

# SCOR Professional Training

Procurement and Supply Chain  
Management - MScBA

Introduction to the SCOR  
*Supply Chain Operations  
Reference Model*

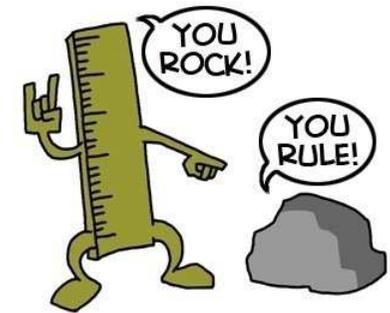
(October 2019)

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APICS SCOR Master Instructor

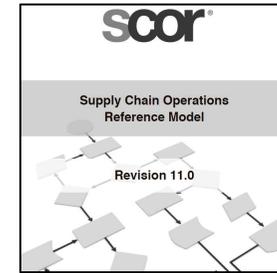


# Tell us more:

- Your name and study field & aspirations ?
- Why you are here ?
- What do you expect ?
- ?? .....
- ?? .....



# What Is SCOR?



## What is SCOR?

# What Is SCOR?



SCOR is an acronym for *supply chain operations reference* model, which was developed to assist businesses in understanding, structuring, and evaluating the performance of supply chains.

# SCOR Definition

The SCOR model describes the business activities associated with satisfying a customer's demand, which include plan, source, make, deliver, and return. Use of the model includes analyzing the current state of a company's processes and goals, quantifying operational performance, and comparing company performance to benchmark data. SCOR has developed a set of metrics and best practices information that companies can use to evaluate their supply chain performance.

*APICS Dictionary*

# APICS Vision and Mission

- **APICS Vision Statement**

APICS—the world’s leading community for end-to-end supply chain excellence.

- **APICS Mission**

Fostering the advancement of end-to-end supply chain management through a body of knowledge, innovative research, systems and methods to create value for customers, members and organizations.

# Now becoming the ASCM – Association for SCM

The image shows a screenshot of the ASCM website. At the top, a dark navigation bar contains the following items from left to right: 'Contact', 'APICS.org' (circled in red), and 'Join/Renew'. On the right side of this bar are 'Search' with a magnifying glass icon, a shopping cart icon with a '0' inside, and 'Login'. Below the navigation bar is the ASCM logo, which includes the text 'ASCM ASSOCIATION FOR SUPPLY CHAIN MANAGEMENT' and 'Built Upon APICS Global Standards'. To the right of the logo are several menu items: 'ABOUT ASCM', 'LEARNING & DEVELOPMENT', 'CORPORATE TRANSFORMATION', 'MAKING AN IMPACT', and 'MEMBERSHIP & COMMUNITY'. The main content area features a large background image of the Earth with a network of glowing lines representing supply chains. The headline reads 'Building a Better World — One Supply Chain at a Time'. Below the headline is a paragraph: 'At ASCM we believe there is unlimited potential for supply chains to shape the world in which we live. We are proud to announce the ASCM Foundation, the philanthropic channel of ASCM.' At the bottom left of this section is a green button with the text 'Read More'.

## Corporate Transformation

As the global leader in supply chain organizational transformation, innovation and leadership, ASCM is your unbiased partner, providing corporations with access to industry experts, frameworks and global standards to help transform your supply chain.

[Learn more](#) →

## Supply Chain Learning Center

Announcing the 2019 launch of the Supply Chain Learning Center, a centralized hub for supply chain education and professional development.

[Learn more](#) →

As supply chain continues to drive the success of businesses across the globe, ASCM is committed to making an end-to-end impact—on the industry, corporations and their workforce through:

### Learning and Development

In addition to our globally recognized APICS certifications, ASCM's network of global alliances and thought-leadership collaborations offers flexible learning opportunities on topics ranging from inventory management to logistics.

[Read more](#) →

### Global Network

Driving innovation through partnerships with world-renowned organizations like Bill & Melinda Gates Foundation, CIPS, Deloitte, PwC, Accenture and more.

[Read more](#) →



### Making an Impact

We believe supply chain is bigger than boxes stacked in a warehouse and containers crossing an ocean. Supply chains impact communities. As an industry leader, ASCM is dedicated to helping businesses create ethical, efficient and economical supply chains.

[Read more](#) →

## Global Alliances

### Bill & Melinda Gates Foundation

The Bill & Melinda Gates Foundation builds partnerships that bring together resources, expertise, and vision to focus on the areas of greatest need and help all people lead healthy, productive lives. ASCM has been awarded a grant by the foundation to develop and implement a sustainable operating model focused on improving public health supply chains and foster the overall advancement of end-to-end supply chain management in Africa.

[Learn more](#) →

### The Chartered Institute of Procurement and Supply (CIPS)

CIPS is the world's largest professional body serving the procurement and supply profession. CIPS will partner with ASCM to improve workforce development, organizational standards and benchmarking within procurement. CIPS and ASCM are developing a new procurement certification, which will be offered in the North American market in 2019.

### Accenture

Accenture is a global management consulting and professional services firm that provides strategy, consulting, digital, technology and operations services. Accenture will work with ASCM to provide an extensive, easy-to-access online study program that supports the APICS CPIM review process.

### Deloitte

Deloitte is the industry-leading provider of advisory and consulting services. Together, Deloitte and ASCM support the Manufacturing Institute's STEP Ahead Initiative, which showcases the impact of women in science, technology, engineering and production careers. Plus, the annual APICS Case Competition is provided in collaboration with Deloitte Consulting LLP.

### PwC

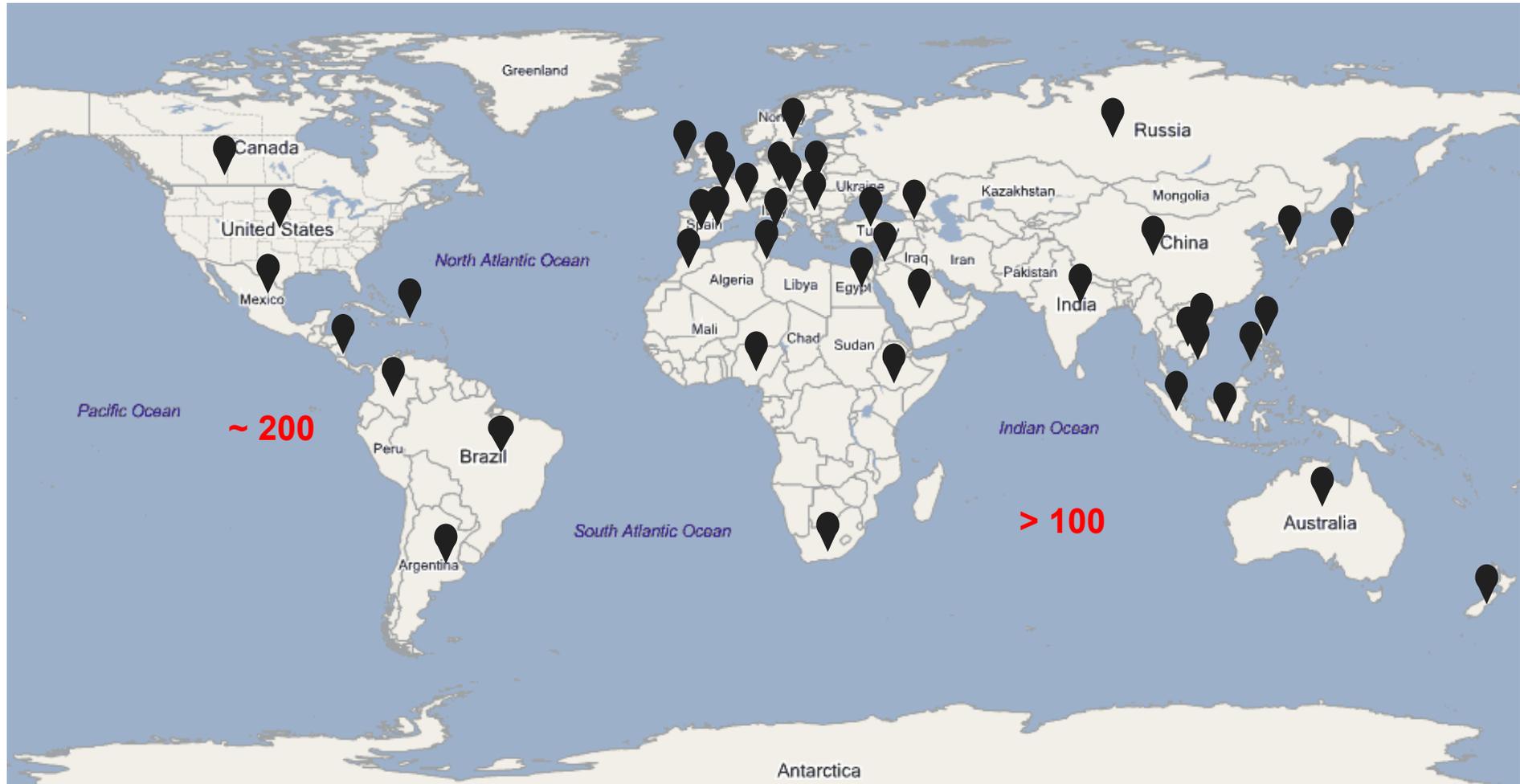
PwC's purpose is to build trust in society and solve important problems. PwC is a network of firms in 158 countries with more than 236,000 people who are committed to delivering quality in assurance, advisory and tax services. PwC is the provider of SCORMark supply chain benchmarking services for APICS members, a sponsor of ASCM research and events, and lends its expertise and point of view as part of the ASCM Digital SCOR Taskforce.

# Ranking of Association Certifications

Association/Certification	1st	2nd	3rd	Weighted Total
APICS (CPIM/CSCP)	229	76	18	857
Supply Chain Council (SCOR Professional)	56	62	76	368
ISM (CPSM/CSM/CPSD)	44	56	42	286
Project Manager Professional (PMI)	20	52	38	202
CSCMP (SCPro)	22	28	14	198
Chartered Institute of Purchasing & Supply	14	15	12	136
Chartered Institute of Logistics & Transport	12	13	19	84

Source: SCM World's 2014 ranking of Supply Chain Associations Certification based on participant's ranking of top 3 associations

# APICS Partners Footprint 300 +



# APICS Education and Credentials

<b>SUPPLY CHAIN MANAGEMENT</b>						
	Plan	Source	Make	Deliver	Return	Enable
Comprehensive	<b>CSCP</b>					
	<b>SCOR-P</b>					
Targeted	<b>CPIM</b>			<b>CLTD</b>		
	<b>PRINCIPLES</b>					
	<b>S&amp;OP</b>	<b>Lean Enterprise</b>	<b>Risk Management</b>	<b>GLA</b>		

# SCOR Users Have a Common Set of Motivations to Launch Improvement Efforts

## Top 6

1. Achieving operational excellence
2. Implementing supply chain performance improvements
3. Defining and building an effective and efficient supply chain organization
4. Improving sales and operations planning
5. Creating a supply chain strategy
6. Globalizing and managing business processes

## Other Notables

- Developing supply chain organization talent, support and competence
- Searching for ROI on capacity
- Integrating Lean, Six Sigma and SCOR to build a better project portfolio
- Building a technology investment roadmap
- Optimizing existing technology investments
- Due diligence as part of a merger or acquisition
- Integrating with the greater value chain

# SCOR players, and many more...



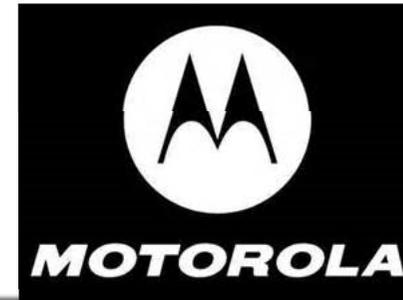
UNITED NATIONS



Johnson Controls



3M Worldwide



NOKIA  
Connecting People



USTRANSCOM United States Transportation Command



# APICS and APICS SCC Members in the Fortune 1000

3M Incorporated	Coca-Cola	JR Simplot Company	Philips
A. Schulman Inc.	Crown Equipment Corp	Kellogg Canada Inc.	PolyOne Corporation
Alticor Corporate Enterprises	Cummins	Kelly Services, Inc.	Sealed Air Corp
ARRIS	Curtiss-Wright Controls Engineered Systems	Kohler Co.	Sonoco Products Company
Avnet, Inc.	Donaldson Company Incorporated	Kraft Foods Incorporated	St Jude Medical
BASF Corporation	Dow Chemical Company	L-3 Cincinnati Electronics	Stanley Black & Decker
Baxter BioScience	Edwards Lifesciences	Lockheed Martin Corporation	Teledyne ODI, Inc.
Becton Dickinson Vacutainer	Emerson Electric Co.	McCormick & Company	Tenneco Inc.
Biomet3i	FMC Technologies	McGraw-Hill Education	Thermo Fisher Scientific
Boeing Company	General Dynamics	Medline Industries	United Technologies
Booz Allen Hamilton	General Mills	Merck & Co	Valmont Industries
Bristol Myers Squibb	Harris Corporation	Microsoft	Verizon Communications
Brocade Communication	Hershey Company	Mondelez International	VWR International, LLC
Brunswick Boat Group	Hospira, Inc.	Moog Inc.	Whirlpool Corporation
C.H. Robinson	Hubbell Incorporated	Nortek	Wilbur-Ellis Company
Cabot Corporation	IDEXX Laboratories	Northrop Grumman Corporation	WL Gore and Assoc.
Cameron International	Intel Corporation	Owens Illinois Inc.	Woodward Inc.
Carlisle Companies	Joy Global Inc. HQ	Parker Hannifin	
Caterpillar, Inc.		Penske Logistics LLC	
Celanese - Ticona		PepsiCo	

# APICS SCC Academic Institutions

American University in Cairo	The Wescoe School of Muhlenberg College	University of Northampton	USC Marshall School of Business
Bellevue University	Tilburg University	University of Pittsburgh	Wisconsin School of Business
Bloomsburg University	Universidad Autonoma de Occidente	University of Pretoria	Maine Maritime Academy
Duquesne University	Universidad De La Salle Bajío AC	University of Scranton	NED University of Engineering & Technology
Georgia Southern University	Universidad del Pacifico	University of South Dakota	School of HRM
Goizueta Business School, Emory University	Universitat Hohenheim	University of Stellenbosch	Kuehne Logistics University
Humber College	Universitat Politècnica de València	University of Strathclyde	Wageningen University and Research Centre
Jonkoping University	Université catholique de Louvain	University of Sydney	ZHAW-Zurich University of Applied Sciences
Metropolitan State University	Université d'Artois - Sepia FSA	University of Vienna	Hochschule Ruhr West - University of Applied Sciences
Miami University	University of Alberta	Wayne State Business School	Hogeschool Rotterdam - IBB
Michigan State University	University of Applied Science Central-Switzerland	Western Illinois University Quad Cities	Istanbul Technical University
North Dakota State University	University of Auckland Business School	Wright State University	King Abdullah University of Science & Technology
Penn State University	University of Bamberg, Chair of Supply Chain Management	Yeditepe University	L'Université du Québec École de technologie supérieure
PHL University College	University of Cambridge	Fontbonne University	Nanyang Technological University
San Jose State University	University of Houston	Al Faisal University	Sirindhorn International Institute of Technology (SIIT), Thammasat University
SCM Executive Education Institute	University of Johannesburg	Deusto Business School	Suranaree University of Technology
Southern University	University of Maribor, Faculty of Logistics	IPAG BUSINESS SCHOOL	<b>Tor Vergata University</b>
St. Louis University	University of Michigan	KEDGE Business School	
Texas Christian University	University of Muenster	Rutgers Business School	
The Ohio State University		Skema Business School	
The University of Texas at Dallas		The Citadel School of Business Administration	

# Learning Objectives



1. Explore the origins and goals of the *SCOR Reference Model* framework.
  2. Understand the structure of the *SCOR Reference Model* framework sourcebooks.
  3. Work with the four central parts of the SCOR framework: **performance**, **processes**, **practices**, **people**, and Sustainable SCOR.
- Develop a SCOR improvement program.
  - Understand the five phases of a typical SCOR improvement program.
  - Apply the SCOR framework to a improvement project.

## End of the course you will have:

- learnt the SCOR framework and its application in the industrial sector (as well as services sector)
- developed **your own case study** together with your team and the extended Participants Group
- Will receive a **Certificate of Completion** from APICS and Tor Vergata University, which will provide credits to your Academic curriculum and qualify you as SCOR proficient.



ICS Confidential and Proprietary



APICS

# Agenda of the lessons

- Lesson 1 APICS; SCOR Intro, SCOR Framework
- Lesson 2 SCOR Framework
- Lesson 3 Framework review + SCOR Improvement Program
- Lesson 4 SCOR Improvement Program – cont.ed
  
- Homework: Teams work together on a case study
  
- Lesson 5 Case Study presentation

## Instructor agreement:

- SCOR framework theory and SCM implications will be taught and addressed by your Instructor together with a case study

## Student agreement:



- Attend the classes and actively participate to the content sharing among students
- Participate in the assigned groups in order to develop your own case study
- Ask any question either during the class and/or through the relevant team Platform available from Tor Vergata MScBA (IaD).

## At your support:

- **SCOR SOURCEBOOKS PDF**
- **QRG – QUICK REFERENCE GUIDE**
- **SMARTPHONE APP – (Android and IOS)**
- **COURSE SLIDES (electronic version)**
  
- **YOUR PC TO FOLLOW THE LESSONS**
- **APICS website access as affiliates and members**  
( [www.apics.org](http://www.apics.org) )

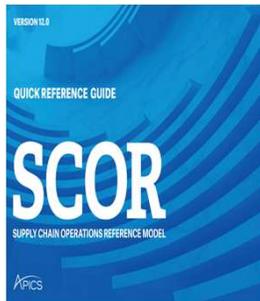
- **Paper and Pencil !**



# SCOR Reference Sources



Complete *Supply Chain Operations Reference (SCOR) Model*



A digital Quick Reference Guide providing a detailed summary of SCOR *Processes, Metrics, Practices, and People*



An easy to access and use app for mobile devices available through iTunes, App Store, and Google Play– Search: **APICS SCOR**



## Non disclosure agreement

*The Courseware material, slides and case studies are an adaptation of the relevant sources extracted by APICS and APICS SCC repositories, with the purpose and intent to make the concepts and applications closer to the Participants' audience needs and expectations.*



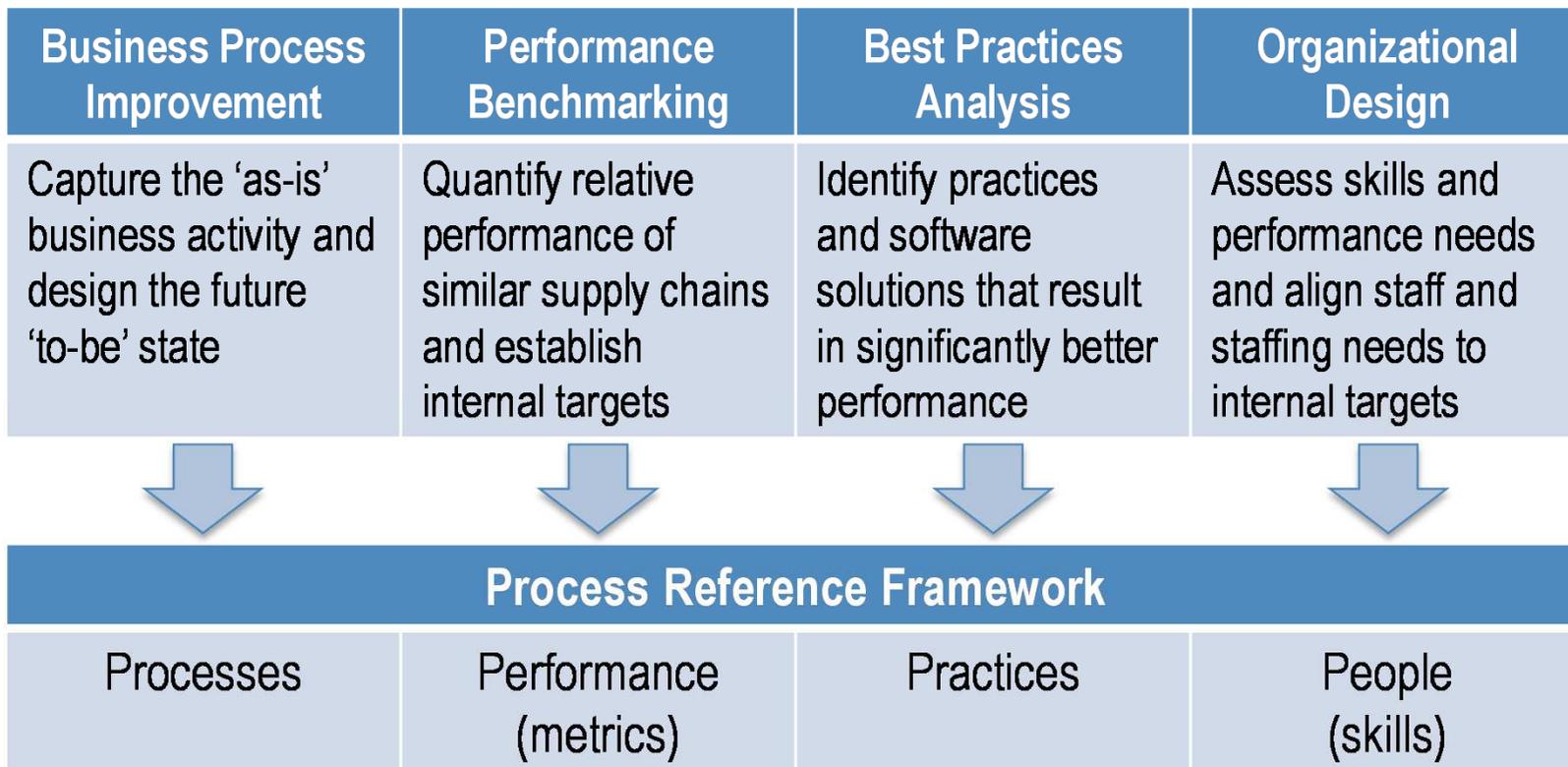
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# SCOR Framework

## Introduction to the SCOR Framework

# About SCOR: A Process Framework

Combining four techniques into a single integrate approach



# SCOR Framework

## Using the SCOR Reference Model

# Structure of the SCOR Reference Model

The SCOR reference model consists of five sections:

## Performance

Standard metrics to describe process performance and define strategic goals

## Processes

Standard descriptions of management processes and process relationships

## Practices

Management practices that produce significant better process performance

## People

Standard definitions for skills required to perform supply chain processes

## Special Applications

SustainableSCOR includes standard definitions for sustainable business models and environmental accounting



# SCOR Codification

- Each of the SCOR model sections has its own codification nomenclature.
- SCOR **Performance and Processes** have a hierarchy of SCOR activities.
- SCOR **Practices** are determined by three separate practices: emerging, best, and standard. Each practice contains a set of relevant practice activities.
- SCOR **People** are determined by a single-level list of skills and processing activities.
- **SustainableSCOR** is determined by a single-level list of skills and processing activities.
- Most of the SCOR activities are crossed referenced across the four major SCOR sections.

# Reading SCOR Tables

ID

SS1.1

Schedule Product Deliveries

name

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.

metrics

Metrics	
RL.3.27	% (3σ) Schedules Changed within Supplier's Lead Time
RS.3.9	Average Days per Engineering Change
RS.3.10	Average Days per Schedule Change
RS.3.11	Average Release Cycle of Changes
RS.3.122	Schedule Product Deliveries Cycle Time

practices

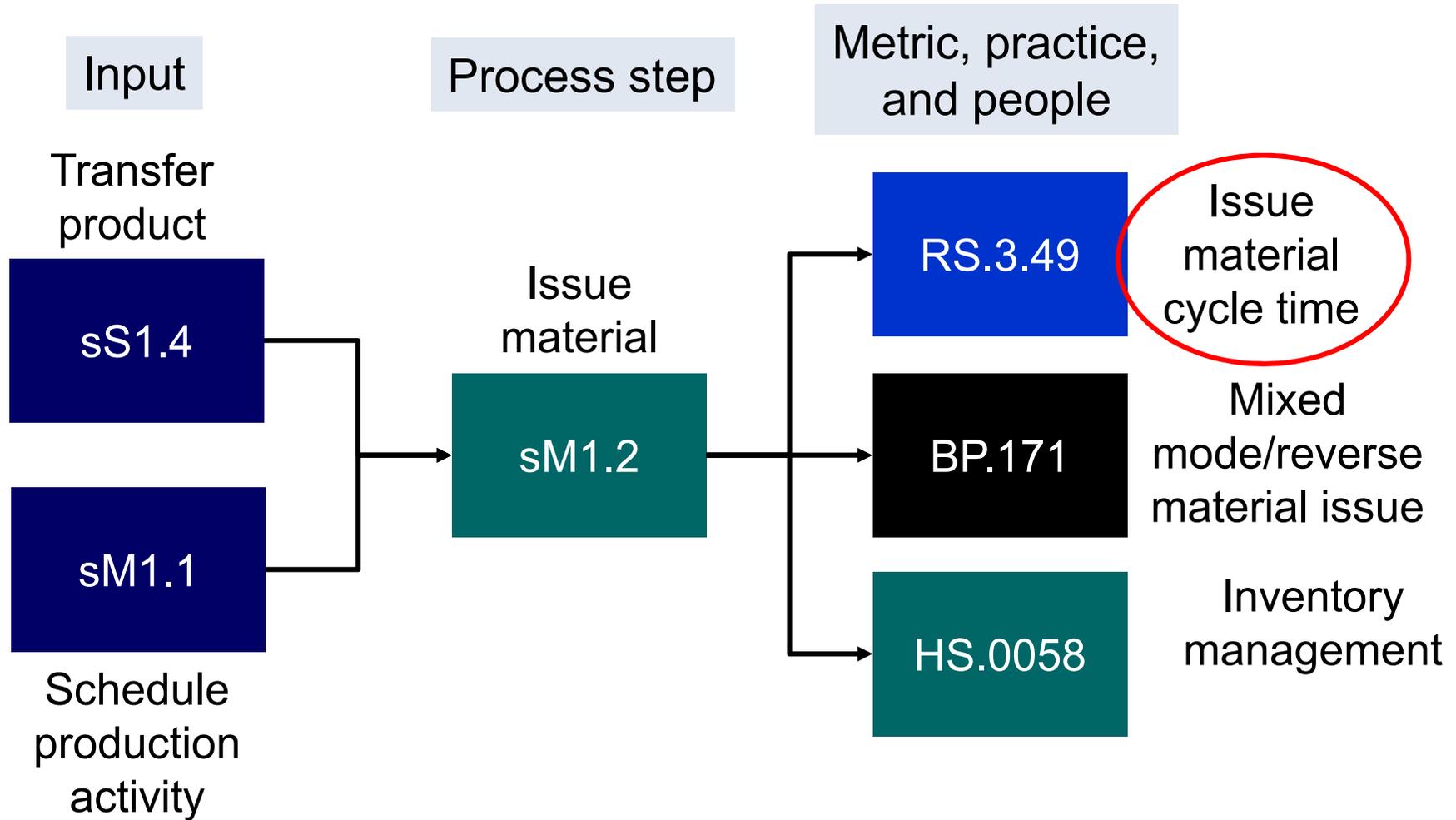
Practices	
BP.009	Kanban
BP.010	Min-Max Replenishment
BP.041	Transportation Optimization
BP.043	Consignment Inventory Reduction
BP.122	Vendor Managed Inventory (VMI)
BP.139	Vendor Managed Inventory (VMI)
BP.144	Purchase Order Management
BP.145	Vendor Collaboration

skills

People	
HS.0012	Benchmarking
HS.0035	Delivery Balancing
HS.0048	Forecasting
HS.0069	Logistics Management
HS.0074	Master Scheduling
HS.0080	MSDS/CoC/BoL/Environmental Interpretation
HS.0083	Order Management
HS.0083	Prioritization
HS.0094	Procurement
HS.0103	Production Scheduling
HS.0135	Solicitation/Competitive Bidding Process
HS.0139	Supplier Relationship Management (SRM)



# SCOR Graphics Example



**PROCESS ELEMENT →**

**sM1.2**

**Issue Material**

The selection and physical movement of sourced/in-process product (e.g., raw materials, fabricated components, subassemblies, required ingredients, intermediate formulations (available code or services) from a stocking or resource location (e.g., stockroom, a location on the production floor, a supplier, data storage or resource pool, to a specific point of use location. Issuing product or resource includes the corresponding system transaction. The Bill of Materials / Bill of Service and routing information or recipe/production instructions will determine the products to be issued to support the production operation(s).

**METRICS →**

Metrics	
RS.3.49	Issue Material Cycle Time
AM.3.19	Packaging as % of total material

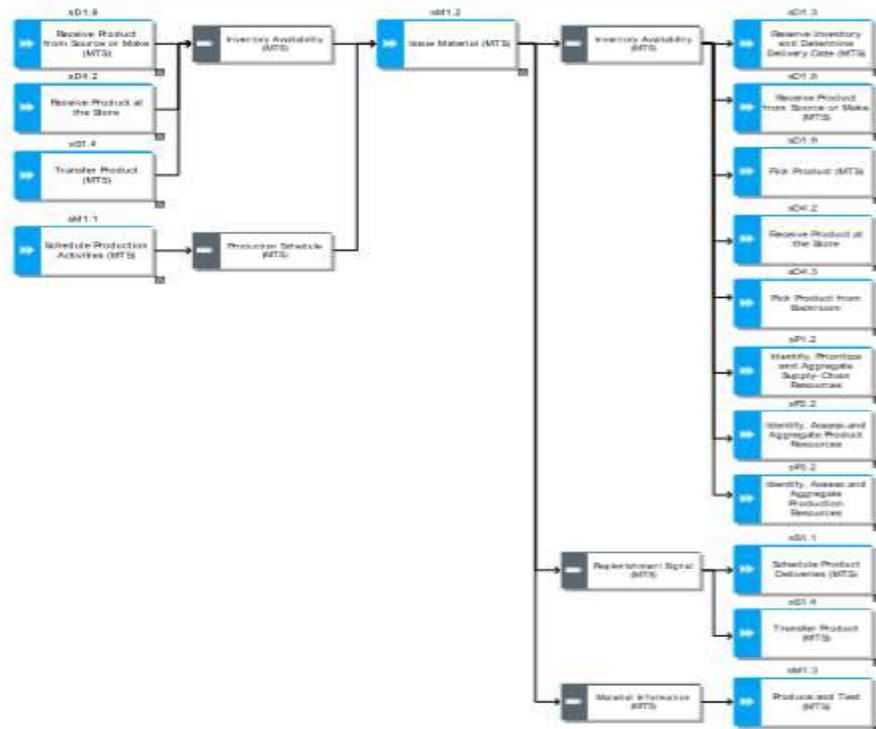
**PRACTICES →**

Practices	
BP.009	Kanban
BP.011	Production Line Sequencing
BP.012	Lot Tracking
BP.152	Automated Data Capture (ADC)
BP.171	Mixed Mode/Reverse Material Issue

**PEOPLE SKILLS →**

People	
Workflow	

**PROCESS WORKFLOW →**

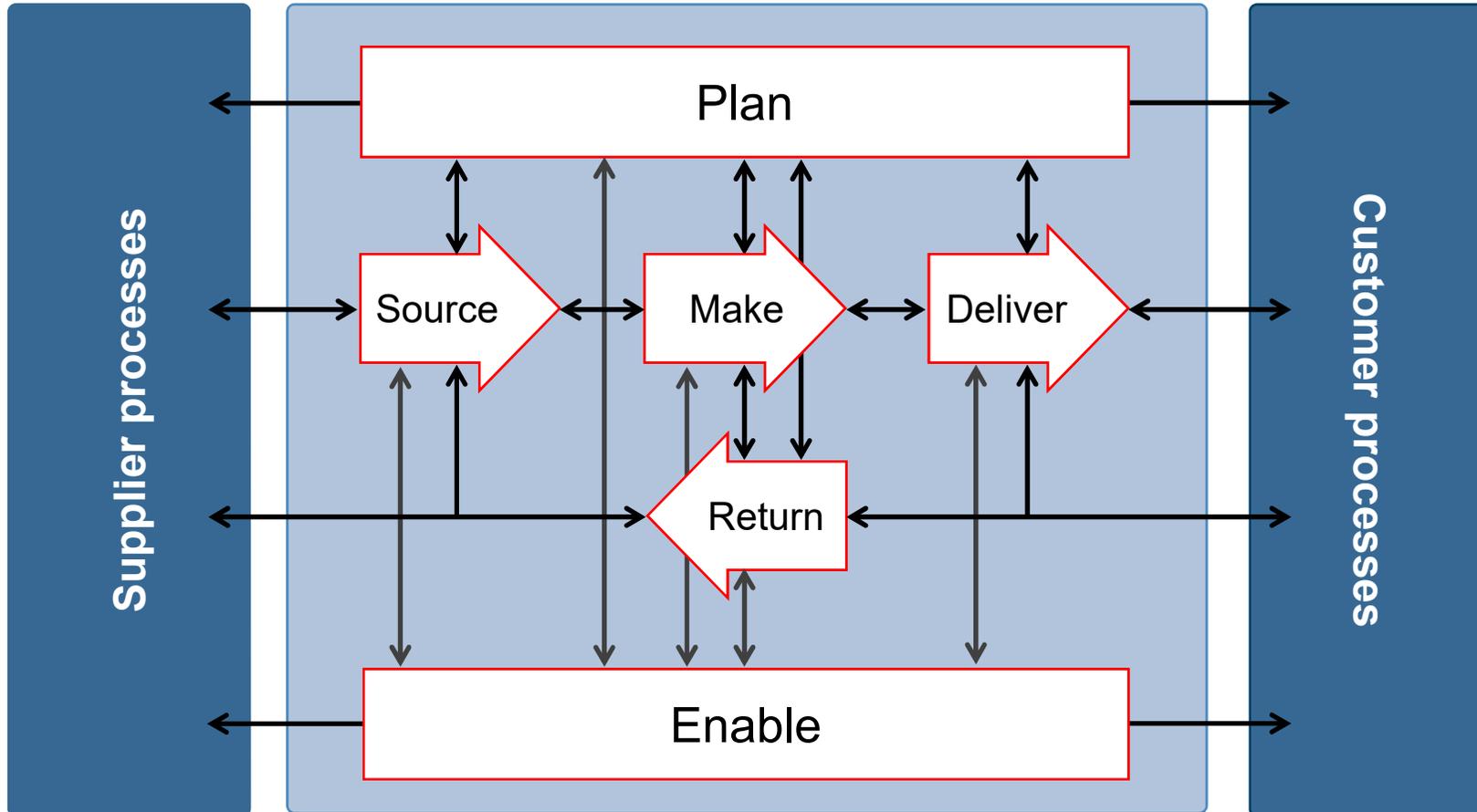


# SCOR Framework

## Review of SCOR Processes

# Anatomy of SCOR Processes

*Plan: S&OP*  
*Source: Purchase Order (inbound)*  
*Make: Work Order*  
*Deliver: Customer Order*  
*Return: From customer to Supplier*



-  Process, arrow indicates material flow direction
-  Process, no material flow
-  Information, goods, financial flow

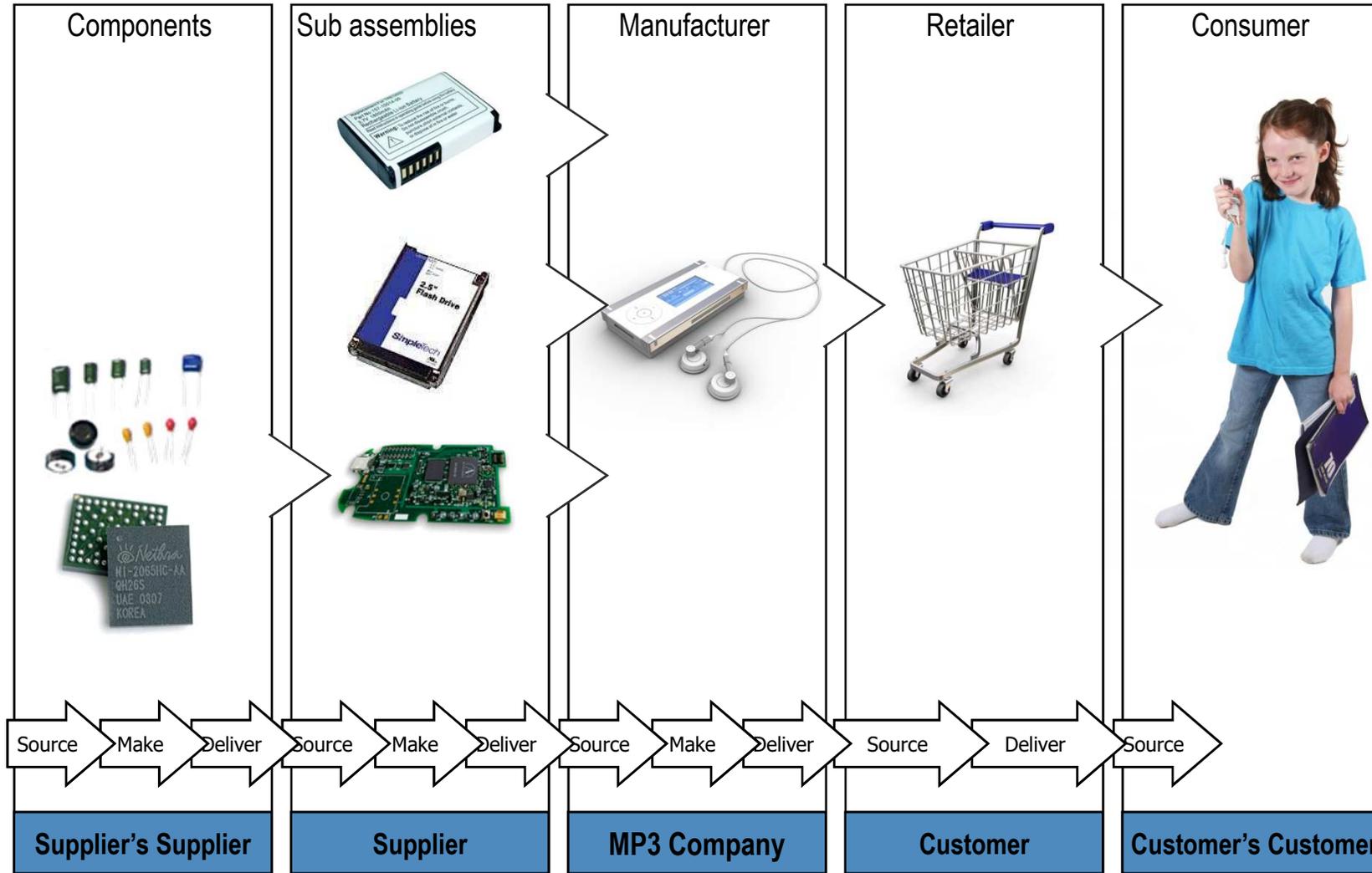
**OBJECTIVE: ADD VALUE**

# Anatomy of SCOR Processes:example

*Launch a new product in the Consumer Goods Market*

1. Budgeting	Company Direction setting
2. Sales Forecasting	PLAN SC
3. Balance Demand and Supply – resource planning	PLAN SC
4. production plan outlook – family level	PLAN Make/Source
5. Disaggregate at single Item level	PLAN Make
6. Execute transformation/production	SOURCE/MAKE
7. Store in Warehouse	DELIVER
8. Get a Customer Order	DELIVER
9. Deliver & Distribute	DELIVER
10. Return from Trade (defect, excess,...)	RETURN
• Contracts mgmt; Performance mgmt; IT mgmt; Risk mgmt	ENABLE

# End-to-End Supply Chain



➔ Process, arrow indicates material flow direction

# SCOR Processes and the Supply Chain



The integrated process of *plan*, *source*, *make*, *deliver*, *return*, and *enable* spanning from the suppliers' supplier to the customers' customer

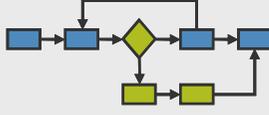
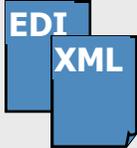
# Objectives of SCOR Processes



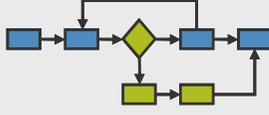
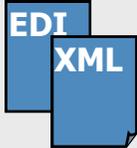
SCOR *Processes* help companies:

- Document the consensus view of how the business and the enterprise supply chain is organized—What do we do and where? **(as-is)**
- Document the consensus view of the capabilities of the business and the enterprise supply chain—How do we do this? (as-is)
- Document and test alternative ways to organize the business and the enterprise supply chain—Test different scenarios (what-if)
- Document the desired way to organize the business and the enterprise supply chain—What will we do and where? (to-be)
- Document future processes—how will we do this going forward? **(to-be)**

# SCOR Hierarchy

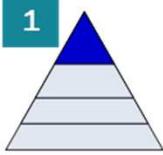
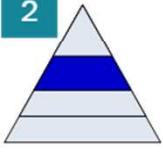
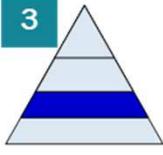
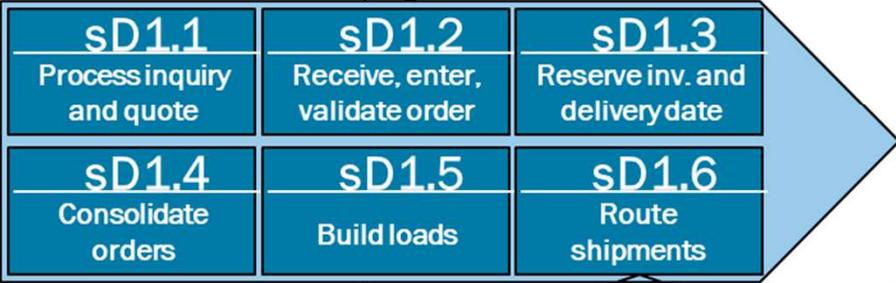
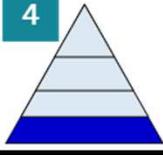
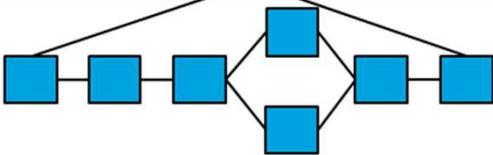
TYPE	CATEGORY	ELEMENT		
Level 1	Level 2	Level 3	Level 4	Level 5
Scope	Configuration	Activity	Workflow	Transactions
				
<b>Differentiates Business</b>	<b>Differentiates Complexity</b>	<b>Names Tasks</b>	Sequences Steps	Links Transactions
Defines Scope	Differentiates Capabilities	Links, Metrics, Tasks and Practices	Job Details	Details of Automation
Framework Language	Framework Language	Framework Language	Industry or Company Language	Technology Specific Language
Standard SCOR practices			Company/Industry definitions	

# Organizational Hierarchy

Level 1	Level 2	Level 3	Level 4	Level 5
Scope	Configuration	Activity	Workflow	Transactions
				
Differentiates Business	Differentiates Complexity	Names Tasks	Sequences Steps	Links Transactions
Defines Scope	Differentiates Capabilities	Links, Metrics, Tasks and Practices	Job Details	Details of Automation
<b>CxO</b> (COO, CIO) <b>EVP</b> <b>SVP</b>	<b>SVP</b> <b>VP</b>	<b>VP</b> <b>Director</b> <b>Line Manager</b>	<b>Manager</b> <b>Team Lead</b>	<b>Team Lead</b> <b>Individuals</b> <b>Programmer</b>



# SCOR Processes: Levels

Level	Description	Schematic	Comments
	Major processes		Defines the scope, content, and performance targets of the supply chain
	Process categories		Defines the operations strategy; process capabilities are set
	Process elements		Defines the configuration of individual processes. The ability to execute is set. Focus is on processes, inputs/outputs, skills, performance, best practices, and capabilities
	Improvement tools/activities		Use of kaizen, lean, TQM, six sigma, benchmarking

# SCOR Process Codification - summary

- SCOR processes have unique identifiers:
  1. One capital only are level 1 processes:  
sP, sS, sM, sD, sR and sE (6 in total) – the small S stands for “SCOR”.
  2. A capital plus a number are level 2 (examples):  
sP1, sS2, sM3, sD2, sD4, sSR1/sDR1 and sE2 (30 in total)
  3. A capital plus a number, a period and a number are level 3 processes (examples):  
sP1.1, sP1.2, sS2.1, sM1.5, sD3.12 (>200 processes in total)

**sX = level 1, sXn = level 2, sXn.m = level 3**

# SCOR Hierarchy - examples

**Example: SOURCE** (purchase order; inbound from Material Vendor)

**LEV.1 sS**

**LEV.2 sS1 Source Stocked Product**

**LEV.3 sS1.1 Schedule Product deliveries**

**Example: DELIVER** (customer order)

**LEV.1 sD**

**LEV.2 sD1 Deliver Stocked Product**

**LEV.3 sD1.1 Process Inquiry and Quote**

# Lead Time and Manufacturing Environments

ETO delivery lead time					Engineer-to-order
Design	Purchase	Manufacture	Assemble	Ship	
		MTO delivery lead time			Make-to-order
	RM Inventory	Manufacture	Assemble	Ship	
			ATO delivery lead time		Assemble-to-order
	Manufacture	Inventory	Assemble	Ship	
				MTS delivery lead time	Make-to-stock
	Manufacture	Assemble	Inventory	Ship	

RM's

components

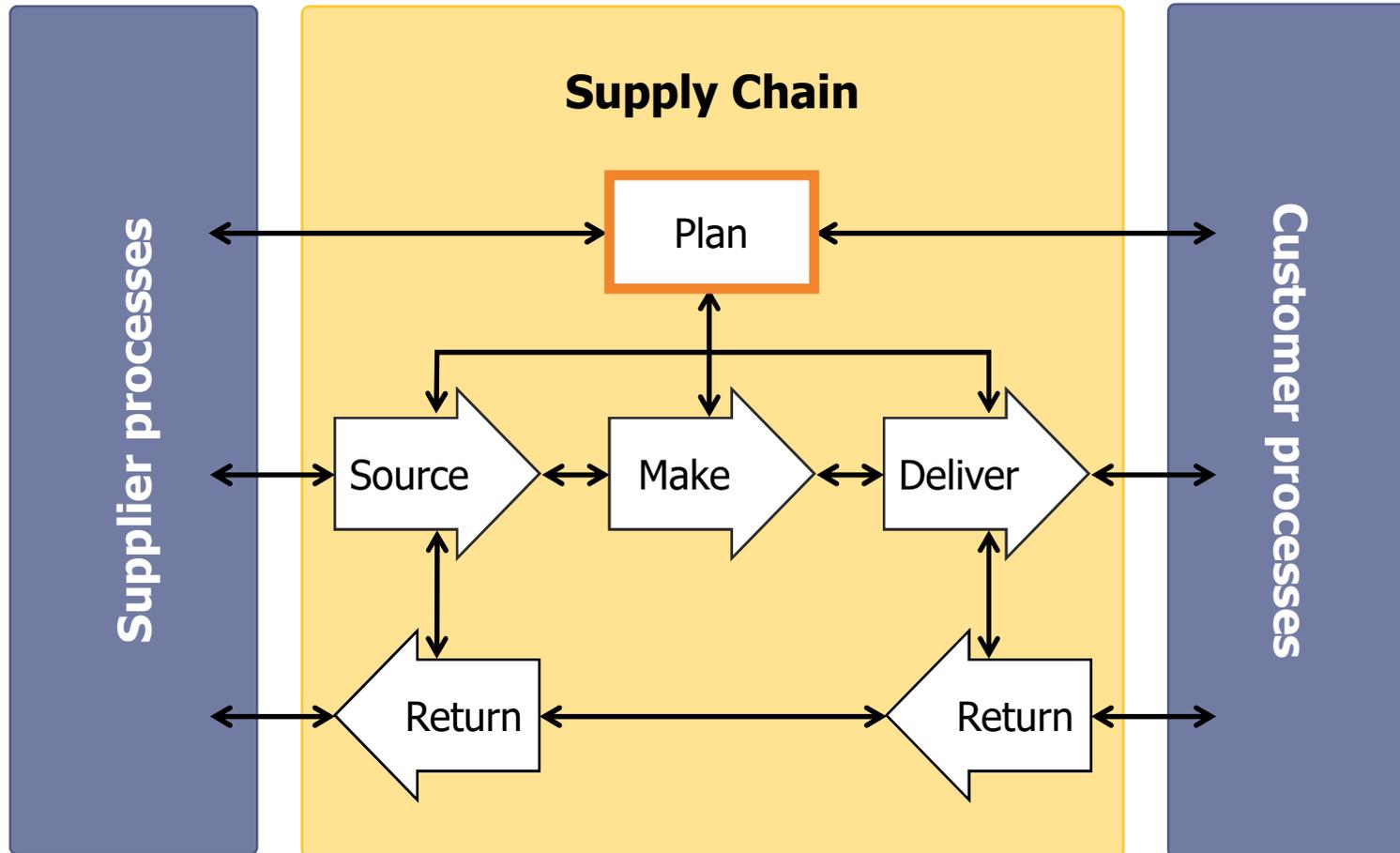
Finished Prod.

Source: Arnold et al., *Introduction to Materials Management*, 7<sup>th</sup> ed. Reprinted by Permission of Pearson Education

# Lead Time and Manufacturing Environments

ETO delivery lead time					Engineer-to-order	Luxury Jewel made with stones from the client
Design	Purchase	Manufacture	Assemble	Ship		
		MTO delivery lead time			Make-to-order	Premium car with special features (leather, non std materials)
	RM Inventory	Manufacture	Assemble	Ship		
			ATO delivery lead time		Assemble-to-order	PC with components selected from catalogue
	Manufacture	Inventory	Assemble	Ship		
				MTS delivery lead time	Make-to-stock	Shampoo, food, clothing (on the shelf !)
	Manufacture	Assemble	Inventory	Ship		

# Planning Processes



- Processes: Plan
- Objective: Drive/coordinate execution processes

# Plan (Process ID: sP)

- Objectives of this process:
  - The process of determining requirements and corrective actions to achieve supply chain objectives
- Key Processes Comprehended:
  - Supply chain revenue planning/forecasting
  - Materials requirement planning
  - Factory, repair, maintenance facilities capacity planning
  - Distribution requirements planning
  - Manage planning parameters
- Hint: Forecasting, S&OP, MRP?  
Probably Plan in SCOR



# Plan Configurations (1/2)

- Plan Supply Chain (Process ID: sP1)
  - Planning overall supply chain targets. Plan Supply Chain drives and coordinates P2, P3, P4 and P5 plans (Compare to “Revenue plan”, or “Budget” in certain industries)
- Plan Source (Process ID: sP2)
  - Planning of material ordering and receiving activities. Plan Source calculates which materials need to be available when to support the production plan (P3) and/or the delivery plan (P4). (Compare to “Materials Requirements Plan”)
- Plan Make (Process ID: sP3)
  - Planning of production and/or MRO activities. Plan Make ensures the production resources (capacity) are in place as needed and may generate production orders. (Compare to “Production Plan”)

## Plan Configurations (2/2)

- Plan Deliver (Process ID: sP4)
  - Planning of order management, material handling and transportation activities. Plan Deliver ensures resources are in place as needed and may generate or recalculate shipping dates based on material availability. (Compare to “Shipment Plan”, “Load Planning”)
- Plan Return (Process ID: sP5)
  - Planning of the reverse logistics shipping and material handling capacity. Note: This does not include the maintenance, repair or overhaul activity planning as those are Make processes.

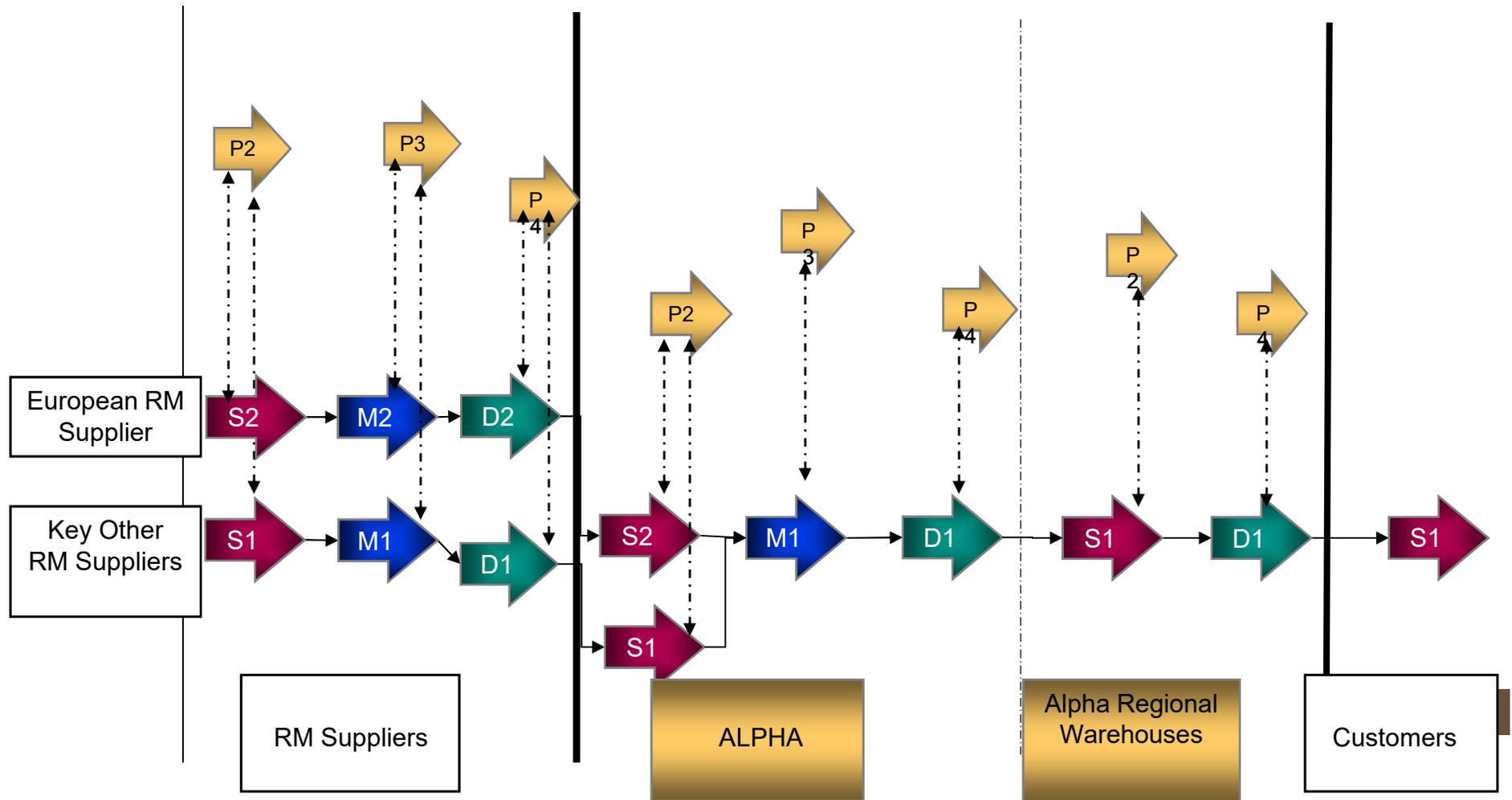
# Plan Level 2 and Level 3 Processes: Detail

Plan supply chain (sP1)	Plan source (sP2)	Plan make (sP3)
sP1.1 Gather supply chain requirements	sP2.1 Gather materials requirements	sP3.1 Gather production requirements
sP1.2 Gather supply chain resources	sP2.2 Gather material resources	sP3.2 Gather production resources
sP1.3 Balance supply chain resources with requirements	sP2.3 Balance material resources with requirements	sP3.3 Balance production resources with requirements
sP1.4 Establish and communicate supply chain plans	sP2.4 Establish sourcing plans	sP3.4 Establish production plans

# Plan Level 2 and Level 3 Processes: Detail

Plan deliver (sP4)	Plan return (sP5)
sP4.1 Gather delivery requirements	sP5.1 Gather return requirements
sP4.2 Gather delivery resources	sP5.2 Gather return resources
sP4.3 Balance delivery resources with requirements	sP5.3 Balance return resources with requirements
sP4.4 Establish delivery plans	sP5.4 Establish and communicate return plans

# Example: Placing the planning process elements

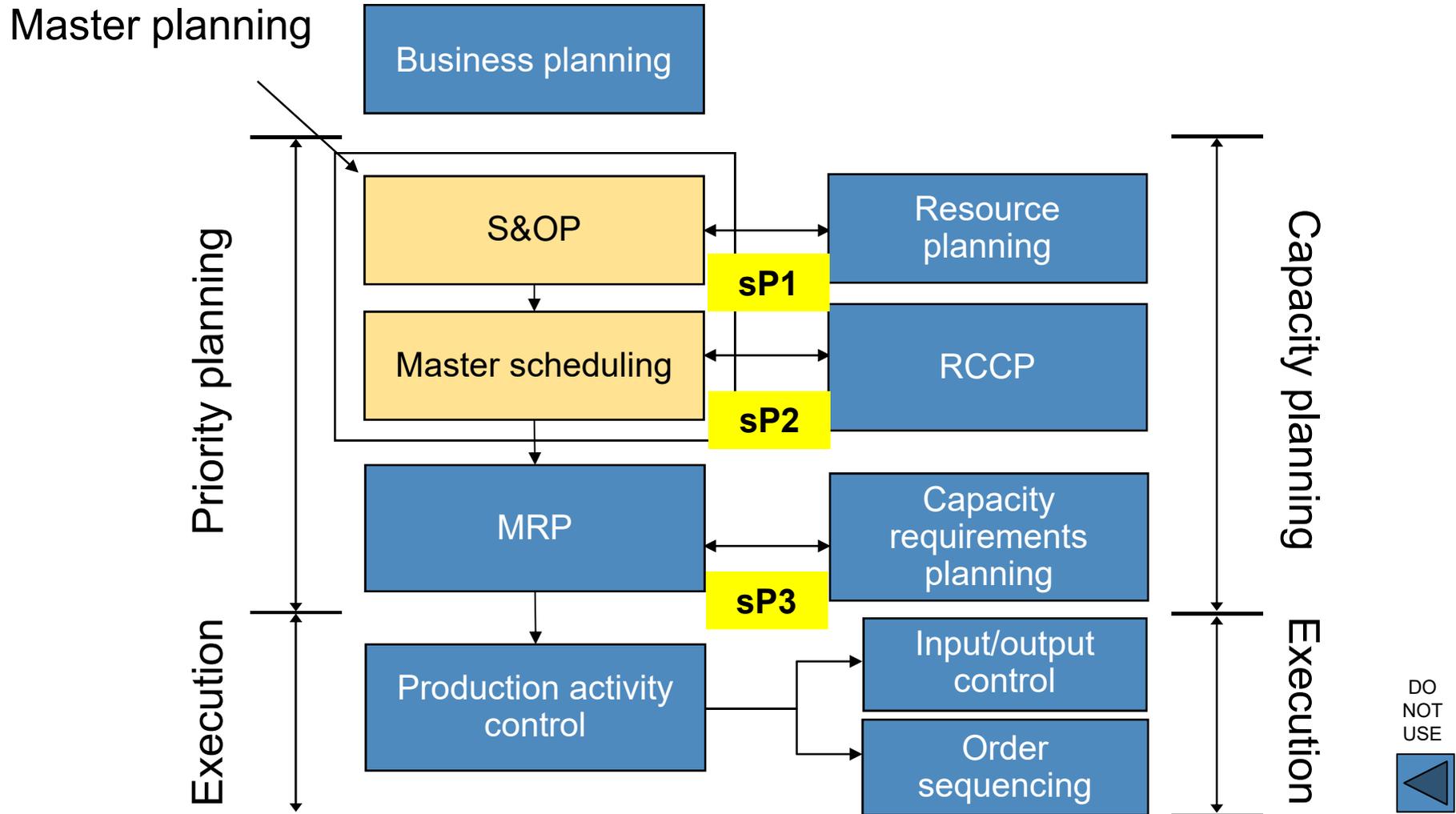


# Plan Process Exercise

- A supply chain manager finds that different organizations (the factory, the distribution center and procurement) are not working off the same plan. Procurement orders more materials than needed, the factory is filled to capacity (but capacity is too low) and so on. Answer the following questions:
  - Which (1) level 3 process would you investigate?
  - What are the key outputs of this process step?
  - Where do these outputs go to?
  - Which best practices would you recommend?



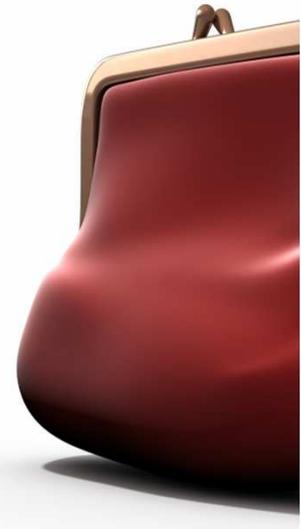
# Manufacturing Planning and Control



Adapted from APICS CPIM

# Source (Process ID: sS)

- Objectives of this process:
  - The ordering, delivery, receipt and transfer of raw material items, subassemblies, product and/or services.
- Key processes comprehended:
  - Schedule product deliveries
  - Receive, inspect, and hold materials
  - Issue material to Make or Deliver processes
  - Supplier/Vendor Agreements
  - Vendor certification and feedback, sourcing quality
  - Manage Raw Materials inventories
  - Freight, import/export documentation
- Hint: Receiving processes? Probably Source in SCOR



# Source Configurations

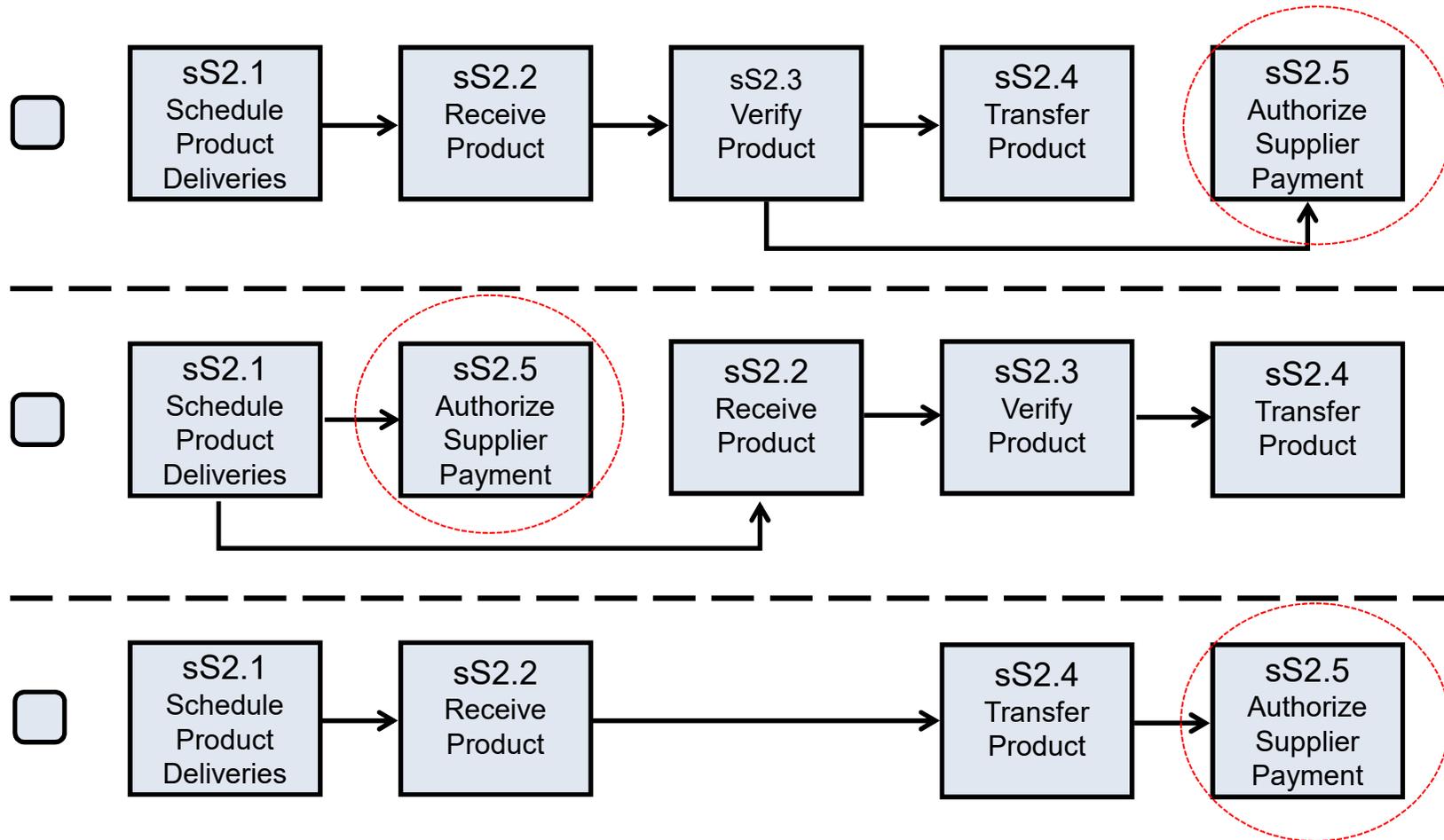
- Configurations:
- Source Stocked Product (Process ID: sS1)
  - The ordering and receiving of existing products, components and services from existing contracts, based on requirement plans. To keep Inventory of materials
- Source Make-to-Order (Process ID: sS2)
  - The ordering and receiving of existing products, components and services for a unique and identified customer order.
- Source Engineer-to-Order (Process ID: sS3)
  - The selection, ordering and receiving of specialized products or services that are designed and/or built based on the requirements or specifications of a particular customer order or contract.

# Source Level 2 and Level 3 Processes: Detail

Source stocked product (sS1)	Source make-to-order product (sS2)	Source engineer-to-order product (sS3)
sS1.1 Schedule product deliveries	sS2.1 Schedule product deliveries	sS3.1 Identify sources of supply
sS1.2 Receive product	sS2.2 Receive product	sS3.2 Select final supplier(s) and negotiate
sS1.3 Verify product	sS2.3 Verify product	sS3.3 Schedule product deliveries
sS1.4 Transfer product	sS2.4 Transfer product	sS3.4 Receive product
sS1.5 Authorize supplier payment	sS2.5 Authorize supplier payment	sS3.5 Verify product
		sS3.6 Transfer product
		sS3.7 Authorize supplier payment

# Question: Source Process Flows

- Which of the following flows is/are correct?



# Source Process Exercise

- A supply chain manager finds that a high percentage of finished goods need to be reworked as a certain component that is ordered specifically for customer orders is showing high failure rates when installed in the product.
  - Which (1) level 3 process should catch faulty materials before they are used in production?
  - Which metric indicates the yield of this process?
  - Where do this process' inputs come from?
  - Which best practices could this manager consider if he wants to reduce the time it takes to complete the materials testing?



# Make (Process ID: sM)

- Objectives of this process:
  - The process of adding value to products through mixing, separating, forming, machining, and chemical processes.
- Key Processes Comprehended:
  - Schedule production, request and receive material from Source and/or Make processes
  - Manufacture, assemble/disassemble and test product, package, hold/release product
  - Managing product quality and engineering changes
  - Managing facilities and equipment, production status workflow and capacity management
  - Manage Work-In-Process (WIP) inventories
- Hint: Item number change? Probably Make in SCOR



# Make Configurations

- Make-to-Stock (Process ID: sM1)
  - The making of standard products and services. Planning (Plan) processes determine what, how much and when to make.
- Make-to-Order (Process ID: sM2)
  - The making of standard or configurable products and services for unique customer orders. Customer orders determine what, how much and when to make. Customer orders can be traced throughout the Make process.
- Engineer-to-Order (Process ID: sM3)
  - The making of specialized products or services that are fully or partially designed and made based on the unique requirements and specifications of a particular customer order or contract. Customer orders and specifications can be traced throughout the Make process.

# Make Level 2 and Level 3 Processes: Detail

Make-to-stock (sM1)	Make-to-order (sM2)	Engineer-to-order (sM3)
sM1.1 Schedule production activities	sM2.1 Schedule production activities	sM3.1 Finalize production engineering
sM1.2 Issue material	sM2.2 Issue sourced/in-process product	sM3.2 Schedule production activities
sM1.3 Produce and test	sM2.3 Produce and test	sM3.3 Issue sourced/in-process product
sM1.4 Package	sM2.4 Package	sM3.4 Produce and test
sM1.5 Stage product	sM2.5 Stage finished product	sM3.5 Package
sM1.6 Release product to deliver	sM2.6 Release finished product to deliver	sM3.6 Stage finished product
sM1.7 Waste disposal	sM2.7 Waste disposal	sM3.7 Release product to deliver
		sM3.8 Waste disposal

# Make: Level 2 Process Differentiation

## Different capabilities, different characteristics

### Stocked product (sS1, sM1, sD1)

- Replenishment, inventory/plan driven
- Standard materials
- High fill-rate, inventory risk

### Make-to-order (sS2, sM2, sD2)

- Customer order driven/tracing
- Allows configurable materials
- Longer lead times, lower inventory risk

### Engineer-to-Order (sS3, sM3, sD3)

- Customer requirements driven/tracing
- Sourcing new materials
- Longest long lead-times, low fill rates, lowest inventory risk, expensive process

# Exercise: Make-to-Order and SCOR

As a group, discuss the following:

1. Describe in *your own words* the process of manufacturing a product of your choice. The deliverable of this step is a list of 5-10 activities.
2. Discuss and agree the **level-2 classification** for the process you documented in step 1. Deliverable: sM1, sM2 or sM3.
3. Review each activity from step 1 and identify the SCOR **level-3 process** step that matches the activity in your words.

Use the template in your text to complete the discussion.

# Exercise: Make-to-Order and SCOR

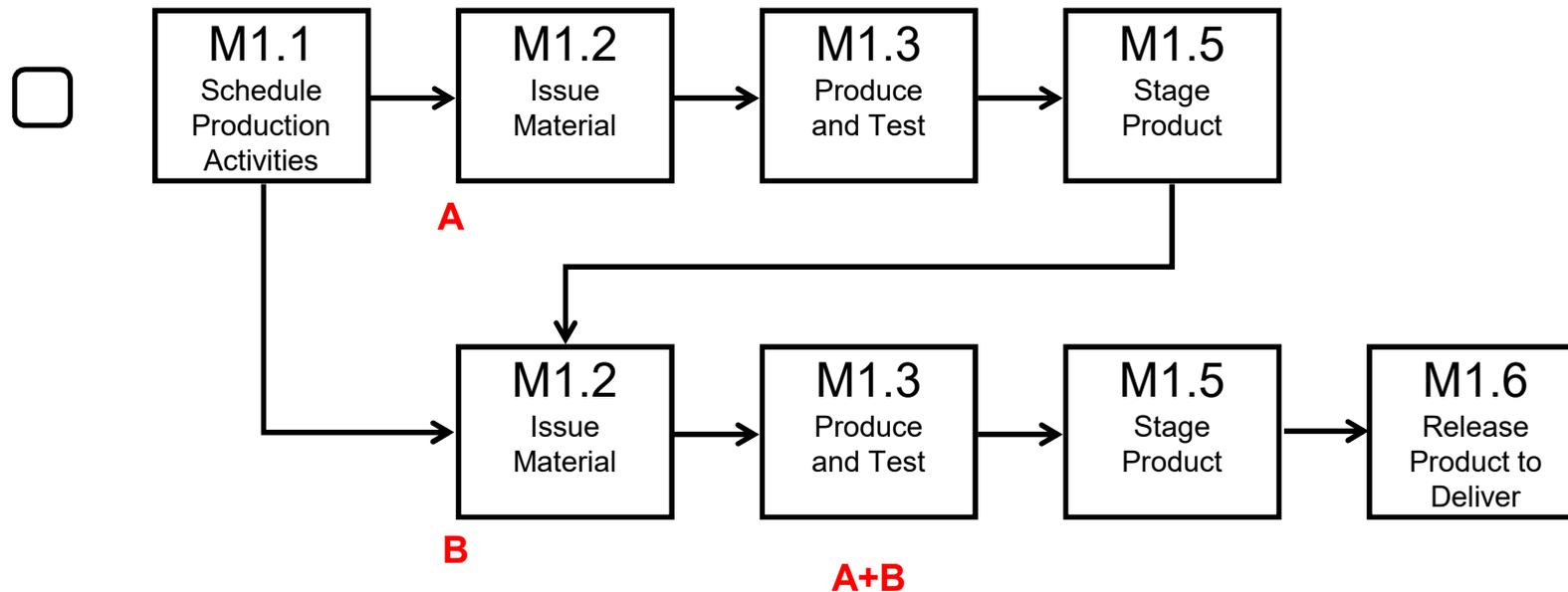
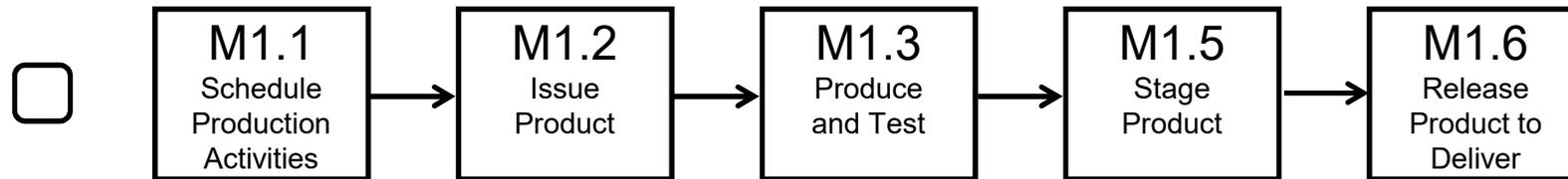
Activities (using your own words)	Classification (level-2 matching)	Matching level-3 SCOR process
1.	<div data-bbox="1317 491 1397 564" style="position: absolute; top: 10%; left: 45%;"><b>3</b></div> <div data-bbox="1043 746 1124 820" style="position: absolute; top: 45%; left: 10%;"><b>2</b></div> <div data-bbox="1128 874 1368 970" style="position: absolute; top: 55%; left: 25%;"><b>sM__</b></div>	
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

1 Activities (using your own words)	Classification (level-2 matching)	3 Matching level-3 SCOR process	Process element L3 description
1.Schedule mixing/cooking activities for ingredients	2 <b>sM2</b>	sM2.1	Schedule production activities
2.Select RM, move to the cooking place		sM2.2	Sourced in product
3.Mix, boil, cook		sM2.3	Produce and test
4.Pour on dish; place on trays		sM2.4	Package
5.Allocate on a common table before serving		sM2.5	Stage finished product
6.The “Chef” verifies and gives green light to go on		sM2.6	Release FP to Deliver
7. Guests arrange piles/waste/refusals for disposal		sM2.7	Waste/Surplus Mgmt
8.Source Return Excess		sSR3 (sR3.5)	Return Excess Product
8a.Deliver return Excess		sDR3 (sDR3.3)	Receive Excess Product

v

# Question: Process Flows

- Which of the following flows is/are correct?



# Make Process Exercise

- A production manager finds that her engineer-to-order shop is unable to meet the daily schedules; down-time, change-over-times and misalignment between sequence and materials seem to be the key problems:
  - Which (1) level 3 process should she investigate?
  - Which metric or metrics should she monitor to continuously track this problem?
  - Where do relevant inputs come from?
  - (Which best practices could this manager consider?)



# Deliver (Process ID: sD)

- Objectives of this process:
  - Perform customer-facing order management and order fulfillment activities including outbound logistics.
- Key processes comprehended:
  - Product, service and price quotations
  - Order entry and maintenance
  - Order consolidation, picking, packing, labeling and shipping
  - Import/export documentation
  - Customer delivery and installation
  - Logistics and Freight Management
  - Manage Finished Goods inventories
- Hint: Order taking or Shipping? Probably Deliver in SCOR



# Deliver Configurations

- Deliver Stocked Product (Process ID: sD1)
  - The delivery of standard products (and services) that are maintained in a finished goods state prior to the receipt of a customer order.
- Deliver Make-to-Order Product (Process ID: sD2)
  - The delivery of standard or configurable products and services that are obtained (Source or Make) for a customer order.
- Deliver Engineer-to-Order Product (Process ID: sD3)
  - The delivery of specialized products and services that have been fully or partially designed in negotiation and based on requirements from a customer order and customer provided specifications
- Deliver Retail Product (Process ID: sD4)
  - The delivery of standards goods in a retail store

# Deliver Level 2 and Level 3 Processes: Detail

MTS (sD1)	MTO (sD2)	ETO (sD3)	Retail Products (sD4)
sD1.1 Process inquiry and quote	sD2.1 Process inquiry and quote	sD3.1 Obtain and respond to RFP/RFQ	sD4.1 Generate stocking schedule
sD1.2 Receive, enter and validate order	sD2.2 Receive, configure, enter and validate order	sD3.2 Negotiate and receive contract	sD4.2 Receive product at store
sD1.3 Reserve inventory and determine delivery date	sD2.3 Reserve inventory and determine delivery date	sD3.3 Enter order, commit resources and launch program	sD4.3 Pick product from backroom
sD1.4 Consolidate orders	sD2.4 Consolidate orders	sD3.4 Schedule installation	sD4.4 Stock shelf
sD1.5 Build loads	sD2.5 Build loads	sD3.5 Build loads	sD4.5 Fill shopping cart
sD1.6 Route shipments	sD2.6 Route shipments	sD3.6 Route shipments	sD4.6 Checkout
sD1.7 Select carriers and rate shipments	sD2.7 Select carriers and rate shipments	sD3.7 Select carriers and rate shipments	sD4.7 Deliver and/or install

<sup>1</sup> RFP = Request for Proposal, RFQ = Request for Quote

# Deliver Level 2 and Level 3 Processes: Detail

Stocked products (sD1)	Make-to-order (sD2)	Engineer-to-order (sD3)
sD1.8 Receive product from source or make	sD2.8 Receive product from source or make	sD3.8 Receive product from source or make
sD1.9 Pick product	sD2.9 Pick product	sD3.9 Pick product
sD1.10 Pack product	sD2.10 Pack product	sD3.10 Pack product
sD1.11 Load product and create documentation	sD2.11 Load product and create documentation	sD3.11 Load product and create documentation
sD1.12 Ship product	sD2.12 Ship product	sD3.12 Ship product
sD1.13 Receive and verify product by customer	sD2.13 Receive and verify product by customer	sD3.13 Receive and verify product by customer
sD1.14 Install product	sD2.14 Install product	sD3.14 Install product
sD1.15 Invoice	sD2.15 Invoice	sD3.15 Invoice

# Deliver Process Elements

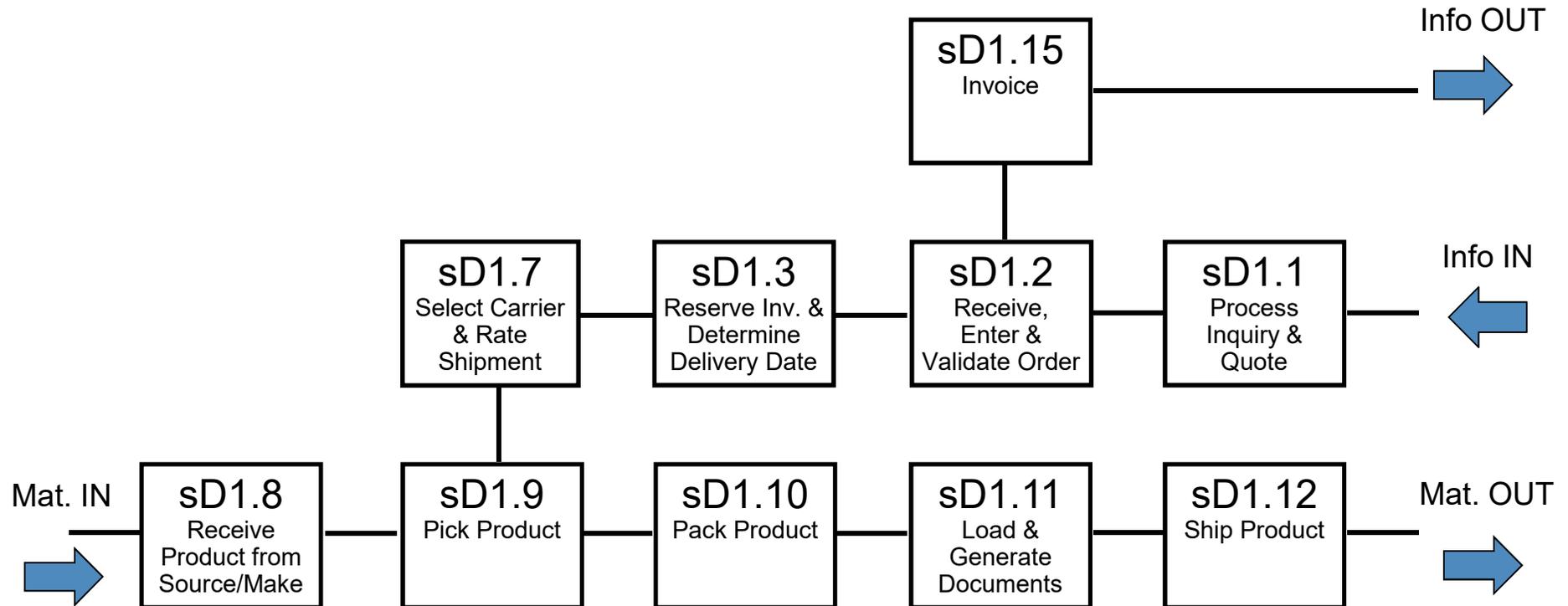
Retail Products (sD4)	
sD4.1	Generate Stocking Schedule
sD4.2	Receive Product at Store
sD4.3	Pick Product from Backroom
sD4.4	Stock Shelf
sD4.5	Fill Shopping Cart
sD4.6	Checkout
sD4.7	Deliver and/or Install

- The Retail supply chain model does not match up to the Manufacturing supply chain model, therefore processes are quite different



# Question

- Which direction does the order flow? And materials?



# Deliver Process Exercise

- A warehouse manager observes a large increase of returns from customers. A quick study of the return reasons shows the increase is primarily in the category ‘Wrong Product’. He wonders whether the “order it today, we ship it today” approach is impacting the quality of his operation.
  - Which level 3 processes should he investigate?
  - Which of these would he look at first if ‘wrong product ordered’ is ~90% of the increase?
  - Which electronic solutions could this manager consider to prevent these errors from reoccurring or increasing?



# Enable Level 2 and Level 3 Processes: Detail

Manage supply chain business rules (sE1)	Manage performance (sE2)	Manage data and information (sE3)
sE1.1 Gather business rule requirements	sE2.1 Initiate reporting	sE3.1 Receive maintenance request
sE1.2 Interpret requirement	sE2.2 Analyze reports	sE3.2 Determine/scope work
sE1.3 Document business rule	sE2.3 Find root causes	sE3.3 Maintain content/code
sE1.4 Communicate business rule	sE2.4 Prioritize root causes	sE3.4 Maintain access rights
sE1.5 Release/publish business rule	sE2.5 develop corrective actions	sE3.5 Publish information
sE1.6 Retire business rule	sE2.6 Approve, prioritize, and launch	sE3.6 Verify information

# Enable Level 2 and Level 3 Processes: Detail

Manage supply chain human resources (sE4)	Manage supply chain assets (sE5)	Manage supply chain contracts (sE6)
sE4.1 Identify skill/resource requirements	sE5.1 Schedule asset management activities	sE6.1 Receive contract/contract updates
sE4.2 Identify available skills/resources	sE5.2 Take Asset Off-line	sE6.2 Enter and distribute contract
sE4.3 Match skill/resource requirements	sE5.3 Inspect and troubleshoot	sE6.3 Activate/archive contract
sE4.4 Determine hiring/redeployment	sE5.4 Install and configure	sE6.4 Review contractual performance
sE4.5 Determine training/education	sE5.5 Clean, maintain and repair	sE6.5 Identify performance issues/opportunities
sE4.6 Approve, prioritize and launch	sE5.6 Decommission and Dispose	sE6.6 Identify resolutions/improvements
	sE5.7 Inspect maintenance	sE6.7 Select, prioritize, and distribute resolutions
	sE5.8 Reinstate asset	

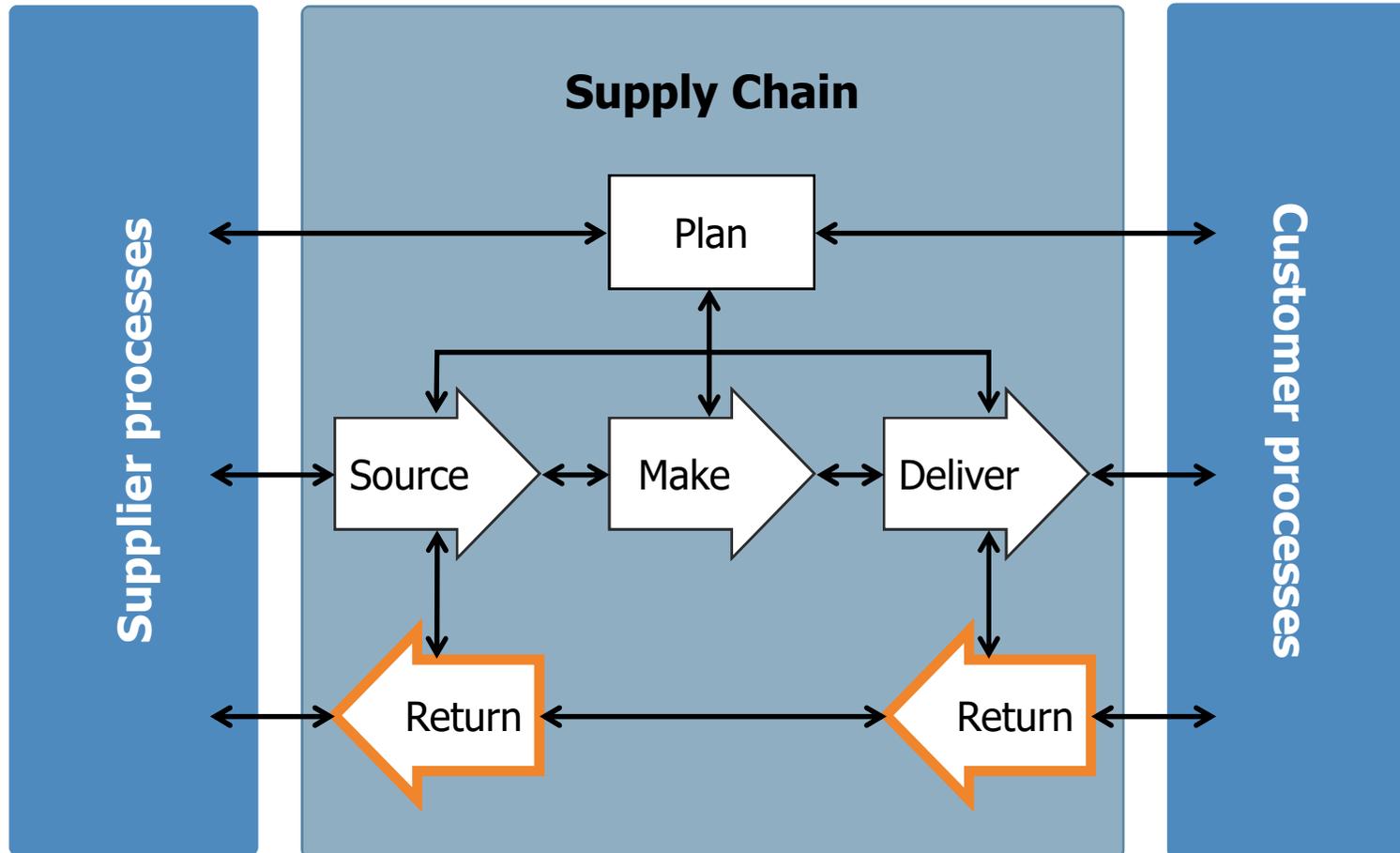
# Enable Level 2 and Level 3 Processes: Detail

Manage supply chain network (sE7)	Manage regulatory compliance (sE8)	Manage supply chain risk (sE9)
sE7.1 Select scope and organization	sE8.1 Monitor regulatory entities	sE9.1 Establish context
sE7.2 Gather input and data	sE8.2 Assess regulatory publications	sE9.2 Identify risk events
sE7.3 Develop scenarios	sE8.3 Identify regulatory deficiencies	sE9.3 Quantify risk events
sE7.4 Model/simulate scenarios	sE8.4 Define remediation	sE9.4 Evaluate risks
sE7.5 Project impact	sE8.5 Verify/obtain license	sE9.5 Mitigate Risks
sE7.6 Select and approve	sE8.6 Publish remediation	
sE7.7 Develop change program		
sE7.8 Approve, prioritize, and launch change		

# Enable Level 2 and Level 3 Processes: Detail

Manage supply chain chain Procurement (sE10)	Manage supply chain technology(sE11)
sE10.1 Develop startegy and plan	sE11.1 Define SC technology requirements
sE7102 Pre.procurement/Make test and Market Engagement	sE11.2 Identify Technology solutions alternatives
sE10.3 Develop Procurement documentation	sE11.3 Define/Update SC Technology roadmap
sE10.4 Supplier selection to participate	sE11.4 Select technology solution
sE7105 Issue ITT/RFQ	sE11.5 Define and deploy SC technology Solution
sE10.6 Bid tender Evaluation and Validation	sE11.6 Maintain and Improve Technology solution
sE10.7 Contract Award and Implementation	Se11.7 Retire technology solution

# Reverse Processes



- **Processes: Return (Source Return, Deliver Return)**
- **Objective: reverse material flows**

# Return (Process ID: sSR - sDR)

- Objective of this process:
  - Moving material from customer back through supply chain to address defects in product, ordering, or manufacturing, or to perform upkeep activities.
- Key Processes Comprehended
  - Identification of the need to return a product or asset
  - Requesting and issuing return authorization
  - Inspection and disposition decision-making
  - Transfer/Disposition of product or asset
  - Managing return transportation capacity
  - Managing returned material inventories
- Hint: Reverse material flow? Probably Return in SCOR

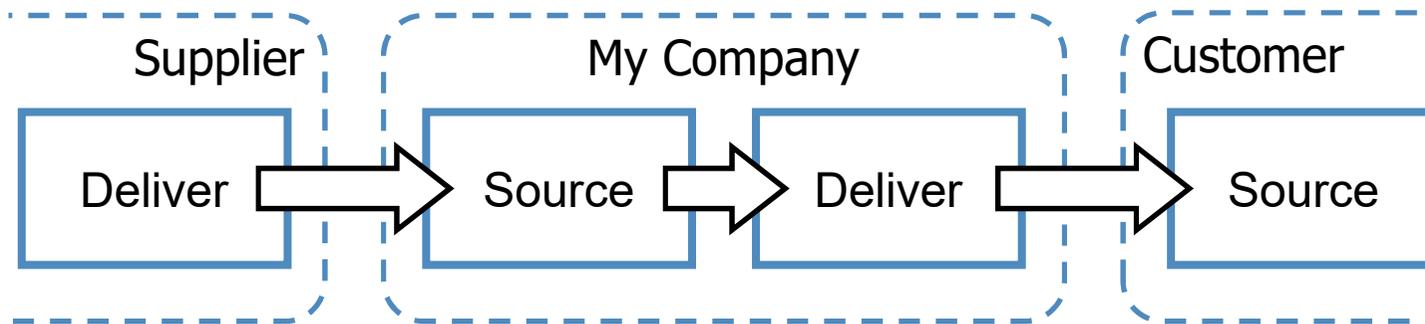


# Return Configurations

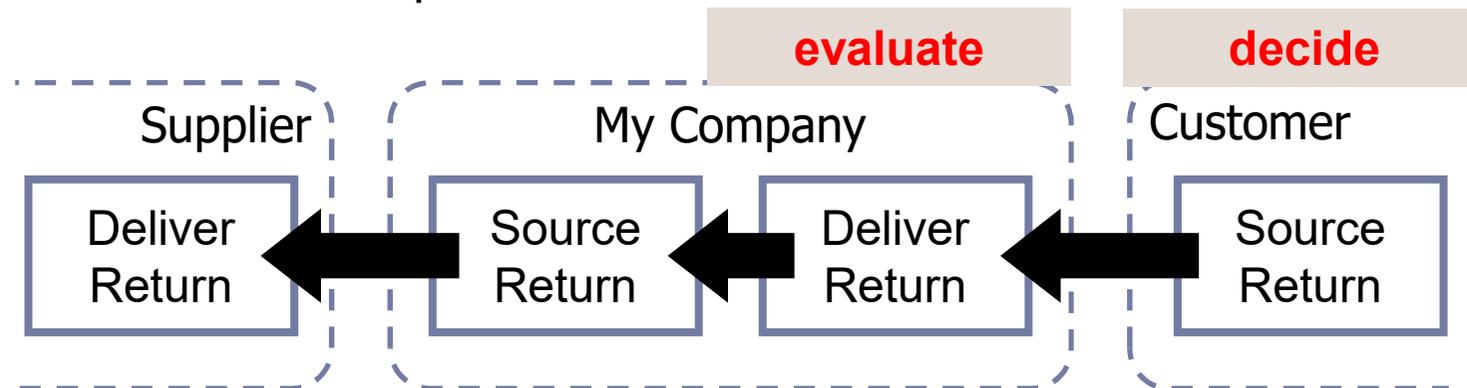
- Return Defective Products (Process IDs: sSR1 and sDR1)
  - The return of products because the product is defective, the wrong product was ordered or shipped.
- Return Maintenance, Repair & Overhaul (IDs: sSR2 and sDR2)
  - The return of products or assets to perform preventative maintenance, (end-of-life) overhaul or repairs due to breakage/aging with use
- Return Excess Products (Process IDs sSR3 and sDR3)
  - The return of excess inventories and inventories of product which will be retired (end-of-life excess). The product is new and in original packaging.
- sSR = Source Return, sDR = Deliver Return

# Return Configurations

- Positioning Source Return and Deliver Return
  - Consider the flow of goods; Notice the positions of Source and Deliver



- Now, notice the positions of Source Return and Deliver Return



# Source Return Process Elements

Source return defective product (sSR1)	Return MRO product (sSR2)	Source return excess products (sSR3)
sSR1.1 Identify defective product condition	sSR2.1 Identify MRO product condition	sSR3.1 Identify excess product condition
sSR1.2 Disposition defective product	sSR2.2 Disposition MRO product	sSR3.2 Disposition excess product
sSR1.3 Request Defective product return authorization	sSR2.3 Request MRO return authorization	sSR3.3 Request excess product return authorization
sSR1.4 Schedule defective product shipment	sSR2.4 Schedule MRO shipment	sSR3.4 Schedule excess product shipment
sSR1.5 Return (Ship) defective product	sSR2.5 Return (Ship) MRO product	sSR3.5 Return (ship) excess product

# Deliver Return Process Elements

Deliver return defective product (sDR1)	Deliver return MRO product (sDR2)	Deliver return excess product (sDR3)
sDR1.1 Authorize defective product return	sDR2.1 Authorize MRO product return	sDR3.1 Authorize excess product return
sDR1.2 Schedule defective product receipt	sDR2.2 Schedule MRO product receipt	sDR3.2 Schedule excess product receipt
sDR1.3 Receive and verify defective product	sDR2.3 Receive and verify MRO product	sDR3.3 Receive and verify excess product
sDR1.4 Transfer defective product	sDR2.4 Transfer MRO product	sDR3.4 Transfer excess product

# Exercise



- Provide examples for each of the 3 different types of Returns processes for a dinner party.
- Deliver Return
  - Return Defective Product
  - Return Excess Product
  - Return Maintenance, Repair Overhaul
- Source Return
  - Return Defective Product
  - Return Excess Product
  - Return Maintenance, Repair Overhaul
- Hint: think material condition and assets

# Example on lev.2 Processes selection

Balance demand/supply SC

Define Operations Strategy Prod.A

- long suppliers Leadtime	Source	S1
- Flexible Mfg operations, short CT	Make	M2
- Spare capacity available		
- Reduced capacity local DC	Deliver	D2
- E-commerce returns high rate	Return	SR1/DR1

# SCOR Framework

## Review of SCOR Performance

# Objectives of SCOR Performance



Performance (SCOR section 1) helps companies:

- ***Translate business strategy to supply chain strategy:*** How closely is the supply chain strategy meeting business plan objectives?
- ***Measure supply chain performance:*** How are we doing, how are we trending?
- ***Understand relative performance compared to competitors:*** How are we doing compared to our supply chain strategy
- ***Identify and monitor processes that most likely cause the performance gaps:*** What improvement targets should we pursue?

# Supply Chain Performance: Definitions



- Definitions:
  - **Performance attribute:** a characteristic used to describe a strategy. Performance attributes serve as classification for metrics and formulate strategic direction
  - **Key performance indicator (KPI):** a metric to measure the overall performance or state-of-affairs. SCOR level 1 metrics are considered KPIs
  - **Metric:** a standard for measurement
  - **Measurement:** an observation that reduces the amount of uncertainty about the value of a quantified metric
- SCOR metrics = diagnostic metrics
  - Monitor and diagnose overall supply chain health.
  - Diagnostic relationships (hierarchy) enables gap analysis.

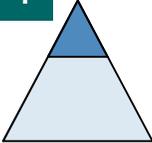
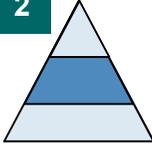
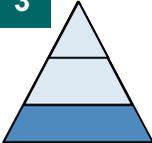
# SCOR Performance Attributes

	Attribute	Strategy
Customer	Reliability (RL)	Consistently getting the orders right, product meets quality requirements
	Responsiveness (RS)	The consistent speed of providing products/ services to customers
	Agility (AG)	The ability to respond to changes in the market (external influences)
Internal	Cost (CO)	The cost associated with managing and operating the supply chain
	Assets (AM)	The effectiveness in managing the supply chain's assets in support of fulfillment

# SCOR Performance Attributes: Level 1

	Attribute	Level 1 Strategic Metrics
Customer	Reliability	RL.1.1 Perfect order fulfilment
	Responsiveness	RS.1.1 Order fulfillment cycle time
	Agility	AG.1.1 Upside supply chain adaptability
		AG.1.2 Downside supply chain adaptability
AG.1.3 Overall value at risk (VAR)		
Internal	Cost	CO.1.1 Total supply chain management costs (TSCMC)
		CO.1.2 Cost of goods sold
	Asset management efficiency	AM.1.1 Cash-to-cash cycle time
		AM.1.2 Return on supply chain fixed assets
		AM.1.3 Return on working capital

# SCOR Performance Metrics: Levels

Level	Description	Schematic	Comments
	Performance attribute		Ability to perform a process as expected
	Level 1 diagnostic metrics		Percentage of orders meeting delivery performance
	Level 2 diagnostic metrics		RL.2.1 % of orders delivered in full
	Level 3 diagnostic metrics		Delivery item and delivery accuracy metrics

# Strategic Reliability Metric

**Metric:** **RL.1.1 Perfect Order Fulfillment**

**Definition:** The percentage of orders meeting delivery performance with complete and accurate documentation and no delivery damage (In Full + Commit Date + Docum.Acc. + Perfect Condition)



**Calculation:**  $[\text{Total Perfect Orders}] / [\text{Total Number of Orders}] \times 100$

- Diagnostic Metrics:** (examples)
- RL.2.1 % Orders Delivered in Full
  - RL.2.4 Perfect Condition
  - RL.3.19 % Orders Received Defect Free
  - RL.3.24 % Orders Received Damage Free

**Notes:** An order is perfect only if all L2/L3 metrics are perfect; An order must be: on-time **AND** in-full **AND** right condition **AND** right documentation

# Reference Sections

Hierarchy	
RL.2.1	% of Orders Delivered In Full
RL.2.2	Delivery Performance to Customer Commit Date
RL.2.3	Documentation Accuracy
RL.2.4	Perfect Condition
Processes	
SCOR	Supply Chain
sS2	Source Make-to-Order Product
sS3	Source Engineer-to-Order Product
sM2	Make-to-Order
sM3	Engineer-to-Order
sD1	Deliver Stocked Product
sD2	Deliver Make-to-Order Product
sD3	Deliver Engineer-to-Order Product
Practices	
BP.159	Electronic Data Interchange (EDI)
BP.014	Demand Planning & Forecasting
BP.019	Demand Planning
BP.020	Demand Management

BP.021	Sales and Operations Planning
BP.027	Pull-Based Inventory Replenishment
BP.028	Inventory Optimization
BP.035	Business Rule Review
BP.040	MTO Order Fulfillment Strategy
BP.117	Embed Specialized Services
BP.119	Generation of Dynamic Bills of Materials
BP.120	3D Print / Rapid Prototyping
BP.121	Digital Packaging on Demand
BP.153	Bar coding/RFID
BP.165	Convergence of SCOR with Lean and Six Sigma

(example still with SCOR 11.0)

# Reliability Level 2 Metric: Table Detail

<b>Metric:</b>	<b>RL.2.1 Percent of Orders Delivered in Full</b>
<b>Definition:</b>	Percentage of orders in which all of the items are received by the customer in the quantities committed.
<b>Calculation:</b>	$\frac{[\text{Total number of orders delivered in full}]}{[\text{total number of orders delivered}]} \times 100\%$
<b>Data Collection:</b>	Data driven from SCOR order delivery (deliver), inventory availability (make), and shipment and customer receiving processes (source)
<b>Discussion:</b>	Order quantities are based on item/quantity original commitments agreed to by the customer.
<b>Diagnostic Level 3 Metrics:</b>	<ul style="list-style-type: none"><li>• RL.3.33 Delivery item accuracy</li><li>• RL.3.35 Delivery quantity accuracy</li></ul>

# Reference Sections - RL.2.1

Hierarchy	
RL.3.33	Delivery Item Accuracy
RL.3.35	Delivery Quantity Accuracy
Processes	
sD1.3	Reserve Inventory and Determine Delivery Date
sD1.12	Ship Product
sD1.13	Receive and verify Product by Customer
sD2.3	Reserve Inventory and Determine Delivery Date
sD2.12	Ship Product
sD3.3	Enter Order, Commit Resources & Launch Program
sD3.12	Ship Product
sD3.13	Receive and verify Product by Customer
Practices	
BP.017	Distribution Planning
BP.019	Demand Planning
BP.022	MRP I
BP.144	Purchase Order Management
BP.145	Vendor Collaboration

# Reliability Level 3 Metric: Table Detail (example)

RL.3.33	<p>Delivery Item Accuracy Percentage of orders in which all items ordered are the items actually provided, and no extra items are provided</p>	<ul style="list-style-type: none"> <li>• sD1.2 Receive, Enter, and Validate Order</li> <li>• sD1.4 Consolidate Orders</li> <li>• sD1.11 Load Vehicle and Generate Shipping Documents</li> <li>• sD1.12 Ship Product</li> <li>• sD1.13 Receive and verify Product by Customer</li> <li>• sD2.2 Receive, Configure, Enter and Validate Order</li> <li>• sD2.4 Consolidate Orders</li> <li>• sD2.11 Load Product &amp; Generate Shipping Docs</li> <li>• sD2.12 Ship Product</li> <li>• sD2.13 Receive and verify Product by Customer</li> <li>• sD3.3 Enter Order, Commit Resources &amp; Launch Program</li> <li>• sD3.6 Route Shipments</li> <li>• sD3.11 Load Product &amp; Generate Shipping Docs</li> <li>• sD3.12 Ship Product</li> <li>• sD3.13 Receive and verify Product by Customer</li> </ul>
RL.3.34	<p>Delivery Location Accuracy Percentage of orders which is delivered to the correct location and customer entity</p>	<ul style="list-style-type: none"> <li>• sD1.2 Receive, Enter, and Validate Order</li> <li>• sD1.4 Consolidate Orders</li> <li>• sD1.11 Load Vehicle and Generate Shipping</li> </ul>

# Strategic Responsiveness Metric

**Metric:** **RS.1.1 Order Fulfillment Cycle Time**

**Definition:** The average actual cycle time consistently achieved to fulfill customer orders. For each individual order, this cycle time starts from the receipt and ends with the customer acceptance of the order (delivery). The unit of measure is days.



**Calculation:**  $[\text{Sum Actual Cycle Times For All Orders Delivered}] / [\text{Total Number Of Orders Delivered}]$

**Diagnostic Metrics:**

- RS.2.1 Source Cycle Time
- RS.2.2 Make Cycle Time
- RS.2.3 Deliver Cycle Time (RS.2.4-Retail; RS.2.5-Return)
- RS.3.96 Pick Product Cycle Time

**Notes:** Order Fulfillment Cycle Time includes **dwell time**. Dwell time is the time no value add activities are performed on the order or product, imposed by customer requirements.

# Strategic Agility Metrics

**Metric:** **AG.1.1 Upside Supply Chain Adaptability**

**Definition:** The maximum sustainable percentage increase in quantity delivered that can be achieved in 30 days



**Calculation:** SC Flexibility is the minimum time required to achieve the unplanned sustainable increase when considering Source, Make and Deliver components and Return.

**Diagnostic Metrics:**

- AG.2.1 Upside Source Adaptability
- AG.2.2 Upside Make Adaptability
- AG.2.3 Upside Deliver Adaptability
- AG.2.4 / AG.2.5 Upside Source/Deliver Return Adaptability

**Notes:** This metric may have more than one Source, Make and Deliver Flexibility component depending on the complexity of the supply chain.

# Strategic Agility Metrics

**Metric:** **AG.1.2 Downside Supply Chain Adaptability**

**Definition:** The reduction in quantities ordered sustainable at 30 days prior to delivery with no inventory or cost penalties. Adaptability is expressed as a percentage of current run-rate.



**Calculation:** Downside: Percentage sustainable reduction (sS, sM, sD, sR)

**Diagnostic Metrics:**  
**(examples)**

- AG.2.6 Downside Source Adaptability
- AG.2.7 Downside Make Adaptability
- AG.2.8 Downside Deliver Adaptability

**Notes:** The calculation of Supply Chain Adaptability requires the calculation to be the least quantity sustainable when considering Source, Make, Deliver and Return components.

# Strategic Agility Metrics

**Metric:** **AG.1.3 Overall Value @ Risk (VAR)**

**Definition:** SC VAR is the sum of the probability of risk events times the monetary impact of the events which can impact any core supply chain functions (e.g. Plan, Source, Make, deliver and Return)



**Calculation:**  $VaR = \text{Probability of Risk Event (P)} \times \text{Monetized Impact of Risk Event (I)}$

**Diagnostic Metrics:**

- AG.2.9 Supplier's/Customer's/Products' Risk Rating
- AG.2.10 Value at Risk (Plan)
- AG.2.11 Value at Risk (Source)
- AG.2.12 Value at Risk (Make)
- AG.2.13 Value at Risk (Deliver)
- AG.2.14 Value at Risk (Return)
- AG.2.15 Time to Recovery

**Notes:** The effort of measuring VaR on periodic basis can provide organizations with an ability to mitigate or respond effectively to external and internal disruption events

# Strategic Cost Metrics

**Metric:** **CO.1.1 Total SCM Cost**

**Definition:** The sum of the costs associated with the SCOR Level 2 processes to Plan, Source, Deliver, and Return. Cost of Raw Material and Make Costs are generally accounted for in COGS. It is recognized that there is likely to be overlap / redundancy between supply chain management costs and COGS



**Calculation:** TSCM is calculated as the sum of:

- CO.2.1 Planning Cost / CO.2.2 Sourcing Cost
- CO.2.3 Make Cost / CO.2.4 Deliver Cost
- CO.2.5 Return Cost / **CO.2.6 Mitigation Cost (related to special cause «variation» not predictable)**

**Diagnostic Metrics:**

- All of the above in calculation
- CO.2.6 Mitigation Cost: The sum of the costs associated with managing non-systemic risks that arise from special cause variations within the supply chain

**Notes:** TSCM Cost can be measured per event and at aggregated SC level. At transactional level requires ABC Activity based costing

# COGS (now is a lev.2 metrics)

**Metric:** **CO.1.2 Cost of Goods Sold**

**Definition:** The cost associated with buying raw materials and producing finished goods. This cost includes direct costs (labor, materials) and indirect costs (overhead).



**Calculation:** [Cost of Goods Sold is calculated as the sum of:  
 $COGS = \text{direct material costs } CO.2.7 + \text{direct labor costs } CO.2.8 + \text{indirect costs related to making product } CO.2.9$

**Diagnostic Metrics:** Lev.2:  
CO.2.7 Direct Labor Cost  
CO.2.8 Direct Matl Cost  
CO.2.9 Indirect Cost related to Production

**Notes:** Cost of Raw Material and Make Costs are generally accounted for in COGS. It is recognized that there is likely to be overlap/ redundancy between Total Supply Chain Management Cost and COGS.

# Strategic Asset Metrics

Metric: **AM.1.1 Cash-to-Cash Cycle Time**

Definition: The time it takes for an investment made to flow back into the company after it has been spent in RMs. For services, from the payment of resources to the point the company receives payment from the customer.



Calculation:  $[Inventory\ Days\ of\ Supply] + [Days\ Sales\ Outstanding] - [Days\ Payable\ Outstanding]$

Diagnostic Metrics:

- AM.2.1 Days Sales Outstanding (DSO)
- AM.2.2 Inventory Days of Supply (IDOS)
- AM.2.3 Days Payable Outstanding (DPO)

Notes: For services, the time between paying the resources assigned to a service and receiving payment for the service delivery.

# Strategic Asset Metrics

Metric: **AM.1.2 Return on Supply Chain Fixed Assets**

Definition: The return an organization receives on its invested capital in supply chain fixed assets. This includes the fixed assets used to Plan, Source, Make, Deliver and Return. Examples of fixed assets include land, buildings, machinery, trucks



Calculation: 
$$\frac{([\text{Supply Chain Revenue AM.2.4}] - [\text{TCTS}^*])}{[\text{Supply Chain Fixed Assets AM.2.5}]}$$

- Diagnostic Metrics:
- AM.3.11 Deliver Fixed Assets Value
  - AM.3.18 Make Fixed Assets Value
  - AM.3.20 Plan Fixed Asset Value
  - AM.3.27 Source Fixed Assets Value
  - AM.3.24 Return Fixed Asset Value

Notes: Supply-Chain Revenue is the operating revenue generated from a supply chain. This does not include non-operating revenue, such as investments, etc. which go in the "Net revenue"

# Strategic Asset Metrics

**Metric:** **AM.1.3 Return on Working Capital**

**Definition:** Return on working capital assesses the magnitude of investment relative to a company's working capital position versus the revenue generated from a supply chain.



Components include accounts receivable, accounts payable, inventory, SC revenue and supply chain management costs.

**Calculation:**  $([\text{Supply Chain Revenue}] - [\text{TCTS}]^*) / [\text{Working Capital}]$   
i.e  $(\text{WC} = \text{IDO} + \text{IRO} - \text{IPO})$

**Diagnostic Metrics:**

- AM.2.6 Payables Outstanding
- AM.2.7 Sales Outstanding
- AM.2.8 Inventory

**Notes:** Supply-Chain Revenue is the operating revenue generated from a supply chain. This does not include non-operating revenue, such as investments, etc..

\* TCTS i.e. TSCMC CO.1.1 + COGS CO.1.2

# What is Benchmarking:

- **Qualitative Benchmarking**
  - Comparing best practices among organizations
  - Maturity Assessments
- **Quantitative Benchmarking**
  - Comparing levels of measured performance
  - Assessment of Performance Gaps
- **Competitive Benchmarking**
  - Quantitative Benchmarking between companies
  - Identifies superior relative performance
- **Process Benchmarking**
  - Based on business processes
  - Identifies the BIC (Best In Class)

# Exercise: Benchmarking

- Create a benchmark for the strategic Cash-to-Cash Cycle Time metric and its three diagnostic metrics (DSO, DPO, IDOS):
  - Use the template provided on the next three slides
  - Your SCOR reference book contains the definitions and calculations. (See Section 1)
  - The provided financial data (from Yahoo Financial) for the 7 companies. Make assumptions as needed.
- Notes:
  - Data provided by Yahoo is not at supply chain level. Supply chain benchmarking should take place at the supply chain level and not at the corporate level. The data does not make this exercise less useful.
  - The exercise simply shows that this type of information is available, as it happens often in real business.



# Exercise: Benchmark (1/3)

- Step 1, Calculate metrics for each company and complete the table

	DSO	DPO	IDOS	C2C
Company 1				
Company 2				
Company 3				
Company 4				
Company 5				
Company 6				
Company 7				



DSO = Days Sales Outstanding, DPO = Days Payables Outstanding, IDOS = Inventory Days of Supply, C2C = Cash to Cash Cycle time

# Exercise: Benchmark (2/3)

Step 2, Copy and sort (for each metric) the results from the previous slide

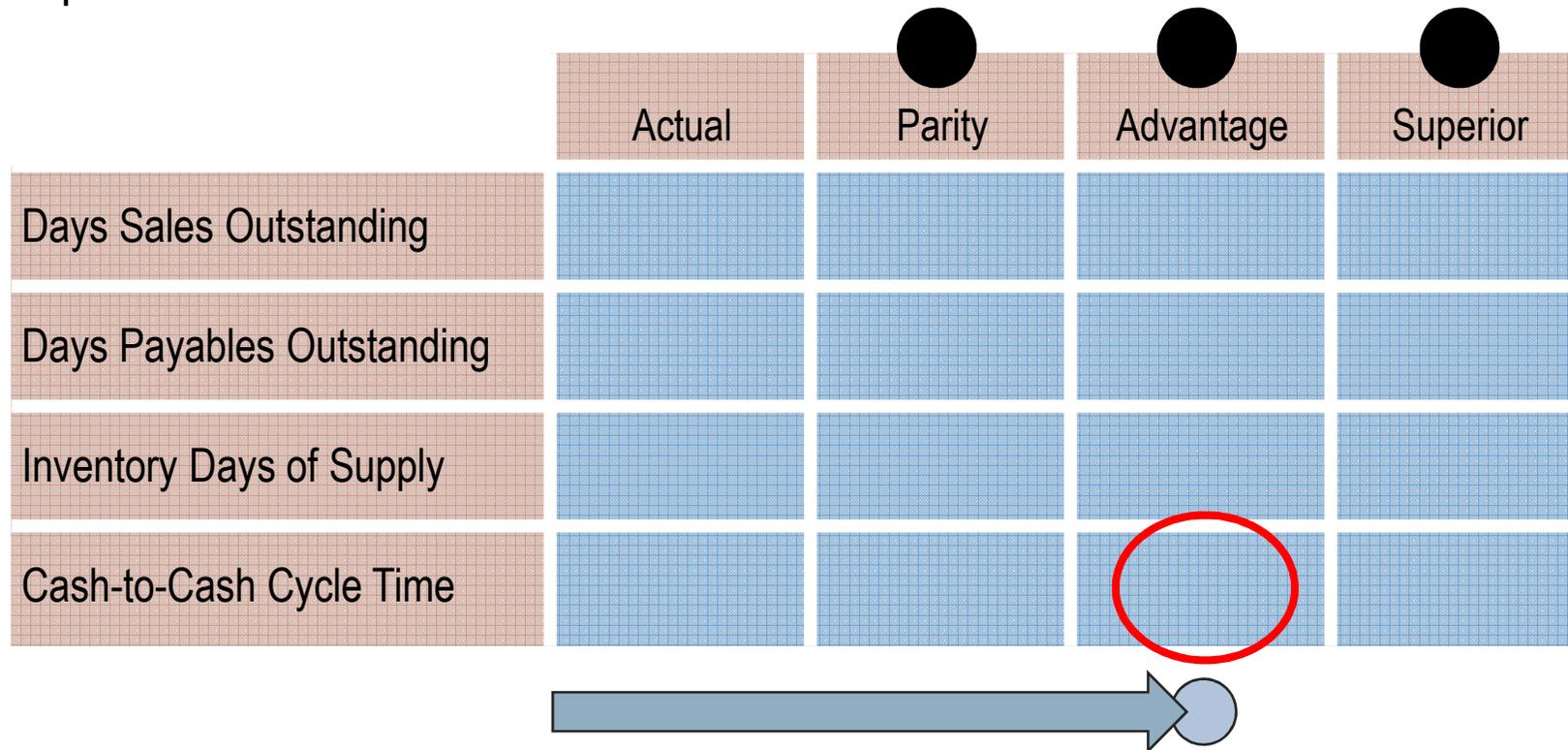
		DSO	DPO	IDOS	C2C	
Sort results from previous table	Best					● Superior
	Median					● Parity
	Worst					

DSO = Days Sales Outstanding, DPO = Days Payables Outstanding, IDOS = Inventory Days of Supply, C2C = Cash to Cash Cycle time

# Exercise: Benchmark (3/3)

- Step 3, Copy the results from the previous table
- Your objective will be to identify the Gap to reach an **Advantage** Market position

	Actual	Parity	Advantage	Superior
Days Sales Outstanding				
Days Payables Outstanding				
Inventory Days of Supply				
Cash-to-Cash Cycle Time				



# Exercise solution: Benchmark (1/3)

- Step 1, Calculate metrics for each company and complete the table

	DSO	IDOS	DPO	C2C
Company 1	45.7	44.4	42.3	47.8
Company 2	65.6	4.0	33.9	35.7
Company 3	58.6	45.1	40.8	62.9
<b>Company 4 GG</b>	41.2	67.2	25.8	82.6
Company 5	59.9	71.9	48.2	83.6
Company 6	64.8	22.5	82.4	4.9
Company 7	69.2	60.4	154.9	-25.3



DSO = Days Sales Outstanding, DPO = Days Payables Outstanding, IDOS = Inventory Days of Supply, C2C = Cash to Cash Cycle time

# Exercise solution: Benchmark (2/3)

Step 2, Copy and sort (for each metric) the results from the previous slide

		DSO	IDOS	DPO	C2C	
Sort results from previous table	Best	41.2	4.0	154.9	-25.3	● Superior
		45.7	22.5	82.4	4.9	
		58.6	44.4	48.2	35.7	
	Median	59.9	45.1	42.3	47.8	● Parity
		64.8	60.4	40.8	62.9	
		65.6	67.2	33.9	82.6	
		69.2	71.9	25.8	83.6	
	Worst					

DSO = Days Sales Outstanding, DPO = Days Payables Outstanding, IDOS = Inventory Days of Supply, C2C = Cash to Cash Cycle time

# Exercise: Benchmark (3/3)

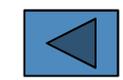
- Step 3, Copy the results from the previous table. Start with Superior, the Parity and then Advantage is in between S and P.

	Actual Company 4 GG	● Parity	● Advantage	● Superior
Days Sales Outstanding	41	60	50	41
Inventory Days of Supply	67	45	25	4
Days Payables Outstanding	26	42	98	155
Cash-to-Cash Cycle Time	83	48	12	-25

 **GAP to Fill: 83 - 12 = 71 days**



The data P, A, S are available from the Benchmark study resources



# Exercises: The Dinner Party

- How do you measure the success for a dinner party (on site kitchen)? For each performance attribute describe 1 or 2 metrics that are measurable and considered key performance indicators. (Use your own words)
  - Reliability
  - Responsiveness
  - Agility
  - Cost
  - Asset Management
- What would you consider good performance for each?



# SCOR Framework

## Review of SCOR Practices

# Introduction to SCOR *Practices*: Definition

The *Practices* section of the SCOR reference manual provides a collection of industry-neutral practices companies have recognized for their value. A practice is a unique way to configure a process or set of processes.

# Four Types of SCOR *Practices*: Definitions



- **Emerging practice:** a practice that introduces new technology, knowledge, or radically different ways of organizing processes
- **Best practices:** practices that are current, structured, and repeatable and have a proven and positive impact on supply chain performance
- **Standard:** practices that have been used by a wide range of businesses over a long period of time and that produce acceptable, positive results
- **Declining:** practices that have been used for long periods of time but have become obsolete and even harmful to business and supply chain performance

# Four Types of SCOR *Practices*: Definitions

TOTAL OF ABOUT 200 PRACTICES

PRACTICES must be:

**current** – not emerging not obsolete

**structured** – feature a clear goal, scope

**proven** – demonstrated in a working environment

**repeatable** – proven in multiple org.s and industries

**EMERGING** (high risk / high result) - BP.176 Omni-channel, BP.177 Additive Manufacturing, BP.178 Block Chain, BP.179 Demand Driven MRP, BP.180 Demand Driven S&OP, BP.181 Digital Supply Chain, BP.182 Internet of Things

**BEST** (moder.risk / moder.result); BP.173 Supply Chain Risk Monitoring, BP.174 Supply Chain Risk Assessment, BP.187 Supply Chain Finance

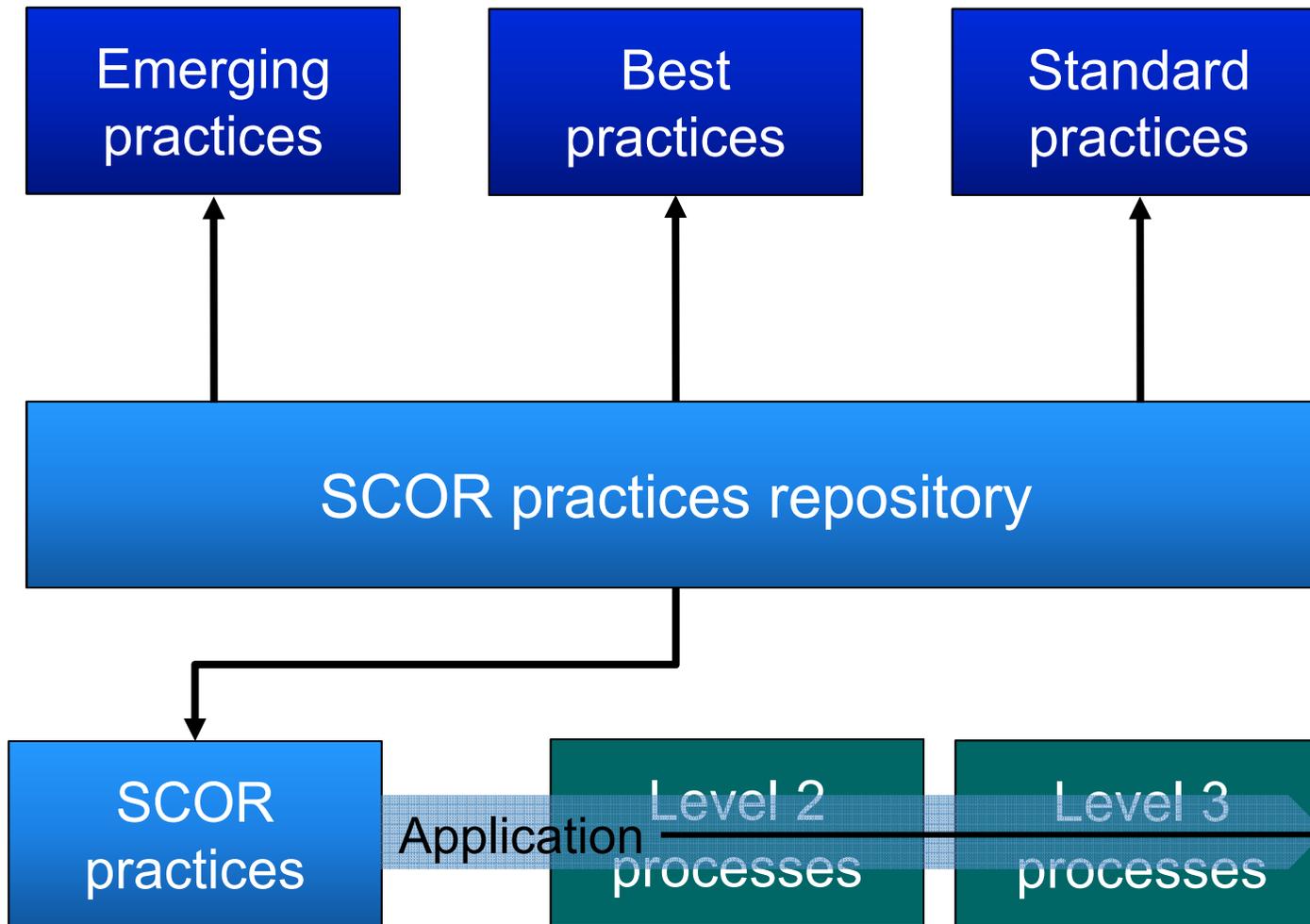
**STANDARD** (low risk / low result); BP.018 ABC Inv.classification

# Classification of *Practices*

Practices by classifications:

- business process analysis/improvement
- customer support
- distribution management
- Information/data management
- inventory management
- material handling
- new product introduction
- order engineering (ETO)
- order management
- people management (training)
- planning and forecasting
- product lifecycle management
- Production execution
- Purchasing/procurement
- reverse logistics
- risk/security management
- sustainable supply chain management
- transportation management
- warehousing

# Levels of SCOR Practices



# Best Practice Selection

Are all best practices equally important for you?

- SCOR contains more than 170 practices today: do you need all?
- Implement a best practice IF it makes sense for your specific processes, business, or industry.

	Low effort/risk	High effort/risk
High return	quick wins	Sponsor issue
Low return	nice to have	consider carefully

How to determine fit?

- Assign each best practice a pin.
- Determine risk, investment.
- Determine return.
- Push the pin in the resulting quadrant.
- Some pins may not make the table at all if they are not appropriate for your supply chain, business or industry.

# SCOR Framework

## Review of SCOR People

# Introduction to SCOR *People*: Definition

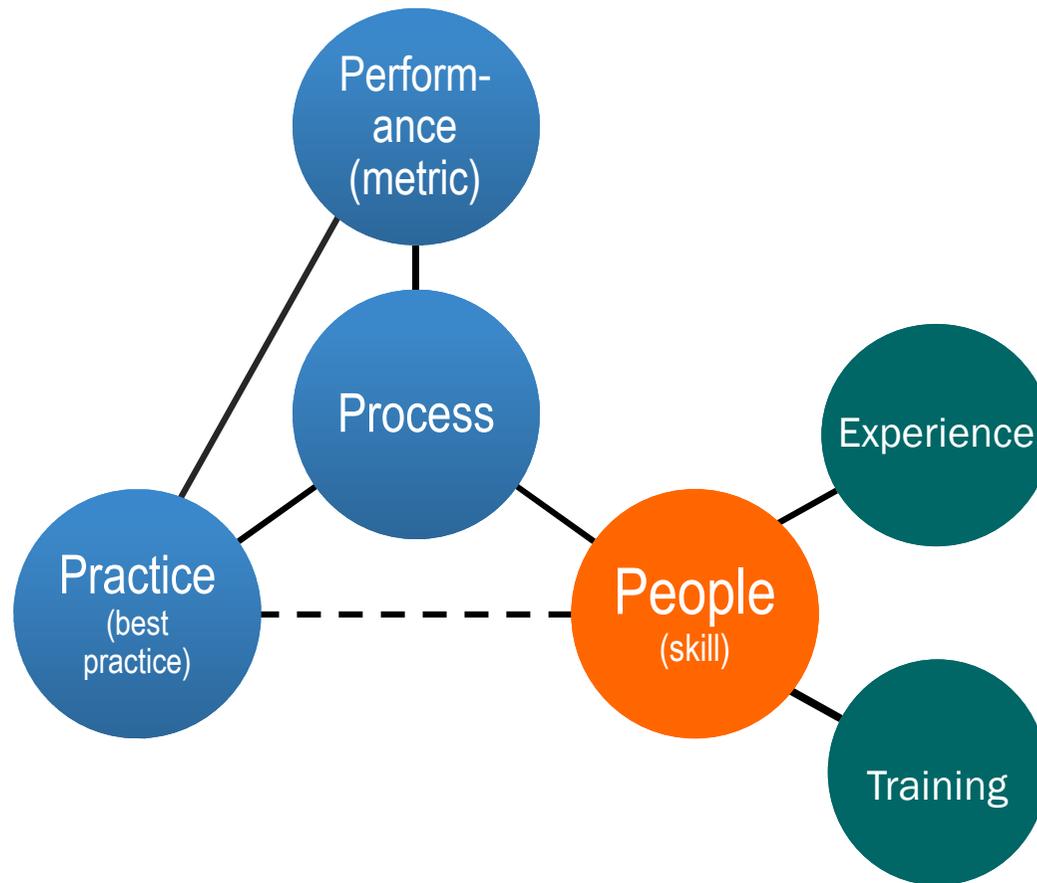
The *People* section of the SCOR reference manual introduces standards for managing talent in the supply chain. This skills management framework within SCOR compliments process reference, metrics reference, and practice reference components with an integrated view of supply chain skills.

# Key Elements of the *People* Section



- ***Skill:*** Capacity to deliver pre-determined results with minimal input of time and energy
- ***Experience:*** The knowledge or skill acquired by observation or active participation
- ***Training:*** A particular skill or type of behavior learned through instruction over a period of time
- ***Competency level:*** The state or quality of being qualified, having the ability, to perform a specific role

# Defining Skills



- Each skill is defined by its description
- And by association to: experiences, training
- Experiences, training, are not directly connected to any other framework element.

# Skills: example

HS.0010 Basic Finance	
Working knowledge and ability to effectively interpret and communicate general financial accounting practices and principles which maintain company and regulatory compliance.	
<b>Processes</b>	
sP2.3	Balance Product Resources with Product Requirements
sS3.1	Identify Sources of Supply
sS3.2	Select Final Supplier and Negotiate
sS3.3	Schedule Product Deliveries
sE2	Manage Performance
<b>Experiences</b>	
HE.0004	Advanced Financial Accounting Principles
HE.0010	Basic Finance
HE.0047	Cost/Price Analysis
HE.0101	Financial Collaboration
HE.0102	Financial Planning
HE.0230	Sales and Operations Planning (S&OP)
HE.0268	Utilizing Finance Systems
<b>Trainings</b>	
HT.0012	Basic legal process (embargo, black list)
HT.0014	Basic Supply Chain Finance
HT.0016	Business Ethics/Conduct training
HT.0035	Credit Management
HT.0055	Exception Management
HT.0102	Negotiation Skills
HT.0109	Product Specific Training
<b>Practices</b>	
BP.131	Alternative Supplier Benchmarking
BP.132	Issue Invitation to Tender (Quote)
BP.134	Supplier Evaluation using Robust Evaluation Tool
BP.144	Purchase Order Management
BP.145	3-Way Delivery Verification

# SCOR FRAMEWORK

Review of SustainableSCOR

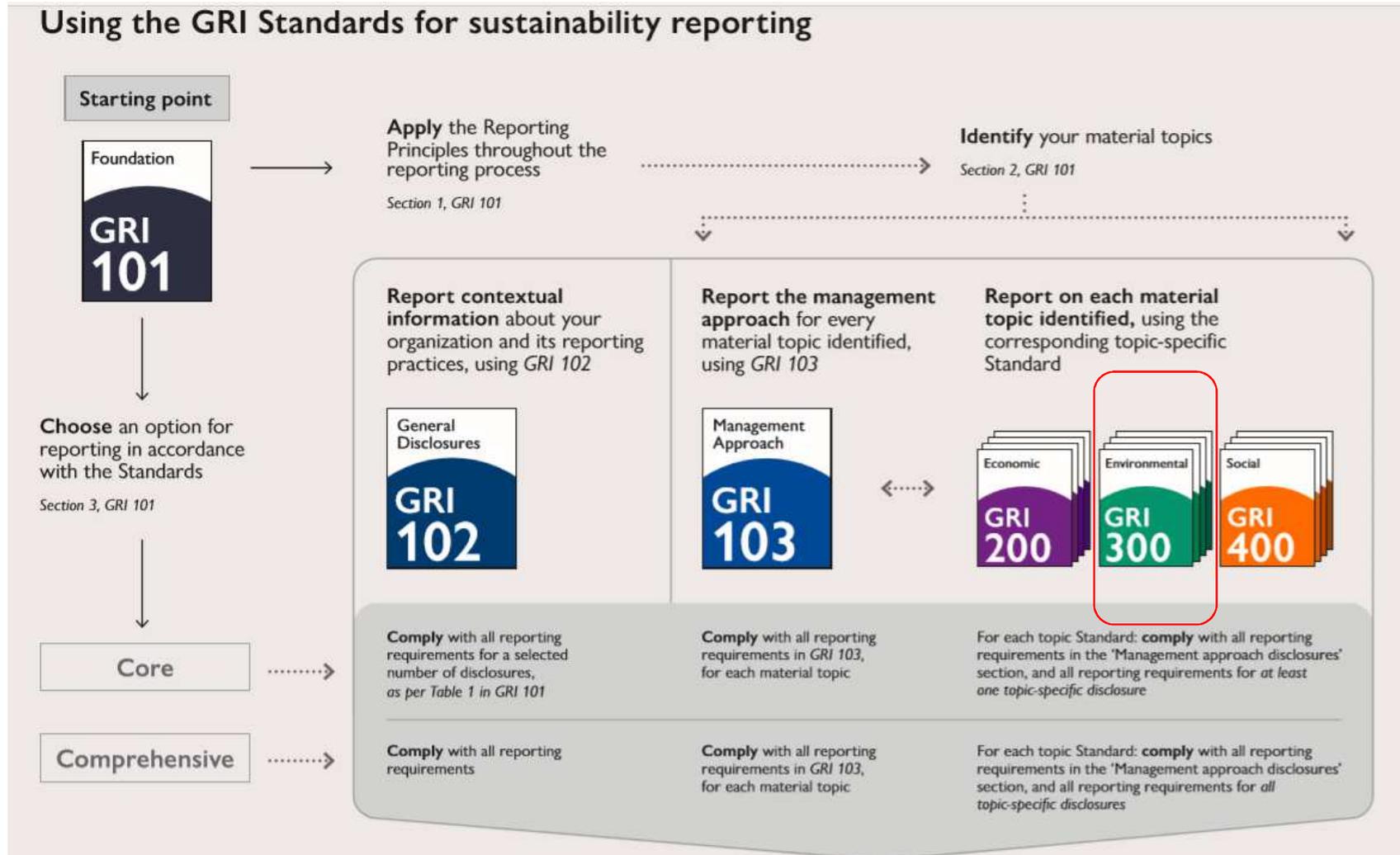
# Introduction to SustainableSCOR: Definition

The SustainableSCOR section, within *Special Applications*, of the SCOR reference manual introduces a set of strategic environmental metrics that effectively allow the SCOR model to be used as a framework for environmental accounting.

GRI Standards are free to use and are available at [www.globalreporting.org/standards](http://www.globalreporting.org/standards).



# GRI – Global Reporting Initiative



# Concepts around sustainable SCOR / GRI

**Reduce**

**Reuse**

**Recycle**

- *Materials used*
- *Non renewable matls used*
- *Renewable matls*
- *% of recycled Input matls*
- *% reclaimed Prods & Pkg Matls*
- *Total SC Energy consumed*
- *Total SC Non renewable Energy consumed (from Oil, natural Gas, etc)*
- *Renewable SC energy (solar, hydro, biomass, geo)*
- *Water withdrawn (oceans, seas, lakes, rivcers, rain, etc)*
- *Water used/recycled*
- *GHG emissions (CO2, gas) Direct/Indirect*

# Sustainable SCOR: GRI

Most of the data are relevant to the Environmental management – **GRI 300** Stds

GRI 301 – Materials

GRI 302 – Energy

GRI 303 – Water / Effluents

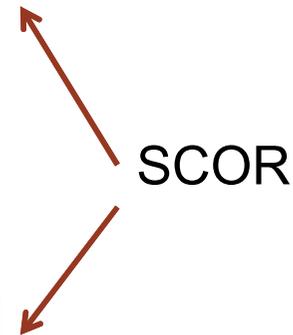
GRI 304 – Biodiversity

GRI 305 – Emissions

GRI 306 – Effluents / Waste

GRI 307 – Environmental compliance

GRI 308 - Supplier environmental assessment



# Sustainable SCOR: example

## Disclosure 305-1 Direct (Scope 1) GHG emissions

### Reporting requirements

The reporting organization shall report the following information:

- a. Gross direct (Scope 1) GHG emissions in metric tons of CO<sub>2</sub> equivalent.
- b. Gases included in the calculation; whether CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, HFCs, PFCs, SF<sub>6</sub>, NF<sub>3</sub>, or all.
- c. Biogenic CO<sub>2</sub> emissions in metric tons of CO<sub>2</sub> equivalent.
- d. Base year for the calculation, if applicable, including:
  - i. the rationale for choosing it;
  - ii. emissions in the base year;
  - iii. the context for any significant changes in emissions that triggered recalculations of base year emissions.
- e. Source of the emission factors and the global warming potential (GWP) rates used, or a reference to the GWP source.
- f. Consolidation approach for emissions; whether equity share, financial control, or operational control.
- g. Standards, methodologies, assumptions, and/or calculation tools used.

Disclosure  
305-1

2.1 When compiling the information specified in Disclosure 305-1, the reporting organization shall:

- 2.1.1 exclude any GHG trades from the calculation of gross direct (Scope 1) GHG emissions;
- 2.1.2 report biogenic emissions of CO<sub>2</sub> from the combustion or biodegradation of biomass separately from the gross direct (Scope 1) GHG emissions. Exclude biogenic emissions of other types of GHG (such as CH<sub>4</sub> and N<sub>2</sub>O), and biogenic emissions of CO<sub>2</sub> that occur in the life cycle of biomass other than from combustion or biodegradation (such as GHG emissions from processing or transporting biomass).

# Example of scorecard – Saint Gobain

Indicator	2016	2015	2014	GRI
<b>ENVIRONMENT</b>				
<b>ENVIRONMENTAL MANAGEMENT</b>				
Total environmental expenditure, of which*:	127.1 M€	127.4 M€	123.6 M€	EN31
◆ Salaries and other payroll expenses for environmental officers	26.1 M€	27.0 M€	25.1 M€	
◆ ISO 14001 and EMAS environmental certification and renewal costs	3.5 M€	2.6 M€	2.9 M€	
◆ Environmental taxes	6.9 M€	5.8 M€	8.9 M€	
◆ Insurance and warranties	8.4 M€	6.1 M€	4.3 M€	
◆ Environmental fines	0.3 M€	0.1 M€	0.1 M€	EN29
◆ Cost of environmental incidents	3.9 M€	0.3 M€	0.9 M€	
◆ Cost of technical measures	6.7 M€	6.0 M€	7.1 M€	
◆ Environmental R&D budget	59.7 M€	61.8 M€	59.0 M€	
◆ Soil decontamination, site remediation and other clean-up costs	18.4 M€	17.7 M€	15.1 M€	
Capital expenditure on environmental protection measures	78.8 M€	63.3 M€	52.1 M€	
<b>RAW MATERIALS AND PRODUCTION WASTE</b>				
Quantity of non-recovered production waste from the concerned sites*	0.482 Mt	0.469 Mt	0.490 Mt	EN23
Quantity of non-recovered hazardous production waste from the concerned sites*	0.029 Mt	0.033 Mt	0.036 Mt	EN23
Consumption of primary raw materials in glass furnaces, concerned sites*	6.50 Mt	6.50 Mt	6.47 Mt	
Consumption of cullet in glass furnaces, concerned sites* <i>The internal cullet is the cullet generated and reused in the same industrial site.</i>	1.72 Mt of internal cullet, and 1.17 Mt of external cullet	1.69 Mt of internal cullet 1.09 Mt of external cullet	1.64 Mt of internal cullet and 0.99 Mt of external cullet	EN2
Percentage of ton of finished product from primary melt of cast iron produced, concerned sites*	82.1%	83.2%	77.7%	EN2
Percentage of recycled material in each ton of finished product of cast iron produced, concerned sites*	45%	42%	44%	EN2
Percentage of recycled material in each ton of finished product of gypsum produced, concerned sites*	34%	36%	36%	EN2
<b>ENERGY</b>				
Total energy consumption of concerned sites*	147,543 TJ	147,026 TJ	148,732 TJ	EN3
Total energy consumption of entire Group at actual scope of reporting**	161,588 TJ	156,308 TJ	202,840 TJ	EN3
Annual variation in energy consumption of entire Group at scope**	5,280 TJ (+3.4%)	(46,532) TJ (-22.9%)	(10,006) TJ (-4.7%)	EN6
Total indirect energy consumption of entire Group at actual scope**	35,177 TJ	33,289 TJ	39,826 TJ	EN3
Annual variation in indirect energy consumption of entire Group at actual scope**	1,888 TJ (+5.7%)	(6,537) TJ (-16.4%)	(3,662) TJ (-8.4%)	EN6
Electricity consumption of entire Group at actual scope**	34,370 TJ	32,501 TJ	38,767 TJ	EN3
Steam and hot water consumption of entire Group at actual scope**	794 TJ	789 TJ	1,060 TJ	EN3
Direct total energy consumption of entire Group at actual scope**	126,412 TJ	123,019 TJ	163,014 TJ	EN3
Annual variation in direct total energy consumption of entire Group at actual scope**	3,393 TJ (+3%)	(39,995) TJ (-25%)	(6,444) TJ (-4%)	
Coal and coke consumption of entire Group at actual scope**	20,066 TJ	21,485 TJ	27,550 TJ	EN3
Natural gas consumption of entire Group at actual scope**	88,889 TJ	87,322 TJ	114,783 TJ	EN3
Petroleum products consumption of entire Group at actual scope**	12,641 TJ	12,037 TJ	20,454 TJ	EN3

# SUSTAINABILITY MODEL

## KPI's example

### *emissions*

Indicator	2016	2015	2014	GRI
<b>ENVIRONMENT</b>				
Indirect emissions of greenhouse gases (purchases of electricity, steam, hot water) for the entire Group of the concerned sites*	3.2 Mt eq.CO <sub>2</sub>	3.3 Mt eq.CO <sub>2</sub>	3.5 Mt eq.CO <sub>2</sub>	EN16
Indirect emissions of greenhouse gases (purchases of electricity, steam, hot water) for the entire Group at actual scope**	3.6 Mt eq.CO <sub>2</sub>	3.5 Mt eq.CO <sub>2</sub>	4.2 Mt eq.CO <sub>2</sub>	EN16
Annual variation of indirect emissions of greenhouse gases (purchases of electricity, steam, hot water) for the entire Group at actual scope**	0.1 Mt eq.CO <sub>2</sub> (+3%)	(0.7) Mt eq.CO <sub>2</sub> (-17%)	(0.6) Mt eq.CO <sub>2</sub> (-13%)	EN19
CO <sub>2</sub> impact on Group annual turnover (value in 2010: 0.47 kg CO <sub>2</sub> /€)	0,34 kgCO <sub>2</sub> /€	0,33 kgCO <sub>2</sub> /€	0,40 kgCO <sub>2</sub> /€	EN18
<b>OTHER AIR EMISSIONS</b>				
SO <sub>2</sub> emissions from the concerned sites in the Pipe and Glass Activities*	11,187 t	13,150 t	15,230 t	EN21
NO <sub>x</sub> emissions from the concerned sites in the Pipe and Glass Activities*	17,824 t	18,679 t	19,972 t	EN21
Dust emissions from the concerned sites of the Pipe and Glass Activities*	3,140 t	5,201 t	7,810 t	EN21
<b>WATER</b>				
Water withdrawal from the concerned sites*	50.9 M of m <sup>3</sup>	64.0 M of m <sup>3</sup>	63.9 M of m <sup>3</sup>	EN8
Total water withdrawal for the entire Group at actual scope**	53.6 M of m <sup>3</sup>	66.9 M of m <sup>3</sup>	69.7 M of m <sup>3</sup>	EN8
Rainwater withdrawal for the entire Group at actual scope**	0.7 M of m <sup>3</sup>	0.7 M of m <sup>3</sup>	0.7 M of m <sup>3</sup>	EN8
Municipal water withdrawal for the entire Group at actual scope**	15.4 M of m <sup>3</sup>	14.3 M of m <sup>3</sup>	15.9 M of m <sup>3</sup>	EN8
Surface water withdrawals for the entire Group at actual scope**	15.6 M of m <sup>3</sup>	29.6 M of m <sup>3</sup>	28.9 M of m <sup>3</sup>	EN8
Ground water withdrawal for the entire Group at actual scope**	20.3 M of m <sup>3</sup>	19.8 M of m <sup>3</sup>	22.7 M of m <sup>3</sup>	EN8
Total water discharge from concerned sites*	28.0 M of m <sup>3</sup>	37.9 M of m <sup>3</sup>	39.2 M of m <sup>3</sup>	EN22
Total water discharge for the entire Group at actual scope**	29.4 M of m <sup>3</sup>	39.1 M of m <sup>3</sup>	42.8 M of m <sup>3</sup>	EN22
Water discharges into the surrounding environment for the entire Group at actual scope**	19.3 M of m <sup>3</sup>	29.5 M of m <sup>3</sup>	32.1 M of m <sup>3</sup>	EN22
Water discharges into the municipal waste water collection system for the entire Group at actual scope**	9.5 M of m <sup>3</sup>	8.8 M of m <sup>3</sup>	10.2 M of m <sup>3</sup>	EN22

# SUSTAINABILITY MODEL KPI's

## wastes

	2016	2015	2014	GRI
<b>RAW MATERIALS AND PRODUCTION WASTE</b>				
Quantity of non-recovered production waste from the concerned sites*	0.482 Mt	0.469 Mt	0.490 Mt	EN23
Quantity of non-recovered hazardous production waste from the concerned sites*	0.029 Mt	0.033 Mt	0.036 Mt	EN23
Consumption of primary raw materials in glass furnaces, concerned sites*	6.50 Mt	6.50 Mt	6.47 Mt	
Consumption of cullet in glass furnaces, concerned sites* <i>The internal cullet is the cullet generated and reused in the same industrial site.</i>	1.72 Mt of internal cullet, and 1.17 Mt of external cullet	1.69 Mt of internal cullet 1.09 Mt of external cullet	1.64 Mt of internal cullet and 0.99 Mt of external cullet	EN2
Percentage of ton of finished product from primary melt of cast iron produced, concerned sites*	82.1%	83.2%	77.7%	EN2
Percentage of recycled material in each ton of finished product of cast iron produced, concerned sites*	45%	42%	44%	EN2
Percentage of recycled material in each ton of finished product of gypsum produced, concerned sites*	34%	36%	36%	EN2
<b>ENERGY</b>				
Total energy consumption of concerned sites*	147,543 TJ	147,026 TJ	148,732 TJ	EN3
Total energy consumption of entire Group at actual scope of reporting**	161,588 TJ	156,308 TJ	202,840 TJ	EN3
Annual variation in energy consumption of entire Group at scope**	5,280 TJ (+3.4%)	(46,532) TJ (-22.9%)	(10,006) TJ (-4.7%)	EN6
Total indirect energy consumption of entire Group at actual scope**	35,177 TJ	33,289 TJ	39,826 TJ	EN3
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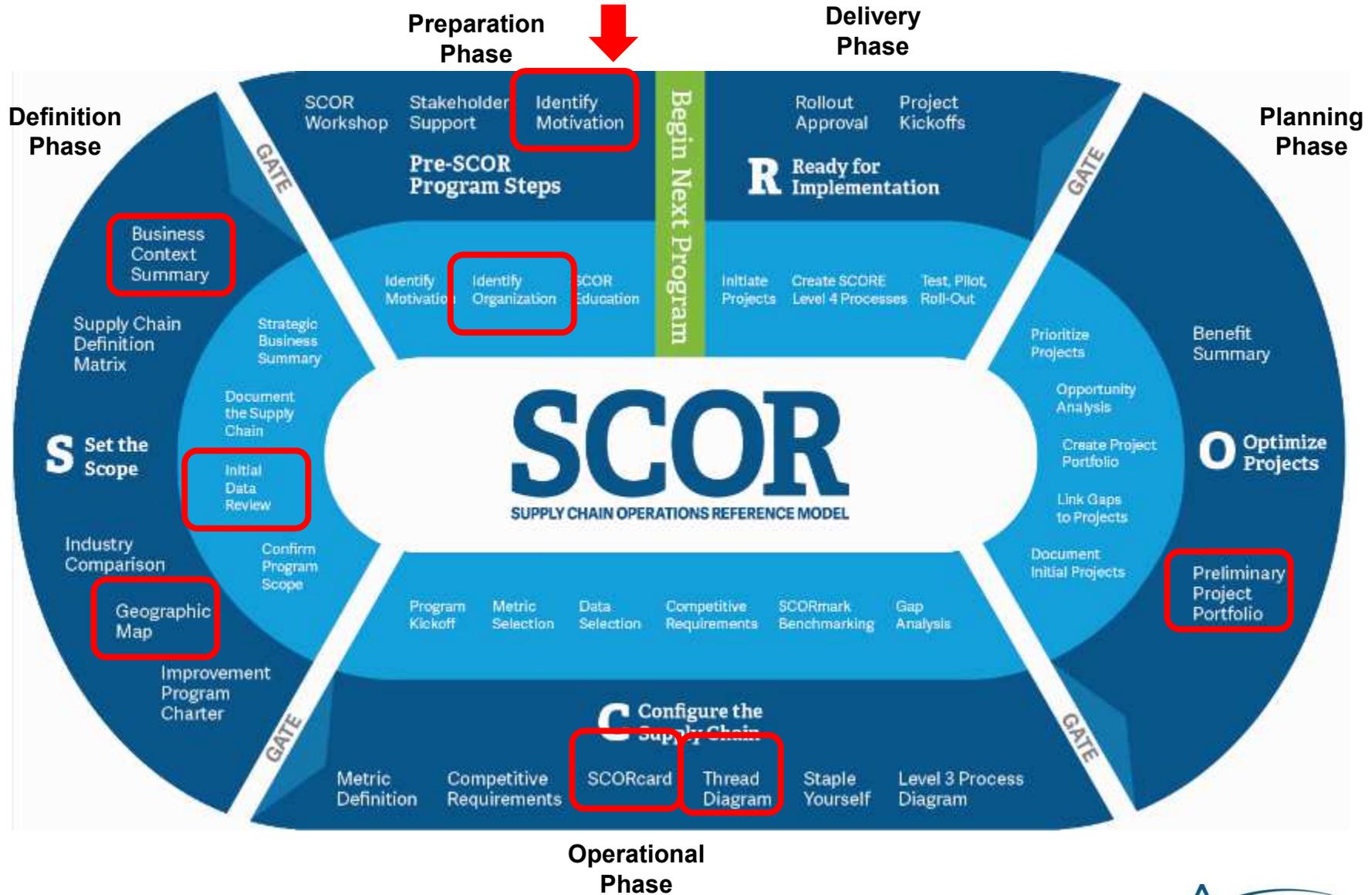
# SCOR Professional Training

## SCOR Improvement Program: Concepts and Practices

# Applying the SCOR Framework

How do project teams use the *SCOR Reference Model* framework to create and continuously apply a program capable of achieving sustainable supply chain improvement?

# SCOR Improvement Program Racetrack



# SCOR Improvement Program Workshop

## Objectives

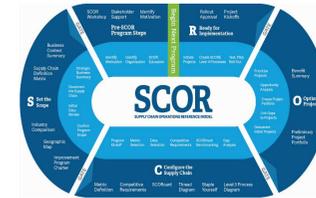


- ▶ Learn how to organize a SCOR supply chain improvement program.
- ▶ Learn how to use the *SCOR Model Reference* framework to develop an effective supply chain improvement program.
- ▶ Develop an understanding of the typical steps of a SCOR improvement program.
- ▶ Develop an understanding of how to use the SCOR supply chain improvement program racetrack.
- ▶ Develop knowledge and skills to complete key implementation program deliverables.
- ▶ Explore a case study illustrating the application of the SCOR program racetrack and the SCOR framework.

# SCOR Professional Training

## Pre-SCOR Improvement Program Steps

# Pre-SCOR Program Steps: Overview



**Objective:** Prepare the organization for the mission critical SCOR improvement program.

## Program Phase Activities



## Key Tasks

- Identify improvement motivation
- Identify internal SCOR program champion
- Identify SCOR team executive sponsor
- Identify SCOR executive team
- Select the SCOR improvement program team
- Conduct SCOR training
- Gain organizational approval

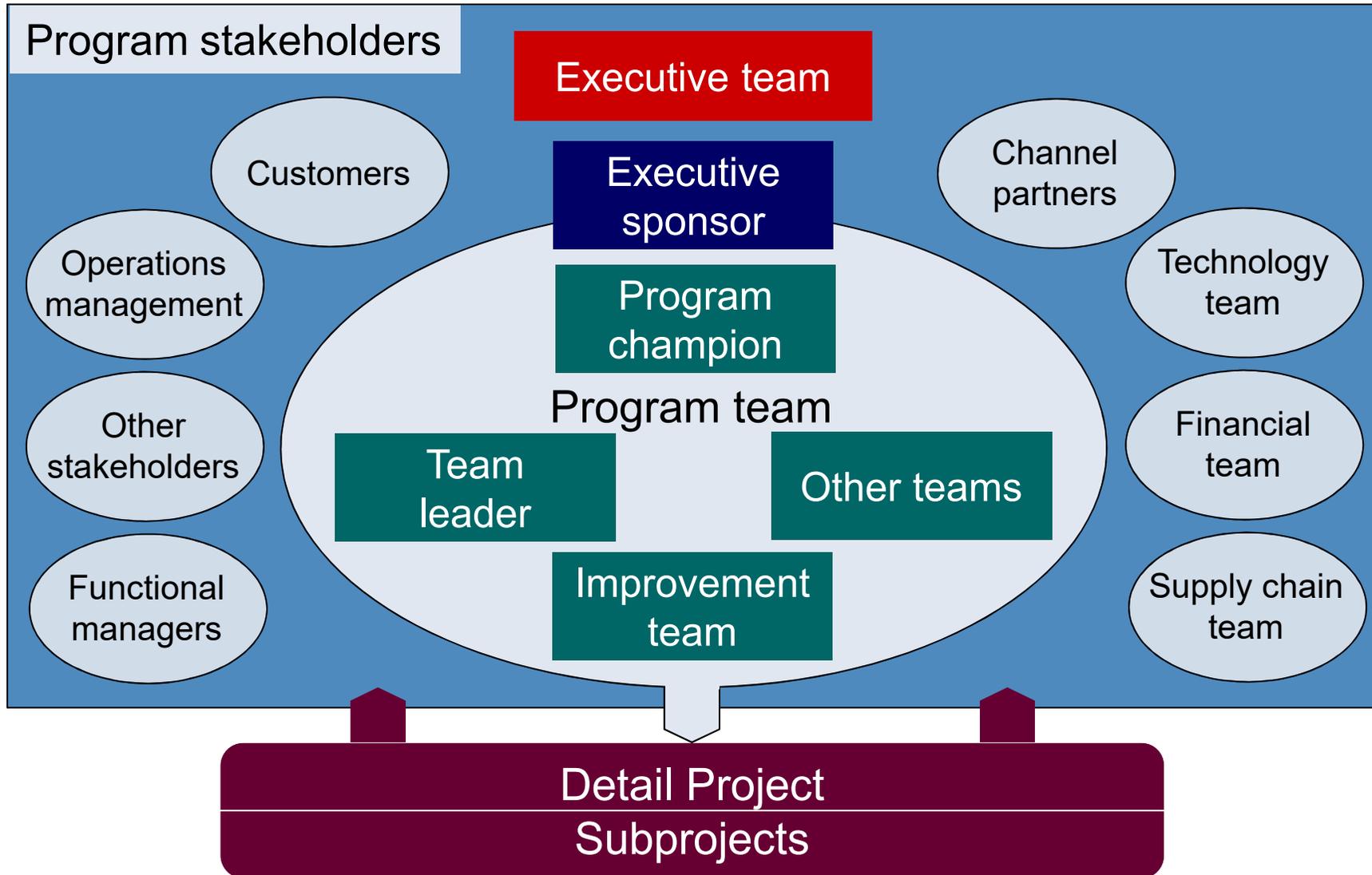
## Deliverables

- Identify motivation
- SCOR program organization
- SCOR-professional training course
- Plan for phase 2—S: *Set the Scope*

# Exercise: What are the Motivations of the Team?

Motivation	SCOR Level 1 Attribute

# SCOR Improvement Program Organization



# SCOR Program Organization Deliverable

## Objective:

Formal definition of the composition, duties, and structure of the SCOR improvement program organization.

## Detail role definition:

For each role:

- Role definition: Definition of each of the major roles in the program
- Identification of roles: Assignment of company individuals to various program roles
- Meeting schedule: Generic description of the activities normally performed by team members during the course of the SCOR improvement program
- Responsibilities: Detail statement of the responsibilities of each SCOR team member for each of the remaining four project phases

# SCOR Professional Training

## Pre-SCOR Case Study

# Case Study: Sample Inc. *Phase 1*



## Business Summary:

**Company:** Distributor, repackager, and private label producer of high end petroleum and chemical products for retail

**Products:**

- Antifreeze and coolants
- Brake fluid
- Cleaners
- Oils and lubricants
- Transmission fluids

**Suppliers:** Bulk purchasing from committed suppliers

**Competition:** Strong competition in generics, limited for private label

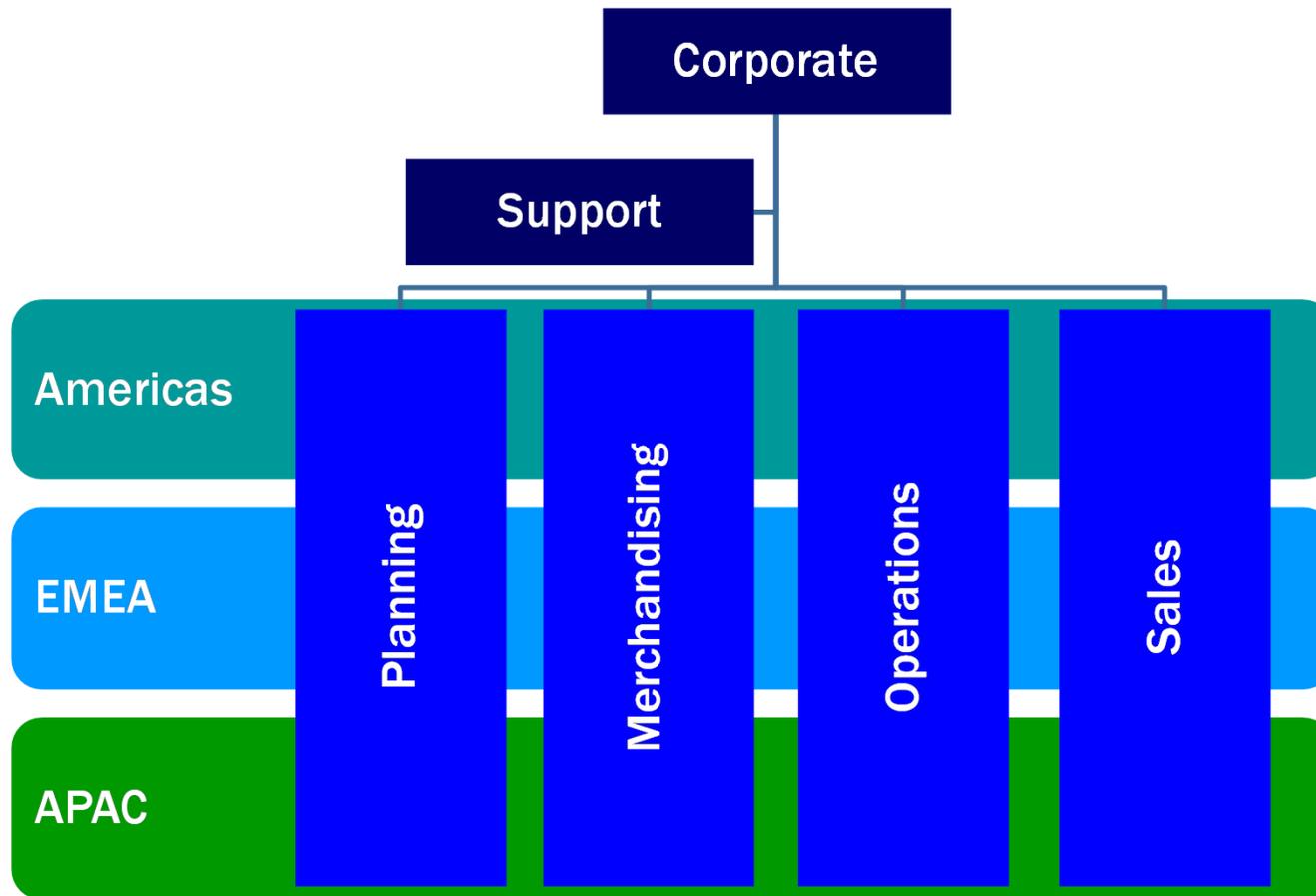
**Organization:** Highly skilled and knowledgeable global staff

**Project:** **Critical supply chain asset management performance problem centered on SCOR cash-to-cash cycle time metric**

# Case Study: Sample Inc. *Phase 1*



## Sample Inc.: Global Organization



Americas= North, Middle and South America, EMEA = Europe, Middle East & Africa, APAC = Asia and Pacific

# Case Study: Sample Inc. *Phase 1*



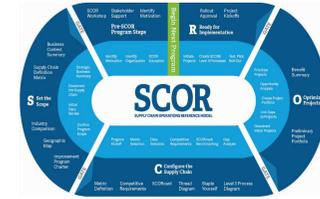
## Sample Inc.: Global Network



# SCOR Professional Training

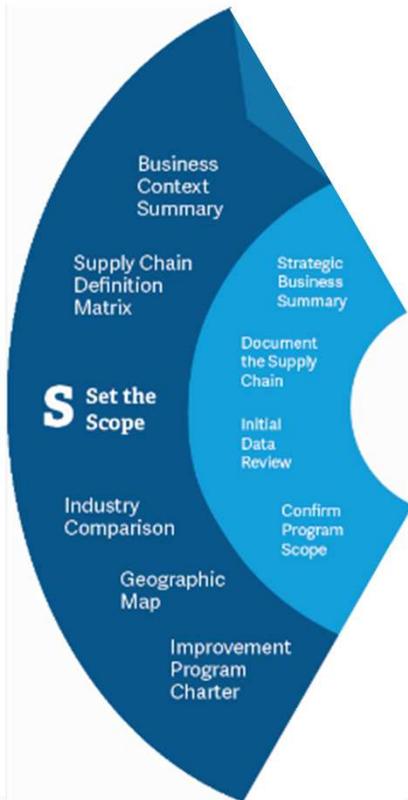
**S: Set the Scope**

# S: Set the Scope Overview



**Objective:** Understand the business environment and define the scope of the supply chain for a SCOR improvement program

## Program Phase Activities



## Key Tasks

- Perform a business context summary
- Document current supply chain
- Collect performance data
- Define the scope of supply chain involvement
- Draft an improvement program charter

## Deliverables

- Business Context Summary
- Supply Chain Definition Matrix
- Industry Comparison
- Geographic Map
- Improvement Program Charter
- Plan for Phase 3

# Business Context Summary Deliverable

Component	Description
Business description	High level description of the company's products, customer base, internal organizational structure, and supply chains
Challenges and opportunities	A summary of company competitive strengths and weaknesses, opportunities, and threats from competitors
Value proposition	How the business and supply chain are providing competitive value to each major customer or customer segment
<b>Critical issues</b>	<b>The performance gaps in reliability, responsiveness, agility, costs, and asset management</b>
Risks	Key organizational and supply chain risks
Financial performance	Current state of company income, assets, liabilities, and profitability expectations
Internal profile	Internal business structure, functions, and performance
External profile	Supply chain and business partners and the customer delivery channel



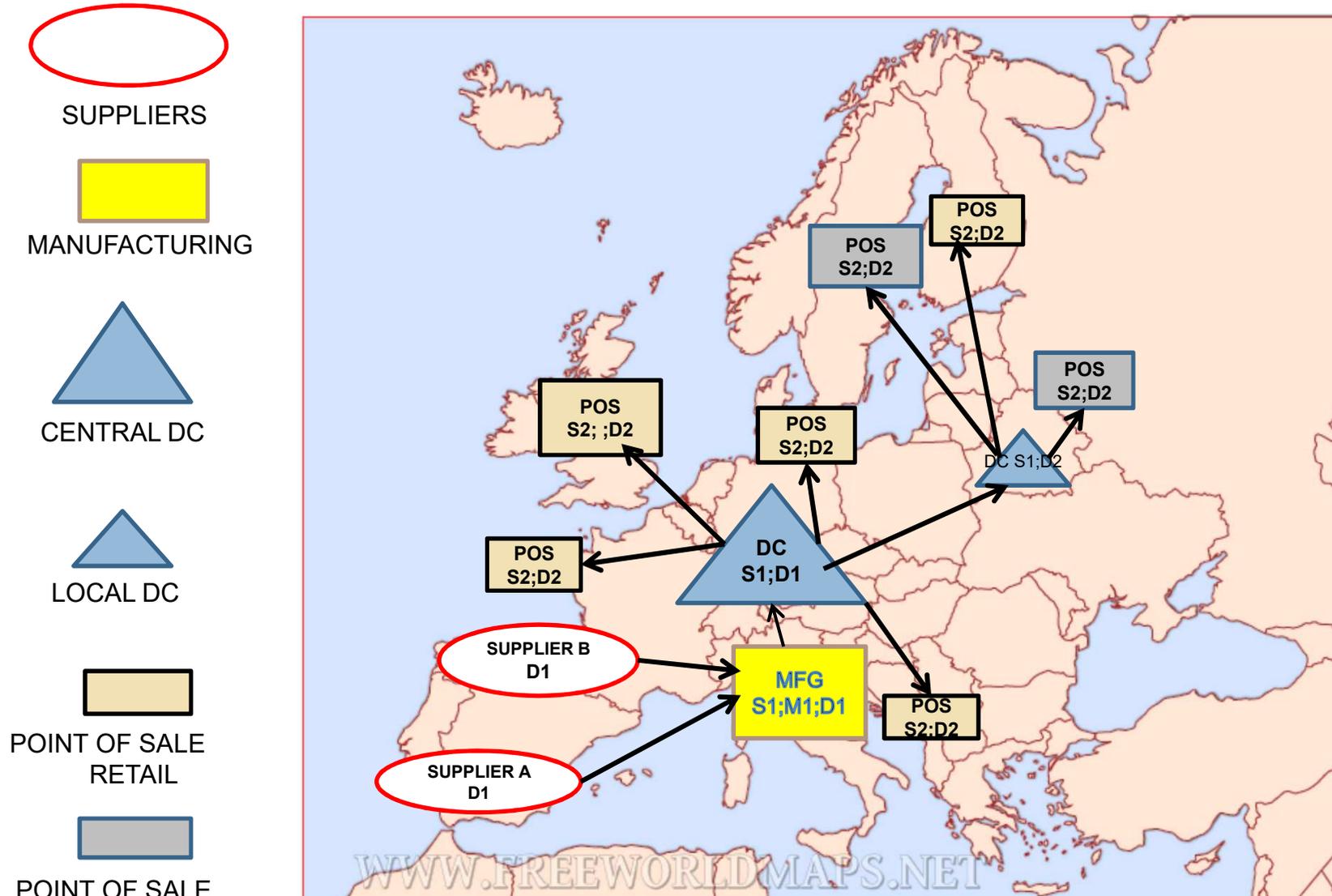
# Geographical Mapping of the Supply Chain

Steps to create the Geographic Map:

1. Create geographic context
  2. Draw and name your customers on the map
    - a. Identify the level-2 processes
    - b. List the level-2 processes in the customer node
  3. Starting with your customers, repeat for each node:
    - a. Identify all supplying nodes
    - b. Draw and name these supplying nodes
    - c. Identify the level-2 processes
    - d. List the level-2 processes in each node
    - e. Draw the material flows (connecting arrows)
- Repeat until you have included all your suppliers



# Geographical Mapping: example



THE PRODUCT IS SOLD GLOBALLY, BUT WE LOOK AT THE EURO BUSINESS SHARE

# Authorization and Plan for the Next Phase

**Objective:** Execute a “go, no go decision” on moving to phase 3—C: Configure the Supply Chain.

**Activities:** The improvement program executive team should make a “go, no go decision” as to the following:

- The tasks, documentation, budgets, and decisions made in phase 2 of the improvement program
- Review and adjustment of the improvement program charter objectives for Phase 3—C: *Configure the Supply Chain*
- The activities to be performed in phase 3
- The activities schedule to be followed in phase 3
- The resource requirements needed to execute phase 3
- The budget required to execute phase 3
- Permission to initiate phase 3 of the improvement program

# SCOR Professional Training

**S: Set the Scope**  
**Case Study**

# Case Study: Sample Inc. *Phase 2*



## Business Context Summary:

- Sample Inc.—markets and delivers high margin automotive and marine oil, lubrication, and cleaning products that it sources from local suppliers and repackages in its central warehouses. For its West Coast operations, there are four customers (S-Mart, Auto Bros, Costking, and Carfix). These customers buy branded and private label oil products from Sample, Inc. on behalf of the retail stores in the area
- Sample Inc. management has identified cash-to-cash cycle time as a significantly underperforming metric. The goal is set at 0 days. The West Coast currently averages at 52 days.
- Because of delivery problems with the local supplier in the past, Sample Inc. has agreed with its customers that it will maintain inventory onsite with its customers.

## Business Context Summary Deliverable (improved)

Component	Description
Business description	OK markets and delivers high margin automotive and marine oil, lubrication, and cleaning products that it sources from local suppliers and repackages in its central warehouses etc...
Challenges and opportunities	OK Because of delivery problems with the local supplier in the past, Sample Inc. has <u>agreed with its customers that it will maintain inventory onsite with its customers.</u>
Value proposition	NOK The value of products is in the marketplace...quality...
Critical issues	OK C2C high inventory
Risks	NOK
Financial performance	NOK not fully available in the case study description
Internal profile	NOK Organisation set up; Operations, Whse i/o HO etc...
External profile	NOK. Competition/Suppliers, Retailers, National, Regional etc



# Case Study: Sample Inc. *Phase 2*



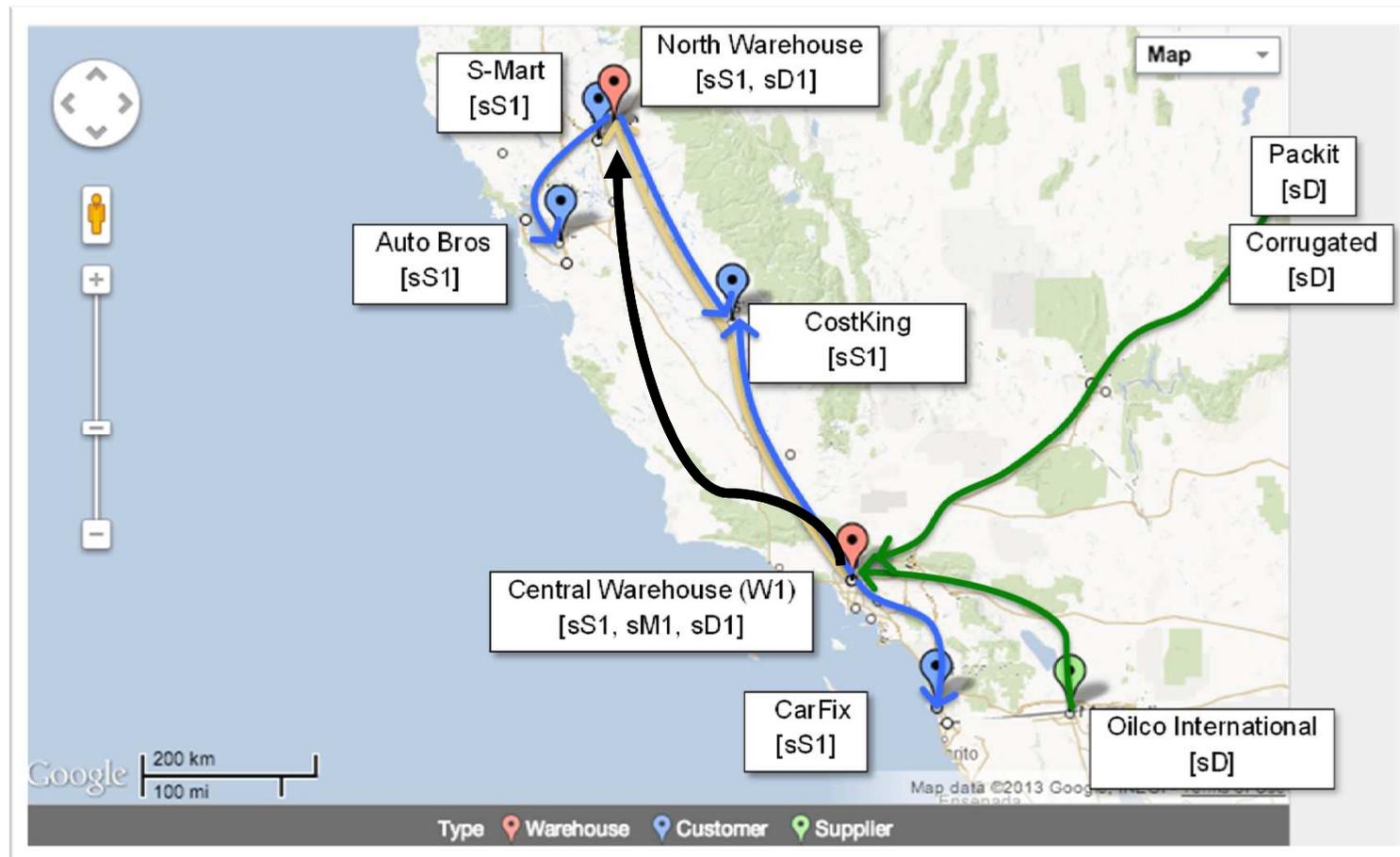
## Document the supply chain

Suppliers	Sample, Inc.	Customers
<ul style="list-style-type: none"> <li>• <b>Oilco</b> Supplier of motor oil products and lubricants</li> <li>• <b>Packit</b> Supplier of plastic containers and labels</li> <li>• <b>Corrugated</b> Supplier of cardboard boxes, fillers and displays</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Central Warehouse (W1)</b> Sample, Inc warehouse repackages oil and lubrication products for the western region</li> <li>• <b>North Warehouse (W3)</b> Sample, Inc warehouse in the northern part of the western region serving customers in the northern part of the western region</li> </ul>	<ul style="list-style-type: none"> <li>• <b>S-Mart</b> One of the largest global retailers – branded and private label customer</li> <li>• <b>Auto Bros</b> A large international chain of automotive retailers – branded and private label</li> <li>• <b>CarFix</b> National chain of auto supply stores – branded only</li> <li>• <b>Costking</b> National membership only warehouse club – private label only</li> </ul>

# Case Study: Sample Inc. *Phase 2*



## Supply Chain Geographic Map

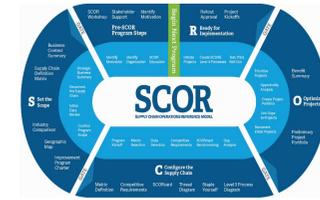




# SCOR Professional Training

## C: Configure the Supply Chain

# C: Configure the Supply Chain Overview



**Objective:** Determine the performance metrics and processes of the SCOR improvement program

- |  |   |
|--|---|
| <p><b>Key Tasks</b></p> <ul style="list-style-type: none"> <li>• Program Kickoff</li> <li>• Select SCOR metrics</li> <li>• Metric data collection</li> <li>• Perform competitive analysis</li> <li>• Benchmark the supply chain</li> <li>• Perform gap analysis</li> </ul> | <p><b>Deliverables</b></p> <ul style="list-style-type: none"> <li>• <u>Metric Definition</u></li> <li>• <u>Competitive Requirements</u></li> <li>• <u>Final SCORcard</u></li> <li>• <u>Thread Diagram</u></li> <li>• Staple Yourself</li> <li>• Level 3 Process Diagrams</li> <li>• Plan for Phase 4</li> </ul> |
|--|---|



# SCOR Improvement Program Kickoff

## Objective:

Create enthusiasm and provide a general understanding of the SCOR improvement program to the organization and supply chain.

## Participants:

- Executive team
- Executive sponsor
- Project champion
- Design team and team leader
- All necessary stakeholders

## Activities:

- Detail reason for the SCOR improvement program.
- Show top management commitment to the program.
- Detail the structure of the SCOR program team.
- Provide a high level overview of the SCOR framework.
- Summary of main sections of the improvement program charter.
- Describe next steps.

# SCOR Level 1 Performance Metric Selection

	Attribute	Level 1 Strategic Metrics
Customer	Reliability	RL.1.1 Perfect order fulfilment
	Responsiveness	RS.1.1 Order fulfillment cycle time
	Agility	AG.1.1 Upside supply chain adaptability
		AG.1.2 Downside supply chain adaptability
AG.1.3 Overall value at risk (VAR)		
Internal	Cost	CO.1.1 Total supply chain management costs (TSCMC)
		CO.1.2 Cost of goods sold
	Asset management efficiency	AM.1.1 Cash-to-cash cycle time
		AM.1.2 Return on supply chain fixed assets
		AM.1.3 Return on working capital

# Benchmarking: Overview



- Definitions
  - *Benchmarking*: Comparing an organization's performance with those of other organizations that operate in the same or comparable industry
  - *Parity*: Being equal in performance; no real advantage over others
  - *Advantage*: Being in a favorable position; in a stronger position than parity, but not yet achieving superior performance
  - *Superior*: Being of high rank or quality; leaders not outlier
- Usage: Why benchmark?
  - *Establish realistic goals*. Know where you are relative to others (competitors or peers), and state where you're going.
  - *Monitor Performance*. Track relative progress you and others (your competitors or peers) make.

# SCOR Benchmarking Requirements



Goal: Compare the performance of similar supply chain environments.



## Use standard metrics:

A numerical comparison of the performance of two companies in the same industry may not have value when the metric is different.



## Measure the same process/business model:

Avoid comparing the performance of a make-to-stock process to an engineer-to-order process. The purpose of these processes is different; measure them accordingly.



## Understand the demographics:

Make sure you understand the other organizations in the benchmark. Regional differences, and differences in product or services may influence results.



# SCORmark Level 1 Scorecard



Attribute	Metrics	Target Performance	Your Org.	Parity (50%)	Advantage (70%)	Superior (90%)	Gap to Target
<b>Reliability</b>	Perfect Order Fulfillment	Advantage	<b>69.2%</b>	77.5%	85.6%	93.7%	16.4%
<b>Responsiveness</b>	Total Order Fulfillment Cycle Time, Configured-to-Order Products (Days)	Parity	<b>7.1</b>	9.1	6.5	3.9	-
<b>Agility</b>	Supply Chain Adaptability (%)	Advantage	<b>10.0%</b>	30.5%	51.3%	72.0%	41.3%
<b>Cost</b>	Total Supply Chain Management Cost (% of Revenue)	Superior	<b>8.1%</b>	8.7%	5.6%	2.4%	-5.7%
<b>Asset Mgmt. Efficiency</b>	Cash to Cash Cycle Time (Days)	Parity	<b>60.5</b>	55.4	30.5	5.5	-5.1

 **New target**

# Assembling the Improvement Program SCORcard

3 Decisions

1 Company

2 Benchmark Data

4 Gap + Projects

Attribute	SAP	Metric (level 1)	Comp.	Parity	Adv	Superior	Gap
Reliability	S	Perfect order fulfillment	65%	85%	90%	98%	33%
Response	A	Order fulfillment cycle time	10 days	8 days	6 days	4 days	4 days
Flexibility	P	Upside supply chain flexibility	55 days	80 days	60 days	40 days	25 days
Cost	P	Supply chain mgmt. cost	15.2%	10.8%	10.4%	10.2%	4.4%
Assets	A	Cash-to-cash cycle time	45 days	45 days	30 days	20 days	15 days

- Used to choose target performance
- Critical to understanding performance in a particular supply chain
- Aligns strategy, performance, and performance goals

# Benchmarking: Competitive Requirements



➤ The objective for this deliverable is to prioritize supply chain performance attributes for each customer or market channel.

➤ The teams (steering and design) needs to determine where the company needs to perform at *superior* (90th percentile), *advantage* (average of *superior* and *parity*), and *parity* (50th percentile) levels for each attribute for each channel.

➤ For each customer or market channel, the team is only allowed to set **one performance attribute at the *superior* level, two at the level of *advantage*, and the remaining two set to *parity*.**

➤ Each *unique* combination of ratings defines your supply chain strategy for the channel.

# Competitive Requirements Strategy Matrix

Supply chain matrix		U.S.	Asia	Europe
External	Reliability	Superior	Parity	Parity
	Responsiveness	Advantage	Parity	Advantage
	Flexibility	Advantage	Advantage	Parity
Internal	Cost	Parity	Advantage	Advantage
	Assets	Parity	Superior	Superior

# 1. Process Modeling with SCOR

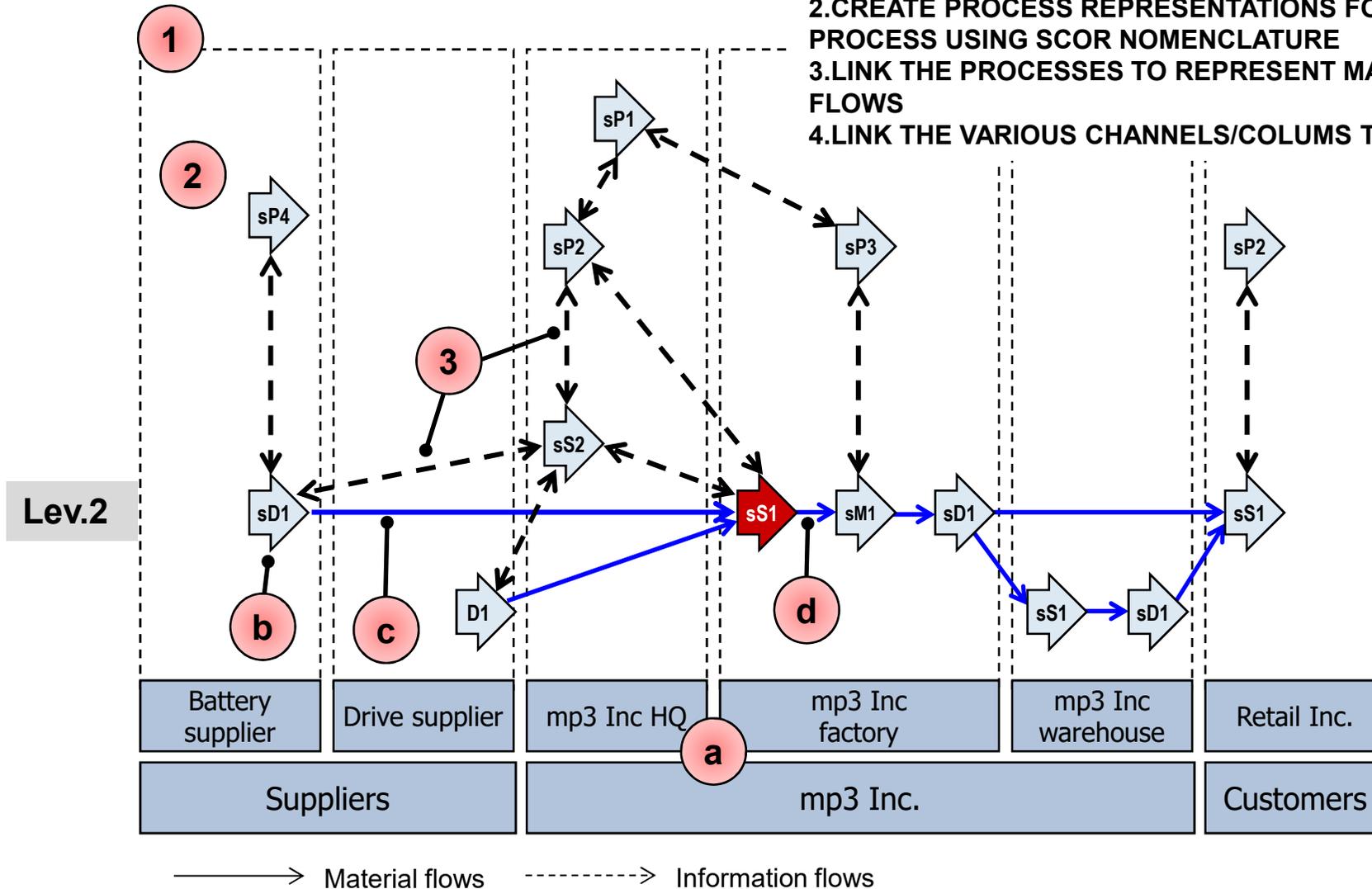
- Workflows/thread diagram/VSM
- Metrics decomposition Lev.2-3
- Collect process info / staple to an order
- Interviews
- Analyse gap sources / gap details

## 2. Developing alternatives

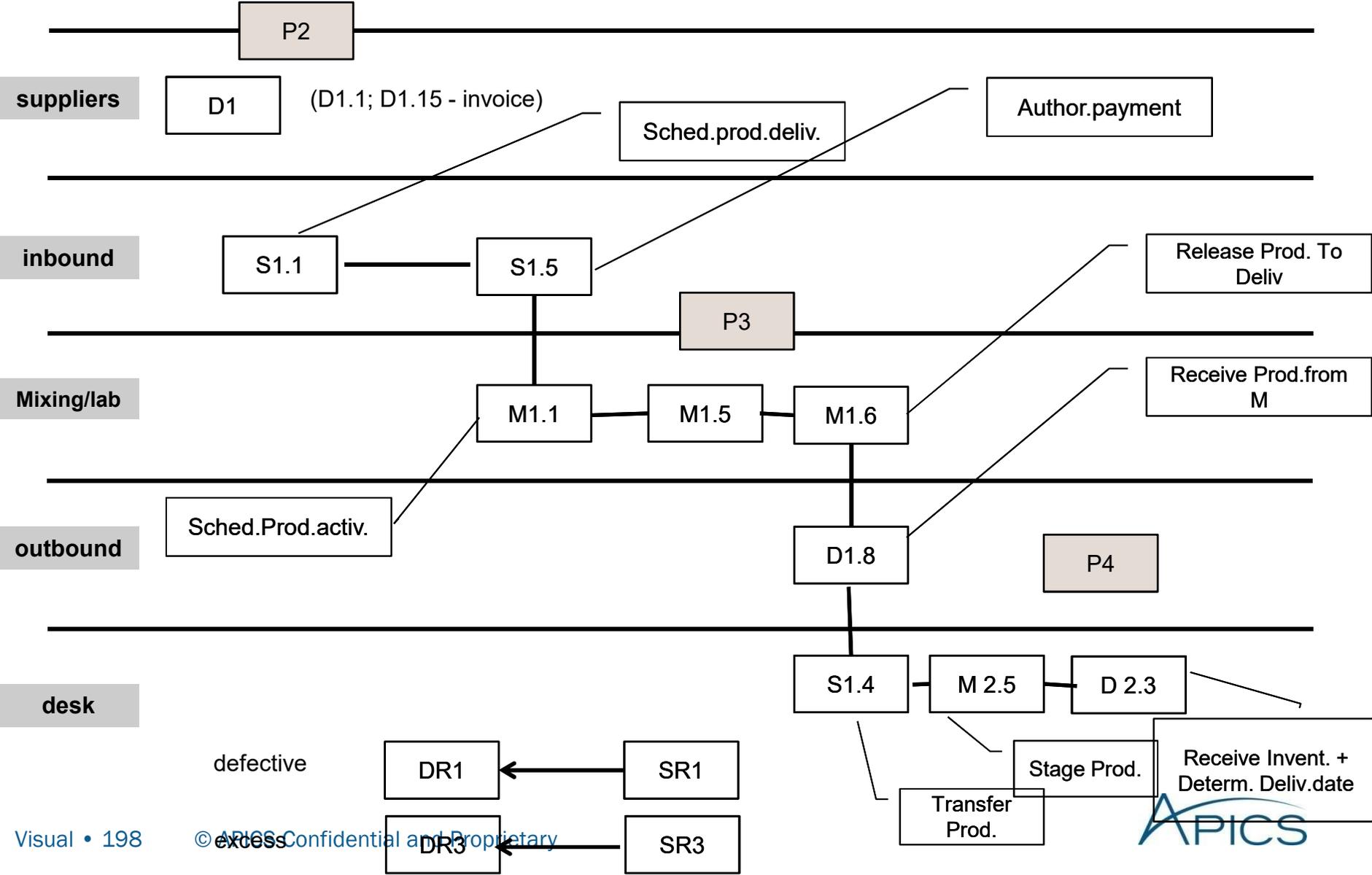
- Develop alternative solutions
  - Brainstorming
  - Ishikawa RCA (Root Cause Analysis)
  - 5 why's
  - affinity diagrams, etc

# Configuring the Supply Chain: *Thread Diagram*

1. CREATE COLUMNS TO REPRESENT EACH CHANNEL
2. CREATE PROCESS REPRESENTATIONS FOR EACH PROCESS USING SCOR NOMENCLATURE
3. LINK THE PROCESSES TO REPRESENT MATERIAL FLOWS
4. LINK THE VARIOUS CHANNELS/COLUMNS TOGETHER



# A family owned stand: THREAD DIAGRAM example



# Staple Yourself to an Order (Discovery)



*Objective:* Method to discover how orders flow through the supply chain system

Outcomes:

- Lists of processes in generic/company language mapped (normalize) to SCOR processes
- List of individuals, functions, or departments by process
- High level workflows of how processes connect
- Basis of interview plan

## What order?

Source: Purchase order

Make: Production or work order

Deliver: Customer order or replenishment signal

Return: Return authorization

Enable: Support or maintenance tickets or request log numbers

Plan: Planning calendar



# Process Analysis: Metric Gaps Detail (example)

## RL.1.1 Perfect Order Fulfillment: Gap Analysis

RL.1.1 Perfect Order Fulfillment Gap Analysis	
SCOR Level 2 Metrics	
RL.2.1 % of Orders Delivered in Full	<b>11.0%</b>
#1 Product shortage	4.0%
#2 Damaged product	3.0%
#3 Incorrect packaging	1.0%
#4 Incorrect product shipped	3.0%
RL.2.2 Delivery Performance to Customer Commit Date	<b>12.0%</b>
#5 Order picking problems	3.0%
#6 Order packing problems	1.0%
#7 Customer on credit hold	0.5%
#8 Transportation scheduling	3.0%
#9 Pricing problem	0.5%
#10 Order lost	4.0%
RL.2.4 Perfect Condition	<b>12.0%</b>
#11 Shipment documentation error	3.0%
#12 Damage to packaging	4.0%
#13 Damage to product during shipment	2.0%
#14 Wrong specification	1.0%
#15 Faulty installation	2.0%
<b>Performance</b>	<b>65.0%</b>

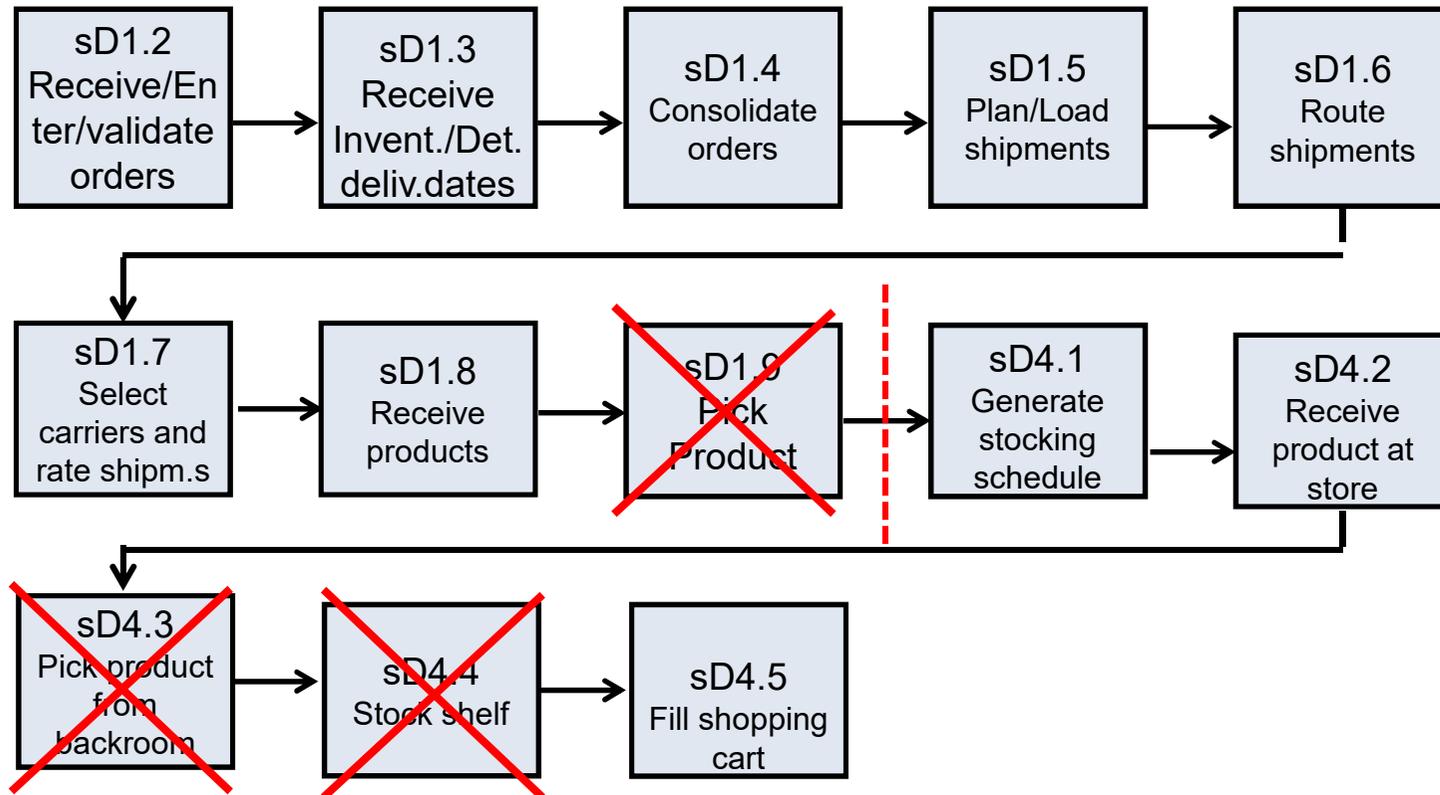
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- Interviews
- Analyse gap sources / gap details

## 2. Developing alternatives

- Develop alternative solutions
  - Brainstorming
  - Ishikawa RCA (Root Cause Analysis)
  - 5 why's
  - affinity diagrams, etc

# Develop alternatives example: improve Logistics Operations Responsiveness (LOR) in CPG



**Objective:** reduce leadtimes and costs for the customer (retail) - ECR

**Result:** 1. create multi product pallets (rainbow config.) 2. ship to Retail avoiding picking and shelving 3. sell at Retail

**Financial benefit:** 1. sell more to the customer (retail) 2. reduce selling price and increase sales to consumers (better share). 3. ROI > 55%

# Test and Approve Alternative Processes

Alternative solution must be

- Approved
- Tested

Solutions must be:

- Mutually exclusive
- Exhaustive of the problem solution (ideally)

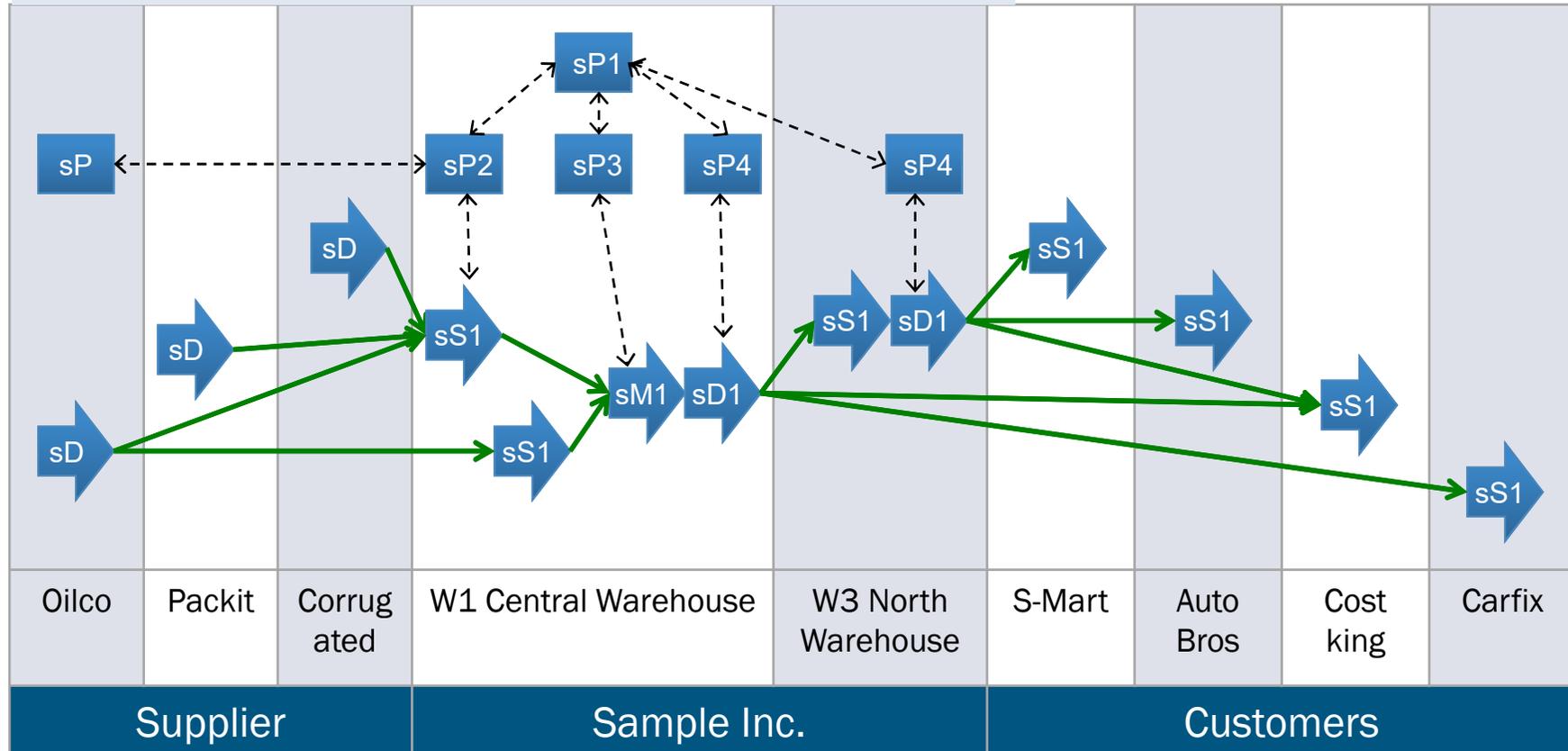
# SCOR – Professional Training

## C: Configure the Supply Chain Case Study

# Case Study: Sample Inc. Phase 3



West Oil & Lubricants: Thread Diagram  
(AS IS – current state)



# Case Study: Sample Inc. Phase 3



## West Oil & Lubricants: Metrics Review (AS IS – current state)

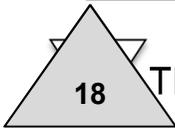
	Metric	Actual	Parity (50 <sup>th</sup> )	Advantage	Superior (90 <sup>th</sup> )	Requirement gap
L1	Cash-to-cash cycle time	52 d	40 d	0 d	-25 d	52 d
L2	. Days payables outstanding	55 d	Industry common: 45–60 days			small
L2	. Days sales outstanding	27 d	Industry common: 30–45 days			none
L2	. Inventory days	80 d	Industry: wide range: 4–90 days			large
	. . Inventory days—FG	67 d	No benchmark information available			large
	. . Inventory days—WIP	1 d	No benchmark information available			none
	. . Inventory days—RM	12 d	No benchmark information available			very small

- No benchmarking information was available for level 3 metrics
- For level 2 metrics we looked at typical ranges in the industry

# Case Study: Sample Inc. Phase 3



West Oil & Lubricants: Decomposition  
(AS IS – current state)



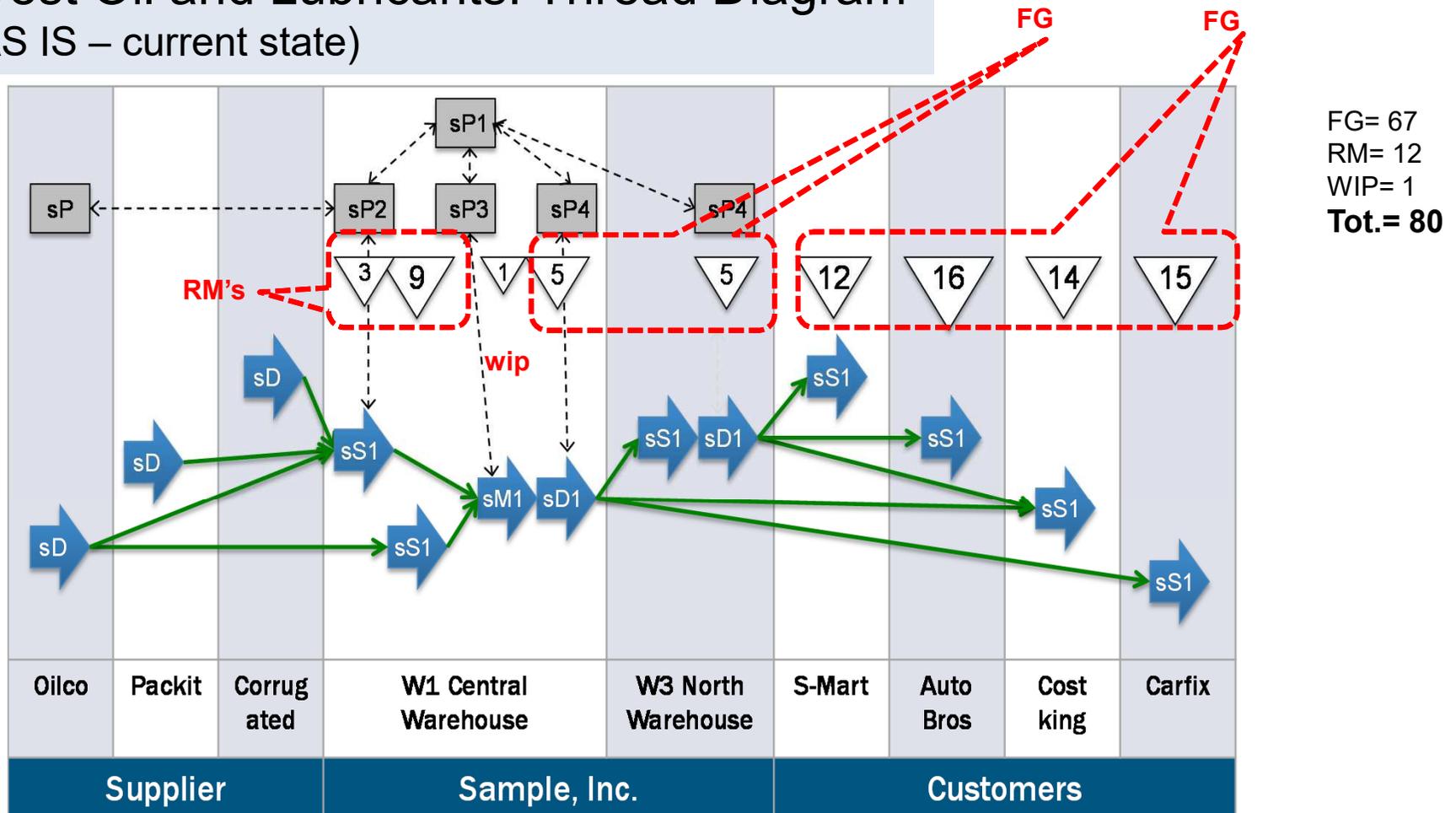
The number represents inventory days of supply owned by Sample, Inc.



# Case Study: Sample Inc. Phase 3



## West Oil and Lubricants: Thread Diagram (AS IS – current state)



5 The number represents inventory days of supply owned by Sample, Inc.

# Case Study: Sample Inc. *Phase 3*



## Finding Alternative Network Configurations

- ▶ Root cause analysis—inventory buffers
- ▶ Inventory planning management alternatives
  - Collaborative planning, forecasting, and replenishment (CPFR)
  - Statistical analysis software
  - Sales and operations planning (S&OP)
- ▶ New initiatives
  - Private labeling in the North warehouse
  - Ability to ship from any warehouse to the customer
  - Offering emergency direct shipments to retailers
  - Increase shipment frequency (2 or 3 times per day)
  - Milk runs for increased frequency
- ▶ Raw material alternatives: eliminate and consignment

# Case Study: Sample Inc. Phase 3



## Scenario Testing

Scenario	Test	Result	Reason
CPFR	High level walkthrough of the scenario	Pass	"CPFR seems to address lack of or delayed information regarding promotions, delay in demand decrease / increase, buy-in to plans."
Statistical Forecast Analysis Software	Review of software benefits and capabilities	Fail	"Our numbers aren't complex. It simply takes too long before we find out what goes on in the stores."
S&OP	High level walkthrough	Fail	"S&OP remains on our wish list but was too limited in scope for the problems at hand."
Private labeling in North warehouse	Financial modeling	Fail	"Significant investment in production equipment, adding inventory of raw materials, after several different financial modeling sessions we gave up."
Cross warehouse picking	Simulation	Pass	"Location mismatches appear very often - we have the product but it needs to be transported to the right warehouse first."
Emergency direct shipments	Financial analysis	Fail	"We already use this for extreme problems - we do not want to implement this as a structural solution."
Increased shipment frequency	Financial analysis	Pass	"Update pick scheduling to beginning of every shift (was one pick schedule daily). Given that we have multiple trucks going to each customer daily, balancing these better over the day will not add significant cost."
Milk runs	Financial analysis	Fail	"This would add more miles, fuller trailer loads is not a problem."
Outsourcing packaging	Tested against corporate policy and strategic direction	Fail	"Sample, Inc. does not intend to outsource one of its core activities, providing responsiveness and flexibility to our customers is a core value."
Consignment inventory	Assess feasibility and cost impact	Fail	"Suppliers pushed back hard, material cost would increase significantly."



# Case Study: Sample Inc. Phase 3



## Future-State Map



- FROM W1 CENTRAL WHSE TO S-MART AND AUTO BROS
- FROM W3 NORTH WHSE TO CARFIX
- FULFILLING CARFIX FROM W3 SHOULD BE VERY LIMITED TO AVOID SHIPPING BACK AND FORTH PROCESSES:
- ALLOCATE PROD.S AS CLOSE AS POSSIBLE TO CUSTOMERS

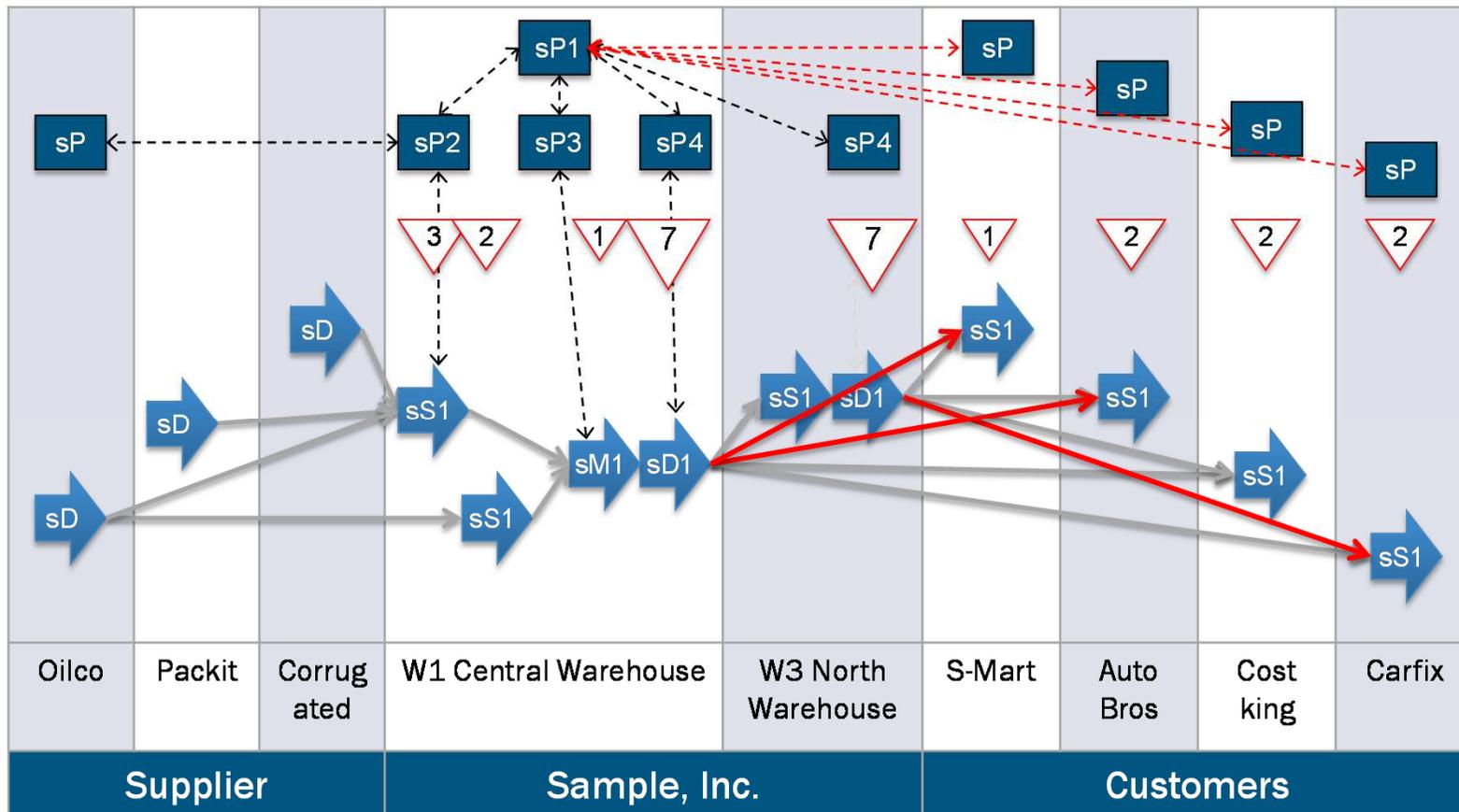
5 The number represents inventory days of supply owned by Sample, Inc.



# Case Study: Sample Inc. Phase 3



## Future-State Thread Diagram (To Be)

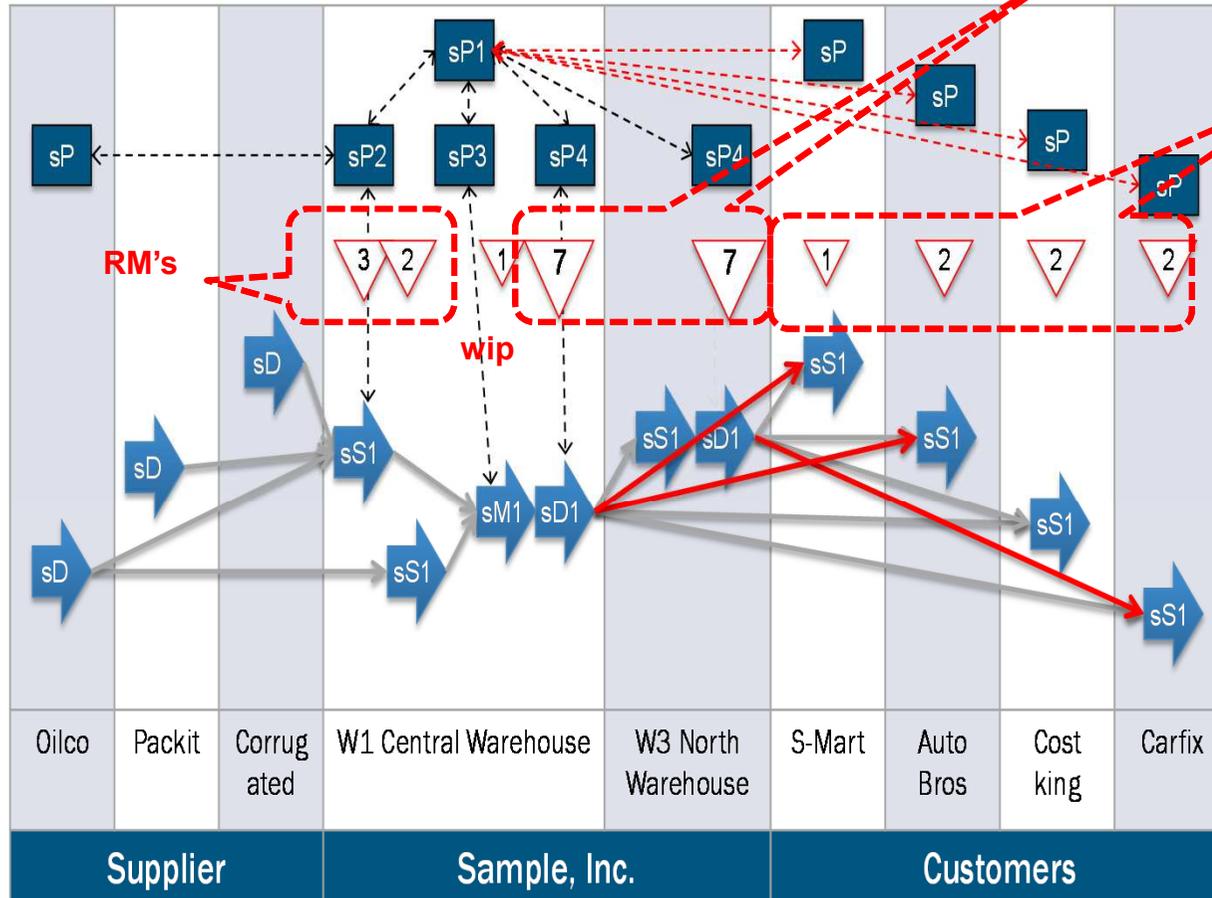


5 The number represents inventory days of supply owned by Sample, Inc.

# Case Study: Sample Inc. Phase 3



## Future-State Thread Diagram



FG=21  
RM=5  
WIP=1  
**Tot.=27**

- CENTRAL WHSE FROM 18 TO 13
- NORTH WHSE FROM 5 TO 7 (INCREASE/SERVICE)
- CARFIX FROM 15 TO 2
- AUTOBROS FROM 16 TO 2
- S-MART FROM 12 TO 1
- COSTKING FROM 14 TO 2

5 The number represents inventory days of supply owned by Sample, Inc.

# Case Study: Sample Inc. Phase 3



## West Oil & Lubricants: Metric Projection

Metric	Actual	Mandate	Change	Future
Inventory days—RM	12 d	--	- 7 d	5 d
Inventory days—WIP	1 d	--	No change	1 d
Inventory days—FG	67 d	--	- 50, + 4 d	21 d
Inventory days	80 d	--	- 53 d	27 d
Days payables outstanding	55 d	--	No change	55 d
Days sales outstanding	27 d	--	No change	27 d
Cash-to-cash cycle time	52 d	0 d	- 53 d	-1 d

- No changes to DPO and DSO
- FG Inventory reduction from 67 to 21 days (includes adding 2 days in Sample’s warehouses)
- RM Inventory reduction of 7 days



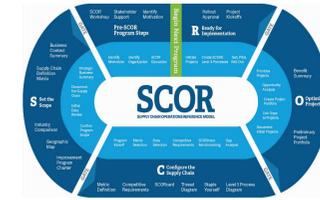
	AS IS	TO BE	DELTA
CUST. FG	57	7	- 50
WHSE FG	10	14	+ 4
WHSE RM	12	5	- 7
WHSE WIP	1	1	0
TOTAL	80	27	-53

# SCOR Professional Training

**0: Optimize Projects**



# O: Optimize Projects Overview



*Objective:* Establish the project portfolio including process scope, priority, and anticipated benefits.

## Key tasks

- Identify a list of improvement projects.
- Calculate the impact of each project.
- Identify SCOR level 3 processes.
- Link performance gaps to projects.
- Document expected benefits/opportunities from each project.
- Prioritize projects.

## Deliverables

- Initial project portfolio
- Project portfolio
- Plan for phase 5.

## Program phase activities





# Create *Preliminary Project Portfolio*: Opening Steps



A successful project portfolio is founded on data (*process analysis deliverable*), commitment, and processes (SCOR)

Opening steps:

1. Establish a list of process issues or defects using a matrix team approach.
2. Group the performance issues into implementation projects using combinations of SCOR processes.
3. Associate a benefit to be achieved with the successful implementation of a project using SCOR metrics.

# Linking Performance Issues to Projects (example)

Project List		
Project #	Project Description	SCOR Level 2 Metric
1	Improve sales order picking	RL.2.1 % of Orders Delivered in Full
2	Reduce sales order packing errors	RL.2.1 % of Orders Delivered in Full
3	Reduce transportation errors	RL.2.1 % of Orders Delivered in Full
4	Reduce inventory errors	RL.2.1 % of Orders Delivered in Full
5	Reduce delivery lead times	RS. 2.3 Deliver cycle time
6	Reduce production leadtimes	RS.2.2 Make cycle time
7	Reduce production changeover	AG.2.2 Upside make flexibility



# Opportunity Analysis: CRM Software ROI - example

<b>Number of Employees</b>	25
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Tangible Benefits Estimate	Year Value	Expected Improvement	ROI Value
Reduced lead time	\$ 20,000,000	2.0%	\$ 400,000
Reduced documentation	\$ 20,000,000	0.5%	\$ 100,000
Reduced time to pick	\$ 20,000,000	1.5%	\$ 300,000
Improved pricing	\$ 20,000,000	1.0%	\$ 200,000
Improved customer credit check	\$ 20,000,000	0.3%	\$ 50,000
Improved visibility to orders	\$ 20,000,000	2.5%	\$ 500,000
<b>Total Annual Benefit</b>			\$ 1,550,000

Intangible Benefits Estimate	Current	Percent	Improvement
Average on-time delivery %	75.0%	8.0%	83.00%
Average financial close time (days)	15	35.0%	5.25
Order fulfillment time (days)	12	30.0%	3.6
Credit authorization (days)	8	10.0%	0.8

SCM Business System Cost	Vendor #1	Vendor #2
Software license	\$ 62,500	\$ 95,000
Project management	\$ 850,000	\$ 950,000
Technical project management costs	\$ 300,000	\$ 325,000
Misceleaneous costs	\$ 200,000	\$ 210,000
<b>Total costs</b>	\$ 1,412,500	\$ 1,580,000

PAYBACK:  
 $1412/1550=0,91$   
 ROI:  
 $(1550-1412)/1412 =$   
 $138/1412=9,7%$

Summary		
Return on investment	9.73%	-1.90%
Payback period in # of years	0.91	1.02

# SCOR Professional Training

**O: Optimize Processes**  
**Case Study**

# Case Study: Sample Inc. Phase 4



## Organize Project Teams

Change	Processes	Related to	Team
Implement CPFR®	sP1, sP4	FG (67 d)	Team 1
Cross warehouse allocation	sD1c, sD1n	FG (67 d)	Team 2
Delivery frequency 2/day	sD1c, sD1n	FG (67 d)	Team 2
Raw material inventory reduction	sP2, sS1c	RM (12 d)	Team 3
Increase warehouse inventory	sP4	FG (67 d)	Team 1

### Sub teams:

- A dedicated team for CPFR—Team 1
- A team that looks at order reservation and shipping—Team 2
- A team for the raw material reduction effort—Team 3

sD1c = Central Warehouse Deliver process

sD1n = North warehouse Deliver process

# Case Study: Sample Inc. *Phase 4*



## RACI Chart

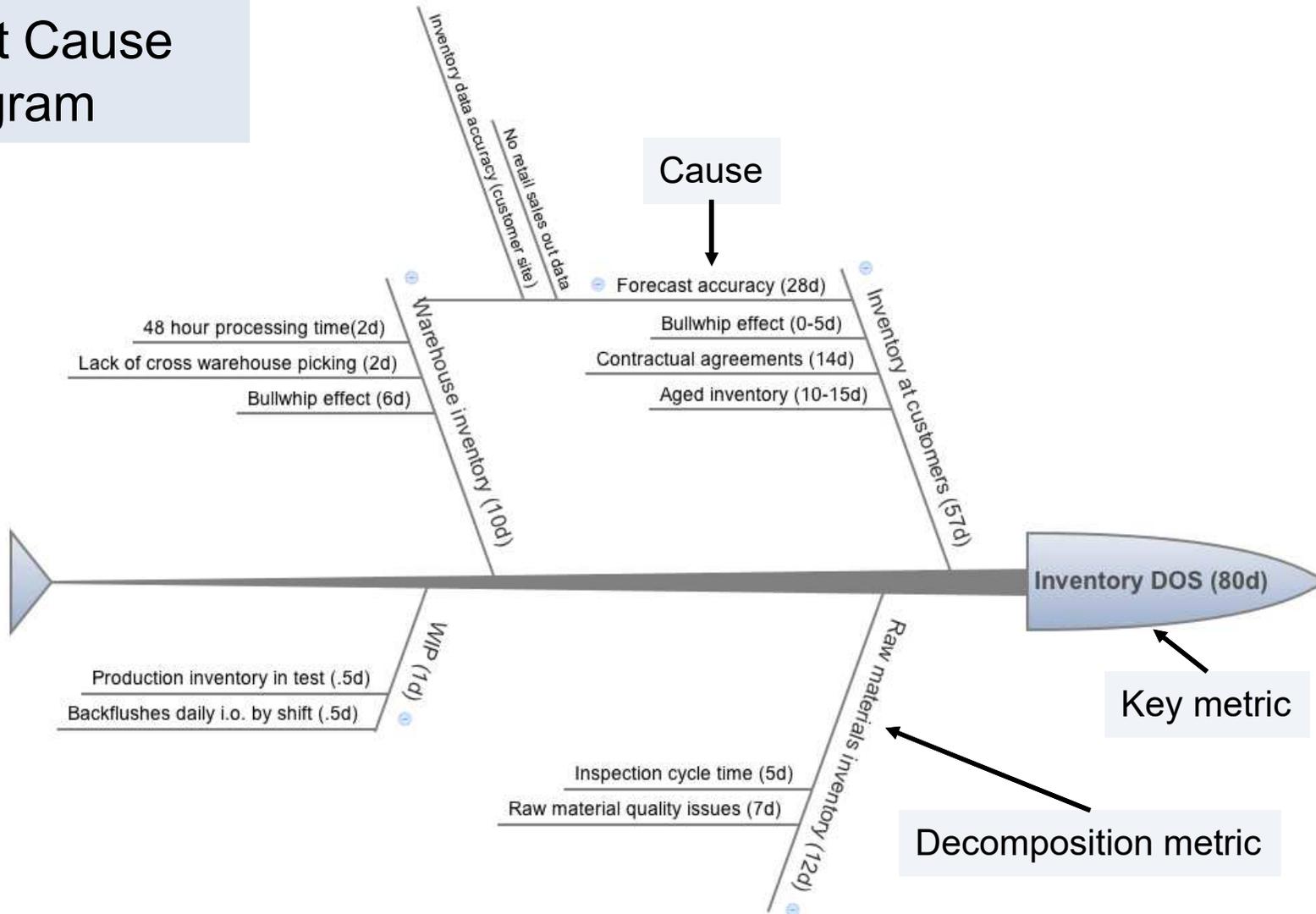
Process	Accountable	Responsible	Consulted	Informed
Accurate/on-time test results	Quality manager	Lab technician	Product Engineer	
Sampling procedure accuracy	Lab technician	Tank operator		
Test accuracy		Lab technician		
Internal Return approval	General manager	Quality manager	Lab technician Product engineer	Merchandising manager Production manager
Sending sample and test results to Oilco	Quality manager	Lab technician		Merchandising manager
Transfer to Return tank	Operations manager	Tank operator		Lab technician
Credit invoice accuracy	Finance manager	Bookkeeper	Lab technician	
In-transit booking	Finance manager	Bookkeeper	Lab technician	Operations mgr. Production mgr.



# Case Study: Sample Inc. Phase 4



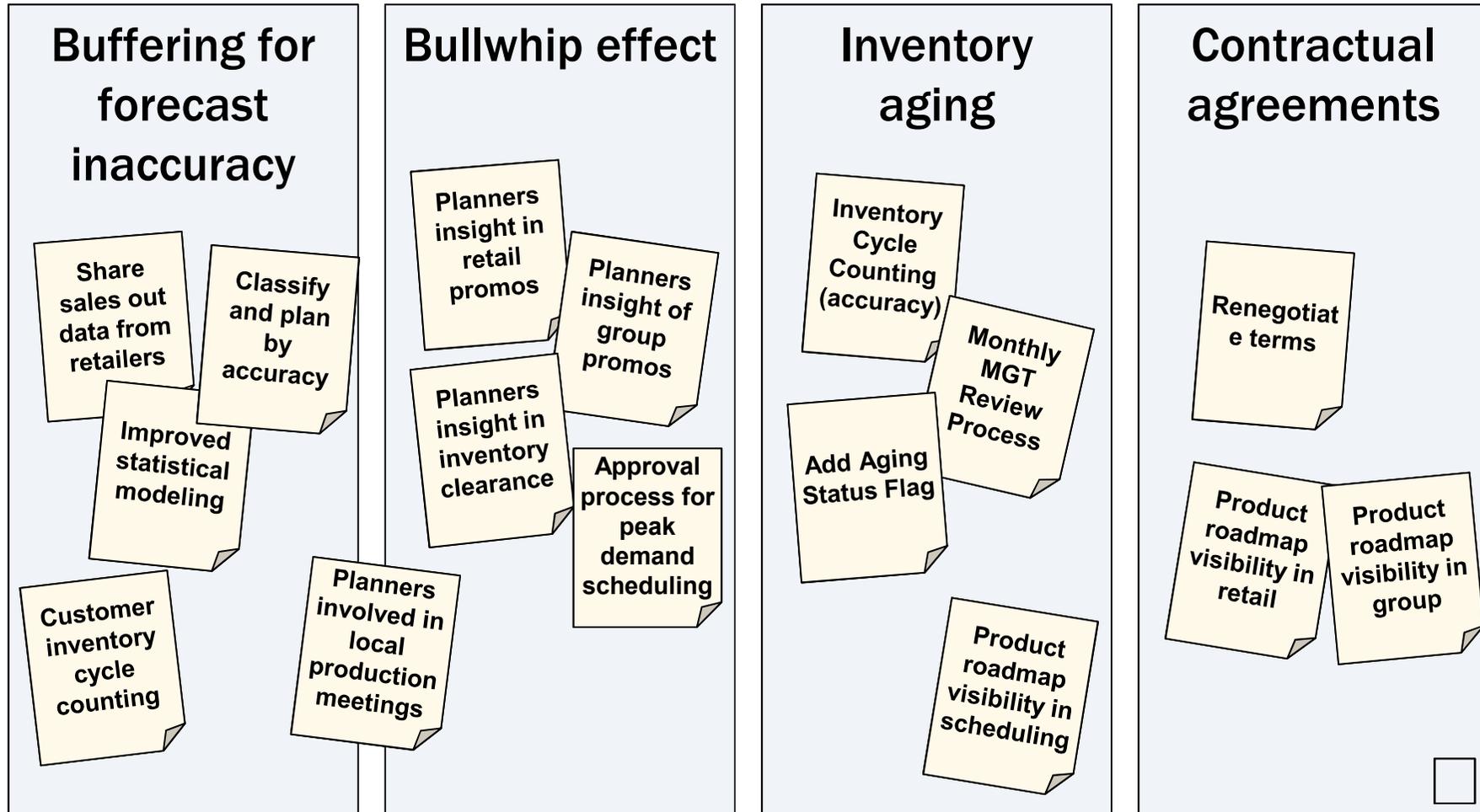
## Root Cause Diagram



# Case Study: Sample Inc. Phase 4



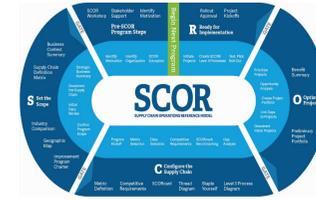
## Develop Process Alternatives



# SCOR Professional Training

**R: Ready for  
Implementation**

# R: Ready for Implementation: Overview



*Objective:* Implement projects in the portfolio and commence benefits realization.

## Key tasks

- Initiate project kickoffs.
- Discuss implementation project charter.
- Establish project schedule.
- Assemble to be SCOR level 3 and level 4 processes based on best practice.
- Complete and approve solution design.
- Configure, test, pilot, and rollout solution.
- Begin next project.

## Deliverables

- Project kickoffs
- Rollout approvals

## Program phase activities





# SCOR Professional Training

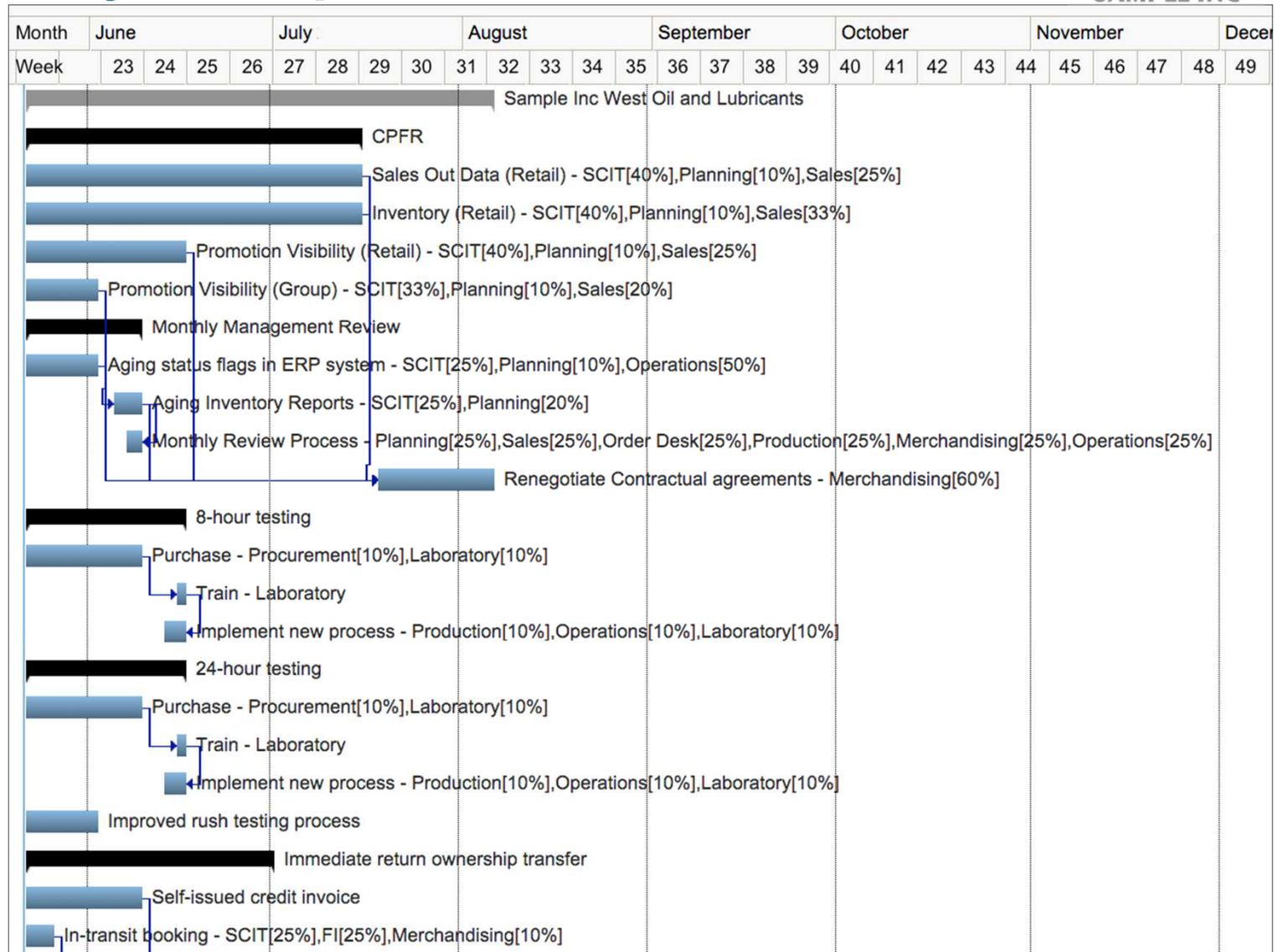
**R: Ready for Implementation**  
**Case Study**



# Case Study: Sample Inc. Phase 5



Prioritization and Scheduling





# Case Study: Sample Inc. *Phase 5*



## Return on Investment: CPFR Projects

Factors	Initial	Annual incremental		
	Year 1	Year 1	Year 2	Year 3
CPFR Project	150 000			
Software licensing	100 000	12 500	12 500	12 500
Total Cost	250 000	12 500	12 500	12 500
Inventory reduction		42 000	42 000	42 000
Reduction in expedited shipments		10 500	10 500	10 500
Lost revenue due to stock outs		48 750	48 750	48 750
Total opportunity		101 250	101 250	101 250
Net Value		-161 250	-72 500	16 250
Return on Investment		-61 %	-26 %	6 %

# Case Study: Sample Inc. Phase 5



## Return on Investment: CPFR Projects

Factors	Initial	Annual incremental		
	Year 1	Year 1	Year 2	Year 3
CPFR Project	150 000			
Software licensing	100 000	12 500	12 500	12 500
Total Cost	250 000	12 500	12 500	12 500
Inventory reduction		42 000	42 000	42 000
Reduction in expedited shipments		10 500	10 500	10 500
Lost revenue due to stock outs		48 750	48 750	48 750
Total opportunity		101 250	101 250	101 250
Net Value		-161 250	-72 500	16 250
Return on Investment		-61 %	-26 %	6 %

$$-250,000 - 12,500 = -262,500 \quad \text{Y1 Total Cost}$$

$$-262,500 + 101,250 = -161,250 \quad \text{Y1 Total Value}$$

$$-161,250 / 262,500 \text{ about } -61\%$$

$$-161,250 + 101,250 - 12,500 = -72,500$$

$$-72,500 / (262,500 + 12,500) = -26\%$$

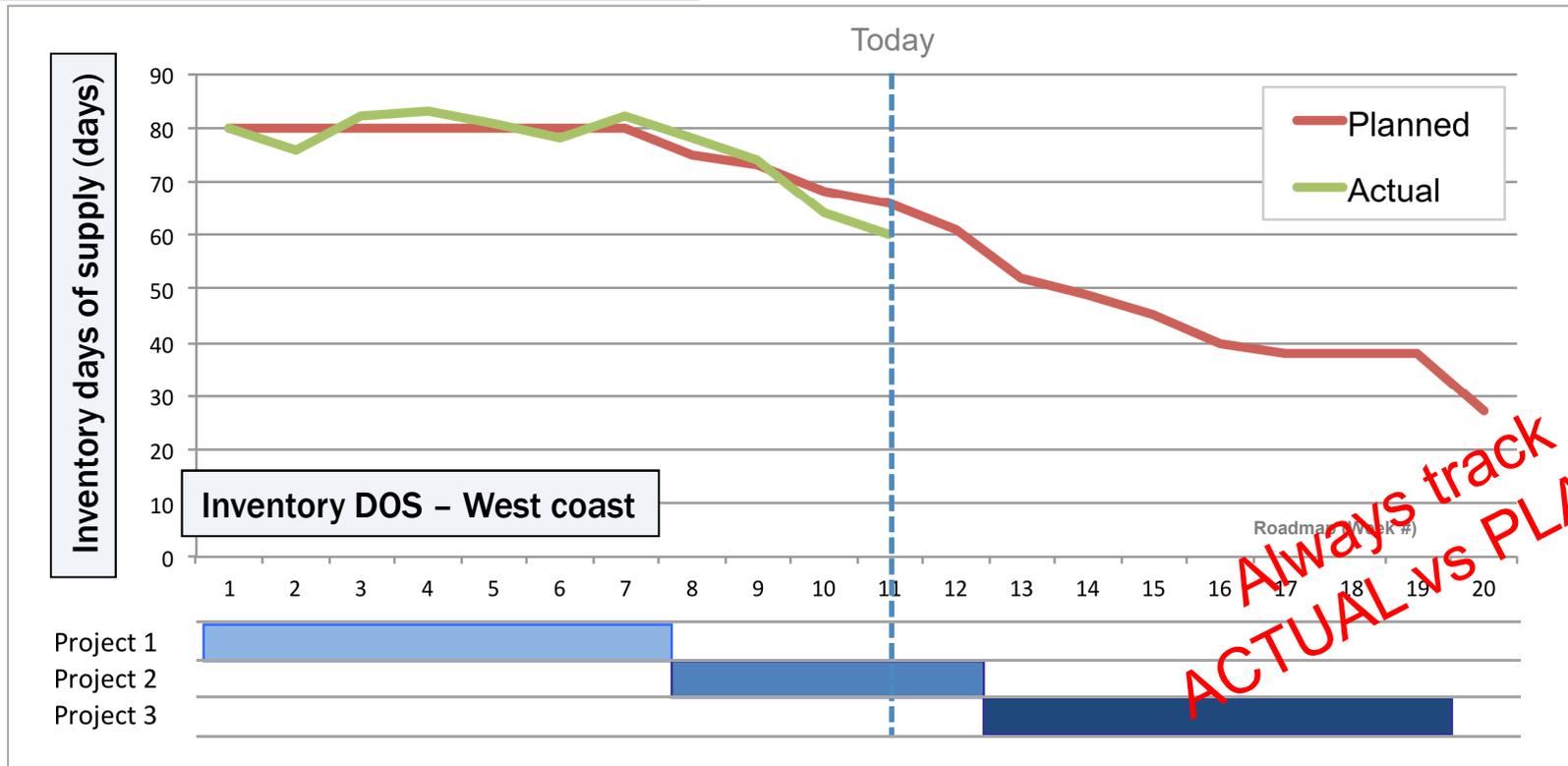




# Case Study: Sample Inc. Phase 5



## Project Tracking



### Planned (original projections)

- In periods 8-14 the inventory reduces due to completion of project 1
- In period 12-17 inventory reduces due to deliverables of project 2

# SCOR Professional Training

THANK YOU !

Q&A