SOLUTIONS

Supply Chain & Logistics an overview

Thomas Jensen
Microsoft Corporation
Supply Chain & Logistics: an overview

Learning points

• Learn the basic definitions and terms
• Get to know the basic supply chain elements and an example of the dynamics in the supply chain
• Understand the concept of modelling supply chain based on reference models as SCOR / VCOR including classification of processes and related metrics / key performance indicators
• Introduction to the idea of reference models as basis for benchmarking and continuously improvements
Supply Chain & Logistics an overview

Agenda

• An introduction to Definitions and Terms in Supply Chain
• Supply Chain Operation Reference Model (SCOR)
• Exercise – Design supply chain for a product
Supply Chain & Logistics an overview

Agenda: Definitions and Terms

• Supply Chain & Logistics to win the battle…

• Basic Terms are
  – Products, Goods, SKU, Bill of Material, Routes, Distribution center, Work Center etc.
  – Key Performance Indicators as Delivery Performance, product cost, etc.
  – Strategies as push, pull, flow, lean, etc
  – Execution processes as Deliver, Source, Make and Return – collaboration needed
  – Planning processes as Sales & Operations Planning, Demand Planing, Supply Chain Planning, Transport and Packaging Planning, Production Scheduling, Man Power Planning, etc. – Balancing demand and resources
  – More on definitions

More on definitions

Supply Chain & Logistics an overview

Agenda: Definitions and Terms – the chains

DEMAND CHAIN

C-Commerce  E-Business  SRM  CRM

Push - Pull strategier

Raw material Supplier
Component Supplier
Manufact
D.C
Retailer
Consumer

Elektronic integrated logistics

SUPPLY CHAIN

Microsoft Dynamics
Supply Chain & Logistics: An overview

Agenda: Definitions and Terms – a classification and metrics

<table>
<thead>
<tr>
<th>Performance Attribute</th>
<th>Customer-Facing</th>
<th>Internal-Facing</th>
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<tbody>
<tr>
<td>Delivery performance</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Fill Rate</td>
<td>✓</td>
<td></td>
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<tr>
<td>Perfect order fulfillment</td>
<td>✓</td>
<td></td>
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<tr>
<td>Order fulfillment lead time</td>
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<td></td>
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<tr>
<td>Supply-chain response time</td>
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<td>✓</td>
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</table>
Supply Chain & Logistics an overview
Agenda: Supply Chain Operation Reference Model (SCOR)
Supply Chain & Logistics: An Overview

Agenda: Supply Chain Operation Reference Model (SCOR)

Plan

- P1 Plan Supply Chain
- P2 Plan Source
- P3 Plan Make
- P4 Plan Deliver
- P5 Plan Returns

Business Planning

Sales and Operations Planning

- Demand Management
- Master Production Scheduling
- Final Assembly Scheduling
- Material Requirements Planning
- Rough-Cut Capacity Planning
- Capacity Requirements Planning

Parent of future supply chain activities

Initial sales tool for raising capital

Microsoft Dynamics
Supply Chain & Logistics an overview

Agenda: Supply Chain Operation Reference Model (SCOR)

Supply Chain Operation Model process at level 3 - Example of level 2 "Source MTS"
Supply Chain & Logistics: an overview
Agenda: Supply Chain Operation Reference Model (SCOR)

Supply Chain Operation Model process at level 3 - Example of level 2 "Deliver MTS"

- D1.1 Process Inquiry & Quote
- D1.2 Receive, Enter & Validate Order
- D1.3 Reserve Inventory and Determine Delivery Date
- D1.4 Consolidate Orders
- D1.5 Plan and Build Loads
- D1.6 Route Shipments
- D1.7 Select Carriers and Rate Shipments
- D1.8 Receive Product
- D1.9 Pick Product
- D1.10 Load Vehicle, Generate Ship Docs & Ship
- D1.11 Install Product
- D1.12 Invoice & Receive Payment

- Scheduled Deliveries (P)
- (S) (M) (D) Inventory
- (M) Scheduled Output
- (S) (M) Scheduled Receipts
- (Customer) Inquiry
- (Customer) Customer Order
- (Customer) Deliver Contract Terms
- (Customer) Customer Replenish Signal
- (S) (M) (D) Consolidated Schedule
- (D) Advanced Ship Notice
- (D) Inventory
- (D) Consolidated Product
- (D) Inventory
- (D) Scheduled Receipts
- (P) Supply Plans
- (P) Production Plans
- (P) Delivery Plans
- (S) (M) (D) Inventory
- (M) Scheduled Output
- (P2) Supply Plans
- (P3) Production Plans
- (P4) Delivery Plans
- (S) (M) (D) Inventory
- (M) Scheduled Output

- Routing Guide
- Rated Carrier Data
- Scheduled Deliveries (P)
- (P2) Supply Plans
- (P3) Production Plans
- (P4) Delivery Plans
- (S) (M) (D) Inventory
- (M) Scheduled Output
- (Customer) Payment
- (Customer) Customer Order
- (Customer) Deliver Contract Terms
- (Customer) Customer Replenish Signal
- (S) (M) Scheduled Receipts
- (Customer) Inquiry
- Validated Order
- Delivery Commit Date
- Ship Docs & Ship
- Daily Shipment Volume
- (Customer) Customer Replenish Signal
- Payment
Supply Chain & Logistics an overview
Agenda: Supply Chain Operation Reference Model (SCOR)

Supply Chain Operation Model process at level 3 - Example of integration
Supply Chain Operation Model and Process Elements with Metrics

**Process Element: Schedule Product Deliveries**

**Process Element Definition**
Scheduling and managing the execution of the individual deliveries of product against an existing contract or purchase order. The requirements for product releases are determined based on the detailed sourcing plan or other types of product pull signals.

**Performance Attributes**

<table>
<thead>
<tr>
<th>Metric</th>
<th>Reliability</th>
<th>Responsiveness</th>
<th>Flexibility</th>
<th>Cost</th>
<th>Assets</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% Schedules Generated within Supplier’s Lead Time</td>
<td>Average Release Cycle of Changes</td>
<td>Average Days per Schedule Change</td>
<td>Product Management and Planning Costs as a % of Product Acquisitions Costs</td>
<td>None Identified</td>
</tr>
</tbody>
</table>

**Best Practices**

- Utilize EDI transactions to reduce cycle time and costs
- EDI interface for 830, 850, 856 & 862 transactions
- VMI agreements allow suppliers to manage (replenish) inventory
- Supplier managed inventories with scheduling interfaces to external supplier systems
- Mechanical (Kanban) pull signals are used to notify suppliers of the need to deliver product
- Electronic Kanban support
- Consignment agreements are used to reduce assets and cycle time while increasing the availability of critical items
- Consignment inventory management
- Advanced ship notices allow for tight synchronization between SOURCE and MAKE processes
- Blanket order support with scheduling interfaces to external supplier systems

**Inputs**

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Plan</th>
<th>Source</th>
<th>Make</th>
<th>Deliver</th>
<th>Return</th>
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<tr>
<td>Sourcing Plans</td>
<td>P2.4</td>
<td>ES.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Source Execution Data</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Logistics Selection</td>
<td></td>
<td>ES.6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production Schedule</td>
<td></td>
<td></td>
<td>M1.1, M2.1, M3.2</td>
<td></td>
<td>D1.3</td>
</tr>
<tr>
<td>Replenishment Signals</td>
<td></td>
<td></td>
<td>M1.2, M2.2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Delivery Performance

- The percentage of orders that are fulfilled on or before:
  - customer requested date
  - original scheduled or committed date

- Components
  - Total number of orders received
  - # of orders scheduled to customer’s request date
  - Total number of orders delivered
  - % of orders delivered on time (to request date)
  - # of orders delivered on-time to commit date
  - % of orders delivered on-time to customer commit date

- Calculation
  - \[ \frac{\text{number of orders delivered on time AND in full}}{\text{total orders}} \]

- P&L Impact
  - Revenue

- Balance Sheet Impact
  - Accounts Receivable

Perfect Order Fulfillment

- The Percentage of Orders Meeting Delivery Performance AND
  - with complete and accurate documentation
  - with no shipping damage

- Components
  - All items and quantities
  - On-time using customer’s definition of on-time
  - Documentation
    - Packing Slips, Bills of Lading, Invoices

- Calculation
  - \[ \frac{\text{total orders shipped on time and in full - orders with faulty documentation - orders with shipping damage}}{\text{total orders}} \]

- P&L Impact
  - Revenue

- Balance Sheet Impact
  - Accounts Receivable
SCC Supply Chain Council have worked out the Supply Chain Reference Model (SCOR):
- Reference model for Supply Chain Operation with
  - a method for an approach,
  - a classification of Supply Chain Processes and
  - definitions of related metrics

A way to improve performance
A basis for benchmarking

Supply-Chain Council Value Benchmark

<table>
<thead>
<tr>
<th>2002 Year Fortune-1000</th>
<th>SCC Members</th>
<th>Other</th>
<th>7% SCC Members</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net Profit</td>
<td>$71B</td>
<td>$131B</td>
<td>35% Profit of Fortune-1000 is SCC Members</td>
</tr>
<tr>
<td>Average Profit</td>
<td>$1B</td>
<td>$.141B</td>
<td>721% more profitable</td>
</tr>
<tr>
<td>Net Revenue</td>
<td>$1,458B</td>
<td>$6,908B</td>
<td>17% Revenue of Fortune-1000 in SCC Members</td>
</tr>
<tr>
<td>Average Revenue</td>
<td>$20B</td>
<td>$7.4B</td>
<td>280% the revenue</td>
</tr>
</tbody>
</table>

Source: SCOR Users Seminar 29/10 2003 Chicago USA
The SCC is an independent, not-for-profit, global corporation with membership open to all companies and organizations interested in applying and advancing state-of-the-art supply chain management systems and practices.

- Over 750 Company Members
- Wide range of industries (Manufacturers, Distributors, Retailers)
- Chapters in Australia/New Zealand, Europe, Japan, Korea, North America, South Africa, Brazil and Singapore with petitions for additional chapters pending.

The Supply-Chain Council (SCC) has developed and endorsed the Supply Chain Operations Reference-model (SCOR) as the cross-industry standard for supply chain management.

The SCC was organized in 1996 by Pittiglio Rabin Todd & McGrath (PRTM) and Advanced Manufacturing Research (AMR), and initially included 69 voluntary member companies.

Source: Director SCC EMEA Jo Vegheim
http://www.supply-chain.org/public/home.asp
Process reference models integrate the well-known concepts of business process reengineering, benchmarking, and process measurement into a cross-functional framework.
Supply Chain Modeling - Measuring Performance (Metrics)

- Measuring how well the supply chain performs is as essential as understanding how it operates
  - Measurements must link to business objectives
  - Measurements must be repeatable
  - Measurements must provide insights into how to manage the supply chain more effectively
  - Measurements must be appropriate for the process activity they are measuring
    - Same level

- Linking Business Strategy to Supply Chain Performance
  - Identify your business strategy in the context of your competitive environment. Sources:
    - SWOT Analysis
      - Strengths, Weaknesses, Opportunities, Threats
    - Mission Statement
    - Strategic Plan
    - Business / Product Line Plan
## Supply Chain SCORcard, Benchmarking & Gap Analysis

### Supply Chain SCORcard

<table>
<thead>
<tr>
<th>Overview Metrics</th>
<th>SCOR Level 1 Metrics</th>
<th>Actual</th>
<th>Performance Versus Competitive Population</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Parity</td>
</tr>
<tr>
<td></td>
<td>Delivery Performance to Commit Date</td>
<td>50%</td>
<td>85%</td>
</tr>
<tr>
<td></td>
<td>Fill Rates</td>
<td>63%</td>
<td>94%</td>
</tr>
<tr>
<td></td>
<td>Perfect Order Fulfillment</td>
<td>0%</td>
<td>80%</td>
</tr>
<tr>
<td></td>
<td>Order Fulfillment Lead times</td>
<td>35 days</td>
<td>7 days</td>
</tr>
<tr>
<td></td>
<td>Supply Chain Response Time</td>
<td>97 days</td>
<td>82 days</td>
</tr>
<tr>
<td></td>
<td>Production Flexibility</td>
<td>45 days</td>
<td>30 days</td>
</tr>
<tr>
<td></td>
<td>Total SCM Management Cost</td>
<td>19%</td>
<td>13%</td>
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<tr>
<td></td>
<td>Warranty Cost</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>Value Added Employee Productivity</td>
<td>NA</td>
<td>$156K</td>
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<td></td>
<td>Inventory Days of Supply</td>
<td>119 days</td>
<td>55 days</td>
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<tr>
<td></td>
<td>Cash-to-Cash Cycle Time</td>
<td>196 days</td>
<td>80 days</td>
</tr>
<tr>
<td></td>
<td>Net Asset Turns (Working Capital)</td>
<td>2.2 turns</td>
<td>8 turns</td>
</tr>
</tbody>
</table>
SCOR Contains 3 Levels of Detail

- Level 1 defines the scope and content for the Supply Chain Operations Reference-model. At "Level 1" companies make their strategic decisions on a product or product line and sets the basis of competition performance targets.
- At Level 2 a company's supply chain can be “configured-to-order”. Companies implement their operations strategy through their unique supply chain configuration.
- Level 3 decomposes the level 2 processes and consist of the more detailed Planning and Execution processes. At this level companies are doing “traditional” BPR. Companies “fine tune” their Operations Strategy at Level 3.
Supply Chain & Logistics an overview
Agenda: Supply Chain Operation Reference Model (SCOR)

Project Road Map is guided by Supply Chain Operation Model levels

1. Analyze Basis of Competition
   - Operations Strategy
     - Competitive Performance Requirements
     - Performance Metrics
     - Supply Chain Scorecard
     - Scorecard Gap Analysis
     - Project Plan

2. Configure supply chain
   - Material Flow
     - AS IS Geographic Map
     - AS IS Thread Diagram
     - Design Specifications
     - TO BE Thread Diagram
     - TO BE Geographic Map

3. Align Performance Levels, Practices, and Systems
   - Information and Work Flow
     - AS IS Level 2, 3, and 4 Maps
     - Disconnects
     - Design Specifications
     - TO BE Level 2, 3, and 4 Maps

4. Implement supply chain Processes and Systems
   - Develop, Test, and Roll Out
     - Organization
     - Technology
     - Process
     - People
Supply Chain & Logistics an overview

Agenda

- Definitions and Terms
- Supply Chain Operation Reference Model (SCOR)
- Exercise – Design supply chain for a product
Introducing PC Company - The Business Problem

Company Background
- PC Company is a $1 Billion US based company
- Designs and manufactures two products (MATURE LINE and NEW LINE) for the consumer market.
- PC Company employs 6000 people.

Strategic Objectives
- Grow Profitably as the Preferred Supplier of Customers in our Targeted Markets
- Overall revenue growth for current year targeted at 10%
- Driven by VALUE defined by customer
- Align processes to deliver this value
- Leverage our strengths to deliver value

PC Company's Critical Success Factors
- Maintain revenue contribution by increasing share of MATURE Product Line in existing markets (distributor) preserving OI return.
- Drive revenue growth by introducing NEW product Line in new market (direct to consumer) and capturing targeted share.
- Maintain image as technical leader in NEW and MATURE product lines while minimizing investments in MATURE product line manufacture.
- Add capacity through OEM supplier in MATURE Product Line

Critical Business Issues
- NEW Products introduced to new market (direct to consumer) are selling slower than anticipated while market continues to grow at forecasted rate.
- Not one NEW order has been processed without some customer complaint
- Profits are disappearing from the MATURE Products in spite of achieving unit manufacturing costs targets (unit purchase price from outsource). Sales forecast is on track.
Supply Chain & Logistics an overview

Agenda: Supply Chain Operation Reference Model (SCOR)

Supply Chain Modeling - Process Mapping

3. Select supply chain to be modeled
4. Illustrate physical locations
5. Draw Material Flows
6. Match SCOR Level 2 to Locations
7. Map Each Product Thread
8. Place Planning Activities
9. Place SC Planning Activity
Supply Chain SCORcard & Gap Analysis - Mature Product Line

### Supply Chain SCORcard

<table>
<thead>
<tr>
<th>Overview Metrics</th>
<th>SCOR Level 1 Metrics</th>
<th>Actual</th>
<th>Parity</th>
<th>Advantage</th>
<th>Superior</th>
<th>Value from Improvements</th>
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</thead>
<tbody>
<tr>
<td><strong>EXTERNAL</strong></td>
<td></td>
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<td>Supply Chain Reliability</td>
<td>Delivery Performance to Commit Date</td>
<td>86%</td>
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<tr>
<td></td>
<td>Fill Rates</td>
<td>89%</td>
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<td>Perfect Order Fulfillment</td>
<td>74%</td>
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<td>Responsiveness</td>
<td>Order Fulfillment Lead times</td>
<td>7 days</td>
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<td>Flexibility</td>
<td>Supply Chain Response Time</td>
<td>127 days</td>
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<td>Production Flexibility</td>
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<td><strong>INTERNAL</strong></td>
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<tr>
<td>Cost</td>
<td>Total SCM Management Cost</td>
<td>19%</td>
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<td>Warranty Cost</td>
<td>NA</td>
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<td></td>
<td>Value Added Employee Productivity</td>
<td>NA</td>
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<tr>
<td>Assets</td>
<td>Inventory Days of Supply</td>
<td>119 days</td>
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<tr>
<td></td>
<td>Cash-to-Cash Cycle Time</td>
<td>196 days</td>
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<td></td>
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<tr>
<td></td>
<td>Net Asset Turns (Working Capital)</td>
<td>2.2 turns</td>
<td></td>
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</tbody>
</table>

**Performance Versus Competitive Population**
Supply Chain & Logistics an overview
Agenda: Supply Chain Operation Reference Model (SCOR)

AS IS Geographic Map  MATURE Product Line
Supply Chain & Logistics an overview

Agenda: Supply Chain Operation Reference Model (SCOR)

AS IS Thread Diagram - MATURE Product Line

- European RM Supplier
- OEM Supplier
- PC Company
- PC Company Regional Warehouses
- Distributor
### Supply Chain & Logistics: An Overview

**Agenda: Supply Chain Operation Reference Model (SCOR)**

#### Competitive Performance Requirements - Mature and New Product Line

<table>
<thead>
<tr>
<th>Performance Attributes</th>
<th>Performance vs. Competition</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>MATURE</td>
</tr>
<tr>
<td>Delivery Reliability</td>
<td></td>
</tr>
<tr>
<td>Flexibility</td>
<td></td>
</tr>
<tr>
<td>Responsiveness</td>
<td></td>
</tr>
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<td>SCM Costs</td>
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<tr>
<td>SCM Asset Utilization</td>
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**Legend**

- Superior
- Advantage
- Parity
<table>
<thead>
<tr>
<th>ENABLE</th>
<th>PLAN</th>
<th>SOURCE</th>
</tr>
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<tbody>
<tr>
<td>EP.1 Manage Business Rules for Plan Processes</td>
<td>P1.1 Identify, Prioritize, and Aggregate Supply Chain Requirements</td>
<td>S1.1 Schedule Product Deliveries</td>
</tr>
<tr>
<td>ES.1 Manage Sourcing Business Rules</td>
<td>P1.2 Identify, Assess, and Aggregate Supply Chain Resources</td>
<td>S2.1 Source Make-To-Order Product</td>
</tr>
<tr>
<td>EM.1 Manage Production Rules</td>
<td>P1.3 Balance Supply Chain Resources with Supply Chain Requirements</td>
<td>S3.1 Identify Sources of Supply</td>
</tr>
<tr>
<td>ED.1 Manage Business Rules for Return Processes</td>
<td>P1.4 Establish and Communicate Supply Chain Plans</td>
<td>S1.2 Receive Product</td>
</tr>
<tr>
<td>ER.1 Manage Business Rules for Return Processes</td>
<td>P2.1 Identify, Prioritize, and Aggregate Product Requirements</td>
<td>S2.2 Receive Product</td>
</tr>
<tr>
<td>EP.2 Manage Performance of Supply Chain</td>
<td>P2.2 Identify, Assess, and Aggregate Product Resources</td>
<td>S3.2 Select Final Supplier(s) and Negotiate</td>
</tr>
<tr>
<td>ES.2 Assess Supplier Performance</td>
<td>P2.3 Balance Product Resources with Product Requirements</td>
<td>S1.3 Verify Product</td>
</tr>
<tr>
<td>EM.2 Assess Production Performance</td>
<td>P2.4 Establish and Communicate Supply Chain Plans</td>
<td>S2.3 Verify Product</td>
</tr>
<tr>
<td>ED.2 Assess Delivery Performance</td>
<td>P3.1 Identify, Prioritize, and Aggregate Delivery Requirements</td>
<td>S3.3 Schedule Product Deliveries</td>
</tr>
<tr>
<td>ER.2 Manage Performance of Return Processes</td>
<td>P3.2 Identify, Assess, and Aggregate Delivery Resources</td>
<td>S1.4 Transfer Product</td>
</tr>
<tr>
<td>EP.3 Manage Plan Data Collection</td>
<td>P3.3 Balance Delivery Resources with Delivery Requirements</td>
<td>S2.4 Transfer Product</td>
</tr>
<tr>
<td>ES.3 Maintain Source Data</td>
<td>P3.4 Establish Production Plans</td>
<td>S3.4 Receive Product</td>
</tr>
<tr>
<td>EM.3 Manage Make Information</td>
<td>P4.1 Identify, Prioritize, and Aggregate Return Requirements</td>
<td>S1.5 Authorize Supplier Payment</td>
</tr>
<tr>
<td>ED.3 Manage Delivery Information</td>
<td>P4.2 Identify, Assess, and Aggregate Return Resources</td>
<td>S2.5 Authorize Supplier Payment</td>
</tr>
<tr>
<td>ER.3 Manage Return Data Collection</td>
<td>P4.3 Balance Return Resources with Return Requirements</td>
<td>S3.5 Verify Product</td>
</tr>
<tr>
<td>EP.4 Manage Integrated Supply Chain Inventory</td>
<td>P4.4 Establish Delivery Plans</td>
<td>S1.6 Transfer Product</td>
</tr>
<tr>
<td>ES.4 Manage Product Inventory</td>
<td>P4.5 Establish and Communicate Return Plans</td>
<td>S2.6 Authorize Supplier Payment</td>
</tr>
<tr>
<td>EM.4 Manage In-Process Products (WIP)</td>
<td>P5.1 Identify, Prioritize, and Aggregate Return Requirements</td>
<td>S3.6 Transfer Product</td>
</tr>
<tr>
<td>ED.4 Manage Finished Product Inventories</td>
<td>P5.2 Identify, Assess, and Aggregate Return Resources</td>
<td>S1.7 Authorize Supplier Payment</td>
</tr>
<tr>
<td>ER.4 Manage Return Inventory</td>
<td>P5.3 Balance Return Resources with Return Requirements</td>
<td></td>
</tr>
<tr>
<td>EP.5 Manage Integrated Supply Chain</td>
<td>P5.4 Establish and Communicate Return Plans</td>
<td></td>
</tr>
<tr>
<td>ES.5 Manage Capital Assets</td>
<td>P5.5 Authorize Supplier Payment</td>
<td></td>
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### Enterprise Resource Planning Systems

#### Map Business Processes using SCOR / VCOR

**Topics** - Value Chain Operation Reference Model

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#### Value Chain Operations Reference Model™

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