Run the simulation](#) and view role metrics and Level 2 metrics through the Metrics toolbars.
  - [Configure Level 2 SCOR](#), which involves viewing role details, configuring category parameters, and configuring product composite parameters.
  - [View Level 2 metrics](#) for categories and product composite through the dialogs.
  - [Create output reports](#) of key performance metrics, both within e-SCOR and in CSV files.
- The **ACME model**, which manufactures computers from components. The Manufacturer role sources cases directly from a Base Manufacturer role and electronics through a Distributor role. The ACME model teaches you how to:
  - [Configure Level 1 roles](#) to source, make, and deliver finished products and components that are part of a product structure.
  - [Configure Level 2 SCOR parameters](#) through input reports.
  - [Run the simulation](#) to determine the performance of the model under two scenarios: normal demand and increased demand.

- The **VMI model**, which presents a case study of a real-world business problem involving a central pharmaceutical distributor and three distribution sites. You create, run, and analyze the model to determine optimal inventory replenishment levels to ensure that each downstream customer always receive its shipments on time. The VMI model teaches how to:
  - [Implement the central distributor model](#) according to the case study by mapping real-world inputs and outputs to e-SCOR parameters and metrics, creating and configuring the supply-chain model, and configuring Level 2 SCOR parameters through input reports.
  - [Run the central distributor model](#) simulation by estimating replenishment levels, creating time-series reports of inventory levels and days of supply, and creating summary tables and charts for configuring key parameters and viewing key metrics.
  - [Optimize the central distributor model](#) by using a worst-case scenario, fine-tuning the results to minimize inventory carrying costs, and analyzing the impact of implementing a vendor-managed inventory control system.

## Using the Tutorial Models

At various points in this tutorial, you have the option of loading finished models and summary reports that are solutions to the individual tutorials. If you do not have time to work through the tutorials yourself, you can use these models and reports instead.

### To open a tutorial model in e-SCOR:

- ➔ Choose File > Open, navigate to the *escor\examples* directory of your e-SCOR installation, and choose the tutorial model to open.

The following list summarizes the models and reports you can load and the chapters that describe each:

- *escor-tutorial-simplest*  
*Tutorial-Simplest-Model-Summary-Reports.xls*
  - [Configuring the Model Environment](#)
  - [Configuring the Simplest Model](#)
  - [Running the Simulation: Simplest Model](#)
  - [Configuring Level 2 SCOR: Simplest Model](#)
  - [Viewing Level 2 Metrics: Simplest Model](#)
  - [Creating Output Reports: Simplest Model](#)

- *escor-tutorial-acme*  
*Tutorial-ACME-Summary-Reports.xls*  
[Configuring Level 1 Roles: ACME Model](#)  
[Configuring Level 2 SCOR: ACME Model](#)  
[Running the Simulation: ACME Model](#)
- *escor-tutorial-vmi*  
*Tutorial-VMI-Summary-Reports.xls*  
[Case Study: Central Distributor Model](#)  
[Running the Simulation: Central Distributor Model](#)  
[Optimizing the Central Distributor Model](#)



# Configuring the Model Environment

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*Teaches you how to configure the environment in which you create a model.*

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# Introduction

To configure the model environment, you:

- [Run e-SCOR.](#)
- [Create a new project.](#)
- [Create a model.](#)
- [Create a scenario](#), which is the discrete event simulation engine for controlling the simulation.
- [Save the model.](#)
- [Start e-SCOR with your model open](#) by configuring the server to load your model.

Many e-SCOR objects have **detail**, which is a workspace associated with an object on which you place and view other objects. You create e-SCOR models on the detail of a Model object, also known as the **model detail**.

---

**Shortcut** If you do not have time to work through the exercises in this part of the tutorial, in e-SCOR, open the file named *escor-tutorial-simplest.kb*, which shows the finished model. Follow along in the existing model as you read through the exercises.

---

## Running e-SCOR

e-SCOR is a client/server application, where the server runs as a hidden process. To run e-SCOR, first you must start the server, then you can start the client. The server and client can run on the same computer or on different computers.

e-SCOR is distributed as a set of modularized KB files, with a top-level module that automatically requires all the e-SCOR modules. The top-level module is called **e-scor**.

When you first start e-SCOR, it is running in Modeler mode, which means that all e-SCOR functionality required for creating and running a model is available to you. To access additional functionality required to customize e-SCOR, you must switch to Developer mode. For information about switching user modes, see the *e-SCOR User? Guide*.

**To run e-SCOR:**

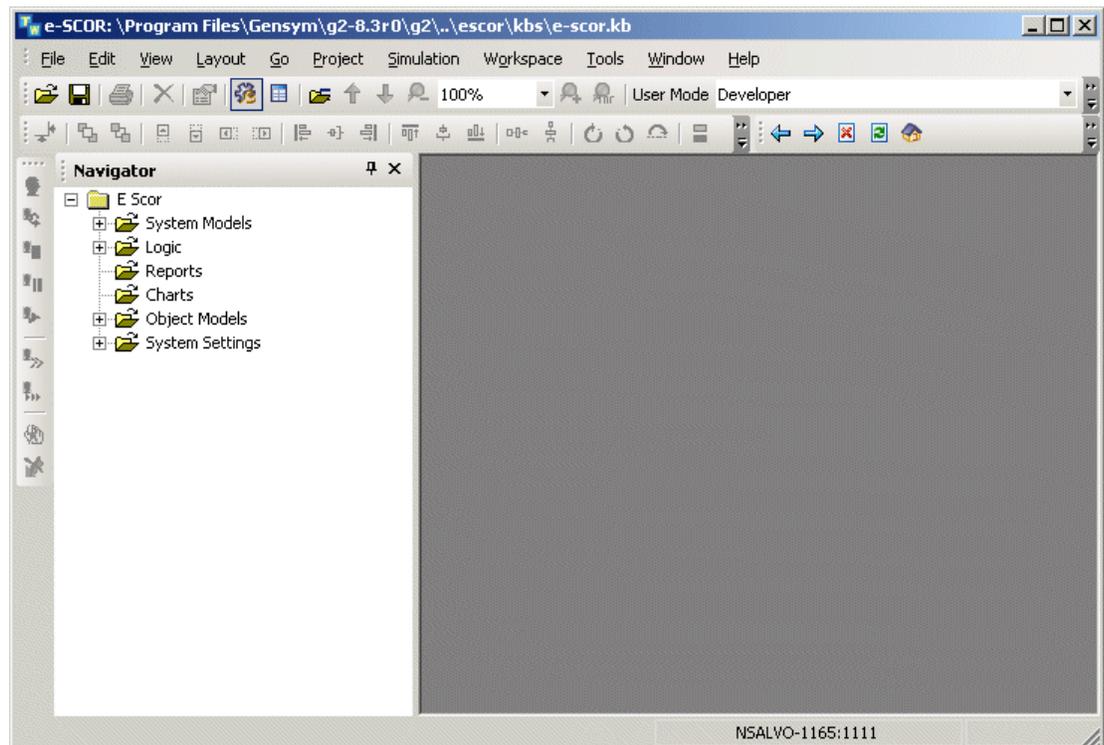
- 1 Choose Start > Programs > Gensym G2 8.3r0 > G2 e-SCOR > Start G2 e-SCOR Server.

This launches the server on the local machine.

- 2 Choose Start > Programs > Gensym G2 8.3r0 > Telewindows Next Generation.

This launches the Telewindows client on the local machine and connects to the server.

When e-SCOR has been loaded, you will see this window:



## Creating a New Project

**To create a new project:**

- 1 Choose File > New.
- 2 Enter a unique name as the name of the project, for example, my-tutorials.  
The project name cannot contain spaces.
- 3 Ensure that e-SCOR is chosen as the selected library and add any other additional libraries that you might need.

e-SCOR creates a new, blank project with the name you enter.

## Creating a Model

Your project can contain one or more models, such as an “As Is” model and a “To Be” model. You create and manage supply-chain models through the Project menu.

**To create a model:**

- 1 Choose Project > System Models > Supply Chain Processes > Manage to display a dialog for managing supply-chain process models.
- 2 Click the New button (  ) to display the properties dialog for creating a new model.
- 3 Edit the Label to be Simplest Model.  
The manage dialog now contains your model.
- 4 With your new model selected, click the Model button (  ) to show the model detail.

You create your supply-chain model on the model detail.

## Creating a Scenario

The control center for running a simulation is a Scenario object. You control the scenario from the Simulation menu or toolbar.

A scenario displays the:

- Current simulation time.
- Simulation mode, which is jump by default.
- Simulation status, which is initially inactive.

Normally, you run the simulation in jump mode, which advances the simulation clock with each new event without pausing between discrete steps. You can also run the simulation in step mode, which advances the simulation clock with each new event, then pauses the simulation, or synch mode, which synchronizes the simulation clock to real time, using a scale factor.

---

**Tip** Normally, you run simulations in jump mode. You use step mode when debugging models at Level 3 and Level 4. You use synchronized mode to simulate actual delays in the model; however, you would probably do this only when debugging models as well.

---

When you run a simulation, the status changes depending on whether it is active, running, paused, or resetting.

You can configure various aspects of the Scenario object, including the simulation mode, start time, duration, and animation. By default, the simulation start time is January 1, 2006, it is configured to run for a maximum of 17 years, and animation is on.

---

**Tip** We recommend disabling animation when working with these tutorials.

---

**To create a scenario:**

- 1 Choose View > Toolbox - e-SCOR to display the e-SCOR toolbox, then click the Tools button to display the Tools palette.

---

**Tip** Hover the mouse over the button to display tooltip.

---

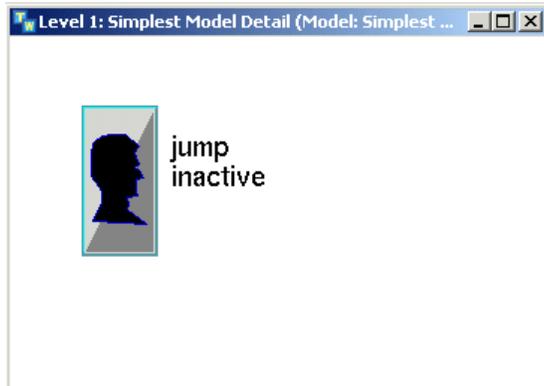
- 2 Select a Scenario, then click the model detail to place the object on the detail.
- 3 Choose Properties on the scenario, click the Options tab, and disable the Enable Animation option.

You can shrink wrap the borders of the detail workspace, which adjusts the window size to just fit the workspace. You can drag objects beyond the workspace borders to expand the workspace size. And you can adjust the window size to be smaller than the workspace, which displays scroll bars on the window.

- 4 Experiment with dragging the Scenario object on the workspace to adjust the borders, adjusting the window size, and shrink wrapping the workspace to just fit the object.

To shrink wrap the workspace, choose Shrink Wrap from the Layout menu or from the popup menu for the workspace, or click the equivalent button on the Layout toolbar (  ).

The model detail should look something like this:



---

**See Also** [Controlling the Simulation](#) in the *e-SCOR User? Guide*.  
[Configuring the Scenario](#) in the *e-SCOR User? Guide*.

---

## Saving a Model

You save models to a *.kb* file whose name corresponds with your project name.

You save models to a *.kb* file that corresponds to the project name, in this case, *my-tutorials.kb*. The project is located in the *projects* directory of your e-SCOR installation directory.

**To save a model:**

→ Choose File > Save.

## Starting e-SCOR with a Particular Model Open

You can open a different model by choosing Open from the File menu. You can also create a shortcut that starts e-SCOR with a particular model open.

e-SCOR is a client-server application. You can configure the e-SCOR server to load your model on startup by creating a shortcut to the batch file that starts the server and modifying its command arguments. The batch file that starts the e-SCOR server is:

```
"C:\Program Files\Gensym\g2-8.3r0\g2\StartServer.bat"  
-kb ..\escor\kbs\e-scor.kb -nowindow
```

In the shortcut, the first argument specifies the KB to load, which specifies a relative pathname with the *.kb* extension. For example:

```
"C:\Program Files\Gensym\g2-8.3r0\g2\StartServer.bat"
-kb ..\projects\my-tutorials.kb -nowindow
```

If you are running the e-SCOR server and the e-SCOR client on the same local machine, the e-SCOR client can automatically connect to the server. It does this by connecting to the machine named *localhost* at port *1111*.

If you are running the e-SCOR server and client on different machines, you can connect to a particular server from the client by choosing Connect to Server from the Go menu. You can also create a shortcut to the e-SCOR client batch file and configure the host and port to which to connect. For details, see the *e-SCOR User? Guide*.

#### To start e-SCOR with a particular model open:

- 1 Choose Create Shortcut on the Start G2 e-SCOR Server shortcut in the Start menu, then drag it to your desktop.
- 2 Choose Properties on the shortcut and click the Shortcut tab.
- 3 Edit the Target to include the *.kb* file to load, as specified above.
- 4 Choose Tools > User Mode > Developer or choose Developer mode on the toolbar.

---

**Note** You cannot exit the e-SCOR server in Modeler mode; you must be in Developer mode.

---

Alternatively, you can choose File > Close to exit the client, then mouse right on the G2 server icon in the system tray and choose Shut Down G2.

- 5 Choose File > Exit to exit e-SCOR and click Yes to shutdown the server as well.

Now, you will start the e-SCOR server and client with your model already open.

#### To start e-SCOR with your model open:

- 1 Double-click the shortcut to start the e-SCOR server with your model open.
- 2 Start the Telewindows Next Generation client.

e-SCOR should now be running with your model open.

## Summary: Configuring the Model Environment

To configure the e-SCOR model environment, you:

- [Created a project.](#)
- [Created a model.](#)
- [Created a scenario.](#)
- [Saved the model.](#)
- [Started e-SCOR with your model open.](#)

You should now know how to configure the model environment for the simplest model.

Next, you will configure Level 1 roles to create a supply-chain model.

# Configuring the Simplest Model

---

*Teaches you how to configure the simplest model, which consists of a Base Manufacturer role and a Consumer role.*

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# Introduction

To develop an e-SCOR model, you create and configure process **roles**, which comprise the four Level 2 SCOR management processes – Plan, Source, Make, and Deliver. These roles correspond to the four basic functions in a supply chain and are implicit in the description of Level 1 SCOR. The four process roles are:

- **Base Manufacturer role** – Represents the node that is the ultimate supplier of raw materials to downstream buyers.
- **Distributor role** – Represents the node that sources products from upstream suppliers and delivers those products to downstream buyers in the form of components, complete products, or product assemblies, also known as “kits.”
- **Manufacturer role** – Represents the node that sources components from upstream suppliers, makes finished products, and delivers those finished products to downstream buyers.
- **Consumer role** – Represents the node that asserts a demand on the supply chain by placing orders for products from upstream suppliers.

The simplest possible e-SCOR model consists of a Base Manufacturer role, which delivers a single product family, and a Consumer role, which sources the product family.

---

**Note** All e-SCOR supply-chain models must include a Base Manufacturer role and a Consumer role.

---

To create and configure Level 1 roles for the simplest e-SCOR model, you:

- [Create a product specification](#) to describe the product family that each role in the supply chain sources, makes, and/or delivers.
- [Create the supply-chain model](#) by creating and optionally connecting roles.
- [Configure role parameters](#), including its name and financial parameters.
- [Assign products to roles](#) to determine the products a role sources and/or delivers.
- [Configuring potential suppliers](#) for source products.

---

**Shortcut** If you do not have time to work through the exercises in this part of the tutorial, in e-SCOR, open the file named *escor-tutorial-simplest.kb*, which shows the finished model. Follow along in the existing model as you read through the exercises.

---

---

**See Also** [e-SCOR Implementation of Level 1 Roles](#) in the *e-SCOR User? Guide*.

---

# Configuring the Product Specification: Simplest Model

A supply chain can process one or more products. You model this by creating a **product hierarchy**, or bill of materials, which consists of **product specifications** for each product that the supply chain sources, makes, and/or delivers.

In the simplest model, the product hierarchy consists of a single product specification, which represents an entire product family.

In a more realistic model, the product hierarchy consists of finished products, which consist of one or more components, where the components themselves can consist of other components. You will learn how to create a product hierarchy with components [later in this tutorial](#).

In general, you create the product hierarchy on the detail of a Product Structure Organizer.

---

**Tip** If the product hierarchy consists of a single product specification, you can place the product specification directly on the model detail, rather than on the detail of a Product Structure Organizer. However, in this tutorial, you will place the product specification in an organizer.

---

## To create a product specification for the simplest model:

- 1 If your project is not already open, choose File > Open and choose your project.
- 2 Choose Project > System Models > Supply Chain Processes > Simplest Model to display your model.
- 3 Display the e-SCOR toolbox, click the Products button, select a Product Structure Organizer, also called a Bill of Materials (BOM), and place it on the model detail.
- 4 Choose Show Detail on the product structure to display its detail.

You place the product specification on this detail.

---

**Tip** You can also show the detail of any object that has detail by using Ctrl + right-click.

---

- 5 Choose a Product Specification from the Products palette of the e-SCOR toolbox and place it on the Product Structure Organizer detail.
- 6 Display the properties dialog for the product specification.

To display the properties dialog for any e-SCOR object, you have a number of options:

- Right-click the object and choose Properties from the object's popup menu.
- Double-click the object.
- Left-click the object to select it and press the F4 key.
- Select the object and choose Properties from the Edit menu or click the equivalent toolbar button (  ).

To accept the properties dialog, click OK or Apply.

- 7 Configure the Product Name to be Product Family and accept the properties dialog.

The label on the Product Specification shows the name you entered.

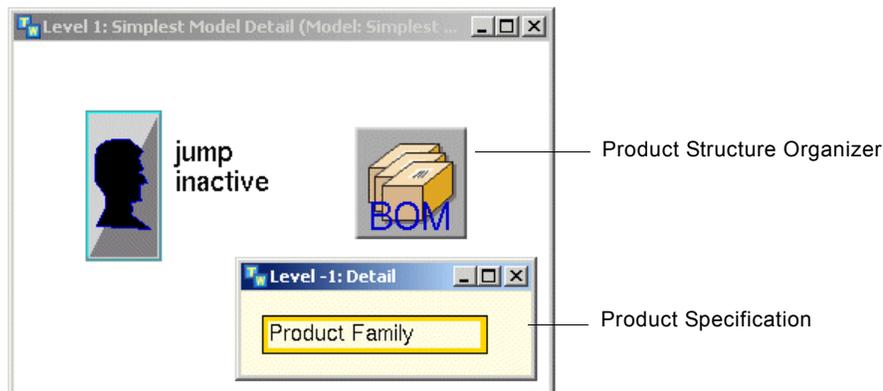
---

**Note** From now on, this tutorial does not explicitly state how to display the properties dialog for an object, nor does it explicitly state that you should accept the properties dialog.

---

- 8 Shrink wrap the detail.

The Product Structure Organizer and its detail should look like this:




---

**See Also** [Products](#) in the *e-SCOR User? Guide*.

[Creating the Product Hierarchy](#) in the *e-SCOR User? Guide*.

---

## Creating a Supply-Chain Model: Simplest Model

To create a supply-chain model, you create roles from the e-SCOR toolbox and place them in the order in which the processes occur in the supply chain, from left to right. A Base Manufacturer must be the first role in the supply chain on the left, and a Consumer must be the last role in the supply chain on the right. Distributor roles can appear downstream of Base Manufacturer roles, and Manufacturer roles can appear downstream or upstream of Distributor roles.

The simplest model consists of a single Base Manufacturer role and a single Consumer role. When you create the supply chain and run the simulation for the simplest model, the following objects flow around the model:

- Orders flow upstream from the Consumer role to the Base Manufacturer role.
- Product shipments and invoices flow downstream from the Base Manufacturer role to the Consumer role.
- Payments flow upstream from the Consumer role to the Base Manufacturer role.

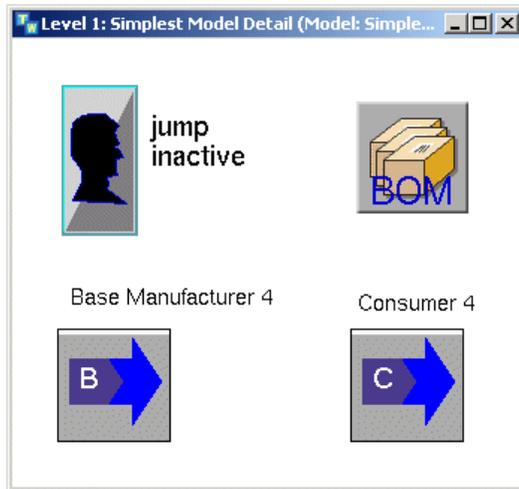
The model is automatically configured to process these and other required objects, such as purchase requests, purchase responses, and purchase awards.

To provide a visual indication of how roles are related in a supply chain, you can optionally create connections between roles. When physically connecting roles in the simplest model, you create an output stub on the downstream side of a Base Manufacturer role, which you connect to the upstream side of a Consumer role to create an input path. Manufacturer and Distributor roles have input stubs on the upstream side of the role and output stubs on the downstream side of the role.

### To create the simplest supply-chain model:

- 1 Display the e-SCOR toolbox, click the Roles button, select a Base Manufacturer role, and place it on the left side of the model detail.
- 2 Select a Consumer role from the toolbox and place it to the right of the Base Manufacturer role.  
e-SCOR creates unique labels for each role, which you can edit.
- 3 Select both roles and choose Layout > Align or Distribute > Align Top or click the equivalent toolbar button.
- 4 Shrink wrap the workspace.

The model should look something like this:



---

**See Also** [Creating the Supply-Chain Model](#) in the *e-SCOR User? Guide*.

---

## Configuring Role Parameters: Simplest Model

Each role defines a set of basic parameters that you can configure, such as the role label, which you can use to indicate the type of product a role sources or delivers.

---

**Note** You must configure a unique Role Label for each role in the model.

---

You can configure the highlight color of the role to visually distinguish different types of roles, and the longitude and latitude of the physical location of the role on a map.

Each role also defines these financial parameters:

- [Financial Period](#) – Used for computing financial, cost, and asset metrics for the role. The default value is 4 weeks and 2 days (30 days).
- [Financial Payment Terms](#) – For supplier roles, determines the amount of time the downstream buyer has to make payments for goods received. A Consumer role ignores its Financial Payment Terms, because it is not a supplier.

Thus, the supplier role determines the payment terms in the supply chain.

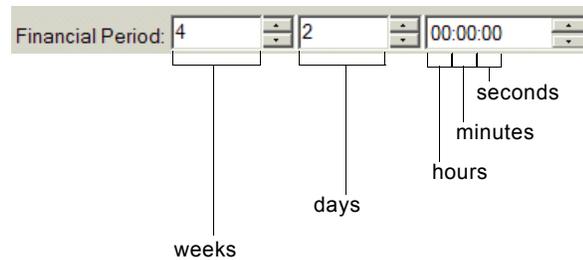
**To configure basic role parameters for the simplest model:**

- 1 Display the properties dialog for each role, in turn.  
For details, see [Configuring the Product Specification: Simplest Model](#).
- 2 On the Role tab, configure this parameter for each role:

Role	Parameter	Value
Base Manufacturer	<a href="#">Role Label</a>	Base Manufacturer
Consumer	<a href="#">Role Label</a>	Consumer

- 3 Adjust the location of the label relative to the role, as needed.
- 4 In the properties dialog for the Base Manufacturer role, click the Financial tab.  
In addition to defining the Financial Period and Financial Payment Terms, the role computes various incoming and outgoing financial metrics. The Consumer role only computes outgoing financial metrics.

To configure timing parameters, select the seconds, minutes, hours, days, or weeks that you want to configure, then use the up and down arrows to adjust the value, or enter the value directly:




---

**See Also** [Configuring General Parameters for Roles](#) in the *e-SCOR User? Guide*.  
[Configuring Financial Parameters for Roles](#) in the *e-SCOR User? Guide*.

---

## Assigning Products to Roles: Simplest Model

Next, you assign each product specification in the product hierarchy to one or more roles by configuring the products that each role in the model sources and/or delivers. In the simplest model, the Consumer role sources the product family, and the Base Manufacturer delivers the product family.

When you assign a product specification to a role, e-SCOR creates the following objects, as appropriate for the role:

- **Source product** – The product that a buyer role sources from an upstream supplier role.
- **Delivery product** – The product that a supplier role delivers to a downstream buyer role.

Together, source and delivery products are called **product composites**.

Thus, when you assign a product specification to a Base Manufacturer role, e-SCOR creates a delivery product, and when you assign a product specification to a Consumer role, e-SCOR creates a source product.

For Distributor and Manufacturer roles, you configure the products that the role both sources and delivers; thus, these roles define both source and delivery products, as you will learn [later in this tutorial](#).

e-SCOR places source and delivery products in the Products pool on the role detail. A **pool** is another type of container in which e-SCOR places objects that it creates and deletes when the simulation runs, such as awards, orders, and shipments.

#### **To assign products to roles for the simplest model:**

- 1 Display the properties dialog for the Base Manufacturer role and click the Product tab.

e-SCOR displays the list of all products associated with the model and the list of source and/or delivery products, depending on the type of role. In the simplest model, the product hierarchy consists of a single product specification. In a real model, the list of products would consist of finished products and their components.

For a Base Manufacturer, you specify the delivery products.

- 2 Click Product Family in the Delivery Products list and apply.

The Product Family is now a delivery product of the Base Manufacturer role.

For a Consumer role, you specify the source products.

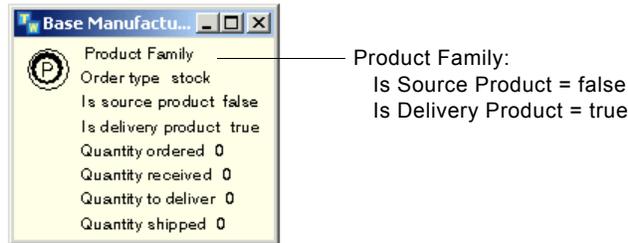
- 3 Display the properties dialog for the Consumer role, click the Product tab, click Product Family in the Source Products list, and apply.

The Product Family is now a source product of the Consumer role.

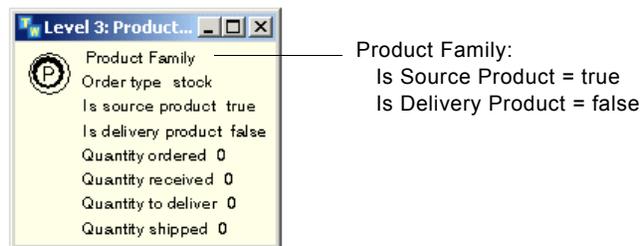
#### **To show which products are assigned to which roles:**

- ➔ Right-click the role to display its popup menu and choose Show Products.

Here is the delivery product associated with the Base Manufacturer role:



Here is the source product associated with the Consumer role:



The product composite associated with a Distributor role can be both a source and a delivery product.

---

**See Also** [Configuring the Products a Role Sources and Delivers](#) in the *e-SCOR User? Guide*.

---

## Configuring Potential Suppliers for Source Products

Once you have assigned products to roles, the last step is to configure the potential suppliers for each source product in the model. In the simplest model, the Base Manufacturer role is the only potential supplier for the source product of the Consumer role. In a more realistic model, you might have multiple source products and multiple suppliers.

You configure potential suppliers by configuring the source product of a role. You will configure other parameters for source and delivery products [later in this tutorial](#).

### To configure potential suppliers for source products:

- 1 Right-click the Consumer role to display its popup menu, choose Products to display the list of source and delivery products for the role, then choose Product Family to display the properties dialog for the source product.

---

**Note** From now, this tutorial does not explicitly instruct you to right-click an object to display its popup menu, then to choose a menu choice. Instead, it simply says to choose a particular menu choice on the object.

---

- 2 Click the Supplier Selection tab.

At the bottom of the dialog, you will see a list of all potential upstream suppliers for the source product. In the simplest model, only one upstream supplier exists, the Base Manufacturer role.

- 3 Check the Base Manufacturer role in the [Potential Supplier Names](#) list and accept.

The Consumer role is now configured to source the Product Family from the only upstream supplier in the model, the Base Manufacturer role.

## Saving the Model

Save the model to your project name.

For details, see [Saving a Model](#).

## Summary: Creating the Simplest Supply-Chain Model

To create and configure Level 1 roles for the simplest supply-chain model, you:

- [Created the product specification.](#)
- [Created the supply-chain model.](#)
- [Configured role parameters.](#)
- [Assigned products to roles.](#)
- [Configured potential suppliers.](#)

You should now know how to create and configure Level 1 roles for the simplest e-SCOR model.

Next, you will run the simulation for the simplest e-SCOR model and view the metrics it computes.

# Running the Simulation: Simplest Model

---

*Teaches you how to run the simulation and view Level 1 and Level 2 SCOR metrics through the Metrics toolbars.*

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# Introduction

You run the simulation from the Simulation menu or toolbar. When you run the simulation, e-SCOR computes metrics for all roles, categories, and product composites in the model, which you can view through the properties dialogs, the Metrics toolbars, and output reports.

In this section of the tutorial, you will:

- [Run the simulation.](#)
- [Troubleshoot problems running the simulation.](#)
- [View role metrics](#) through the properties dialogs and Metrics toolbars.
- [View Level 2 metrics through the Metrics toolbars.](#)

Later in this tutorial, you will [view Level 2 metrics](#) through the dialogs, and you will [create output reports](#) for viewing metrics.

---

**Shortcut** If you do not have time to work through the exercises in this part of the tutorial, in e-SCOR, open the file named *escor-tutorial-simplest.kb*, which shows the finished model. Follow along in the existing model as you read through the exercises.

---

## Running the Simulation

When you run a simulation, the status of the Scenario object changes, depending on whether the model is running, paused, resetting, or stopped.

As mentioned earlier, e-SCOR runs the simulation in jump mode, which processes each discrete event continuously and automatically advances the simulation clock with each new event.

### To run the simulation:

- 1 Choose Start All from the Simulation menu or click the equivalent toolbar button: 

The status changes to **resetting**, then **running**.

---

**Note** Clicking the Start All button activates, resets, and starts the simulation running. Step 4 describes what happens when you reset the simulation.

---

e-SCOR verifies that you have configured the model correctly. If so, the simulation clock advances with each new event and computes metrics for all objects.

In addition to computing metrics, objects begin flowing through the model. These objects represent purchase requests, purchase responses, purchase awards, orders, product shipments, invoices, and payments, which the model creates and deletes when it runs. By default, animation is off, which means you will not see these objects flowing through the model.

- 2 Choose Pause from the Simulation menu or click the equivalent toolbar button to pause the simulation: 

The status changes to **paused**.

Pausing the simulation stops the simulation clock, causes all objects to stop flowing through the model, and stops computing metrics.

- 3 Choose Continue from the Simulation menu or click the equivalent toolbar button to resume running the simulation after pausing: 

The status changes to **running**.

The simulation clock begins advancing and the model continues to compute metrics.

- 4 Choose Reset from the Simulation menu or click the equivalent toolbar button to reset the simulation: 

The status changes from **resetting** to **reset**.

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

---

**See Also** [Controlling the Simulation](#) in the *e-SCOR User? Guide*.

[Verifying that the Simulation is Running Correctly](#) in the *e-SCOR User? Guide*.

[Problems that Can Occur When Running a Simulation](#) in the *e-SCOR User? Guide*.

---

## Troubleshooting Problems Running the Simulation

The most common mistakes you can make when configuring a simple e-SCOR model are:

- You forget to assign product specifications to roles.
- You forget to configure the potential supplier of a source product.
- You did not label each role with a unique name.

If you do not configure the model correctly, e-SCOR immediately pauses the simulation and displays the detail of the category or role that is configured incorrectly. You will see a magenta arrow pointing to the object with the error.

You can drag the arrow away from the block to see the associated error message, which gives some indication of the error. You can also choose Message Board from the View menu to view these errors.

**To correct configuration errors when running a simulation:**

- ➔ Configure the model correctly, reset the simulation, and run the simulation again.

---

**See Also** [Controlling the Simulation](#) in the *e-SCOR User? Guide*.

[Verifying that the Simulation is Running Correctly](#) in the *e-SCOR User? Guide*.

[Problems that Can Occur When Running a Simulation](#) in the *e-SCOR User? Guide*.

---

## Viewing Role Metrics

Each role computes the following metrics:

- Number of Financial Periods – The number of financial periods that have passed since the start of the simulation.
- Incoming financial metrics – Financial Bookings, Financial Outstanding, Financial Collections within Financial Period, and Financial Collections Total for products shipped. (See note below.)
- Outgoing financial metrics – Financial Obligations, Financial Payments within Financial Period, and Financial Payments Total for products received. (See note below.)
- Days of supply metrics – Cost-weighted value of source product inventory (Raw Materials), source product inventory that has been taken from inventory but not yet assembled and shipped (Work in Progress), delivery product inventory that has not yet shipped (Finished Goods), and total inventory (Inventory Level).
- Asset metrics – Standard asset calculations: Asset Turns, Cash-to-Cash Cycle Time, Days Sales Outstanding, and Cash Flow Period.
- Order Management Costs – The total cost of doing business, which includes the cost of creating customer orders and delivering those orders, which is 0, by default.

A Consumer role computes only outgoing financial metrics, based on the net selling price of the upstream supplier's delivery products. A Base Manufacturer computes incoming financial metrics from all its downstream buyers, as well as outgoing financial metrics, based on the purchase price of raw materials.

---

**Note** The model computes total financial collections and payments, financial bookings, financial outstanding, and financial obligations since the start of the simulation with each new event; therefore, these metrics are always current. The model computes financial collections and payments within the financial period at the end of each period; therefore, these metrics refer to collections and payments for the *previous* financial period.

---

The financial and asset metrics for roles require that at least one financial cycle complete before the role begins computing values.

When you view metrics through the dialogs, e-SCOR takes a snapshot at a particular point in time and updates the values once every few seconds. You can also manually update the metrics to view the latest values by clicking the Update button in the dialog.

When you view financial metrics through the Metrics toolbar, the values update automatically.

For those metrics that are based on historical values, you can also view statistical calculations, such as minimum and maximum values, and averages, and you can view the history. You view these values through the properties dialog.

**To view metrics for the Base Manufacturer and Consumer roles:**

- 1** Run the simulation again.
- 2** Choose View > Financial Metrics.  
A spreadsheet of financial metrics appears at the bottom of the window. The financial collections and payments begin to update after one financial period has completed.
- 3** Choose View > Asset Metrics.  
A spreadsheet of asset metrics appears at the bottom of the window. Similarly, the asset metrics begin to update after one financial period has completed.
- 4** Wait until at least four months of simulation time has past, which is four financial periods.  
The simulation time should be some time after May 1. Now, you will view the metrics through the dialogs.

- 5 Display the properties dialog for each role to view these metrics on these tabs:

Tab	Group/Metric
Role	<a href="#">Number of End Products</a>
Financial	General <a href="#">Number of Financial Periods</a>
	Incoming <a href="#">Financial Bookings</a> <a href="#">Financial Outstanding</a> <a href="#">Financial Collections within Financial Period</a> <a href="#">Financial Collections Total</a>
Assets	Outgoing <a href="#">Financial Obligations</a> <a href="#">Financial Payments within Financial Period</a> <a href="#">Financial Payments Total</a>
	Days of Supply <a href="#">Raw Materials</a> <a href="#">Work in Progress</a> <a href="#">Finished Goods</a> <a href="#">Inventory</a>
Cost	Metrics <a href="#">Asset Turns</a> <a href="#">Cash-to-Cash Cycle Time</a> <a href="#">Days Sales Outstanding</a> <a href="#">Cash Flow Period</a>
	<a href="#">Order Management Costs</a>

- 6 Click the button next to any of the metrics that are calculated based on a history, such as Financial Bookings.

The Metrics tab shows statistical values calculated for the metric. You can also configure various properties and keep a history.

- 7 Pause the simulation.

Here are the Financial and Asset Metrics toolbars after 4 financial periods have passed:

Financial Metrics								
Role	Number of Financial Periods	Bookings	Outstanding	Collection Period	Collection Total	Obligations	Payment Period	Payment Total
Consumer	4	0.0	0.0	0.0	0.0	2.752e5	3200.0	10500.0
Base Manufacturer	4	2.719e5	3200.0	3200.0	10500.0	0.0	0.0	0.0

Asset Metrics									
Role	Number of ...	Raw Material DOS	WIP DOS	Finished Good DOS	Inventory DOS	Asset Turns	Cash to Cash Cycle Time	Days Sales Outstanding	Cash Flow Period
Consumer	4	+Inf	0.0	0.0	+Inf	0.0	0.0	0.0	-3200.0
Base Manufacturer	4	0.0	0.0	9.886	9.886	36.921	2588.949	2579.063	3200.0

See Also [Viewing Metrics for Roles](#) in the *e-SCOR User? Guide*.

## Viewing Level 2 Metrics through the Toolbars

You can view Level 2 metrics related to orders, inventory, and contracts in the Metrics toolbars.

### To view Level 2 metrics through the toolbars:

- 1 Choose View > Order Metrics.

The Order Metrics toolbar includes metrics related to orders for all source and delivery products in the model, including order fulfillment times.

- 2 Choose View > Inventory Metrics.

The Inventory Metrics toolbar includes metrics related to inventory levels for all source and delivery products in the model.

- 3 Choose View > Contract Metrics.

The Contract Metrics toolbar includes metrics related to contracts for all source and delivery products in the model.

- 4 Reset the simulation.

Here are the Order, Inventory, and Contract Metrics toolbars after 4 financial periods have passed:

Order Metrics							
Product Name	Role	Quantity Ordered	Quantity Received	Quantity to Deliver	Quantity Shipped	Order Fulfillment Lead Time	Received Fulfillment Time
Product Family	Consumer	286300	13700	0	0	000.000.00:00:00	000.000.08:31:58
Product Family	Base Manufacturer	0	0	286200	13700	000.000.07:31:58	000.000.00:00:00

Order Metrics							
Product Name	Role	Quantity Ordered	Quantity Received	Quantity to Deliver	Quantity Shipped	Order Fulfillment Lead Time	Received Fulfillment Time
Product Family	Consumer	286300	13700	0	0	000.000.00:00:00	000.000.08:31:58
Product Family	Base Manufacturer	0	0	286200	13700	000.000.07:31:58	000.000.00:00:00

Order Metrics							
Product Name	Role	Quantity Ordered	Quantity Received	Quantity to Deliver	Quantity Shipped	Order Fulfillment Lead Time	Received Fulfillment Time
Product Family	Consumer	286300	13700	0	0	000.000.00:00:00	000.000.08:31:58
Product Family	Base Manufacturer	0	0	286200	13700	000.000.07:31:58	000.000.00:00:00

## Saving the Model

Save the model to your project name.

For details, see [Saving a Model](#).

## Summary: Running the Simulation for the Simplest Model

To run the simulation for the simplest model, you:

- [Ran the simulation.](#)
- [Troubleshoot problems running the simulation.](#)
- [Viewed role metrics.](#)
- [Viewed Level 2 metrics through the toolbars.](#)

You should now know how to view metrics for Level 2 categories and product composites for the simplest e-SCOR model.

Next, you will configure the simplest model to generate output reports for viewing metrics in an Excel spreadsheet.

# Configuring Level 2 SCOR: Simplest Model

---

*Teaches you how to configure parameters for Level 2 categories and product composites for the simplest model.*

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# Introduction

Each role has detail, which provides the default configuration of Level 2 SCOR for the particular role. Level 2 SCOR includes:

- Process categories, which define how the role plans, sources, makes, and delivers products, as appropriate for the role.
- Product composites, which define the source and delivery products that a role sources and/or delivers.

Process categories are also referred to simply as “categories.”

You configure various parameters for each category and each product composite on the role detail. The parameters you configure for categories apply to all products the role sources, makes, and/or delivers, such as the time it takes to manufacture a batch of products. On the other hand, the parameters you configure for product composites apply to individual source and delivery products, such as the starting and maximum inventory for a particular product.

You configure Level 2 SCOR parameters on the various tab pages of the properties dialog for categories and product composites. These dialogs also include metrics the model computes for each category and product composite.

For a quick reference to the definition of all parameters and metrics, see the *e-SCOR Quick Reference*. For the SCOR definition of all SCOR metrics, see [Appendix B, SCOR Metrics](#) in the *webSCOR User? Guide*-*SCOR User? Guide*.

To configure Level 2 SCOR for the simplest model, you:

- [View the Consumer role detail](#), then configure:
  - [Source category parameters](#)
- [View the Base Manufacturer role detail](#), then configure:
  - [Make category parameters](#)
  - [Plan category parameters](#)
  - [Deliver category parameters](#)
- [Configure product composite parameters](#)

---

**Shortcut** If you do not have time to work through the exercises in this part of the tutorial, in e-SCOR, open the file named *escor-tutorial-simplest.kb*, which shows the finished model. Follow along in the existing model as you read through the exercises.

---

---

**See Also** [Process Category Summary](#) in the *e-SCOR User? Guide*.  
[Configuring Category Parameters](#) in the *e-SCOR User? Guide*.  
[Configuring Product Composites](#) in the *e-SCOR User? Guide*.

---

## Viewing the Consumer Role Detail

The Consumer role detail includes these process categories related to sourcing stock products, which is the default planning strategy:

- ES: Enable Source category, which is responsible for sending **customer orders** – orders for source products with upstream suppliers – and establishing contracts with those suppliers.
- S1: Source Stocked Product category, which is responsible for placing orders and change orders for the finished products that the overall supply chain consumes, receiving orders for stock finished products, and making payments to suppliers.

The Consumer role contains two additional categories, which represent boundary conditions:

- Input, which signals the beginning of the supply-chain process when orders for finished products are placed.
- End, which signals the end of the supply-chain process when the finished products in the supply chain have been received.

You configure the frequency with which the Consumer role places orders for its source products and the size of those orders in the source product of the Consumer role, which you will do [later in this tutorial](#).

Distributor and Manufacturer roles also contain the ES: Enable Source and S1: Source Stocked Product categories on the role detail. Customer orders that originate in a Distributor or Manufacturer role are also known as **replenishment orders**.

Consumer, Distributor, and Manufacturer roles also contain the S2: Source Make-to-Order Product and S3: Source Engineer-to-Order Product process categories for sourcing products, using alternative planning strategies.

### To view the Consumer role detail:

- ➔ Choose Show Detail on the Consumer role.

---

**Tip** Remember, you can also press Ctrl + right-click to display the detail.

---

---

See Also [Viewing Role Details](#) in the *e-SCOR User? Guide*.

---

## Configuring Source Category Parameters: Consumer Role

The Source category of a role is responsible for receiving shipments from and making payments to suppliers. You configure timing parameters related to receiving and verifying source products and placing them in inventory.

You configure all timing parameters, based on one of a number of mathematical distributions, including random triangular, random normal, and random exponential. The default distribution for all timing parameters is random triangular, where the minimum, maximum, and mode are all 1 hour; therefore, the duration is fixed.

You also configure cost parameters related to acquiring products, creating orders, verifying and receiving shipments, and making payments. In this tutorial, the costs are specified as US dollars, however, in general, you configure costs as currency units.

Distributor and Manufacturer roles use source planning to determine the size of each replenishment order for source products and when to place an order, based on orders for its delivery products.

Because a Consumer role has no downstream buyers, it places orders for its source products, based on parameters that you configure in the source product, which you will do [later in this tutorial](#). These parameters determine the overall demand for finished products in the supply chain.

Configure these parameters for the S1 category:

- Receiving Duration, Verification Duration, Transfer Duration – Takes an average of 1 hour each to receive, verify, and transfer source products, using a triangular distribution, the default.
- Costs per Transaction parameters – Costs \$10 to receive the source product (Receiving), verify the shipment (Verification), transfer the shipment (Transfer), create an order (Create Customer Order), and pay an invoice (Invoice).

**To configure Source category parameters for the Consumer role:**

- Configure these parameters for the S1: Source Stocked Product category on the Consumer role detail:

Tab	Group/Parameter	Value
Receiving	<a href="#">Receiving Duration</a>	
	Duration Mode	Random Triangular
	Min	30 minutes
	Max	1 hour and 30 minutes
Verification	<a href="#">Verification Duration</a>	
	Duration Mode	Random Triangular
	Min	30 minutes
	Max	1 hour and 30 minutes
Transfer	<a href="#">Transfer Duration</a>	
	Duration Mode	Random Triangular
	Min	30 minutes
	Max	1 hour and 30 minutes
Cost	Costs per Transaction	
	<a href="#">Receiving</a>	10
	<a href="#">Verification</a>	10
	<a href="#">Transfer</a>	10
	<a href="#">Create Customer Order</a>	10
	<a href="#">Invoice</a>	10

**See Also** [Configuring the Source Category](#) in the *e-SCOR User? Guide*.

[Configuring the Mathematical Distribution](#) in the *e-SCOR User? Guide*.

# Viewing Base Manufacturer Role Details

The Base Manufacturer role detail includes these process categories related to manufacturing and distributing stock products, the default:

- Mb: Make Product category, which defines the cost of raw materials in the supply chain and the manufacturing time for making batches of finished products.
- P3: Plan Make category, which defines the frequency with which the role creates **build orders**, which are orders for delivery products that the role sends to manufacturing, and implicitly determines when the role delivers those products.
- D1: Deliver Stocked Product category, which defines the amount of time it takes to enter an order for stock products, the criteria the role uses to determine which orders to deliver first, and various timing parameters related to delivering products.
- ED: Enable Deliver category, which is responsible for establishing contracts with and receiving orders from downstream buyers for delivery products. The ED category has no configurable parameters.

Base Manufacturer roles use the Mb category as its Make category. Manufacturer roles include the M1: Make-to-Stock category for manufacturing stock finished products, the default, as well as the M2: Make-to-Order and M3: Engineer-to-Order categories for making products, using alternative planning strategies.

Base Manufacturer and Manufacturer roles use the P3: Plan Make category on the role detail for make planning. **Make planning** determines the number of finished products a manufacturer role makes and the frequency with which it sends build orders to manufacturing.

Base Manufacturer, Distributor, and Manufacturer roles include the D1: Deliver Stocked Product category for delivering stock finished products, the default. They also include the D2: Deliver Make-to-Order Product and D3: Deliver Engineer-to-Order Product categories for delivering products, using alternative planning strategies.

Base Manufacturer, Distributor, and Manufacturer roles all include the ED: Enable Deliver category on the role detail.

## To view the Base Manufacturer role detail:

- ➔ Choose Show Detail on the Base Manufacturer role.

---

**See Also** [Viewing Role Details](#) in the *e-SCOR User? Guide*.

---

## Configuring Make Category Parameters: Base Manufacturer Role

The Make category is responsible for selecting build orders for manufacture and manufacturing delivery products. Therefore, you configure timing and build-selection parameters related to manufacturing delivery products.

Base Manufacturer and Manufacturer roles use make planning to determine the size of each build order and when to start manufacturing batches, based on orders for its delivery products. Therefore, you configure planning parameters in the P3: Plan Make category and in the delivery products for the role.

By default, Base Manufacturer roles use a stock planning strategy to determine build order size, based on orders for its delivery products. If the role uses an engineer-to-order planning strategy, you configure additional parameters for the Base Manufacturer role related to engineering duration and costs.

By default, a Base Manufacturer or Manufacturer role that makes stock products chooses build orders at random. You can configure various build-selection criteria in the Make category for choosing build orders.

Configure these parameters for the Mb category:

- Order Release to Manufacturing Duration – Takes 1 day, on average, from when the role receives a build order to when it begins manufacturing batches of finished products.
- Build Selection parameters – Chooses the largest build orders first.
- Production Material Duration – Takes 1 day, on average, from when the Make category receives components to when it starts manufacturing batches of finished products.
- Manufacturing Duration – Takes 10 hours, on average, to manufacture a batch of finished products.
- Move to Delivery Duration – Takes 1 hour, on average, to place the finished products in inventory.
- Production Material Handling – The costs associated with handling the components the Make category uses to manufacture finished products.

**To configure Make category parameters for the Base Manufacturer role:**

→ Configure these parameters for the Mb: Make Product category on the Base Manufacturer role detail:

Tab	Group/Parameter	Value
Build Orders	<a href="#">Order Release to Manufacturing Duration</a>	
	Distribution Mode	Random Triangular
	Min	12 hours
	Max Mode	1 day and 12 hours 1 day
Build Selection 1-2	First	
	<a href="#">First Sort Direction</a> <a href="#">First Sort Criteria</a>	Biggest Order Size
Production Material	<a href="#">Production Material Duration</a>	
	Distribution Mode	Random Triangular
	Min	12 hours
	Max Mode	1 day and 12 hours 1 day
Manufacturing	<a href="#">Manufacturing Duration</a>	
	Distribution Mode	Random Triangular
	Min	9 hours
	Max Mode	11 hours 10 hours
Transfer	<a href="#">Move to Delivery Duration</a>	
	Distribution Mode	Random Triangular
	Min	12 hours
	Max Mode	1 day and 12 hours 1 day
Cost	Costs Incurred	
	<a href="#">Production Material Handling</a>	10

**See Also** [Configuring the Make Category](#) in the *e-SCOR User? Guide*.

## Configuring Plan Category Parameters: Base Manufacturer Role

The Plan category is responsible for computing the size of an order, the frequency with which to create orders, when to place the first order, and to whom to ship each order. Base Manufacturer and Manufacturer roles use make planning to determine the size of each build order. Distributor and Manufacturer roles use source planning to determine the size of each replenishment order.

By default, the Plan category uses cyclic planning to determine when to create build orders or replenishment orders; therefore, you configure timing parameters related to the planning period and the initial delay before creating the first plan. You can also configure the Plan category to use continuous planning, also known as demand-based planning, which causes the role to create build orders or replenishment orders whenever the downstream buyer places an order for the role's delivery products.

You configure planning parameters related to safety stocks, order quantities, inventory control planning strategies, and build yield in the source and delivery products for the role, which you will do [later in this tutorial](#).

Configure these parameters for the P3 category:

- Planning Period – Initiates a plan once every 2 weeks.
- Initial Plan Delay – Waits 2 days before initiating its first plan, the default.
- Continuous Planning – Performs cyclic planning, the default.
- Compensate for Yield – Compensates for lower yield rates when determining build order size, the default.

### To configure Plan category parameters for the Base Manufacturer role:

➔ Configure these parameters for the P3: Plan Make category on the Base Manufacturer role detail:

Tab	Group/Parameter	Value
Planning	Planning	
	<a href="#">Planning Period</a>	2 weeks
	<a href="#">Initial Plan Delay</a>	2 days (default)
	<a href="#">Continuous Planning</a>	off (default)
	<a href="#">Compensate for Yield</a>	on (default)

---

**See Also** [Configuring the Plan Category](#) in the *e-SCOR User? Guide*.

---

# Configuring Deliver Category Parameters: Base Manufacturer Role

The Deliver category is responsible for entering and choosing orders for shipments, picking delivery products from inventory, packing containers, shipping containers to buyers, and invoicing and receiving payments from buyers. You configure timing and cost parameters related to processing and fulfilling orders for delivery products.

By default, a role chooses orders for shipment at random. You can configure the criteria the role uses for choosing orders for shipment for stock delivery products. For example, you can deliver orders on a first-in first-out basis, or you can deliver the most expensive orders first.

Configure these parameters for the D1 category:

- Order Entry Duration – Takes 1 day, on average, to enter an order for delivery products from when the order is received.
- Order Selection parameters – Chooses orders for shipment on a first-in first-out basis, by sorting orders based on the smallest Internal Order Number first.
- Pick Duration and Packing Duration – Takes 1 hour, on average, to pick delivery products from inventory and to pack a container for shipment.
- Transportation Duration – Takes 3 days, on average, to ship a container of delivery products.
- Costs Per Transaction parameters – Costs \$10 to enter an order for delivery products (Order Entry), fulfill the order (Order Fulfillment), pick delivery products from inventory (Pick), pack containers for shipment (Packing), ship the container (Transportation), invoice customers (Customer Invoicing), and receive payments for each order (Customer Collections).

**To configure Deliver category parameters for the Base Manufacturer role:**

- Configure these parameters for the D1: Deliver Stocked Product category on the Base Manufacturer role detail:

Tab	Group/Parameter	Value
Order	<a href="#">Order Entry Duration</a>	
	Distribution Mode	Random Triangular
	Min	12 hours
	Max	1 day and 12 hours
Order Selection 1-2	First	
	<a href="#">First Sort Direction</a> <a href="#">First Sort Criteria</a>	Smallest Internal Order Number
Fulfillment	<a href="#">Pick Duration</a>	
	Distribution Mode	Random Triangular
	Min	30 minutes
	Max	1 hour and 30 minutes
	Mode	1 hour
	<a href="#">Packing Duration</a>	
	Distribution Mode	Random Triangular
	Min	30 minutes
Transportation	<a href="#">Transportation Duration</a>	
	Distribution Mode	Random Triangular
	Min	2 days
	Max	4 days
Cost	Costs per Transaction	
	<a href="#">Order Entry</a>	10
	<a href="#">Order Fulfillment</a>	10
	<a href="#">Pick</a>	10
	<a href="#">Packing</a>	10
	<a href="#">Transportation</a>	10
	<a href="#">Customer Invoicing</a> <a href="#">Customer Collections</a>	10

**See Also** [Configuring the Deliver Category](#) in the *e-SCOR User? Guide*.

# Configuring Product Composite Parameters

When you assign a product to a role, e-SCOR creates product composites for the various roles, as follows:

- A Base Manufacturer role has only delivery products.
- A Consumer role has only source products.
- A Manufacturer role has both source and delivery products, where the source products are components and the delivery products are finished products.
- A Distributor role that delivers its source products has both source and delivery products, where the source and delivery products are the same.
- A Distributor role that assembles components into kits has both source and delivery products, just like a Manufacturer role.

You will create and view product composites for Distributor and Manufacturer roles [later in this tutorial](#).

You configure various parameters for product composites, depending on whether it is a source or delivery product, and depending on the role. The dialog tab pages determine which parameters you need to configure, as follows:

<b>Tab</b>	<b>Description</b>
General	Order type and preferences for both source and delivery products of buyer and supplier roles.
Demand	Consumer demand order start and stop time, demand input report, demand order duration, and demand order size for source products of Consumer roles only.
MRO	Enables MRO, specifies maintenance, repair, and overhaul parameters.
Sourcing	Purchase cost for the raw materials of Base Manufacturer roles only.
Supplier	Order fulfillment parameters, push planning, and contract and forecast amount for source products of buyer roles.
Supplier Selection	Potential and maximum number of suppliers, selection criteria for choosing suppliers, and whether and how to split orders between suppliers for buyer roles.

Tab	Description
Inventory	Initial and maximum inventory, inventory control strategy, safety stock, and minimum reorder quantities for both source and delivery products of Base Manufacturer, Distributor, and Manufacturer roles. You do not configure inventory parameters for Consumer roles.
Manufacturing	Batch and yield parameters for delivery products of Manufacturer roles only.
Return	Defective, excess, and MRO return authorization yield for delivery products of supplier roles.
Delivery	Published lead time and selling price for delivery products of supplier roles.
Multipliers	When sourcing and delivering multiple products, multipliers for configuring variation in timing parameters for source and delivery products.

You can configure multiple product composites at the same time through a report rather than using dialogs, which you will do [later in this tutorial](#).

You can use one of several techniques for configuring product composite parameters for the Base Manufacturer and Consumer roles.

**To configure product composite parameters:**

- ➔ Choose Products on the role, then choose the product whose parameters you want to configure to display the properties dialog directly.
- or**
- ➔ Choose Show Products on the role to display the detail of the Products pool, then display the properties dialog for the product composite whose parameters you want to configure.
- or**
- ➔ Show the role detail, choose Show Detail on the Products pool, then display the properties dialog for the product composite whose parameters you want to configure.

Next, you will configure various parameters for each product composite.

---

**See Also** [Default Source and Delivery Products for Each Role](#) in the *e-SCOR User? Guide*.  
[Configuring Product Composite Parameters](#) in the *e-SCOR User? Guide*.

---

## Configuring Source Product Parameters: Consumer Role

The Input block of the Consumer role is responsible for placing orders with upstream suppliers for finished products in the overall supply chain. Because a Consumer role has no downstream buyers, unlike a Distributor or Manufacturer role, it does not use source planning to determine order size. Instead, it places orders for its source products, based on parameters that you configure in the source product. You configure the Demand Start Time, Demand Stop Time, Demand Order Duration, and Demand Order Size for generating orders.

If you have demand data in a tabular format, you can configure when to place orders and the order size through a Demand Report. You can also configure change orders through a Demand Report, which allows you to change various information about an order that has already been placed but not yet delivered.

A Consumer role creates orders for its source products on a cyclical basis, based on parameters that you configure in the source product, rather than based on source planning. Therefore, you do not configure parameters for the source product of a Consumer role related to inventory planning.

By default, if a buyer role has multiple upstream supplier roles for the same source product, it chooses the supplier based on the lowest product price. You can configure parameters on the Supplier Selection tab for choosing one or more suppliers. You can also configure the buyer role to use contracts when placing orders for source products by configuring parameters on the Supplier tab of the source product.

In the simplest e-SCOR model, the Consumer role sources products from a single upstream supplier; therefore, the only parameters you need to configure related to the supplier is the potential supplier, the desired turnaround time, and the fulfillment preference.

Configure the source product parameters on the following tabs for the Consumer role:

- General tab:
  - Order Type – Uses a stock planning strategy for sourcing products, the default.
- Demand tab:
  - Demand Order Duration – Generates orders once a week, using a random exponential distribution.
  - Demand Order Size – Generates orders for 10 source products, plus or minus 5, using the default start and stop times.
- Supplier tab:

- Desired Turnaround – Requests that suppliers deliver orders for source products within 1 week of receiving them, the default.
- Fulfillment Preference – Fulfills only complete orders; does not allow partial shipments, the default.
- Supplier Selection tab:
  - Potential Suppliers – Sources products from the Base Manufacturer role.

**To configure source product parameters for the Consumer role:**

➔ Configure these parameters for the source product of the Consumer role:

Tab	Group/Parameter	Value
General	General <a href="#">Order Type</a>	stock (default)
Demand	<a href="#">Demand Order Duration</a>	
	Distribution Mode	Random Exponential
	Mean	1 week
	<a href="#">Demand Order Size</a>	
	Distribution Mode	Random Triangular
	Min	5
	Max	15
	Mode	10
Supplier	Policy	
	<a href="#">Desired Turnaround</a> <a href="#">Fulfillment Preference</a>	1 week (default) Whole (default)
Supplier Selection	Potential Suppliers <a href="#">Potential Suppliers</a>	Base Manufacturer

**See Also** [Configuring Parameters for Source Products](#) in the *e-SCOR User? Guide*.  
[Configuring the Mathematical Distribution](#) in the *e-SCOR User? Guide*.  
[Configuring Demand and Change Orders through a Demand Report](#) in the *e-SCOR User? Guide*.

## Configuring Delivery Product Parameters: Base Manufacturer

You configure inventory and planning parameters for the delivery products of each supplier role in the model. You also configure parameters related to selling price, published lead time, batch size, and manufacturing yield.

The Order Type of the delivery product determines the planning strategy a role uses for making and delivering products – stock, make-to-order, or engineer-to-order. The role uses make planning to determine the size of each build order and when the role manufactures each build order.

Normally, the upstream suppliers' delivery product determines the selling price buyers must pay for their source products. However, because a Base Manufacturer role has no upstream suppliers, it determines the price it pays for its source products, based on the Purchase Cost parameter, which you configure for the delivery product of the Base Manufacturer role.

---

**Note** Normally, the Purchase Cost is a metric that the model computes for buyer roles in the model; however, for a Base Manufacturer role only, Purchase Cost is a parameter that you configure.

---

If the role manufactures multiple delivery products, you can configure the [Product Preference](#) for each delivery product when choosing orders for shipment, based on preference.

By default, each role uses a **pull planning mode**, which means that downstream buyer roles place orders with suppliers for their source products, based on source planning. Source planning determines the number of source products a buyer role orders and the frequency of those orders.

You can also configure a role to use a **push planning mode**, in which case the upstream supplier role determines how many products it delivers, based on contracts and forecasts. You can combine pull and push planning modes between roles and within the same role to use different types of planning at each stage in the supply chain. For example, a Manufacturer role might source components, using a pull planning strategy, but it might deliver finished products, using a push planning strategy.

If the role is one of multiple suppliers for the same delivery product to a single downstream buyer, you can configure various parameters for each delivery product for choosing the supplier, based on contracts.

If the role sources, makes, or delivers multiple products, you can configure various multipliers for each source and delivery product to model variation in timing parameters for each product. The simplest e-SCOR model sources and delivers a single product only; therefore, typically, you do not configure these multipliers.

Configure the delivery product parameters on the following tabs for the Base Manufacturer role:

- General tab:
  - Order Type – Uses a stock planning strategy for making and delivering delivery products, the default.
- Inventory tab:
  - Starting Product Inventory Level – Has 100 units of delivery product in inventory when the simulation starts.
  - Maximum Inventory Level – Can hold a maximum of 1000 delivery products in inventory.
  - Inventory Control Strategy – Uses a stock/replenishment inventory control strategy to determine how the role computes build-order size when manufacturing stock delivery products, the default.
  - Safety Stock – Keeps 50 units of delivery product in inventory as a safety stock.
  - Minimum Reorder Quantity – Creates build orders for a minimum of 10 delivery products when creating replenishment orders.
- Sourcing tab:
  - Purchase Cost – Costs \$100 for raw materials to manufacture a delivery product.
- Manufacture tab:
  - Build Time Dependent on Order Size – Adjusts the build time of the Make category to be proportional to the size of the build order.
  - Minimum Batch Size and Maximum Batch Size – Manufactures delivery products with a minimum batch size of 30 units and a maximum batch size of 50 units.
  - Build Yield – Has a 95% yield during the manufacturing process.
- Delivery tab:
  - Published Delivery Lead Time – Tells buyers that it can turn around orders for products in 5 days.
  - Net Selling Price – Charges \$250 as the selling price for each product it delivers to buyers.

**To configure the delivery product for the Base Manufacturer role:**

➔ Configure these parameters for the delivery product of the Base Manufacturer role:

Tab	Parameter	Value
General	General <a href="#">Order Type</a>	stock (default)
Inventory	Policy <a href="#">Starting Product Inventory Level</a> <a href="#">Maximum Inventory Level</a> <a href="#">Inventory Control Strategy</a> <a href="#">Safety Stock</a> <a href="#">Minimum Reorder Quantity</a>	100 1000 replenishment 50 10
Sourcing	Policy <a href="#">Purchase Cost</a>	100
Manufacturing	Policy <a href="#">Build Time Dependent on Order Size</a> <a href="#">Minimum Batch Size</a> <a href="#">Maximum Batch Size</a> <a href="#">Build Yield</a>	true 30 50 .95
Delivery	Policy <a href="#">Published Delivery Lead Time</a> <a href="#">Net Selling Price</a>	5 days 250

---

**See Also** [Configuring Parameters for Delivery Products](#) in the *e-SCOR User? Guide*.  
[Configuring Multipliers for Timing Parameters](#) in the *e-SCOR User? Guide*.

---

## Saving the Model

Save the model to your project name.

For details, see [Saving a Model](#).

## Summary: Configuring Level 2 SCOR

To configure Level 2 SCOR for the simplest e-SCOR model, you:

- [Viewed Consumer role details.](#)
- [Configured Source category parameters.](#)
- [Viewed Base Manufacturer role details.](#)
- [Configured Make category parameters.](#)
- [Configured Plan category parameters.](#)
- [Configured Deliver category parameters.](#)
- [Configured product composite parameters](#)

You should now know how to configure Level 2 SCOR parameters for categories and product composites for the simplest e-SCOR model.

Next, you will run the simulation and view metrics for Level 2 categories and product composites.



# Viewing Level 2 Metrics: Simplest Model

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*Teaches you how to view metrics for Level 2 categories and product composites through the dialogs.*

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# Introduction

Now that you have configured Level 2 category and product composite parameters, you will run the simulation again and view the following Level 2 category and product composite metrics:

- [Source category metrics.](#)
- [ES: Enable Source category metrics.](#)
- [Deliver category metrics.](#)
- [ED: Enable Deliver category metrics.](#)
- [Make category metrics.](#)
- [Plan category metrics.](#)
- [Delivery product metrics.](#)
- [Source product metrics.](#)

---

**Shortcut** If you do not have time to work through the exercises in this part of the tutorial, in e-SCOR, open the file named *escor-tutorial-simplest.kb*, which shows the finished model. Follow along in the existing model as you read through the exercises.

---

## Viewing Source Category Metrics

The S1: Source Stocked Product category computes these metrics for all stock source products:

- Orders Sent and Change Orders Sent – The number of orders and the number of change orders sent to the supplier since the start of the simulation.
- Product Shipments Received – The number of product shipments received since the start of the simulation.
- Product Shipment Lead Time – The product shipment lead time, which is the difference between the Desired Turnaround of the source product and the actual delivery time of the current shipment of source products, as a delta. A positive number indicates the shipment was early, and a negative number indicates the shipment was late.
- Outgoing financial metrics – Financial Obligations, Financial Payments within Financial Period, and Financial Payments Total for individual source products that use the same planning strategy – stock, make-to-order, or engineer-to-order.

- Cost Incurred metrics – The total cost of receiving source products (Receiving Metric), verifying orders (Verification Metric), transferring source products to inventory (Transfer Metric), creating customer orders for source products (Create Customer Order Metric), and paying invoices for those orders (Invoice Metric) since the start of the simulation.

**To view Source category metrics for the Consumer role:**

- ➔ Run the simulation for approximately one year of simulation time, then pause the simulation and display the properties dialog for the S1: Source Stocked Product category on the Consumer role detail to view these metrics:

Tab	Group/Metric
Source	Metrics <a href="#">Orders Sent</a> <a href="#">Change Orders Sent</a> <a href="#">Product Shipments Received</a> <a href="#">Product Shipment Lead Time</a>
Financial	Outgoing <a href="#">Financial Obligations</a> <a href="#">Financial Payments within Financial Period</a> <a href="#">Financial Payments Total</a>
Cost	Cost Incurred <a href="#">Receiving Metric</a> <a href="#">Verification Metric</a> <a href="#">Transfer Metric</a> <a href="#">Create Customer Order Metric</a> <a href="#">Invoice Metric</a>

**See Also** [Viewing Metrics for the Source Categories](#) in the *e-SCOR User? Guide*.

## Viewing ES: Enable Source Category Metrics

The ES: Enable Source category computes these metrics for all source products:

- Orders Sent and Change Orders Sent – The number of orders and the number of change orders sent to the supplier since the start of the simulation.
- Product Shipments Received – The number of product shipments received since the start of the simulation.
- Contracts Established – The number of contracts the role has established with upstream suppliers. In the simplest model, when the first contract is

established, the number of contracts established is 1, which means the buyer role has a single supplier for its source products. The buyer might have several suppliers, in which case the number of contracts established could be a number greater than 1.

- Supplier On-Time Performance (%) – The percentage of shipments that the role has received on or before the customer request date, which is the Desired Turnaround of the role’s source product.

When you run the simulation, the Supplier On-Time Performance should be approximately 90%.

**To view ES: Enable Source category metrics for the Consumer role:**

- ➔ Display the properties dialog for the ES: Enable Source category on the Consumer role detail and view these metrics:

Tab	Group/Metric
Source	Metrics <a href="#">Orders Sent</a> <a href="#">Change Orders Sent</a> <a href="#">Product Shipments Received</a> <a href="#">Contracts Established</a> <a href="#">Supplier On-Time Performance (%)</a>

---

**See Also** [Viewing Metrics for the ES: Enable Source Category](#) in the *e-SCOR User? Guide*.

---

## Viewing Make Category Metrics

The Mb: Make Product category computes these metrics for all delivery products that use the same planning strategy:

- Build Orders Started and Build Orders Completed – The number of build orders started and completed since the start of the simulation.
- Make Cycle Time – The average time it takes from when the role receives a build order for delivery products to when it finishes manufacturing those products.
- Order Entry to Manufacturing Time – The 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 computed for the Mb and M3 categories for ETO products only.

When you run the simulation, the Make Cycle Time should be approximately 3 days.

**To view Make category metrics for the Base Manufacturer role:**

- ➔ Display the properties dialog for the Mb: Make Product category on the Base Manufacturer role detail and view these metrics:

Tab	Group/Metric
Manufacturer	Metrics <a href="#">Build Orders Started</a> <a href="#">Build Orders Completed</a> <a href="#">Make Cycle Time</a> <a href="#">Order Entry to Manufacturing Time</a>

---

**See Also** [Viewing Metrics for the Make Categories](#) in the *e-SCOR User? Guide*.

---

## Viewing Plan Category Metrics

The P2: Plan Source and P3: Plan Make categories compute the number of planning periods that have passed since that start of the simulation.

**To view Plan category metrics for the Base Manufacturer role:**

- ➔ Display the properties dialog for the P3: Plan Make category on the Base Manufacturer role detail and view this metric:

Tab	Group/Metric
Planning	Planning <a href="#">Number of Planning Periods</a>

---

**See Also** [Viewing Metrics for the Plan Categories](#) in the *e-SCOR User? Guide*.

---

## Viewing Deliver Category Metrics

The D1: Deliver Stocked Product category computes these metrics for all stock delivery products:

- Orders Received and Change Orders Received – The number of orders and the number of change orders received since the start of the simulation.
- Product Shipments Sent – The number of product shipments sent since the start of the simulation.

- Fill Rates (%) – The percentage of orders the role has delivered within 24 hours of receiving the order.
- Ready to Ship Time – The number of days it takes to pick delivery products from inventory and pack containers.
- Order Entry to Ship Time – The average number of days from when the role receives an order to when the order is actually ready to ship.
- Incoming financial metrics – The Financial Bookings, Financial Outstanding, Financial Collections within Financial Period, and Financial Collections Total for delivery products.
- Costs Incurred metrics – The total cost of entering orders for delivery products (Order Entry Metric), fulfilling orders (Order Fulfillment Metric), picking delivery products from inventory (Pick Metric), packing shipments (Packing Metric), transporting shipments (Transportation Metric), sending invoices (Customer Invoicing Metric), and collecting payments (Customer Collections Metric).

The Fill Rates should be approximately 80%, the Ready to Ship Time should be approximately 2 hours, and the Order Entry to Ship Time should be approximately 3 days.

**To view Deliver category metrics for the Base Manufacturer role:**

➔ Display the properties dialog for the D1: Deliver Stocked Products category on the Base Manufacturer role detail and view these metrics:

Tab	Group/Metric
Delivery	Metrics <a href="#">Orders Received</a> <a href="#">Change Orders Received</a> <a href="#">Product Shipments Sent</a> <a href="#">Fill Rates (%)</a> <a href="#">Ready to Ship Time</a> <a href="#">Order Entry to Ship Time</a>

Tab	Group/Metric
Financial	Incoming <a href="#">Financial Bookings</a> <a href="#">Financial Outstanding</a> <a href="#">Financial Collections within Financial Period</a> <a href="#">Financial Collections Total</a>
Cost	Costs Incurred <a href="#">Order Entry Metric</a> <a href="#">Order Fulfillment Metric</a> <a href="#">Pick Metric</a> <a href="#">Packing Metric</a> <a href="#">Transportation Metric</a> <a href="#">Customer Invoicing Metric</a> <a href="#">Customer Collections Metric</a>

**See Also** [Viewing Metrics for the Deliver Categories](#) in the *e-SCOR User? Guide*.

## Viewing ED: Enable Deliver Category Metrics

The ED: Enable Deliver category computes these metrics for all delivery products:

- Order Received and Change Orders Received – The number of orders and the number of change orders received since the start of the simulation.
- Product Shipments Sent – The number of product shipments sent since the start of the simulation.
- Contracts Established – The number of contracts the supplier has established with downstream buyers. For the simplest model, when the first contract is established, the number of contracts established is 1, which means the supplier has a single downstream buyer for its delivery products.
- Delivery Performance (%) – The percentage of orders that the role has delivered on or before the customer request date, which is the Desired Turnaround parameter of the source product of the downstream buyer role.
- Perfect Order Fulfillment (%) – The percentage of orders that the role has delivered on or before the customer request date and for the requested quantities.

The Delivery Performance (%) and Perfect Order Fulfillment (%) should both be approximately 80%.

**To view ED: Enable Deliver category metrics for the Base Manufacturer role:**

➔ Display the properties dialog for the ED: Enable Deliver category on the Base Manufacturer role detail and view these metrics:

<b>Tab</b>	<b>Group/Metric</b>
Delivery	Metrics <a href="#">Orders Received</a> <a href="#">Change Orders Received</a> <a href="#">Product Shipments Sent</a> <a href="#">Contracts Established</a> <a href="#">Delivery Performance (%)</a> <a href="#">Perfect Order Fulfillment (%)</a>

---

**See Also** [Viewing Metrics for the ED: Enable Deliver Category](#) in the *e-SCOR User? Guide*.

---

## Viewing Delivery Product Metrics: Base Manufacturer Role

The delivery product of a Base Manufacturer role computes:

- Quantity to Deliver and Quantity Shipped – The number of orders for this delivery product that the supplier has received and the number of delivery products that have been shipped since the start of the simulation.
- Total Products Accepted and Total Products Rejected – The number of delivery products that have been accepted and rejected, which is based on the Build Yield parameter of the role’s delivery product.
- Awaiting Orders – The current number of delivery products that downstream buyers have ordered and the supplier has entered, but the supplier has not yet delivered.
- Products On Order – The number of delivery products for which the make planning process has created build orders but which the Deliver category of the supplier has not yet received.
- Received Inventory Level – The number of delivery products that the supplier has manufactured and placed in inventory since the start of the simulation.
- Inventory Level – The current inventory level for this delivery product.
- In Transit Inventory Level – The number of delivery products that the supplier has taken from inventory and is waiting to deliver.

- Shipped Inventory Level – The number of delivery products that the role has manufactured and shipped since the start of the simulation.
- Pushed Inventory Level – The number of delivery products that the supplier has delivered to downstream buyers, using a push planning strategy, since the start of the simulation.
- Manufacturing Batch Size – The size of the current batch of delivery products.
- Order Fulfillment Lead Time – The average amount of time, in days, from when the supplier role receives an order for the delivery product to when the buyer actually receives the product shipment.

The Order Fulfillment Lead Time should be approximately 6 days.

**To view delivery product metrics for the Base Manufacturer role:**

- ➔ Display the properties dialog for the delivery product in the Products pool on the Base Manufacturer role detail and view these metrics:

Tab	Group/Metric
General	Order <a href="#">Quantity to Deliver</a> <a href="#">Quantity Shipped</a>
Manufacturing	Policy <a href="#">Total Products Accepted</a> <a href="#">Total Products Rejected</a>
Metrics	Metrics <a href="#">Awaiting Orders</a> <a href="#">Products On Order</a> <a href="#">Received Inventory Level</a> <a href="#">Inventory Level</a> <a href="#">In Transit Inventory Level</a> <a href="#">Shipped Inventory Level</a> <a href="#">Pushed Inventory Level</a> <a href="#">Manufacturing Batch Size</a> <a href="#">Order Fulfillment Lead Time</a>

The delivery product of a Distributor or Manufacturer role computes additional metrics related to inventory level, which are not relevant for Base Manufacturer roles.

**See Also** [Viewing Metrics for Source and Delivery Products](#) in the *e-SCOR User? Guide*.

# Viewing Source Product Metrics: Consumer Role

The source product of a Consumer role computes:

- Quantity Ordered and Quantity Received – The number of source products that have been ordered and received since the start of the simulation.
- Purchase Cost – The average purchase cost for the source product, based on the Net Selling Price of each upstream supplier's delivery product.
- Products On Order – The number of source products for which the source planning process has created replenishment orders but which the upstream supplier has not yet delivered.
- Received Inventory Level – The number of source products that the buyer has received and placed in inventory since the start of the simulation.
- Incoming Inventory Level – The number of source products that the buyer has received but not yet placed in inventory.
- Inventory Level – The number of source products currently in inventory.
- Received Fulfillment Time – The average amount of time from when the buyer orders source products to when the buyer receives product shipments, in days.

The Received Fulfillment Time should be approximately 6 days.

The source product of a Distributor or Manufacturer role computes additional metrics related to inventory level, which are not relevant for Consumer roles.

**To view source product metrics for the Consumer role:**

→ Display the properties dialog for the source product in the Products pool on the Consumer role detail and view these metrics:

Tab	Group/Metric
General	Order <a href="#">Quantity Ordered</a> <a href="#">Quantity Received</a>
Sourcing	Policy <a href="#">Purchase Cost</a>
Metrics	Metrics <a href="#">Products On Order</a> <a href="#">Received Inventory Level</a> <a href="#">Incoming Inventory Level</a> <a href="#">Inventory Level</a> <a href="#">Received Fulfillment Time</a>

---

**See Also** [Viewing Metrics for Source and Delivery Products](#) in the *e-SCOR User? Guide*.

---

## Saving the Model

Save the model to your project name.

For details, see [Saving a Model](#).

## Summary: Running the Simulation for the Simplest Model

To view Level 2 metrics for the simplest model, you:

- [Viewed Source category metrics.](#)
- [Viewed ES: Enable Source category metrics.](#)
- [Viewed Deliver category metrics.](#)
- [Viewed ED: Enable Deliver category metrics.](#)
- [Viewed Make category metrics.](#)
- [Viewed Plan category metrics.](#)

- [Viewed delivery product metrics.](#)
- [Viewed source product metrics.](#)

You should now know how to view metrics for Level 2 SCOR categories and product composites for the simplest e-SCOR model.

Next, you will create an output report for viewing financial metrics for a role.

# Creating Output Reports: Simplest Model

---

*Teaches you how to create and view output metrics in reports.*

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# Introduction

You can create reports within e-SCOR. You can also send the report data to Excel, to CSV files, or to a database, which means you have all the capabilities available in these programs to analyze the performance of your model.

For information about sending report data to CSV files, see the *ReThink User? Guide*.

To analyze the performance of the simplest model, you:

- [Generate output report data](#) in e-SCOR.
- [Generate time-series data](#) in e-SCOR for viewing metrics over time.
- [Generate output reports in Excel](#) for further analysis.

---

**Shortcut** If you do not have time to work through the exercises in this part of the tutorial, in e-SCOR, open the file named *escor-tutorial-simplest.kb*, which shows the finished model. To view the Excel report, open the file named *Tutorial-Simplest-Model-Summary-Reports.xls*. Follow along in the existing model as you read through the exercises.

---

**See Also** [Writing to and Reading from CSV Files](#) in the *e-SCOR User? Guide*.  
[Writing to and Importing from Databases](#) in the *e-SCOR User? Guide*.

---

## Generating Output Report Data

You can create these types of output reports to view metrics for these objects in a model:

- Role Output Report, which includes metrics computed for all Level 1 roles in the model.
- Category Output Report, which includes metrics computed for all Level 2 categories in the model.
- Product Composite Output Report, which includes metrics computed for all source and delivery products in the model.
- Resource Output Report, which includes metrics computed for all manufacturing resources in the model.

To create an output report, you:

- Create a report object.
- Configure the report object to update at regular time intervals.

- Run the simulation, which generates the report data each time the report updates.

You can configure which attributes appear in the report, which you will learn how to do this [later in this tutorial](#). You can also configure the time unit for computing time-based metrics.

You will now generate output data for a Role Output Report to view financial metrics for each role in the model.

---

**Note** Remember, you must wait for one or two financial cycles to elapse before the model computes financial metrics.

---

#### To generate output report data:

- 1 Display the e-SCOR toolbox, display the Reports palette, select a Role Output Report, and place it on the model detail.

Typically, you configure the report object to update at regular time intervals, which outputs data each time the report updates. Typically, you also configure a report that contains financial data to update once per financial period to ensure the report data is always current.

- 2 Choose Setup Report as Role Financial Metrics to configure the report to include financial metrics only.
- 3 Display the properties dialog for the Role Output Report, configure the Update Mode to be **Simulation-Time**, and configure the Update Interval to be **4 weeks and 2 days (30 days)**.
- 4 Click the Attributes tab to view the attributes to appear in the report.  
You can add and remove attributes to and from the report, as needed. You can also configure the column labels.
- 5 Choose Show Report to create a report template with the specified metrics.  
The report template contains columns for each attribute in the report.
- 6 Run the simulation for at least one financial period.  
The report contains rows for each role in the model and updates financial data once per financial period.
- 7 Reset the simulation.

---

**See Also** [Summary of Input and Output Reports](#) in the *e-SCOR User? Guide*.

[Creating a Report](#) in the *e-SCOR User? Guide*.

[Updating Output Reports at Regular Time Intervals](#) in the *e-SCOR User? Guide*.

[Configuring the Time Unit](#) in the *e-SCOR User? Guide*.

---

# Generating Time-Series Data

You might want to compare metric values over time. To do this, you configure the report to keep a history. You can configure any type of output report to keep a history. The output report timestamps each value in the report.

## To generate time-series data:

- 1 Display the properties dialog for the Role Output Report and enable the Keep History option.

When you change the configuration of the report object, you must update the report.

- 2 Choose Update Report on the report object or select the report object and click the Update button on the report.
- 3 Run the simulation again and show the report.

This time, the report contains rows with timestamps for each new value.

- 4 Reset the simulation.

---

**See Also** [Keeping a History of Data Values](#) in the *e-SCOR User? Guide*.

---

The file contains financial data for all roles in the model.

# Generating Output Reports in Excel

You can send report data directly to Excel for further analysis. e-SCOR provides a default Excel report with one tab page for each report type.

When generating reports in Excel, you can configure the Excel macros used to format the report. You can also update the report manually and control the simulation from Excel.

## To generate output reports in Excel:

- 1 Create a Role Output Report and place it on the model detail.
- 2 Configure the report object to update once every 30 days of simulation time.
- 3 From the Start menu, choose Start > Programs > Gensym G2 8.3r0 > Examples > G2 e-SCOR > e-SCOR Default Summary Reports to open the default e-SCOR summary report in Excel.

The default report is located in the file *Default-Summary-Reports.xls*, which is located in the *kbs* directory of your e-SCOR product directory. You can also open the report directly from Excel.

The default report uses a macro to format the report template when you create it; therefore, you must enable macros each time you open the report.

- 4 Click the Enable Macros button in Excel.

Next, Excel attempts to establish a connection to the e-SCOR server.

- 5 Enter the host and port of the computer on which the e-SCOR server is running, using the following syntax:

<host>:<port>

The default value is localhost:1111.

---

**Tip** To avoid displaying this dialog each time you open a report, you can create an environment variable named *ESCOR\_SERVER*, which defines the host and port of the server to which to connect, using the same syntax.

---

- 6 In e-SCOR, choose Show Report on the Role Output Report.

e-SCOR creates a template for the Role Output Report on the appropriate tab page in the Excel report. The template contains columns for each metric the report computes and rows for each role in the model.

- 7 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 exactly 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.

- 8 Run the simulation.

The report updates financial and asset data once per financial period.

- 9 Pause the simulation, then save the Excel report to a new file name, such as *my-tutorials-Summary-Report.xls*.

---

**Note** Do not overwrite the *Default-Summary-Reports.xls* file.

---

- 10 Reset the simulation.

---

**See Also** [Creating Reports in Excel](#) in the *e-SCOR User? Guide*.

---

## Saving the Model

Save the model to your project name.

For details, see [Saving a Model](#).

## Summary: Creating Reports

To create output reports, you:

- [Generated output report data](#).
- [Generated time-series data](#).
- [Generate output reports in Excel](#).

You should know how to create output reports of static and time-series data, which update at regular time intervals, both locally in the e-SCOR client and in Excel files.

Next, you will look at the underlying processes that e-SCOR runs when you run a simulation.

# Configuring Level 1 Roles: ACME Model

---

*Teaches you how to configure Level 1 roles for a more realistic model, which manufactures stock computers from components.*

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# Introduction

Now that you understand how to create, configure, and run the simplest supply-chain model, you will create a more realistic model, called the ACME model. This model allows you to experiment with different parameter values to analyze model performance and perform “what-if” analysis.

The ACME model:

- Manufactures computers from a case and three electronics components, and delivers those computers directly to the consumer.
- Sources cases directly from the ACME manufacturer in Taiwan.
- Sources electronic components through a single distributor, which sources them directly from another manufacturer.

To configure Level 1 roles for the ACME model, you:

- [Set up the model environment](#).
- [Create a product hierarchy](#), which consists of a computer and two components: a case and electronics.
- [Configure the supply-chain model](#), which includes two Base Manufacturer roles, a Distributor role, a Manufacturer role, and a Consumer role.
- [Assign products to roles](#) so that:
  - The Consumer role sources computers.
  - The Manufacturer role makes and delivers computers from cases and electronics.
  - The Distributor role sources and delivers electronics.
  - One Base Manufacturer role delivers electronics to the Distributor role.
  - The other Base Manufacturer role delivers cases directly to the Manufacturer role.
- [Configure potential suppliers](#) for each source product in the model.
- [Configure resources](#) for the two Base Manufacturer roles and the Manufacturer role.

The ACME model makes the following assumptions, which determine the Level 2 SCOR parameters you must configure:

- Uses a stock/replenishment planning strategy, which means roles source, make, and deliver stock products and determine order size, based on source planning.
- Uses a pull planning mode, which means downstream buyer roles determine when to source products by placing orders, and upstream supplier roles make and deliver products, based on those orders.
- Sources each component from a single supplier.
- Delivers a single finished product.

You can also create models that use different inventory control strategies for stock products (replenishment, R-Q, and Q), use alternative planning strategies (make-to-order and engineer-to-order), source and deliver multiple products that you configure separately, source products from multiple suppliers, or use a push planning mode.

---

**See Also** [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.](#)

All chapters are in the *e-SCOR User? Guide*.

---

---

**Shortcut** If you do not have time to work through the exercises in this part of the tutorial, in e-SCOR, open the file named *escor-tutorial-acme.kb*, which shows the finished model. Follow along in the existing model as you read through the exercises.

---

# Configuring the Model Environment: ACME Model

First, you must set up the model environment for the ACME model.

## To set up the ACME model environment:

- 1 Create a new model named ACME.  
For details, see [Creating a Model](#).
- 2 Place a Scenario on the model detail.  
For details, see [Creating a Scenario](#).

# Configuring the Product Hierarchy: ACME Model

In the simplest e-SCOR model, the product hierarchy consists of a single product specification, which represents an entire product family. In the ACME model, the product hierarchy consists of:

- A computer finished product.
- A case component.
- Three electronics components – mother board, power supply, and drives.

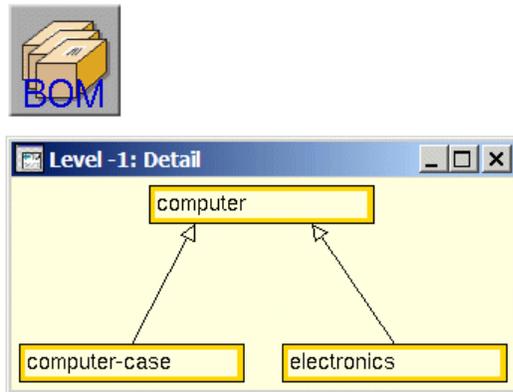
In general, you should try to create the simplest product hierarchy and supply chain that models the metrics you are most interested in observing. For example, because the Manufacturer role sources the three electronics components from a single Distributor role, you can treat them as a single product family that consists of three units.

## To configure the product hierarchy:

- 1 Create a product specification named `computer` and place it on a Product Structure Organizer detail.  
For details, see [Configuring the Product Specification: Simplest Model](#).
- 2 Create a product specification named `computer-case` and place it on the Product Structure detail below the `computer`.
- 3 Create a product specification named `electronics` and place it below the `computer`, next to the `computer-case`.
- 4 Choose Create Product Connection on the `computer-case` and connect the stub to the `computer`.

- 5 Choose Create Product Connection on the **electronics** and connect the stub to the **computer**.
- 6 Configure the Usage Quantity of the connection between the **electronics** and the **computer** to be **3** to represent the three electronics components.

The product hierarchy should look similar to this:




---

**See Also** [Creating a Product Hierarchy with Components](#) in the *e-SCOR User? Guide*.

---

## Configuring the Supply-Chain Model: ACME Model

Once you have created the product hierarchy, you create the supply-chain model for the ACME model, which consists of:

- A Base Manufacturer role that delivers cases.
- A Base Manufacturer role that delivers the electronics components.
- A Distributor role that sources and delivers electronics components.
- A Manufacturer role that sources cases and electronics components, and makes and delivers computers.
- A Consumer role that sources computers.

The Manufacturer role adds value to the supply-chain by transforming components into finished products through a manufacturing step, whereas the Distributor role simply delivers its source products directly to the downstream buyer.

You can also configure a Distributor role to source components and assemble those components into finished products, or “kits.” For details, see [Modeling a Distribution Process](#) in the *e-SCOR User? Guide*.

---

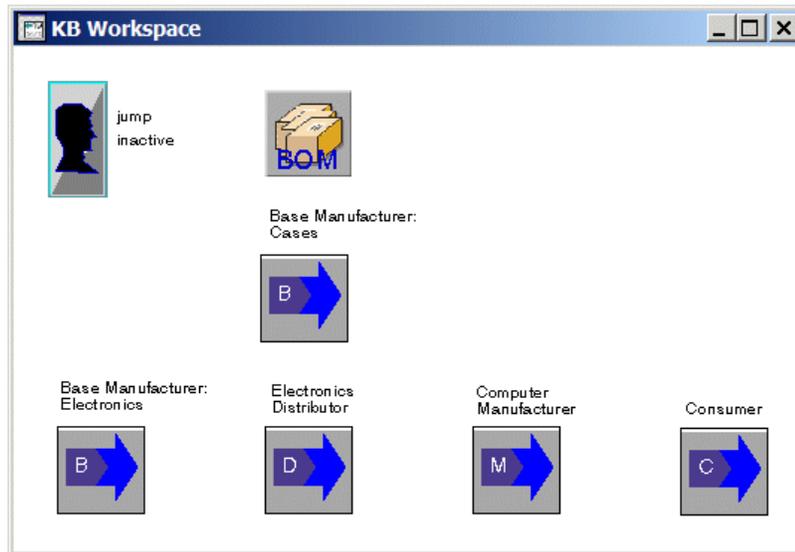
**Note** You must configure each role’s label to be unique.

---

The ACME model uses the default Financial Period for all roles, 30 days, to determine when the role computes financial and asset metrics. It also uses the default Financial Payment Terms, also 30 days, to determine when buyer roles make payments to supplier roles.

**To configure the ACME supply-chain model:**

- 1 Place two Base Manufacturer roles, a Distributor role, a Manufacturer role, and a Consumer role on the model detail and configure their labels, as follows:



For details, see [Creating a Supply-Chain Model: Simplest Model](#).

- 2 Select multiple roles, then choose Layout > Align or Distribute and use the various menu choices to align and distribute the roles, or use the equivalent toolbar buttons located in the toolbar at the top of the window:



- 3 Shrink wrap the workspace.

## Assigning Products to Roles: ACME Model

Now that you have configured the supply-chain model, you must assign product specifications to roles to create source and delivery products for each role, as follows:

Assign this product specification...	To this role...	To create...
Computer Case	Base Manufacturer Cases	A case delivery product.
Electronics	Base Manufacturer Electronics	An electronics delivery product.
Electronics	Electronics Distributor	An electronics source and delivery product.
Computer	Computer Manufacturer	A case source product, an electronics source product, and a computer delivery product.
Computer	Consumer	A computer source product.

### To assign product specifications to roles for the ACME model:

- 1 Assign each product specification in the product hierarchy to the appropriate role, as outlined in the table above.
- 2 Verify the assignment of each product specification.

For details, see [Assigning Products to Roles: Simplest Model](#).

## Configuring Potential Suppliers: ACME Model

Next, you must assign the potential suppliers for each source product in the model, as follows:

For this source product...	Of this role...	Assign this role as the potential supplier...
Computer	Consumer	Computer Manufacturer
Electronics	Computer Manufacturer	Electronics Distributor

For this source product...	Of this role...	Assign this role as the potential supplier...
Computer Case	Computer Manufacturer	Base Manufacturer Cases
Electronics	Electronics Distributor	Base Manufacturer Electronics

**To configure potential suppliers for the ACME model:**

- 1 Show the properties dialog for each source product in the model.
- 2 Click the Supplier Selection tab and configure the Potential Suppliers according to the table above.

## Configuring Resources: ACME Model

Each Base Manufacturer and Manufacturer role in the model requires a manufacturing resource to make finished products, which determines the number of products the role can manufacture in a single batch. By default, each Manufacturer role defines a single manufacturing resource, which means the role takes the entire build time to manufacture a batch of finished products. You can add manufacturing resources and/or configure resource parameters, as needed.

You can configure the [Resource Capacity](#) to specify the number of units that each manufacturing resource represents, thereby increasing the number of finished products a role can manufacture. You can also configure the [Efficiency Factor](#) to model variation in the build time for different resources.

These roles in the ACME model require manufacturing resources:

- Base Manufacturer: Cases requires a Cases Plant resource.
- Base Manufacturer: Electronics requires an Electronics Plant resource.
- Computer Manufacturer requires a Computer Plant resource.

In the ACME model, each manufacturing resource uses the default capacity and efficiency factor.

**To configure resources for the simplest model:**

- 1 Choose Show Resources on each manufacturing role to show the detail of the Resources pool.
- 2 Show the properties dialog for each resource and configure the Resource Label according to the descriptions above.

Notice the Resource Capacity and Efficiency Factor are both 1, the default, which means the maximum throughput of the model is 1 times the actual batch size of

each batch, divided by the Manufacturing Duration. Notice that the resource also computes various utilization statistics.

---

**Tip** You can display the properties dialog for a resource directly by choosing Resources on the role, then choosing the resource to configure.

---

**See Also** [Configuring Manufacturing Resources](#) in the *e-SCOR User? Guide*.  
[Showing Resource Representations for a Role](#) in the *e-SCOR User? Guide*.

---

## Saving the Model

Save the model to your project name.

For details, see [Saving a Model](#).

## Summary: Configuring Level 1 Roles for the ACME Model

To configure Level 1 roles for the ACME model, you:

- [Set up the model environment](#).
- [Created a product hierarchy](#).
- [Configured the supply-chain model](#).
- [Assigned products to roles](#).
- [Configured potential suppliers](#).
- [Configured resources](#).

You should now be able to configure a more complex model, which consists of a product hierarchy, a Distributor role and a Manufacturer role, and manufacturing resources.



# Configuring Level 2 SCOR: ACME Model

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*Teaches you how to configure Level 2 SCOR category and product composite parameters through input reports.*

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# Introduction

In the simplest model, you configured Level 2 SCOR parameters through the properties dialogs for each category and product composite in the model. As you build more complex models, you will find that it is easier to configure Level 2 parameters for categories and product composites by using input reports. Input reports enable you to configure parameters for all categories of a given type in a single report and to configure parameters for all product composites in the model in a single report.

You can create input reports and configure parameters locally in the e-SCOR client or in Excel.

To configure Level 2 SCOR parameters for the ACME model, you:

- [Create input reports](#) for configuring category and product composite parameters, using the default report templates.
- [Configure reports](#), including visible attributes and filters.
- [Configure report data through Excel](#).
- [Configure Level 2 category parameters](#) through an input report.
- [Configure product composite parameters](#) through an input report.
- [Create output reports](#) for analyzing the performance of the model.
- [Configure the simulation to run for a fixed duration](#).

---

**Shortcut** If you do not have time to work through the exercises in this part of the tutorial, in e-SCOR, open the file named *escor-tutorial-acme.kb*, which shows the finished model. To view the Excel report, open the file named *Tutorial-Simplest-Model-Summary-Reports.xls*. Follow along in the existing model as you read through the exercises.

---

## Creating Input Reports for Configuring Level 2 SCOR Parameters

You can create the following types of input reports:

- Role Input Report, which includes parameters for all roles in the model.
- Category Input Report, which includes parameters for all categories in the model.
- Resource Input Report, which includes parameters for all manufacturing resources in the model.

- Product Composite Input Report, which includes parameters for all source and delivery products in the model.
- Product Specification Input Report, which includes parameters for all product specifications in the product hierarchy.

By default, the reports contain the complete set of available parameters for each type of object that the report defines. You can filter Level 2 reports to include parameters for certain categories only. You can also configure the report to include only the parameters you need for your model. For example, you might want to create separate reports for configuring Plan, Source, Make, and Delivery category parameters.

The simplest way to do this is to choose from a number of predefined templates. For example, to set up a Category Input Report for configuring Source category parameters only, you choose the Setup Report as Source Parameters menu choice on the report object. The report automatically applies filters to include Source category parameters only and configures the appropriate attributes. You can also configure the visible attributes and filters manually by configuring the report object, as needed.

Now, you will create a number of Category Input Reports for configuring Plan, Source, Make, and Deliver category parameters. You will also create a Product Composite Input Report for configuring source and delivery product parameters in your model.

**To create input reports for configuring Level 2 SCOR parameters:**

- 1 Create four Category Input Reports and a Product Composite Input Report from the Reports tab of the e-SCOR toolbar and place them on the model detail.
- 2 Choose one of the following menu choices on each report to set up the report to use the default templates:

Report Type	Menu Choice
Category Input Report	Setup Report as Plan Parameters Setup Report as Source Parameters Setup Report as Make Parameters Setup Report as Deliver Parameters
Product Composite Input Report	Setup Report as Product Parameters

The report labels update to reflect the name of the template. Each Category Input Report is now configured to include only the relevant parameters for the specified categories.

- 3 Show the properties dialog for each report and click the Filters and Attributes tabs to view the default configuration for each template.
- 4 Choose Show Report on each report to view the attributes that you can configure in each report.

---

**Tip** Double-click the divider between the column labels to expand the cell width to just fit the attribute names.

---

To apply values to the model, you configure the parameters in the report and click the Apply button.

You can also edit the reports through Excel.

- 5 In Excel, open the default report named *Default-Summary-Reports.xls*.

---

**Tip** Remember, you can open this report by choosing e-SCOR Default Summary Reports from the Start menu.

---

- 6 Enable macros and connect to the server.
- 7 Select all the reports and choose Create from the Reports menu to create report templates for each report.

---

**Tip** You can select all the reports by selecting individual reports and adding to the selection, using the Shift key, or you can select all the reports at once by selecting the region.

---

- 8 In Excel, click the various tab pages of the reports you created to view the default templates.
- 9 To facilitate viewing, format the reports in Excel, using a combination of these techniques:

- Filter rows in the report by clicking the arrow next to the column header and choosing the filter value.

For example, to facilitate data entry, click the arrow next to the Block column header to display individual categories of the same type.

Alternatively, click the arrow next to any attribute column header and choose NonBlanks to display only those rows that contain values for a particular attribute.

- Sort the rows in the report to group similar rows together by choosing Data > Sort.

For example, sort the data in the Level 2 Input Report in descending order, based on data in the Block column.

- Freeze the column headers and row labels by choosing Window > Freeze Panes to facilitate scrolling.

---

**Note** Do not filter rows or sort data in an output report until the simulation is finished; otherwise, each time the report updates, the data reverts to its original configuration.

---

**10** Save the report to the file *My-ACME-Summary-Reports.xls*.

## Configuring Reports

By default, the time unit used for configuring all timing parameters in the report is hours. You can configure the time unit to be seconds, minutes, hours, days, or weeks, depending on what is most convenient. You can also configure the time unit of the report to be none, in which case you configure timing parameters as a duration. For example, you would configure 30 days as 4 weeks and 2 days, as follows: 004:002:000:000:000.

You can configure the filters applied to the report and the visible attributes that appear in the report. By default, the column headers concatenate the group/subtable, if any, and the attribute name. For example, in the Product Composite Input Report, the `demand-order-cycle-time` group defines the `mean`, `min`, `mode`, and `max` attributes for configuring different mathematical distributions. Thus, the column header for the Demand Order Duration Mean attribute looks like this: `demand-order-cycle-time.mean`. You can edit the column labels, if desired. You can also delete attributes from the report, and add attributes to the report by choosing from a list of all available attributes.

---

**Caution** Each input report contains the UUID internal attribute, which uniquely identifies each object's attribute. Do not remove this attribute from the report; otherwise, editing parameter values in the report does not update the model.

---

### To configure the reports:

- 1 Display the properties dialog for the Plan Parameters report.  
Notice that the time unit for the report is `hours`, the default.
- 2 Configure the Time Unit for the Plan Parameters report to be `days`.  
For the Plan Parameters report only, you will configure timing parameters in days, rather than hours.
- 3 Display the properties dialog for the Product Composite Input Reports and configure the Time Unit to be `none` to configure timing parameters, using a duration.

- 4 Display the properties dialog for the Deliver Parameters report and click the Filters tab.

The report includes data for the relevant categories only. For example, by default, the Deliver Parameters report contains data for the D1, D2, and D3 parameters only.

- 5 Disable the D2 and D3 categories for the Deliver Parameters report.
- 6 Click the Attributes tab.

The report includes only those attributes that are relevant for the specified categories. The attribute name appears in the left-hand column, which is the default column label for the report.

The attribute name includes the name of the group/subtable and the attribute, for example `order-entry-duration-subtable.min`, `order-entry-duration-subtable.mode`, and `order-entry-duration-subtable.max`.

---

**Tip** Double-click the divider between the column labels to expand the cell width to just fit the attribute names.

---

You can add and remove attributes from reports, as needed, using the buttons.

Particularly for long attribute names, you might want to configure a custom column label.

- 7 Configure the Source Parameters and Make Parameters reports to include parameters for the S1 and M1 categories only, respectively.

You are now ready to configure the Level 2 SCOR parameters for the ACME model, using the input reports.

---

**See Also** [Summary of Input and Output Reports](#) in the *e-SCOR User? Guide*.  
[Configuring the Attributes to Appear in a Report](#) in the *e-SCOR User? Guide*.  
[Filtering Report Data](#) in the *e-SCOR User? Guide*.

---

## Configuring Report Data through CSV Files

You can configure report values directly in e-SCOR, or you can configure them through CSV files, depending on what is most convenient. Follow these instructions if you choose to configure the reports through CSV files.

### To configure report data through CSV files:

- 1 For each Category Input Report, display the properties, click the Excel tab, and enable the Excel Report Enabled option.
- 2 Choose Show Report on each report object to create the CSV file.

e-SCOR creates the file in the *output* directory of your e-SCOR installation directory.

## Configuring Level 2 Category Parameters: ACME Model

Level 2 category parameters apply to all products that a role sources, makes, and/or delivers. For example, when configuring Source category parameters for the Computer Manufacturer role, you configure the time it takes to receive and place into inventory both cases and electronics, and the cost of receiving both of these components.

Because a Manufacturer role both sources components and delivers finished products, it uses both source and make planning. You must coordinate the timing of source and make planning by configuring the initial delays for initiating each type of planning.

---

**Tip** In pull planning mode, configure the Initial Plan Delay for the P3: Plan Make category to be smaller than the Initial Plan Delay for the P2: Plan Source category. That way, make planning occurs before source planning.

---

### To configure Level 2 category parameters for the ACME model:

- 1 Using the Category Input Report that you created, configure the parameters for the Level 2 categories, according to the headings below, using the time unit of the report.

### Plan Parameters Report

Configure these Plan category parameters in the Plan Parameters report:

- [P2 of Electronics Distributor](#)
- [P2 of Computer Manufacturer](#)

- [P3 of Computer Manufacturer](#)
- [P3 of Base Manufacturer Electronics](#)
- [P3 of Base Manufacturer Cases](#)

When configured, the report should look like this:

	Block	Role Label	Process Number	Initial Plan Delay	Planning Period	Continuous Pl...
1	Plan Source	Electronics Distributor	P2	7.0	5.0	<input type="checkbox"/>
2	Plan Source	Computer Manufacturer	P2	7.0	7.0	<input type="checkbox"/>
3	Plan Make	Computer Manufacturer	P3	6.0	3.0	<input type="checkbox"/>
4	Plan Make	BM Electronics	P3	7.0	7.0	<input type="checkbox"/>
5	Plan Make	BM Computer Cases	P3	7.0	1.0	<input type="checkbox"/>

## P2 of Electronics Distributor

### Parameter

Initial Plan Delay = 7  
Planning Period = 5

### Description

Sends replenishment orders for electronics to upstream supplier once every 5 days. Uses the default plan delay.

## P2 of Computer Manufacturer

### Parameter

Initial Plan Delay = 7  
Planning Period = 7

### Description

Creates the first replenishment order for components 7 days into the simulation, which happens one day after it creates the first build order.

Sends replenishment orders for cases and electronics to upstream suppliers once a week.

## P3 of Computer Manufacturer

### Parameter

Initial Plan Delay = 6  
Planning Period = 3

### Description

Creates the first build order for computers 6 days into the simulation.

Sends build orders for computers to the Make category once every 3 days.

### P3 of Base Manufacturer Electronics

Parameter	Description
Initial Plan Delay = 7 Planning Period = 7	Sends build orders for electronics to the Make category once a week. Uses the default delay.

### P3 of Base Manufacturer Cases

Parameter	Description
Initial Plan Delay = 7 Planning Period = 1	Sends build orders for cases to the Make category once a day. Uses the default delay.

- 2 In Excel, choose Report > Apply from the e-SCOR floating toolbar or press Ctrl + A to apply the parameter values to the model.
- 3 Save the report to the file *My-ACME-Summary-Reports.xls*.

**See Also** [Applying Input Report Data to the Model from Excel](#) in the *e-SCOR User? Guide*.

## Source Parameters Report

Configure these Source category parameters in the Source Parameters report:

- [S1 of Electronics Distributor](#)
- [S1 of Computer Manufacturer](#)
- [S1 of Consumer](#)

When configured, the report should look like this:

	Bl...	Role Label	Re...	Re...	Re...	Ve...	Ve...	Ve...	Tr...	Tr...	Tr...	Pr...	Pr...	Pr...	Cre...	Inv...
1	So...	Electronics Distributor	2.0	3.0	4.0	2.0	3.0	4.0	2.0	3.0	4.0	5.0	5.0	5.0	5.0	5.0
2	So...	Computer Manufacturer	2.0	3.0	4.0	2.0	3.0	4.0	2.0	3.0	4.0	2.0	2.0	2.0	2.0	2.0
3	So...	Consumer	2.0	3.0	4.0	2.0	3.0	4.0	2.0	3.0	4.0	5.0	5.0	5.0	5.0	5.0

## S1 of Electronics Distributor

Parameter	Description
Receiving Cycle Time Duration Subtable.min = 2 Receiving Cycle Time Duration Subtable.mode = 3 Receiving Cycle Time Duration Subtable.max = 4	Takes 3 hours, on average, to receive electronics.
Verification Cycle Time Duration Subtable.min = 2 Verification Cycle Time Duration Subtable.mode = 3 Verification Cycle Time Duration Subtable.max = 4	Takes 3 hours, on average, to verify received electronics.
Transfer Cycle Time Duration Subtable.min = 2 Transfer Cycle Time Duration Subtable.mode = 3 Transfer Cycle Time Duration Subtable.max = 4	Takes 3 hours, on average, to transfer electronics to inventory.
Product Receiving Cost.fixed Cost = 5 Product Verification Cost.fixed Cost = 5 Product Transfer Cost.fixed Cost= 5 Create Customer Order Cost.fixed Cost = 5 Invoice Cost.fixed Cost = 5	Costs \$5 to receive, verify, transfer, create orders, and pay invoices for electronics.

## S1 of Computer Manufacturer

Parameter	Description
Receiving Cycle Time Duration Subtable.min = 2 Receiving Cycle Time Duration Subtable.mode = 3 Receiving Cycle Time Duration Subtable.max = 4	Takes 3 hours, on average, to receive components.
Verification Cycle Time Duration Subtable.min = 2 Verification Cycle Time Duration Subtable.mode = 3 Verification Cycle Time Duration Subtable.max = 4	Takes 3 hours, on average, to verify received components.
Transfer Cycle Time Duration Subtable.min = 2 Transfer Cycle Time Duration Subtable.mode = 3 Transfer Cycle Time Duration Subtable.max = 4	Takes 3 hours, on average, to transfer components to inventory.
Product Receiving Cost.fixed Cost = 2 Product Verification Cost.fixed Cost = 2 Product Transfer Cost.fixed Cost= 2 Create Customer Order Cost.fixed Cost = 2 Invoice Cost.fixed Cost = 2	Costs \$2 to receive, verify, transfer, create orders, and pay invoices for components.

## S1 of Consumer

Parameter	Description
Receiving Cycle Time Duration Subtable.min = 2 Receiving Cycle Time Duration Subtable.mode = 3 Receiving Cycle Time Duration Subtable.max = 4	Takes 3 hours, on average, to receive components.
Verification Cycle Time Duration Subtable.min = 2 Verification Cycle Time Duration Subtable.mode = 3 Verification Cycle Time Duration Subtable.max = 4	Takes 3 hours, on average, to verify received components.
Transfer Cycle Time Duration Subtable.min = 2 Transfer Cycle Time Duration Subtable.mode = 3 Transfer Cycle Time Duration Subtable.max = 4	Takes 3 hours, on average, to transfer components to inventory.
Product Receiving Cost.fixed Cost = 5 Product Verification Cost.fixed Cost = 5 Product Transfer Cost.fixed Cost= 5 Create Customer Order Cost.fixed Cost = 5 Invoice Cost.fixed Cost = 5	Costs \$5 to receive, verify, transfer, create orders, and pay invoices for computers.

## Make Parameters Report

Configure these Make category parameters in the Make Parameters report:

- [M1 of Computer Manufacturer](#)
- [Mb of Base Manufacturer Electronics](#)
- [Mb of Base Manufacturer Computer Cases](#)

When configured, the report should look like this:

	Bl...	Role Label	Or...	Ord...	Or...	Pr...	Pr...	Pr...	Mf...	Mf...	Mfg...	Mo...	Mo...	Mo...	Pro...
1	Ma...	Computer Manufacturer	2.0	3.0	4.0	1.0	2.0	3.0	7.0	8.0	9.0	1.0	2.0	3.0	5.0
2	Ma...	BM Electronics	2.0	3.0	4.0	2.0	3.0	4.0	3.0	4.0	5.0	0.5	1.0	1.5	5.0
3	Ma...	BM Computer Cases	7.0	8.0	9.0	7.0	8.0	9.0	8.0	10.0	12.0	0.5	1.0	1.5	5.0

## M1 of Computer Manufacturer

Parameter	Description
Order Release To Mfg Duration Subtable.min = 2 Order Release To Mfg Duration Subtable.mode = 3 Order Release To Mfg Duration Subtable.max = 4	Starts manufacturing batches of computers 3 hours, on average, after receiving a build order.
Production Material Cycle Duration Subtable.min = 1 Production Material Cycle Duration Subtable.mode = 2 Production Material Cycle Duration Subtable.max = 3	Takes 2 hours, on average, to take case and electronics components out of inventory before manufacturing computers.
Mfg Duration Subtable.min = 7 Mfg Duration Subtable.mode = 8 Mfg Duration Subtable.max = 9	Takes 8 hours, on average, to manufacture a batch of computers.
Move To Delivery Duration Subtable.min = 1 Move To Delivery Duration Subtable.mode = 2 Move To Delivery Duration Subtable.max = 3	Takes 2 hours, on average, to transfer computers from where they are manufactured to where they are delivered.
Production Material Handling Cost.fixed cost = 5	Costs \$5 to handle raw materials.

**Mb of Base Manufacturer Electronics**

<b>Parameter</b>	<b>Description</b>
Order Release To Manufacturing Duration Min = 2 Order Release To Manufacturing Duration Mode = 3 Order Release To Manufacturing Duration Max = 4	Starts manufacturing batches of electronics 3 hours, on average, after receiving a build order.
Production Material Duration Min = 2 Production Material Duration Mode = 3 Production Material Duration Max = 4	Takes 3 hours, on average, to take raw materials out of inventory before manufacturing electronics.
Mfg Duration Subtable.min = 3 Mfg Duration Subtable.mode = 4 Mfg Duration Subtable.max = 5	Takes 4 hours, on average, to manufacture a batch of electronics.
Move To Delivery Duration Subtable.min = .5 Move To Delivery Duration Subtable.mode = 1 Move To Delivery Duration Subtable.max = 1.5	Takes 1 hour, on average, to transfer electronics from where they are manufactured to where they are delivered.
Production Material Handling Cost.fixed cost = 5	Costs \$5 to handle raw materials.

## Mb of Base Manufacturer Computer Cases

Parameter	Description
Order Release To Mfg Duration Subtable.min = 7 Order Release To Mfg Duration Subtable.mode = 8 Order Release To Mfg Duration Subtable.max = 9	Starts manufacturing batches of cases 8 hours, on average, after receiving a build order.
Production Material Cycle Duration Subtable.min = 7 Production Material Cycle Duration Subtable.mode = 8 Production Material Cycle Duration Subtable.max = 9	Takes 8 hours, on average, to take raw materials out of inventory before manufacturing cases.
Mfg Duration Subtable.min = 8 Mfg Duration Subtable.mode = 10 Mfg Duration Subtable.max = 12	Takes 10 hours, plus or minus 2 hours, to manufacture a batch of cases.
Move To Delivery Duration Subtable.min = .5 Move To Delivery Duration Subtable.mode = 1 Move To Delivery Duration Subtable.max = 1.5	Takes 1 hour, on average, to transfer cases from where they are manufactured to where they are delivered.
Production Material Handling Cost.fixed cost = 5	Costs \$5 to handle raw materials.

## Deliver Parameters Report

Configure these Deliver category parameters in the Deliver Parameters report:

- [D1 of Electronics Distributor](#)
- [D1 of Computer Manufacturer](#)
- [D1 of Base Manufacturer Electronics](#)
- [D1 of Base Manufacturer Cases](#)

When configured, the report should look like this:

	Bl...	Role Label	Or...	Or...	Or...	Pi...	Pi...	Pi...	Pa...	Pa...	Pa...	Tra...	Tra...	Tra...	Or...	Or...	Pi...	Pa...	Tr...	In...	Co...
1	De...	Electronics...	0.5	1.0	1.5	0.5	1.0	1.5	0.5	1.0	1.5	24.0	48.0	72.0	2.0	2.0	2.0	2.0	5.0	5.0	5.0
2	De...	Computer ...	7.0	8.0	9.0	0.5	1.0	1.5	0.5	1.0	1.5	48.0	72.0	96.0	5.0	5.0	5.0	5.0	10.0	10.0	10.0
3	De...	BM Electro...	3.0	4.0	5.0	1.0	2.0	3.0	1.0	2.0	3.0	48.0	72.0	96.0	5.0	5.0	5.0	5.0	10.0	10.0	10.0
4	De...	BM Compu...	7.0	8.0	9.0	0.5	1.0	1.5	0.5	1.0	1.5	96.0	168.0	240.0	5.0	5.0	5.0	5.0	10.0	10.0	10.0

### D1 of Electronics Distributor

Parameter	Description
Order Entry Duration Subtable.min = .5 Order Entry Duration Subtable.mode = 1 Order Entry Duration Subtable.max = 1.5	Takes 1 hour, on average, to enter orders for electronics components.
Pick Duration Subtable.min = .5 Pick Duration Subtable.mode = 1 Pick Duration Subtable.max = 1.5	Takes 1 hour, on average, to pick electronics from inventory for delivery.
Packing Duration Subtable.min = .5 Packing Duration Subtable.mode = 1 Packing Duration Subtable.max = 1.5	Takes 1 hour, on average, to pack electronics in containers for shipment.
Transportation Duration Subtable.min = 24 Transportation Duration Subtable.mode = 48 Transportation Duration Subtable.max = 72	Takes 2 days, on average, to ship containers of electronics to buyers.
Order Entry Cost.fixed Cost = 2 Order Fulfillment Cost.fixed Cost = 2 Pick Cost.fixed Cost = 2 Packing Cost.fixed Cost = 2 Transportation Cost.fixed Cost = 5 Invoice Cost.fixed Cost = 5 Customer Collections Cost.fixed Cost = 5	Costs \$2 to enter, fulfill, pick, and pack orders for electronics, and costs \$5 to transport containers, send invoices, and collect payments.

## D1 of Computer Manufacturer

Parameter	Description
Order Entry Duration Subtable.min = 7 Order Entry Duration Subtable.mode = 8 Order Entry Duration Subtable.max = 9	Takes 8 hours, on average, to enter orders for computers.
Pick Duration Subtable.min = .5 Pick Duration Subtable.mode = 1 Pick Duration Subtable.max = 1.5	Takes 1 hour, on average, to pick computers from inventory for delivery.
Packing Duration Subtable.min = .5 Packing Duration Subtable.mode = 1 Packing Duration Subtable.max = 1.5	Takes 1 hour, on average, to pack computers in containers for shipment.
Transportation Duration Subtable.min = 48 Transportation Duration Subtable.mode = 72 Transportation Duration Subtable.max = 96	Takes 3 days, on average, to ship containers of computers to buyers.
Order Entry Cost.fixed Cost = 5 Order Fulfillment Cost.fixed Cost = 5 Pick Cost.fixed Cost = 5 Pack Cost.fixed Cost = 5 Transportation Cost.fixed Cost = 10 Invoice Cost.fixed Cost = 10 Customer Collections Cost.fixed Cost = 10	Costs \$5 to enter, fulfill, pick, and pack orders for computers, and costs \$10 to transport containers, send invoices, and collect payments.

## D1 of Base Manufacturer Electronics

Parameter	Description
Order Entry Duration Subtable.min = 3 Order Entry Duration Subtable.mode = 4 Order Entry Duration Subtable.max = 5	Takes 4 hours, on average, to enter orders for electronics.
Pick Duration Subtable.min = 1 Pick Duration Subtable.mode = 2 Pick Duration Subtable.max = 3	Takes 2 hours, on average, to pick electronics from inventory for delivery.
Packing Duration Subtable.min = 1 Packing Duration Subtable.mode = 2 Packing Duration Subtable.max = 3	Takes 2 hours, on average, to pack electronics into containers for shipment.

Parameter	Description
Transportation Duration Subtable.min = 48 Transportation Duration Subtable.mode = 72 Transportation Duration Subtable.max = 96	Takes 3 days, on average, to ship containers of electronics to buyers.
Order Entry Cost.fixed Cost = 5 Order Fulfillment Cost.fixed Cost = 5 Pick Cost.fixed Cost = 5 Packing Cost.fixed Cost = 5 Transportation Cost.fixed Cost = 10 Invoice Cost.fixed Cost =10 Customer Collections Cost.fixed Cost = 10	Costs \$5 to enter, fulfill, pick, and pack containers for electronics, and costs and costs \$10 to transport containers, send invoices, and collect payments.

### D1 of Base Manufacturer Cases

Parameter	Description
Order Entry Duration Subtable.min = 7 Order Entry Duration Subtable.mode = 8 Order Entry Duration Subtable.max = 9	Takes 8 hours, on average, to enter orders for cases.
Pick Duration Subtable.min = .5 Pick Duration Subtable.mode = 1 Pick Duration Subtable.max = 1.5	Takes 1 hour, on average, to pick cases from inventory for delivery.
Packing Duration Subtable.min = .5 Packing Duration Subtable.mode = 1 Packing Duration Subtable.max = 1.5	Takes 1 hour, on average, to pack cases into containers for shipment.
Transportation Duration Subtable.min = 96 Transportation Duration Subtable.mode = 168 Transportation Duration Subtable.max = 240	Takes 1 week, plus or minus 3 days, to ship containers of cases to buyers.
Order Entry Cost.fixed Cost = 5 Order Fulfillment Cost.fixed Cost = 5 Pick Cost.fixed Cost =5 Pack Cost.fixed Cost =5 Transportation Cost.fixed Cost = 10 Invoice Cost.fixed Cost =10 Customer Collections Cost.fixed Cost = 10	Costs \$5 to enter, fulfill, pick, and pack orders for cases, and costs \$10 to transport containers, send invoices, and collect payments.

# Configuring Product Composite Parameters: ACME Model

You configure different parameters for different products composites, depending on whether it is a source or delivery product, or both.

**Tip** To avoid skewed metrics at the beginning of the simulation when a role has not yet built up any inventory, configure the Starting Product Inventory Level to be the same as the Safety Stock.

## To configure product composite parameters for the ACME model:

- 1 Using the Product Parameters Report that you created, configure the parameters for the product composites, according to the headings below.

When configured, the report should look like this (left and right sides):

	Ob...	Product Name	Role La...	Or...	Is ...	Is ...	Demand Orde...	Dem...	Dem...	Dem...	Suppliers Polic...
1	ES...	electronics	Electron...	ST...	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	000:000:01:00:00	3600	3600	3600	000:005:00:00:00
2	ES...	computer	Comput...	ST...	<input type="checkbox"/>	<input checked="" type="checkbox"/>	000:000:01:00:00	3600	3600	3600	000:000:00:00:00
3	ES...	electronics	Comput...	ST...	<input checked="" type="checkbox"/>	<input type="checkbox"/>	000:000:01:00:00	3600	3600	3600	001:000:00:00:00
4	ES...	computer-case	Comput...	ST...	<input checked="" type="checkbox"/>	<input type="checkbox"/>	000:000:01:00:00	3600	3600	3600	001:000:00:00:00
5	ES...	electronics	BM Ele...	ST...	<input type="checkbox"/>	<input checked="" type="checkbox"/>	000:000:01:00:00	3600	3600	3600	000:000:00:00:00
6	ES...	computer	Consum...	ST...	<input checked="" type="checkbox"/>	<input type="checkbox"/>	000:001:00:00:00	20	25	30	001:000:00:00:00
7	ES...	computer-case	BM Co...	ST...	<input type="checkbox"/>	<input checked="" type="checkbox"/>	000:000:01:00:00	3600	3600	3600	000:000:00:00:00

	Inv...	Inv...	Inv...	Man...	Man...	Man...	Delivery Policy...	Delivery Policy.net...
1	200	200	50	0	1000	1.0	000:005:00:00:00	100.0
2	50	50	100	25	50	0.9	001:000:00:00:00	500.0
3	150	150	100	0	100	1.0	000:000:00:00:00	1.0
4	50	50	100	0	100	1.0	000:000:00:00:00	1.0
5	200	200	50	25	50	0.8	000:001:00:00:00	50.0
6	0	500	100	0	100	1.0	000:000:00:00:00	1.0
7	200	200	100	250	500	0.95	001:000:00:00:00	10.0

- 2 In Excel, choose Report > Apply from the e-SCOR floating toolbar or press Ctrl + A to apply the parameter values to the model.
- 3 Save the report to the file *My-ACME-Summary-Reports.xls*.

For details on viewing and configuring Level 2 product composite parameters:

- [Configuring Product Composite Parameters.](#)
- [Configuring Source Product Parameters: Consumer Role.](#)
- [Configuring Delivery Product Parameters: Base Manufacturer.](#)

## Electronics Source and Delivery Product: Electronics Distributor Role

Parameter	Description
Inventory Policy.Starting Product Inventory Level = 200 Inventory Policy.safety Stock = 200 Inventory Policy.minimum Reorder Quantity = 50	Starts with 200 electronics components in inventory. Replenishes inventory when fewer than 200 electronics components exist. Creates replenishment orders for a minimum of 50 electronics components at a time.
Suppliers Policy.desired Turnaround = 5 days	Wants to receive electronics components from suppliers within 5 days of placing an order.
Delivery Policy.published Delivery Lead Time = 5 days Delivery Policy.net Selling Price = 100	Publishes that it can deliver electronics components within 5 days of receiving an order. Charges \$100 to buyers for each electronics component.

## Computer Delivery Product: Computer Manufacturer Role

Parameter	Description
Inventory Policy.starting Product Inventory Level = 50 Inventory Policy.safety Stock = 50 Inventory Policy.minimum Reorder Quantity = 100	Starts with 50 computers in inventory. Replenishes inventory when fewer than 50 computers exist. Creates build orders for a minimum of 100 computers at a time.
Manufacturing Policy.minimum Match Size = 25 Manufacturing Policy.maximum Batch Size = 50 Manufacturing Policy.build Yield = .90	Builds computers in batches with a minimum size of 25 units and a maximum size of 50 units. Has a 90% manufacturing yield.
Delivery Policy.published Delivery Lead Time = 1 week Delivery Policy.net Selling Price = 500	Publishes that it can deliver computers within 1 week of receiving an order. Charges \$500 to buyers for each computer.

## Electronics Source Product: Computer Manufacturer Role

Parameter	Description
Inventory Policy.starting Product Inventory Level = 150 Inventory Policy.safety Stock = 150 Inventory Policy.minimum Reorder Quantity = 100	Starts with 150 electronics components in inventory, which is three times the number of cases. Replenishes inventory when fewer than 150 electronics components exist, which is three times as many as the number of cases. Reorders a minimum of 100 electronics components at a time.
Suppliers Policy.desired Turnaround = 1 week	Wants to receive electronics within 7 days of placing an order.

## Computer Case Source Product: Computer Manufacturer Role

Parameter	Description
Inventory Policy.starting Product Inventory Level = 50 Inventory Policy.safety Stock = 50 Inventory Policy.minimum Reorder Quantity = 100	Starts with 50 cases in inventory. Replenishes inventory when fewer than 50 cases exist. Reorders a minimum of 100 cases at a time.
Suppliers Policy.desired Turnaround = 1 week	Wants to receive cases within 1 week of placing an order.

## Electronics Delivery Product: Base Manufacturer Electronics Role

Parameter	Description
Inventory Policy.starting Product Inventory Level = 200 Inventory Policy.safety Stock = 200 Inventory Policy.minimum Reorder Quantity = 50	Starts with 200 electronics components in inventory. Replenishes inventory when fewer than 200 electronics components exist. Creates build orders for a minimum of 50 electronics components at a time.
Manufacturing Policy.minimum Batch Size = 25 Manufacturing Policy.maximum Batch Size = 50 Manufacturing Policy.build Yield = .80	Builds electronics in batches with a minimum size of 25 units and a maximum size of 50 units. Has an 80% manufacturing yield.
Delivery Policy.published Delivery Lead Time = 1 day Delivery Policy.net Selling Price = 50	Publishes that it can deliver electronics components within 1 day of receiving an order. Charges \$50 to buyers for each electronics component.

## Computer Source Product: Consumer Role

Parameter	Description
Demand Order Cycle Time.mean = 1 week	Places an order once a week.
Demand Order Size.min = 20 Demand Order Size.mode = 25 Demand Order Size.max = 30	Places orders for 25 computers, plus or minus 5.
Suppliers Policy.desired Turnaround = 1 week	Wants to receive computers within 1 week of placing an order.

## Computer Case Delivery Product: Base Manufacturer Computer Cases Role

Parameter	Description
Inventory Policy.starting Product Inventory Level = 200 Inventory Policy.safety Stock = 200 Inventory Policy.minimum Reorder Quantity = 100	Starts with 200 cases in inventory. Replenishes inventory when fewer than 200 cases exist. Creates build orders for a minimum of 100 cases at a time.
Manufacturing Policy.minimum Batch Size = 250 Manufacturing Policy.maximum Batch Size = 500 Manufacturing Policy.build Yield = .95	Builds electronics in batches with a minimum size of 250 units and a maximum size of 500 units. Has a 95% manufacturing yield.
Delivery Policy.published Delivery Lead Time = 1 week Delivery Policy.net Selling Price = 10	Publishes that it can deliver cases within 1 week of receiving an order. Charges \$10 to buyers for each case.

# Creating Output Reports: ACME Model

The last step in configuring the ACME model is to create the following output reports to analyze the performance of the model:

- Role Financial Metrics Report
- Role Assets Metrics Report
- Enable Source Metrics Report
- Enable Deliver Metrics Report
- Plan Metrics Report
- Source Metrics Report
- Make Metrics Report
- Deliver Metrics Report
- Product Inventory Metrics Report
- Product Metrics Report

You will create these reports by using the default report templates for the Role Output, Category Output, and Product Composite Output Reports.

The Role Output Reports update once per financial period, and the Category Output Report and Product Composite Output Report update once a week.

## To create output reports for the ACME model:

- 1 Create a Role Output Report, configure the Update Mode to be Simulation Time, and configure the Update Interval so that it updates once per financial period, which is 30 days.
- 2 Clone the object to create two more reports, then choose one of the following menu choices on each report object:
  - Setup Report as Role Financial Metrics
  - Setup Report as Role Asset Metrics
- 3 Create a Category Output Report, configure it to update once per week of simulation time, clone the object to create a total of six reports, then choose one of the following menu choices on each report object:
  - Setup Report as Enable Source Metrics
  - Setup Report as Enable Deliver Metrics
  - Setup Report as Plan Metrics
  - Setup Report as Source Metrics

- Setup Report as Make Metrics
  - Setup Report as Deliver Metrics
- 4 Create a Product Composite Output Report, configure it to update once per week of simulation time, clone the object to create two reports, then choose one of the following menu choices on each report object:
- Setup Report as Product Inventory Metrics
  - Setup Report as Product Metrics

## Configuring the Simulation to Run for a Fixed Duration

Typically, you run a simulation for a fixed duration so you can compare the performance of different sets of input parameters over the same duration. To do this, you configure the duration of the Scenario associated with the model. Typically, you configure the Scenario to run for several financial periods.

---

**Tip** To ensure that the simulation generates data for the last financial period, configure the duration of the Scenario to be one day more than the end of the last financial period. For example, to run the simulation for two financial periods of 30 days each, configure the Scenario to run for 61 days.

---

### To configure the simulation to run for a fixed duration:

- 1 Display the properties dialog for the Scenario on the model detail.
- 2 On the Scenario tab, configure the Duration to be 8 weeks and 5 days (61 days).

Now, when you run the simulation, it will run for two financial cycles plus one day, then stop.

## Saving the Model

Save the model to your project name.

For details, see [Saving a Model](#).

## Summary: Configuring Level 2 SCOR for the ACME Model

To configure Level 2 SCOR parameters for the ACME model, you:

- [Created input reports.](#)
- [Configured reports.](#)
- [Configured report data through CSV files](#)
- [Configured Level 2 category parameters.](#)
- [Configured product composite parameters.](#)
- [Created output reports.](#)
- [Configured the simulation to run for a fixed duration.](#)

You should now know how to configure Level 2 SCOR parameters for categories and product composites through an input report. You are now ready to run the simulation.



# Running the Simulation: ACME Model

---

*Teaches you how to run the simulation and determine performance for the ACME model.*

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Running the Simulation: Normal Demand **114**

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Summary: Running the ACME Model Simulation **120**



# Introduction

When you run the simulation for the ACME model, you will determine model performance by asking a series of questions about key performance metrics, under two different scenarios:

- [Normal demand](#), where the customer orders an average of 25 computers a week.
- [Increased demand](#), where the customer orders an average of 50 computers a week.

You will experiment with modifying key parameters to improve the performance of the model under the scenario of increased demand.

---

**Shortcut** If you do not have time to work through the exercises in this part of the tutorial, in e-SCOR, open the file named *escor-tutorial-acme.kb*, which shows the finished model. To view the Excel report, open the file named *Tutorial-ACME-Summary-Reports.xls*. Follow along in the existing model as you read through the exercises.

---

## Running the Simulation: Normal Demand

You will now run the simulation to determine how the Manufacturer role performs under a situation of normal demand.

**To run the ACME model simulation under a scenario of normal demand:**

- 1 Start the ACME model simulation running.

After the first financial period, e-SCOR updates the Role Financial Metrics and Role Asset Metrics Reports.

- 2 Observe the metrics as the model runs.

You can view the metrics through the Metrics toolbar, the dialogs, or the reports, depending on what you find most convenient.

The simulation stops after 61 days of simulation time has passed.

- 3 To analyze the performance of the model, ask yourself the following questions, using the hints to help you decide which metrics to look at:
  - How much money did the manufacturer receive during the two financial periods? How much money did it receive in the current financial period? How do these values compare with the money the consumer paid? Are there any discrepancies? If so, why?

**Hint:** Look at the Manufacturer role's Financial Collections and compare it with the Consumer role's Financial Payments, both the total value and

within the current financial the period. Discrepancies exist when the Manufacturer role has Financial Bookings or Financial Outstanding, and when the Consumer role has Financial Obligations. In this case, the sum of the Manufacturer role's Financial Collections Total, Financial Bookings, and Financial Outstanding should equal the sum of the Consumer role's Financial Payments Total and Financial Obligations.

- What is the carrying cost of the manufacturer's inventory after two financial periods? How much of that cost is for finished computers? What is the cost basis for the inventory?

**Hint:** Look at the Inventory Days of Supply for the Manufacturer role and compare this value with the Finished Goods Days of Supply. The days of supply metrics are cost-weighted values of the current inventory, based on the Net Selling Price of the Manufacturer role's computer delivery product.

- What is the carrying cost in days for the manufacturer's inventory turnover? Is the manufacturer taking in more money than it is spending, or vice versa? How much? What is the value of computer sales for the current financial period? How much money does the manufacturer have available during the current financial period?

**Hint:** Asset Turns indicates how long it takes to turn over inventory, measured as a cost-weighted value, in days.

Cash-to-Cash Cycle Time indicates whether the role takes in more money than it spends or vice versa, during the current financial period, measured as a cost-weighted value. A positive value means the role spends more money than it takes in, and a negative value indicates the role takes in more money than it spends.

Days Sales Outstanding indicates the value of sales for the current financial period, measured in days, which is the sum of Financial Collections, Financial Bookings, and Financial Outstanding.

Cash Flow Period indicates the amount of money available during the current financial period, which is equal to the Financial Collections within Financial Period minus the Financial Payment within Financial Period.

- What is the manufacturer's total cost of doing business? How do you account for all of these costs?

**Hint:** Look at the Order Management Costs for the Manufacturer role and compare this value with the sum of the Cost Incurred metrics for the Source and Deliver categories on the role detail. These values should be the same, except that Order Management Costs does not include the Receiving Cost or the Invoice Cost of the Source category, as defined by SCOR. Note that Order Management Costs do not include the Production Material Handling Cost of the Make category either.

- What percentage of time does the customer receive shipments on or before the requested date? How does this compare with the percentage of time the manufacturer delivers shipments on or before the customer request date? What is the current vs. average value of these metrics?

**Hint:** Look at the Supplier On-Time Performance for the Consumer role's ES: Enable Source category, which computes the percentage of time that the role receives shipments within the Desired Turnaround of its source product. Compare this value with the Delivery Performance and Perfect Order Fulfillment for the Manufacturer role's ED: Enable Deliver category. These values should all be the same. Click the button next to each of these metrics in the dialogs to show the current and average values.

In the ACME model, Delivery Performance is the same as Perfect Order Fulfillment, because the Consumer role accepts only complete shipments. If the Consumer role allowed partial shipments, Perfect Order Fulfillment would be the percentage of time that the role delivers shipments before the customer request date and in the requested amounts.

You can also look at Fill Rates for the Manufacturer role's Deliver category, which measures the percentage of product shipments that the role delivers within 24 hours of receiving an order.

- On average, how late or early are the shipments of computers that the customer receives?

**Hint:** Look at the Product Shipments Lead Time of the S1: Source Stocked Products category on the Consumer role detail. A positive number indicates the average amount of time that shipments are early, and a negative number indicates the average amount of time that shipments are late. The delta is measured against the Desired Turnaround of the Consumer role's computer source product.

- How much time, on average, does it take the manufacturer to make a batch of computers, from when it receives a build order to when it releases computers for shipment? What factors contribute to this time?

**Hint:** Look at the Make Cycle Time for the Manufacturer role's Make category. The timing parameters for the Make category all contribute to the cycle time.

- How much time, on average, does it take the manufacturer to fulfill orders for computers? How does this time compare with the average amount of time it takes the customer to receive computer shipments? How do these values compare with the desired turnaround time?

**Hint:** Look at the Order Fulfillment Lead Time of the Manufacturer role's computer delivery product. Compare this value with the Received Fulfillment Time of the Consumer role's computer source product. These

values should be the same. Compare these values with the Desired Turnaround Time of the Consumer role's computer source product.

- How many components and finished products does the manufacturer have in inventory at the end of the simulation? How does this compare with the amount of safety stock the role wants to keep in inventory?

**Hint:** Look at the Inventory Level of the source and delivery products for the Manufacturer role. The higher the inventory levels are above the Safety Stock, the more excess inventory the role is carrying.

- How many computers has the manufacturer received orders for and how many computers has it actually shipped? How does this compare with the number of computers the customer has ordered and the number of computers it has received? Are there any discrepancies? If so, why?

**Hint:** Look at the Quantity to Deliver and Quantity Shipped of the Manufacturer role's computer delivery product. Compare these values with the Quantity Ordered and Quantity Received of the Consumer role's computer source product. If the Consumer role has received every shipment, these values will be the same. If the values are not the same, look at the In Transit Inventory Level of the Manufacturer role's computer delivery product and the Products on Order of the Consumer role's computer source product. These values should be the same and should make up the difference between actual orders received and shipped.

- How many orders for computers has the consumer placed with the manufacturer? How does this compare with the number of orders the manufacturer has received and shipped?

**Hint:** Look at the Orders Sent and Product Shipments Received for the ES: Enable Source category of the Consumer role. Compare this with the Orders Received and Product Shipments Sent for the ED: Enable Deliver category of the Manufacturer role. These values should be the same.

- How many computers did the manufacturer have to discard as scrap compared with the number it actually could use?

**Hint:** Look at the Total Products Accepted and Total Products Rejected for the Manufacturer role's computer delivery product. The model computes these values based on the Build Yield for the Manufacturer role's computer delivery product.

- 4 Save the report to the file named *My-ACME-Summary-Reports.xls*.

# Running the Simulation: Increased Demand

Now, you will increase the number of computers the Consumer role orders and run the simulation again to determine performance. You will then experiment with modifying various parameters to improve performance under the scenario of increased demand.

## To run the ACME model simulation under a scenario of increased demand:

- 1 Increase the average number of computers the Consumer role orders to 100.

To do this, configure the Demand Order Size parameters for the computer source product of the Consumer role through the dialogs or through the Product Parameters report, as follows:

Parameter	Value
Demand Order Size.min	25
Demand Order Size.max	75
Demand Order Size.mode	50

- 2 Run the simulation again until it stops.
- 3 What effect does the increased demand have on performance and where are these effects the most pronounced?
- 4 Experiment with configuring one or more of the following parameters to improve performance:
  - Increase the frequency with which the manufacturer sends build orders to manufacturing for computers and sends replenishment orders to its suppliers for components.  
**Hint:** Decrease the Planning Period of the P3: Plan Make and P2: Plan Source categories.
  - Increase the level at which the manufacturer replaces its inventory of computers, cases, and electronics.  
**Hint:** Increase the Safety Stock for the computer delivery product and the electronics and case source products. Remember that the safety stock for electronics should be three times the safety stock for cases, because a computer requires three electronics components for every case.
  - Increase the number of computers the manufacturer can make in a single batch.  
**Hint:** Increase the Maximum Batch Size for the Manufacturer role's delivery product.

- Increase the number of available manufacturing resources.

**Hint:** Configure the Resource Capacity of the Computer Plant resource from 1 to 2, or create another resource and assign it to the Manufacturer role.

- Decrease the amount of time it takes to deliver shipments of computers to customers.

**Hint:** Decrease the Transportation Duration of the Manufacturer role's Deliver category.

You should be able to achieve approximately an average of 75% on-time performance with the following values for the Manufacturer role:

Object	Parameter	Value
P3	Planning Period	1 day
P2	Planning Period	3 days
Computer (delivery product)	Starting Product Inventory Level	100
	Safety Stock	100
	Minimum Batch Size	100
	Maximum Batch Size	150
Electronics (source product)	Starting Product Inventory Level	300
	Safety Stock	300
Case (source product)	Starting Product Inventory Level	100
	Safety Stock	100
Computer Manufacturer resource	Resource Capacity	2
D1	Transportation Duration	Min = 1 Mode = 2 Max = 3

- 5 Save the report to the file name called *My-ACME-Summary-Reports.xls*.

## Saving the Model

Save the model to your project name.

For details, see [Saving a Model](#).

## Summary: Running the ACME Model Simulation

To run the simulation for the ACME model, you ran two scenarios:

- [Normal demand](#).
- [Increased demand](#).

You should now have a better understanding of how some of the key input parameters impact some of the key metrics in the model.

In the last model, you will focus on optimizing on-time performance, inventory levels, and inventory days of supply by varying customer demand, delivery times, and safety stocks.

# Case Study: Central Distributor Model

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*Provides a case study of a central distribution process that lets you experiment with determining optimal inventory replenishment levels and implementing a vendor-managed inventory control system.*

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# Introduction

In this part of the tutorial, we present a case study that addresses a real-world business problem. First, you will model a central pharmaceutical distribution process with three distribution sites, then you will perform “what-if” analysis to answer these two questions:

- How much inventory does the central distributor need to carry to guarantee that the downstream consumers never runs out of inventory?
- What effect would implementing a vendor-managed inventory (VMI) system have on the distributor’s inventory levels and associated carrying costs?

The case study describes the:

- [Business problem.](#)
- [Supply chain.](#)
- [Input parameters.](#)
- [Output metrics.](#)

To implement the case study, you:

- [Configure the supply-chain model.](#)
- [Configure the Level 2 SCOR parameters](#) by mapping the inputs and outputs to e-SCOR parameters and metrics, then create input and output reports for configuring and viewing values.
- [Configure the simulation to run for a fixed duration.](#)

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**Shortcut** If you do not have time to work through the exercises in this part of the tutorial, in e-SCOR, open the file named *escor-tutorial-vmi.kb*, which shows the finished model. To view the Excel report, open the file named *Tutorial-VMI-Summary-Reports.xls*. Follow along in the existing model as you read through the exercises.

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## Case Study: Business Problem

A regional supplier of medical supplies and drugs is trying to convince its customers that it can save them money by taking ownership of their stock and managing their resupply. The Just-in-time Medical Supplies (JMS) Co. wants to show three customers, the Saint Augustine Hospital, Bearly Legal Drugs, and Cold Storage Nursing Home, how much it can reduce inventory and associated costs while maintaining adequate safety stock at each location. JMS also wants to know how much it can reduce its own inventory if it can deliver supplies to them more often.

JMS must show its customers the minimum inventory everyone must carry to meet their normal and worst case scenarios. Senior management wants this information in terms of days of supply and other standard asset calculations.

If JMS were to take over control of the customer's stock, they think that they could cut normal delivery time in half due to simpler delivery schedules. They need to determine what effect this strategy would have on their assets.

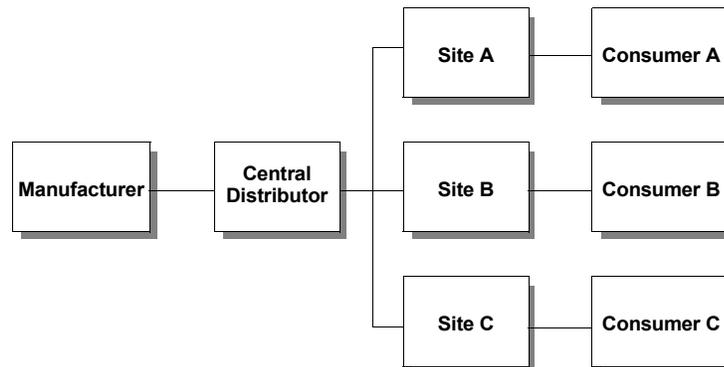
## Case Study: Supply Chain

The pharmaceutical distributor has three customers, which are themselves distribution sites that deliver pharmaceuticals and medical supplies to their customers, as follows:

- Site A is a hospital, which delivers supplies to its patients.
- Site B is a nursing home, which delivers supplies to its residents.
- Site C is a pharmacy, which delivers supplies to its customers.

The central distributor receives its inventory directly from a manufacturer.

The supply chain looks like this:



## Case Study: Input Parameters

The central distributor case study deals strictly with inventory levels, days of supply, and delivery times. Therefore, the only input parameters you need to configure are those related to:

- [Order quantity and frequency](#)
- [Planning](#)
- [Selling price](#)
- [Delivery times](#)

## Order Quantity and Frequency

Each consumer places an order with each distribution site once a day and in these quantities with this amount of variation, based on a triangular distribution:

Quantity	Consumer A	Consumer B	Consumer C
Order Size Minimum	50	100	100
Order Size Mode	100	200	100
Order Size Maximum	150	400	100

## Planning

Once a week, each distribution site and the central distributor determine how many orders to place with their suppliers. The manufacturer determines how many build orders to send to manufacturing to fulfill its orders once a week as well.

To receive volume discounts, each process role in the supply chain uses the following minimum order sizes when placing orders with suppliers:

Distribution Sites	Central Distributor	Base Manufacturer
500 units	1000 units	5000 units

Because of the nature of the products being shipped, each distribution site must maintain sufficient inventory to ensure that it never runs out. To do this, you must determine the optimal inventory level that the central distributor and each distribution site must maintain before replenishing.

The manufacturer replenishes its inventory of finished goods whenever its safety stock goes below 6000 units, regardless of the size of the orders it receives.

Each role starts the simulation with as much initial inventory of its source and delivery products as the safety stock you specify.

Each role accepts partial shipments.

## Selling Price

To compute days of supply from inventory levels, you need to know how much each buyer pays for its inventory. In this case study, assume:

- The manufacturer's selling price to the central distributor is \$5.
- The central distributor's selling price to the distribution sites is \$10.
- The distribution sites' selling price to their consumers is \$15.

## Delivery Time

The central distributor delivers orders at 8:00 AM each day. Each delivery takes between six and nine days. This variation in delivery time requires that each distribution site keep enough inventory on hand at all times to ensure that they never run out.

Each process role in the supply chain delivers shipments to its downstream buyers according to these frequencies, based on a triangular distribution:

<b>Delivery Time</b>	<b>Base Manufacturer</b>	<b>Central Distributor</b>	<b>Distribution Sites</b>
Minimum	2 weeks	6 days	30 minutes
Mode	2 weeks	7.5 days	30 minutes
Maximum	2 weeks	9 days	30 minutes

## Case Study: Output Metrics

Due to the nature of the products being shipped, the central distributor must ensure that the end consumers in the supply chain never run out of inventory. To do this, it must ensure that the on-time performance of each consumer is as close to 100% as possible.

To do this, you will attempt to optimize inventory levels for each of the three distribution sites, as well as for the central distributor, by maintaining the smallest possible inventory, while never running out.

In addition, you need to determine the dollar value of your inventory, in terms of days of supply, as well as other asset calculations such as asset turns, cycle time, and cash flow.

# Configuring the Supply Chain: Central Distributor Model

The supply-chain model consists of these process roles:

Role Labels	Description
Base Manufacturer	The Base Manufacturer role that supplies the central pharmaceutical distributor.
Central Distributor	The central pharmaceutical Distributor role.
Site A Site B Site C	The three Distributor roles that buy from the central distributor.
Consumer A Consumer B Consumer C	The three Consumer roles that consume the pharmaceuticals and medical supplies that each site delivers.

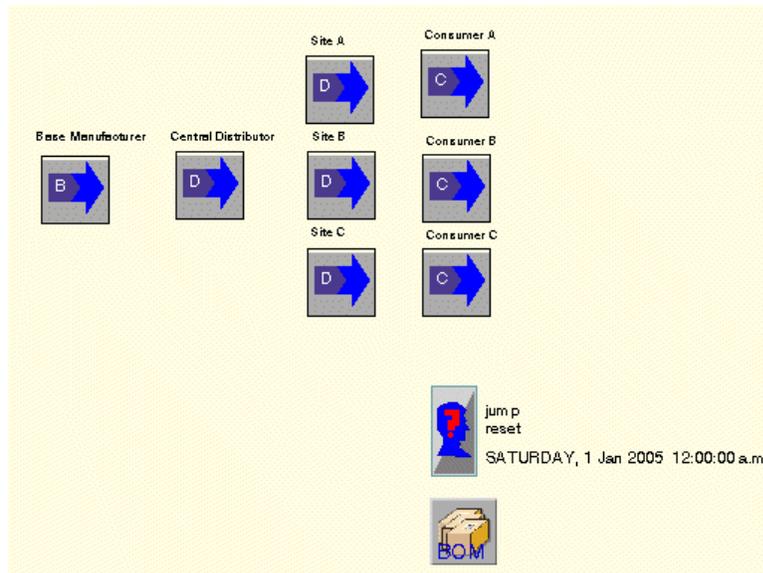
Each role in the supply chain sources, makes, and/or delivers pharmaceutical products, as appropriate for the role. Because this case study is concerned with overall inventory levels of all products, rather than inventory levels of particular products, the product hierarchy consists of a single product specification.

## To configure the supply-chain model:

- 1 On the Getting Started workspace, create a model named Central Distributor.  
For details, see [Configuring the Model Environment](#).
- 2 Create a single product specification named Products, which represents the pharmaceutical products and medical supplies.  
For details, see [Configuring the Product Specification: Simplest Model](#).
- 3 Create roles to form the supply chain.  
For details, see [Configuring the Supply-Chain Model: ACME Model](#).
- 4 Assign the product specification to each role in the supply-chain model.  
For details, see [Assigning Products to Roles: Simplest Model](#).
- 5 Configure the basic parameters for each role.  
For details, see [Configuring Role Parameters: Simplest Model](#).
- 6 Configure the Financial Period of each role to be 2 weeks.  
For details, see [Configuring Role Parameters: Simplest Model](#).

- 7 Configure resources for the manufacturer that supplies the central distributor.  
For details, see [Configuring Resources: ACME Model](#).

The model should look something like this:



## Configuring Level 2 SCOR: Central Distributor Model

The supply-chain model consists of eight roles, whose Level 2 SCOR parameters you must configure. This case study is focused on determining optimal inventory levels, given perfect on-time performance. Therefore, you will configure only those parameters that affect inventory and on-time performance.

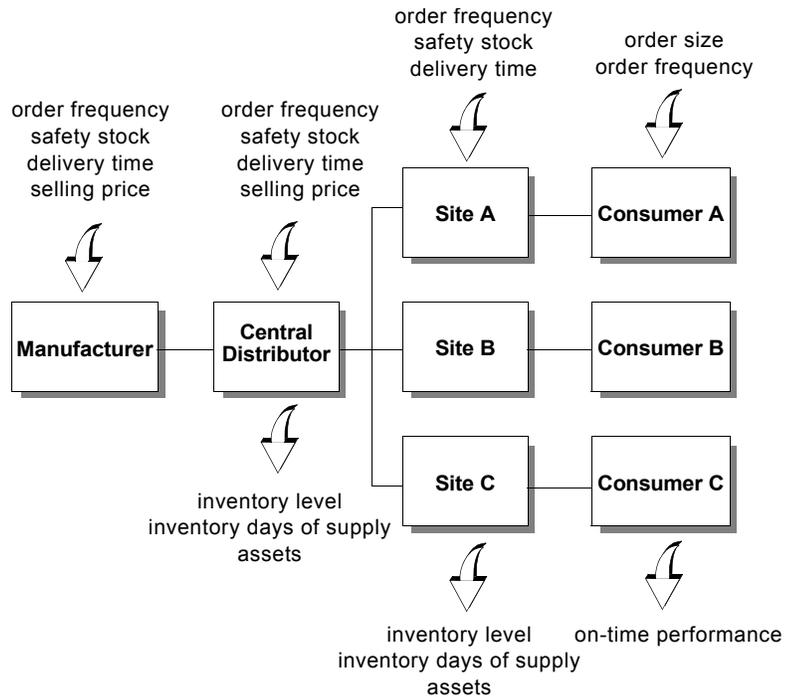
To configure Level 2 SCOR for the central distributor model, you:

- [View a diagram](#) of key inputs and outputs for the central distributor model.
- Map the inputs and outputs to the appropriate e-SCOR parameters and metrics for each of these roles:
  - [Consumer roles](#)
  - [Distributor roles](#)
  - [Base Manufacturer role](#)
- [Create input reports](#) for configuring the key parameters.
- [Configure Level 2 SCOR parameters](#) through the input reports.
- [Create output reports](#) for viewing the key metrics.

- [Configure the simulation to run for a fixed duration.](#)

## Diagram of Key Inputs and Outputs

This diagram shows the key inputs (above each role) and outputs (below each role) that you need to configure and measure for each role:



## Mapping Inputs and Outputs for Consumer Roles

You specify the size and frequency with which each Consumer role places orders with each distribution site by configuring parameters in the source product for each Consumer role.

You view on-time performance in the ES: Enable Source category on the Consumer role detail.

This table maps the inputs and output for the Consumer roles to the appropriate e-SCOR parameters and metric, assuming a triangular distribution for the parameters, the default:

Description	Input/ Output	Category/ Product Composite	Parameter/Metric
Order size	I	Source product (Demand tab)	Demand Order Size Min Mode Max
Order frequency	I	Source product (Demand tab)	Demand Order Duration Min Mode Max
On-time performance	O	ES: Enable Source (Enable Source tab)	Supplier On-Time Performance (%)

## Mapping Inputs and Outputs for Distributor Roles

A Distributor role uses source planning to determine the size and frequency with which it places orders with suppliers. You configure source planning parameters in the P2: Plan Source category on the role detail and in the source and delivery products associated with the role.

You determine delivery time by configuring parameters in the Deliver category on each role detail.

The model computes inventory levels, based on products shipped and received. Inventory days of supply and other asset calculations represents the dollar value of the current inventory level, measured in days. Therefore, to translate current inventory levels into a dollar amount, you must provide a value for the price each downstream buyer must pay for its source products. To do this, you configure the Net Selling Price parameter of each supplier's delivery product. The buyer then computes the Purchase Cost metric for its source product.

This table maps the inputs and outputs for the Distributor roles to the appropriate e-SCOR parameters and metrics, assuming a triangular distribution for the timing parameters, the default:

<b>Description</b>	<b>Input/ Output</b>	<b>Category/ Product Composite</b>	<b>Parameter/Metric</b>
Order frequency	I	P2: Plan Source	Planning Period
Safety stock	I	Source and delivery product (Inventory tab)	Safety Stock
Delivery time	I	D1: Deliver Stock Product (Transportation tab)	Transportation Duration Min Mode Max
Inventory	I	Delivery product (Delivery tab)	Net Selling Price
	O	Source and delivery product (Metrics tab)	Inventory Level
	O	Distributor role (Assets tab)	Inventory Days of Supply
Assets	O	Distributor role (Asset tab)	Asset Turns
			Cash-to-Cash Cycle Time
			Cash Flow Period

## Mapping Inputs for Base Manufacturer Role

A Base Manufacturer role uses make planning to determine the size and frequency with which it creates and sends build orders to manufacturing. You configure make planning parameters in the P3: Plan Make category and in the delivery product associated with the role.

Similar to the Distributor roles, you must configure the Net Selling Price of the delivery product so the downstream central distributor can compute Inventory Days of Supply.

This table maps the inputs for the Base Manufacturer role to the appropriate e-SCOR parameters, assuming a triangular distribution for timing parameters, the default:

<b>Description</b>	<b>Input/ Output</b>	<b>Category/ Product Composite</b>	<b>Parameter/Metric</b>
Order frequency	I	P3: Plan Make	Planning Period
Safety stock	I	Delivery product (Inventory tab)	Safety Stock
Delivery time	I	D1: Delivery Stock Product (Transportation tab)	Transportation Duration Min Mode Max
Inventory	I	Delivery product (Delivery tab)	Net Selling Price

## Creating Input Reports for Configuring Key Parameters

You will create the following input reports for configuring the key Level 2 SCOR parameters:

- Category Input Report, which will contain parameters relating to planning and delivery time.
- Product Composite Input Report, which will contain parameters relating to orders quantity and frequency, product cost, and starting inventory.

---

**Tip** Remember, you must include the UUID parameter in all input reports, which provides a unique identifier for each row in the spreadsheet.

---

This table summarizes the internal attribute groups and names that should appear in each input report:

<b>Report</b>	<b>Attribute Group</b>	<b>Attribute Name</b>
Plan Parameters	N/A	Role Label
	N/A	Planning Period

Report	Attribute Group	Attribute Name
Deliver Parameters	N/A	Role Label
	Transportation Duration	Min Mode Max
Product Composite Input Report	N/A	Product Name
	N/A	Role Label
	N/A	Is Source Product
	N/A	Is Delivery Product
	Demand Order Duration	Min Mode Max
	Demand Order Size	Min Mode Max
	Inventory Policy	Starting Product Inventory Inventory
	Inventory Policy	Safety Stock
	Inventory Policy	Minimum Reorder Quantity
Delivery Policy	Net Selling Price	

**To create input reports for configuring key parameters:**

- 1 Create two Category Input Reports from the Reports tab on the e-SCOR toolbar and place them on the model detail.
- 2 Choose Setup Report as Plan Parameters on one report and Setup Report as Deliver Parameters on the other report.
- 3 Click the Attributes tab and configure the attributes that should appear in the report, according to the table above.

For details, see [Creating Input Reports for Configuring Level 2 SCOR Parameters](#).

- 4 Configure the Time Unit of the Plan Parameters and Deliver Parameters reports to be weeks and days, respectively.
- 5 Open the e-SCOR Default Summary Reports in Excel.

- 6 Choose Show Report on the Category Input Report to create the report template in Excel.
- 7 Configure the spreadsheet to facilitate viewing.

---

**Tip** Hide the ES, ED, S1, and Mb categories so the spreadsheet includes only the S1, P2, P3, and D1 categories.

---

For details, see [Creating Input Reports for Configuring Level 2 SCOR Parameters](#).

- 8 Create a Product Composite Input Report and configure the attributes to appear, according to the table above.
- 9 Configure the Time Unit of the Product Composite Input Report to be days.
- 10 Choose Show Report on the Product Composite Input Report to create the report template in Excel.

## Configuring Level 2 SCOR: Central Distributor Model

You can now configure the key Level 2 SCOR parameters for all relevant categories and product composites in the model through the input reports.

Based on the description in [Case Study: Input Parameters](#), configure the following category parameter values through the Level 2 Input Report. Be sure to enter all time-based values in the time unit of the report.

Category	Role Label	Parameter Name	Value
P3	Base Manufacturer	Planning Period	1 week
P2	Central Distributor	Planning Period	1 week
P2	Site A Site B Site C	Planning Period	1 week
D1	Central Distributor	Transportation Duration.min	6 days
		Transportation Duration.mode	7.5 days
		Transportation Duration.max	9 days

Category	Role Label	Parameter Name	Value
D1	Base Manufacturer	Transportation Duration.min	14 days
		Transportation Duration.mode	14 days
		Transportation Duration.max	14 days
D1	Site A	Transportation Duration.min	.042 days
	Site B	Transportation Duration.mode	.042 days
	Site C	Transportation Duration.max	.042 days

Similarly, configure these product composite parameter values for these roles through the Product Composite Input Report, using the time unit of the report.

Role Label	Parameter Name	Value
A Consumers	Demand Order Duration.min	1 day
	Demand Order Duration.mode	1 day
	Demand Order Duration.max	1 day
	Demand Order Size.min	50
	Demand Order Size.mode	100
	Demand Order Size.max	150
B Consumers	Demand Order Duration.min	1 day
	Demand Order Duration.mode	1 day
	Demand Order Duration.max	1 day
	Demand Order Size.min	100
	Demand Order Size.mode	200
	Demand Order Size.max	400
C Consumers	Demand Order Duration.min	1 day
	Demand Order Duration.mode	1 day
	Demand Order Duration.max	1 day
	Demand Order Size.min	100
	Demand Order Size.mode	100
	Demand Order Size.max	100
Site A	Net Selling Price	15
Site B	Minimum Reorder Quantity	500
Site C		
Central Distributor	Net Selling Price	10
	Minimum Reorder Quantity	1000

Role Label	Parameter Name	Value
Base Manufacturer	Starting Product Inventory Level	5000
	Net Selling Price	5
	Safety Stock	15000
	Minimum Reorder Quantity	5000

**Note** You will configure the Safety Stock and Starting Product Inventory Level for the product composites of each Distributor role later, based on estimates, when you run the simulation.

#### To configure Level 2 SCOR parameters:

- 1 In Excel, display the appropriate spreadsheet by clicking the tab at the bottom.
- 2 Enter values into the appropriate cells, according to the tables above.
- 3 When you are finished entering values in the spreadsheet, choose Reports > Apply from the e-SCOR floating toolbar or press Ctrl + A to apply the values to the model.

The values you entered into the spreadsheet now exist in the appropriate locations in the e-SCOR dialogs.

## Creating Output Reports for Viewing Key Metrics

You will create two output reports for viewing key parameters:

- Category Output Report, which will contain the supplier on-time performance metric for the ES: Enable Source category of each Consumer role.
- Role Output Report, which will include the asset metrics for each role.

This table summarizes the attributes that should appear in each output report:

Report	Attribute Name
Category Output Report	Role Label
	Supplier On-Time Delivery Performance.average Value
Role Output Report	Label
	Inventory Days of Supply.average Value

Report	Attribute Name
	Asset Turns.average Value
	Cash-to-Cash Cycle Time.average Value
	Cash Flow.average Value

You will configure the reports to update at regular time intervals, based on simulation time.

**To create output reports for viewing key metrics:**

- 1 Create a Category Output Report from the Reports palette of the e-SCOR toolbox and place it on the model detail.
- 2 Choose Setup Report as Enable Source Metrics, then configure the attributes to appear in the report according to the table above.  
For details, see [Creating Input Reports for Configuring Key Parameters](#).
- 3 Create a Role Output Report, choose Setup Report as Asset Metrics, and configure the attributes to appear in the report according to the table.
- 4 Configure the Time Unit of each report to be Days.
- 5 Choose Show Report on each report.

---

**Tip** For the Level 2 Output Report, hide all categories except the ES: Enable Source category.

---

- 6 Configure the Category Output Report to update once a week of simulation time, and configure the Role Output Report to update once every two weeks.  
For details, see [Generating Output Report Data](#).
- 7 Save the reports to the file named *My-Tutorial-VMI-Summary-Reports.xls*.

## Configuring the Simulation to Run for a Fixed Duration

You will configure the central distributor model to run for three financial cycles, where each financial cycle is 2 weeks. To allow the model to reach a steady state, you will also configure the simulation to begin one week before the model outputs metrics to the reports. To ensure that the data for the last financial period is current in the output reports, you will configure the simulation to run for one day longer than the end of the last financial cycle. This means you will configure the simulation to run for 43 days, which is  $(3 \times 14) + 1$ .

You will also configure the model to start generating orders after the delivery time of the first shipment. Because the central distributor delivers orders at 8:00 AM each day, this means you should configure the starting time for generating orders to be some number greater than 8 hours, such as 9 hours. To do this, you configure order timing parameters for each Consumer role in the model.

### To configure the simulation run for a fixed duration:

- 1 Display the properties dialog for the Scenario and on the Scenario tab, configure the Simulation Duration to be 43 days.
- 2 Click the Start Time tab and configure the start time of the simulation to be December 25, 2004, which is 7 days before January 1, 2005, the time at which the first report updates.
- 3 Display the properties dialog for the source product of each Consumer role and configure the Demand Detail parameters on the Demand tab, as follows:

Parameter	Value
Demand Start Time	9 hours
Demand Stop Time	43 days (6 weeks and 1 day)

## Saving the Model

Save the model to your project name.

For details, see [Saving a Model](#).

# Summary: Central Distributor Case Study

To configure the central distributor case study model, you:

- Analyzed these features of the case study:
  - The [business problem](#), which is to determine optimal replenishment levels and to minimize inventory days of supply to guarantee 100% on-time performance, then to compare these results with a vendor-managed inventory system.
  - The [supply chain](#), which consists of single Base Manufacturer role, a central Distributor role, three site Distributor roles, and three Consumer roles.
  - The [input parameters](#), which relate to [order quantity and frequency](#), [planning](#), [selling price](#), and [delivery time](#).
  - The [output metrics](#), which relate to on-time performance, inventory days of supply, and other standard asset metrics.
- [Configured the supply-chain](#) by creating, connecting, and configuring roles, then assigning product specifications to each role in the model.
- Configured Level 2 SCOR by:
  - [Analyzing a diagram of key inputs and outputs](#).
  - [Mapping inputs and outputs for the Consumer roles](#).
  - [Mapping inputs and outputs for the Distributor roles](#).
  - [Mapping inputs for the Base Manufacturer role](#).
  - [Creating input reports for configuring key parameters](#).
  - [Configuring Level 2 SCOR parameters](#).
  - [Creating output reports for viewing key metrics](#).
  - [Configuring the simulation to run for a fixed duration](#).

You should now have a general understanding of the central distributor model case study and how to model it in e-SCOR.

Next, you will estimate replenishment levels for the three distribution sites and run the simulation to determine performance over time.

# Running the Simulation: Central Distributor Model

---

*Describes how to run the central distributor model simulation by estimating initial replenishment levels.*

Introduction **140**

Estimating Initial Safety Stocks **140**

Running the Simulation **141**

Saving the Model **142**

Summary: Running the Central Distributor Simulation **142**



# Introduction

Before you can run the central distributor model simulation, you must configure the Safety Stock parameters for each of the Distributor roles in the model. The Safety Stock determines the level at which each distribution site, as well as the central distributor replaces its inventory. Each Distributor role uses the Safety Stock and the Minimum Reorder Quantity, along with the current number of products on order, to determine order size when performing its source planning.

To avoid skewed metrics due to lack of initial inventory, you will also configure the Starting Inventory to be the same as the Safety Stock.

To run the central distributor model, you:

- [Estimate initial safety stock](#) to approximate the levels you think will achieve the desired results.
- [Run the simulation](#) to determine whether the end consumers achieve 100% on-time performance.

---

**Shortcut** If you do not have time to work through the exercises in this part of the tutorial, in e-SCOR, open the file named *escor-tutorial-vmi.kb*, which shows the finished model. To view the Excel report, open the file named *Tutorial-VMI-Summary-Reports.xls*. Follow along in the existing model as you read through the exercises.

---

## Estimating Initial Safety Stocks

Initially, you might estimate safety stocks for each of the three distribution sites by multiplying the average order size by the order frequency. You might add some extra to account for variation in order size, perhaps the amount required to accommodate the maximum order size.

To estimate the safety stock of the central distributor, you might estimate the average demand of the three distribution sites. You would then determine the number of weeks of inventory that are required to keep on hand at all times to account for delivery times. It takes two weeks for the central distributor to receive shipment from the manufacturer, and it takes one week to deliver shipments to the distribution sites. Therefore, the central distributor needs to replenish its inventory at a level that is equal to three times the average weekly demand.

As outlined in the case study, the ranges of order sizes for each of the three consumers and the central distributor are:

- Consumer A: 50, 100, 150
- Consumer B: 100, 200, 400

- Consumer C: 100, 100, 100
- Central Distributor: 250, 400, 650

For example, you might estimate the initial safety stocks for each of the three distribution sites and the central distributor as follows:

Role	Initial Safety Stock Estimate	Value
Site A	$100 \text{ units} \times 7 \text{ days} + 50 =$	750
Site B	$200 \text{ units} \times 7 \text{ days} + 200 =$	1600
Site C	$100 \text{ units} \times 7 \text{ days} =$	700
Central Distributor	$3 (7 \text{ days} \times (100 + 200 + 100)) =$	8400

You will configure both the Safety Stock and the Initial Product Inventory Level of each product composite to use the estimated values.

**To configure replenishment and initial inventory levels:**

- 1 Use the Product Composite Input Report to configure the Safety Stock parameter for each of the three distribution sites and the central distributor, according to the table above.
- 2 Configure the Starting Product Inventory Level to be the same as the Safety Stock.

## Running the Simulation

You will now run the simulation to determine whether each consumer achieves a 100% on-time performance, given your initial estimates. You will also look at inventory days of supply and the other asset metrics.

The model runs different processes at different phases of the simulation.

**To run the simulation, using estimated safety stocks:**

- 1 Run the simulation in jump mode.  
For details, see [Running the Simulation](#).
- 2 Display the Category Output Report so you can view the Supplier On-Time Performance metric as the model runs.  
As the model runs, buyer roles place orders and supplier roles deliver shipments. At the same time, the model computes Supplier On-Time Performance.
- 3 Display the Role Output Report to view the Inventory Days of Supply and other asset metrics as the model runs.

Each financial period, which is 2 weeks, each role computes incoming and outgoing financial metrics, days of supply, and other asset metrics, based on the Net Selling Price of each delivery product in the model.

- 4 Observe the metrics in the Metrics toolbar and in the reports until the simulation stops.

The simulation runs for 43 days, then stops when the simulation clock reads February 6.

Did your safety stock estimates result in 100% on-time performance? No, neither the three consumers nor the distribution sites had anywhere close to 100% Supplier On-Time Performance.

Now, let's look at inventory days of supply and assets.

In this simulation, the distribution sites are carrying less than one day of inventory, which is way too low. The sites take between 0 and 168 days to turn over their inventory. Two of the three sites spend more money than they take in, based on a positive cash-to-cash cycle time. Therefore, the asset metrics for the three distribution sites, as well as for the central distributor, are not very favorable, because the amount of inventory is not sufficient to supply all sites equally well, based on demand.

To increase on-time performance and balance asset metrics between the sites, you need to increase safety stocks, which you will experiment with [later in this tutorial](#).

## Saving the Model

Save the model to your project name.

For details, see [Saving a Model](#).

## Summary: Running the Central Distributor Simulation

To run the central distributor simulation, you:

- [Estimated initial safety stock](#), based on order size and order frequency.
- [Ran the simulation](#) and view the on-time performance and days of supply.

You should now have a better understanding of how safety stocks, order size, and order frequency affect on-time performance.

# Optimizing the Central Distributor Model

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*Describes how to determine optimal replenishment levels for the central distributor model and how to implement a vendor-managed inventory system.*

Introduction **144**

Determining Optimal Safety Stocks **144**

Implementing a Vendor-Managed Inventory Control System **148**

Saving the Model **149**

Summary: Optimizing the Central Distributor Model **150**



# Introduction

Based on the results you obtained by using estimates, you will now fine-tune the estimates to optimize the central distributor model. To optimize the model, you:

- [Determine optimal safety stocks.](#)

The goal is to achieve 100% on-time performance, given the lowest possible safety stocks and the lowest inventory carrying costs, measured in Inventory Days of Supply. To do this, first, you will optimize safety stocks by configuring the model for the worst case scenario, then you will attempt to minimize inventory days of supply, given normal demand and delivery times. You will find that the safety stocks need to be significantly higher than you originally estimated to account for variation in order size and delivery times.

- [Implement a vendor-managed inventory control system](#) in which the central distributor owns and controls all the inventory – its own, as well as that of each of its distribution sites.

By implementing a vendor-managed inventory control system, the central distributor believes it can make deliveries more frequently, which means it can carry less inventory centrally. You will find that the central distributor does not need to carry that much more inventory than it does when it owned only its own inventory. Therefore, the decrease in inventory levels required due to more frequent deliveries to some extent offsets the increase in inventory levels required for each of the distribution sites.

---

**Shortcut** If you do not have time to work through the exercises in this part of the tutorial, in e-SCOR, open the file named *escor-tutorial-vmi.kb*, which shows the finished model. To view the Excel report, open the file named *Tutorial-VMI-Summary-Reports.csvxls*. Follow along in the existing model as you read through the exercises.

---

## Determining Optimal Safety Stocks

One way of determining optimal safety stocks is to configure the model for the worst case scenario, as follows:

- Configure each customer to use the maximum order size, in all cases.
- Configure the central distributor to take the maximum number of days to deliver its shipments, in all cases.

When you run the simulation, you can then experiment with larger and larger safety stocks for each of the three distribution sites until you achieve close to 100% Supplier On-Time Performance. When you set the order sizes and delivery times

back to the original minimum, mode, and maximum settings, the safety stocks should generally be sufficient to cover the worst case.

Once you have optimized safety stocks for the worst case scenario, you can then experiment with minimizing the inventory days of supply, given normal customer demand and delivery times.

## Optimizing Safety Stocks for the Worst Case Scenario

First, you will optimize safety stocks by simulating the worst case scenario.

### To optimize safety stocks for the worst case scenario:

- 1 In Excel, open the file named *Tutorial-VMI-Summary-Reports.xls* located in the *kbs* directory.

---

**Tip** Remember, you can open this report from the Start menu.

---

- 2 Configure the Demand Order Size Minimum, Mode, and Maximum to be the maximum value for each of the three Consumer roles, as follows:

Consumer	Site A	Site B	Site C
Demand Order Size Min	150	400	100
Demand Order Size Mode	150	400	100
Demand Order Size Max	150	400	100

- 3 As a starting point, increase the initial estimate for the Safety Stock for each of the three distribution sites by the amount of the maximum order size, as follows:

Sites	A	B	C
Safety Stock	900 (750 + 150)	2000 (1600 + 400)	800 (700 + 100)

- 4 Configure the Transportation Duration Min to be the same as the Delivery Time Max, as follows:

### Distributor

Transportation Duration Mini	9
Transportation Duration Max	9

- 5 Run the simulation until it stops.

Is the increase in safety stock enough to compensate for the worst case scenario in terms of order size and deliver times? No, the on-time performance is still nowhere near 100% for the three consumers.

- 6 Continue increasing the safety stocks and running the simulation until you obtain a 90% or greater on-time performance for each of the three consumers.

For example, you might experiment with the following sets of values for safety stock for the three distribution sites and the central distributor until you obtain close to 100% on-time performance:

	<b>Site A</b>	<b>Site B</b>	<b>Site C</b>	<b>Central Distributor</b>
Safety Stock	(900)	(2000)	(800)	(8400)
	1800	4000	1200	8600
	2000	5000	1400	8800
	2200	6000	1600	9000
	2200	6500	1600	9000

You should achieve approximately 90% or greater on-time performance for all three consumers with safety stocks approximately equal to those listed in the last row of the table above. At the same time, the inventory days of supply for each of the three distributors should be relatively low.

- 7 Set the Transportation Duration Min back to its original value, which is 6 days.
- 8 Set the Demand Order Size Min, Mode, and Max to their original values, as follows:

<b>Consumer</b>	<b>A</b>	<b>B</b>	<b>C</b>
Demand Order Size Min	50	100	100
Demand Order Size Mode	100	200	100
Demand Order Size Max	150	400	100

- 9 Run the simulation again to determine inventory days of supply, given normal order sizes and delivery times.

The sites should each have 100% on-time performance and the inventory days of supply should be somewhat higher than in the worst case scenario.

## Minimizing Inventory Days of Supply

Now, let's see if you can minimize inventory carrying costs by reducing the inventory days of supply, while still maintaining 100% on-time performance.

### To minimize inventory days of supply:

- ➔ Experiment with reducing the safety stocks for each of the three sites and the central distributor, while still maintaining 100% on-time performance, with the goal of minimizing the inventory days of supply as much as possible.

Once you think you have settled on safety stock values, run the simulation again with the same numbers to verify that on-time performance remains at 100%. If the on-time performance becomes less than 100%, increase the safety stock again.

For example, you might experiment with the following sets of values for safety stock for the three distribution sites and the central distributor:

	Site A	Site B	Site C	Central Distributor
Safety Stock	(2200)	(6500)	(1600)	(9000)
	2100	5000	1400	8500
	2000	4000	1500	8400
	2100	4200	1600	8300
	2100	4500	1600	8400

---

**Note** The numbers you try might be different because of variation in order size and delivery times.

---

In the end, you should achieve approximately 100% on-time performance and inventory days of supply equal to approximately 10 or below for each of the three sites.

As you have demonstrated, to guarantee 100% on-time performance, you must set the safety stocks to significantly higher values than originally estimated. The reason is that each distribution site must build up enough initial inventory so it does not run out before it receives its first shipment. Therefore, the optimal safety stock is a function of these factors:

- Variation in order size.
- Variation in order frequency.

- Variation in delivery time.
- Initial shipment delay time.

## Implementing a Vendor-Managed Inventory Control System

As the case study's [business problem](#) presented, the central distributor believes it can reduce delivery time by half by implementing a vendor-managed inventory control system. The question you need to answer is: what effect will this have on overall assets for the central distributor?

To simulate a vendor-managed inventory control system, configure the delivery times to be half what they currently are, then experiment with lower safety stocks until you obtain 100% on-time performance with minimum inventory days of supply. In a vendor-managed inventory control system, the days of supply is the sum of the days of supply for each of the three distribution sites, plus the days of supply for the central distributor.

**To implement a vendor-managed inventory control system:**

- 1 Configure the delivery times, as follows:

### Distributor

Transportation Duration Min	3
Transportation Duration Max	5

- 2 Run the simulation, using the optimized safety stocks, as follows:

	Site A	Site B	Site C	Central Distributor
Safety Stock	2100	4500	1600	8400

- 3 Now, optimize the safety stocks until you achieve the lowest inventory days of supply while maintaining 100% on-time performance.

In a vendor-managed inventory scenario, the safety stocks should be somewhat lower for all three distribution sites and for the central distributor.

To answer the question about the effect a vendor-managed inventory control system has on assets, compare the sum of the total inventory costs for all three distribution sites and the central distributor in the optimized scenario with the

same sum in the vendor-managed inventory scenario. For example, in two sample simulations, the results might be as follows:

<b>Role</b>	<b>Optimized Scenario</b>	<b>Vendor-Managed Inventory Scenario</b>
Site A	\$11.9	\$5.6
Site B	\$21.2	\$8.1
Site C	\$7.3	\$6.2
Central Distributor	<b>\$29.8</b>	\$6.5
<b>Total</b>	\$70.2	<b>\$26.4</b>

As you can see, Sites A and B have significantly lower inventory carrying costs, and Site C has somewhat lower same carrying costs. This decrease is due to the fact that the Central Distributor is now carrying the inventory for the distribution sites. Site C has more or less the same carrying costs because the end consumer has no variation in demand, so it must carry the same amount of inventory.

The central distributor also has a lower inventory carrying cost in the vendor-managed inventory scenario than in the optimized scenario. To determine this difference, compare the central distributor's carrying costs in the optimized scenario (\$29.8) with the sum of the carrying costs of the central distributor plus each distribution site in the vendor-managed inventory scenario (\$26.4). As you can see, the central distributor's carrying costs are approximately the same for the vendor-managed inventory scenario as they are for the optimized scenario. Furthermore, in the vendor-managed inventory scenario, the overall inventory carrying costs in the vendor-managed inventory scenario (\$26.4) are less than half of what they are in the optimized scenario (\$70.1).

The decreased carrying costs are due to the fact that delivery times are shorter and order frequency is greater, which means the central distributor can carry less inventory. Overall, the vendor-managed inventory system is a much more cost-effective inventory control system.

## Saving the Model

Save the model to your project name.

For details, see [Saving a Model](#).

# Summary: Optimizing the Central Distributor Model

To optimize the central distributor model, you:

- [Determined optimal safety stocks](#) for each distribution site by:
  - [Optimizing safety stocks for the worst case scenario](#), which involves setting order size and delivery times to their maximum values in all cases, then increasing safety stocks to obtain at least a 90% on-time performance.
  - [Minimizing inventory days of supply](#), which involves setting order size and delivery times back to their original levels, then reducing safety stocks to minimize inventory days of supply while maintaining 100% on-time performance.
- [Implemented a vendor-managed inventory control system](#) by reducing delivery times and corresponding safety stocks, then comparing the total inventory days of supply for the central distributor and the three distribution sites with that of the optimized simulation where each site owns its own inventory.

This table provides a summary of the parameters you configure for each scenario described in these tutorials for the VMI model:

Parameters	Estimate	Worst Case	Optimized	Vendor-Managed Inventory
Safety Stock				
Site A	750	2200	2100	1500
Site B	1600	6500	4500	3500
Site C	700	1600	1600	1400
Central Distributor	8400	9000	8400	6300
Transportation Duration (Central Distributor)				
Min	7	9	7	3
Max	9	9	9	5

Parameters	Estimate	Worst Case	Optimized	Vendor-Managed Inventory
Planning Period (Sites and Central Distributor)				
Min	7	7	7	4
Max	7	7	7	4

You should now understand some of the strategies you can use to improve on-time performance and minimize carrying costs. You should also understand the impact on carrying costs of implementing a vendor-managed inventory control system. Finally, you should be able to make key business decisions, based on opportunity costs associated with providing different service levels for different customers in the supply chain.

**Congratulations!** You have finished the e-SCOR tutorials.



**A**

ACME model

- assigning products to roles
- configuring
  - category parameters for Level 2 SCOR for model environment for potential suppliers
  - product composite parameters for product hierarchy for resources for roles for supply chain for
- creating
  - input reports for
  - output reports for
- running the simulation for
  - increased demand
  - introduction to normal demand
- summary
  - configuring Level 1 roles for
  - configuring Level 2 SCOR
  - running the simulation for

Align or Distribute menu choice

Asset Metrics toolbar

Asset Turns metric

assigning products to roles

- ACME model
  - central distributor model
  - simplest model

attributes, configuring for reports

audience

Awaiting Orders metric

**B**

Base Manufacturer roles

- configuring
  - Deliver category parameters for
  - Make category parameters for
  - Plan category parameters for

- creating supply chains, using description of
- viewing
  - delivery product metrics for details for

batch files

Bill of Materials (BOM)

boundary conditions

- Consumer role

build orders

- configuring selection criteria for definition of

Build Orders Completed metric

Build Orders Started metric

Build Selection parameters

- Make category

Built Time Dependent on Order Size parameter

**C**

case study, central distributor model

Cash Flow Period metric

Cash-to-Cash Cycle Time metric

categories, *See* individual category listings

Category Input Report

Category Output Report

central distributor model

- case study
  - business problem
  - input parameters
  - introduction to
  - output metrics
  - supply chain
- configuring
  - Level 2 SCOR for
  - Level 2 SCOR parameters
  - supply chain for
- creating
  - input reports for
  - output reports for
- determining optimal replenishment levels for

- diagram of key inputs and outputs
- estimating initial replenishment levels
- implementing a vendor-managed inventory control system for
- mapping inputs and outputs
  - for Consumer roles
  - for Distributor roles
- mapping inputs for Base Manufacturer role
- minimizing inventory days of supply for
- optimizing
- optimizing replenishment levels for the worst case scenario
- running the simulation for
- summary
  - case study
  - optimizing
  - running the simulation for
- Change Orders Received metric
  - Deliver category
  - ED category
- Change Orders Sent metric
- Compensate for Yield parameter
- components
  - See Also* product composites and product specifications
  - adding to product specifications
- configuring
  - Deliver category parameters
  - delivery product parameters
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  - model environment
  - Plan category parameters
  - potential suppliers
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  - product hierarchies
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  - roles
  - Source category parameters
  - source product parameters
  - supply chain
    - for ACME model
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- connecting roles
- Consumer roles
  - configuring
    - Source category parameters for
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  - input reports
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  - models
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  - scenarios
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- Customer Invoicing Metric
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## D

- D1: Deliver Stocked Product categories
  - See Also* Deliver categories
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- D2: Deliver Make-to-Order Product categories
- D3: Deliver Engineer-to-Order Product categories
  - categories
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- Days Sales Outstanding metric
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  - configuring parameters for
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  - See Also* finished products
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- Delivery Products parameter
- Delivery tab, product composites
- Demand Order Duration parameter
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- Demand tab, product composites
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- detail
  - showing
    - for product structure organizers
    - for roles
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  - description of

## E

- ED: Enable Deliver categories
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- Enable Macros button
- End category, Consumer role
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- ES: Enable Source categories
  - description of
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- ESCOR\_SERVER* environment variable
- e-SCOR-Summary-Report.xls*
- escor-tutorial-acme.kb* file
- escor-tutorial-simplest.kb* file
- escor-tutorial-vmi.kb* file
- ETO, *See* engineer-to-order
- Excel
  - connecting to the server from
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## F

- files

- escor-tutorial-acme.kb*
- escor-tutorial-simplest.kb*
- escor-tutorial-vmi.kb*

- Fill Rates (%) metric
- Financial Bookings metric
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  - roles
- Financial Collections Total metric
  - Deliver category
  - roles
- Financial Collections within Financial Period metric
  - Deliver category
  - roles
- Financial Metrics toolbar
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  - roles
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  - roles
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- Financial Payment Terms parameter
- Financial Payments Total metric
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  - roles
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- Finished Goods Days of Supply metric
- finished products
  - See* delivery products
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- formatting reports
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## G

- General tab, product composites
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**I**

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   coordinating planning, using  
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   vendor-managed  
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   minimizing for central distributor model  
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**K**

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**L**

Level 1 roles, *See* roles  
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**M**

M1: Make to Stock categories  
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   delivering products, using  
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   description of  
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 Mb: Make Base Manufacturer categories  
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     for ED: Enable Deliver categories  
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   *See Also* simulations  
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**N**

Net Selling Price parameter  
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**O**

optimizing
 

- central distributor model
- replenishment levels
  - for worst case scenario
  - introduction to
  - minimizing inventory days of supply

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 Order Entry to Manufacturing Time metric  
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- Deliver category

 Order Type parameter
 

- product composites
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- build
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 Orders Received metric
 

- Deliver category
- ED category

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- creating
  - for ACME model
  - for central distributor model
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- generating
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**P**

P3: Plan Make categories
 

- configuring parameters for
- description of
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 Packing cost parameter  
 Packing Duration parameter  
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- configuring
  - for Deliver categories
  - for delivery products
  - for Make categories
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  - for source products
  - time-based, in reports
- configuring through input reports
  - for ACME model
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 Pause menu choice  
 Perfect Order Fulfillment (%) metric  
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- configuring parameters for
- viewing metrics for

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  - Plan category parameters for
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  - delivering products, using
  - making products, using
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- make
- make-to-order
  - delivering products, using
  - making products, using
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  - for Plan categories
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- source

- stock
  - delivering products, using
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  - pull
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- Planning Period parameter
- pools
- Potential Supplier Names parameter
- potential suppliers
  - configuring
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- product composites
  - See Also* delivery and source products
- product hierarchy
  - configuring
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- Product Preference parameter
- Product Shipments Lead Time metric
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- Product Specification
- Product Specification Input Report
- product specifications
  - adding components to
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  - configuring
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- Product Structure Organizer
- Production Material Duration parameter
- Production Material Handling cost
- Products menu choice
  - configuring potential suppliers, using
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- pull planning mode
- Purchase Cost metric
- Purchase Cost parameter
- push planning mode
- Pushed Inventory Level metric
  - delivery products

## Q

- Quantity Ordered metric
- Quantity Received metric
- Quantity Shipped metric
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## R

- Raw Materials Days of Supply metric
- Ready to Ship Time metric
- Received Fulfillment Time metric
- Received Inventory Level metric
  - delivery products
- Receiving cost parameter
- Receiving Duration parameter
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  - determining optimal
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- replenishment orders
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  - See Also* input and output reports
  - configuring attributes to appear in
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- Resource Input Report
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- resources
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- Return tab, product composites
- Role Input Report
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    - products to
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    - for ACME model
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- for simplest model
- parameters for
- connecting
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- viewing metrics for
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## S

- S1: Source Stocked Product categories
- S2: Source Make-to-Order Product categories
- S3: Source Engineer-to-Order Product categories
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- Save menu choice
- saving models
- Scenario object
- scenarios, creating
- SCOR modeling
- Shipped Inventory Level metric
- Show Detail menu choice
  - product structures
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- Show Products menu choice
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  - summary
    - configuring Level 2 SCOR
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- Level 2
  - roles
- simulations
  - configuring to run for a fixed duration
  - running
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  - troubleshooting problems running
- Sort Criteria, First parameter
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- Sort Direction, First parameter
  - Deliver category
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- Source categories
  - configuring parameters for
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- source planning
  - configuring
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    - source product parameters for
  - definition of
  - determining replenishment orders, using
- source products
  - configuring parameters for
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- Source Products parameter
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- Start All menu choice
- starting e-SCOR, with a particular model open
- Starting Product Inventory Level parameter
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  - delivering products, using
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    - configuring Level 2 SCOR
    - running the simulation for
  - central distributor model
  - case study
  - optimizing
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- creating supply chain
- running the simulation for
- Supplier On-Time Performance (%) metric
- Supplier Selection tab, product composites
- Supplier tab, product composites
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## T

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- Total Products Rejected metric
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- Transfer Duration parameter
- Transfer Metric
- Transportation cost parameter
- Transportation Duration parameter
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    - configuring Level 1 roles
    - configuring Level 2 SCOR
    - running the simulation
  - central distributor model
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    - optimizing
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    - configuring
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## U

- Update button
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- Usage Quantity parameter
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## V

- vendor-managed inventory control system,
  - implementing
- Verification cost parameter
- Verification Duration parameter
- Verification Metric
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    - for Consumer roles
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    - for Deliver category
    - for delivery products
    - for ED: Enable Deliver category
    - for ES: Enable Source category
    - for Make category
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    - for Source category
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## W

- Work in Progress Days of Supply metric