Supply Chain Operations Reference Model (SCOR®) Version 8.0

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Supply Chain Operations Reference-model (SCOR) 8.0

Introduction

The Supply Chain Operations Reference-model (SCOR) is the product of the Supply-Chain Council (SCC), an independent, not-for-profit, global corporation with membership open to all companies and organizations interested in applying and advancing the state-of-the-art in supply-chain management systems and practices. The SCOR-model captures the Council's consensus view of supply chain management. While much of the underlying content of the Model has been used by practitioners for many years, the SCOR-model provides a unique framework that links business process, metrics, best practices and technology features into a unified structure to support communication among supply chain partners and to improve the effectiveness of supply chain management and related supply chain improvement activities.

The SCC was organized in 1996 and initially included 69 practitioner companies meeting in an informal consortium. Subsequently, the companies of the Council elected to form an independent not for profit trade association. The majority of the SCC's members are practitioners and represent a broad cross-section of industries, including manufacturers, distributors, and retailers. Equally important to the Council and the advancement of the SCOR-model are the technology suppliers and implementers, the academicians, and the government organizations that participate in Council activities and the development and maintenance of the Model. At the time of this release, the Council has approximately 800 members worldwide and has established international chapters in Australia/New Zealand, Brazil, Greater China, Europe, Japan, Southeast Asia, and Southern Africa with additional requests for regional chapters pending.

The Supply-Chain Council is interested in providing the widest possible dissemination of the SCOR-model. The wide-spread use of the Model results in better customer-supplier relationships, software systems that can better support members through the use of common measurements and terms, and the ability to rapidly recognize and adopt best practice no matter where it originates. SCC requests that all who use the SCOR-model provide attribution to the Supply-Chain Council. Additionally, members are encouraged to monitor the members section of the SCC website (www.supply-chain.org) to ensure that they are using the latest version of SCOR.

This introduction is provided to assist new users of the SCOR-model to begin analytic and implementation projects. It is intended to remind experienced users of the framework and structure of the Model to assist in more complex applications and operationalizing the Model for their businesses. Finally, it is provided to orient members to the changes between Version 8.0 and Version 7.0**.**

Version 8.0 of the SCOR-model is the tenth revision since the Model's introduction in 1996. Revisions of the Model are made when it is determined by Council members that changes should be made to facilitate the use of the Model in practice. Specific changes in Version 8.0 are outlined later in this Introduction.

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Scope

The SCOR-model has been developed to describe the business activities associated with all phases of satisfying a customer's demand. The Model itself contains several sections and is organized around the five primary management processes of Plan, Source, Make, Deliver, and Return (shown in **Figure 1)**. By describing supply chains using these process building blocks, the Model can be used to describe supply chains that are very simple or very complex using a common set of definitions. As a result, disparate industries can be linked to describe the depth and breadth of virtually any supply chain. The Model has been able to successfully describe and provide a basis for supply chain improvement for global projects as well as site-specific projects.

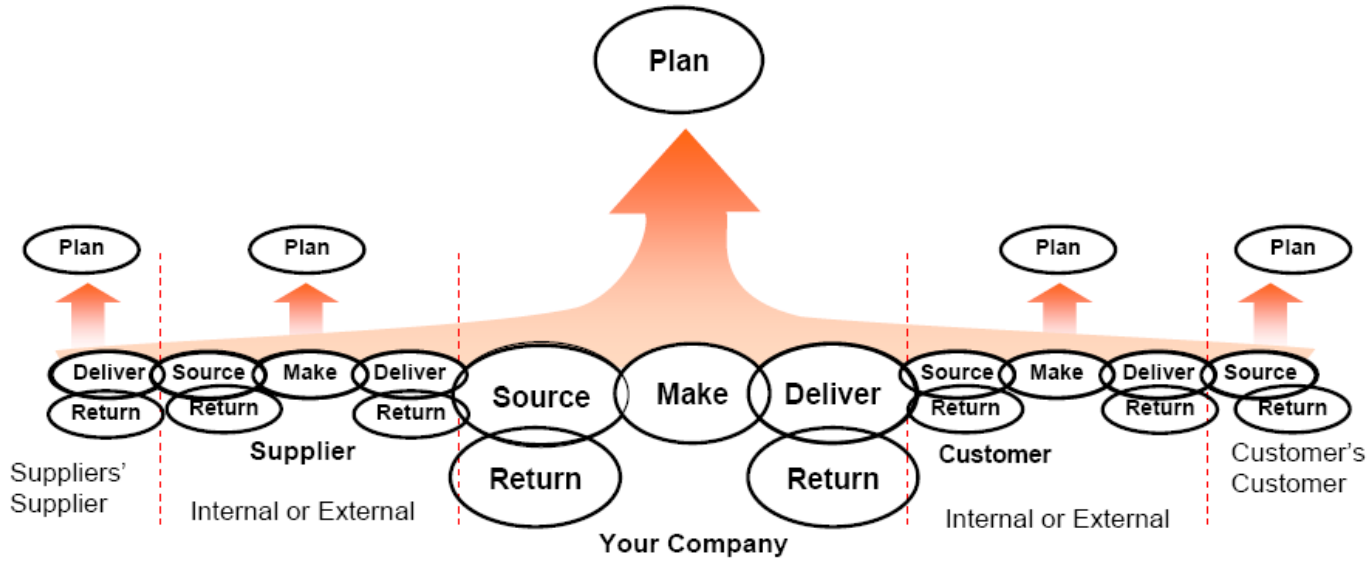

Figure 1 - SCOR is organized around five major management processes.

It spans: all customer interactions (order entry through paid invoice), all physical material transactions (supplier's supplier to customer's customer, including equipment, supplies, spare parts, bulk product, software, etc.) and all market interactions (from the understanding of aggregate demand to the fulfillment of each order). It does not attempt to describe every business process or activity. Specifically, the Model does not address: sales and marketing (demand generation), product development, research and development, and some elements of post-delivery customer support.

It should be noted that the scope of the Model has changed and is anticipated to change based on Council member requirements. With the introduction of Return, the Model has been extended into the area of post-delivery customer support (although it does not include all activities in that area).

As shown in **Figure 2**, the Model is designed and maintained to support supply chains of various complexities and across multiple industries. The Council has focused on three process levels and does not attempt to prescribe how a particular organization should conduct its business or tailor its systems / information flow. Every organization that implements supply chain improvements using the SCOR-model will need to extend the Model, at least to Level 4, using organization-specific processes, systems, and practice.

The Model is silent in the areas of human resources, training, and quality assurance among others. Currently, it is the position of the Council that these horizontal activities are implicit in the Model and there are other highly qualified organizations that are chiefly concerned with how an organization should train, retain, organize, and conduct their quality programs. Just as the Council recognized the requirements for marketing and sales in commercial organizations, the Council is not minimizing the importance of these other activities.

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SCOR Contains Three Levels of Process Detail

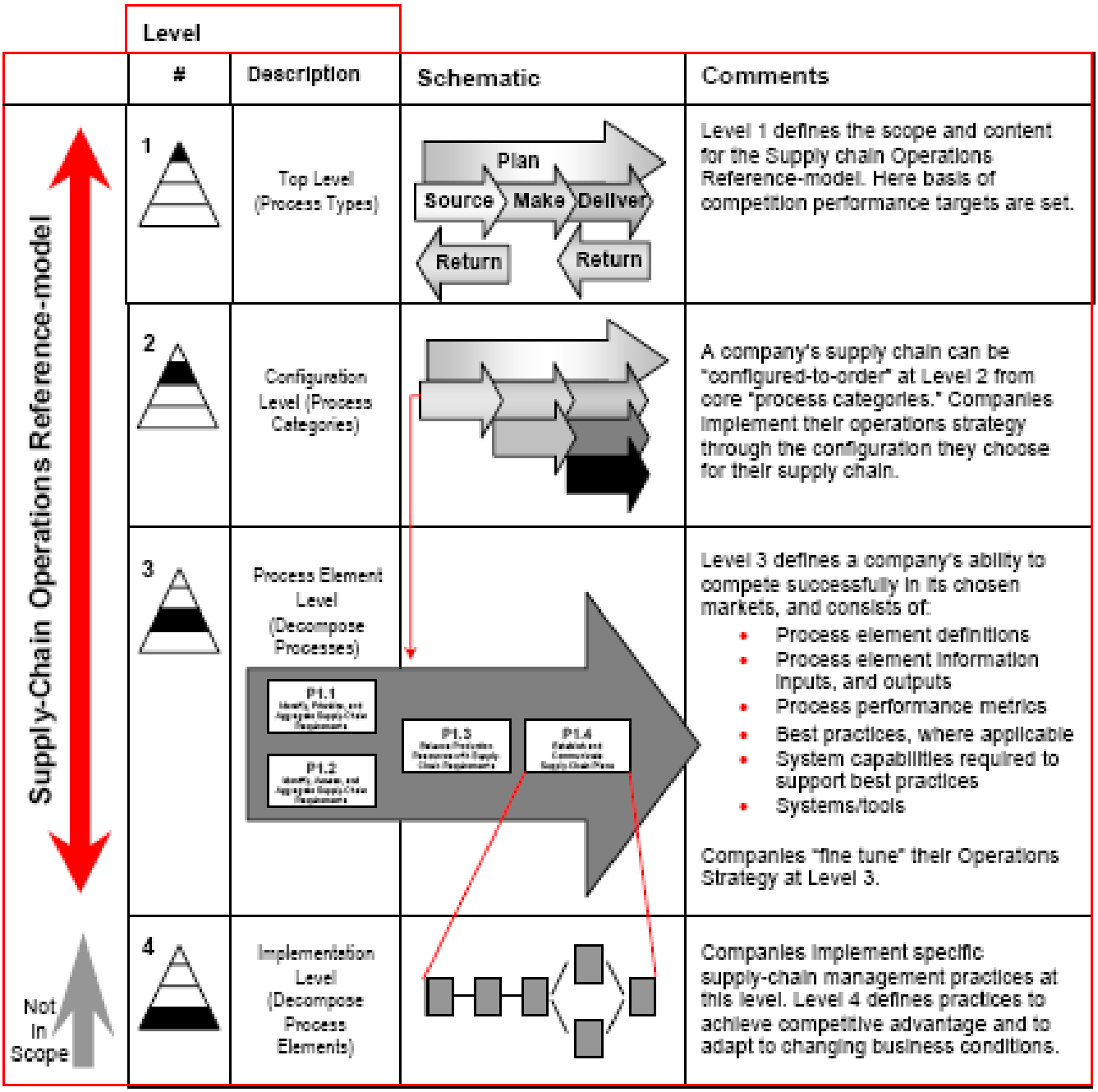

Figure 2 - SCOR is a hierarchical model with specific boundaries in regard to scope.

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The SCOR-model is a business process reference model as illustrated in **Figure 3**. That is, it is a Model that links process elements, metrics, best practice and the features associated with the execution of a supply chain in a unique format. The uniqueness and power of the Model and its successful implementation is chiefly derived from using these four elements together.

It is important to note that this Model describes processes not functions. In other words, the Model focuses on the activity involved, not the person or organizational element that performs the activity.

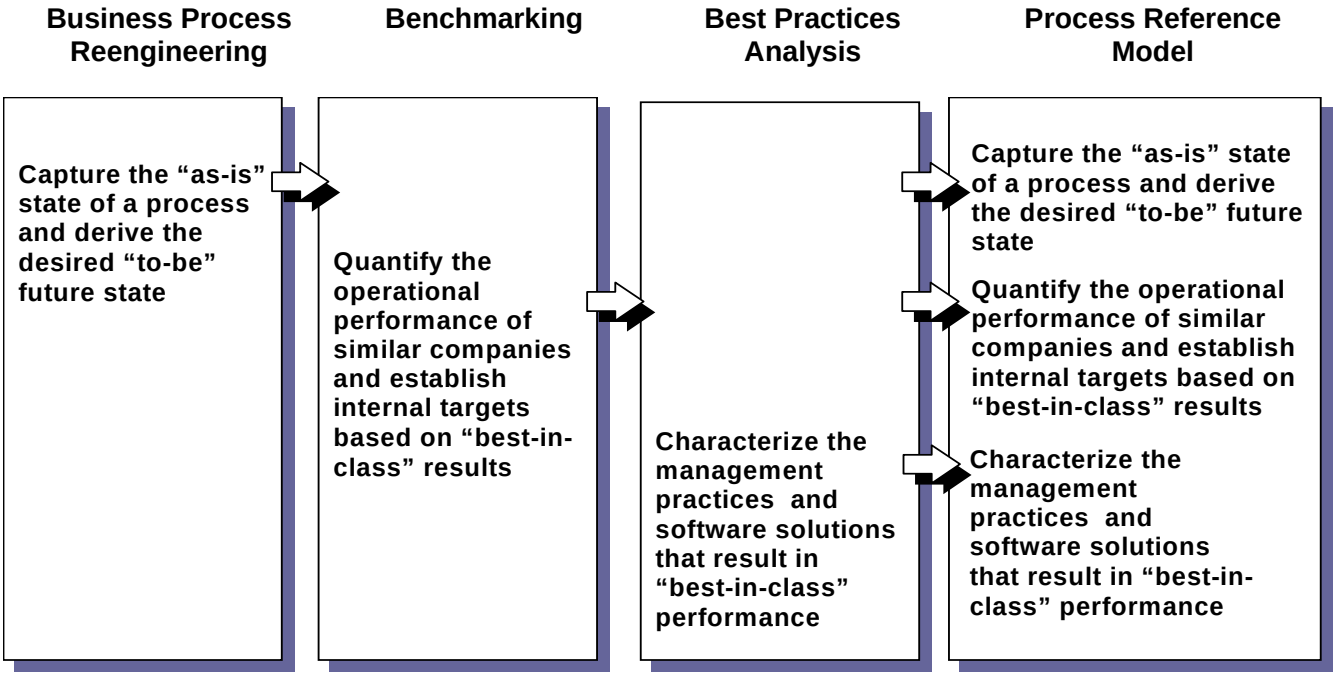

Figure 3 - SCOR is a business process reference model.

SCOR-model Structure

Besides the five basic management processes (Plan, Source, Make, Deliver, Return) that provide the organizational structure of the SCOR-model, it is useful to distinguish between the three process types in the Model: planning, execution, and enable (formerly infrastructure). A planning element is a process that aligns expected resources to meet expected demand requirements. Planning processes balance aggregated demand across a consistent planning horizon. Planning processes generally occur at regular intervals and can contribute to supply chain response time. Execution processes are triggered by planned or actual demand that changes the state of products. They include scheduling and sequencing, transforming materials and services, and moving product. Enable processes prepare, maintain, and manage information or relationships upon which planning and execution processes rely.

A set of standard notation is used throughout the Model. **P** depicts Plan elements, **S** depicts Source elements, **M** depicts Make elements, **D** depicts Deliver elements, and **R** depicts Return elements. **SR** = Source Return and **DR** = Deliver Return. An **E** preceding any of the others (e.g., EP) indicates that the process element is an Enable element associated with the Planning or Execution element (in this case, **EP** would be an Enable Planning element).

As indicated in **Figure 2**, the Model is hierarchical with three levels. P1.1 is a notation that indicates a third level process element. In this case, it is a Plan (P – Level 1) element that is concerned with supply chain planning (1 – Level 2) and is specific to identifying, prioritizing, and aggregating supply chain requirements (.1 – Level 3).

The SCOR-model contains 8 basic sections: Introduction, Plan, Source, Make, Deliver, Return, Glossary and Appendices. For modeling purposes, Return is documented in two locations – Source and Deliver. Those Return processes that connect an organization with its supplier (i.e., the return of raw material) are documented as Source Return activities. Those processes that connect an organization with its customer (i.e. the receipt of returned finished goods) are documented as Deliver Return activities. This preserves the concept that Source connects an organization

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with its suppliers and Deliver connects an organization with its customers. The Plan and Execution (Source, Make, Deliver, Return) sections are the heart of the Model while the Glossary provides a listing of the standard process and metrics terms that are used within the Model. The Appendices provide detailed information on metrics and best practices.

Plan, Source, Make, Deliver, and Return sections are organized with a standard structure. At the beginning of each section, there are graphics that provide a visual representation of the process elements, their relationships to each other, and the inputs and outputs that are germane to each process element. Following the graphics are text tables that identify: 1) the standard name for the process element, 2) the notation for the process element, 3) SCC's "standard" definition for the process element, 4) performance attributes that are associated with the process element, 5) metrics that are associated with the performance attributes, 6) best practices that are associated with the process (candidates, not necessarily an exhaustive list), and features (generally technologically related) that can contribute to heightened performance of the process.

Within the Source, Make and Deliver process elements, a common internal structure has been agreed upon. The Model focuses on three environments, Make-to-Stock, Make-to-Order, and Engineer-to-Order. As a result, S1 becomes Source Make-to-Stock Product, S2 becomes Source Make-to-Order Product and S3 becomes Source Engineer-to-Order Product. This same convention is used for Make, i.e. M1 – Make-to-Stock, and Deliver, i.e. D2 – Deliver Make-to-Order Product. This convention was extended to Return in Version 5.0. R1 is the Return of Defective Product, R2 is the Return of Maintenance, Repair or Overhaul (MRO) Product, and R3 is the Return of Excess Product.

Within each of the planning and execution sections and following the graphic and text descriptions, the associated Enable elements are described using the same graphic and text formats.

It is important to note, that like the process elements themselves, the metrics are intended to be hierarchical. Although not explicit in the Model, Level 1 metrics, as shown in **Figure 4** are typically "assigned" to P1 (Plan Supply Chain) and are decomposed (Level 2 and diagnostic metrics) to the respective planning, execution and enable elements.

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Performance Attributes and Level 1 Metrics

Level 1 Metrics are primary, high level measures that may cross multiple SCOR processes. Level 1 Metrics do not necessarily relate to a SCOR Level 1 process (PLAN, SOURCE, MAKE, DELIVER, RETURN).

Level 1 Metrics	Performance Attributes				
	Customer-Facing			Internal-Facing	
	Reliability	Responsiveness	Flexibility	Costs	Assets
Perfect Order Fulfillment	X				
Order Fulfillment Cycle Time		X			
Upside Supply Chain Flexibility			X		
Upside Supply Chain Adaptability			X		
Downside Supply Chain Adaptability			X		
Supply Chain Management Cost				X	
Cost of Goods Sold				X	
Cash-To-Cash Cycle Time					X
Return on Supply Chain Fixed Assets					X
Return on Working Capital					X

Figure 4 - SCOR Performance Attributes and Level 1 Metrics

The metrics are used in conjunction with performance attributes. In Version 4.0 of the Model, the Performance Attributes were expanded from four (Supply Chain Reliability, Supply Chain Flexibility and Responsiveness, Supply Chain Costs, and Supply Chain Asset Management) to five (Supply Chain Reliability, Supply Chain Responsiveness, Supply Chain Flexibility, Supply Chain Costs, and Supply Chain Asset Management). Generally, the impact of this exercise was to associate cycle time measures with Responsiveness and to identify needed metrics in the area of Flexibility. The table in **Figure 5** defines the performance attributes and indicates which Level 1 metrics are associated with each attribute.

The Performance Attributes are characteristics of the supply chain that permit it to be analyzed and evaluated against other supply chains with competing strategies. Just as you would describe a physical object like a piece of lumber using standard characteristics (e.g., height, width, depth), a supply chain requires standard characteristics to be described. Without these characteristics it is extremely difficult to compare an organization that chooses to be the low-cost provider against an organization that chooses to compete on reliability and performance.

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Performance Attributes and Associated Level 1 Metrics

Performance Attribute	Performance Attribute Definition	Level 1 Metric
Supply Chain Reliability	The performance of the supply chain in delivering: the correct product, to the correct place, at the correct time, in the correct condition and packaging, in the correct quantity, with the correct documentation, to the correct customer.	Perfect Order Fulfillment
Supply Chain Responsiveness	The speed at which a supply chain provides products to the customer.	Order Fulfillment Cycle Time
Supply Chain Flexibility	The agility of a supply chain in responding to marketplace changes to gain or maintain competitive advantage.	Upside Supply Chain Flexibility
		Upside Supply Chain Adaptability
		Downside Supply Chain Adaptability
Supply Chain Costs	The costs associated with operating the supply chain.	Supply Chain Management Cost
		Cost of Goods Sold
Supply Chain Asset Management	The effectiveness of an organization in managing assets to support demand satisfaction. This includes the management of all assets: fixed and working capital.	Cash-to-Cash Cycle Time
		Return on Supply Chain Fixed Assets
		Return on Working Capital

Figure 5 – Definitions for SCOR Performance Attributes and which Level 1 metrics are associated with each attribute.

Associated with the Performance Attributes are the Level 1 Metrics. These Level 1 Metrics are the calculations by which an implementing organization can measure how successful they are in achieving their desired positioning within the competitive market space. While these Performance Attributes are critical in implementing the Model, formal definitions were not previously included in the Model. In Version 4.0, standard Performance Attribute definitions were provided. In Version 5.0, the process tables associated with Level 2 and 3 activities were reconciled to reflect the separation of the flexibility and responsiveness attributes and to ensure that the metrics measured what they were intended to measure.

First time users of the Model should be aware that the metrics in the Model are hierarchical – just as the process elements are hierarchical. Level 1 Metrics are created from lower level calculations. (Level 1 Metrics are primary, high level measures that may cross multiple SCOR processes. Level 1 Metrics do not necessarily relate to a SCOR Level 1 process (PLAN, SOURCE, MAKE, DELIVER, RETURN).

Lower level calculations (Level 2 metrics) are generally associated with a narrower subset of processes. For example, Delivery Performance is calculated as the total number of products delivered on time and in full based on a commit date. Additionally, even lower level metrics (diagnostics) are used to diagnose variations in performance against plan. For example, an organization may wish to examine the correlation between the request date and commit date.

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SCOR Version 8.0 Changes

Processes

In Version 8.0, there are no changes to the Level 1, 2, or 3 Processes.

Metrics

There is an additional Level 1 metric – **Return on Working Capital** – in the Assets Attribute category. The definition and other detailed information regarding this metric are included in the Metrics Appendix A in this publication. It is also listed in the appropriate processes under "Metrics."

The Metrics in SCOR 8.0 have been significantly streamlined. Level 2 processes now only include Level 1 metrics and a Cost metric has been added for every single process in the model. Version 7.0 similarly saw the addition of a Cycle Time metric for every process. This allows the easy "roll up" of cost and cycle time metrics to the Level 1 metrics. Metrics that are considered to be "diagnostic" are not included in the Appendix A Metrics Hierarchy. These measures are important measures, but do not "roll up" to Level 1 Metrics. There are a few new hierarchical Level 3 metrics that are not yet defined and listed in the tables – this will be included in the next SCOR update – likely to be a minor update 8.1. SCOR 7.0 Metrics that were categorized as lower level or no longer relevant have been archived. An archived list of SCOR metrics is available upon request.

Best Practices

The Best Practices Appendix has also been reworked to make it a more clean and consistent reference. Changes to some of the definitions throughout the Model have been updated and some process affiliations are changed. Best Practices no longer contain the "Feature" column, as this was a "hangover" from when the Model used to list affiliated software features, now not maintained by the Council. This column has been replaced by a definition where it has been identified. The team surveyed SCC members on Best Practices that they want to see included in the future and this work is ongoing. Changed definitions in Version 8.0 include:

Barcoding	add RFID
Design/upgrade production equipment to maximize flexibility and avoid line stoppages	old: None Identified new: Machine productivity and downtime monitoring. (consistent to the other occurrences of the best practice process characteristic)
Assessing export/import requirements during time of product development/manufacture	old: None Identified new: Multi-country Export/Import documentation compliance
Bar coding is used to minimize handling time and maximize data accuracy	old: Product serial number used as identifier new: Bar code interface for data collection devices Generate bar coded receiving documents
Cellular manufacturing	old: None Identified new: Manufacturing is broken into work cells
Collaboration among Supply Chain partners extends outwards to customers, spanning the supply chain. Planning Replanning Business Rules Plan Changes	old: None Identified new: Supply Chain Advanced Planning Systems Supply Chain Integration Systems Integration between supply chain Advanced Planning and ERP execution systems Supply Chain Capacity Planning Systems
Design/upgrade production equipment to maximize flexibility and avoid line stoppages	old: None Identified new: Machine productivity and downtime monitoring
Electronic material move transactions	old: Bar code data collection new: Automated process control and/or barcode data collection
ATP and Product Reservation	old: ATP and Product Reservation, Integration with scheduling and inventory management new: Available-to-Promise (ATP), See Glossary
Supplier (Carrier) Agreements	old: Supplier (Carrier) Agreements new: Carrier Agreements

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CPFR®, Collaborative Planning, Forecasting, Replenishment	old: CPFR®, Collaborative Planning, Forecasting, Replenishment new: Collaborative Planning, Forecasting, Replenishment (CPFR)
Postponement	New: Postponement (delayed differentiation) is a supply chain concept where a product is kept as long as possible in a generic state. Differentiation of the generic product into a specific end-product is shifted closer to the consumer by postponing identify changes, such as assembly or packaging, to the last possible supply chain location.
S&OP, Sales and Operations Planning	old: S&OP, Sales and Operations Planning new: Sales and Operations Planning (S&OP)
Inventory Cycle Counting	old: Inventory Cycle Counting new: Statistical Test Count
Assess Supplier Performance	old: Assess Supplier Performance new: Supplier Performance Assessment System

Inputs and Outputs

New in the Glossary are the Inputs/Outputs and their definitions. These were not defined or listed for reference in any previous versions of SCOR. This piece of the SCOR 8.0 development was facilitated by a team working to use the ISA 95 standard in conjunction with SCOR. The definitions they added were included to also satisfy their use of both SCOR and ISA 95.

Workflow Graphics

Prompted by the first time re-hosting of the SCOR model into a BPM native format, the workflow diagrams are very different than the previously published Microsoft Word graphics. They now also include “deliverables” – what is moving from one process to another, or into and out of the process. As a result of these complex workflows and the rehosting in software rather than maintenance in Microsoft Word, the type is very small in the workflow graphics. The TDSC has agreed to post them ‘as is” for this printing until a more legible print version can be developed. They are included behind the process tables in the printed SCOR Model. **They are also available as HTML files on the www.supply-chain.org members’ website with a zoom feature so that they can be enlarged for easy reading.**

SCOR database

For the next version of SCOR (most likely 8.1), the database output from this BPM will be released as a vendor-neutral format. The suppliers working with SCC on this project will help determine how this will be released and made available. A software licensing program is also being developed for future releases of SCOR in electronic format.

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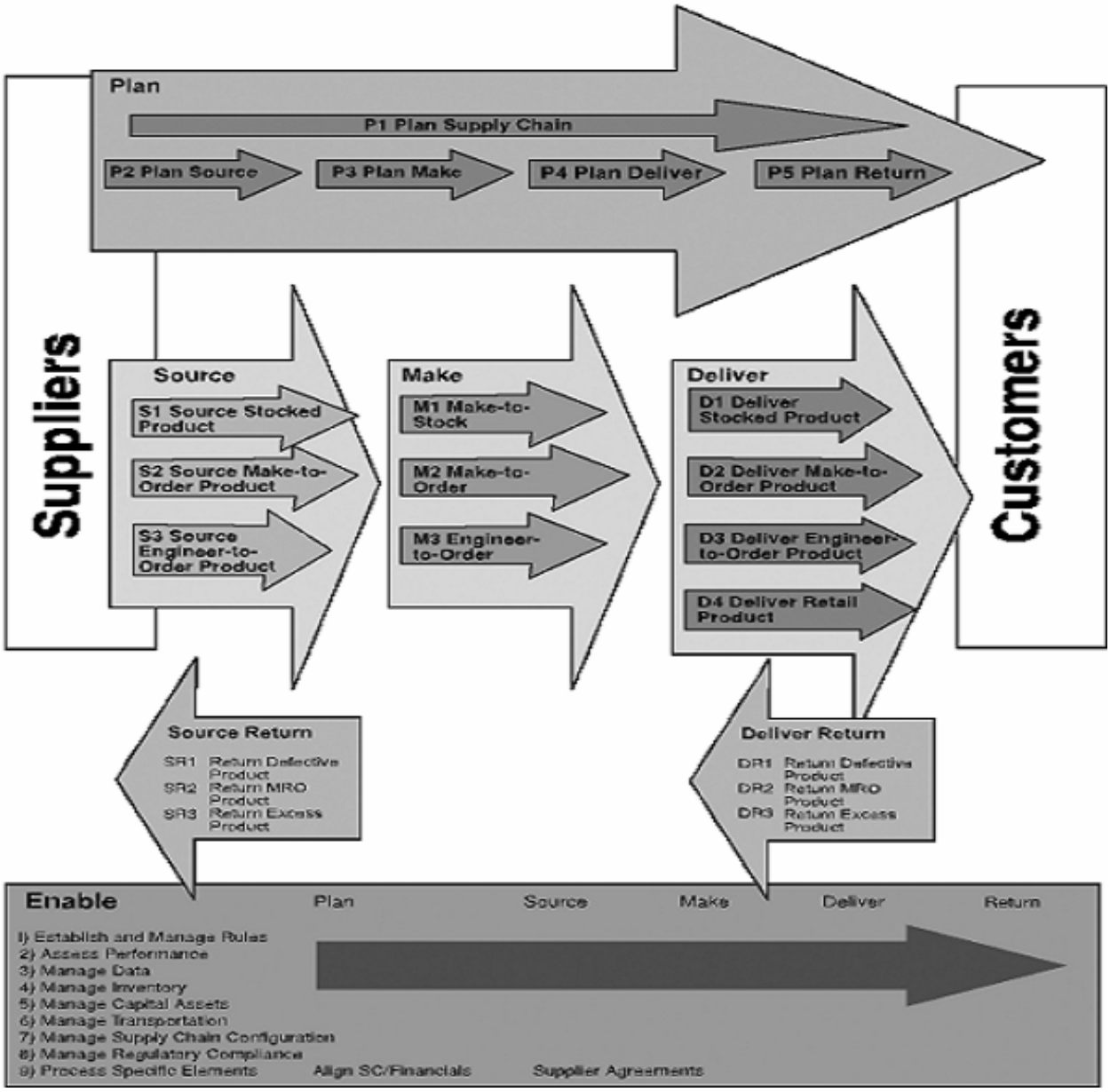
SCOR Toolkit



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The Technical Change Process

The SCOR-model is developed and maintained by the voluntary efforts of the Supply Chain Council members. Unlike other organizations with large technical staffs, the Council depends on the contributions of its members to actively advance the state of knowledge in supply chain by identifying required Model changes, researching and validating those changes, and developing the consensus regarding the proposed changes. SCOR-model versions prior to Version 6.0 were developed in a Committee structure that was focused on developing a stable, usable Model that could be used by experienced Council members as well as organizations newly introduced to the SCOR concept. In 2002, confident that the Model's stability had been demonstrated with over 5 years of application experience by Council members, the Supply Chain Council shifted its technical development focus to specific implementation issues.

The current technical development process relies on project teams composed of volunteers from Supply Chain Council member organizations. These project teams are short-lived groups that focus on specific Model challenges. It is expected that the normal term of a project team will be between 3-6 months. The change process and the coordination of the project team activities is led by the Technical Development Steering Committee (TDSC), a standing body elected by their peers in the Council. Changes to the Model are normally initiated by a Council member or members (but may be initiated by a Special Industry Group, an implementation project team, or the Chief Technical Officer). The primary mechanism for changing the Model is the Project Team. These self-organizing and self-directed teams propose areas of investigation, pursue and develop proposals for Model development and publish research results on the Council website. These activities are coordinated by the Supply Chain Council's Technical Development Steering Committee, which is comprised of elected representatives from the Council's membership.

The Model change process is documented on the SCC's website. Essentially, the process consists of: 1) The Council issues a call for volunteers to work on an identified need for revision or change, 2) volunteers submit a Charter Proposal to the TDSC outlining the concept, scope of work, schedules and milestones, and identifying the volunteer resources, 3) the TDSC reviews the proposed Charter and provides feedback on the proposed changes to the initiating group, 4) upon approval, the Project Team crafts the details of their scope of work and determines whether it is likely their efforts will lead to a Model change (which generally includes the modification of SCOR processes, metrics, best practice, features and inputs and outputs) or a research report (white paper), 5) the Project Team proposes how to integrate proposed changes into the overall Model, 6) after final technical review the TDSC forwards the technical community recommendations for proposed changes/additions to the SCC Board of Directors, and 7) following the approval of the Board, the new Model is published for the SCC membership.

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P1 Plan Supply Chain

The development and establishment of courses of action over specified time periods that represent a projected appropriation of supply chain resources to meet supply chain requirements for the longest time fence constraints of supply resources.

The Category P1 includes four Level 3 Elements:

P1.1 Identify, Prioritize, and Aggregate Supply Chain Requirements	The process of identifying, aggregating, and prioritizing, all sources of demand for the integrated supply chain of a product or service at the appropriate level, horizon and interval. The sales forecast is comprised of the following concepts: sales forecasting level, time horizon, and time interval. The sales forecasting level is the focal point in the corporate hierarchy where the forecast is needed at the most generic level. i.e. Corporate forecast, Divisional forecast, Product Line forecast, SKU, SKU by Location. The sales forecasting time horizon generally coincides with the time frame of the plan for which it was developed i.e. Annual, 1-5 years, 1- 6 months, Daily, Weekly, Monthly. The sales forecasting time interval generally coincides with how often the plan is updated, i.e. Daily, Weekly, Monthly, and Quarterly.
P1.2 Identify, Assess, and Aggregate Supply Chain Resources	The process of identifying, prioritizing, and aggregating, as a whole with constituent parts, all sources of supply that are required and add value in the supply chain of a product or service at the appropriate level, horizon and interval.
P1.3 Balance Supply Chain Resources with Supply Chain Requirements	The process of identifying and measuring the gaps and imbalances between demand and resources in order to determine how to best resolve the variances through marketing, pricing, packaging, warehousing, outsource plans or some other action that will optimize service, flexibility, costs, assets, (or other supply chain inconsistencies) in an iterative and collaborative environment. The process of developing a time-phased course of action that commits supply-chain resources to meet supply-chain requirements.
P1.4 Establish Supply Chain Plans	The establishment and communication of courses of action over the appropriate time-defined (long-term, annual, monthly, weekly) planning horizon and interval, representing a projected appropriation of supply-chain resources to meet supply-chain requirements.

Metrics (see Appendix A for metrics attributes):

Cash-To-Cash Cycle Time	[Inventory Days of Supply + Days Sales Outstanding - Days Payable Outstanding] The time it takes for an investment made to flow back into a company after it has been spent for raw materials. For services, this represents the time from the point where a company pays for the resources consumed in the performance of a service to the time that the company received payment from the customer for those services.
Cost to Plan Supply Chain	The sum of the costs associated with planning supply chain activities.
Order Fulfillment Cycle Time	The average actual cycle time consistently achieved to fulfill customer orders.
Plan Cycle Time	The average time associated with planning source activities

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Return on Supply Chain Fixed Assets	Return on Supply Chain Fixed Assets measures the return an organization receives on its invested capital in supply chain fixed assets. This includes the fixed assets used in Plan, Source, Make, Deliver, and Return. The levels of aggregation can be at any element associated with a supply chain asset.
Return on Working Capital	Return on working capital is a measurement which assesses the magnitude of investment relative to a company's working capital position verses the revenue generated from a supply chain. Components include accounts receivable, accounts payable, inventory, supply chain revenue, cost of goods sold and supply chain management costs.

Best Practices:

All Functions and Organizations Understand Their Impact on Supply/Demand Balancing, Including Sales, Marketing, Product Management, Manufacturing, Customer, Suppliers, Materials Management, and Product Development	None identified
Capability to Run "Simulated" Full-Stream Supply/Demand Balancing for "What-If" Scenarios	Supply chain modeling and visualization system
Change in the Demand Signal Instantaneously "Reconfigures" the Production and Supply Plans	Event-driven supply chain re-planning
Collaborative Planning, Forecasting, Replenishment (CPFR)	Collaborative Planning, Forecasting and Replenishment is a concept that allows collaborative processes across the supply chain, using a set of process and technology models.... (From www.cpfr.org/intro.html)
On-Line Visibility of All Supply-Chain Demand Requirements and Resources, both Currently Available and Committed (Pegged)	Enterprise resource planning system Customer relationship management system
Re-Balancing of Full-Stream Supply/Demand on a Daily Basis, Including Source-Make-Deliver Resources and Requirements from "Customers' Customer to Suppliers' Supplier"	Enterprise-wide planning system customer Relationship Systems
Responsiveness and Flexibility Are Emphasized By Developing Expertise in Making Business Processes Re-Programmable, Re-Configurable and Continuously Changeable	Integrated process modeling and software reconfiguration tools
Sales and Operations Planning (S&OP)	A process to develop tactical plans that provide management the ability to strategically direct its businesses to achieve competitive advantage on a continuous basis by integrating customer-focused marketing plans for new and existing products with the management of the supply chain. The process brings together all the plans for the business (sales, marketing, development, manufacturing, sourcing, and financial) into one integrated set of plans. It is performed at least once a month and is reviewed by management at an aggregate (product family) level. The process must reconcile all supply, demand, and new-product plans at both the detail and aggregate levels and tie to the business plan. It is the definitive statement of the company's plans for the near to intermediate term, covering a horizon sufficient to plan for resources and to support the annual business planning process. Executed properly, the sales and operation planning process links the strategic plans for the business with its execution and reviews performance measurements for continuous improvement. (From APICS online dictionary.)
Supply Chain is Designed to Have Supply Flexibility Equal to Demand Volatility	None identified

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Supply/Demand Process is Highly Integrated from Customer Data Gathering to Order Receipt, through Production to Supplier Request	Integrated supply chain planning system with interfaces to all supply/demand data sources through public and private digitally enabled supply networks.
Tools Support Balanced Decision Making (e.g., Trade-Off between Service Level and Inventory Investment)	Supply chain planning optimization system
Vendor Managed Inventory	VMI is a concept for planning and control of inventory, in which the supplier has access to the customer's inventory data and is responsible for maintaining the inventory level required by the customer. Re-supply is performed by the vendor through regularly scheduled reviews of the on-site inventory. The on-site inventory is counted, damaged or outdated goods are removed, and the inventory is restocked to predefined levels.

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P1.1 Identify, Prioritize, and Aggregate Supply Chain Requirements

The process of identifying, aggregating, and prioritizing, all sources of demand for the integrated supply chain of a product or service at the appropriate level, horizon and interval.

The sales forecast is comprised of the following concepts: sales forecasting level, time horizon, and time interval. The sales forecasting level is the focal point in the corporate hierarchy where the forecast is needed at the most generic level. i.e. Corporate forecast, Divisional forecast, Product Line forecast, SKU, SKU by Location. The sales forecasting time horizon generally coincides with the time frame of the plan for which it was developed i.e. Annual, 1-5 years, 1- 6 months, Daily, Weekly, Monthly. The sales forecasting time interval generally coincides with how often the plan is updated, i.e. Daily, Weekly, Monthly, and Quarterly.

Metrics (see Appendix A for metrics attributes):

Cost to Identify, Prioritize, and Aggregate Supply Chain Requirements	The sum of the costs associated with identifying, assessing and aggregating supply chain requirements.
Forecast Accuracy	Forecast accuracy is calculated for products and/or families for markets/distribution channels, in unit measurement. Common calculation is Forecast Sum - Sum of Variance/Sum of Actuals to determine percentage error. *monitoring the delta of Forecast Accuracy over measured time periods can determine success rates.
Identify, Prioritize, and Aggregate Supply Chain Requirements Cycle Time	The average time associated with the identifying, prioritizing, and aggregating supply chain requirements

Best Practices:

Collaboration among Operations Strategy Team	Supply Chain Advanced Planning Systems Supply Chain Integration Systems Integration between supply chain advanced planning and ERP execution systems Supply Chain Capacity Planning Systems
Digital Links (XML Based, EDI. Etc.) Among Supply Chain Members	Real-time exchange of supply chain information between supply chain members collaborative planning systems, Internet Trading Exchanges, B2B Integration and Application Server Systems
Joint Service Agreements (JSA)	Collaborative Planning Systems
Push-Based Forecasts Are Replaced with Customer Replenishment “Pull-Based“ Signals	Standards Based (RosettaNet, eBXML, OAGI, etc) B2B integration tools and systems
Supply Chain Advance Planning System	Collaboration among Supply Chain partners extends outwards to customers, spanning the supply chain. Planning Re-planning Business Rules Plan Changes
Systems Support Accurate On-Line Visibility of Full-Stream Demand Requirements and Priorities	Advance Planning and Scheduling System Supply Chain Event Management Software

Inputs:

Customer Requirements from Source: Customer	The part of the supply chain requirements related to the customer’s needs, including sales forecasts and actual orders and backorders
Order Backlog from D1.3 Reserve Inventory & Determine Delivery Date	Orders that have been received and entered into the order processing system and are in a queue waiting to be processed and shipped.

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Order Backlog from D1.11 Load Vehicle & Generate Shipping Documentation	Orders that have been received and entered into the order processing system and are in a queue waiting to be processed and shipped.
Planning Data from EP.3 Manage PLAN Data Collection	Execution information necessary to plan the balance of supply chain resources to demand requirements at both the highest aggregate and lowest SKU planning levels.
Revised Aggregate Forecast and Projections from EP.9 Align Supply Chain Unit Plan with Financial Plan	An update to the aggregate Supply-Chain Forecasts of Demand by Product Family supporting the Market/Channel Plans. Corresponding Projections, supporting Make, Source, Deliver, Inventory and Response Time Plans through the Supply-Chain are produced from these Forecasts Together, they represent balanced Supply and Demand.
Revised Business Assumptions from EP.5 Manage Integrated Supply Chain Capital Assets	An update to the expected cause and effect statements that are the base for the Revised Aggregate Forecast and Projections. These are reviewed periodically with actual results to verify the linkage of actual cause and effect.
Revised Business Assumptions from EP.9 Align Supply Chain Unit Plan with Financial Plan	An update to the expected cause and effect statements that are the base for the Revised Aggregate Forecast and Projections. These are reviewed periodically with actual results to verify the linkage of actual cause and effect.
Shipments from D1.11 Load Vehicle & Generate Shipping Documentation	Transactions related to sending the product to the customer.
Shipments from D1.3 Reserve Inventory & Determine Delivery Date	Transactions related to sending the product to the customer.

Outputs:

Supply Chain Requirements to P1.3 Balance Supply Chain Resources with Supply Chain Requirements	Sources of demand for the integrated supply chain of a product or service at the appropriate level, horizon and interval.

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P1.2 Identify, Assess, and Aggregate Supply Chain Resources

The process of identifying, prioritizing, and aggregating, as a whole with constituent parts, all sources of supply that are required and add value in the supply chain of a product or service at the appropriate level, horizon and interval.

Metrics (see Appendix A for metrics attributes):

Cost to Identify, Assess, and Aggregate Supply Chain Resources	The sum of the costs associated with identifying, assessing and aggregating supply chain resources.
Identify, Assess, and Aggregate Supply Chain Resources Cycle Time	The average time associated with the identifying, assessing, and aggregating supply chain resource availability
Inventory Days of Supply	Five point annual average of the sum of all gross inventories (raw materials & WIP, plant FG, field FG, field samples, other) ÷ (COGS ÷ 365). Total gross value of inventory at standard cost before reserves for excess and obsolescence. Only includes inventory on company books, future liabilities should not be included

Best Practices:

Digital Links (XML Based, EDI. Etc.) Among Supply Chain Members	Real-time exchange of supply chain information between supply chain members collaborative planning systems, Internet Trading Exchanges, B2B Integration and Application Server Systems
Joint Service Agreements (JSA)	Collaborative Planning Systems
Lead Times Updated Monthly	None identified
Review Product Profitability	ABC and cost modeling.

Inputs:

Delivery Plans from P4.4 Establish Delivery Plans	A plan for a course of action over specified time periods that involves a projected appropriation of supply resources to meet delivery requirements.
Inventory from Source: Customer	In business management, inventory consists of a list of goods and materials held available in stock. Also, those stocks or items used to support production (raw materials and work-in-process items), supporting activities (maintenance, repair, and operating supplies), and customer service (finished goods and spare parts)
Make/Buy Decision from EP.5 Manage Integrated Supply Chain Capital Assets	The output of the process used to determine whether a demand will be supplied with internal capacity or purchased through contract manufacturing and/or contracted services externally.
Outsource Plan from EP.5 Manage Integrated Supply Chain Capital Assets	A plan that describes how a company will utilize third party business partners to provide products and services which the company chooses not to provide with internal capacity. Outsource Plans can vary in detail from simple policy statements to highly detailed plans with specifics about the third party business partners, specifications for products and services, performance expectations, and contract considerations.
Outsource Plan from EP.6 Manage Integrated Supply Chain Transportation	A plan that describes how a company will utilize third party business partners to provide products and services which the company chooses not to provide with internal capacity. Outsource Plans can vary in detail from simple policy statements to highly detailed plans with specifics about the third party business partners, specifications for products and services, performance expectations, and contract considerations.
Planning Data from EP.3 Manage PLAN Data Collection	Execution information necessary to plan the balance of supply chain resources to demand requirements at both the highest aggregate and lowest SKU planning levels.

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Production Plans from P3.4 Establish Production Plans	A master production plan used to allocate capacity among manufacturing resources and schedule finite manufacturing activities or executing the performance of a service. Production Plan includes production capability.
Regulatory Requirements from EP.8 Manage PLAN Regulatory Requirements and Compliance	Requirements dictated by process standards set by external entities (i.e. government, trade officials, etc.).
Revised Capital Plan from EP.6 Manage Integrated Supply Chain Transportation	A revision to plan for capital expenditures necessitated by either changes in specific business plans or factors and assumptions affecting a business plan.
Revised Capital Plan from EP.5 Manage Integrated Supply Chain Capital Assets	A revision to plan for capital expenditures necessitated by either changes in specific business plans or factors and assumptions affecting a business plan.
Sourcing Plans from P2.4 Establish Sourcing Plans	An aggregate material requirements plan used to schedule material deliveries to meet production plan.

Outputs:

Supply Chain Resources to P1.3 Balance Supply Chain Resources with Supply Chain Requirements	As a whole with constituent parts, all sources of supply that are required to add value in the supply chain of a product or service at the appropriate level, horizon and interval.

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P1.3 Balance Supply Chain Resources with Supply Chain Requirements

The process of identifying and measuring the gaps and imbalances between demand and resources in order to determine how to best resolve the variances through marketing, pricing, packaging, warehousing, outsource plans or some other action that will optimize service, flexibility, costs, assets, (or other supply chain inconsistencies) in an iterative and collaborative environment.

The process of developing a time-phased course of action that commits supply-chain resources to meet supply-chain requirements.

Metrics (see Appendix A for metrics attributes):

Balance Supply Chain Resources with Supply Chain Requirements Cycle Time	The average time associated with balancing supply chain resources with supply chain requirements.
Cost to Balance Supply Chain Resources with Supply Chain Requirements	The sum of the costs associated with balance of supply chain resources with supply chain requirements.
Fill Rate	The percentage of ship-from-stock orders shipped within 24 hours of order receipt. For services, this metric is the proportion for services that are filled so that the service is completed within 24 hours
Inventory Days of Supply	Five point annual average of the sum of all gross inventories (raw materials & WIP, plant FG, field FG, field samples, other) ÷ (COGS ÷ 365). Total gross value of inventory at standard cost before reserves for excess and obsolescence. Only includes inventory on company books, future liabilities should not be included

Best Practices:

Business Intelligence (BI)	A data warehouse / data mart is the source of all planning (master) data, business rules and transaction data. Analytical tools enable the ongoing maintenance and improvement of the business rules based on actual data.
Customer Relationship Management (CRM)	Software that provides customer input and keeps the customer informed about the planning of the production and delivery process by managing all contacts and communication with the customer thorough all channels including internet and traditional sales and customer service channels.
Demand Planning, Demand Flow Leadership	Software that provides multiple data models including the business rules and metrics for the entire supply chain planning process. Algorithms use the business rules and metrics as the drivers for the planning engine.

Inputs:

Supply Chain Resources from P1.2 Identify, Assess, and Aggregate Supply Chain Resources	As a whole with constituent parts, all sources of supply that are required to add value in the supply chain of a product or service at the appropriate level, horizon and interval.
Supply Chain Requirements from P1.1 Identify, Prioritize, and Aggregate Supply Chain Requirements	Sources of demand for the integrated supply chain of a product or service at the appropriate level, horizon and interval.
Inventory Strategy from EP.4 Manage Integrated Supply Chain Inventory	The total supply chain inventory strategy. Contains the plan for total inventory limits or levels (including Raw Material, Work In Process, Finished and Purchased Finished Goods) including replenishment models, ownership, product mix, and stocking locations, both inter and intra company.
Planning Decision Policies from EP.1 Manage Business Rules for PLAN Processes	Any company policies that affect how a planning process is defined, approved, and performed.
Supply Chain Performance Improvement Plan from EP.2 Manage Performance of Supply Chain	A plan that describes goals and objectives for a supply chain and the steps that will be taken to reach those goals and objectives from the current performance levels.

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Outputs:

Workflow to P1.4 Establish Supply Chain Plans

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P1.4 Establish Supply Chain Plans

The establishment and communication of courses of action over the appropriate time-defined (long-term, annual, monthly, weekly) planning horizon and interval, representing a projected appropriation of supply-chain resources to meet supply-chain requirements.

Metrics (see Appendix A for metrics attributes):

Cost to Establish and Communicate Supply Chain Plans	The sum of the costs associated with establishing and communicating supply chain plans.
Establish Supply Chain Plans Cycle Time	The average time associated with establishing and communicating supply chain plans
Inventory Days of Supply	Five point annual average of the sum of all gross inventories (raw materials & WIP, plant FG, field FG, field samples, other) ÷ (COGS ÷ 365). Total gross value of inventory at standard cost before reserves for excess and obsolescence. Only includes inventory on company books, future liabilities should not be included

Best Practices:

Collaboration among Operations Strategy Team	Supply Chain Advanced Planning Systems Supply Chain Integration Systems Integration between supply chain advanced planning and ERP execution systems Supply Chain Capacity Planning Systems
Digital Links (XML Based, EDI. Etc.) Among Supply Chain Members	Real-time exchange of supply chain information between supply chain members collaborative planning systems, Internet Trading Exchanges, B2B Integration and Application Server Systems
Joint Service Agreements (JSA)	Collaborative Planning Systems
Supply Chain Advance Planning System	Collaboration among Supply Chain partners extends outwards to customers, spanning the supply chain. Planning Replanning Business Rules Plan Changes
Systems Support Accurate On-Line Visibility of Full-Stream Demand Requirements and Priorities as Well as Resource Utilization and Availability	Advance Planning and Scheduling System

Inputs:

Workflow from P1.3 Balance Supply Chain Resources with Supply Chain Requirements

Outputs:

Supply Chain Plans to P5.1 Assess, and Aggregate Return Requirements	Courses of action over specified time periods that represent a projected appropriation of total supply-chain resources to meet total supply-chain demand requirements.
Supply Chain Plans to P4.1 Identify, Prioritize, and Aggregate Delivery Requirements	Courses of action over specified time periods that represent a projected appropriation of total supply-chain resources to meet total supply-chain demand requirements.
Supply Chain Plans to Customer	Courses of action over specified time periods that represent a projected appropriation of total supply-chain resources to meet total supply-chain demand requirements.

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Supply Chain Plans to P2.1 Identify, Prioritize, and Aggregate Product Requirements	Courses of action over specified time periods that represent a projected appropriation of total supply-chain resources to meet total supply-chain demand requirements.
Supply Chain Plans to P3.1 Identify, Prioritize, and Aggregate Production Requirements	Courses of action over specified time periods that represent a projected appropriation of total supply-chain resources to meet total supply-chain demand requirements.

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P2 Plan Source

The development and establishment of courses of action over specified time periods that represent a projected appropriation of material resources to meet supply chain requirements.

The Category P2 includes four Level 3 Elements:

P2.1 Identify, Prioritize, and Aggregate Product Requirements	The process of identifying, prioritizing, and considering, as a whole with constituent parts, all sources of demand for a product or service in the supply chain.
P2.2 Identify, Assess, And Aggregate Product Resources	The process of identifying, evaluating, and considering, as a whole with constituent parts, all material and other resources used to add value in the supply chain for a product or services.
P2.3 Balance Product Resources with Product Requirements	The process of developing a time-phased course of action that commits resources to meet requirements.
P2.4 Establish Sourcing Plans	The establishment of courses of action over specified time periods that represent a projected appropriation of supply resources to meet sourcing plan requirements.

Metrics (see Appendix A for metrics attributes):

Cash-To-Cash Cycle Time	[Inventory Days of Supply + Days Sales Outstanding - Days Payable Outstanding] The time it takes for an investment made to flow back into a company after it has been spent for raw materials. For services, this represents the time from the point where a company pays for the resources consumed in the performance of a service to the time that the company received payment from the customer for those services.
Cost to Plan Source	The sum of the costs associated with planning source activities.
Order Fulfillment Cycle Time	The average actual cycle time consistently achieved to fulfill customer orders.
Plan Source Cycle Time	The average time associated with planning source activities
Return on Supply Chain Fixed Assets	Return on Supply Chain Fixed Assets measures the return an organization receives on its invested capital in supply chain fixed assets. This includes the fixed assets used in Plan, Source, Make, Deliver, and Return. The levels of aggregation can be at any element associated with a supply chain asset.
Return on Working Capital	Return on working capital is a measurement which assesses the magnitude of investment relative to a company's working capital position verses the revenue generated from a supply chain. Components include accounts receivable, accounts payable, inventory, supply chain revenue, cost of goods sold and supply chain management costs.

Best Practices:

All Key Participants in the Supply Chain, Including Strategic Partners, Have Full Visibility of the Demand/Supply Plan	Supply Chain Event Management Systems
Distinct and Consistent Linkages Exist to Ensure Disruptions and Opportunities in Material Resources Are Quickly and Accurately Communicated and Acted Upon	Bi-directional Digital Links (XML, EDI, etc) or Internet procurement networks to customer service linkage
EDI Links Integrate Supplier Resource Information (Inventory, Capacity Availability, Etc.) with Own Resources	Inter-company resource planning with EDI/Internet communication

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Joint Service Agreements with Suppliers Define the Levels of “Flexibility“ or Resource Upside Available Within Stated Lead Times and Agreed Upon Conditions	None identified

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P2.1 Identify, Prioritize, and Aggregate Product Requirements

The process of identifying, prioritizing, and considering, as a whole with constituent parts, all sources of demand for a product or service in the supply chain.

Metrics (see Appendix A for metrics attributes):

Cost to Identify, Prioritize, and Aggregate Product Requirements	The sum of the costs associated with identifying, assessing and aggregating deliver requirements.
Forecast Accuracy	Forecast accuracy is calculated for products and/or families for markets/distribution channels, in unit measurement. Common calculation is Forecast Sum - Sum of Variance/Sum of Actuals to determine percentage error. *monitoring the delta of Forecast Accuracy over measured time periods can determine success rates.
Identify, Prioritize, and Aggregate Product Requirements Cycle Time	The average time associated with the identifying, prioritizing, and aggregating product requirements

Best Practices:

Capacity and Supply Constraints Are Balanced Against Demand during the Planning Cycle	None identified
Categorize 100% of Total Inventory (Active, Usable, Excess, Obsolete) for Appropriate Action	None identified
Master Production Scheduling Reflects Management of Capacity and/or Supply Constraints	None identified
Sales and Operations Agree to Limits of Short Term Flexibility	None identified
The Demand Plan is Updated Frequently to Reflect Actual Consumption or Customer Forecast Information	None identified

Inputs:

Bill of Materials from EP.7 Manage Planning Configuration	The Bill of Materials is a structured list of all the materials or parts needed to produce a particular finished product, assembly, subassembly, manufactured part, whether purchased or not.
Delivery Plans from P4.4 Establish Delivery Plans	A plan for a course of action over specified time periods that involves a projected appropriation of supply resources to meet delivery requirements.
Item Master from EP.7 Manage Planning Configuration	A record of specific information for each product, which defines the system parameters with which to effectively plan and execute using ERP (MRP, etc) systems.
Order Signal from D3.3 Enter Order, Commit Resources & Launch Program	Reserved inventory and/or planned capacity and delivery date for a specific order.
Order Signal from D2.3 Reserve Resources & Determine Delivery Date	Reserved inventory and/or planned capacity and delivery date for a specific order.
Planning Data from EP.3 Manage PLAN Data Collection	Execution information necessary to plan the balance of supply chain resources to demand requirements at both the highest aggregate and lowest SKU planning levels.

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Product Routings from EP.7 Manage Planning Configuration	Product routings represent the way products are made and are integrated with the Bill of Materials. Key elements of proper Routings include proper sequence of operations, work center identification, relevant tolerances, run times, lot size and setups. The equivalent concepts for services are the workflow processes and rules.
Production Plans from P3.4 Establish Production Plans	A master production plan used to allocate capacity among manufacturing resources and schedule finite manufacturing activities or executing the performance of a service. Production Plan includes production capability.
Source Return Requirements from P5.4 Establish and Communicate Return Plans	All sources of demand in the Source Return of a product or service.
Supply Chain Plans from P1.4 Establish Supply Chain Plans	Courses of action over specified time periods that represent a projected appropriation of total supply-chain resources to meet total supply-chain demand requirements.

Outputs:

Product Requirements to P2.3 Balance Product Resources with Product Requirements	As a whole with constituent parts, all sources of demand for a product or service in the supply chain.

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P2.2 Identify, Assess, And Aggregate Product Resources

The process of identifying, evaluating, and considering, as a whole with constituent parts, all material and other resources used to add value in the supply chain for a product or services.

Metrics (see Appendix A for metrics attributes):

Cost to Identify, Assess, and Aggregate Product Resources	The sum of the costs associated with identifying, assessing and aggregating product resources.
Identify, Assess, and Aggregate Product Resources Cycle Time	The average time associated with the identifying, assessing, and aggregating product resource availability

Best Practices:

Capacity and Supply Constraints Identified During MPS Schedule Process Are Balanced Against Demand during the Planning Cycle	None identified
Categorize 100% of Total Inventory (Active, Usable, Excess, Obsolete) for Appropriate Action	None identified
Inventory is Planned at the Part Level, Based on Supply and Demand Variability	None identified
Inventory Performance is Measured at the Dollar and Unit Levels	None identified
Inventory Targets Are Reviewed and Adjusted Frequently	Digital Linkages using XML standards (RosettaNet, eBXML, OAGI) to automatically query inventory levels.
Obsolete Inventory is Reviewed at the Part Number Level	None identified

Inputs:

Inventory Availability from S3.6 Transfer Product	Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts).
Inventory Availability from S1.4 Transfer Product	Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts).
Inventory Availability from S2.4 Transfer Product	Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts).
Planning Data from EP.3 Manage PLAN Data Collection	Execution information necessary to plan the balance of supply chain resources to demand requirements at both the highest aggregate and lowest SKU planning levels.
Product Availability from Source:	Availability of a product by location that is reserved, scheduled or available for sale, or the number of products ready to be or planned to be shipped to the specific customer or market at the specific time.
Product Inventory Target Levels from ES.4 Manage Product Inventory	The target for the total product inventory, including e.g. raw material, work in progress and finished goods.
Product On Order from S1.1 Schedule Product Deliveries	Product on order with a selected source.
Product On Order from S3.3 Schedule Product Deliveries	Product on order with a selected source.
Product On Order from S2.1 Schedule Product Deliveries	Product on order with a selected source.

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Outputs:

Product Sources to P2.3 Balance Product Resources with Product Requirements	As a whole with constituent parts, all material and other resources used to add value in the supply chain for a product or services.

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P2.3 Balance Product Resources with Product Requirements

The process of developing a time-phased course of action that commits resources to meet requirements.

Metrics (see Appendix A for metrics attributes):

Balance Product Resources with Product Requirements Cycle Time	The average time associated with balancing product resources and product requirements.
Cost to Balance Product Resources with Product Requirements	The sum of the costs associated with balance of product resources with product requirements.

Best Practices:

Suppliers Share Responsibility for Balancing Supply and Demand through Joint Service Agreements	None identified

Inputs:

Product Sources from P2.2 Identify, Assess, And Aggregate Product Resources	As a whole with constituent parts, all material and other resources used to add value in the supply chain for a product or services.
Product Requirements from P2.1 Identify, Prioritize, and Aggregate Product Requirements	As a whole with constituent parts, all sources of demand for a product or service in the supply chain.
Planning Decision Policies from EP.1 Manage Business Rules for PLAN Processes	Any company policies that affect how a planning process is defined, approved, and performed.

Outputs:

Workflow to P2.4 Establish Sourcing Plans

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P2.4 Establish Sourcing Plans

The establishment of courses of action over specified time periods that represent a projected appropriation of supply resources to meet sourcing plan requirements.

Metrics (see Appendix A for metrics attributes):

Cost to Establish Sourcing Plans	The sum of the costs associated with establishing and communicating source plans.
Establish Sourcing Plans Cycle Time	The average time associated with establishing and communicating source plans

Best Practices:

Blanket Purchase Orders Cover Period Requirements	None identified
Digital Linkage (EDI, XML, Etc.) is Used to Provide Real-Time Demand Information and Handle Routine Transactions	None identified

Inputs:

Workflow from P2.3 Balance Product Resources with Product Requirements

Outputs:

Sourcing Plans to DR1.4 Transfer Defective Product	An aggregate material requirements plan used to schedule material deliveries to meet production plan.
Sourcing Plans to P4.2 Identify, Assess, and Aggregate Delivery Resources and Capabilities	An aggregate material requirements plan used to schedule material deliveries to meet production plan.
Sourcing Plans to D1.3 Reserve Inventory & Determine Delivery Date	An aggregate material requirements plan used to schedule material deliveries to meet production plan.
Sourcing Plans to ES.4 Manage Product Inventory	An aggregate material requirements plan used to schedule material deliveries to meet production plan.
Sourcing Plans to D2.3 Reserve Resources & Determine Delivery Date	An aggregate material requirements plan used to schedule material deliveries to meet production plan.
Sourcing Plans to ES.3 Maintain Source Data	An aggregate material requirements plan used to schedule material deliveries to meet production plan.
Sourcing Plans to S1.1 Schedule Product Deliveries	An aggregate material requirements plan used to schedule material deliveries to meet production plan.
Sourcing Plans to P1.2 Identify, Assess, and Aggregate Supply Chain Resources	An aggregate material requirements plan used to schedule material deliveries to meet production plan.
Sourcing Plans to P3.2 Identify, Assess, and Aggregate Production Resources	An aggregate material requirements plan used to schedule material deliveries to meet production plan.
Sourcing Plans to S3.3 Schedule Product Deliveries	An aggregate material requirements plan used to schedule material deliveries to meet production plan.
Sourcing Plans to P5.2 Identify, Assess, and Aggregate Return Resources	An aggregate material requirements plan used to schedule material deliveries to meet production plan.
Sourcing Plans to S3.1 Identify Sources of Supply	An aggregate material requirements plan used to schedule material deliveries to meet production plan.
Sourcing Plans to P5.1 Assess, and Aggregate Return Requirements	An aggregate material requirements plan used to schedule material deliveries to meet production plan.
Sourcing Plans to DR2.4 Transfer MRO Product	An aggregate material requirements plan used to schedule material deliveries to meet production plan.
Sourcing Plans to DR3.4 Transfer Excess Product	An aggregate material requirements plan used to schedule material deliveries to meet production plan.
Sourcing Plans to S2.1 Schedule Product Deliveries	An aggregate material requirements plan used to schedule material deliveries to meet production plan.

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Sourcing Plans to D3.3 Enter Order, Commit Resources & Launch Program	An aggregate material requirements plan used to schedule material deliveries to meet production plan.

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P3 Plan Make

The development and establishment of courses of action over specified time periods that represent a projected appropriation of production resources to meet production requirements.

The Category P3 includes four Level 3 Elements:

P3.1 Identify, Prioritize, and Aggregate Production Requirements	The process of identifying, prioritizing, and considering as a whole with constituent parts, all sources of demand in the creation of a product or service.
P3.2 Identify, Assess, and Aggregate Production Resources	The process of identifying, evaluating, and considering, as a whole with constituent parts, all things that add value in the creation of a product or performance of a service.
P3.3 Balance Production Resources with Production Requirements	The process of developing a time-phased course of action that commits creation and operation resources to meet creation and operation requirements.
P3.4 Establish Production Plans	The establishment of courses of action over specified time periods that represent a projected appropriation of supply resources to meet production and operating plan requirements.

Metrics (see Appendix A for metrics attributes):

Cash-To-Cash Cycle Time	[Inventory Days of Supply + Days Sales Outstanding - Days Payable Outstanding] The time it takes for an investment made to flow back into a company after it has been spent for raw materials. For services, this represents the time from the point where a company pays for the resources consumed in the performance of a service to the time that the company received payment from the customer for those services.
Order Fulfillment Cycle Time	The average actual cycle time consistently achieved to fulfill customer orders.
Return on Supply Chain Fixed Assets	Return on Supply Chain Fixed Assets measures the return an organization receives on its invested capital in supply chain fixed assets. This includes the fixed assets used in Plan, Source, Make, Deliver, and Return. The levels of aggregation can be at any element associated with a supply chain asset.
Return on Working Capital	Return on working capital is a measurement which assesses the magnitude of investment relative to a company's working capital position verses the revenue generated from a supply chain. Components include accounts receivable, accounts payable, inventory, supply chain revenue, cost of goods sold and supply chain management costs.

Best Practices:

Distinct and Consistent Linkages Exist to Ensure that Disruptions and Opportunities in Production Are Quickly and Accurately Communicated and Responses Made	Multi-plant supply/demand planning and execution

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P3.1 Identify, Prioritize, and Aggregate Production Requirements

The process of identifying, prioritizing, and considering as a whole with constituent parts, all sources of demand in the creation of a product or service.

Metrics (see Appendix A for metrics attributes):

Cost to Identify, Prioritize, and Aggregate Production Requirements	The sum of the costs associated with identifying, assessing and aggregating production requirements
Forecast Accuracy	Forecast accuracy is calculated for products and/or families for markets/distribution channels, in unit measurement. Common calculation is Forecast Sum - Sum of Variance/Sum of Actuals to determine percentage error. *monitoring the delta of Forecast Accuracy over measured time periods can determine success rates.
Identify, Prioritize, and Aggregate Production Requirements Cycle Time	The average time associated with the identifying, prioritizing, and aggregating production requirements

Best Practices:

Consideration of Supplier's Material Availability in Company's Supply Resources (Including Supplier's Production Plans & Capability, Inventory, and Delivery Plans)	Digital linkage to supplier quoting, planning, configuration and customer service applications

Inputs:

Bill of Materials from EP.7 Manage Planning Configuration	The Bill of Materials is a structured list of all the materials or parts needed to produce a particular finished product, assembly, subassembly, manufactured part, whether purchased or not.
Delivery Plans from P4.4 Establish Delivery Plans	A plan for a course of action over specified time periods that involves a projected appropriation of supply resources to meet delivery requirements.
Item Master from EP.7 Manage Planning Configuration	A record of specific information for each product, which defines the system parameters with which to effectively plan and execute using ERP (MRP, etc) systems.
Order Signal from D3.3 Enter Order, Commit Resources & Launch Program	Reserved inventory and/or planned capacity and delivery date for a specific order.
Order Signal from D2.3 Reserve Resources & Determine Delivery Date	Reserved inventory and/or planned capacity and delivery date for a specific order.
Planning Data from EP.3 Manage PLAN Data Collection	Execution information necessary to plan the balance of supply chain resources to demand requirements at both the highest aggregate and lowest SKU planning levels.
Product Routings from EP.7 Manage Planning Configuration	Product routings represent the way products are made and are integrated with the Bill of Materials. Key elements of proper Routings include proper sequence of operations, work center identification, relevant tolerances, run times, lot size and setups. The equivalent concepts for services are the workflow processes and rules.
Return Production Requirements from P5.4 Establish and Communicate Return Plans	As a whole with constituent parts, all sources of demand in the creation of a product or service.
Supply Chain Plans from P1.4 Establish Supply Chain Plans	Courses of action over specified time periods that represent a projected appropriation of total supply-chain resources to meet total supply-chain demand requirements.

Outputs:

Return Production Requirements to P3.3 Balance Production Resources with	As a whole with constituent parts, all sources of demand in the creation of a product or service.

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Production Requirements	

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P3.2 Identify, Assess, and Aggregate Production Resources

The process of identifying, evaluating, and considering, as a whole with constituent parts, all things that add value in the creation of a product or performance of a service.

Metrics (see Appendix A for metrics attributes):

Cost to Identify, Assess, and Aggregate Production Resources	The sum of the costs associated with identifying, assessing and aggregating production resources.
Identify, Assess, and Aggregate Production Resources Cycle Time	The average time associated with the identifying, assessing, and aggregating production resource availability

Best Practices:

Inventory Targets Are Reviewed and Adjusted Frequently	Digital Linkages using XML standards (RosettaNet, eBXML, OAGI) to automatically query inventory levels.
Obsolete Inventory is Reviewed at the Part Number Level	None identified

Inputs:

Equipment and Facilities Replacement and Disposition Plans from EM.5 Manage Equipment and Facilities	Actions relating to the planning, financing and disposition of capital outlays for such purposes as the purchase of new equipment, the introduction of new product lines, and the modernization of plant facilities
Inventory Availability from M3.3 Issue Sourced/In-Process Product	Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts).
Inventory Availability from M1.2 Issue Material	Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts).
Inventory Availability from M2.2 Issue Sourced/In-Process Product	Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts).
Planning Data from EP.3 Manage PLAN Data Collection	Execution information necessary to plan the balance of supply chain resources to demand requirements at both the highest aggregate and lowest SKU planning levels.
Production Schedule from M3.2 Schedule Production Activities	A plan that authorizes the factory to manufacture or repair a certain quantity of a specific item.
Production Schedule from M1.1 Schedule Production Activities	A plan that authorizes the factory to manufacture or repair a certain quantity of a specific item.
Production Schedule from M2.1 Schedule Production Activities	A plan that authorizes the factory to manufacture or repair a certain quantity of a specific item.
Sourcing Plans from P2.4 Establish Sourcing Plans	An aggregate material requirements plan used to schedule material deliveries to meet production plan.

Outputs:

Production Resources to P3.3 Balance Production Resources with Production	As a whole with constituent parts, all things that add value in the creation of a product or performance of a service.

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Requirements	

P3.3 Balance Production Resources with Production Requirements

The process of developing a time-phased course of action that commits creation and operation resources to meet creation and operation requirements.

Metrics (see Appendix A for metrics attributes):

Balance Production Resources with Product Creation Requirements Cycle Time	The average time associated with balancing production resources with production creation requirements.
Cost to Balance Production Resources with Product Creation Requirements	The sum of the costs associated with balance of production resources with product creation requirements.

Best Practices:

Inventory Targets Are Reviewed and Adjusted Frequently	Digital Linkages using XML standards (RosettaNet, eBXML, OAGI) to automatically query inventory levels.

Inputs:

Return Production Requirements from P3.1 Identify, Prioritize, and Aggregate Production Requirements	As a whole with constituent parts, all sources of demand in the creation of a product or service.
Production Resources from P3.2 Identify, Assess, and Aggregate Production Resources	As a whole with constituent parts, all things that add value in the creation of a product or performance of a service.
Planning Decision Policies from EP.1 Manage Business Rules for PLAN Processes	Any company policies that affect how a planning process is defined, approved, and performed.

Outputs:

Workflow to P3.4 Establish Production Plans

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P3.4 Establish Production Plans

The establishment of courses of action over specified time periods that represent a projected appropriation of supply resources to meet production and operating plan requirements.

Metrics (see Appendix A for metrics attributes):

Cost to Establish Production Plans	The sum of the costs associated with establishing and communicating production plans.
Establish Production Plans Cycle Time	The average time associated with establishing and communicating production plans

Best Practices:

Unplanned Orders Are Accepted and Scheduled Only When There is No Detrimental Impact on Overall Product Delivery Plan	Digital Linkages using XML standards (RosettaNet, eBXML, OAGI) to automatically query production capacity and ATP and schedule unplanned orders.

Inputs:

Workflow from P3.3 Balance Production Resources with Production Requirements

Outputs:

Production Plans to EM.5 Manage Equipment and Facilities	A master production plan used to allocate capacity among manufacturing resources and schedule finite manufacturing activities or executing the performance of a service. Production Plan includes production capability.
Production Plans to EM.1 Manage Production Rules	A master production plan used to allocate capacity among manufacturing resources and schedule finite manufacturing activities or executing the performance of a service. Production Plan includes production capability.
Production Plans to M3.2 Schedule Production Activities	A master production plan used to allocate capacity among manufacturing resources and schedule finite manufacturing activities or executing the performance of a service. Production Plan includes production capability.
Production Plans to P2.1 Identify, Prioritize, and Aggregate Product Requirements	A master production plan used to allocate capacity among manufacturing resources and schedule finite manufacturing activities or executing the performance of a service. Production Plan includes production capability.
Production Plans to D2.3 Reserve Resources & Determine Delivery Date	A master production plan used to allocate capacity among manufacturing resources and schedule finite manufacturing activities or executing the performance of a service. Production Plan includes production capability.
Production Plans to D3.3 Enter Order, Commit Resources & Launch Program	A master production plan used to allocate capacity among manufacturing resources and schedule finite manufacturing activities or executing the performance of a service. Production Plan includes production capability.

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Production Plans to P4.2 Identify, Assess, and Aggregate Delivery Resources and Capabilities	A master production plan used to allocate capacity among manufacturing resources and schedule finite manufacturing activities or executing the performance of a service. Production Plan includes production capability.
Production Plans to D1.3 Reserve Inventory & Determine Delivery Date	A master production plan used to allocate capacity among manufacturing resources and schedule finite manufacturing activities or executing the performance of a service. Production Plan includes production capability.
Production Plans to EM.2 Manage Production Performance	A master production plan used to allocate capacity among manufacturing resources and schedule finite manufacturing activities or executing the performance of a service. Production Plan includes production capability.
Production Plans to M2.1 Schedule Production Activities	A master production plan used to allocate capacity among manufacturing resources and schedule finite manufacturing activities or executing the performance of a service. Production Plan includes production capability.
Production Plans to P5.2 Identify, Assess, and Aggregate Return Resources	A master production plan used to allocate capacity among manufacturing resources and schedule finite manufacturing activities or executing the performance of a service. Production Plan includes production capability.
Production Plans to M2.5 Stage Finished Product	A master production plan used to allocate capacity among manufacturing resources and schedule finite manufacturing activities or executing the performance of a service. Production Plan includes production capability.
Production Plans to P1.2 Identify, Assess, and Aggregate Supply Chain Resources	A master production plan used to allocate capacity among manufacturing resources and schedule finite manufacturing activities or executing the performance of a service. Production Plan includes production capability.
Production Plans to M3.6 Stage Finished Product	A master production plan used to allocate capacity among manufacturing resources and schedule finite manufacturing activities or executing the performance of a service. Production Plan includes production capability.
Production Plans to P5.1 Assess, and Aggregate Return Requirements	A master production plan used to allocate capacity among manufacturing resources and schedule finite manufacturing activities or executing the performance of a service. Production Plan includes production capability.
Production Plans to M1.1 Schedule Production Activities	A master production plan used to allocate capacity among manufacturing resources and schedule finite manufacturing activities or executing the performance of a service. Production Plan includes production capability.
Production Plans to M1.5 Stage Product	A master production plan used to allocate capacity among manufacturing resources and schedule finite manufacturing activities or executing the performance of a service. Production Plan includes production capability.

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P4 Plan Deliver

The development and establishment of courses of action over specified time periods that represent a projected appropriation of delivery resources to meet delivery requirements.

The Category P4 includes four Level 3 Elements:

P4.1 Identify, Prioritize, and Aggregate Delivery Requirements	The process of identifying, prioritizing, and considering, as a whole with constituent parts, all sources of demand in the delivery of a product or service.
P4.2 Identify, Assess, and Aggregate Delivery Resources and Capabilities	The process of identifying, evaluating, and considering, as a whole with constituent parts, all things that add value in the delivery of a product or service.
P4.3 Balance Delivery Resources and Capabilities with Delivery Requirements	The process of developing a time-phased course of action that commits delivery resources to meet delivery requirements.
P4.4 Establish Delivery Plans	The establishment of courses of action over specified time periods that represent a projected appropriation of delivery resources to meet delivery requirements.

Metrics (see Appendix A for metrics attributes):

Cash-To-Cash Cycle Time	[Inventory Days of Supply + Days Sales Outstanding - Days Payable Outstanding] The time it takes for an investment made to flow back into a company after it has been spent for raw materials. For services, this represents the time from the point where a company pays for the resources consumed in the performance of a service to the time that the company received payment from the customer for those services.
Cost to Plan Deliver	The sum of the costs associated with planning the delivery of product.
Order Fulfillment Cycle Time	The average actual cycle time consistently achieved to fulfill customer orders.
Return on Supply Chain Fixed Assets	Return on Supply Chain Fixed Assets measures the return an organization receives on its invested capital in supply chain fixed assets. This includes the fixed assets used in Plan, Source, Make, Deliver, and Return. The levels of aggregation can be at any element associated with a supply chain asset.
Return on Working Capital	Return on working capital is a measurement which assesses the magnitude of investment relative to a company's working capital position verses the revenue generated from a supply chain. Components include accounts receivable, accounts payable, inventory, supply chain revenue, cost of goods sold and supply chain management costs.
Total Deliver Costs	The sum of the costs associated with the Deliver processes.

Best Practices:

Distinct and Consistent Linkages Exist to Ensure Disruptions and Opportunities in Material Resources Are Quickly and Accurately Communicated and Acted Upon	Bi-directional Digital Links (XML, EDI, etc) or Internet procurement networks to customer service linkage
Proactive Education of Customers to Set Expectations and Encourage Close Working Relationships (Knowledge of Long-Lead Items, Visibility to Supply Resources, Agreement on Levels of Flexibility)	None identified

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P4.1 Identify, Prioritize, and Aggregate Delivery Requirements

The process of identifying, prioritizing, and considering, as a whole with constituent parts, all sources of demand in the delivery of a product or service.

Metrics (see Appendix A for metrics attributes):

Cost to Identify, Prioritize, and Aggregate Delivery Requirements	The sum of the costs associated with identifying, assessing and aggregating deliver requirements
Forecast Accuracy	Forecast accuracy is calculated for products and/or families for markets/distribution channels, in unit measurement. Common calculation is Forecast Sum - Sum of Variance/Sum of Actuals to determine percentage error. *monitoring the delta of Forecast Accuracy over measured time periods can determine success rates.
Identify, Prioritize, and Aggregate Delivery Requirements Cycle Time	The average time associated with the identifying, prioritizing, and aggregating delivery requirements

Best Practices:

Customer Relationship and Digital Linkages (XML, EDI, Etc.) Provide Accurate Visibility into Actual Demand via Customer Forecasts, Product Plans, Production Plans, and Inventory Positions	Tightly integrated supply chain or demand planning with point of sale and customer inventory systems
Electronic Matching Between POS Data and Store Inventory (Shelves and Back Room)	Integrated Software Systems
Eliminate “Special Deals“ Sales to Reduce Returns and Improve Forecast Accuracy (Reduces Uncertainty, Lowers Safety Stock Requirements, Cheaper to Administer)	None identified
Forecasts Are Replaced with Actual Customer Replenishment Signals and Orders Where Possible	B2B Integration and Application Server Systems
Ideal Stock Position Based on Days/Weeks of Supply	Pilot by Wal-Mart. MIT
Matching Shelf Stock to Expectations	A software based system that corrects shelf inventory levels based on actual product present (possible RFID solution). Identifies stock-outs from shrinkage or item misplacement.
Planogram Flexibility for Seasonal/Promotional changes	None identified
RFID and Other Tagging	POG software/field force
Unplanned Orders Are Accepted and Scheduled Only When There is No Detrimental Impact on Overall Product Delivery Plan	Digital Linkages using XML standards (Rosettanet, eBXML, OAGI) to automatically query production capacity and ATP and schedule unplanned orders.
Vendor Managed Inventory	VMI is a concept for planning and control of inventory, in which the supplier has access to the customer’s inventory data and is responsible for maintaining the inventory level required by the customer. Re-supply is performed by the vendor through regularly scheduled reviews of the on-site inventory. The on-site inventory is counted, damaged or outdated goods are removed, and the inventory is restocked to predefined levels.

Inputs:

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Actual Shrink from Source: Company	Reductions of actual quantities of items in stock, in process, or in transit. The loss may be caused by scrap, theft, deterioration, evaporation, etc.
DC/Vendor Lead Time from Source: Company	The amount of time that normally elapses between the time an order is received and the time the order is shipped.
DC/Vendor Transit Time from Source: Company	A standard allowance that is assumed on any given order for the movement of items from one operation to the next.
Deliver Return Requirements from P5.4 Establish and Communicate Return Plans	A determination or projection of the requirements the supply chain must meet in the handling and execution of returns. (i.e. quantity, mix, timing)
EOQ/ESQ's from Source: Company	Economic Order Quantity - Result of a calculation that determines the most cost effective to quantity to order or produce. Economic Shipping Quantity - Result of a calculation that determines the most cost effective quantity to ship.
Item Master from EP.7 Manage Planning Configuration	A record of specific information for each product, which defines the system parameters with which to effectively plan and execute using ERP (MRP, etc) systems.
Markdown Plans from Source: Company	Part of the Market Plan, which establishes an allowance or deduction, granted by the seller to the buyer, usually when the buyer meets certain stipulated conditions that reduce the price of the products purchased. For example, based upon paying early, buying in quantity, etc.
Merchandise Category/Classification from Source: Company	The categorization of goods based upon the range of specifications met during the manufacturing process.
Order Backlog from D1.3 Reserve Inventory & Determine Delivery Date	Orders that have been received and entered into the order processing system and are in a queue waiting to be processed and shipped.
Order Backlog from D2.3 Reserve Resources & Determine Delivery Date	Orders that have been received and entered into the order processing system and are in a queue waiting to be processed and shipped.
Order Backlog from D3.3 Enter Order, Commit Resources & Launch Program	Orders that have been received and entered into the order processing system and are in a queue waiting to be processed and shipped.
Planning Data from EP.3 Manage PLAN Data Collection	Execution information necessary to plan the balance of supply chain resources to demand requirements at both the highest aggregate and lowest SKU planning levels.
Point of Sale Data (Daily) from D4.6 Checkout	The relief of inventory and computation of sales data at the time and place of the sales, generally (may be manual) through the use of bar-coding, or magnetic media and equipment.
Product Routings from EP.7 Manage Planning Configuration	Product routings represent the way products are made and are integrated with the Bill of Materials. Key elements of proper Routings include proper sequence of operations, work center identification, relevant tolerances, run times, lot size and setups. The equivalent concepts for services are the workflow processes and rules.
Product/Category Lifecycle from Source: Company	The time from initial research and development to the time at which the sales and support of the product to customers are withdrawn.
Promotion/Event Plans from Source: Company	Promotion activities - other than advertising, publicity, and personal selling - that stimulate, interest, trial or purchase by final customers or others in the marketing channel.
Service Levels from EP.1 Manage Business Rules for PLAN Processes	Performance targets in service related measures (i.e. delivery performance, lead times, etc.) compared to the established service requirements. Service levels are established by balancing requirements against operational strategy.

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Stock-out History from Source: Company	History of a lack of materials, components, or finished goods that are ordered.
Store Shelf Inventory Counts from D4.4 Stock Shelf	The determination of inventory quantity by actual count. Physical inventories can be taken on a continuous, periodic or annual basis.
Supply Chain Plans from P1.4 Establish Supply Chain Plans	Courses of action over specified time periods that represent a projected appropriation of total supply-chain resources to meet total supply-chain demand requirements.
Year-to-Year for Like SKU/Subclass from Source: Company	The sales or demand history that is analogous to the present situation for similar products, a SKU / Subclass.

Outputs:

Delivery Requirements to P4.3 Balance Delivery Resources and Capabilities with Delivery Requirements	As a whole with constituent parts, all sources of demand in the delivery of a product or service.
Item Stocking Requirements to D4.2 Receive Product at Store	The activities and techniques of determining the desired levels of items, whether raw materials, work in process, or finished products. Demand for inventory maybe dependant or independent. Inventory functions are anticipation, hedge, cycle (lot size), fluctuation (safety, buffer or reserve), transportation (pipeline), an service parts.

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P4.2 Identify, Assess, and Aggregate Delivery Resources and Capabilities

The process of identifying, evaluating, and considering, as a whole with constituent parts, all things that add value in the delivery of a product or service.

Metrics (see Appendix A for metrics attributes):

Cost to Identify, Assess, and Aggregate Production Resources	The sum of the costs associated with identifying, assessing and aggregating production resources.
Forecast Accuracy	Forecast accuracy is calculated for products and/or families for markets/distribution channels, in unit measurement. Common calculation is Forecast Sum - Sum of Variance/Sum of Actuals to determine percentage error. *monitoring the delta of Forecast Accuracy over measured time periods can determine success rates.
Identify, Assess, and Aggregate Delivery Resources Cycle Time	The average time associated with the identifying, assessing, and aggregating delivery resource availability

Inputs:

Deliver Return Requirements from P5.4 Establish and Communicate Return Plans	A determination or projection of the requirements the supply chain must meet in the handling and execution of returns. (i.e. quantity, mix, timing)
Finish Goods Inventory Target Levels from ED.4 Manage Finished Goods Inventories	In a min-max inventory system, the equivalent of the maximum. The target inventory is equal to the order point plus a variable order quantity.
Inventory Availability/Delivery Date from D1.3 Reserve Inventory & Determine Delivery Date	Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts). Determination of the time required from the receipt of the order until the item should be delivered.
Inventory Availability/Delivery Date from D2.3 Reserve Resources & Determine Delivery Date	Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts). Determination of the time required from the receipt of the order until the item should be delivered.
Load Information from D1.5 Build Loads	Information relative to a load that is built and shipped, i.e. customer, items, destinations, weight, etc
Planning Data from EP.3 Manage PLAN Data Collection	Execution information necessary to plan the balance of supply chain resources to demand requirements at both the highest aggregate and lowest SKU planning levels.
Production Plans from P3.4 Establish Production Plans	A master production plan used to allocate capacity among manufacturing resources and schedule finite manufacturing activities or executing the performance of a service. Production Plan includes production capability.
Resource Availability from D3.3 Enter Order, Commit Resources & Launch Program	The capability of a system or resource to produce a quantity of output in a particular time period, or the available resources at a point in time able to generate an output.
Sourcing Plans from P2.4 Establish Sourcing Plans	An aggregate material requirements plan used to schedule material deliveries to meet production plan.

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Outputs:

Delivery Resources and Capabilities to P4.3 Balance Delivery Resources and Capabilities with Delivery Requirements	As a whole with constituent parts, all things that add value in the delivery of a product.

P4.3 Balance Delivery Resources and Capabilities with Delivery Requirements

The process of developing a time-phased course of action that commits delivery resources to meet delivery requirements.

Metrics (see Appendix A for metrics attributes):

Balance Delivery Resources with Delivery Requirements Cycle Time	The average time associated with balancing deliver resources and deliver requirements.
Cost to Balance Delivery Resources with Delivery Requirements	The sum of the costs associated with balance of delivery resources with delivery requirements.

Best Practices:

Demand Priorities Reflecting Strategic Customer Relationships as Business Policies Are Automatically Followed in Allocating Resources; First-In-First-Out (FIFO) is Utilized as the Default Scheduling Priority	Rules-based distribution planning system Trading partner agreements

Inputs:

Delivery Resources and Capabilities from P4.2 Identify, Assess, and Aggregate Delivery Resources and Capabilities	As a whole with constituent parts, all things that add value in the delivery of a product.
Delivery Requirements from P4.1 Identify, Prioritize, and Aggregate Delivery Requirements	As a whole with constituent parts, all sources of demand in the delivery of a product or service.
Planning Decision Policies from EP.1 Manage Business Rules for PLAN Processes	Any company policies that affect how a planning process is defined, approved, and performed.

Outputs:

Workflow to P4.4 Establish Delivery Plans

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P4.4 Establish Delivery Plans

The establishment of courses of action over specified time periods that represent a projected appropriation of delivery resources to meet delivery requirements.

Metrics (see Appendix A for metrics attributes):

Cost to Establish Delivery Plans	The sum of the costs associated with establishing and communicating deliver plans.
Establish Delivery Plans Cycle Time	The average time associated with establishing and communicating deliver plans
Fill Rate	The percentage of ship-from-stock orders shipped within 24 hours of order receipt. For services, this metric is the proportion for services that are filled so that the service is completed within 24 hours

Best Practices:

Plans that Violate Business Rules (e.g. Joint Service Agreements) Are Addressed Cross-Functionally, Considering Total Business Impacts (Revenue, Cost, Quality, Customer Service, Etc.)	None identified
Plans Which Do Not Violate Business Rules Are Communicated Openly and Cross-Functionally for Execution	None identified
Specific Changes to the Plan Are Agreed to Cross-Functionally, According to Defined Business Rules	None identified
To Address Conditions which Cannot be Adequately Satisfied During the Current Planning Period, Each Functional Area Develops Prioritized Recommendations for the Subsequent Planning Period	None identified

Inputs:

Workflow from P4.3 Balance Delivery Resources and Capabilities with Delivery Requirements

Outputs:

Delivery Plans to P1.2 Identify, Assess, and Aggregate Supply Chain Resources	A plan for a course of action over specified time periods that involves a projected appropriation of supply resources to meet delivery requirements.
Delivery Plans to D1.3 Reserve Inventory & Determine Delivery Date	A plan for a course of action over specified time periods that involves a projected appropriation of supply resources to meet delivery requirements.
Delivery Plans to P5.1 Assess, and Aggregate Return Requirements	A plan for a course of action over specified time periods that involves a projected appropriation of supply resources to meet delivery requirements.
Delivery Plans to P3.1 Identify, Prioritize, and Aggregate Production Requirements	A plan for a course of action over specified time periods that involves a projected appropriation of supply resources to meet delivery requirements.
Delivery Plans to P2.1 Identify, Prioritize, and Aggregate Product Requirements	A plan for a course of action over specified time periods that involves a projected appropriation of supply resources to meet delivery requirements.
Delivery Plans to D3.3 Enter Order, Commit Resources & Launch Program	A plan for a course of action over specified time periods that involves a projected appropriation of supply resources to meet delivery requirements.
Delivery Plans to P5.2 Identify, Assess, and Aggregate Return Resources	A plan for a course of action over specified time periods that involves a projected appropriation of supply resources to meet delivery requirements.
Delivery Plans to M3.6 Stage Finished Product	A plan for a course of action over specified time periods that involves a projected appropriation of supply resources to meet delivery requirements.
Delivery Plans to D2.3 Reserve Resources & Determine Delivery Date	A plan for a course of action over specified time periods that involves a projected appropriation of supply resources to meet delivery requirements.
Delivery Plans to M1.5 Stage Product	A plan for a course of action over specified time periods that involves a

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	projected appropriation of supply resources to meet delivery requirements.
Delivery Plans to M2.5 Stage Finished Product	A plan for a course of action over specified time periods that involves a projected appropriation of supply resources to meet delivery requirements.
Stocking Requirements to D4.1 Generate Stocking Schedule	The activities and techniques of determining the desired levels of items, whether raw materials, work in process, or finished products. Demand for inventory may be dependant or independent. Inventory functions are anticipation, hedge, cycle (lot size), fluctuation (safety, buffer or reserve), transportation (pipeline), and service parts.

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P5 Plan Return

A strategic or tactical process to establish and adjust courses of action or tasks over specified time periods that represent a projected appropriation of return resources and assets to meet anticipated as well as unanticipated return requirements. The scope includes unplanned returns of sold merchandise as well as planned returns of “rotable” products that are refurbished for reissue to customers.

The Category P5 includes four Level 3 Elements:

P5.1 Assess, and Aggregate Return Requirements	The process of identifying, evaluating, and considering, as a whole with constituent parts, all sources of demand for the return of a product.
P5.2 Identify, Assess, and Aggregate Return Resources	The process of identifying, evaluating, and consideration for all resources that add value to, execute, or constrain the processes for the return of a product.
P5.3 Balance Return Resources with Return Requirements	The process of developing courses of action that make feasible the commitment the appropriate return resources and or assets to satisfy return requirements.
P5.4 Establish and Communicate Return Plans	The establishment and communication of courses of action over specified time periods that represent a projected appropriation of required return resources and or assets to meet return process requirements.

Metrics (see Appendix A for metrics attributes):

Cost to Plan Return	The sum of the costs associated with planning the returning of product.
Order Fulfillment Cycle Time	The average actual cycle time consistently achieved to fulfill customer orders.

Best Practices:

Planning and Forecasting Outsourced Return process	Collaborative planning and forecasting with RETURN outsourcing partners (3PL, reverse drop shippers, etc.)
Use Demand Planning	Demand Planning Systems to forecast returns, predict yield rates for reusable products or components, determine demand in a resale market, and project a revenue stream.

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P5.1 Assess, and Aggregate Return Requirements

The process of identifying, evaluating, and considering, as a whole with constituent parts, all sources of demand for the return of a product.

Metrics (see Appendix A for metrics attributes):

Cost to Identify, Prioritize, and Aggregate Return Requirements	The sum of the costs associated with identifying, assessing and aggregating return requirements.
Identify, Prioritize, and Aggregate Return Requirements Cycle Time	The average time associated with the identifying, prioritizing, and aggregating return requirements

Best Practices:

Real Time Return Anticipation	Having real time data on return demand and including it in the plan and forecast. Requires a connection with customers, call centers or CRM system, possibly to the store level with retail returns. The return demand needs to be included in the production plan as soon as possible because upon repair it may be the next piece of serviceable inventory to satisfy demand.
Use Historical Based Return Rate Forecasts	None identified

Inputs:

Actual Sales History from D2.2 Receive, Configure, Enter and Validate Order	Amount of past sales spanning any specified period of time (weeks, months, years, etc.) and expressed in any specified increments (per day, week, month, year, etc.)
Actual Sales History from D3.3 Enter Order, Commit Resources & Launch Program	Amount of past sales spanning any specified period of time (weeks, months, years, etc.) and expressed in any specified increments (per day, week, month, year, etc.)
Actual Sales History from D1.2 Receive, Enter & Validate Order	Amount of past sales spanning any specified period of time (weeks, months, years, etc.) and expressed in any specified increments (per day, week, month, year, etc.)
Business Rules for Return Processes from ER.1 Manage Business Rules for Return Processes	Rules for conducting business, i.e. developing and maintaining customer and channel performance standards of an return processes such as service levels, given service requirements by supply chain stakeholders/trading partners. Business rules align Return process policies with business strategy, goals, and objectives.
Contractual Obligations from Source: Plan (Marketing, Sales, Legal)	A promise in a contract that binds one to a specific course of action. These promises maybe made by either the buyer of seller.
Delivery Plans from P4.4 Establish Delivery Plans	A plan for a course of action over specified time periods that involves a projected appropriation of supply resources to meet delivery requirements.
Historical Return Rates from SR1.3 Request Defective Return Authorization	A judgmental forecasting technique based upon the a return history that is analogous to a present situation, such as the return history on a similar product, and using the past pattern to predict future returns.
Historical Return Rates from DR3.1 Authorize Excess Product Return	A judgmental forecasting technique based upon the a return history that is analogous to a present situation, such as the return history on a similar product, and using the past pattern to predict future returns.
Historical Return Rates from SR3.3 Request Excess Return Authorization	A judgmental forecasting technique based upon the a return history that is analogous to a present situation, such as the return history on a similar product, and using the past pattern to predict future returns.

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Historical Return Rates from DR2.1 Authorize MRO Product Return	A judgmental forecasting technique based upon the a return history that is analogous to a present situation, such as the return history on a similar product, and using the past pattern to predict future returns.
Historical Return Rates from SR2.3 Request MRO Return Authorization	A judgmental forecasting technique based upon the a return history that is analogous to a present situation, such as the return history on a similar product, and using the past pattern to predict future returns.
Historical Return Rates from DR1.1 Authorize Defective Product Return	A judgmental forecasting technique based upon the a return history that is analogous to a present situation, such as the return history on a similar product, and using the past pattern to predict future returns.
Item Master from EP.7 Manage Planning Configuration	A record of specific information for each product, which defines the system parameters with which to effectively plan and execute using ERP (MRP, etc) systems.
Planning Data from EP.3 Manage PLAN Data Collection	Execution information necessary to plan the balance of supply chain resources to demand requirements at both the highest aggregate and lowest SKU planning levels.
Product Routings from EP.7 Manage Planning Configuration	Product routings represent the way products are made and are integrated with the Bill of Materials. Key elements of proper Routings include proper sequence of operations, work center identification, relevant tolerances, run times, lot size and setups. The equivalent concepts for services are the workflow processes and rules.
Production Plans from P3.4 Establish Production Plans	A master production plan used to allocate capacity among manufacturing resources and schedule finite manufacturing activities or executing the performance of a service. Production Plan includes production capability.
Return Regulatory Requirements from ER.8 Manage Return Regulatory Requirements	Return requirements dictated by process standards set by external entities (i.e. government, trade officials, etc.).
Revised Aggregate Forecast and Projections from EP.9 Align Supply Chain Unit Plan with Financial Plan	An update to the aggregate Supply-Chain Forecasts of Demand by Product Family supporting the Market/Channel Plans. Corresponding Projections, supporting Make, Source, Deliver, Inventory and Response Time Plans through the Supply-Chain are produced from these Forecasts Together, they represent balanced Supply and Demand.
Revised Aggregate Forecast and Projections from Source: Plan (Marketing, Sales, Product Management/Engineering)	An update to the aggregate Supply-Chain Forecasts of Demand by Product Family supporting the Market/Channel Plans. Corresponding Projections, supporting Make, Source, Deliver, Inventory and Response Time Plans through the Supply-Chain are produced from these Forecasts Together, they represent balanced Supply and Demand.
Revised Business Assumptions from EP.5 Manage Integrated Supply Chain Capital Assets	An update to the expected cause and effect statements that are the base for the Revised Aggregate Forecast and Projections. These are reviewed periodically with actual results to verify the linkage of actual cause and effect.
Revised Business Assumptions from EP.9 Align Supply Chain Unit Plan with Financial Plan	An update to the expected cause and effect statements that are the base for the Revised Aggregate Forecast and Projections. These are reviewed periodically with actual results to verify the linkage of actual cause and effect.
Sourcing Plans from P2.4 Establish Sourcing Plans	An aggregate material requirements plan used to schedule material deliveries to meet production plan.
Supply Chain Plans from P1.4 Establish Supply Chain Plans	Courses of action over specified time periods that represent a projected appropriation of total supply-chain resources to meet total supply-chain demand requirements.

Outputs:

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Return Requirements to P5.3 Balance Return Resources with Return Requirements	As a whole with constituent parts, all sources of demand for the return of a product.

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P5.2 Identify, Assess, and Aggregate Return Resources

The process of identifying, evaluating, and consideration for all resources that add value to, execute, or constrain the processes for the return of a product.

Metrics (see Appendix A for metrics attributes):

Cost to Identify, Assess, and Aggregate Return Resources	The sum of the costs associated with identifying, assessing and aggregating return resources.
Identify, Assess, and Aggregate Return Resources Cycle Time	The average time associated with the identifying, assessing, and aggregating return resource availability

Best Practices:

Allow Source Suppliers Full Visibility into the Current Return Situations and the Forecasted Return Activity	Shared supply chain forecasting and event management functionality with Source suppliers
Joint Service Agreements with Source Suppliers to Share Responsibilities and Costs of Returns	Collaborative planning tools with the Source suppliers
Rapid Reconfiguration of Return Capacity	Use of RETURN tracking and projection systems and flexible partner agreements that allow the rapid addition of RETURN capacity to match unexpected demand.

Inputs:

Budget Constraints from EP.9 Align Supply Chain Unit Plan with Financial Plan	A plan that includes an estimate of future costs and revenues related to expected activities. The budget serves as pattern for and a control over future operations.
Business Rules for Return Processes from ER.1 Manage Business Rules for Return Processes	Rules for conducting business, i.e. developing and maintaining customer and channel performance standards of an return processes such as service levels, given service requirements by supply chain stakeholders/trading partners. Business rules align Return process policies with business strategy, goals, and objectives.
Data About Return Capabilities from ER.3 Manage Return Data Collection	Information required in the process of integrating and maintaining the accuracy of return execution.
Delivery Plans from P4.4 Establish Delivery Plans	A plan for a course of action over specified time periods that involves a projected appropriation of supply resources to meet delivery requirements.
Inventory Strategy from EP.4 Manage Integrated Supply Chain Inventory	The total supply chain inventory strategy. Contains the plan for total inventory limits or levels (including Raw Material, Work In Process, Finished and Purchased Finished Goods) including replenishment models, ownership, product mix, and stocking locations, both inter and intra company.
Make/Buy Decision from EP.5 Manage Integrated Supply Chain Capital Assets	The output of the process used to determine whether a demand will be supplied with internal capacity or purchased through contract manufacturing and/or contracted services externally.
MRO Product Return Capabilities from ER.2 Manage Performance of Return Processes	See “Product Return Capabilities“
MRO Product Return Capabilities from ER.5 Manage Return Capital Assets	See “Product Return Capabilities“
Outsource Plan from EP.6 Manage Integrated Supply Chain Transportation	A plan that describes how a company will utilize third party business partners to provide products and services which the company chooses not to provide with internal capacity. Outsource Plans can vary in detail from simple policy statements to highly detailed plans with specifics about the third party business partners, specifications for products and services, performance expectations, and contract considerations.

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Planning Data from EP.3 Manage PLAN Data Collection	Execution information necessary to plan the balance of supply chain resources to demand requirements at both the highest aggregate and lowest SKU planning levels.
Production Plans from P3.4 Establish Production Plans	A master production plan used to allocate capacity among manufacturing resources and schedule finite manufacturing activities or executing the performance of a service. Production Plan includes production capability.
Projected Internal and External Capacity from EP.6 Manage Integrated Supply Chain Transportation	An estimate of the amount of product or service a particular part of the business (internal capacity) or a third party business partner (external capacity) is capable of producing over a particular period of time when all factors that control the production processes are working optimally.
Regulatory Requirements from EP.8 Manage PLAN Regulatory Requirements and Compliance	Requirements dictated by process standards set by external entities (i.e. government, trade officials, etc.).
Return Inventory Targets from ER.4 Manage Return Inventory	The goals and approach to the management of return inventories.
Return Inventory Transfer Data from DR2.3 Receive MRO Product	The process of receipt and verification of the returned item against the return authorization and other documentation and prepares the item for transfer.
Return Inventory Transfer Data from DR3.3 Receive Excess Product	The process of receipt and verification of the returned item against the return authorization and other documentation and prepares the item for transfer.
Return Inventory Transfer Data from DR2.4 Transfer MRO Product	The process of receipt and verification of the returned item against the return authorization and other documentation and prepares the item for transfer.
Return Inventory Transfer Data from DR1.3 Receive Defective Product	The process of receipt and verification of the returned item against the return authorization and other documentation and prepares the item for transfer.
Return Inventory Transfer Data from DR1.4 Transfer Defective Product	The process of receipt and verification of the returned item against the return authorization and other documentation and prepares the item for transfer.
Return Inventory Transfer Data from DR3.4 Transfer Excess Product	The process of receipt and verification of the returned item against the return authorization and other documentation and prepares the item for transfer.
Return Process Capabilities from EP.2 Manage Performance of Supply Chain	The capability of a system or resources to produce a quantity output in a particular time period
Return Process Workflow Definition and Policies from ER.7 Manage Return Network Configuration	Definition and maintenance of the information flow about the Returns supply chain network for a group of similar or complimentary items through out their life cycle
Return Regulatory Requirements from ER.8 Manage Return Regulatory Requirements	Return requirements dictated by process standards set by external entities (i.e. government, trade officials, etc.).
Return Transportation Guidelines, Policies, & Agreements from ER.6 Manage Return Transportation	Guidelines, policies and agreements for the transportation activities around return process.
Revised Capital Plan from EP.5 Manage Integrated Supply Chain Capital Assets	A revision to plan for capital expenditures necessitated by either changes in specific business plans or factors and assumptions affecting a business plan.
Sourcing Plans from P2.4 Establish Sourcing Plans	An aggregate material requirements plan used to schedule material deliveries to meet production plan.

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Outputs:

Return Resources to P5.3 Balance Return Resources with Return Requirements	All resources that add value to, execute, or constrain the processes for the return of a product.

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P5.3 Balance Return Resources with Return Requirements

The process of developing courses of action that make feasible the commitment the appropriate return resources and or assets to satisfy return requirements.

Metrics (see Appendix A for metrics attributes):

Balance Return Resources with Return Requirements Cycle Time	The average time associated with balancing return resources and return requirements.
Cost to Balance Return Resources with Return Requirements	The sum of the costs associated with balance of return resources with return requirements.

Best Practices:

Advance Planning Engines Applied to Returns	Advanced math model “solvers“ that optimize / minimize constraints, routing, restocking priorities and costs.
Cost Accounting System to Determine the Best Return Process to Follow from a Cost of Business Perspective	ABC costing system
Dynamic Return Restocking Management	Dynamic prioritization of restocking plans in order to rapidly re-sell products that are in demand thus reducing new inventory demand.

Inputs:

Return Resources from P5.2 Identify, Assess, and Aggregate Return Resources	All resources that add value to, execute, or constrain the processes for the return of a product.
Return Requirements from P5.1 Assess, and Aggregate Return Requirements	As a whole with constituent parts, all sources of demand for the return of a product.
Planning Decision Policies from EP.1 Manage Business Rules for PLAN Processes	Any company policies that affect how a planning process is defined, approved, and performed.
Supply Chain Performance Improvement Plan from EP.2 Manage Performance of Supply Chain	A plan that describes goals and objectives for a supply chain and the steps that will be taken to reach those goals and objectives from the current performance levels.

Outputs:

Workflow to P5.4 Establish and Communicate Return Plans

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P5.4 Establish and Communicate Return Plans

The establishment and communication of courses of action over specified time periods that represent a projected appropriation of required return resources and or assets to meet return process requirements.

Metrics (see Appendix A for metrics attributes):

Cost to Establish and Communicate Return Plans	The sum of the costs associated with establishing and communicating return plans.
Establish and Communicate Return Plans Cycle Time	The average time associated with establishing and communicating return plans

Best Practices:

Full Internal (And External If Source Suppliers Share in the Return Process Responsibilities) Visibility to Return Plans	Intranet and Extranet communications tools
Rapid, Dynamic Reconfiguration of Return Process to Meet Demand	The ability to reset and reconfigure the RETURN process capacity, routings, etc. by transmitting new requirements and directives using mathematical models, the Internet, outsourcing and flexible partnership agreements. Also requires integration with the CRM system for real time redirection of customer returns based upon cost and capacity.

Inputs:

Workflow from P5.3 Balance Return Resources with Return Requirements

Outputs:

Deliver Return Requirements to P4.1 Identify, Prioritize, and Aggregate Delivery Requirements	A determination or projection of the requirements the supply chain must meet in the handling and execution of returns. (i.e. quantity, mix, timing)
Deliver Return Requirements to P4.2 Identify, Assess, and Aggregate Delivery Resources and Capabilities	A determination or projection of the requirements the supply chain must meet in the handling and execution of returns. (i.e. quantity, mix, timing)
Process Procedures to ER.2 Manage Performance of Return Processes	A planned series of actions or operations that advances returns from one stage to another, or established procedures to manage and execute all activities in the process.
Process Procedures to ER.8 Manage Return Regulatory Requirements	A planned series of actions or operations that advances returns from one stage to another, or established procedures to manage and execute all activities in the process.
Process Procedures to ER.1 Manage Business Rules for Return Processes	A planned series of actions or operations that advances returns from one stage to another, or established procedures to manage and execute all activities in the process.
Product Return Capabilities to DR1.1 Authorize Defective Product Return	The capability of a system or resources to produce a quantity output in a particular time period; and, any element or factor that constrains the system or resources from achieving a higher level of performance in respect to its goal. The ability the supply chain has to return products in a valid and accurate way.

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Product Return Capabilities to DR2.1 Authorize MRO Product Return	The capability of a system or resources to produce a quantity output in a particular time period; and, any element or factor that constrains the system or resources from achieving a higher level of performance in respect to its goal. The ability the supply chain has to return products in a valid and accurate way.
Product Return Capabilities to DR3.1 Authorize Excess Product Return	The capability of a system or resources to produce a quantity output in a particular time period; and, any element or factor that constrains the system or resources from achieving a higher level of performance in respect to its goal. The ability the supply chain has to return products in a valid and accurate way.
Return Plans to ER.4 Manage Return Inventory	Courses of action over specified time periods that represent the projected appropriation of required return resources and or assets to meet the return process requirements.
Return Plans to SR2.2 Disposition MRO Product	Courses of action over specified time periods that represent the projected appropriation of required return resources and or assets to meet the return process requirements.
Return Plans to ER.5 Manage Return Capital Assets	Courses of action over specified time periods that represent the projected appropriation of required return resources and or assets to meet the return process requirements.
Return Plans to ER.6 Manage Return Transportation	Courses of action over specified time periods that represent the projected appropriation of required return resources and or assets to meet the return process requirements.
Return Plans to SR3.2 Disposition Excess Product	Courses of action over specified time periods that represent the projected appropriation of required return resources and or assets to meet the return process requirements.
Return Plans to DR1.1 Authorize Defective Product Return	Courses of action over specified time periods that represent the projected appropriation of required return resources and or assets to meet the return process requirements.
Return Plans to ER.7 Manage Return Network Configuration	Courses of action over specified time periods that represent the projected appropriation of required return resources and or assets to meet the return process requirements.
Return Plans to DR3.1 Authorize Excess Product Return	Courses of action over specified time periods that represent the projected appropriation of required return resources and or assets to meet the return process requirements.
Return Plans to SR1.2 Disposition Defective Product	Courses of action over specified time periods that represent the projected appropriation of required return resources and or assets to meet the return process requirements.
Return Plans to DR2.1 Authorize MRO Product Return	Courses of action over specified time periods that represent the projected appropriation of required return resources and or assets to meet the return process requirements.
Return Production Requirements to P3.1 Identify, Prioritize, and Aggregate Production Requirements	As a whole with constituent parts, all sources of demand in the creation of a product or service.

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Return Rules and Policies to ER.1 Manage Business Rules for Return Processes	Rules and Policies for conducting business, i.e. developing and maintaining customer and channel performance standards of return processes such as service levels, given service requirements by supply chain stakeholders/trading partners. Rules and policies align the Return process with the organization's business strategy, goals and objectives.
Source Return Requirements to P2.1 Identify, Prioritize, and Aggregate Product Requirements	All sources of demand in the Source Return of a product or service.

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EP Enable PLAN

A plan for the development and establishment of courses of action over specified time periods to appropriate delivery resources to meet projected delivery requirements. The plan contains necessary business requirements for information and relationships to effectively and efficiently PLAN the Supply Chain.

The Category EP includes nine Level 3 Elements:

EP.1 Manage Business Rules for PLAN Processes	The process of establishing, maintaining, and enforcing decision support criteria for Supply Chain Planning which translate to rules for conducting business, i.e. developing and maintaining customer and channel performance standards of an entire supply chain such as service levels, given service requirements by supply chain stakeholders/trading partners. Business rules align PLAN process policies with business strategy, goals, and objectives.
EP.2 Manage Performance of Supply Chain	The process of measuring actual integrated Supply Chain performance against internal and/or external standards to develop and implement a course of action to achieve targeted performance levels. Performance targets established for the execution of supply chain processes are reflected in the process elements for PLAN, i.e. cost, delivery reliability, cycle time, responsiveness, and assets.
EP.3 Manage PLAN Data Collection	The process of collecting, integrating and maintaining the accuracy of supply chain execution information necessary to plan the balance of supply chain resources to demand requirements at both the highest aggregate and lowest SKU planning levels.
EP.4 Manage Integrated Supply Chain Inventory	The process of establishing total supply chain inventory strategy and planning the total inventory limits or levels (including Raw Material, Work In Process, Finished and Purchased Finished Goods) including replenishment models, ownership, product mix, and stocking locations, both inter and intra company.
EP.5 Manage Integrated Supply Chain Capital Assets	The process of defining capacity strategy (i.e. internal versus contract manufacturing or internal versus 3rd Party Logistics) and then acquiring, maintaining and dispositioning an organization's capital assets to operate the integrated supply chain.
EP.6 Manage Integrated Supply Chain Transportation	The process of defining an integrated supply chain transportation strategy and maintaining the information which characterizes total supply chain transportation requirements, and the management of transporters both inter and intra company.
EP.7 Manage Planning Configuration	The process of defining and maintaining the information about a unique supply chain network for a group of similar or complimentary products through their full life cycle, including the evaluation of market need, product realization (development, introduction and production), product discontinuation, and after-market support. This element also includes the management of critical sub processes needed to manage the life cycle of individual item numbers including item masters, routings, event planning (promotions, etc.), ABC classification, rationalization, and bill of materials.
EP.8 Manage PLAN Regulatory Requirements and Compliance	The process of identifying and complying with regulatory documentation and process standards set by external entities (i.e. government, trade officials, etc.) when planning for the integrated supply chain network.
EP.9 Align Supply Chain Unit Plan with Financial Plan	The process of revising the long-term supply chain capacity and resource plans, given the inputs from the strategic and business plans. This includes revision of not only aggregate forecast and projections related to supply chain, source, make, and delivery plans, but also business assumptions.

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EP.1 Manage Business Rules for PLAN Processes

The process of establishing, maintaining, and enforcing decision support criteria for Supply Chain Planning which translate to rules for conducting business, i.e. developing and maintaining customer and channel performance standards of an entire supply chain such as service levels, given service requirements by supply chain stakeholders/trading partners. Business rules align PLAN process policies with business strategy, goals, and objectives.

Metrics (see Appendix A for metrics attributes):

Cost to Manage Business Rules for PLAN Processes	The sum of the .Costs to Manage Business Rules for PLAN Processes
Manage Business Rules for PLAN Processes Cycle Time	The average time associated with managing plan business rules

Best Practices:

Integrated Business and Supply-Chain Planning Processes Where Cross-Functional Input is Leveraged to Set Business Rules	Supply Chain performance dashboard capability.

Inputs:

Business Plan from Source: Company	A document resulting from a process of linking the long-range strategy with projections of revenue, activity, cost and profit. This process develops objectives usually accompanied by budgets, projected balance sheet, and a cash flow statement.
Service Requirements from Source: Company	A set of minimum acceptable values that describe service requirements of a particular industry, channel, and/or customer segment.
Strategic Plan from Source: Company	A longer range, high-level plan that describes how a company intends to conduct business. Improve its market and competitive position, and increase its earnings performance.

Outputs:

Planning Decision Policies to P4.3 Balance Delivery Resources and Capabilities with Delivery Requirements	Any company policies that affect how a planning process is defined, approved, and performed.
Planning Decision Policies to P3.3 Balance Production Resources with Production Requirements	Any company policies that affect how a planning process is defined, approved, and performed.
Planning Decision Policies to P1.3 Balance Supply Chain Resources with Supply Chain Requirements	Any company policies that affect how a planning process is defined, approved, and performed.
Planning Decision Policies to P5.3 Balance Return Resources with Return Requirements	Any company policies that affect how a planning process is defined, approved, and performed.
Planning Decision Policies to P2.3 Balance Product Resources with Product Requirements	Any company policies that affect how a planning process is defined, approved, and performed.
Service Levels to P4.1 Identify, Prioritize, and Aggregate Delivery Requirements	Performance targets in service related measures (i.e. delivery performance, lead times, etc.) compared to the established service requirements. Service levels are established by balancing requirements against operational strategy.

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EP.2 Manage Performance of Supply Chain

The process of measuring actual integrated Supply Chain performance against internal and/or external standards to develop and implement a course of action to achieve targeted performance levels. Performance targets established for the execution of supply chain processes are reflected in the process elements for PLAN, i.e. cost, delivery reliability, cycle time, responsiveness, and assets.

Metrics (see Appendix A for metrics attributes):

Cost to Manage Performance of Supply Chain	The sum of the costs associated with assessing supplier performance.
Manage Performance of Supply Chain Cycle Time	The average time associated with managing the performance of return activities

Best Practices:

Efficient and Effective Benchmarking Process Leveraging Cross Industry Metrics and Definitions	None identified
Reliable Continuous Improvement Process and Methodology.	None identified
Sound Project Management Process and Methodology	None identified

Inputs:

Continuous Improvement Process from Source: Company	A process that identifies opportunities for performance improvement and facilitates their realization through the use of metrics, process development methodologies/approaches, project management principles, and reporting tools that support strategic and business plans.
Supply-Chain Performance Metrics from ED.2 Assess Delivery Performance	Standard measures that indicate how well a supply chain performs within certain categories of performance known as Performance Attributes, e.g. delivery reliability, flexibility and responsiveness, cost, and asset management.
Supply-Chain Performance Metrics from ES.4 Manage Product Inventory	Standard measures that indicate how well a supply chain performs within certain categories of performance known as Performance Attributes, e.g. delivery reliability, flexibility and responsiveness, cost, and asset management.
Supply-Chain Performance Metrics from ER.2 Manage Performance of Return Processes	Standard measures that indicate how well a supply chain performs within certain categories of performance known as Performance Attributes, e.g. delivery reliability, flexibility and responsiveness, cost, and asset management.
Supply-Chain Performance Metrics from EM.2 Manage Production Performance	Standard measures that indicate how well a supply chain performs within certain categories of performance known as Performance Attributes, e.g. delivery reliability, flexibility and responsiveness, cost, and asset management.

Outputs:

Return Process Capabilities to P5.2 Identify, Assess, and Aggregate Return Resources	The capability of a system or resources to produce a quantity output in a particular time period
Supply Chain Performance Improvement Plan to P1.3 Balance Supply Chain Resources with Supply Chain Requirements	A plan that describes goals and objectives for a supply chain and the steps that will be taken to reach those goals and objectives from the current performance levels.
Supply Chain Performance Improvement Plan to P5.3 Balance Return Resources with Return Requirements	A plan that describes goals and objectives for a supply chain and the steps that will be taken to reach those goals and objectives from the current performance levels.

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EP.3 Manage PLAN Data Collection

The process of collecting, integrating and maintaining the accuracy of supply chain execution information necessary to plan the balance of supply chain resources to demand requirements at both the highest aggregate and lowest SKU planning levels.
Each occurrence consumes time:

Metrics (see Appendix A for metrics attributes):

Cost to Manage PLAN Data Collection	The sum of the costs to Manage PLAN Data Collection.
Manage PLAN Data Collection Cycle Time	The average time associated with collecting plan data

Best Practices:

Integrated Demand and Supply Planning - Demand Planning, Supply Planning and especially the Supply Plan Execution Are no longer disconnected. All required planning and execution data is integrated and shared in between all functional areas within an organization.	Memory based planning systems provide one single data model and data mart (including the business rules) for the entire supply chain planning and execution process. Algorithms use the business rules as the driver for the planning engine.
Single Data Source for Decision Support and Business Rules	A data warehouse/data mart is the source of all planning (master) data, business rules and transaction data. Analyzing tools enable the ongoing maintenance and improvement of the business rules based on actual data.

Inputs:

Supply Chain Execution Data from Source: Company	Information necessary to plan the balance of supply chain resources to demand requirements at both the highest aggregate and lowest SKU planning levels.

Outputs:

Planning Data to P4.2 Identify, Assess, and Aggregate Delivery Resources and Capabilities	Execution information necessary to plan the balance of supply chain resources to demand requirements at both the highest aggregate and lowest SKU planning levels.
Planning Data to P5.1 Assess, and Aggregate Return Requirements	Execution information necessary to plan the balance of supply chain resources to demand requirements at both the highest aggregate and lowest SKU planning levels.
Planning Data to P1.2 Identify, Assess, and Aggregate Supply Chain Resources	Execution information necessary to plan the balance of supply chain resources to demand requirements at both the highest aggregate and lowest SKU planning levels.
Planning Data to P1.1 Identify, Prioritize, and Aggregate Supply Chain Requirements	Execution information necessary to plan the balance of supply chain resources to demand requirements at both the highest aggregate and lowest SKU planning levels.
Planning Data to P2.2 Identify, Assess, And Aggregate Product Resources	Execution information necessary to plan the balance of supply chain resources to demand requirements at both the highest aggregate and lowest SKU planning levels.
Planning Data to P3.1 Identify, Prioritize, and Aggregate Production Requirements	Execution information necessary to plan the balance of supply chain resources to demand requirements at both the highest aggregate and lowest SKU planning levels.
Planning Data to P5.2 Identify, Assess, and Aggregate Return Resources	Execution information necessary to plan the balance of supply chain resources to demand requirements at both the highest aggregate and lowest SKU planning levels.
Planning Data to P4.1 Identify, Prioritize, and Aggregate Delivery Requirements	Execution information necessary to plan the balance of supply chain resources to demand requirements at both the highest aggregate and lowest SKU planning levels.

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Planning Data to P2.1 Identify, Prioritize, and Aggregate Product Requirements	Execution information necessary to plan the balance of supply chain resources to demand requirements at both the highest aggregate and lowest SKU planning levels.
Planning Data to P3.2 Identify, Assess, and Aggregate Production Resources	Execution information necessary to plan the balance of supply chain resources to demand requirements at both the highest aggregate and lowest SKU planning levels.

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EP.4 Manage Integrated Supply Chain Inventory

The process of establishing total supply chain inventory strategy and planning the total inventory limits or levels (including Raw Material, Work In Process, Finished and Purchased Finished Goods) including replenishment models, ownership, product mix, and stocking locations, both inter and intra company.

Metrics (see Appendix A for metrics attributes):

Cost to Manage Integrated Supply Chain Inventory	The sum of the costs associated with managing the integrated supply chain inventory.
Forecast Accuracy	Forecast accuracy is calculated for products and/or families for markets/distribution channels, in unit measurement. Common calculation is Forecast Sum - Sum of Variance/Sum of Actuals to determine percentage error. *monitoring the delta of Forecast Accuracy over measured time periods can determine success rates.
Manage Integrated Supply Chain Inventory Cycle Time	The average time associated with managing integrated supply chain inventory

Best Practices:

Capability to Run Multiple "Simulated" Full-Stream Supply/Demand Balancing Against Long-Term Capacity Plans and Scenarios	Supply Chain modeling capabilities, i.e. Advanced Planning Systems.

Inputs:

Capacity Constraints from Source: Company	A capacity constraint is said to exist when the available capacity at a resource may be insufficient to meet the workload necessary to support the desired throughput. A capacity constraint is often a bottleneck.
Manage Integrated Supply Chain Inventory Information from DR3.1 Authorize Excess Product Return	Managing the flow of raw materials and products in a supply chain based on uncertain demand for the finished products
Manage Integrated Supply Chain Inventory Information from DR1.1 Authorize Defective Product Return	Managing the flow of raw materials and products in a supply chain based on uncertain demand for the finished products
Manage Integrated Supply Chain Inventory Information from DR2.1 Authorize MRO Product Return	Managing the flow of raw materials and products in a supply chain based on uncertain demand for the finished products
Planning Decision Policies from Source: Company	Any company policies that affect how a planning process is defined, approved, and performed.
Product Routings from Source: Company	Product routings represent the way products are made and are integrated with the Bill of Materials. Key elements of proper Routings include proper sequence of operations, work center identification, relevant tolerances, run times, lot size and setups. The equivalent concepts for services are the workflow processes and rules.

Outputs:

Inventory Capacity to EM.1 Manage Production Rules	Maximum rate of output for the inventory management and warehouse process
Inventory Capacity to EM.2 Manage Production Performance	Maximum rate of output for the inventory management and warehouse process

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Inventory Strategy to P5.2 Identify, Assess, and Aggregate Return Resources	The total supply chain inventory strategy. Contains the plan for total inventory limits or levels (including Raw Material, Work In Process, Finished and Purchased Finished Goods) including replenishment models, ownership, product mix, and stocking locations, both inter and intra company.
Inventory Strategy to P1.3 Balance Supply Chain Resources with Supply Chain Requirements	The total supply chain inventory strategy. Contains the plan for total inventory limits or levels (including Raw Material, Work In Process, Finished and Purchased Finished Goods) including replenishment models, ownership, product mix, and stocking locations, both inter and intra company.
Manage Integrated Supply Chain Inventory Information to DR1.1 Authorize Defective Product Return	Managing the flow of raw materials and products in a supply chain based on uncertain demand for the finished products
Manage Integrated Supply Chain Inventory Information to DR3.1 Authorize Excess Product Return	Managing the flow of raw materials and products in a supply chain based on uncertain demand for the finished products
Manage Integrated Supply Chain Inventory Information to DR2.1 Authorize MRO Product Return	Managing the flow of raw materials and products in a supply chain based on uncertain demand for the finished products

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EP.5 Manage Integrated Supply Chain Capital Assets

The process of defining capacity strategy (i.e. internal versus contract manufacturing or internal versus 3rd Party Logistics) and then acquiring, maintaining and dispositioning an organization's capital assets to operate the integrated supply chain.

Metrics (see Appendix A for metrics attributes):

Cost to Manage Integrated Supply Chain Capital Assets	The sum of the costs associated with managing integrated supply chain assets.
Forecast Accuracy	Forecast accuracy is calculated for products and/or families for markets/distribution channels, in unit measurement. Common calculation is Forecast Sum - Sum of Variance/Sum of Actuals to determine percentage error. *monitoring the delta of Forecast Accuracy over measured time periods can determine success rates.
Manage Integrated Supply Chain Capital Assets Cycle Time	The average time associated with managing integrated supply chain capital assets

Best Practices:

Alignment of Strategic and Business Plans with Long-Term Capacity and Resource Planning	None identified
Capability to Run Multiple "Simulated" Full-Stream Supply/Demand Balancing Against Long-Term Capacity Plans and Scenarios	Supply Chain modeling capabilities, i.e. Advanced Planning Systems.
Use of Cross Functional Teams to Execute the Process of Developing Long-Term Capacity and Resource Plans	None identified

Inputs:

Capacity Constraints from Source: Company	A capacity constraint is said to exist when the available capacity at a resource may be insufficient to meet the workload necessary to support the desired throughput. A capacity constraint is often a bottleneck.
Planning Decision Policies from Source: Company	Any company policies that affect how a planning process is defined, approved, and performed.
Product Routings from Source: Company	Product routings represent the way products are made and are integrated with the Bill of Materials. Key elements of proper Routings include proper sequence of operations, work center identification, relevant tolerances, run times, lot size and setups. The equivalent concepts for services are the workflow processes and rules.

Outputs:

Make/Buy Decision to P5.2 Identify, Assess, and Aggregate Return Resources	The output of the process used to determine whether a demand will be supplied with internal capacity or purchased through contract manufacturing and/or contracted services externally.
Make/Buy Decision to P1.2 Identify, Assess, and Aggregate Supply Chain Resources	The output of the process used to determine whether a demand will be supplied with internal capacity or purchased through contract manufacturing and/or contracted services externally.

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Outsource Plan to P1.2 Identify, Assess, and Aggregate Supply Chain Resources	A plan that describes how a company will utilize third party business partners to provide products and services which the company chooses not to provide with internal capacity. Outsource Plans can vary in detail from simple policy statements to highly detailed plans with specifics about the third party business partners, specifications for products and services, performance expectations, and contract considerations.
Production Capacity to EM.2 Manage Production Performance	The highest, sustainable output rate which can be achieved with the current product specifications, product mix, worker effort, plant, and equipment.
Production Capacity to EM.1 Manage Production Rules	The highest, sustainable output rate which can be achieved with the current product specifications, product mix, worker effort, plant, and equipment.
Projected Internal and External Capacity	An estimate of the amount of product or service a particular part of the business (internal capacity) or a third party business partner (external capacity) is capable of producing over a particular period of time when all factors that control the production processes are working optimally.
Revised Business Assumptions to P5.1 Assess, and Aggregate Return Requirements	An update to the expected cause and effect statements that are the base for the Revised Aggregate Forecast and Projections. These are reviewed periodically with actual results to verify the linkage of actual cause and effect.
Revised Business Assumptions to P1.1 Identify, Prioritize, and Aggregate Supply Chain Requirements	An update to the expected cause and effect statements that are the base for the Revised Aggregate Forecast and Projections. These are reviewed periodically with actual results to verify the linkage of actual cause and effect.
Revised Capital Plan to P5.2 Identify, Assess, and Aggregate Return Resources	A revision to plan for capital expenditures necessitated by either changes in specific business plans or factors and assumptions affecting a business plan.
Revised Capital Plan to P1.2 Identify, Assess, and Aggregate Supply Chain Resources	A revision to plan for capital expenditures necessitated by either changes in specific business plans or factors and assumptions affecting a business plan.

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EP.6 Manage Integrated Supply Chain Transportation

The process of defining an integrated supply chain transportation strategy and maintaining the information which characterizes total supply chain transportation requirements, and the management of transporters both inter and intra company.

Metrics (see Appendix A for metrics attributes):

Cost to Manage Integrated Supply Chain Transportation	The sum of the costs associated with managing integrated supply chain transportation.
Forecast Accuracy	Forecast accuracy is calculated for products and/or families for markets/distribution channels, in unit measurement. Common calculation is Forecast Sum - Sum of Variance/Sum of Actuals to determine percentage error. *monitoring the delta of Forecast Accuracy over measured time periods can determine success rates.
Manage Integrated Supply Chain Transportation Cycle Time	The average time associated with managing integrated supply chain transportation

Best Practices:

Alignment of Strategic and Business Plans with Long-Term Capacity and Resource Planning	None identified
Capability to Run “Simulated“ Full-Stream Supply/Demand Balancing for “What-If“ Scenarios	Supply chain modeling and visualization system
Use of Cross Functional Teams to Execute the Process of Developing Long-Term Capacity and Resource Plans	None identified

Inputs:

Capacity Constraints from Source: Company	A capacity constraint is said to exist when the available capacity at a resource may be insufficient to meet the workload necessary to support the desired throughput. A capacity constraint is often a bottleneck.
Planning Decision Policies from Source: Company	Any company policies that affect how a planning process is defined, approved, and performed.
Product Routings from Source: Company	Product routings represent the way products are made and are integrated with the Bill of Materials. Key elements of proper Routings include proper sequence of operations, work center identification, relevant tolerances, run times, lot size and setups. The equivalent concepts for services are the workflow processes and rules.

Outputs:

Outsource Plan to P1.2 Identify, Assess, and Aggregate Supply Chain Resources	A plan that describes how a company will utilize third party business partners to provide products and services which the company chooses not to provide with internal capacity. Outsource Plans can vary in detail from simple policy statements to highly detailed plans with specifics about the third party business partners, specifications for products and services, performance expectations, and contract considerations.

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Outsource Plan to P5.2 Identify, Assess, and Aggregate Return Resources	A plan that describes how a company will utilize third party business partners to provide products and services which the company chooses not to provide with internal capacity. Outsource Plans can vary in detail from simple policy statements to highly detailed plans with specifics about the third party business partners, specifications for products and services, performance expectations, and contract considerations.
Projected Internal and External Capacity	An estimate of the amount of product or service a particular part of the business (internal capacity) or a third party business partner (external capacity) is capable of producing over a particular period of time when all factors that control the production processes are working optimally.
Projected Internal and External Capacity to P5.2 Identify, Assess, and Aggregate Return Resources	An estimate of the amount of product or service a particular part of the business (internal capacity) or a third party business partner (external capacity) is capable of producing over a particular period of time when all factors that control the production processes are working optimally.
Revised Capital Plan to P1.2 Identify, Assess, and Aggregate Supply Chain Resources	A revision to plan for capital expenditures necessitated by either changes in specific business plans or factors and assumptions affecting a business plan.
Transportation Capacity to EM.2 Manage Production Performance	The capability of a transportation system to perform it's function.
Transportation Capacity to EM.1 Manage Production Rules	The capability of a transportation system to perform it's function.

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EP.7 Manage Planning Configuration

The process of defining and maintaining the information about a unique supply chain network for a group of similar or complimentary products through their full life cycle, including the evaluation of market need, product realization (development, introduction and production), product discontinuation, and after-market support. This element also includes the management of critical sub processes needed to manage the life cycle of individual item numbers including item masters, routings, event planning (promotions, etc.), ABC classification, rationalization, and bill of materials.

Metrics (see Appendix A for metrics attributes):

Cost to Manage Planning Configuration	The sum of the Cost to Manage Planning Configuration
Forecast Accuracy	Forecast accuracy is calculated for products and/or families for markets/distribution channels, in unit measurement. Common calculation is Forecast Sum - Sum of Variance/Sum of Actuals to determine percentage error. *monitoring the delta of Forecast Accuracy over measured time periods can determine success rates.
Manage Planning Configuration Cycle Time	The average time associated with managing the planning of the supply chain configuration

Best Practices:

ABC Classification	None identified
Incorporates leading practices such as Efficient Consumer Response, Collaborative Planning, Forecasting, and Replenishment, Vendor Managed Inventory, and real time point of consumption reporting.	None identified
New Items Introductions Are part of the Sales and Operations Planning Process at the General Management Business Team Level	None identified
SKU Rationalization	None identified
Use of Platform Teams in the New Product Development Process	None identified

Outputs:

Bill of Materials to P3.1 Identify, Prioritize, and Aggregate Production Requirements	The Bill of Materials is a structured list of all the materials or parts needed to produce a particular finished product, assembly, subassembly, manufactured part, whether purchased or not.
Bill of Materials to P2.1 Identify, Prioritize, and Aggregate Product Requirements	The Bill of Materials is a structured list of all the materials or parts needed to produce a particular finished product, assembly, subassembly, manufactured part, whether purchased or not.
Item Master to P5.1 Assess, and Aggregate Return Requirements	A record of specific information for each product, which defines the system parameters with which to effectively plan and execute using ERP (MRP, etc) systems.
Item Master to P2.1 Identify, Prioritize, and Aggregate Product Requirements	A record of specific information for each product, which defines the system parameters with which to effectively plan and execute using ERP (MRP, etc) systems.
Item Master to P4.1 Identify, Prioritize, and Aggregate Delivery Requirements	A record of specific information for each product, which defines the system parameters with which to effectively plan and execute using ERP (MRP, etc) systems.

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Item Master to P3.1 Identify, Prioritize, and Aggregate Production Requirements	A record of specific information for each product, which defines the system parameters with which to effectively plan and execute using ERP (MRP, etc) systems.
Product Routings to P2.1 Identify, Prioritize, and Aggregate Product Requirements	Product routings represent the way products are made and are integrated with the Bill of Materials. Key elements of proper Routings include proper sequence of operations, work center identification, relevant tolerances, run times, lot size and setups. The equivalent concepts for services are the workflow processes and rules.
Product Routings to P3.1 Identify, Prioritize, and Aggregate Production Requirements	Product routings represent the way products are made and are integrated with the Bill of Materials. Key elements of proper Routings include proper sequence of operations, work center identification, relevant tolerances, run times, lot size and setups. The equivalent concepts for services are the workflow processes and rules.
Product Routings to P5.1 Assess, and Aggregate Return Requirements	Product routings represent the way products are made and are integrated with the Bill of Materials. Key elements of proper Routings include proper sequence of operations, work center identification, relevant tolerances, run times, lot size and setups. The equivalent concepts for services are the workflow processes and rules.
Product Routings to P4.1 Identify, Prioritize, and Aggregate Delivery Requirements	Product routings represent the way products are made and are integrated with the Bill of Materials. Key elements of proper Routings include proper sequence of operations, work center identification, relevant tolerances, run times, lot size and setups. The equivalent concepts for services are the workflow processes and rules.

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EP.8 Manage PLAN Regulatory Requirements and Compliance

The process of identifying and complying with regulatory documentation and process standards set by external entities (i.e. government, trade officials, etc.) when planning for the integrated supply chain network.

Metrics (see Appendix A for metrics attributes):

Cost to Manage Plan Regulatory Requirements and Compliance	The sum of the costs to Manage Plan Regulatory Requirements and Compliance.
Manage Plan Regulatory Requirements and Compliance Cycle Time	The average time associated with managing the planning of regulatory requirements and compliance

Outputs:

Regulatory Requirements to P5.2 Identify, Assess, and Aggregate Return Resources	Requirements dictated by process standards set by external entities (i.e. government, trade officials, etc.).
Regulatory Requirements to P1.2 Identify, Assess, and Aggregate Supply Chain Resources	Requirements dictated by process standards set by external entities (i.e. government, trade officials, etc.).

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EP.9 Align Supply Chain Unit Plan with Financial Plan

The process of revising the long-term supply chain capacity and resource plans, given the inputs from the strategic and business plans. This includes revision of not only aggregate forecast and projections related to supply chain, source, make, and delivery plans, but also business assumptions.

Metrics (see Appendix A for metrics attributes):

Align Supply Chain Unit Plan with Financial Plan Cycle Time	The average time associated with aligning the supply chain unit plan with the financial plan
Cost to Align Supply Chain Unit Plan with Financial Plan	The sum of the costs associated with aligning supply chain performance plans with financial plans.

Best Practices:

Re-Planning Process Exists in Multi-Levels of the Supply-Chain between Business Enterprises	Business to business Internet capability to share common data.
Re-Planning Process Links the Supply Chain Operation with the Business Strategy and the Marketing Strategy	None identified
Strategic Sales and Operations Planning Process in Place and Managed at the Executive Level	None identified

Inputs:

Business Plan from Source: Company	A document resulting from a process of linking the long-range strategy with projections of revenue, activity, cost and profit. This process develops objectives usually accompanied by budgets, projected balance sheet, and a cash flow statement.
Strategic Plan from Source: Company	A longer range, high-level plan that describes how a company intends to conduct business. Improve its market and competitive position, and increase its earnings performance.

Outputs:

Budget Constraints to P5.2 Identify, Assess, and Aggregate Return Resources	A plan that includes an estimate of future costs and revenues related to expected activities. The budget serves as pattern for and a control over future operations.
Revised Aggregate Forecast and Projections to P5.1 Assess, and Aggregate Return Requirements	An update to the aggregate Supply-Chain Forecasts of Demand by Product Family supporting the Market/Channel Plans. Corresponding Projections, supporting Make, Source, Deliver, Inventory and Response Time Plans through the Supply-Chain are produced from these Forecasts Together, they represent balanced Supply and Demand.
Revised Aggregate Forecast and Projections to P1.1 Identify, Prioritize, and Aggregate Supply Chain Requirements	An update to the aggregate Supply-Chain Forecasts of Demand by Product Family supporting the Market/Channel Plans. Corresponding Projections, supporting Make, Source, Deliver, Inventory and Response Time Plans through the Supply-Chain are produced from these Forecasts Together, they represent balanced Supply and Demand.
Revised Business Assumptions to P5.1 Assess, and Aggregate Return Requirements	An update to the expected cause and effect statements that are the base for the Revised Aggregate Forecast and Projections. These are reviewed periodically with actual results to verify the linkage of actual cause and effect.
Revised Business Assumptions to P1.1 Identify, Prioritize, and Aggregate Supply Chain Requirements	An update to the expected cause and effect statements that are the base for the Revised Aggregate Forecast and Projections. These are reviewed periodically with actual results to verify the linkage of actual cause and effect.

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S1 Source Stocked Product

The procurement, delivery, receipt and transfer of raw material items, subassemblies, product and or services.

The Category S1 includes five Level 3 Elements:

S1.1 Schedule Product Deliveries	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.
S1.2 Receive Product	The process and associated activities of receiving product to contract requirements.
S1.3 Verify Product	The process and actions required determining product conformance to requirements and criteria.
S1.4 Transfer Product	The transfer of accepted product to the appropriate stocking location within the supply chain. This includes all of the activities associated with repackaging, staging, transferring and stocking product. For service this is the transfer or application of service to the final customer or end user.
S1.5 Authorize Supplier Payment	The process of authorizing payments and paying suppliers for product or services. This process includes invoice collection, invoice matching and the issuance of checks.

Metrics (see Appendix A for metrics attributes):

Cost to Source	The sum of the costs associated with Source.
Inventory Days of Supply (Raw Material)	Value of raw materials ÷ (COGS ÷ 365).
Order Fulfillment Cycle Time	The average actual cycle time consistently achieved to fulfill customer orders.
Product Acquisition Costs	Product acquisition costs include costs incurred for the production of product: sum of product management and planning, supplier quality engineering, inbound freight and duties, receiving and product storage, incoming inspection, product process engineering and tooling costs.
Return on Supply Chain Fixed Assets	Return on Supply Chain Fixed Assets measures the return an organization receives on its invested capital in supply chain fixed assets. This includes the fixed assets used in Plan, Source, Make, Deliver, and Return. The levels of aggregation can be at any element associated with a supply chain asset.
Return on Working Capital	Return on working capital is a measurement which assesses the magnitude of investment relative to a company's working capital position verses the revenue generated from a supply chain. Components include accounts receivable, accounts payable, inventory, supply chain revenue, cost of goods sold and supply chain management costs.
Source Cycle Time	The average time associated with Source Processes

Best Practices:

Alliance and Leverage Agreements	None identified
Joint Service Agreements (JSA)	Collaborative Planning Systems
Postponement	Postponement (delayed differentiation) is a supply chain concept where a product is kept as long as possible in a generic state. Differentiation of the generic product into a specific end-product is shifted closer to the consumer by postponing identify changes, such as assembly or packaging, to the last possible supply chain location.

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S1.1 Schedule Product Deliveries

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.
Each occurrence consumes time:

Metrics (see Appendix A for metrics attributes):

% Schedules Changed within Supplier's Lead Time	The number of schedules that are changed within the suppliers lead-time divided by the total number of schedules generated within the measurement period
Average Days per Engineering Change	# of days each engineering change impacts the delivery date divided by the total # of changes.
Average Days per Schedule Change	# of days each schedule change impacts the delivery date divided by the total # of changes.
Average Release Cycle of Changes	Cycle time for implementing change notices divided by total number of changes.
Cost to Schedule Product Deliveries	The sum of the costs associated with scheduling product deliveries.
Schedule Product Deliveries Cycle Time	The average time associated with scheduling the shipment of the return of MRO product

Best Practices:

Advanced Ship Notices Allow for Tight Synchronization between Source and Make Processes	Blanket order support with scheduling interfaces to external supplier systems
Consignment Agreements Are Used to Reduce Assets and Cycle Time While Increasing the Availability of Critical Items	Consignment inventory management
Mechanical (Kanban) Pull Signals Are Used to Notify Suppliers of the Need to Deliver Product	Electronic Kanban support
Utilize EDI Transactions to Reduce Cycle Time and Costs	EDI interface for 830, 850, 856 & 862 transactions

Inputs:

Logistics Selection from ES.6 Manage Incoming Product	Carrier selection and management for inbound or outbound shipments (linked to terms of delivery)
Production Schedule from M2.1 Schedule Production Activities	A plan that authorizes the factory to manufacture or repair a certain quantity of a specific item.
Production Schedule from M3.2 Schedule Production Activities	A plan that authorizes the factory to manufacture or repair a certain quantity of a specific item.
Production Schedule from M1.1 Schedule Production Activities	A plan that authorizes the factory to manufacture or repair a certain quantity of a specific item.
Replenishment Signal from M3.3 Issue Sourced/In-Process Product	Any signal that indicates when to produce or transport Items in a pull replenishment system.
Replenishment Signal from D1.3 Reserve Inventory & Determine Delivery Date	Any signal that indicates when to produce or transport Items in a pull replenishment system.
Replenishment Signal from M2.2 Issue Sourced/In-Process Product	Any signal that indicates when to produce or transport Items in a pull replenishment system.

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Replenishment Signal from M1.2 Issue Material	Any signal that indicates when to produce or transport Items in a pull replenishment system.
Return Inventory Transfer Data from DR3.4 Transfer Excess Product	The process of receipt and verification of the returned item against the return authorization and other documentation and prepares the item for transfer.
Return Inventory Transfer Data from DR2.4 Transfer MRO Product	The process of receipt and verification of the returned item against the return authorization and other documentation and prepares the item for transfer.
Return Inventory Transfer Data from DR1.4 Transfer Defective Product	The process of receipt and verification of the returned item against the return authorization and other documentation and prepares the item for transfer.
Sourcing Plans from P2.4 Establish Sourcing Plans	An aggregate material requirements plan used to schedule material deliveries to meet production plan.
Supplier Performance from ES.2 Assess Supplier Performance	The results of measuring the actual supplier performance on cost, quality, engineering, purchasing, and so on, based on an agreed set of measurements.

Outputs:

Procurement Signal (Supplier) to Supplier	Any signal that indicates when to produce or transport Items in a pull replenishment system, or the signal that sends the estimated need of parts or services to the supplier.
Product On Order to P2.2 Identify, Assess, And Aggregate Product Resources	Product on order with a selected source.
Product On Order to ES.9 Manage Supplier Agreements	Product on order with a selected source.
Scheduled Receipts to D1.8 Receive Product from Source or Make	Product due to arrive.
Scheduled Receipts to M1.1 Schedule Production Activities	Product due to arrive.
Scheduled Receipts to S1.2 Receive Product	Product due to arrive.
Scheduled Receipts to D4.2 Receive Product at Store	Product due to arrive.
Scheduled Receipts to M2.1 Schedule Production Activities	Product due to arrive.
Scheduled Receipts to M3.2 Schedule Production Activities	Product due to arrive.

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S1.2 Receive Product

The process and associated activities of receiving product to contract requirements.
Each occurrence consumes time:

Metrics (see Appendix A for metrics attributes):

% Orders/ Lines Processed Complete	The number of orders / lines that are processed complete divided by the total orders / lines processed within the measurement period
% Orders/ Lines Received On-Time To Demand Requirement	The number of orders / lines that are received on-time to the demand requirements divided by the total orders / lines for the demand requirements in the measurement period
% Orders/ Lines Received with Correct Shipping Documents	The number of orders / lines that are received on-time with correct shipping documents divided by the total orders / lines processed in the measurement period
Cost to Receive Product	The sum of the costs associated with receiving product.
Receiving Product Cycle Time	Total elapsed time from time product is received to time it is passed to next process

Best Practices:

Bar Coding is Used to Minimize Handling Time and Maximize Data Accuracy	- Bar code interface for data collection devices - Generate bar coded receiving documents - Product serial number used as identifier - RFID
Carrier Agreement	Carrier agreements are agreements between a company and its domestic and global carriers (for both, inbound raw materials and outbound finished goods) specifying service levels, payment terms, and other conditions.
Deliveries Are Balanced Throughout Each Working Day and Throughout the Week	None identified
Supplier Certification Programs Are Used to Reduce (Skip Lot) or Eliminate Receiving Inspection	Skip lot/sampling inspection logic
Supplier Delivers Directly to Point of Use - (Dock to Line or End Destination)	Electronic Tag tracking to Point of Use (POU) destination
Vendor Managed Inventory	VMI is a concept for planning and control of inventory, in which the supplier has access to the customer's inventory data and is responsible for maintaining the inventory level required by the customer. Re-supply is performed by the vendor through regularly scheduled reviews of the on-site inventory. The on-site inventory is counted, damaged or outdated goods are removed, and the inventory is restocked to predefined levels.

Inputs:

Defective Products from DR1.4 Transfer Defective Product	Maintenance, Repair and Overhaul spare parts used to support of operations and maintenance.
Excess Products from DR3.4 Transfer Excess Product	Material in excess of the current requirements.
MRO Products from DR2.4 Transfer MRO Product	Maintenance, Repair and Overhaul spare parts used to support of operations and maintenance.
Product from Source: Supplier	The end object of a transformation process that includes physical objects, information or services.
Scheduled Receipts from S1.1 Schedule Product Deliveries	Product due to arrive.

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Outputs:

Receipt Verification to ES.2 Assess Supplier Performance	Acknowledgement that the product received conforms to specified requirements and criteria.
Receipt Verification to ES.8 Manage Import/Export Requirements	Acknowledgement that the product received conforms to specified requirements and criteria.
Receipt Verification to ES.1 Manage Sourcing Business Rules	Acknowledgement that the product received conforms to specified requirements and criteria.
Receipt Verification to S1.3 Verify Product	Acknowledgement that the product received conforms to specified requirements and criteria.
Receipt Verification to ED.8 Manage Import/Export Requirements	Acknowledgement that the product received conforms to specified requirements and criteria.
Receipt Verification to ES.6 Manage Incoming Product	Acknowledgement that the product received conforms to specified requirements and criteria.

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S1.3 Verify Product

The process and actions required determining product conformance to requirements and criteria. Each occurrence consumes time:

Metrics (see Appendix A for metrics attributes):

% Orders/ Lines Received Defect Free	The number of orders / lines that are received defect free divided by the total orders / lines processed in the measurement period.
Cost to Verify Product	The sum of the costs associated with raw material verification.
Verify Product Cycle Time	The average time associated with verifying raw material product

Best Practices:

Bar Coding is Used to Minimize Handling Time and Maximize Data Accuracy	- Bar code interface for data collection devices - Generate bar coded receiving documents - Product serial number used as identifier - RFID
Deliveries Are Balanced Throughout Each Working Day and Throughout the Week	None identified
Supplier Certification Programs Are Used to Reduce (Skip Lot) or Eliminate Receiving Inspection	Skip lot/sampling inspection logic
Supplier Delivers Directly to Point of Use	Electronic Tag tracking to Point of Use (POU) destination
Supplier Replaces Defective Material at Customer's Facility with Good Product as Required	Electronic Tag tracking to Point of Use (POU) destination

Inputs:

Receipt Verification from S1.2 Receive Product	Acknowledgement that the product received conforms to specified requirements and criteria.

Outputs:

Receipt Verification to S1.4 Transfer Product	Acknowledgement that the product received conforms to specified requirements and criteria.
Receipt Verification to ES.1 Manage Sourcing Business Rules	Acknowledgement that the product received conforms to specified requirements and criteria.
Receipt Verification to ES.2 Assess Supplier Performance	Acknowledgement that the product received conforms to specified requirements and criteria.

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S1.4 Transfer Product

The transfer of accepted product to the appropriate stocking location within the supply chain. This includes all of the activities associated with repackaging, staging, transferring and stocking product. For service this is the transfer or application of service to the final customer or end user.

Metrics (see Appendix A for metrics attributes):

% Product Transferred On-Time to Demand Requirement	The number of product orders / lines that are transferred on-time to demand requirements divided by the total orders / lines transferred in the measurement period
% Product Transferred without Transaction Errors	The number of transactions processed without error divided by the total transactions processed in the measurement period
Cost to Transfer Product	The sum of the costs associated with transferring product to Make or Deliver processes
Inventory Days of Supply	Five point annual average of the sum of all gross inventories (raw materials & WIP, plant FG, field FG, field samples, other) ÷ (COGS ÷ 365). Total gross value of inventory at standard cost before reserves for excess and obsolescence. Only includes inventory on company books, future liabilities should not be included
Transfer Product Cycle Time	The average time associated transfer until product is moved to the next process.

Best Practices:

Capability Transfer to Organization	None identified
Drive Deliveries Directly to Stock or Point-Of-Use in Manufacturing to Reduce Costs and Cycle Time	Pay on receipt Specify delivery location and time (to the minute) Specify delivery sequence

Inputs:

Finished Goods Inventory Location from ED.4 Manage Finished Goods Inventories	The physical storage location where Finished Product inventory is held in stock prior to use or shipment.
Product Inventory Location from ES.4 Manage Product Inventory	The physical storage location where product inventory is held in stock prior to use or shipment.
Receipt Verification from S1.3 Verify Product	Acknowledgement that the product received conforms to specified requirements and criteria.
Replenishment Signal from M2.2 Issue Sourced/In-Process Product	Any signal that indicates when to produce or transport Items in a pull replenishment system.
Replenishment Signal from M1.2 Issue Material	Any signal that indicates when to produce or transport Items in a pull replenishment system.
Replenishment Signal from M3.3 Issue Sourced/In-Process Product	Any signal that indicates when to produce or transport Items in a pull replenishment system.
Replenishment Signal from D1.3 Reserve Inventory & Determine Delivery Date	Any signal that indicates when to produce or transport Items in a pull replenishment system.
WIP Inventory Location from EM.6 Manage Transportation	Location of inventory that is specified as “work in progress“. This can be intermediate storage in a manufacturing facility prior to final packaging or can be a class of materials waiting final transformation to finished products.

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Outputs:

Daily Replenishment Requirements to D4.1 Generate Stocking Schedule	Resources needed to meet Item stocking schedule requirement.
Existing Inventory Data to ES.4 Manage Product Inventory	Available data that characterizes and quantifies raw material, work in process, and finished goods inventories
Inventory Availability to P2.2 Identify, Assess, And Aggregate Product Resources	Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts).
Inventory Availability to ES.4 Manage Product Inventory	Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts).
Inventory Availability to D4.2 Receive Product at Store	Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts).
Inventory Availability to D1.8 Receive Product from Source or Make	Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts).
Inventory Availability to D1.3 Reserve Inventory & Determine Delivery Date	Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts).
Inventory Availability to M3.3 Issue Sourced/In-Process Product	Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts).
Inventory Availability to M1.2 Issue Material	Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts).
Inventory Availability to M2.2 Issue Sourced/In-Process Product	Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts).
Loaded Retail Cart or Pallet to D4.4 Stock Shelf	Customer selected retail finished goods transferred to the point of sale.
Transferred Product to S1.5 Authorize Supplier Payment	Product being transferred to the appropriate stocking location within the supply chain.

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S1.5 Authorize Supplier Payment

The process of authorizing payments and paying suppliers for product or services. This process includes invoice collection, invoice matching and the issuance of checks.
Each occurrence consumes time:

Metrics (see Appendix A for metrics attributes):

Authorize Supplier Payment Cycle Time	The average time associated with authorizing payment to suppliers.
Cost to Authorize Supplier Payment	The sum of the costs associated with authorizing supplier payment.

Best Practices:

Pay on Receipt	Electronic Invoice Processing

Inputs:

Payment Terms from ES.9 Manage Supplier Agreements	The process of authorizing payments and paying suppliers for product or services. This process includes invoice collection, invoice matching and the issuance of checks.
Transferred Product from S1.4 Transfer Product	Product being transferred to the appropriate stocking location within the supply chain.

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S2 Source Make-to-Order Product

The procurement and delivery of product that is built to a specific design or configured based on the requirements of a particular customer order.

The Category S2 includes five Level 3 Elements:

S2.1 Schedule Product Deliveries	Scheduling and managing the execution of the individual deliveries of product against the contract. The requirements for product deliveries are determined based on the detailed sourcing plan. This includes all aspects of managing the contract schedule including prototypes, qualifications or service deployment.
S2.2 Receive Product	The process and associated activities of receiving product to contract requirements.
S2.3 Verify Product	The process and actions required determining product conformance to requirements and criteria.
S2.4 Transfer Product	The transfer of accepted product to the appropriate stocking location within the supply chain. This includes all of the activities associated with repackaging, staging, transferring, and stocking product and or application of service.
S2.5 Authorize Supplier Payment	The process of authorizing payments and paying suppliers for product or services. This process includes invoice collection, invoice matching and the issuance of checks.

Metrics (see Appendix A for metrics attributes):

Cost to Source	The sum of the costs associated with Source.
Inventory Days of Supply (Raw Material)	Value of raw materials ÷ (COGS ÷ 365).
Order Fulfillment Cycle Time	The average actual cycle time consistently achieved to fulfill customer orders.
Perfect Order Fulfillment	The percentage of orders meeting delivery performance with complete and accurate documentation and no delivery damage. Components include all items and quantities on-time using the customer's definition of on-time, and documentation - packing slips, bills of lading, invoices, etc.
Product Acquisition Costs	Product acquisition costs include costs incurred for the production of product: sum of product management and planning, supplier quality engineering, inbound freight and duties, receiving and product storage, incoming inspection, product process engineering and tooling costs.
Return on Supply Chain Fixed Assets	Return on Supply Chain Fixed Assets measures the return an organization receives on its invested capital in supply chain fixed assets. This includes the fixed assets used in Plan, Source, Make, Deliver, and Return. The levels of aggregation can be at any element associated with a supply chain asset.
Return on Working Capital	Return on working capital is a measurement which assesses the magnitude of investment relative to a company's working capital position verses the revenue generated from a supply chain. Components include accounts receivable, accounts payable, inventory, supply chain revenue, cost of goods sold and supply chain management costs.
Source Cycle Time	The average time associated with Source Processes

Best Practices:

Automated Statistical Process Control (SPC)	None identified
Joint Service Agreements (JSA)	Collaborative Planning Systems
Postponement	Postponement (delayed differentiation) is a supply chain concept where a product is kept as long as possible in a generic state. Differentiation of the generic product into a specific end-product is shifted closer to the consumer by postponing identify changes, such as assembly or

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	packaging, to the last possible supply chain location.

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S2.1 Schedule Product Deliveries

Scheduling and managing the execution of the individual deliveries of product against the contract. The requirements for product deliveries are determined based on the detailed sourcing plan. This includes all aspects of managing the contract schedule including prototypes, qualifications or service deployment.

Metrics (see Appendix A for metrics attributes):

% Schedules Changed within Supplier's Lead Time	The number of schedules that are changed within the suppliers lead-time divided by the total number of schedules generated within the measurement period
Average Days per Engineering Change	# of days each engineering change impacts the delivery date divided by the total # of changes.
Average Days per Schedule Change	# of days each schedule change impacts the delivery date divided by the total # of changes.
Average Release Cycle of Changes	Cycle time for implementing change notices divided by total number of changes.
Cost to Schedule Product Deliveries	The sum of the costs associated with scheduling product deliveries.
Schedule Product Deliveries Cycle Time	The average time associated with scheduling the shipment of the return of MRO product

Best Practices:

Advanced Ship Notices Allow for Tight Synchronization between Source and Make Processes	Blanket order support with scheduling interfaces to external supplier systems
Consignment Agreements Are Used to Reduce Assets and Cycle Time While Increasing the Availability of Critical Items	Consignment inventory management
Mechanical (Kanban) Pull Signals Are Used to Notify Suppliers of the Need to Deliver Product	Electronic Kanban support
Utilize EDI Transactions to Reduce Cycle Time and Costs	EDI interface for 830, 850, 856 & 862 transactions

Inputs:

Logistics Selection from ES.6 Manage Incoming Product	Carrier selection and management for inbound or outbound shipments (linked to terms of delivery)
Production Schedule from M3.2 Schedule Production Activities	A plan that authorizes the factory to manufacture or repair a certain quantity of a specific item.
Production Schedule from M2.1 Schedule Production Activities	A plan that authorizes the factory to manufacture or repair a certain quantity of a specific item.
Production Schedule from M1.1 Schedule Production Activities	A plan that authorizes the factory to manufacture or repair a certain quantity of a specific item.
Replenishment Signal from M2.2 Issue Sourced/In-Process Product	Any signal that indicates when to produce or transport Items in a pull replenishment system.
Replenishment Signal from D2.3 Reserve Resources & Determine Delivery Date	Any signal that indicates when to produce or transport Items in a pull replenishment system.

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Replenishment Signal from M3.3 Issue Sourced/In-Process Product	Any signal that indicates when to produce or transport Items in a pull replenishment system.
Replenishment Signal from M1.2 Issue Material	Any signal that indicates when to produce or transport Items in a pull replenishment system.
Return Inventory Transfer Data from DR2.4 Transfer MRO Product	The process of receipt and verification of the returned item against the return authorization and other documentation and prepares the item for transfer.
Return Inventory Transfer Data from DR1.4 Transfer Defective Product	The process of receipt and verification of the returned item against the return authorization and other documentation and prepares the item for transfer.
Return Inventory Transfer Data from DR3.4 Transfer Excess Product	The process of receipt and verification of the returned item against the return authorization and other documentation and prepares the item for transfer.
Source Execution Data from M2.2 Issue Sourced/In-Process Product	Data which will provide measurement of actual supplier performance against internal and or external standards to provide feedback to achieve and maintain the performance required to meet the customer's needs.
Sourcing Plans from P2.4 Establish Sourcing Plans	An aggregate material requirements plan used to schedule material deliveries to meet production plan.
Supplier Performance from ES.2 Assess Supplier Performance	The results of measuring the actual supplier performance on cost, quality, engineering, purchasing, and so on, based on an agreed set of measurements.

Outputs:

Procurement Signal (Supplier) to Supplier	Any signal that indicates when to produce or transport Items in a pull replenishment system, or the signal that sends the estimated need of parts or services to the supplier.
Product On Order to P2.2 Identify, Assess, And Aggregate Product Resources	Product on order with a selected source.
Product On Order to ES.9 Manage Supplier Agreements	Product on order with a selected source.
Scheduled Receipts to S2.2 Receive Product	Product due to arrive.
Scheduled Receipts to M1.1 Schedule Production Activities	Product due to arrive.
Scheduled Receipts to M3.2 Schedule Production Activities	Product due to arrive.
Scheduled Receipts to M2.1 Schedule Production Activities	Product due to arrive.

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S2.2 Receive Product

The process and associated activities of receiving product to contract requirements.

Metrics (see Appendix A for metrics attributes):

% Orders/ Lines Processed Complete	The number of orders / lines that are processed complete divided by the total orders / lines processed within the measurement period
% Orders/ Lines Received On-Time To Demand Requirement	The number of orders / lines that are received on-time to the demand requirements divided by the total orders / lines for the demand requirements in the measurement period
% Orders/ Lines Received with Correct Shipping Documents	The number of orders / lines that are received on-time with correct shipping documents divided by the total orders / lines processed in the measurement period
Cost to Receive Product	The sum of the costs associated with receiving product.
Receiving Product Cycle Time	Total elapsed time from time product is received to time it is passed to next process

Best Practices:

Bar Coding is Used to Minimize Handling Time and Maximize Data Accuracy	- Bar code interface for data collection devices - Generate bar coded receiving documents - Product serial number used as identifier - RFID
Carrier Agreement	Carrier agreements are agreements between a company and its domestic and global carriers (for both, inbound raw materials and outbound finished goods) specifying service levels, payment terms, and other conditions.
Deliveries Are Balanced Throughout Each Working Day and Throughout the Week	None identified
Supplier Certification Programs Are Used to Reduce (Skip Lot) or Eliminate Receiving Inspection	Skip lot/sampling inspection logic
Supplier Delivers Directly to Point of Use - (Dock to Line or End Destination)	Electronic Tag tracking to Point of Use (POU) destination
Vendor Managed Inventory	VMI is a concept for planning and control of inventory, in which the supplier has access to the customer's inventory data and is responsible for maintaining the inventory level required by the customer. Re-supply is performed by the vendor through regularly scheduled reviews of the on-site inventory. The on-site inventory is counted, damaged or outdated goods are removed, and the inventory is restocked to predefined levels.

Inputs:

Defective Products from DR1.4 Transfer Defective Product	Maintenance, Repair and Overhaul spare parts used to support of operations and maintenance.
Excess Products from DR3.4 Transfer Excess Product	Material in excess of the current requirements.
MRO Products from DR2.4 Transfer MRO Product	Maintenance, Repair and Overhaul spare parts used to support of operations and maintenance.
Product from Source: Supplier	The end object of a transformation process that includes physical objects, information or services.
Scheduled Receipts from S2.1 Schedule Product Deliveries	Product due to arrive.

Outputs:

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Receipt Verification to ES.2 Assess Supplier Performance	Acknowledgement that the product received conforms to specified requirements and criteria.
Receipt Verification to ES.8 Manage Import/Export Requirements	Acknowledgement that the product received conforms to specified requirements and criteria.
Receipt Verification to ES.6 Manage Incoming Product	Acknowledgement that the product received conforms to specified requirements and criteria.
Receipt Verification to ES.1 Manage Sourcing Business Rules	Acknowledgement that the product received conforms to specified requirements and criteria.
Receipt Verification to ED.8 Manage Import/Export Requirements	Acknowledgement that the product received conforms to specified requirements and criteria.
Receipt Verification to S2.3 Verify Product	Acknowledgement that the product received conforms to specified requirements and criteria.

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S2.3 Verify Product

The process and actions required determining product conformance to requirements and criteria.

Metrics (see Appendix A for metrics attributes):

% Orders/ Lines Received Defect Free	The number of orders / lines that are received defect free divided by the total orders / lines processed in the measurement period.
Cost to Verify Product	The sum of the costs associated with raw material verification.
Verify Product Cycle Time	The average time associated with verifying raw material product

Best Practices:

Bar Coding is Used to Minimize Handling Time and Maximize Data Accuracy	- Bar code interface for data collection devices - Generate bar coded receiving documents - Product serial number used as identifier - RFID
Deliveries Are Balanced Throughout Each Working Day and Throughout the Week	None identified
Supplier Certification Programs Are Used to Reduce (Skip Lot) or Eliminate Receiving Inspection	Skip lot/sampling inspection logic
Supplier Delivers Directly to Point of Use	Electronic Tag tracking to Point of Use (POU) destination
Supplier Replaces Defective Material at Customer's Facility with Good Product as Required	Electronic Tag tracking to Point of Use (POU) destination

Inputs:

Receipt Verification from S2.2 Receive Product	Acknowledgement that the product received conforms to specified requirements and criteria.

Outputs:

Receipt Verification to S2.4 Transfer Product	Acknowledgement that the product received conforms to specified requirements and criteria.
Receipt Verification to ES.2 Assess Supplier Performance	Acknowledgement that the product received conforms to specified requirements and criteria.
Receipt Verification to ES.1 Manage Sourcing Business Rules	Acknowledgement that the product received conforms to specified requirements and criteria.

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S2.4 Transfer Product

The transfer of accepted product to the appropriate stocking location within the supply chain. This includes all of the activities associated with repackaging, staging, transferring, and stocking product and or application of service.

Metrics (see Appendix A for metrics attributes):

% Product Transferred On-Time to Demand Requirement	The number of product orders / lines that are transferred on-time to demand requirements divided by the total orders / lines transferred in the measurement period
% Product Transferred without Transaction Errors	The number of transactions processed without error divided by the total transactions processed in the measurement period
Cost to Transfer Product	The sum of the costs associated with transferring product to Make or Deliver processes
Inventory Days of Supply	Five point annual average of the sum of all gross inventories (raw materials & WIP, plant FG, field FG, field samples, other) ÷ (COGS ÷ 365). Total gross value of inventory at standard cost before reserves for excess and obsolescence. Only includes inventory on company books, future liabilities should not be included
Transfer Product Cycle Time	The average time associated transfer until product is moved to the next process.

Best Practices:

Capability Transfer to Customer	None identified
Drive Deliveries Directly to Stock or Point-Of-Use in Manufacturing to Reduce Costs and Cycle Time	Pay on receipt Specify delivery location and time (to the minute) Specify delivery sequence

Inputs:

Finished Goods Inventory Location from ED.4 Manage Finished Goods Inventories	The physical storage location where Finished Product inventory is held in stock prior to use or shipment.
Product Inventory Location from ES.4 Manage Product Inventory	The physical storage location where product inventory is held in stock prior to use or shipment.
Receipt Verification from S2.3 Verify Product	Acknowledgement that the product received conforms to specified requirements and criteria.
Replenishment Signal from M2.2 Issue Sourced/In-Process Product	Any signal that indicates when to produce or transport Items in a pull replenishment system.
Replenishment Signal from D1.3 Reserve Inventory & Determine Delivery Date	Any signal that indicates when to produce or transport Items in a pull replenishment system.
Replenishment Signal from M3.3 Issue Sourced/In-Process Product	Any signal that indicates when to produce or transport Items in a pull replenishment system.
Replenishment Signal from M1.2 Issue Material	Any signal that indicates when to produce or transport Items in a pull replenishment system.
WIP Inventory Location from EM.6 Manage Transportation	Location of inventory that is specified as “work in progress“. This can be intermediate storage in a manufacturing facility prior to final packaging or can be a class of materials waiting final transformation to finished products.

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Outputs:

Existing Inventory Data to ES.4 Manage Product Inventory	Available data that characterizes and quantifies raw material, work in process, and finished goods inventories
Inventory Availability to M2.2 Issue Sourced/In-Process Product	Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts).
Inventory Availability to D2.3 Reserve Resources & Determine Delivery Date	Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts).
Inventory Availability to D2.9 Pick Product	Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts).
Inventory Availability to M1.2 Issue Material	Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts).
Inventory Availability to ES.4 Manage Product Inventory	Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts).
Inventory Availability to M3.3 Issue Sourced/In-Process Product	Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts).
Inventory Availability to P2.2 Identify, Assess, And Aggregate Product Resources	Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts).
Transferred Product to S2.5 Authorize Supplier Payment	Product being tranferred to the appropriate stocking location within the supply chain.

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S2.5 Authorize Supplier Payment

The process of authorizing payments and paying suppliers for product or services. This process includes invoice collection, invoice matching and the issuance of checks.

Metrics (see Appendix A for metrics attributes):

Authorize Supplier Payment Cycle Time	The average time associated with authorizing payment to suppliers.
Cost to Authorize Supplier Payment	The sum of the costs associated with authorizing supplier payment.

Best Practices:

Pay on Receipt	Electronic Invoice Processing

Inputs:

Payment Terms from ES.9 Manage Supplier Agreements	The process of authorizing payments and paying suppliers for product or services. This process includes invoice collection, invoice matching and the issuance of checks.
Transferred Product from S2.4 Transfer Product	Product being tranferred to the appropriate stocking location within the supply chain.

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S3 Source Engineer-to-Order Product

The negotiation, procurement and delivery of engineer-to-order assemblies or specialized product or services that are designed and built based on the requirements or specifications of a particular customer order or contract.

The Category S3 includes seven Level 3 Elements:

S3.1 Identify Sources of Supply	The identification and qualification of potential suppliers capable of designing and delivering product that will meet all of the required product specifications.
S3.2 Select Final Supplier(s) and Negotiate	The identification of the final supplier(s) based on the evaluation of RFQs, supplier qualifications and the generation of a contract defining the costs and terms and conditions of product availability.
S3.3 Schedule Product Deliveries	Scheduling and managing the execution of the individual deliveries of product against the contract. The requirements for product deliveries are determined based on the detailed sourcing plan. This includes all aspects of managing the contract schedule including prototypes and qualifications.
S3.4 Receive Product	The process and associated activities of receiving product to contract requirements.
S3.5 Verify Product	The process and actions required determining product conformance to requirements and criteria.
S3.6 Transfer Product	The transfer of accepted product to the appropriate stocking location within the supply chain. This includes all of the activities associated with repackaging, staging, transferring, and stocking product.
S3.7 Authorize Supplier Payment	The process of authorizing payments and paying suppliers for product or services. This process includes invoice collection, invoice matching and the issuance of checks.

Metrics (see Appendix A for metrics attributes):

Cost to Source	The sum of the costs associated with Source.
Inventory Days of Supply (Raw Material)	Value of raw materials ÷ (COGS ÷ 365).
Order Fulfillment Cycle Time	The average actual cycle time consistently achieved to fulfill customer orders.
Product Acquisition Costs	Product acquisition costs include costs incurred for the production of product: sum of product management and planning, supplier quality engineering, inbound freight and duties, receiving and product storage, incoming inspection, product process engineering and tooling costs.
Return on Supply Chain Fixed Assets	Return on Supply Chain Fixed Assets measures the return an organization receives on its invested capital in supply chain fixed assets. This includes the fixed assets used in Plan, Source, Make, Deliver, and Return. The levels of aggregation can be at any element associated with a supply chain asset.
Return on Working Capital	Return on working capital is a measurement which assesses the magnitude of investment relative to a company's working capital position verses the revenue generated from a supply chain. Components include accounts receivable, accounts payable, inventory, supply chain revenue, cost of goods sold and supply chain management costs.
Source Cycle Time	The average time associated with Source Processes

Best Practices:

Joint Service Agreements (JSA)	Collaborative Planning Systems

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S3.1 Identify Sources of Supply

The identification and qualification of potential suppliers capable of designing and delivering product that will meet all of the required product specifications.

Metrics (see Appendix A for metrics attributes):

.		Cost to Identify Sources of Supply		The sum of the costs associated with identifying sources of supply.
.		Identify Sources of Supply Cycle Time		The average time associated with the identification of sources of supply

Best Practices:

.		Concurrent Engineering is Used to Tightly Link Sourcing into the Product Development Process Make/Buy Decision Process (Outsourcing vs. In Sourcing)		None identified
.		Electronic Data Interchange is Used to Send Technical Information to and from Potential Suppliers		None identified
.		On Line RFQ Processes Linked into the Document Management Process Reduces Cycle Time and Product Management Costs		None identified
.		Product Data Management & Electronic Document Management Are Used to Manage Technical Documents and Requirements for Engineer to Order Product		None identified
.		Supplier Development Programs Are Used to Get Local Suppliers to Invest in Developing New Technologies		None identified

Inputs:

.		Business Rules for Source Processes from ES.1 Manage Sourcing Business Rules		Rules that are translated into guidelines and policies for conducting business within the enterprise and other legal entities. Sourcing business rules include: supplier selection and negotiation processes, fulfillment and delivery performance and relationship definition for specific levels of collaboration and partnership.
.		Current Inventory Source Data from ES.3 Maintain Source Data		Data which will provide measurement of actual supplier performance against internal and or external standards to provide feedback to achieve and maintain the performance required to meet the customer's needs.
.		ETO Spec or Design from Source: Company		A clear, complete and accurate statement or drawing of the technical requirements of a material, item or service, and of the procedure to determine if the requirements are met.
.		Sourcing Plans from P2.4 Establish Sourcing Plans		An aggregate material requirements plan used to schedule material deliveries to meet production plan.
.		Supplier Data from ES.7 Manage Supplier Network		Data or information about the supplier. This data can be organizational, product, information, financial. Structured supplier data is needed to set up and implement ERP or similar systems.

Outputs:

.		Workflow to S3.2 Select Final Supplier(s) and Negotiate		
.		ETO Request for Proposal to Supplier		A document used to solicit vendor responses when the functional requirements and features are known.

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S3.2 Select Final Supplier(s) and Negotiate

The identification of the final supplier(s) based on the evaluation of RFQs, supplier qualifications and the generation of a contract defining the costs and terms and conditions of product availability.

Metrics (see Appendix A for metrics attributes):

.	Cost to Select Final Supplier(s) and Negotiate		The sum of the costs associated with selecting final suppliers and negotiating supplier agreements.
.	Select Final Supplier(s) and Negotiate Cycle Time		The average time associated with scheduling the shipment of the return of MRO product

Best Practices:

.	Electronic Data Interchange Can Be Used To Send Rfqs and Technical Information to and from Potential Suppliers to Determine Supplier Capability to Fulfill Requirements So that They May Be Added to Supplier Network		Electronic Data Interchange
.	On Line Document Management and Automated Supplier Approval Processes Can Reduce the Cycle Time and Costs Associated With Managing Supplier Evaluations and Get Them into the Supplier Network Faster		ERP
.	On Line RFQ Processes Linked into the Document Management Process Reduces Cycle Time and Product Management Costs		None identified
.	On-Line Availability to Supplier Financials to Determine Potential Supplier Viability to be Added to Supplier Network		Internet web sites for financial evaluation
.	Supplier Certification Programs Can Reduce the Cycle Time for Certifying Existing Suppliers to Provide New Technologies		None identified
.	Utilize Concurrent Engineering with Suppliers to Allow Them to Provide Engineering and Product Performance Test Data		None identified

Inputs:

.	Workflow from S3.1 Identify Sources of Supply		
.	Business Rules for Source Processes from ES.1 Manage Sourcing Business Rules		Rules that are translated into guidelines and policies for conducting business within the enterprise and other legal entities. Sourcing business rules include: supplier selection and negotiation processes, fulfillment and delivery performance and relationship definition for specific levels of collaboration and partnership.
.	Current Inventory Source Data from ES.3 Maintain Source Data		Data which will provide measurement of actual supplier performance against internal and or external standards to provide feedback to achieve and maintain the performance required to meet the customer's needs.
.	ETO Proposal from Source: Supplier		A proposal that may contain final drawings, specifications, formulas, part programs, etc., that describe requirements of a product
.	Supplier Data from ES.7 Manage Supplier Network		Data or information about the supplier. This data can be organizational, product, information, financial. Structured supplier

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				data is needed to set up and implement ERP or similar systems.

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Outputs:

.		Procurement Signal (Supplier) to Supplier		Any signal that indicates when to produce or transport Items in a pull replenishment system, or the signal that sends the estimated need of parts or services to the supplier.
.		Supplier Agreement to ES.9 Manage Supplier Agreements		An agreement between supplier and purchaser to perform or not to perform specific acts or services or to deliver merchandise, such as purchase order or supplier contract.
.		Supplier Agreement to EM.6 Manage Transportation		An agreement between supplier and purchaser to perform or not to perform specific acts or services or to deliver merchandise, such as purchase order or supplier contract.
.		Supplier Agreement to S3.3 Schedule Product Deliveries		An agreement between supplier and purchaser to perform or not to perform specific acts or services or to deliver merchandise, such as purchase order or supplier contract.

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S3.3 Schedule Product Deliveries

Scheduling and managing the execution of the individual deliveries of product against the contract. The requirements for product deliveries are determined based on the detailed sourcing plan. This includes all aspects of managing the contract schedule including prototypes and qualifications.

Metrics (see Appendix A for metrics attributes):

.		% Schedules Changed within Supplier's Lead Time		The number of schedules that are changed within the suppliers lead-time divided by the total number of schedules generated within the measurement period
.		Average Days per Engineering Change		# of days each engineering change impacts the delivery date divided by the total # of changes.
.		Average Days per Schedule Change		# of days each schedule change impacts the delivery date divided by the total # of changes.
.		Average Release Cycle of Changes		Cycle time for implementing change notices divided by total number of changes.
.		Cost to Schedule Product Deliveries		The sum of the costs associated with scheduling product deliveries.
.		Schedule Product Deliveries Cycle Time		The average time associated with scheduling the shipment of the return of MRO product

Best Practices:

.		Advanced Ship Notices Allow for Tight Synchronization between Source and Make Processes		Blanket order support with scheduling interfaces to external supplier systems
.		Consignment Agreements Are Used to Reduce Assets and Cycle Time While Increasing the Availability of Critical Items		Consignment inventory management
.		Mechanical (Kanban) Pull Signals Are Used to Notify Suppliers of the Need to Deliver Product		Electronic Kanban support
.		Utilize EDI Transactions to Reduce Cycle Time and Costs		EDI interface for 830, 850, 856 & 862 transactions

Inputs:

.		Logistics Selection from ES.6 Manage Incoming Product		Carrier selection and management for inbound or outbound shipments (linked to terms of delivery)
.		Production Schedule from M2.1 Schedule Production Activities		A plan that authorizes the factory to manufacture or repair a certain quantity of a specific item.
.		Production Schedule from M1.1 Schedule Production Activities		A plan that authorizes the factory to manufacture or repair a certain quantity of a specific item.
.		Production Schedule from M3.2 Schedule Production Activities		A plan that authorizes the factory to manufacture or repair a certain quantity of a specific item.
.		Replenishment Signal from M1.2 Issue Material		Any signal that indicates when to produce or transport Items in a pull replenishment system.
.		Replenishment Signal from M2.2 Issue Sourced/In-Process Product		Any signal that indicates when to produce or transport Items in a pull replenishment system.
.		Replenishment Signal from M3.3 Issue Sourced/In-Process Product		Any signal that indicates when to produce or transport Items in a pull replenishment system.

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.		Replenishment Signal from D3.3 Enter Order, Commit Resources & Launch Program		Any signal that indicates when to produce or transport Items in a pull replenishment system.
.		Return Inventory Transfer Data from DR3.4 Transfer Excess Product		The process of receipt and verification of the returned item against the return authorization and other documentation and prepares the item for transfer.
.		Return Inventory Transfer Data from DR1.4 Transfer Defective Product		The process of receipt and verification of the returned item against the return authorization and other documentation and prepares the item for transfer.
.		Return Inventory Transfer Data from DR2.4 Transfer MRO Product		The process of receipt and verification of the returned item against the return authorization and other documentation and prepares the item for transfer.
.		Sourcing Plans from P2.4 Establish Sourcing Plans		An aggregate material requirements plan used to schedule material deliveries to meet production plan.
.		Supplier Agreement from S3.2 Select Final Supplier(s) and Negotiate		An agreement between supplier and purchaser to perform or not to perform specific acts or services or to deliver merchandise, such as purchase order or supplier contract.
.		Supplier Performance from ES.2 Assess Supplier Performance		The results of measuring the actual supplier performance on cost, quality, engineering, purchasing, and so on, based on an agreed set of measurements.

Outputs:

.		Procurement Signal (Supplier) to Supplier		Any signal that indicates when to produce or transport Items in a pull replenishment system, or the signal that sends the estimated need of parts or services to the supplier.
.		Product On Order to ES.9 Manage Supplier Agreements		Product on order with a selected source.
.		Product On Order to P2.2 Identify, Assess, And Aggregate Product Resources		Product on order with a selected source.
.		Scheduled Receipts to M1.1 Schedule Production Activities		Product due to arrive.
.		Scheduled Receipts to M3.2 Schedule Production Activities		Product due to arrive.
.		Scheduled Receipts to M2.1 Schedule Production Activities		Product due to arrive.
.		Scheduled Receipts to S3.4 Receive Product		Product due to arrive.

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S3.4 Receive Product

The process and associated activities of receiving product to contract requirements.

Metrics (see Appendix A for metrics attributes):

.		% Orders/ Lines Processed Complete		The number of orders / lines that are processed complete divided by the total orders / lines processed within the measurement period
.		% Orders/ Lines Received On-Time To Demand Requirement		The number of orders / lines that are received on-time to the demand requirements divided by the total orders / lines for the demand requirements in the measurement period
.		% Orders/ Lines Received with Correct Shipping Documents		The number of orders / lines that are received on-time with correct shipping documents divided by the total orders / lines processed in the measurement period
.		Cost to Receive Product		The sum of the costs associated with receiving product.
.		Receiving Product Cycle Time		Total elapsed time from time product is received to time it is passed to next process

Best Practices:

.		Bar Coding is Used to Minimize Handling Time and Maximize Data Accuracy		- Bar code interface for data collection devices - Generate bar coded receiving documents - Product serial number used as identifier - RFID
.		Carrier Agreement		Carrier agreements are agreements between a company and its domestic and global carriers (for both, inbound raw materials and outbound finished goods) specifying service levels, payment terms, and other conditions.
.		Deliveries Are Balanced Throughout Each Working Day and Throughout the Week		None identified
.		Supplier Certification Programs Are Used to Reduce (Skip Lot) or Eliminate Receiving Inspection		Skip lot/sampling inspection logic
.		Supplier Delivers Directly to Point of Use - (Dock to Line or End Destination)		Electronic Tag tracking to Point of Use (POU) destination
.		Vendor Managed Inventory		VMI is a concept for planning and control of inventory, in which the supplier has access to the customer's inventory data and is responsible for maintaining the inventory level required by the customer. Re-supply is performed by the vendor through regularly scheduled reviews of the on-site inventory. The on-site inventory is counted, damaged or outdated goods are removed, and the inventory is restocked to predefined levels.

Inputs:

.		Product from Source: Supplier		The end object of a transformation process that includes physical objects, information or services.
.		Scheduled Receipts from S3.3 Schedule Product Deliveries		Product due to arrive.

Outputs:

.		Receipt Verification to ES.2 Assess Supplier Performance		Acknowledgement that the product received conforms to specified requirements and criteria.
.		Receipt Verification to ES.8 Manage Import/Export Requirements		Acknowledgement that the product received conforms to specified requirements and criteria.

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.		Receipt Verification to ES.1 Manage Sourcing Business Rules		Acknowledgement that the product received conforms to specified requirements and criteria.
.		Receipt Verification to S3.5 Verify Product		Acknowledgement that the product received conforms to specified requirements and criteria.
.		Receipt Verification to ED.8 Manage Import/Export Requirements		Acknowledgement that the product received conforms to specified requirements and criteria.
.		Receipt Verification to ES.6 Manage Incoming Product		Acknowledgement that the product received conforms to specified requirements and criteria.

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S3.5 Verify Product

The process and actions required determining product conformance to requirements and criteria.

Metrics (see Appendix A for metrics attributes):

.		% Orders/ Lines Received Defect Free		The number of orders / lines that are received defect free divided by the total orders / lines processed in the measurement period.
.		Cost to Verify Product		The sum of the costs associated with raw material verification.
.		Verify Product Cycle Time		The average time associated with verifying raw material product

Best Practices:

.		Bar Coding is Used to Minimize Handling Time and Maximize Data Accuracy		- Bar code interface for data collection devices - Generate bar coded receiving documents - Product serial number used as identifier - RFID
.		Deliveries Are Balanced Throughout Each Working Day and Throughout the Week		None identified
.		Supplier Certification Programs Are Used to Reduce (Skip Lot) or Eliminate Receiving Inspection		Skip lot/sampling inspection logic
.		Supplier Delivers Directly to Point of Use		Electronic Tag tracking to Point of Use (POU) destination
.		Supplier Replaces Defective Material at Customer's Facility with Good Product as Required		Electronic Tag tracking to Point of Use (POU) destination

Inputs:

.		Receipt Verification from S3.4 Receive Product		Acknowledgement that the product received conforms to specified requirements and criteria.

Outputs:

.		Receipt Verification to S3.6 Transfer Product		Acknowledgement that the product received conforms to specified requirements and criteria.
.		Receipt Verification to ES.2 Assess Supplier Performance		Acknowledgement that the product received conforms to specified requirements and criteria.
.		Receipt Verification to ES.1 Manage Sourcing Business Rules		Acknowledgement that the product received conforms to specified requirements and criteria.

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S3.6 Transfer Product

The transfer of accepted product to the appropriate stocking location within the supply chain. This includes all of the activities associated with repackaging, staging, transferring, and stocking product.

Metrics (see Appendix A for metrics attributes):

.		% Product Transferred On-Time to Demand Requirement		The number of product orders / lines that are transferred on-time to demand requirements divided by the total orders / lines transferred in the measurement period
.		% Product Transferred without Transaction Errors		The number of transactions processed without error divided by the total transactions processed in the measurement period
.		Cost to Transfer Product		The sum of the costs associated with transferring product to Make or Deliver processes
.		Inventory Days of Supply		Five point annual average of the sum of all gross inventories (raw materials & WIP, plant FG, field FG, field samples, other) ÷ (COGS ÷ 365). Total gross value of inventory at standard cost before reserves for excess and obsolescence. Only includes inventory on company books, future liabilities should not be included
.		Transfer Product Cycle Time		The average time associated transfer until product is moved to the next process.

Best Practices:

.		Capability Transfer to Organization		None identified
.		Drive Deliveries Directly to Stock or Point-Of-Use in Manufacturing to Reduce Costs and Cycle Time		Pay on receipt Specify delivery location and time (to the minute) Specify delivery sequence

Inputs:

.		Finished Goods Inventory Location from ED.4 Manage Finished Goods Inventories		The physical storage location where Finished Product inventory is held in stock prior to use or shipment.
.		Product Inventory Location from ES.4 Manage Product Inventory		The physical storage location where product inventory is held in stock prior to use or shipment.
.		Receipt Verification from S3.5 Verify Product		Acknowledgement that the product received conforms to specified requirements and criteria.
.		Replenishment Signal from M3.3 Issue Sourced/In-Process Product		Any signal that indicates when to produce or transport Items in a pull replenishment system.
.		Replenishment Signal from M2.2 Issue Sourced/In-Process Product		Any signal that indicates when to produce or transport Items in a pull replenishment system.
.		Replenishment Signal from D1.3 Reserve Inventory & Determine Delivery Date		Any signal that indicates when to produce or transport Items in a pull replenishment system.
.		Replenishment Signal from M1.2 Issue Material		Any signal that indicates when to produce or transport Items in a pull replenishment system.
.		WIP Inventory Location from EM.6 Manage Transportation		Location of inventory that is specified as “work in progress“. This can be intermediate storage in a manufacturing facility prior to final packaging or can be a class of materials waiting final transformation to finished products.

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Outputs:

.		Existing Inventory Data to ES.4 Manage Product Inventory		Available data that characterizes and quantifies raw material, work in process, and finished goods inventories
.		Inventory Availability to D3.9 Pick Product		Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts).
.		Inventory Availability to P2.2 Identify, Assess, And Aggregate Product Resources		Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts).
.		Inventory Availability to M2.2 Issue Sourced/In-Process Product		Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts).
.		Inventory Availability to M1.2 Issue Material		Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts).
.		Inventory Availability to M3.3 Issue Sourced/In-Process Product		Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts).
.		Transferred Product to S3.7 Authorize Supplier Payment		Product being tranferred to the appropriate stocking location within the supply chain.

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S3.7 Authorize Supplier Payment

The process of authorizing payments and paying suppliers for product or services. This process includes invoice collection, invoice matching and the issuance of checks.

Metrics (see Appendix A for metrics attributes):

.		Authorize Supplier Payment Cycle Time		The average time associated with authorizing payment to suppliers.
.		Cost to Authorize Supplier Payment		The sum of the costs associated with authorizing supplier payment.

Best Practices:

.		Pay on Receipt		Electronic Invoice Processing

Inputs:

.		Payment Terms from ES.9 Manage Supplier Agreements		The process of authorizing payments and paying suppliers for product or services. This process includes invoice collection, invoice matching and the issuance of checks.
.		Transferred Product from S3.6 Transfer Product		Product being tranferred to the appropriate stocking location within the supply chain.

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ES Enable SOURCE

Enable Processes prepare, maintain, or manage information or relationships on which planning and execution processes rely.

The Category ES includes nine Level 3 Elements:

ES.1 Manage Sourcing Business Rules	The process of defining requirements and establishing, maintaining and enforcing decision support criteria, in alignment with business strategy, goals and objectives. The business strategy defines the criteria for sourcing business rules that are translated into guidelines and policies for conducting business within the enterprise and other legal entities. Sourcing business rules include: supplier selection and negotiation processes, fulfillment and delivery performance and relationship definition for specific levels of collaboration and partnership.
ES.2 Assess Supplier Performance	The process of measuring actual supplier performance against internal and/or external standards, providing feedback to achieve and maintain the performance required to meet the customers' business and/or competitive needs.
ES.3 Maintain Source Data	The process of collecting, sorting, defining hierarchy and managing configuration control of supplier information and source data that are required to make sourcing and related planning and manufacturing decisions. Source data to be maintained includes supplier profile data, financials, quality and delivery performance, spend analysis at various levels of the enterprise, from major business units to material part number.
ES.4 Manage Product Inventory	The process of establishing and maintaining physical inventories and inventory information. This includes warehouse management, cycle counting, physical inventories and inventory reconciliation. For Services, this may include tracking the number of service providers and the financial resources committed at any given point in time.
ES.5 Manage Capital Assets	The process of acquiring, maintaining and dispositioning an organization's <capital assets> located at a supplier's facility and/or outside source, which are used to operate the supply chain.
ES.6 Manage Incoming Product	The process of defining and maintaining the information that characterizes inbound logistics management of all supplier deliveries, including both physical and electronic goods and services. This includes carrier selection and management, tracking deliveries and import.
ES.7 Manage Supplier Network	The process of defining and maintaining a unique network of suppliers to deliver a specific product set. This includes establishment of a new supplier or maintaining an existing supplier and all the tasks and activities associated with identifying and qualifying the supplier and finalizing on the sourcing terms and conditions. Also, the management of a supplier certification process, which includes certifying new suppliers and maintaining the current status of existing suppliers.
ES.8 Manage Import/Export Requirements	The process of identifying and complying with import/export regulatory documentation and process standards set by external entities (e.g., government).
ES.9 Manage Supplier Agreements	The management of existing purchase orders or supplier contracts. This includes managing volume/step pricing, resolving issues, enforcing terms and conditions and maintaining an accurate status for existing purchase orders or contracts. Also, the management of a supplier certification process, which includes certifying new suppliers and maintaining the current status of existing suppliers.

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ES.1 Manage Sourcing Business Rules

The process of defining requirements and establishing, maintaining and enforcing decision support criteria, in alignment with business strategy, goals and objectives. The business strategy defines the criteria for sourcing business rules that are translated into guidelines and policies for conducting business within the enterprise and other legal entities. Sourcing business rules include: supplier selection and negotiation processes, fulfillment and delivery performance and relationship definition for specific levels of collaboration and partnership.

Metrics (see Appendix A for metrics attributes):

.		Cost to Manage Sourcing Business Rules		The sum of the costs associated with Source business rules.
.		Manage Sourcing Business Rules Cycle Time		The average time associated with managing source business rules

Best Practices:

.		Collaborative Review and Agreement of Business Rules Prior to Contract Execution		Web based access to current spend data available from enterprise to part level
.		Electronic Sourcing and Negotiation		Business Rules for electronic sourcing process and hierarchy
.		Enterprise Level Policies/Rules with Local Execution		Web based access to enterprise level business rules
.		Enterprise Level Spend Analysis		None identified
.		Long Term Supplier Agreements/Partnerships		Electronic rules for business relationships and transactions: Vendor-managed Inventory Agreements, Fab & Hold Agreements, Just-In-Time Agreements.
.		Optimized Supply-Chain Processes, Optimized Supplier Count, Supplier and Part Rationalization		Web based access to preferred and recommended suppliers, supplier performance data & spend data stratified by commodity, business unit/site, supplier, part type, process type

Inputs:

.		Receipt Verification from S3.5 Verify Product		Acknowledgement that the product received conforms to specified requirements and criteria.
.		Receipt Verification from S2.2 Receive Product		Acknowledgement that the product received conforms to specified requirements and criteria.
.		Receipt Verification from S1.3 Verify Product		Acknowledgement that the product received conforms to specified requirements and criteria.
.		Receipt Verification from S2.3 Verify Product		Acknowledgement that the product received conforms to specified requirements and criteria.
.		Receipt Verification from S1.2 Receive Product		Acknowledgement that the product received conforms to specified requirements and criteria.
.		Receipt Verification from S3.4 Receive Product		Acknowledgement that the product received conforms to specified requirements and criteria.
.		Supplier Data from ES.7 Manage Supplier Network		Data or information about the supplier. This data can be organizational , product, information , financial. Structured supplier data is needed to set up and implement ERP or similar systems.

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Outputs:

.		Business Rules for Return Processes to ES.7 Manage Supplier Network		Rules for conducting business, i.e. developing and maintaining customer and channel performance standards of an return processes such as service levels, given service requirements by supply chain stakeholders/trading partners. Business rules align Return process policies with business strategy, goals, and objectives.
.		Business Rules for Source Processes to ES.4 Manage Product Inventory		Rules that are translated into guidelines and policies for conducting business within the enterprise and other legal entities. Sourcing business rules include: supplier selection and negotiation processes, fulfillment and delivery performance and relationship definition for specific levels of collaboration and partnership.
.		Business Rules for Source Processes to S3.2 Select Final Supplier(s) and Negotiate		Rules that are translated into guidelines and policies for conducting business within the enterprise and other legal entities. Sourcing business rules include: supplier selection and negotiation processes, fulfillment and delivery performance and relationship definition for specific levels of collaboration and partnership.
.		Business Rules for Source Processes to S3.1 Identify Sources of Supply		Rules that are translated into guidelines and policies for conducting business within the enterprise and other legal entities. Sourcing business rules include: supplier selection and negotiation processes, fulfillment and delivery performance and relationship definition for specific levels of collaboration and partnership.

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ES.2 Assess Supplier Performance

The process of measuring actual supplier performance against internal and/or external standards, providing feedback to achieve and maintain the performance required to meet the customers' business and/or competitive needs.

Metrics (see Appendix A for metrics attributes):

.		Assess Supplier Performance Cycle Time		The average time associated with assessing the performance of supplier processes.
.		Cost to Assess Supplier Performance		The sum of the costs associated with assessing supplier performance.

Best Practices:

.		Carrier Agreement		Carrier agreements are agreements between a company and its domestic and global carriers (for both, inbound raw materials and outbound finished goods) specifying service levels, payment terms, and other conditions.
.		Comparative Analysis of Supplier Performance is Used in Sourcing Decisions		Software application with data analysis capability
.		Continuous Improvement and Development is Driven and Measured through the Performance Review Process		None identified
.		Cost Reduction and or Cost Avoidance Are Opportunities Are Identified, Implemented and Measured on a Periodic Basis		None identified
.		Performance Expectations and Business Rules Are Clearly Communicated Prior to the Initiation of Business with the Supplier		Web based access / availability to business rules and performance criteria
.		Supplier "Cost of Nonconformance" Data is Collected, Analyzed and Used in Performance Reporting		Software application to automate data collection and reporting
.		Supplier Performance Assessment System		"Assess Supplier Performance" is the process of measuring actual supplier performance against internal and/or external standards, providing feedback to achieve and maintain the performance required to meet the customers' business and/or competitive needs.
.		Supplier Performance Data is Collected, Analyzed and Reported to Suppliers Online and Real-Time through Extranet Applications		Web based relational database / management application
.		Suppliers Are Evaluated, Selected and Qualified with Criteria Matched to Business Requirements and Competitive Needs		None identified

Inputs:

.		Receipt Verification from S1.2 Receive Product		Acknowledgement that the product received conforms to specified requirements and criteria.
.		Receipt Verification from S3.5 Verify Product		Acknowledgement that the product received conforms to specified requirements and criteria.
.		Receipt Verification from S2.2 Receive Product		Acknowledgement that the product received conforms to specified requirements and criteria.
.		Receipt Verification from S1.3 Verify Product		Acknowledgement that the product received conforms to specified requirements and criteria.

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.	Receipt Verification from S3.4 Receive Product		Acknowledgement that the product received conforms to specified requirements and criteria.
.	Receipt Verification from S2.3 Verify Product		Acknowledgement that the product received conforms to specified requirements and criteria.
.	Supplier Data from ES.7 Manage Supplier Network		Data or information about the supplier. This data can be organizational , product, information , financial. Structured supplier data is needed to set up and implement ERP or similar systems.

Outputs:

.	Quality and Delivery Performance to ES.3 Maintain Source Data		"The process of measuring actual supplier performance against internal and/or external standards, providing feedback to achieve and maintain the performance required to meet the customers' business and/or competitive needs. Or, the extent to which the supplier delivers according to quality specification (e.g. product quality, logistic quality) and to delivery specification (in time, correct packaging etc). Sometimes these two metrics are connected in one."
.	Supplier Performance to S3.3 Schedule Product Deliveries		The results of measuring the actual supplier performance on cost, quality, engineering, purchasing, and so on, based on an agreed set of measurements.
.	Supplier Performance to ES.7 Manage Supplier Network		The results of measuring the actual supplier performance on cost, quality, engineering, purchasing, and so on, based on an agreed set of measurements.
.	Supplier Performance to S1.1 Schedule Product Deliveries		The results of measuring the actual supplier performance on cost, quality, engineering, purchasing, and so on, based on an agreed set of measurements.
.	Supplier Performance to S2.1 Schedule Product Deliveries		The results of measuring the actual supplier performance on cost, quality, engineering, purchasing, and so on, based on an agreed set of measurements.

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ES.3 Maintain Source Data

The process of collecting, sorting, defining hierarchy and managing configuration control of supplier information and source data that are required to make sourcing and related planning and manufacturing decisions. Source data to be maintained includes supplier profile data, financials, quality and delivery performance, spend analysis at various levels of the enterprise, from major business units to material part number.

Metrics (see Appendix A for metrics attributes):

.		Cost to Maintain Source Data		The sum of the costs associated with maintaining supplier data.
.		Maintain Source Data Cycle Time		The average time associated with maintaining source data

Best Practices:

.		Automated Update of Supplier Performance Information		None identified
.		Data Accessibility across the Enterprise for Visibility by Discrete Business Units		Web based access to various levels of enterprise data
.		On Demand Access of Supplier/Source Data		Web based access to current supplier/source data
.		Supplier and Material Rationalization		Web based access to supplier/source data

Inputs:

.		Quality and Delivery Performance from ES.2 Assess Supplier Performance		"The process of measuring actual supplier performance against internal and/or external standards, providing feedback to achieve and maintain the performance required to meet the customers' business and/or competitive needs. Or, the extent to which the supplier delivers according to quality specification (e.g. product quality, logistic quality) and to delivery specification (in time, correct packaging etc). Sometimes these two metrics are connected in one."
.		Sourcing Plans from P2.4 Establish Sourcing Plans		An aggregate material requirements plan used to schedule material deliveries to meet production plan.
.		Supplier Data from ES.7 Manage Supplier Network		Data or information about the supplier. This data can be organizational , product, information , financial. Structured supplier data is needed to set up and implement ERP or similar systems.

Outputs:

.		Current Inventory Source Data to ES.7 Manage Supplier Network		Data which will provide measurement of actual supplier performance against internal and or external standards to provide feedback to achieve and maintain the performance required to meet the customer's needs.
.		Current Inventory Source Data to S3.2 Select Final Supplier(s) and Negotiate		Data which will provide measurement of actual supplier performance against internal and or external standards to provide feedback to achieve and maintain the performance required to meet the customer's needs.
.		Current Inventory Source Data to S3.1 Identify Sources of Supply		Data which will provide measurement of actual supplier performance against internal and or external standards to provide feedback to achieve and maintain the performance required to meet the customer's needs.
.		Current Inventory Source Data to ED.7		Data which will provide measurement of actual supplier performance

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		Manage Product Life Cycle		against internal and or external standards to provide feedback to achieve and maintain the performance required to meet the customer's needs.

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ES.4 Manage Product Inventory

The process of establishing and maintaining physical inventories and inventory information. This includes warehouse management, cycle counting, physical inventories and inventory reconciliation. For Services, this may include tracking the number of service providers and the financial resources committed at any given point in time.

Metrics (see Appendix A for metrics attributes):

.		Cost to Manage Product Inventory		The sum of the Cost to Manage Product Inventory
.		Inventory Days of Supply		Five point annual average of the sum of all gross inventories (raw materials & WIP, plant FG, field FG, field samples, other) ÷ (COGS ÷ 365). Total gross value of inventory at standard cost before reserves for excess and obsolescence. Only includes inventory on company books, future liabilities should not be included
.		Manage Product Inventory Cycle Time		The average time associated with managing raw material inventory

Best Practices:

.		Periodic Review of Metrics and Strategy with Comparisons to Industry Benchmarks		Real time view of data.
.		Real Time Data on Current Status		Dynamic calculation of safety stock based on actual sales.
.		Statistical Test Count		The Statistical Test Count (STC) process is a method of validating inventory on-hand values by physically counting and reconciling a statistical sample of the entire inventory population. This sample is then extrapolated across the inventory population, which provides an indicative measure of entire inventory population. Furthermore, with extrapolation the net and gross percentage of error is determined.
.		Vendor Managed Inventory		VMI is a concept for planning and control of inventory, in which the supplier has access to the customer's inventory data and is responsible for maintaining the inventory level required by the customer. Re-supply is performed by the vendor through regularly scheduled reviews of the on-site inventory. The on-site inventory is counted, damaged or outdated goods are removed, and the inventory is restocked to predefined levels.

Inputs:

.		Business Rules for Source Processes from ES.1 Manage Sourcing Business Rules		Rules that are translated into guidelines and policies for conducting business within the enterprise and other legal entities. Sourcing business rules include: supplier selection and negotiation processes, fulfillment and delivery performance and relationship definition for specific levels of collaboration and partnership.
.		Existing Inventory Data from S2.4 Transfer Product		Available data that characterizes and quantifies raw material, work in process, and finished goods inventories
.		Existing Inventory Data from S3.6 Transfer Product		Available data that characterizes and quantifies raw material, work in process, and finished goods inventories
.		Existing Inventory Data from S1.4 Transfer Product		Available data that characterizes and quantifies raw material, work in process, and finished goods inventories
.		Inventory Availability from S1.4 Transfer Product		Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts).

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.		Inventory Availability from S2.4 Transfer Product		Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts).
.		Parts and Services Consumed from EM.5 Manage Equipment and Facilities		The items and services utilized to manufacture a product.
.		Sourcing Plans from P2.4 Establish Sourcing Plans		An aggregate material requirements plan used to schedule material deliveries to meet production plan.

Outputs:

.		MRO Parts Availability to EM.5 Manage Equipment and Facilities		The on-hand MRO inventory balance minus allocations, reservations, backorders, and (usually) quantities held for quality problems.
.		Product Inventory Location to S2.4 Transfer Product		The physical storage location where product inventory is held in stock prior to use or shipment.
.		Product Inventory Location to S1.4 Transfer Product		The physical storage location where product inventory is held in stock prior to use or shipment.
.		Product Inventory Location to S3.6 Transfer Product		The physical storage location where product inventory is held in stock prior to use or shipment.
.		Product Inventory Target Levels to P2.2 Identify, Assess, And Aggregate Product Resources		The target for the total product inventory, including e.g. raw material, work in progress and finished goods.
.		Supply-Chain Performance Metrics to EP.2 Manage Performance of Supply Chain		Standard measures that indicate how well a supply chain performs within certain categories of performance known as Performance Attributes, e.g. delivery reliability, flexibility and responsiveness, cost, and asset management.

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ES.5 Manage Capital Assets

The process of acquiring, maintaining and dispositioning an organization's <capital assets> located at a supplier's facility and/or outside source, which are used to operate the supply chain.

Metrics (see Appendix A for metrics attributes):

.		Cost to Manage Source Capital Assets		The sum of the Costs to Manage Source Capital Assets
.		Manage Capital Assets Cycle Time		The average time associated with managing capital assets

Best Practices:

.		Changeover Reduction / Continuous Improvement Program		Changeover process flow element identification, instructional directions to conduct changeover, and measurement tool, which can be used to prioritize and track results of improvement efforts. Software to identify operational constraints to the MAKE processes to assist in directing resources toward bottleneck functional areas.
.		Facility & Equipment Environmental / Safety Audit System		System software to list checklist items, report results of audit & forward actions to be taken
.		Removal of Obsolete Capital Assets		Automated Calculation of ABC Velocity Movement
.		Total Preventative Maintenance Program		Automatically generated TPM repair schedules integrated with MRP systems, electronic equipment repair history, parts listings, part stores inventory & reorder points, automatic store room parts purchases, Shop floor access to electronic data base of equipment line drawings, electrical wiring diagrams, parts listing reference guide and part cost lists.

Inputs:

.		Import/Export Requirements from ES.8 Manage Import/Export Requirements		Requirements established by a government or trading areas (i.e EU, NAFTA etc) which must be met before allowing the shipping or delivery of a product across national boundaries.
.		Parts and Services Consumed from EM.5 Manage Equipment and Facilities		The items and services utilized to manufacture a product.
.		Supplier Agreement from ES.9 Manage Supplier Agreements		An agreement between supplier and purchaser to perform or not to perform specific acts or services or to deliver merchandise, such as purchase order or supplier contract.

Outputs:

.		Capital Assets to ES.8 Manage Import/Export Requirements		Physical objects that are held by an organization for its production potential and that costs more than some threshold value (APICS)

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ES.6 Manage Incoming Product

The process of defining and maintaining the information that characterizes inbound logistics management of all supplier deliveries, including both physical and electronic goods and services. This includes carrier selection and management, tracking deliveries and import.

Metrics (see Appendix A for metrics attributes):

.		Cost to Manage Incoming Product		The sum of the costs associated with managing incoming product.
.		Manage Incoming Product Cycle Time		The average time associated with managing inbound raw material

Best Practices:

.		Appointment Scheduling for Pickup and Delivery of Customer Shipments		Transportation Management System (TMS) Maintenance Management
.		Automated Documentation for International Shipments		Transportation Management System (TMS) Maintenance Management
.		Backhaul Trading Exchange		Pooling
.		Capture and Maintain Mode Specific Data		Transportation Management System (TMS) Maintenance Management
.		Electronic Manifest and Electronic Billing		Transportation Management System (TMS) Maintenance Management
.		Integrated Order Management, Warehouse Management, and Transportation Management Systems View for analysis for all orders and shipments the following data: Logistics, Product, Cost, GL Charging		Transportation Management System (TMS) Maintenance Management
.		Internet Pooling (Electronic Brokerage of Shipments)		Rating & Routing
.		Manage Information Across 100% of Shipments		Transportation Management System (TMS) Maintenance Management
.		Measurement of Carrier Performance for On-time Delivery and Completeness		Transportation Management System (TMS) Maintenance Management
.		Real-Time Optimized Shipment Method Selection (Air Parcel, Ground Parcel, LTL, etc.) Based on Customer Service Requirements		Transportation Management System (TMS) Maintenance Management
.		Real-Time Shipment Tracking, (via internet)		Transportation Management System (TMS) Maintenance Management

Inputs:

.		Contract Carrier Rates from ES.8 Manage Import/Export Requirements		The rates charged by a carrier that does not serve the general public, but provides transportation for hire for one or a limited number of shippers under a specific contract.
.		Import/Export Requirements from ES.8 Manage Import/Export Requirements		Requirements established by a government or trading areas (i.e EU, NAFTA etc) which must be met before allowing the shipping or delivery of a product across national boundaries.
.		Receipt Verification from S2.2 Receive Product		Acknowledgement that the product received conforms to specified requirements and criteria.
.		Receipt Verification from S1.2 Receive Product		Acknowledgement that the product received conforms to specified requirements and criteria.
.		Receipt Verification from S3.4 Receive Product		Acknowledgement that the product received conforms to specified requirements and criteria.

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Outputs:

.		Logistics Selection to S2.1 Schedule Product Deliveries		Carrier selection and management for inbound or outbound shipments (linked to terms of delivery)
.		Logistics Selection to S3.3 Schedule Product Deliveries		Carrier selection and management for inbound or outbound shipments (linked to terms of delivery)
.		Logistics Selection to S1.1 Schedule Product Deliveries		Carrier selection and management for inbound or outbound shipments (linked to terms of delivery)

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ES.7 Manage Supplier Network

The process of defining and maintaining a unique network of suppliers to deliver a specific product set. This includes establishment of a new supplier or maintaining an existing supplier and all the tasks and activities associated with identifying and qualifying the supplier and finalizing on the sourcing terms and conditions. Also, the management of a supplier certification process, which includes certifying new suppliers and maintaining the current status of existing suppliers.

Metrics (see Appendix A for metrics attributes):

Cost to Manage Supplier Network	The sum of the costs associated with managing the supplier network.
Manage Supplier Network Cycle Time	The average time associated with managing the supplier network

Best Practices:

Carrier Agreement	Carrier agreements are agreements between a company and its domestic and global carriers (for both, inbound raw materials and outbound finished goods) specifying service levels, payment terms, and other conditions.
Create and Maintain Multiple Suppliers and Multiple Supplier Sites to Record Information about Individuals and Companies from Whom You Want to Purchase Catalogue Goods and Services	None Identified
Electronic Data Interchange Can Be Used To Send Rfqs and Technical Information to and from Potential Suppliers to Determine Supplier Capability to Fulfill Requirements So that They May Be Added to Supplier Network	Electronic Data Interchange
Establishment of Criteria to Rank Suppliers	Utilize supplier delivery, quality, price performance as well as any other criteria such as terms and conditions
Evaluate Supplier Network for Duplicates	Supplier Merge Programs for duplicates
Identification of Suppliers Who Will Participate in Consignment Inventory Programs	Consignment Inventory Management
Identification of Suppliers Who Will Participate in Kanban Programs	Electronic Kanban Support
Identification of Suppliers Who Will Participate in Procurement Split (Two or More Suppliers Sharing Purchase Requirements) Programs	None identified
Identification of Suppliers Who Will Participate in Vendor Managed Inventory (VMI) Programs	Supplier managed inventories with scheduling interfaces to external supplier systems to replenish
Internet Exchanges	Internet Exchanges are a hosted, business-to-business trading network. Exchanges are an open procurement network, accessible to any buyer and focused on new Internet-enabled purchasing models like spot buys or reverse, buyer-driven auctions. Exchanges will also support more traditional catalog-based sales.
On Line Document Management and Automated Supplier Approval Processes Can Reduce the Cycle Time and Costs Associated With Managing Supplier Evaluations and Get Them into the Supplier Network Faster	ERP
On-Line Availability to Supplier Financials to Determine Potential Supplier Viability to be Added to Supplier Network	Internet web sites for financial evaluation

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Supplier Certification Programs Can Reduce the Cycle Time for Certifying Existing Suppliers to Provide New Technologies	None identified
Supplier Certification Programs Can Reduce the Cycle Time for Initial Certification of New Suppliers or Certifying Existing Suppliers that Wish to Provide New Technologies	None identified
Utilize Concurrent Engineering with Suppliers to Allow Them to Provide Engineering and Product Performance Test Data to Qualify as Part of Potential Supplier Network	Internet, EDI, FAX

Inputs:

Business Rules for Return Processes from ES.1 Manage Sourcing Business Rules	Rules for conducting business, i.e. developing and maintaining customer and channel performance standards of an return processes such as service levels, given service requirements by supply chain stakeholders/trading partners. Business rules align Return process policies with business strategy, goals, and objectives.
Current Inventory Source Data from ES.3 Maintain Source Data	Data which will provide measurement of actual supplier performance against internal and or external standards to provide feedback to achieve and maintain the performance required to meet the customer's needs.
Supplier Agreement from ES.9 Manage Supplier Agreements	An agreement between supplier and purchaser to perform or not to perform specific acts or services or to deliver merchandise, such as purchase order or supplier contract.
Supplier Performance from ES.2 Assess Supplier Performance	The results of measuring the actual supplier performance on cost, quality, engineering, purchasing, and so on, based on an agreed set of measurements.

Outputs:

Supplier Data to ES.1 Manage Sourcing Business Rules	Data or information about the supplier. This data can be organizational , product, information , financial. Structured supplier data is needed to set up and implement ERP or similar systems.
Supplier Data to S3.2 Select Final Supplier(s) and Negotiate	Data or information about the supplier. This data can be organizational , product, information , financial. Structured supplier data is needed to set up and implement ERP or similar systems.
Supplier Data to ES.3 Maintain Source Data	Data or information about the supplier. This data can be organizational , product, information , financial. Structured supplier data is needed to set up and implement ERP or similar systems.
Supplier Data to ES.2 Assess Supplier Performance	Data or information about the supplier. This data can be organizational , product, information , financial. Structured supplier data is needed to set up and implement ERP or similar systems.
Supplier Data to ES.9 Manage Supplier Agreements	Data or information about the supplier. This data can be organizational , product, information , financial. Structured supplier data is needed to set up and implement ERP or similar systems.
Supplier Data to S3.1 Identify Sources of Supply	Data or information about the supplier. This data can be organizational , product, information , financial. Structured supplier data is needed to set up and implement ERP or similar systems.

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ES.8 Manage Import/Export Requirements

The process of identifying and complying with import/export regulatory documentation and process standards set by external entities (e.g., government).

Metrics (see Appendix A for metrics attributes):

.		Cost to Manage Import/Export Requirements		The sum of the costs associated with the management of import/export requirements
.		Customs Clearance Cycle Time		The average time associated with clearing an order through customs
.		Manage Import/Export Requirements Cycle Time		The average time associated with managing import/export requirements

Best Practices:

.		Ability to Track Component/Sub-Component Manufacturing Country of Origin		Component/lot tracking (lot trace-ability)
.		Assessing Export/Import Requirements during Time of Product Development/Manufacture		Multi-country Export/Import documentation compliance
.		Direct Connection to Customs Clearance		Electronic documentation submission via EDI and/or internet.
.		Direct Transfer of Documents to Recipient and Forwarder		Electronic documentation submission via EDI and/or internet.
.		Documents Generated Automatically During Shipment Preparation.		Electronic documentation submission via EDI and/or internet.

Inputs:

.		Capital Assets from ES.5 Manage Capital Assets		Physical objects that are held by an organization for its production potential and that costs more than some threshold value (APICS)
.		Parts and Services Consumed from EM.5 Manage Equipment and Facilities		The items and services utilized to manufacture a product.
.		Receipt Verification from S3.4 Receive Product		Acknowledgement that the product received conforms to specified requirements and criteria.
.		Receipt Verification from S2.2 Receive Product		Acknowledgement that the product received conforms to specified requirements and criteria.
.		Receipt Verification from S1.2 Receive Product		Acknowledgement that the product received conforms to specified requirements and criteria.

Outputs:

.		Contract Carrier Rates to ES.6 Manage Incoming Product		The rates charged by a carrier that does not serve the general public, but provides transportation for hire for one or a limited number of shippers under a specific contract.
.		Contract Carrier Rates to ED.6 Manage Transportation		The rates charged by a carrier that does not serve the general public, but provides transportation for hire for one or a limited number of shippers under a specific contract.
.		Import/Export Requirements to ES.5 Manage Capital Assets		Requirements established by a government or trading areas (i.e EU, NAFTA etc) which must be met before allowing the shipping or delivery of a product across national boundaries.

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.		Import/Export Requirements to ES.9 Manage Supplier Agreements		Requirements established by a government or trading areas (i.e EU, NAFTA etc) which must be met before allowing the shipping or delivery of a product across national boundaries.
.		Import/Export Requirements to ES.6 Manage Incoming Product		Requirements established by a government or trading areas (i.e EU, NAFTA etc) which must be met before allowing the shipping or delivery of a product across national boundaries.

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ES.9 Manage Supplier Agreements

The management of existing purchase orders or supplier contracts. This includes managing volume/step pricing, resolving issues, enforcing terms and conditions and maintaining an accurate status for existing purchase orders or contracts. Also, the management of a supplier certification process, which includes certifying new suppliers and maintaining the current status of existing suppliers.

Metrics (see Appendix A for metrics attributes):

.		Cost to Manage Supplier Agreements		The sum of the costs associated with managing supplier agreements.
.		Manage Supplier Agreements Cycle Time		The average time associated with managing supplier agreements

Best Practices:

.		Carrier Agreement		Carrier agreements are agreements between a company and its domestic and global carriers (for both, inbound raw materials and outbound finished goods) specifying service levels, payment terms, and other conditions.
.		Electronic Sourcing and Negotiation		Business Rules for electronic sourcing process and hierarchy
.		Enterprise Level Policies/Rules with Local Execution		Web based access to enterprise level business rules
.		Enterprise Level Spend Analysis		None identified
.		Long Term Supplier Agreements/Partnerships		Electronic rules for business relationships and transactions: Vendor-managed Inventory Agreements, Fab & Hold Agreements, Just-In-Time Agreements.
.		Optimized Supply-Chain Processes, Optimized Supplier Count, Supplier and Part Rationalization		Web based access to preferred and recommended suppliers, supplier performance data & spend data stratified by commodity, business unit/site, supplier, part type, process type

Inputs:

.		Import/Export Requirements from ES.8 Manage Import/Export Requirements		Requirements established by a government or trading areas (i.e EU, NAFTA etc) which must be met before allowing the shipping or delivery of a product across national boundaries.
.		Product On Order from S2.1 Schedule Product Deliveries		Product on order with a selected source.
.		Product On Order from S3.3 Schedule Product Deliveries		Product on order with a selected source.
.		Product On Order from S1.1 Schedule Product Deliveries		Product on order with a selected source.
.		Supplier Agreement from S3.2 Select Final Supplier(s) and Negotiate		An agreement between supplier and purchaser to perform or not to perform specific acts or services or to deliver merchandise, such as purchase order or supplier contract.
.		Supplier Data from ES.7 Manage Supplier Network		Data or information about the supplier. This data can be organizational , product, information , financial. Structured supplier data is needed to set up and implement ERP or similar systems.

Outputs:

.		Payment Terms to S2.5 Authorize Supplier Payment		The process of authorizing payments and paying suppliers for product or services. This process includes invoice collection, invoice matching and the issuance of checks.

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.		Payment Terms to S3.7 Authorize Supplier Payment		The process of authorizing payments and paying suppliers for product or services. This process includes invoice collection, invoice matching and the issuance of checks.
.		Payment Terms to S1.5 Authorize Supplier Payment		The process of authorizing payments and paying suppliers for product or services. This process includes invoice collection, invoice matching and the issuance of checks.
.		Supplier Agreement to ES.5 Manage Capital Assets		An agreement between supplier and purchaser to perform or not to perform specific acts or services or to deliver merchandise, such as purchase order or supplier contract.
.		Supplier Agreement to ES.7 Manage Supplier Network		An agreement between supplier and purchaser to perform or not to perform specific acts or services or to deliver merchandise, such as purchase order or supplier contract.

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M1 Make-to-Stock

The process of manufacturing in a make to stock environment adds value to products through mixing, separating, forming, machining, and chemical processes. Make to stock products are intended to be shipped from finished goods or “off the shelf,“ are completed prior to receipt of a customer order, and are generally produced in accordance with a sales forecast.

The Category M1 includes six Level 3 Elements:

M1.1 Schedule Production Activities	Given plans for the production of specific parts, products, or formulations in specified quantities and planned availability of required sourced products, the scheduling of the operations to be performed in accordance with these plans. Scheduling includes sequencing, and, depending on the factory layout, any standards for setup and run. In general, intermediate production activities are coordinated prior to the scheduling of the operations to be performed in producing a finished product.
M1.2 Issue Material	The selection and physical movement of sourced/in-process product (e.g., raw materials, fabricated components, subassemblies, required ingredients or intermediate formulations) from a stocking location (e.g., stockroom, a location on the production floor, a supplier) to a specific point of use location. Issuing product includes the corresponding system transaction. The Bill of Materials/routing information or recipe/production instructions will determine the products to be issued to support the production operation(s).
M1.3 Produce and Test	The series of activities performed upon sourced/in-process product to convert it from the raw or semi-finished state to a state of completion and greater value. The processes associated with the validation of product performance to ensure conformance to defined specifications and requirements.
M1.4 Package	The series of activities that containerize completed products for storage or sale to end-users. Within certain industries, packaging may include cleaning or sterilization.
M1.5 Stage Product	The movement of packaged products into a temporary holding location to await movement to a finished goods location. Products that are made to order may remain in the holding location to await shipment per the associated customer order. The movement to finished goods is part of the Deliver process.
M1.6 Release Product to Deliver	Activities associated with post-production documentation, testing, or certification required prior to delivery of finished product to customer. Examples include assembly of batch records for regulatory agencies, laboratory tests for potency or purity, creating certificate of analysis, and sign-off by the quality organization.

Metrics (see Appendix A for metrics attributes):

Cash-To-Cash Cycle Time	[Inventory Days of Supply + Days Sales Outstanding - Days Payable Outstanding] The time it takes for an investment made to flow back into a company after it has been spent for raw materials. For services, this represents the time from the point where a company pays for the resources consumed in the performance of a service to the time that the company received payment from the customer for those services.
Cost of Goods Sold	The cost associated with buying raw materials and producing finished goods. This cost includes direct costs (labor, materials) and indirect costs (overhead).
Cost to Make	The sum of the costs associated with make.

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Downside Make Adaptability	The production reduction sustainable at 30 days prior to delivery with no inventory or cost penalties.
Make Cycle Time	The average time associated with Make Processes
Order Fulfillment Cycle Time	The average actual cycle time consistently achieved to fulfill customer orders.
Return on Supply Chain Fixed Assets	Return on Supply Chain Fixed Assets measures the return an organization receives on its invested capital in supply chain fixed assets. This includes the fixed assets used in Plan, Source, Make, Deliver, and Return. The levels of aggregation can be at any element associated with a supply chain asset.
Return on Working Capital	Return on working capital is a measurement which assesses the magnitude of investment relative to a company's working capital position verses the revenue generated from a supply chain. Components include accounts receivable, accounts payable, inventory, supply chain revenue, cost of goods sold and supply chain management costs.
Upside Make Adaptability	The maximum sustainable percentage increase in production that can be achieved in 30 days with the assumption of no raw material constraints.
Upside Make Flexibility	The number of days required to achieve an unplanned sustainable 20% increase in production with the assumption of no raw material constraints.
Yield	The ratio of usable output from a process to its input.

Best Practices:

Accurate and Approved Work Instructions/Process Plans	Electronic document management that maintains current Standard Operating Procedures (SOP)
Accurate and Low Cost Batch/Configuration Records for Warranty and Regulatory Tracking	Electronic batch recording/configuration
Cellular Manufacturing	Manufacturing is broken into work cells
Demand-Pull Manufacturing, Including Active Reduction of Manufacturing Systems Time and WIP Through the Use of Demand-Pull Mechanisms and Visual Controls	Support of demand-pull mechanisms (Kanban, replenishment signals, etc.) based on rate schedules and user-defined minimum/maximum trigger points
Lean Manufacturing	Use a team based systematic approach to identifying and eliminating wasteful, or non-value adding activities within your manufacturing organization
Link Individual Performance to Organizational and Divisional Goals	None identified
Migrate From Build to Stock to Configure to Order; Build Subassemblies to Forecast at the Highest Generic Level in the Bill of Material/Recipe/Formula	None identified
Organize to Enhance Flexibility: Few Job Classifications, Self-Directed Work Force, Flat Management Structure, Cross-Functional Work Teams	Support for modular skills inventory with links to training databases, compensations systems, and operator instructions
Paperless Order Tracking and Customer Visibility of Orders	Electronic dispatch and data collection with external interface to internet.
Paperless Production Order and Inventory Tracking	Electronic dispatch and data collection. Allow customer access to production status and inventories using internet technologies and web site features.
Performance Results that Are Compared to Benchmarks (ie Capacity, Scheduling) and Readily Available to Employees	Data warehouse, report writing, real time database and Executive Information systems that are easily accessible. Use of web-based technologies for dissemination of information.
Posted Performance Results	Data warehouse, report writing, real time data base and EI systems

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Postponement	Postponement (delayed differentiation) is a supply chain concept where a product is kept as long as possible in a generic state. Differentiation of the generic product into a specific end-product is shifted closer to the consumer by postponing identify changes, such as assembly or packaging, to the last possible supply chain location.
Production Level Loading	Capacity planning
Provide Continuous Formal Training to Employees	Examples would be TQM, Six Sigma.
Vendor Managed Inventory	VMI is a concept for planning and control of inventory, in which the supplier has access to the customer's inventory data and is responsible for maintaining the inventory level required by the customer. Re-supply is performed by the vendor through regularly scheduled reviews of the on-site inventory. The on-site inventory is counted, damaged or outdated goods are removed, and the inventory is restocked to predefined levels.

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M1.1 Schedule Production Activities

Given plans for the production of specific parts, products, or formulations in specified quantities and planned availability of required sourced products, the scheduling of the operations to be performed in accordance with these plans. Scheduling includes sequencing, and, depending on the factory layout, any standards for setup and run. In general, intermediate production activities are coordinated prior to the scheduling of the operations to be performed in producing a finished product.

Metrics (see Appendix A for metrics attributes):

.		Capacity Utilization		A measure of how intensively a resource is being used to produce a good or service. Some factors that should be considered are internal manufacturing capacity, constraining processes, direct labor availability and key components/materials availability.
.		Cost to Schedule Production Activities		The sum of the costs associated with scheduling production activities.
.		Schedule Achievement		The percentage of time that a plant achieves its production schedule. This calculation is based on the number of scheduled end-items or total volume for a specific period. Note: over-shipments do not make up for under-shipments.
.		Schedule Production Activities Cycle Time		The average time associated with scheduling production activities

Best Practices:

.		Additional Capacity for Overflow Demand		Outsource manufacturing and work force augmentation providers connected to production schedules via the internet.
.		Cross Training/Certification		HR/certification support
.		Demand-Pull Manufacturing, Including Active Reduction of Manufacturing Systems Time and WIP Through the Use of Demand-Pull Mechanisms and Visual Controls		Support of demand-pull mechanisms (Kanban, replenishment signals, etc.) based on rate schedules and user-defined minimum/maximum trigger points
.		Drum-Buffer-Rope Scheduling Technique		(DBR, also referred to as Synchronous Manufacturing or Constraint Management) A technique used to manage resources to maximize throughput.
.		Maintain Data and System Integrity by Ensuring Production Data, Inventory Levels, and Schedule Requirements Are 99+% Accurate		Detailed production model that synchronizes PLAN and MAKE activities in real time.
.		Produce Products to Unique Customer Specification		Order entry, engineering, and product specifications linked to production order
.		Provide Scheduling Output Back to Material and Labor Planning Systems		Allow dynamic re-synchronization of MAKE activities by tying in real time status information to scheduler
.		Real Time Feedback from Production, Raw Materials, and Finished Goods Inventory and Test Activities		Allow dynamic re-synchronization of MAKE activities by tying in real time status information to scheduler.
.		Schedule Includes Preventative Maintenance Program		Interface between maintenance management system and scheduling system
.		Schedule Minimizes Changeover Costs		Detailed production scheduling model and simulation capabilities
.		Schedule Optimizes Use of Shared Resources Such as Tooling and Production Equipment		Scheduling utilizing optimization techniques. Required production resources included in routing/process instructions
.		Schedule Reflects Current Plant Status (Equipment Availability, Other Jobs and Resource Availability) On Line		Schedule undated by on line reporting and status systems and re-sequence activities

Inputs:

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.		Equipment and Facilities Schedules and Plans from EM.5 Manage Equipment and Facilities		Time-phased plans of present and future load (capacity required) on all resources (Equipment and Facilities) based on the planned and released supply authorizations (i.e., orders) and the planned capacity (capacity available) of these resources over a span of time.
.		Information Feedback from M1.5 Stage Product		The flow of information back into the control system so that actual performance can be compared with planned performance.
.		Information Feedback from M1.4 Package		The flow of information back into the control system so that actual performance can be compared with planned performance.
.		Information Feedback from M1.3 Produce and Test		The flow of information back into the control system so that actual performance can be compared with planned performance.
.		Information Feedback from M1.2 Issue Material		The flow of information back into the control system so that actual performance can be compared with planned performance.
.		Information Feedback from M1.6 Release Product to Deliver		The flow of information back into the control system so that actual performance can be compared with planned performance.
.		Preventative Maintenance and Calibration Schedule from EM.5 Manage Equipment and Facilities		Planned and scheduled activities, including adjustments, replacements, and basic cleanliness, that forestall machine and facility breakdowns. Also, the established frequency to change and maintain parts, based on failure consequences, with frequency set per part or machine type. (Well cared for equipment and facilities will last longer and cause fewer problems.)
.		Production Plans from P3.4 Establish Production Plans		A master production plan used to allocate capacity among manufacturing resources and schedule finite manufacturing activities or executing the performance of a service. Production Plan includes production capability.
.		Scheduled Receipts from S1.1 Schedule Product Deliveries		Product due to arrive.
.		Scheduled Receipts from S3.3 Schedule Product Deliveries		Product due to arrive.
.		Scheduled Receipts from S2.1 Schedule Product Deliveries		Product due to arrive.

Outputs:

.		Production Schedule to P3.2 Identify, Assess, and Aggregate Production Resources		A plan that authorizes the factory to manufacture or repair a certain quantity of a specific item.
.		Production Schedule to S2.1 Schedule Product Deliveries		A plan that authorizes the factory to manufacture or repair a certain quantity of a specific item.
.		Production Schedule to S3.3 Schedule Product Deliveries		A plan that authorizes the factory to manufacture or repair a certain quantity of a specific item.
.		Production Schedule to S1.1 Schedule Product Deliveries		A plan that authorizes the factory to manufacture or repair a certain quantity of a specific item.
.		Production Schedule to D4.2 Receive Product at Store		A plan that authorizes the factory to manufacture or repair a certain quantity of a specific item.
.		Production Schedule to D1.3 Reserve		A plan that authorizes the factory to manufacture or repair a certain

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		Inventory & Determine Delivery Date		quantity of a specific item.
.		Production Schedule to M1.2 Issue Material		A plan that authorizes the factory to manufacture or repair a certain quantity of a specific item.
.		Production Schedule to D1.8 Receive Product from Source or Make		A plan that authorizes the factory to manufacture or repair a certain quantity of a specific item.

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M1.2 Issue Material

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

Metrics (see Appendix A for metrics attributes):

.		Cost to Issue Material		The sum of the costs associated with issuing material.
.		Issue Material Cycle Time		The average time associated with the issuance of material to production

Best Practices:

.		Back Flush Material at Order Completion		Flexible back flush logic
.		Complete Lot History		Inventory by lot of sourced/in-process or discrete order /usage reporting by lot or discrete order
.		Demand-Pull Mechanisms; Kanban Replenishment Signals from Stockroom, Intermediate Products, or Subassembly Area		None identified
.		Electronic Material Move Transactions		Automated process control and/or barcode data collection
.		Strategic Safety Stock of Selected Materials, Items, or Subassemblies to Decouple Sourced Product Issuance Cycle Time from Supplier Lead Time		Use of safety stock algorithms to minimize stock levels.
.		Supplier Delivery to Production Process at Point of Use		EDI link to supplier's sales order and inventory systems

Inputs:

.		Inventory Availability from S1.4 Transfer Product		Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts).
.		Inventory Availability from S3.6 Transfer Product		Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts).
.		Inventory Availability from S2.4 Transfer Product		Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts).
.		Production Schedule from M1.1 Schedule Production Activities		A plan that authorizes the factory to manufacture or repair a certain quantity of a specific item.
.		WIP Handling Rules, Move Information and Methods from EM.4 Manage In-Process Products (WIP)		The rules for handling WIP items in the production and repair process. These rules include the movement and accounting for in-process items between work locations, in inventory, and movement inventory.
.		WIP Location Rules from EM.6 Manage Transportation		The process and rules for establishing and maintaining in-process item inventory ownership and stocking locations.

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Outputs:

.	Workflow to M1.3 Produce and Test		
.	Information Feedback to M1.1 Schedule Production Activities		The flow of information back into the control system so that actual performance can be compared with planned performance.
.	Inventory Availability to D1.3 Reserve Inventory & Determine Delivery Date		Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts).
.	Inventory Availability to P3.2 Identify, Assess, and Aggregate Production Resources		Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts).
.	Product Location Information to EM.6 Manage Transportation		Attributes of the product's storage location.
.	Replenishment Signal to S3.3 Schedule Product Deliveries		Any signal that indicates when to produce or transport Items in a pull replenishment system.
.	Replenishment Signal to S1.4 Transfer Product		Any signal that indicates when to produce or transport Items in a pull replenishment system.
.	Replenishment Signal to S3.6 Transfer Product		Any signal that indicates when to produce or transport Items in a pull replenishment system.
.	Replenishment Signal to S2.4 Transfer Product		Any signal that indicates when to produce or transport Items in a pull replenishment system.
.	Replenishment Signal to S2.1 Schedule Product Deliveries		Any signal that indicates when to produce or transport Items in a pull replenishment system.
.	Replenishment Signal to S1.1 Schedule Product Deliveries		Any signal that indicates when to produce or transport Items in a pull replenishment system.

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M1.3 Produce and Test

The series of activities performed upon sourced/in-process product to convert it from the raw or semi-finished state to a state of completion and greater value. The processes associated with the validation of product performance to ensure conformance to defined specifications and requirements.

Metrics (see Appendix A for metrics attributes):

.		Asset Turns		Total gross product revenue ÷ Total net assets
.		Capacity Utilization		A measure of how intensively a resource is being used to produce a good or service. Some factors that should be considered are internal manufacturing capacity, constraining processes, direct labor availability and key components/materials availability.
.		Cost to Produce and Test		The sum of the costs associated with production and test.
.		Fill Rate		The percentage of ship-from-stock orders shipped within 24 hours of order receipt. For services, this metric is the proportion for services that are filled so that the service is completed within 24 hours
.		Produce and Test Cycle Time		The average time associated with production and test
.		Warranty and Returns		Number of returns within the warranty period. Warranty is a commitment, either expressed or implied, that a certain fact regarding the subject matter of a contract is presently true or will be true.
.		Warranty Costs		Warranty costs include materials, labor and problem diagnosis for product defects.
.		Yield		The ratio of usable output from a process to its input.
.		Yield Variability		The condition that occurs when the output of a process is not consistently repeatable either in quantity, quality, or combination of these.

Best Practices:

.		Accurate and Approved Process Plans/Specifications		Electronic document management
.		Accurate and Low Cost Batch/Configuration Records for Warranty and Regulatory Tracking		Electronic batch recording/configuration
.		Authorize Each Operation to Assess the Quality of the Previous Operations		None identified
.		Design/Upgrade Production Equipment to Maximize Flexibility and Avoid Line Stoppages		Machine productivity and downtime monitoring
.		Just-In-Time Demand Flow Techniques		Demand-pull mechanisms
.		Maintain Accurate Lot/Batch History Information		Electronic data collection of employee actions and sourced/in-process product lot used
.		Measuring Process Metrics and Feedback to Operators		Electronic data collection of completion, quality, scrap, labor and equipment data and dissemination of information on factory floor
.		Paperless Production Control		Electronic dispatch of operations
.		Provide Continuous Formal Training to Employees		Examples would be TQM, Six Sigma.
.		Real Time quality control techniques		Electronic collection of quality data and on-line SPC.
.		Real Time Statistical Control Techniques		Electronic collection of defect data and on-line SPC.
.		Reduce Chances of Operator Error		Automatic download of production equipment with batch recipes/part programs
.		Reduce Non-Value Added Activities, Including Queue, Move, and Set-Up Times		Use principals of Lean Manufacturing.
.		Reduce Non-Value Added Paperwork While Still Measuring Process Metrics		Electronic data collection of completion, quality, lot tractability, scrap, and labor data

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.		Up-to-Date Shop Packet/Specifications		Electronic work instructions

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Inputs:

.	Workflow from M1.2 Issue Material	

Outputs:

.	Workflow to M1.4 Package		
.	Information Feedback to M1.1 Schedule Production Activities		The flow of information back into the control system so that actual performance can be compared with planned performance.

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M1.4 Package

The series of activities that containerize completed products for storage or sale to end-users. Within certain industries, packaging may include cleaning or sterilization.

Metrics (see Appendix A for metrics attributes):

Asset Turns	Total gross product revenue ÷ Total net assets
Capacity Utilization	A measure of how intensively a resource is being used to produce a good or service. Some factors that should be considered are internal manufacturing capacity, constraining processes, direct labor availability and key components/materials availability.
Cost to Package	The sum of the costs associated with product packaging.
Package Cycle Time	
Warranty and Returns	Number of returns within the warranty period. Warranty is a commitment, either expressed or implied, that a certain fact regarding the subject matter of a contract is presently true or will be true.
Warranty Costs	Warranty costs include materials, labor and problem diagnosis for product defects.

Best Practices:

Accurate and Approved Process Plans, Routings, Specifications and Procedures	Electronic document management
Accurate and Low Cost Batch/Configuration Records for Warranty and Regulatory Tracking	Electronic batch recording/configuration
Automatic Label and Seal Verification	Automatic interface to inspection systems
Design/Upgrade Production Equipment to Maximize Flexibility and Avoid Line Stoppages	Machine productivity and downtime monitoring
Minimize Operator Induced Errors	Automatic download of production equipment with setup parameters Graphical display of setup, changeover, or layout
Packaging Operation is an Integral Part of the Overall Production Process	None identified
Paperless Production Control	Electronic dispatch of operations
Postponement and Pre-Kitting Of Accessories into Modular Packages that Allow Flexibility While Maintaining Control	None identified
Reduce Non-Value Added Paperwork While Still Measuring Process Metrics	Electronic data collection of completion, quality, lot tractability, scrap, and labor data
Up-to-Date Shop Packet/Specification for Each Unique Production Event/Demand	Electronic Work Instructions

Inputs:

Workflow from M1.3 Produce and Test

Outputs:

Workflow to M1.5 Stage Product	
Information Feedback to M1.1 Schedule Production Activities	The flow of information back into the control system so that actual performance can be compared with planned performance.

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M1.5 Stage Product

The movement of packaged products into a temporary holding location to await movement to a finished goods location. Products that are made to order may remain in the holding location to await shipment per the associated customer order. The movement to finished goods is part of the Deliver process.

Metrics (see Appendix A for metrics attributes):

.		Cost to Stage Finished Product		The sum of the costs associated with staging finished goods.
.		Stage Finished Product Cycle Time		The average time associated with staging finished product

Best Practices:

.		Direct Ship from Factory to Customer/Channel		Share production status with customers and transportation providers via web-based tools. Auto-Tendering for direct ship utilizing EDI/XML protocols.
.		Electronic Material Move Transactions		Automated process control and/or barcode data collection

Inputs:

.		Workflow from M1.4 Package		
.		Delivery Plans from P4.4 Establish Delivery Plans		A plan for a course of action over specified time periods that involves a projected appropriation of supply resources to meet delivery requirements.
.		Production Plans from P3.4 Establish Production Plans		A master production plan used to allocate capacity among manufacturing resources and schedule finite manufacturing activities or executing the performance of a service. Production Plan includes production capability.

Outputs:

.		Workflow to M1.6 Release Product to Deliver		
.		Information Feedback to M1.1 Schedule Production Activities		The flow of information back into the control system so that actual performance can be compared with planned performance.

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M1.6 Release Product to Deliver

Activities associated with post-production documentation, testing, or certification required prior to delivery of finished product to customer. Examples include assembly of batch records for regulatory agencies, laboratory tests for potency or purity, creating certificate of analysis, and sign-off by the quality organization.

Metrics (see Appendix A for metrics attributes):

.		Cost to Release Finished Product to Deliver		The sum of the costs associated with releasing finished goods to deliver processes.
.		Release Finished Product to Deliver Cycle Time		The average time associated with releasing finished product to deliver

Best Practices:

.		Accurate and Low Cost Batch Records for Regulatory Compliance		Electronic batch records
.		Automated Notification of Laboratory Regarding Sample Availability		Interface between production system and LIMS
.		Review Batch Records by Exception		Electronic batch records linked to process plans/recipes and exceptions flagged

Inputs:

.		Workflow from M1.5 Stage Product

Outputs:

.		Finished Product Release to D4.2 Receive Product at Store		The authorization to ship a finished product that has been ordered.
.		Finished Product Release to D1.8 Receive Product from Source or Make		The authorization to ship a finished product that has been ordered.
.		Information Feedback to M1.1 Schedule Production Activities		The flow of information back into the control system so that actual performance can be compared with planned performance.

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M2 Make-to-Order

The process of manufacturing in a make to order environment adds value to products through mixing, separating, forming, machining, and chemical processes. A make to order environment is one in which products are completed after receipt of a customer order and are built or configured only in response to a customer order.

The Category M2 includes six Level 3 Elements:

M2.1 Schedule Production Activities	Given plans for the production of specific parts, products, or formulations in specified quantities and planned availability of required sourced products, the scheduling of the operations to be performed in accordance with these plans. Scheduling includes sequencing, and, depending on the factory layout, any standards for setup and run. In general, intermediate production activities are coordinated prior to the scheduling of the operations to be performed in producing a finished product.
M2.2 Issue Sourced/In-Process Product	The selection and physical movement of sourced/in-process product (e.g., raw materials, fabricated components, subassemblies, required ingredients or intermediate formulations) from a stocking location (e.g., stockroom, a location on the production floor, a supplier) to a specific point of use location. Issuing product includes the corresponding system transaction. The Bill of Materials/routing information or recipe/production instructions will determine the products to be issued to support the production operation(s).
M2.3 Produce and Test	The series of activities performed upon sourced/in-process product to convert it from the raw or semi-finished state to a state of completion and greater value. The processes associated with the validation of product performance to ensure conformance to defined specifications and requirements.
M2.4 Package	The series of activities that containerize completed products for storage or sale to end-users. Within certain industries, packaging may include cleaning or sterilization.
M2.5 Stage Finished Product	The movement of packaged products into a temporary holding location to await movement to a finished goods location. Products that are made to order may remain in the holding location to await shipment per the associated customer order. The movement to finished goods is part of the Deliver process.
M2.6 Release Finished Product to Deliver	Activities associated with post-production documentation, testing, or certification required prior to delivery of finished product to customer. Examples include assembly of batch records for regulatory agencies, laboratory tests for potency or purity, creating certificate of analysis, and sign-off by the quality organization.

Metrics (see Appendix A for metrics attributes):

Cash-To-Cash Cycle Time	[Inventory Days of Supply + Days Sales Outstanding - Days Payable Outstanding] The time it takes for an investment made to flow back into a company after it has been spent for raw materials. For services, this represents the time from the point where a company pays for the resources consumed in the performance of a service to the time that the company received payment from the customer for those services.
Cost of Goods Sold	The cost associated with buying raw materials and producing finished goods. This cost includes direct costs (labor, materials) and indirect costs (overhead).
Cost to Make	The sum of the costs associated with make.

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Downside Make Adaptability	The production reduction sustainable at 30 days prior to delivery with no inventory or cost penalties.
Inventory Days of Supply (WIP)	Total value of Work in Process ÷ (COGS ÷ 365).
Make Cycle Time	The average time associated with Make Processes
Order Fulfillment Cycle Time	The average actual cycle time consistently achieved to fulfill customer orders.
Perfect Order Fulfillment	The percentage of orders meeting delivery performance with complete and accurate documentation and no delivery damage. Components include all items and quantities on-time using the customer's definition of on-time, and documentation - packing slips, bills of lading, invoices, etc.
Return on Supply Chain Fixed Assets	Return on Supply Chain Fixed Assets measures the return an organization receives on its invested capital in supply chain fixed assets. This includes the fixed assets used in Plan, Source, Make, Deliver, and Return. The levels of aggregation can be at any element associated with a supply chain asset.
Return on Working Capital	Return on working capital is a measurement which assesses the magnitude of investment relative to a company's working capital position verses the revenue generated from a supply chain. Components include accounts receivable, accounts payable, inventory, supply chain revenue, cost of goods sold and supply chain management costs.
Upside Make Adaptability	The maximum sustainable percentage increase in production that can be achieved in 30 days with the assumption of no raw material constraints.
Upside Make Flexibility	The number of days required to achieve an unplanned sustainable 20% increase in production with the assumption of no raw material constraints.
Yield	The ratio of usable output from a process to its input.

Best Practices:

Accurate and Approved Work Instructions/Process Plans	Electronic document management that maintains current Standard Operating Procedures (SOP)
Accurate and Low Cost Batch/Configuration Records for Warranty and Regulatory Tracking	Electronic batch recording/configuration
Build Subassemblies/Products to Forecast at Highest Generic Level to Minimize Make Cycle Time	None identified
Cellular and Demand Pull Manufacturing	Support for cellular and demand pull manufacturing execution
Delivery Schedules Are Collaboratively Developed with Customers	Web-based access to plant scheduling status, collaborative data-sharing environment.
Link Individual Performance to Organizational and Divisional Goals	None identified
Organize to Enhance Flexibility: Few Job Classifications, Self-Directed Work Force, Flat Management Structure, Cross-Functional Work Teams	Support for modular skills inventory with links to training databases, compensations systems, and operator instructions
Paperless Order Tracking and Customer Visibility of Orders	Electronic dispatch and data collection with external interface to internet.
Posted Performance Results	Data warehouse, report writing, real time data base and EI systems
Postponement	Postponement (delayed differentiation) is a supply chain concept where a product is kept as long as possible in a generic state. Differentiation of the generic product into a specific end-product is shifted closer to the consumer by postponing identify changes, such as assembly or packaging, to the last possible supply chain location.
Produce Products to Unique Customer Requirements	Order entry specifications linked to manufacturing order
Production Level Loading	Capacity planning
Provide Continuous Formal Training to Employees	Examples would be TQM, Six Sigma.

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M2.1 Schedule Production Activities

Given plans for the production of specific parts, products, or formulations in specified quantities and planned availability of required sourced products, the scheduling of the operations to be performed in accordance with these plans. Scheduling includes sequencing, and, depending on the factory layout, any standards for setup and run. In general, intermediate production activities are coordinated prior to the scheduling of the operations to be performed in producing a finished product.

Metrics (see Appendix A for metrics attributes):

.		Capacity Utilization		A measure of how intensively a resource is being used to produce a good or service. Some factors that should be considered are internal manufacturing capacity, constraining processes, direct labor availability and key components/materials availability.
.		Cost to Schedule Production Activities		The sum of the costs associated with scheduling production activities.
.		Schedule Achievement		The percentage of time that a plant achieves its production schedule. This calculation is based on the number of scheduled end-items or total volume for a specific period. Note: over-shipments do not make up for under-shipments.
.		Schedule Production Activities Cycle Time		The average time associated with scheduling production activities

Best Practices:

.		Additional Capacity for Overflow Demand		Outsource manufacturing and work force augmentation providers connected to production schedules via the internet.
.		Cross Training/Certification		HR/certification support
.		Demand Pull Mechanisms		Repetitive scheduling and sequencing
.		Demand-Pull Manufacturing, Including Active Reduction of Manufacturing Systems Time and WIP Through the Use of Demand-Pull Mechanisms and Visual Controls		Support of demand-pull mechanisms (Kanban, replenishment signals, etc.) based on rate schedules and user-defined minimum/maximum trigger points
.		Drum-Buffer-Rope Scheduling Technique		(DBR, also referred to as Synchronous Manufacturing or Constraint Management) A technique used to manage resources to maximize throughput.
.		Maintain Data and System Integrity by Ensuring Production Data, Inventory Levels, and Schedule Requirements Are 99+% Accurate		Detailed production model that synchronizes PLAN and MAKE activities in real time.
.		Produce Products to Unique Customer Specification		Order entry, engineering, and product specifications linked to production order
.		Schedule Includes Preventative Maintenance Program		Interface between maintenance management system and scheduling system
.		Schedule Minimizes Changeover Costs		Detailed production scheduling model and simulation capabilities
.		Schedule Optimizes Use of Shared Resources Such as Tooling and Production Equipment		Scheduling utilizing optimization techniques. Required production resources included in routing/process instructions
.		Schedule Reflects Current Plant Status (Equipment Availability, Other Jobs and Resource Availability) On Line		Schedule undated by on line reporting and status systems and re-sequence activities

Inputs:

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.		Equipment and Facilities Schedules and Plans from EM.5 Manage Equipment and Facilities		Time-phased plans of present and future load (capacity required) on all resources (Equipment and Facilities) based on the planned and released supply authorizations (i.e., orders) and the planned capacity (capacity available) of these resources over a span of time.
.		Information Feedback from M2.2 Issue Sourced/In-Process Product		The flow of information back into the control system so that actual performance can be compared with planned performance.
.		Information Feedback from M2.5 Stage Finished Product		The flow of information back into the control system so that actual performance can be compared with planned performance.
.		Information Feedback from M2.4 Package		The flow of information back into the control system so that actual performance can be compared with planned performance.
.		Information Feedback from M2.3 Produce and Test		The flow of information back into the control system so that actual performance can be compared with planned performance.
.		Information Feedback from M2.6 Release Finished Product to Deliver		The flow of information back into the control system so that actual performance can be compared with planned performance.
.		Preventative Maintenance and Calibration Schedule from EM.5 Manage Equipment and Facilities		Planned and scheduled activities, including adjustments, replacements, and basic cleanliness, that forestall machine and facility breakdowns. Also, the established frequency to change and maintain parts, based on failure consequences, with frequency set per part or machine type. (Well cared for equipment and facilities will last longer and cause fewer problems.)
.		Production Plans from P3.4 Establish Production Plans		A master production plan used to allocate capacity among manufacturing resources and schedule finite manufacturing activities or executing the performance of a service. Production Plan includes production capability.
.		Scheduled Receipts from S1.1 Schedule Product Deliveries		Product due to arrive.
.		Scheduled Receipts from S2.1 Schedule Product Deliveries		Product due to arrive.
.		Scheduled Receipts from S3.3 Schedule Product Deliveries		Product due to arrive.

Outputs:

.		Production Schedule to D2.9 Pick Product		A plan that authorizes the factory to manufacture or repair a certain quantity of a specific item.
.		Production Schedule to M2.2 Issue Sourced/In-Process Product		A plan that authorizes the factory to manufacture or repair a certain quantity of a specific item.
.		Production Schedule to P3.2 Identify, Assess, and Aggregate Production Resources		A plan that authorizes the factory to manufacture or repair a certain quantity of a specific item.
.		Production Schedule to S1.1 Schedule Product Deliveries		A plan that authorizes the factory to manufacture or repair a certain quantity of a specific item.
.		Production Schedule to D2.3 Reserve Resources & Determine Delivery Date		A plan that authorizes the factory to manufacture or repair a certain quantity of a specific item.
.		Production Schedule to S3.3 Schedule		A plan that authorizes the factory to manufacture or repair a certain

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		Product Deliveries		quantity of a specific item.
.		Production Schedule to S2.1 Schedule Product Deliveries		A plan that authorizes the factory to manufacture or repair a certain quantity of a specific item.

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M2.2 Issue Sourced/In-Process Product

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

Metrics (see Appendix A for metrics attributes):

.		Cost to Issue Sourced/In-Process Product		The sum of the costs associated with issuing sourced or in-process material.
.		Issue Sourced/In-Process Product Cycle Time		The average time associated with the issuance of material to production

Best Practices:

.		Back Flush Material at Order Completion		Flexible back flush logic
.		Complete Lot History		Inventory by lot of sourced/in-process or discrete order /usage reporting by lot or discrete order
.		Demand-Pull Mechanisms; Kanban Replenishment Signals from Stockroom, Intermediate Products, or Subassembly Area		None identified
.		Electronic Material Move Transactions		Automated process control and/or barcode data collection
.		Strategic Safety Stock of Selected Materials, Items, or Subassemblies to Decouple Sourced Product Issuance Cycle Time from Supplier Lead Time		Use of safety stock algorithms to minimize stock levels.
.		Supplier Delivery to Production Process at Point of Use		EDI link to supplier's sales order and inventory systems

Inputs:

.		Inventory Availability from S1.4 Transfer Product		Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts).
.		Inventory Availability from S2.4 Transfer Product		Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts).
.		Inventory Availability from S3.6 Transfer Product		Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts).
.		Production Schedule from M2.1 Schedule Production Activities		A plan that authorizes the factory to manufacture or repair a certain quantity of a specific item.
.		WIP Handling Rules, Move Information and Methods from EM.4 Manage In-Process Products (WIP)		The rules for handling WIP items in the production and repair process. These rules include the movement and accounting for in-process items between work locations, in inventory, and movement inventory.
.		WIP Location Rules from EM.6 Manage		The process and rules for establishing and maintaining in-process

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		Transportation		item inventory ownership and stocking locations.

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Outputs:

.		Information Feedback to M2.1 Schedule Production Activities		The flow of information back into the control system so that actual performance can be compared with planned performance.
.		Inventory Availability to D2.9 Pick Product		Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts).
.		Inventory Availability to P3.2 Identify, Assess, and Aggregate Production Resources		Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts).
.		Product Location Information to EM.6 Manage Transportation		Attributes of the product's storage location.
.		Production Schedule to M2.3 Produce and Test		A plan that authorizes the factory to manufacture or repair a certain quantity of a specific item.
.		Replenishment Signal to S1.1 Schedule Product Deliveries		Any signal that indicates when to produce or transport Items in a pull replenishment system.
.		Replenishment Signal to S2.1 Schedule Product Deliveries		Any signal that indicates when to produce or transport Items in a pull replenishment system.
.		Replenishment Signal to S3.6 Transfer Product		Any signal that indicates when to produce or transport Items in a pull replenishment system.
.		Replenishment Signal to S3.3 Schedule Product Deliveries		Any signal that indicates when to produce or transport Items in a pull replenishment system.
.		Replenishment Signal to S2.4 Transfer Product		Any signal that indicates when to produce or transport Items in a pull replenishment system.
.		Replenishment Signal to S1.4 Transfer Product		Any signal that indicates when to produce or transport Items in a pull replenishment system.
.		Source Execution Data to S2.1 Schedule Product Deliveries		Data which will provide measurement of actual supplier performance against internal and or external standards to provide feedback to achieve and maintain the performance required to meet the customer's needs.

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M2.3 Produce and Test

The series of activities performed upon sourced/in-process product to convert it from the raw or semi-finished state to a state of completion and greater value. The processes associated with the validation of product performance to ensure conformance to defined specifications and requirements.

Metrics (see Appendix A for metrics attributes):

.		Asset Turns		Total gross product revenue ÷ Total net assets
.		Capacity Utilization		A measure of how intensively a resource is being used to produce a good or service. Some factors that should be considered are internal manufacturing capacity, constraining processes, direct labor availability and key components/materials availability.
.		Cost to Produce and Test		The sum of the costs associated with production and test.
.		Produce and Test Cycle Time		The average time associated with production and test
.		Warranty Costs		Warranty costs include materials, labor and problem diagnosis for product defects.
.		Yield		The ratio of usable output from a process to its input.
.		Yield Variability		The condition that occurs when the output of a process is not consistently repeatable either in quantity, quality, or combination of these.

Best Practices:

.		Accurate and Approved Process Plans/Specifications		Electronic document management
.		Accurate and Low Cost Batch/Configuration Records for Warranty and Regulatory Tracking		Electronic batch recording/configuration
.		Authorize Each Operation to Assess the Quality of the Previous Operations		None identified
.		Design/Upgrade Production Equipment to Maximize Flexibility and Avoid Line Stoppages		Machine productivity and downtime monitoring
.		Just-In-Time Demand Flow Techniques		Demand-pull mechanisms
.		Maintain Accurate Lot/Batch History Information		Electronic data collection of employee actions and sourced/in-process product lot used
.		Paperless Production Control		Electronic dispatch of operations
.		Real Time quality control techniques		Electronic collection of qualityt data and on-line SPC.
.		Real Time Statistical Control Techniques		Electronic collection of defect data and on-line SPC.
.		Reduce Chances of Operator Error		Automatic download of production equipment with batch recipes/part programs
.		Reduce Non-Value Added Activities, Including Queue, Move, and Set-Up Times		Use principals of Lean Manufacturing.
.		Reduce Non-Value Added Paperwork While Still Measuring Process Metrics		Electronic data collection of completion, quality, lot tractability, scrap, and labor data
.		Up-to-Date Shop Packet/Specifications		Electronic work instructions

Outputs:

.		Workflow to M2.4 Package		
.		Information Feedback to M2.1 Schedule Production Activities		The flow of information back into the control system so that actual performance can be compared with planned performance.

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M2.4 Package

The series of activities that containerize completed products for storage or sale to end-users. Within certain industries, packaging may include cleaning or sterilization.

Metrics (see Appendix A for metrics attributes):

.	Asset Turns		Total gross product revenue ÷ Total net assets
.	Capacity Utilization		A measure of how intensively a resource is being used to produce a good or service. Some factors that should be considered are internal manufacturing capacity, constraining processes, direct labor availability and key components/materials availability.
.	Cost to Package		The sum of the costs associated with product packaging.
.	Package Cycle Time		
.	Warranty Costs		Warranty costs include materials, labor and problem diagnosis for product defects.

Best Practices:

.	Accurate and Approved Process Plans, Routings, Specifications and Procedures		Electronic document management
.	Accurate and Low Cost Batch/Configuration Records for Warranty and Regulatory Tracking		Electronic batch recording/configuration
.	Automatic Label and Seal Verification		Automatic interface to inspection systems
.	Design/Upgrade Production Equipment to Maximize Flexibility and Avoid Line Stoppages		Machine productivity and downtime monitoring
.	Minimize Operator Induced Errors		Automatic download of production equipment with setup parameters Graphical display of setup, changeover, or layout
.	Packaging Operation is an Integral Part of the Overall Production Process		None identified
.	Paperless Production Control		Electronic dispatch of operations
.	Postponement and Pre-Kitting Of Accessories into Modular Packages that Allow Flexibility While Maintaining Control		None identified
.	Reduce Non-Value Added Paperwork While Still Measuring Process Metrics		Electronic data collection of completion, quality, lot tractability, scrap, and labor data
.	Up-to-Date Shop Packet/Specification for Each Unique Production Event/Demand		Electronic Work Instructions

Inputs:

.	Workflow from M2.3 Produce and Test

Outputs:

.	Workflow to M2.5 Stage Finished Product		
.	Information Feedback to M2.1 Schedule Production Activities		The flow of information back into the control system so that actual performance can be compared with planned performance.

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M2.5 Stage Finished Product

The movement of packaged products into a temporary holding location to await movement to a finished goods location. Products that are made to order may remain in the holding location to await shipment per the associated customer order. The movement to finished goods is part of the Deliver process.

Metrics (see Appendix A for metrics attributes):

.		Cost to Stage Finished Product		The sum of the costs associated with staging finished goods.
.		Stage Finished Product Cycle Time		The average time associated with staging finished product

Best Practices:

.		Direct Ship from Factory to Customer/Channel		Share production status with customers and transportation providers via web-based tools. Auto-Tendering for direct ship utilizing EDI/XML protocols.
.		Electronic Material Move Transactions		Automated process control and/or barcode data collection

Inputs:

.		Workflow from M2.4 Package		
.		Delivery Plans from P4.4 Establish Delivery Plans		A plan for a course of action over specified time periods that involves a projected appropriation of supply resources to meet delivery requirements.
.		Production Plans from P3.4 Establish Production Plans		A master production plan used to allocate capacity among manufacturing resources and schedule finite manufacturing activities or executing the performance of a service. Production Plan includes production capability.

Outputs:

.		Workflow to M2.6 Release Finished Product to Deliver		
.		Information Feedback to M2.1 Schedule Production Activities		The flow of information back into the control system so that actual performance can be compared with planned performance.

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M2.6 Release Finished Product to Deliver

Activities associated with post-production documentation, testing, or certification required prior to delivery of finished product to customer. Examples include assembly of batch records for regulatory agencies, laboratory tests for potency or purity, creating certificate of analysis, and sign-off by the quality organization.

Metrics (see Appendix A for metrics attributes):

.		Cost to Release Finished Product to Deliver		The sum of the costs associated with releasing finished goods to deliver processes.
.		Release Finished Product to Deliver Cycle Time		The average time associated with releasing finished product to deliver

Best Practices:

.		Accurate and Low Cost Batch Records for Regulatory Compliance		Electronic batch records
.		Automated Notification of Laboratory Regarding Sample Availability		Interface between production system and LIMS
.		Review Batch Records by Exception		Electronic batch records linked to process plans/recipes and exceptions flagged

Inputs:

.		Workflow from M2.5 Stage Finished Product

Outputs:

.		Finished Product Release to D2.9 Pick Product		The authorization to ship a finished product that has been ordered.
.		Information Feedback to M2.1 Schedule Production Activities		The flow of information back into the control system so that actual performance can be compared with planned performance.

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M3 Engineer-to-Order

The process of manufacturing distinct items, such as parts that retain their identity through the transformation process and are intended to be completed after receipt of a customer order. While Make to Order includes standard products built only in response to a customer order or products configured in response to a customer order, Engineer to Order includes custom products that are designed, developed, and manufactured in response to a specific customer request.

The Category M3 includes seven Level 3 Elements:

M3.1 Finalize Production Engineering	Engineering activities required after acceptance of order, but before product can be produced. May include generation and delivery of final drawings, specifications, formulas, part programs, etc. In general, the last step in the completion of any preliminary engineering work done as part of the quotation process.
M3.2 Schedule Production Activities	Given plans for the production of specific parts, products, or formulations in specified quantities and planned availability of required sourced products, the scheduling of the operations to be performed in accordance with these plans. Scheduling includes sequencing, and, depending on the factory layout, any standards for setup and run. In general, intermediate production activities are coordinated prior to the scheduling of the operations to be performed in producing a finished product.
M3.3 Issue Sourced/In-Process Product	The selection and physical movement of sourced/in-process product (e.g., raw materials, fabricated components, subassemblies, required ingredients or intermediate formulations) from a stocking location (e.g., stockroom, a location on the production floor, a supplier) to a specific point of use location. Issuing product includes the corresponding system transaction. The Bill of Materials/routing information or recipe/production instructions will determine the products to be issued to support the production operation(s).
M3.4 Produce and Test	The series of activities performed upon sourced/in-process product to convert it from the raw or semi-finished state to a state of completion and greater value. The processes associated with the validation of product performance to ensure conformance to defined specifications and requirements.
M3.5 Package	The series of activities that containerize completed products for storage or sale to end-users. Within certain industries, packaging may include cleaning or sterilization.
M3.6 Stage Finished Product	The movement of packaged products into a temporary holding location to await movement to a finished goods location. Products that are made to order may remain in the holding location to await shipment per the associated customer order. The movement to finished goods is part of the Deliver process.
M3.7 Release Product to Deliver	Activities associated with post-production documentation, testing, or certification required prior to delivery of finished product to customer. Examples include assembly of batch records for regulatory agencies, laboratory tests for potency or purity, creating certificate of analysis, and sign-off by the quality organization.

Metrics (see Appendix A for metrics attributes):

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Cash-To-Cash Cycle Time	[Inventory Days of Supply + Days Sales Outstanding - Days Payable Outstanding] The time it takes for an investment made to flow back into a company after it has been spent for raw materials. For services, this represents the time from the point where a company pays for the resources consumed in the performance of a service to the time that the company received payment from the customer for those services.
Cost of Goods Sold	The cost associated with buying raw materials and producing finished goods. This cost includes direct costs (labor, materials) and indirect costs (overhead).
Cost to Make	The sum of the costs associated with make.
Downside Make Adaptability	The production reduction sustainable at 30 days prior to delivery with no inventory or cost penalties.
Inventory Days of Supply (WIP)	Total value of Work in Process ÷ (COGS ÷ 365).
Make Cycle Time	The average time associated with Make Processes
Order Fulfillment Cycle Time	The average actual cycle time consistently achieved to fulfill customer orders.
Return on Supply Chain Fixed Assets	Return on Supply Chain Fixed Assets measures the return an organization receives on its invested capital in supply chain fixed assets. This includes the fixed assets used in Plan, Source, Make, Deliver, and Return. The levels of aggregation can be at any element associated with a supply chain asset.
Return on Working Capital	Return on working capital is a measurement which assesses the magnitude of investment relative to a company's working capital position verses the revenue generated from a supply chain. Components include accounts receivable, accounts payable, inventory, supply chain revenue, cost of goods sold and supply chain management costs.
Upside Make Adaptability	The maximum sustainable percentage increase in production that can be achieved in 30 days with the assumption of no raw material constraints.
Upside Make Flexibility	The number of days required to achieve an unplanned sustainable 20% increase in production with the assumption of no raw material constraints.
Yield	The ratio of usable output from a process to its input.

Best Practices:

Cellular Manufacturing	Manufacturing is broken into work cells
Delivery Schedules Are Collaboratively Developed with Customers	Web-based access to plant scheduling status, collaborative data-sharing environment.
Demand-Pull Manufacturing, Including Active Reduction of Manufacturing Systems Time and WIP Through the Use of Demand-Pull Mechanisms and Visual Controls	Support of demand-pull mechanisms (Kanban, replenishment signals, etc.) based on rate schedules and user-defined minimum/maximum trigger points
Organize to Enhance Flexibility: Few Job Classifications, Self-Directed Work Force, Flat Management Structure, Cross-Functional Work Teams	Support for modular skills inventory with links to training databases, compensations systems, and operator instructions
Paperless Order Tracking and Customer Visibility of Orders	Electronic dispatch and data collection with external interface to internet.
Posted Performance Results	Data warehouse, report writing, real time data base and EI systems
Product Design Collaboration with Customers	On-line design tools facilitated by internet connections.

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M3.1 Finalize Production Engineering

Engineering activities required after acceptance of order, but before product can be produced. May include generation and delivery of final drawings, specifications, formulas, part programs, etc. In general, the last step in the completion of any preliminary engineering work done as part of the quotation process.

Metrics (see Appendix A for metrics attributes):

.		Cost to Finalize Production Engineering		The sum of the costs associated with finalizing production engineering.
.		ECO Cost		
.		Finalize Production Engineering Cycle Time		The average time associated with the finalization of production engineering

Best Practices:

.		Automated Configuration Management		Configuration
.		Automated Conversion of Engineering Drawings into Product Specifications		None identified

Inputs:

.		Engineering Design from Source: Company		Final drawings, specifications, formulas, part programs, etc.that describe requirements of a product. The design process consists of translating a set of functional requirements into an operational product, process, or service.
.		Order Information from D3.3 Enter Order, Commit Resources & Launch Program		The function encompasses receiving and entering all data necessary on orders, so the order can be finalized and entered into the order system.

Outputs:

.		Methods, Procedures, Processes to M3.2 Schedule Production Activities		Methods, procedures and processes required to produce distinct items, such as parts that retain their identity through the transformation process and are intended to be completed after receipt of a customer order, including custom products that are designed, developed, and produced in response to a specific customer request.

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M3.2 Schedule Production Activities

Given plans for the production of specific parts, products, or formulations in specified quantities and planned availability of required sourced products, the scheduling of the operations to be performed in accordance with these plans. Scheduling includes sequencing, and, depending on the factory layout, any standards for setup and run. In general, intermediate production activities are coordinated prior to the scheduling of the operations to be performed in producing a finished product.

Metrics (see Appendix A for metrics attributes):

.		Capacity Utilization		A measure of how intensively a resource is being used to produce a good or service. Some factors that should be considered are internal manufacturing capacity, constraining processes, direct labor availability and key components/materials availability.
.		Cost to Schedule Production Activities		The sum of the costs associated with scheduling production activities.
.		Schedule Achievement		The percentage of time that a plant achieves its production schedule. This calculation is based on the number of scheduled end-items or total volume for a specific period. Note: over-shipments do not make up for under-shipments.
.		Schedule Production Activities Cycle Time		The average time associated with scheduling production activities

Best Practices:

.		Additional Capacity for Overflow Demand		Outsource manufacturing and work force augmentation providers connected to production schedules via the internet.
.		Build Subassemblies to Forecast at Highest Generic Level in Bill of Material; Maintain Flexibility While Minimizing Cycle Time and Inventory Position		None identified
.		Cellular Manufacturing		Manufacturing is broken into work cells
.		Cross Training/Certification		HR/certification support
.		Demand Pull Mechanisms		Repetitive scheduling and sequencing
.		Design/Upgrade Production Equipment to Maximize Flexibility and Avoid Line Stoppages		Machine productivity and downtime monitoring
.		Drum-Buffer-Rope Scheduling Technique		(DBR, also referred to as Synchronous Manufacturing or Constraint Management) A technique used to manage resources to maximize throughput.
.		Maximize Data Integrity and System Accuracy by Ensuring 99%+ Accuracy of BOM Configuration, Inventory Levels, and Schedule Requirements		None identified
.		Schedule Includes Preventative Maintenance Program		Interface between maintenance management system and scheduling system
.		Schedule Minimizes Changeover Costs between Products		Algorithms that manage set up times/costs, cleaning times, and ideal job sequences (eg, color sequencing light to dark)
.		Schedule Optimizes Use of Shared Resources Such as Tooling and Production Equipment		Scheduling utilizing optimization techniques. Required production resources included in routing/process instructions
.		Schedule Reflects Current Plant Status (Equipment Availability, Other Jobs and Resource Availability) On Line		Schedule undated by on line reporting and status systems and re-sequence activities

Inputs:

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.		Equipment and Facilities Schedules and Plans from EM.5 Manage Equipment and Facilities		Time-phased plans of present and future load (capacity required) on all resources (Equipment and Facilities) based on the planned and released supply authorizations (i.e., orders) and the planned capacity (capacity available) of these resources over a span of time.
.		Information Feedback from M3.5 Package		The flow of information back into the control system so that actual performance can be compared with planned performance.
.		Information Feedback from M3.4 Produce and Test		The flow of information back into the control system so that actual performance can be compared with planned performance.
.		Information Feedback from M3.3 Issue Sourced/In-Process Product		The flow of information back into the control system so that actual performance can be compared with planned performance.
.		Information Feedback from M3.7 Release Product to Deliver		The flow of information back into the control system so that actual performance can be compared with planned performance.
.		Information Feedback from M3.6 Stage Finished Product		The flow of information back into the control system so that actual performance can be compared with planned performance.
.		Methods, Procedures, Processes from M3.1 Finalize Production Engineering		Methods, procedures and processes required to produce distinct items, such as parts that retain their identity through the transformation process and are intended to be completed after receipt of a customer order, including custom products that are designed, developed, and produced in response to a specific customer request.
.		Preventative Maintenance and Calibration Schedule from EM.5 Manage Equipment and Facilities		Planned and scheduled activities, including adjustments, replacements, and basic cleanliness, that forestall machine and facility breakdowns. Also, the established frequency to change and maintain parts, based on failure consequences, with frequency set per part or machine type. (Well cared for equipment and facilities will last longer and cause fewer problems.)
.		Production Plans from P3.4 Establish Production Plans		A master production plan used to allocate capacity among manufacturing resources and schedule finite manufacturing activities or executing the performance of a service. Production Plan includes production capability.
.		Scheduled Receipts from S2.1 Schedule Product Deliveries		Product due to arrive.
.		Scheduled Receipts from S3.3 Schedule Product Deliveries		Product due to arrive.
.		Scheduled Receipts from S1.1 Schedule Product Deliveries		Product due to arrive.

Outputs:

.		Production Schedule to D3.9 Pick Product		A plan that authorizes the factory to manufacture or repair a certain quantity of a specific item.
.		Production Schedule to S2.1 Schedule Product Deliveries		A plan that authorizes the factory to manufacture or repair a certain quantity of a specific item.
.		Production Schedule to S1.1 Schedule Product Deliveries		A plan that authorizes the factory to manufacture or repair a certain quantity of a specific item.

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.		Production Schedule to S3.3 Schedule Product Deliveries		A plan that authorizes the factory to manufacture or repair a certain quantity of a specific item.
.		Production Schedule to M3.3 Issue Sourced/In-Process Product		A plan that authorizes the factory to manufacture or repair a certain quantity of a specific item.
.		Production Schedule to P3.2 Identify, Assess, and Aggregate Production Resources		A plan that authorizes the factory to manufacture or repair a certain quantity of a specific item.
.		Production Schedule to D3.3 Enter Order, Commit Resources & Launch Program		A plan that authorizes the factory to manufacture or repair a certain quantity of a specific item.

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M3.3 Issue Sourced/In-Process Product

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

Metrics (see Appendix A for metrics attributes):

.	Cost to Issue Sourced/In-Process Product		The sum of the costs associated with issuing sourced or in-process material.
.	Issue Sourced/In-Process Product Cycle Time		The average time associated with the issuance of material to production

Best Practices:

.	Back Flush Material at Order Completion		Flexible back flush logic
.	Demand-Pull Mechanisms; Kanban Replenishment Signals from Stockroom, Intermediate Products, or Subassembly Area		None identified
.	Electronic Material Move Transactions		Automated process control and/or barcode data collection
.	Strategic Safety Stock of Selected Materials, Items, or Subassemblies to Decouple Sourced Product Issuance Cycle Time from Supplier Lead Time		Use of safety stock algorithms to minimize stock levels.
.	Supplier Delivery to Production Process at Point of Use		EDI link to supplier's sales order and inventory systems
.	Two-Bin Floor Stock Located at Work Center for "B" And "C" Components - Controlled by Operators and Replenished When One Bin is Empty		None identified

Inputs:

.	Inventory Availability from S3.6 Transfer Product		Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts).
.	Inventory Availability from S2.4 Transfer Product		Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts).
.	Inventory Availability from S1.4 Transfer Product		Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts).
.	Production Schedule from M3.2 Schedule Production Activities		A plan that authorizes the factory to manufacture or repair a certain quantity of a specific item.
.	WIP Handling Rules, Move Information and Methods from EM.4 Manage In-Process Products (WIP)		The rules for handling WIP items in the production and repair process. These rules include the movement and accounting for in-process items between work locations, in inventory, and movement inventory.

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.		WIP Location Rules from EM.6 Manage Transportation		The process and rules for establishing and maintaining in-process item inventory ownership and stocking locations.

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Outputs:

.	Workflow to M3.4 Produce and Test		
.	Information Feedback to M3.2 Schedule Production Activities		The flow of information back into the control system so that actual performance can be compared with planned performance.
.	Inventory Availability to D3.9 Pick Product		Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts).
.	Inventory Availability to P3.2 Identify, Assess, and Aggregate Production Resources		Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts).
.	Product Location Information to EM.6 Manage Transportation		Attributes of the product's storage location.
.	Replenishment Signal to S3.6 Transfer Product		Any signal that indicates when to produce or transport Items in a pull replenishment system.
.	Replenishment Signal to S1.4 Transfer Product		Any signal that indicates when to produce or transport Items in a pull replenishment system.
.	Replenishment Signal to S1.1 Schedule Product Deliveries		Any signal that indicates when to produce or transport Items in a pull replenishment system.
.	Replenishment Signal to S2.4 Transfer Product		Any signal that indicates when to produce or transport Items in a pull replenishment system.
.	Replenishment Signal to S3.3 Schedule Product Deliveries		Any signal that indicates when to produce or transport Items in a pull replenishment system.
.	Replenishment Signal to S2.1 Schedule Product Deliveries		Any signal that indicates when to produce or transport Items in a pull replenishment system.

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M3.4 Produce and Test

The series of activities performed upon sourced/in-process product to convert it from the raw or semi-finished state to a state of completion and greater value. The processes associated with the validation of product performance to ensure conformance to defined specifications and requirements.

Metrics (see Appendix A for metrics attributes):

.	Asset Turns		Total gross product revenue ÷ Total net assets
.	Capacity Utilization		A measure of how intensively a resource is being used to produce a good or service. Some factors that should be considered are internal manufacturing capacity, constraining processes, direct labor availability and key components/materials availability.
.	Cost to Produce and Test		The sum of the costs associated with production and test.
.	Produce and Test Cycle Time		The average time associated with production and test
.	Warranty Costs		Warranty costs include materials, labor and problem diagnosis for product defects.
.	Yield		The ratio of usable output from a process to its input.
.	Yield Variability		The condition that occurs when the output of a process is not consistently repeatable either in quantity, quality, or combination of these.

Best Practices:

.	Authorize Each Operation to Assess the Quality of the Previous Operations		None identified
.	Design/Upgrade Production Equipment to Maximize Flexibility and Avoid Line Stoppages		Machine productivity and downtime monitoring
.	Implement Employee Involvement Programs		
.	Just-In-Time Demand Flow Techniques		Demand-pull mechanisms
.	Link Individual Performance to Organizational and Divisional Goals		None identified
.	Maintain Accurate Lot/Batch History Information		Electronic data collection of employee actions and sourced/in-process product lot used
.	Paperless Production Control		Electronic dispatch of operations
.	Provide Continuous Formal Training to Employees		Examples would be TQM, Six Sigma.
.	Real Time quality control techniques		Electronic collection of qualityt data and on-line SPC.
.	Real Time Statistical Control Techniques		Electronic collection of defect data and on-line SPC.
.	Reduce Non-Value Added Activities, Including Queue, Move, and Set-Up Times		Use principals of Lean Manufacturing.
.	Reduce Non-Value Added Paperwork While Still Measuring Process Metrics		Electronic data collection of completion, quality, lot tractability, scrap, and labor data
.	Up-to-Date Shop Packet/Specifications		Electronic work instructions

Inputs:

.	Workflow from M3.3 Issue Sourced/In-Process Product	

Outputs:

.	Workflow to M3.5 Package		
.	Information Feedback to M3.2 Schedule Production Activities		The flow of information back into the control system so that actual performance can be compared with planned performance.

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M3.5 Package

The series of activities that containerize completed products for storage or sale to end-users. Within certain industries, packaging may include cleaning or sterilization.

Metrics (see Appendix A for metrics attributes):

.	Asset Turns		Total gross product revenue ÷ Total net assets
.	Capacity Utilization		A measure of how intensively a resource is being used to produce a good or service. Some factors that should be considered are internal manufacturing capacity, constraining processes, direct labor availability and key components/materials availability.
.	Cost to Package		The sum of the costs associated with product packaging.
.	Package Cycle Time		
.	Warranty Costs		Warranty costs include materials, labor and problem diagnosis for product defects.

Best Practices:

.	Automatic Label and Seal Verification		Automatic interface to inspection systems
.	Design/Upgrade Production Equipment to Maximize Flexibility and Avoid Line Stoppages		Machine productivity and downtime monitoring
.	Minimize Operator Induced Errors		Automatic download of production equipment with setup parameters Graphical display of setup, changeover, or layout
.	Packaging Operation is an Integral Part of the Overall Production Process		None identified
.	Paperless Production Control		Electronic dispatch of operations
.	Postponement and Pre-Kitting Of Accessories into Modular Packages that Allow Flexibility While Maintaining Control		None identified
.	Reduce Non-Value Added Paperwork While Still Measuring Process Metrics		Electronic data collection of completion, quality, lot tractability, scrap, and labor data
.	Up-to-Date Shop Packet/Specification for Each Unique Production Event/Demand		Electronic Work Instructions

Inputs:

.	Workflow from M3.4 Produce and Test

Outputs:

.	Workflow to M3.6 Stage Finished Product		
.	Information Feedback to M3.2 Schedule Production Activities		The flow of information back into the control system so that actual performance can be compared with planned performance.

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M3.6 Stage Finished Product

The movement of packaged products into a temporary holding location to await movement to a finished goods location. Products that are made to order may remain in the holding location to await shipment per the associated customer order. The movement to finished goods is part of the Deliver process.

Metrics (see Appendix A for metrics attributes):

.		Cost to Stage Finished Product		The sum of the costs associated with staging finished goods.
.		Stage Finished Product Cycle Time		The average time associated with staging finished product

Best Practices:

.		Direct Ship from Factory to Customer/Channel		Share production status with customers and transportation providers via web-based tools. Auto-Tendering for direct ship utilizing EDI/XML protocols.
.		Electronic Material Move Transactions		Automated process control and/or barcode data collection

Inputs:

.		Workflow from M3.5 Package		
.		Delivery Plans from P4.4 Establish Delivery Plans		A plan for a course of action over specified time periods that involves a projected appropriation of supply resources to meet delivery requirements.
.		Production Plans from P3.4 Establish Production Plans		A master production plan used to allocate capacity among manufacturing resources and schedule finite manufacturing activities or executing the performance of a service. Production Plan includes production capability.

Outputs:

.		Workflow to M3.7 Release Product to Deliver		
.		Information Feedback to M3.2 Schedule Production Activities		The flow of information back into the control system so that actual performance can be compared with planned performance.

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M3.7 Release Product to Deliver

Activities associated with post-production documentation, testing, or certification required prior to delivery of finished product to customer. Examples include assembly of batch records for regulatory agencies, laboratory tests for potency or purity, creating certificate of analysis, and sign-off by the quality organization.

Metrics (see Appendix A for metrics attributes):

.		Cost to Release Finished Product to Deliver		The sum of the costs associated with releasing finished goods to deliver processes.
.		Release Finished Product to Deliver Cycle Time		The average time associated with releasing finished product to deliver

Best Practices:

.		Accurate and Low Cost Batch Records for Regulatory Compliance		Electronic batch records
.		Automated Notification of Laboratory Regarding Sample Availability		Interface between production system and LIMS
.		Review Batch Records by Exception		Electronic batch records linked to process plans/recipes and exceptions flagged

Inputs:

.		Workflow from M3.6 Stage Finished Product

Outputs:

.		Finished Product Release to D3.9 Pick Product		The authorization to ship a finished product that has been ordered.
.		Information Feedback to M3.2 Schedule Production Activities		The flow of information back into the control system so that actual performance can be compared with planned performance.

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EM Enable MAKE

Enable Processes prepare, maintain, or manage information or relationships on which planning and execution processes rely.

The Category EM includes eight Level 3 Elements:

EM.1 Manage Production Rules	The process of establishing, maintaining, and enforcing rules for managing production details in line with business strategy, goals, and objectives. Production details include part/item master, bills of materials/formulas, routings, processes, equipment requirements, tooling, and other information specifying the method of production for a particular product.
EM.2 Manage Production Performance	The process of developing and maintaining performance standards and analysis methods to compare actual production performance against the established standards. This process allows the development and implementation of a course of action to achieve targeted performance.
EM.3 Manage MAKE Information	The process of managing, collecting, maintaining, and communicating information to support MAKE planning and execution processes. The information to be managed includes production, order and process data.
EM.4 Manage In-Process Products (WIP)	The process of establishing and maintaining limits or levels, replenishment models, ownership, product mix and stocking locations for In-Process Product (WIP). Management of the activities associated with handling/storage/movement of materials used to support production.
EM.5 Manage Equipment and Facilities	The process of specifying maintaining and dispositioning MAKE's capital assets to operate the supply chain production processes. This process element includes repairs, alterations, calibration and other miscellaneous items to maintain production capabilities of the manufacturing fixed asset base. The ongoing management of the activities associated with ensuring equipment and facilities are kept in proper order.
EM.6 Manage Transportation	The process of transporting In-Process Product (WIP). This includes management of the activities associated with in transit handling and movement of In-Process Product (WIP).
EM.7 Manage Production Network	The process of identifying and maintaining a network of intra-company production units that deliver specific semi-finished materials or product sets to the final production site.
EM.8 Manage Regulatory Compliance	The process of identifying and complying with regulatory documentation and process standards set by external entities (e.g. government)

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EM.1 Manage Production Rules

The process of establishing, maintaining, and enforcing rules for managing production details in line with business strategy, goals, and objectives. Production details include part/item master, bills of materials/formulas, routings, processes, equipment requirements, tooling, and other information specifying the method of production for a particular product.

Metrics (see Appendix A for metrics attributes):

Cost to Manage Production Rules	The sum of the costs to manage production rules.
Manage Production Rules Cycle Time	The average time associated with managing production rules

Best Practices:

Attribute-Based Process Planning	Computer aided process planning / recipe management
Automated Engineering Specifications	Automated Intelligence (Heuristic) - based engineering specifications system
Automated Links To Existing CAD & CAM Information	Electronic hypertext or links to existing database of detail/parts/setup sketches/drawings
Automatic Generation / Configuration Of Tooling / Set-Up Instructions	Parametric driven (Group Technology - based) manufacturing design system
Automatic Link to Recipe Management, PLC Program, CNC Program Systems, Etc., to Deliver New Manufacturing Documentation	Seamless application interface to manufacturing planning documentation and CAM systems
Automatic Notification When to Begin and When to Complete	Workflow/Groupware
Design For Production	Table of manufacturing capacities or design envelops (capacities; envelop sizes; tank, vessel or batch sizes)
Document Control	Control who can create, revise and access information
Electronic Documentation and Imaging	Graphical display of drawings, diagrams, recipes/formulas, specifications, instructions, etc., to all users
Genealogy Tracking	Where-used listing of as-planned vs. as-built documentation
On Line Access and Notification of Tooling and Equipment Information	Delivery of tooling and equipment details drawings
Pre-Defined Manufacturing Design Rules	Libraries of manufacturing capabilities or design envelopes
Storage and Configuration Management for Release and Revision Control of Final Documents	Product data management (PDM) or Electronic Data Management (EDM) feature set

Inputs:

Business Plan from Source: Company	A document resulting from a process of linking the long-range strategy with projections of revenue, activity, cost and profit. This process develops objectives usually accompanied by budgets, projected balance sheet, and a cash flow statement.
Corporate Objectives and Strategies from Source: Company	Corporate objectives are the goals and mission of an organization.
Inventory Capacity from EP.4 Manage Integrated Supply Chain Inventory	Maximum rate of output for the inventory management and warehouse process
Product Design from Source: Company	The product design is the translation of a set of functional requirements into an operational product that meets both the enterprise and customer expectations.
Production Capacity from EP.5 Manage Integrated Supply Chain Capital Assets	The highest, sustainable output rate which can be achieved with the current product specifications, product mix, worker effort, plant, and equipment.

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Production Plans from P3.4 Establish Production Plans	A master production plan used to allocate capacity among manufacturing resources and schedule finite manufacturing activities or executing the performance of a service. Production Plan includes production capability.
Transportation Capacity from EP.6 Manage Integrated Supply Chain Transportation	The capability of a trasportation system to perform it's function.

Outputs:

Production Rules to Deliver	The rules directing or regulating the movement of goods through the entire manufacturing and repair cycle (parameters of production) from the requisitioning of raw material to the delivery of the finished products.
Production Rules to Make	The rules directing or regulating the movement of goods through the entire manufacturing and repair cycle (parameters of production) from the requisitioning of raw material to the delivery of the finished products.
Production Rules to Source	The rules directing or regulating the movement of goods through the entire manufacturing and repair cycle (parameters of production) from the requisitioning of raw material to the delivery of the finished products.
Production Rules to Plan	The rules directing or regulating the movement of goods through the entire manufacturing and repair cycle (parameters of production) from the requisitioning of raw material to the delivery of the finished products.

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EM.2 Manage Production Performance

The process of developing and maintaining performance standards and analysis methods to compare actual production performance against the established standards. This process allows the development and implementation of a course of action to achieve targeted performance.

Metrics (see Appendix A for metrics attributes):

Cost to Manage Production Performance	The sum of the costs to manage production performance.
Manage Production Performance Cycle Time	The average time associated with managing production performance

Best Practices:

Periodic Review of Standards	Process for establishing and maintaining review schedules
Real Time Performance Measurement Reporting Systems	Systems to collect production information online generate reports upon request by operators, and track progress against schedule and standards.
Standards and Measurements Aligned to Maximize Supply Chain Performance	Internal/external benchmarking, industry standards, customer/supplier alignment agreements, visibility of key performance indicators

Inputs:

Business Plan from Source: Company	A document resulting from a process of linking the long-range strategy with projections of revenue, activity, cost and profit. This process develops objectives usually accompanied by budgets, projected balance sheet, and a cash flow statement.
Corporate Objectives and Strategies from Source: Company	Corporate objectives are the goals and mission of an organization.
Inventory Capacity from EP.4 Manage Integrated Supply Chain Inventory	Maximum rate of output for the inventory management and warehouse process
Product Design/Quality from Source: Company	A product design approach that uses quality measures to capture the extent to which the design meets the needs of the target market (customer attributes), as well as its actual performance, aesthetics, and cost.
Production Capacity from EP.5 Manage Integrated Supply Chain Capital Assets	The highest, sustainable output rate which can be achieved with the current product specifications, product mix, worker effort, plant, and equipment.
Production Plans from P3.4 Establish Production Plans	A master production plan used to allocate capacity among manufacturing resources and schedule finite manufacturing activities or executing the performance of a service. Production Plan includes production capability.
Transportation Capacity from EP.6 Manage Integrated Supply Chain Transportation	The capability of a trasportation system to perform it's function.

Outputs:

Production Quality and Policies to EM.5 Manage Equipment and Facilities	The operational techniques and planned and systematic activities used to fulfill requirements for quality in the production process, or the quality of the production, as defined by the company. For example, a percentage of parts produced without a need for adjustment or repair. The production policy indicates standard rules on how the production quality should be secured.

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Production Rules to Deliver	The rules directing or regulating the movement of goods through the entire manufacturing and repair cycle (parameters of production) from the requisitioning of raw material to the delivery of the finished products.
Production Rules to Source	The rules directing or regulating the movement of goods through the entire manufacturing and repair cycle (parameters of production) from the requisitioning of raw material to the delivery of the finished products.
Production Rules to Make	The rules directing or regulating the movement of goods through the entire manufacturing and repair cycle (parameters of production) from the requisitioning of raw material to the delivery of the finished products.
Production Rules to Plan	The rules directing or regulating the movement of goods through the entire manufacturing and repair cycle (parameters of production) from the requisitioning of raw material to the delivery of the finished products.
Supply-Chain Performance Metrics to EP.2 Manage Performance of Supply Chain	Standard measures that indicate how well a supply chain performs within certain categories of performance known as Performance Attributes, e.g. delivery reliability, flexibility and responsiveness, cost, and asset management.

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EM.3 Manage MAKE Information

The process of managing, collecting, maintaining, and communicating information to support MAKE planning and execution processes. The information to be managed includes production, order and process data.

Metrics (see Appendix A for metrics attributes):

Cost to Manage MAKE Information	The sum of the Cost to Manage MAKE Information
Manage MAKE Information Cycle Time	The average time associated with managing production information

Best Practices:

Continuous Improvement	Historical trending, cause and effect analysis, and Key Performance Indicators Scheduling reviews of processes for possible improvements
On-Demand Access of Production Information	Data Collection and Display Systems designed for efficient performance of value-added operations in production. This could include using PLC, Machine Interface, bar code, Radio Frequency Communication, Radio Frequency Identification, Magnetic Stripe, Smart Cards, etc., to enable data collection
On-Demand Access to Available to Promise (ATP), Production Schedules and Inventory Status by Internal Operations and Customers	None identified
Utilize Enterprise Information Systems	Enter, Process, and Deliver information about the manufacturing process to management using information systems that span the enterprise

Inputs:

Information from Business Processes from Source: Make	Data arranged or presented from a set of logically related tasks or activities performed to achieve a defined business outcome; so that the data yields an understanding not available from any single data element.
Information from Business Processes from Source: Plan	Data arranged or presented from a set of logically related tasks or activities performed to achieve a defined business outcome; so that the data yields an understanding not available from any single data element.
Information from Business Processes from Source: Source	Data arranged or presented from a set of logically related tasks or activities performed to achieve a defined business outcome; so that the data yields an understanding not available from any single data element.
Information from Business Processes from Source: Deliver	Data arranged or presented from a set of logically related tasks or activities performed to achieve a defined business outcome; so that the data yields an understanding not available from any single data element.
Information Needed to Create and Maintain IT from Source: Company	Interrelated computer hardware and software along with people and processes designed for the collection, processing, and dissemination of information for planning, decision making, and control.
Information Needs Analysis from Source: Make	Specifying the inputs, files, processing, business rules and outputs for a new system, but without expressing computer alternatives and technical details.
Information Needs Analysis from Source: Source	Specifying the inputs, files, processing, business rules and outputs for a new system, but without expressing computer alternatives and technical details.

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Information Needs Analysis from Source: Deliver	Specifying the inputs, files, processing, business rules and outputs for a new system, but without expressing computer alternatives and technical details.
Information Needs Analysis from Source: Plan	Specifying the inputs, files, processing, business rules and outputs for a new system, but without expressing computer alternatives and technical details.
Systems Capability from Source: Make	The capability of a system to perform its expected function
Systems Capability from Source: Source	The capability of a system to perform its expected function

Outputs:

Information Infrastructure Plan to Plan	A plan outlining the processes required for managing, collecting, maintaining, and communicating information and master data to support planning and execution processes.
Information Infrastructure Plan to Source	A plan outlining the processes required for managing, collecting, maintaining, and communicating information and master data to support planning and execution processes.
Reports, Information, and Documents to Make	Collecting data and organizing, arranging or presenting the data so that they yield an understanding not available from any single data element.
Reports, Information, and Documents to Plan	Collecting data and organizing, arranging or presenting the data so that they yield an understanding not available from any single data element.
Reports, Information, and Documents to Deliver	Collecting data and organizing, arranging or presenting the data so that they yield an understanding not available from any single data element.
Reports, Information, and Documents to Source	Collecting data and organizing, arranging or presenting the data so that they yield an understanding not available from any single data element.

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EM.4 Manage In-Process Products (WIP)

The process of establishing and maintaining limits or levels, replenishment models, ownership, product mix and stocking locations for In-Process Product (WIP).
Management of the activities associated with handling/storage/movement of materials used to support production.

Metrics (see Appendix A for metrics attributes):

Cost to Manage In-Process Products (WIP)	The sum of the costs associated with managing in-process products (WIP).
Inventory Days of Supply	Five point annual average of the sum of all gross inventories (raw materials & WIP, plant FG, field FG, field samples, other) ÷ (COGS ÷ 365). Total gross value of inventory at standard cost before reserves for excess and obsolescence. Only includes inventory on company books, future liabilities should not be included
Manage In-Process Products (WIP) Cycle Time	The average time associated with managing WIP inventory

Best Practices:

Dunnage Control	System data field to specify where the part / product shipping container should be removed. Best practice is to remove the dunnage as soon as possible unless part / product damage will result. Reuse of intermediate WIP containers for finished goods.
First In - First Out	Part / WIP location by date received for those parts that must be stocked or staged in a holding area
In-Process Product (WIP) Handling Rules	Tracking, genealogy
Minimizing In-Process Product (WIP)	WIP Storage Management System Efficient Space Utilization Implementing Pull Systems
Minimum Product Handling	Move high frequency used inventory close to point of use. For example, the system should provide the frequency of picks by part number so that high frequency picks can be moved to convenient locations or part pick quantities increased.
Optimize Packing	No packing and unpacking time required. Recyclable or no containers where appropriate. No discarded material.
Statistical Test Count	The Statistical Test Count (STC) process is a method of validating inventory on-hand values by physically counting and reconciling a statistical sample of the entire inventory population. This sample is then extrapolated across the inventory population, which provides an indicative measure of entire inventory population. Furthermore, with extrapolation the net and gross percentage of error is determined.
Vendor Managed Inventory	VMI is a concept for planning and control of inventory, in which the supplier has access to the customer's inventory data and is responsible for maintaining the inventory level required by the customer. Re-supply is performed by the vendor through regularly scheduled reviews of the on-site inventory. The on-site inventory is counted, damaged or outdated goods are removed, and the inventory is restocked to predefined levels.

Inputs:

Capacity Requirements from Source: Plan	The resources needed to produce the projected level of work required from a facility over a time horizon. Capacity requirements are usually expressed in terms of hours of work or, when units consume similar resources at the same rate, units of production.
Incoming Product Information from Source: Source	Data concerning product on order and due to be delivered to location agreed in the order.

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Production Orders Planned & Actual Reports from Source: Plan	A statement of the output of a production facility for a specified period, comparing planned to actual production.
Returned Product Information from Source: Deliver	Data concerning the return and disposition of defective products, excess inventory and/or serviceable or obsolete products, or MRO product.

Outputs:

WIP Handling Rules, Move Information and Methods to M1.2 Issue Material	The rules for handling WIP items in the production and repair process. These rules include the movement and accounting for in-process items between work locations, in inventory, and movement inventory.
WIP Handling Rules, Move Information and Methods to Deliver	The rules for handling WIP items in the production and repair process. These rules include the movement and accounting for in-process items between work locations, in inventory, and movement inventory.
WIP Handling Rules, Move Information and Methods to Source	The rules for handling WIP items in the production and repair process. These rules include the movement and accounting for in-process items between work locations, in inventory, and movement inventory.
WIP Handling Rules, Move Information and Methods to M2.2 Issue Sourced/In-Process Product	The rules for handling WIP items in the production and repair process. These rules include the movement and accounting for in-process items between work locations, in inventory, and movement inventory.
WIP Handling Rules, Move Information and Methods to M3.3 Issue Sourced/In-Process Product	The rules for handling WIP items in the production and repair process. These rules include the movement and accounting for in-process items between work locations, in inventory, and movement inventory.
WIP Handling Rules, Move Information and Methods to Plan	The rules for handling WIP items in the production and repair process. These rules include the movement and accounting for in-process items between work locations, in inventory, and movement inventory.
WIP Handling Rules, Move Information and Methods to EM.6 Manage Transportation	The rules for handling WIP items in the production and repair process. These rules include the movement and accounting for in-process items between work locations, in inventory, and movement inventory.

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EM.5 Manage Equipment and Facilities

The process of specifying maintaining and dispositioning MAKE's capital assets to operate the supply chain production processes. This process element includes repairs, alterations, calibration and other miscellaneous items to maintain production capabilities of the manufacturing fixed asset base.

The ongoing management of the activities associated with ensuring equipment and facilities are kept in proper order.

Metrics (see Appendix A for metrics attributes):

Actual Asset Life Maintenance Cost as % of Replacement Value	Measure of total lifecycle maintenance cost of an asset compared to its replacement cost. This ratio is based maintenance cost to-date so that that replacement or upgrade cost can be evaluated as the asset ages on an on-going basis.
Cost to Manage MAKE Equipment and Facilities	The sum of the costs associated with managing Make equipment and facilities.
Manage MAKE Equipment and Facilities Cycle Time	The average time associated with managing production equipment and facilities

Best Practices:

Changeover Reduction / Continuous Improvement Program	Changeover process flow element identification, instructional directions to conduct changeover, and measurement tool, which can be used to prioritize and track results of improvement efforts. Software to identify operational constraints to the MAKE processes to assist in directing resources toward bottleneck functional areas.
Facility & Equipment Environmental / Safety Audit System	System software to list checklist items, report results of audit & forward actions to be taken
Factory Floor Electronic Decision Making Information System	Software to capture actual performance history / costs of operations with capability of predicting "best cost action plans" relating to maintaining equipment and facilities.
Minimize Capital Assets Required and Maintenance Costs	Outsourcing strategies including the use of Application Service Providers (ASPs), web-based maintenance/diagnostic assistance and MRO parts.
Predictive Maintenance Monitoring (Heat, Noise, Lubrication Composition & Vibration)	Database for equipment to contain expected results of analysis, allow entry of test readings, and have capability of generating desired reports, which could highlight suggested actions based upon readings obtained, track maintenance completed, contain a help-file to be consulted
Supplier Managed Inventory of Parts	E.D.I. linkage of Inventory Information
Systematic Disposition Of Equipment	Rules for deciding appropriate disposition.
Total Preventative Maintenance Program	Automatically generated TPM repair schedules integrated with MRP systems, electronic equipment repair history, parts listings, part stores inventory & reorder points, automatic store room parts purchases, Shop floor access to electronic data base of equipment line drawings, electrical wiring diagrams, parts listing reference guide and part cost lists.

Inputs:

Budgets from Source: Make	A plan that includes an estimate of future costs and revenues related to expected activities. The budget serves as a pattern for and a control over future operations.
Equipment and Facilities Monitoring Information from Source: Company	Data gathered by measuring, examining, testing, or gauging one or more characteristics of equipment and facilities and comparing it to planned.

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Manufacturer's Recommended Maintenance Schedules & Specifications from Source: Company	The scheduled activities, including adjustments, replacements, and basic cleanliness, that are recommended by the manufacturer to forestall machine breakdowns.
MRO Parts Availability from ES.4 Manage Product Inventory	The on-hand MRO inventory balance minus allocations, reservations, backorders, and (usually) quantities held for quality problems.
Production Plans from P3.4 Establish Production Plans	A master production plan used to allocate capacity among manufacturing resources and schedule finite manufacturing activities or executing the performance of a service. Production Plan includes production capability.
Production Quality and Policies from EM.2 Manage Production Performance	The operational techniques and planned and systematic activities used to fulfill requirements for quality in the production process, or the quality of the production, as defined by the company. For example, a percentage of parts produced without a need for adjustment or repair. The production policy indicates standard rules on how the production quality should be secured.

Outputs:

Equipment and Facilities Maintenance History to Source	The process of documenting of the timing and maintenance of equipment and facilities including required repairs, alterations, calibration, servicing, replacement of parts and other miscellaneous items to maintain production capability of the manufacturing fixed asset base
Equipment and Facilities Maintenance History to Make	The process of documenting of the timing and maintenance of equipment and facilities including required repairs, alterations, calibration, servicing, replacement of parts and other miscellaneous items to maintain production capability of the manufacturing fixed asset base
Equipment and Facilities Replacement and Disposition Plans to P3.2 Identify, Assess, and Aggregate Production Resources	Actions relating to the planning, financing and disposition of capital outlays for such purposes as the purchase of new equipment, the introduction of new product lines, and the modernization of plant facilities
Equipment and Facilities Replacement and Disposition Plans to EM.6 Manage Transportation	Actions relating to the planning, financing and disposition of capital outlays for such purposes as the purchase of new equipment, the introduction of new product lines, and the modernization of plant facilities
Equipment and Facilities Schedules and Plans to M2.1 Schedule Production Activities	Time-phased plans of present and future load (capacity required) on all resources (Equipment and Facilities) based on the planned and released supply authorizations (i.e., orders) and the planned capacity (capacity available) of these resources over a span of time.
Equipment and Facilities Schedules and Plans to M3.2 Schedule Production Activities	Time-phased plans of present and future load (capacity required) on all resources (Equipment and Facilities) based on the planned and released supply authorizations (i.e., orders) and the planned capacity (capacity available) of these resources over a span of time.
Equipment and Facilities Schedules and Plans to M1.1 Schedule Production Activities	Time-phased plans of present and future load (capacity required) on all resources (Equipment and Facilities) based on the planned and released supply authorizations (i.e., orders) and the planned capacity (capacity available) of these resources over a span of time.
Parts and Services Consumed to ES.4 Manage Product Inventory	The items and services utilized to manufacture a product.
Parts and Services Consumed to ES.5 Manage Capital Assets	The items and services utilized to manufacture a product.

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Parts and Services Consumed to ES.8 Manage Import/Export Requirements	The items and services utilized to manufacture a product.
Preventative Maintenance and Calibration Schedule to Source	Planned and scheduled activities, including adjustments, replacements, and basic cleanliness, that forestall machine and facility breakdowns. Also, the established frequency to change and maintain parts, based on failure consequences, with frequency set per part or machine type. (Well cared for equipment and facilities will last longer and cause fewer problems.)
Preventative Maintenance and Calibration Schedule to M3.2 Schedule Production Activities	Planned and scheduled activities, including adjustments, replacements, and basic cleanliness, that forestall machine and facility breakdowns. Also, the established frequency to change and maintain parts, based on failure consequences, with frequency set per part or machine type. (Well cared for equipment and facilities will last longer and cause fewer problems.)
Preventative Maintenance and Calibration Schedule to M1.1 Schedule Production Activities	Planned and scheduled activities, including adjustments, replacements, and basic cleanliness, that forestall machine and facility breakdowns. Also, the established frequency to change and maintain parts, based on failure consequences, with frequency set per part or machine type. (Well cared for equipment and facilities will last longer and cause fewer problems.)
Preventative Maintenance and Calibration Schedule to Plan	Planned and scheduled activities, including adjustments, replacements, and basic cleanliness, that forestall machine and facility breakdowns. Also, the established frequency to change and maintain parts, based on failure consequences, with frequency set per part or machine type. (Well cared for equipment and facilities will last longer and cause fewer problems.)
Preventative Maintenance and Calibration Schedule to M2.1 Schedule Production Activities	Planned and scheduled activities, including adjustments, replacements, and basic cleanliness, that forestall machine and facility breakdowns. Also, the established frequency to change and maintain parts, based on failure consequences, with frequency set per part or machine type. (Well cared for equipment and facilities will last longer and cause fewer problems.)
Production Status to EM.7 Manage Production Network	Feedback on the production schedule allowing for corrective action to a production problem, or an indication of how far in the production process a specific part has progressed

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EM.6 Manage Transportation

The process of transporting In-Process Product (WIP). This includes management of the activities associated with in transit handling and movement of In-Process Product (WIP).
Each occurrence consumes time:

Metrics (see Appendix A for metrics attributes):

Cost to Manage Transportation (WIP)	The sum of the costs associated with managing WIP Transportation
Manage Transportation (WIP) Cycle Time	The average time associated with managing (WIP) transportation

Best Practices:

Reduce In-Process Product (WIP) Handling	Reduction of WIP handling through automation (i.e. AGVs and ASRS) and process improvement (i.e. reduction of handling steps, shorter move paths)
Short Move Paths	Software that allows for input of the distance that particular parts/WIP need to be moved. This software then needs to provide a report based on the cubic feet of material times distance moved by part number.

Inputs:

Capacity Requirements from Source: Plan	The resources needed to produce the projected level of work required from a facility over a time horizon. Capacity requirements are usually expressed in terms of hours of work or, when units consume similar resources at the same rate, units of production.
Equipment and Facilities Replacement and Disposition Plans from EM.5 Manage Equipment and Facilities	Actions relating to the planning, financing and disposition of capital outlays for such purposes as the purchase of new equipment, the introduction of new product lines, and the modernization of plant facilities
Product Location Information from M2.2 Issue Sourced/In-Process Product	Attributes of the product's storage location.
Product Location Information from M1.2 Issue Material	Attributes of the product's storage location.
Product Location Information from M3.3 Issue Sourced/In-Process Product	Attributes of the product's storage location.
Product Location Information from Source: Deliver	Attributes of the product's storage location.
Production Orders Planned & Actual Reports from Source: Company	A statement of the output of a production facility for a specified period, comparing planned to actual production.
Projected Delivery Requirements from EM.7 Manage Production Network	The company's goal for the time to ship the product after the receipt of a customer's order. The policy is sometimes stated as "our quoted delivery time," or an estimate of the customer delivery requirements of a product or service, e.g. which kind of packaging, should the parts be shipped one by one or in bulks etc.
Supplier Agreement from S3.2 Select Final Supplier(s) and Negotiate	An agreement between supplier and purchaser to perform or not to perform specific acts or services or to deliver merchandise, such as purchase order or supplier contract.
WIP Handling Rules, Move Information and Methods from Source: Source	The rules for handling WIP items in the production and repair process. These rules include the movement and accounting for in-process items between work locations, in inventory, and movement inventory.

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WIP Handling Rules, Move Information and Methods from Source: Plan	The rules for handling WIP items in the production and repair process. These rules include the movement and accounting for in-process items between work locations, in inventory, and movement inventory.
WIP Handling Rules, Move Information and Methods from Source: Deliver	The rules for handling WIP items in the production and repair process. These rules include the movement and accounting for in-process items between work locations, in inventory, and movement inventory.
WIP Handling Rules, Move Information and Methods from Source: Make	The rules for handling WIP items in the production and repair process. These rules include the movement and accounting for in-process items between work locations, in inventory, and movement inventory.
WIP Handling Rules, Move Information and Methods from EM.4 Manage In-Process Products (WIP)	The rules for handling WIP items in the production and repair process. These rules include the movement and accounting for in-process items between work locations, in inventory, and movement inventory.

Outputs:

WIP Inventory Location to S2.4 Transfer Product	Location of inventory that is specified as “work in progress“. This can be intermediate storage in a manufacturing facility prior to final packaging or can be a class of materials waiting final transformation to finished products.
WIP Inventory Location to S1.4 Transfer Product	Location of inventory that is specified as “work in progress“. This can be intermediate storage in a manufacturing facility prior to final packaging or can be a class of materials waiting final transformation to finished products.
WIP Inventory Location to S3.6 Transfer Product	Location of inventory that is specified as “work in progress“. This can be intermediate storage in a manufacturing facility prior to final packaging or can be a class of materials waiting final transformation to finished products.
WIP Location Rules to D2.9 Pick Product	The process and rules for establishing and maintaining in-process item inventory ownership and stocking locations.
WIP Location Rules to M3.3 Issue Sourced/In-Process Product	The process and rules for establishing and maintaining in-process item inventory ownership and stocking locations.
WIP Location Rules to M2.2 Issue Sourced/In-Process Product	The process and rules for establishing and maintaining in-process item inventory ownership and stocking locations.
WIP Location Rules to M1.2 Issue Material	The process and rules for establishing and maintaining in-process item inventory ownership and stocking locations.
WIP Move Information and Methods to Make	The process of recording and tracking the movement of WIP items through the production and repair process. This process includes item stocking and accounting requirements.
WIP Move Information and Methods to Source	The process of recording and tracking the movement of WIP items through the production and repair process. This process includes item stocking and accounting requirements.
WIP Move Information and Methods to Plan	The process of recording and tracking the movement of WIP items through the production and repair process. This process includes item stocking and accounting requirements.
WIP Move Information and Methods to Deliver	The process of recording and tracking the movement of WIP items through the production and repair process. This process includes item stocking and accounting requirements.

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EM.7 Manage Production Network

The process of identifying and maintaining a network of intra-company production units that deliver specific semi-finished materials or product sets to the final production site.

Metrics (see Appendix A for metrics attributes):

Cost to Manage Production Network	The sum of the costs to manage the production network
Manage Production Network Cycle Time	The average time associated with managing the production network

Best Practices:

Collaborative Planning/Scheduling	Interactive, on-line planning/scheduling systems. Capacity planning systems with accurate production capability data.
JIT Environment	Schedule visibility, on-line communications between source and demand
Production Reporting/Status	Real time monitoring of production status and In-Process Product (WIP)

Inputs:

Planning Data from Source: Plan	Execution information necessary to plan the balance of supply chain resources to demand requirements at both the highest aggregate and lowest SKU planning levels.
Production Status from EM.5 Manage Equipment and Facilities	Feedback on the production schedule allowing for corrective action to a production problem, or an indication of how far in the production process a specific part has progressed
Supply Chain Plans from Source: Plan	Courses of action over specified time periods that represent a projected appropriation of total supply-chain resources to meet total supply-chain demand requirements.

Outputs:

Cost to Produce to Plan	The cost to produce and item during a given period of time. Includes: the amount of direct materials, direct labor, and allocated overhead.
Internal Capacity to Source	The organic capability of an organization to produce output per time period.
Internal Capacity to Plan	The organic capability of an organization to produce output per time period.
Projected Delivery Requirements to Plan	The company's goal for the time to ship the product after the receipt of a customer's order. The policy is sometimes stated as "our quoted delivery time," or an estimate of the customer delivery requirements of a product or service, e.g. which kind of packaging, should the parts be shipped one by one or in bulks etc.
Projected Delivery Requirements to EM.6 Manage Transportation	The company's goal for the time to ship the product after the receipt of a customer's order. The policy is sometimes stated as "our quoted delivery time," or an estimate of the customer delivery requirements of a product or service, e.g. which kind of packaging, should the parts be shipped one by one or in bulks etc.
Projected Delivery Requirements to Deliver	The company's goal for the time to ship the product after the receipt of a customer's order. The policy is sometimes stated as "our quoted delivery time," or an estimate of the customer delivery requirements of a product or service, e.g. which kind of packaging, should the parts be shipped one by one or in bulks etc.

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EM.8 Manage Regulatory Compliance

The process of identifying and complying with regulatory documentation and process standards set by external entities (e.g. government)

Metrics (see Appendix A for metrics attributes):

Cost to Manage MAKE Regulatory Compliance	The sum of the Cost to Manage MAKE Regulatory Compliance
Manage MAKE Regulatory Compliance Cycle Time	The average time associated with managing compliance to the make regulatory environment

Best Practices:

Automated Conformance Monitoring And Control	Internal automatic notification of conformance, including holding of product until requirements are met
Automatic Generation And Submission Of Conformance Documents	Software specific to industry regulations and standards (e.g. may be software to produce MSDS documents, or FDA requirements, etc.)
Maintaining Repository of Current Regulatory Requirements	Electronic subscription and publication of conformance documentation. Electronic Document Management System features.

Inputs:

Corporate Objectives and Strategies from Source: Company	Corporate objectives are the goals and mission of an organization.
Equipment and Facilities Characteristics from Source: Company	Equipment and facility traits and specifications required to meet external entities requirements.
External Regulatory Information from Source: Source	Documentation and process standards set by external entities (i.e. government, trade officials, etc.)
External Regulatory Information from Source: Plan	Documentation and process standards set by external entities (i.e. government, trade officials, etc.)
External Regulatory Information from Source: Make	Documentation and process standards set by external entities (i.e. government, trade officials, etc.)
Product Design/Claims from Source: Company	The product design is the translation of a set of functional requirements into an operational product that meets both the enterprise and customer expectations. Claims are marketing information provided as to performance, etc. Claims from the users of the product indicate a need to change the product design

Outputs:

Conformance Plan to Source	Courses of action and processes that are established to meet the requirements placed on production by external entities.
Conformance Plan to Make	Courses of action and processes that are established to meet the requirements placed on production by external entities.
Conformance Rules to Make	An affirmative indication or judgment that a product or service has met criteria translated into rules for meeting external regulatory requirements

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D1 Deliver Stocked Product

The process of delivering product that is maintained in a finished goods state prior to the receipt of a firm customer order.

The Category D1 includes fifteen Level 3 Elements:

D1.1 Process Inquiry & Quote	Receive and respond to general customer inquiries and requests for quotes.
D1.10 Pack Product	The activities such as sorting / combining the products, packing / kitting the products, paste labels, barcodes etc. and delivering the products to the shipping area for loading.
D1.11 Load Vehicle & Generate Shipping Documentation	The series of tasks including placing/loading product onto modes of transportation and generating the documentation necessary to meet internal, customer, carrier and government needs..
D1.12 Ship Product	The process of shipping the product to the customer site.
D1.13 Receive & Verify Product by Customer	The process of receiving the shipment by the customer site (either at customer site or at shipping area in case of self-collection) and verifying that the order was shipped complete and that the product meets delivery terms.
D1.14 Install Product	When necessary, the process of preparing, testing and installing the product at the customer site. The product is fully functional upon completion.
D1.15 Invoice	A signal is sent to the financial organization that the order has been shipped and that the billing process should begin and payment be received or be closed out if payment has already been received. Payment is received from the customer within the payment terms of the invoice.
D1.2 Receive, Enter & Validate Order	Receive orders from the customer and enter them into a company's order processing system. Orders can be received through phone, fax, or electronic media. "Technically" examine orders to ensure an orderable configuration and provide accurate price. Check the customer's credit. Optionally accept payment.
D1.3 Reserve Inventory & Determine Delivery Date	Inventory and/or planned capacity (both on hand and scheduled) is identified and reserved for specific orders and a delivery date is committed and scheduled.
D1.4 Consolidate Orders	The process of analyzing orders to determine the groupings that result in least cost/best service fulfillment and transportation.
D1.5 Build Loads	Transportation modes are selected and efficient loads are built.
D1.6 Route Shipments	Loads are consolidated and routed by mode, lane and location.
D1.7 Select Carriers & Rate Shipments	Specific carriers are selected by lowest cost per route and shipments are rated and tendered.
D1.8 Receive Product from Source or Make	The activities such as receiving product, verifying, recording product receipt, determining put-away location, putting away and recording location that a company performs at its own warehouses. May include quality inspection.
D1.9 Pick Product	The series of activities including retrieving orders to pick, determining inventory availability, building the pick wave, picking the product, recording the pick and delivering product to shipping in response to an order.

Metrics (see Appendix A for metrics attributes):

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Cash-To-Cash Cycle Time	[Inventory Days of Supply + Days Sales Outstanding - Days Payable Outstanding] The time it takes for an investment made to flow back into a company after it has been spent for raw materials. For services, this represents the time from the point where a company pays for the resources consumed in the performance of a service to the time that the company received payment from the customer for those services.
Return on Working Capital	Return on working capital is a measurement which assesses the magnitude of investment relative to a company's working capital position verses the revenue generated from a supply chain. Components include accounts receivable, accounts payable, inventory, supply chain revenue, cost of goods sold and supply chain management costs.
Cost to Deliver	The sum of the costs associated with deliver
Deliver Cycle Time	The average time associated with Deliver Processes
Downside Deliver Adaptability	The reduction in delivered quantities sustainable at 30 days prior to delivery with no inventory or cost penalties.
Finished Goods Inventory Days of Supply	Plant finished goods inventory days of supply are calculated as gross plant finished goods inventory ÷ (value of transfers/365 days).
Order Fulfillment Cycle Time	The average actual cycle time consistently achieved to fulfill customer orders.
Order Management Costs	The aggregation of the following cost elements (contained in this glossary):
Perfect Order Fulfillment	The percentage of orders meeting delivery performance with complete and accurate documentation and no delivery damage. Components include all items and quantities on-time using the customer's definition of on-time, and documentation - packing slips, bills of lading, invoices, etc.
Return on Supply Chain Fixed Assets	Return on Supply Chain Fixed Assets measures the return an organization receives on its invested capital in supply chain fixed assets. This includes the fixed assets used in Plan, Source, Make, Deliver, and Return. The levels of aggregation can be at any element associated with a supply chain asset.
Upside Deliver Adaptability	The maximum sustainable percentage increase in quantities delivered that can be achieved in 30 days with the assumption of unconstrained finished good availability.
Upside Deliver Flexibility	The number of days required to achieve an unplanned sustainable 20% increase in quantity delivered with the assumption of no other constraints.

Best Practices:

Efficient Consumer Response (ECR); Quick Response	Demand Planning, Deployment, Scheduling
Electronic Catalogues/Malls	None identified
Internet Ordering	None identified
Postponement	Postponement (delayed differentiation) is a supply chain concept where a product is kept as long as possible in a generic state. Differentiation of the generic product into a specific end-product is shifted closer to the consumer by postponing identify changes, such as assembly or packaging, to the last possible supply chain location.
Rapid Replenishment, VMI, EDI	None identified

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D1.1 Process Inquiry & Quote

Receive and respond to general customer inquiries and requests for quotes.
Each occurrence consumes time:

Metrics (see Appendix A for metrics attributes):

Cost to Process Inquiry & Quote	The sum of the costs associated with processing inquiry and quotes.
Process Inquiry & Quote Cycle Time	The average time associated with processing inquiries and quotes

It is associated with deliverables:

Deliverable: Customer Inquiry	General customer inquiries for information concerning products, availability, cost, and requests for quotes.
Deliverable: Order Quote (Customer)	A statement of price, terms of sale, and description of goods or services offered by a supplier to a prospective purchaser; a bid. When given in response to an inquiry, it is usually considered an offer to sell.

Best Practices:

Quote Capability, without Reserving Inventory, Which Can Be Converted into an Order in a Single Step	None identified
Single Point of Contact for All Order Inquiries (Including Order Entry)	None identified

Inputs:

Customer Inquiry from Source: Customer	General customer inquiries for information concerning products, availability, cost, and requests for quotes.

Outputs:

Customer Quote to D1.2 Receive, Enter & Validate Order	A statement of price, terms of sale, and description of goods or services offered by a supplier to a prospective purchaser; a bid. When given in response to an inquiry, it is usually considered an offer to sell.

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D1.2 Receive, Enter & Validate Order

Receive orders from the customer and enter them into a company's order processing system. Orders can be received through phone, fax, or electronic media. "Technically" examine orders to ensure an orderable configuration and provide accurate price. Check the customer's credit. Optionally accept payment.

Metrics (see Appendix A for metrics attributes):

Cost to Receive, Enter & Validate Order	The sum of the costs associated with receiving, entering and validating a customer order.
Order Fulfillment Dwell Time	Any lead time during the order fulfillment process where no activity takes place, which is imposed by customer requirements. Note that this dwell time is different from 'idle time' or 'non-value-add lead time', which is caused by inefficiencies in the organization's processes and therefore ultimately under responsibility of the organization. This kind of idle time should not be deducted from Order Fulfillment Cycle Time.
Receive, Enter & Validate Order Cycle Time	The average time associated with receiving and verifying an order at the customer site

Best Practices:

Automatic Multi-level Credit Checking: Dollar Limits; Days Sales Outstanding; Margin Testing	Integrated Order/Financial Management
Continuous Replenishment Programs; Vendor Managed Inventory, Telemetry to Automatically Communicate Replenishment of Chemicals	Integrated demand/deployment planning to customer location driven by POS; Customer movement data
Electronic Commerce (Customer Visibility of Stock Availability, Use of Hand-Held Terminals for Direct Order Entry, Confirmation, Credit Approval), On-Line Stock Check and Reservation of Inventory	EDI applications and integrated order management
Enable Real-Time Visibility into Backlog, Order Status, Shipments, Scheduled Material Receipts, Customer Credit History, and Current Inventory Positions	None identified
Remote (Sales, Customers) Order Entry Capability	None identified
Value Pricing Based on "Cost to Serve"; EDLP; Cost Plus Pricing	Activity Based Costing; Integrated Order Management by Customer by Line Item

Inputs:

Customer Order from Source: Customer	An order from a customer for a particular product or a number of products. It is often referred to as an actual demand to distinguish it from a forecasted demand.
Customer Quote from D1.1 Process Inquiry & Quote	A statement of price, terms of sale, and description of goods or services offered by a supplier to a prospective purchaser; a bid. When given in response to an inquiry, it is usually considered an offer to sell.
Customer Replenish Signal from Source: Customer	A requirement for product from a distribution location to a source location.
Deliver Contract Terms from Source: Customer	The process of making a delivery commitment. For make-to-order products, this usually involves a check of uncommitted material and availability of capacity, often as represented by the master schedule available-to-promise.

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Order Rules from ED.1 Manage Deliver Business Rules	Rules for the function that encompasses receiving, entering, and promising orders from customers, distribution centers, and interplant operations.

Outputs:

Actual Sales History to P5.1 Assess, and Aggregate Return Requirements	Amount of past sales spanning any specified period of time (weeks, months, years, etc.) and expressed in any specified increments (per day, week, month, year, etc.)
Contract Status to ED.3 Manage Deliver Information	Customer profile, which include address data, credit and purchase histories, customer preferences including shipping, status, and delivery requirements, etc.
Credit History to ED.3 Manage Deliver Information	Report that portrays a potential customer's payment history and debt, indicating the ability to pay in a timely manner in the future.
Customer Address Data to ED.3 Manage Deliver Information	Customer profile, which include address data, credit and purchase histories, customer preferences including shipping, status, and delivery requirements, etc.
Customer Order to ED.2 Assess Delivery Performance	An order from a customer for a particular product or a number of products. It is often referred to as an actual demand to distinguish it from a forecasted demand.
Customer Order Size, Weight, and Freight Class to ED.6 Manage Transportation	Coupled with cube and route, these criteria determine type of carrier and cost of shipment
Location of Customers to ED.7 Manage Product Life Cycle	Customer profile, which includes address and location data, credit and purchase histories, customer preferences including shipping, status, and delivery requirements, etc.
Optional Payment to Company	Payment at the time of order, maybe partial or in full.
Purchase History to ED.3 Manage Deliver Information	The amount of purchased products for a certain time in history per specific intervals
Shipping Preferences to ED.3 Manage Deliver Information	Customer preferences including shipping, status, and delivery requirements, etc., and customer profile, which includes address data, credit and purchase histories,
Validated Order to D1.3 Reserve Inventory & Determine Delivery Date	An order that has had the instructions / requirements validated i.e. the information that the order contains is accurate , consistent with previous information and does not violate business policies or rules. Note 1 - this does not make the order ""committed"" there may be other tasks to be performed before a commitment can be made. Note 2 - this order could be customer, internal , purchase or production.

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D1.3 Reserve Inventory & Determine Delivery Date

Inventory and/or planned capacity (both on hand and scheduled) is identified and reserved for specific orders and a delivery date is committed and scheduled.

Metrics (see Appendix A for metrics attributes):

% of Orders Delivered in Full	Percentage of orders which all of the items are received by customer in the quantities committed The number of orders that are received by the customer in the quantities committed divided by the total orders [Total number of orders delivered in full] / [Total number of orders delivered] x 100%
Cost to Reserve Resources & Determine Delivery Date	The sum of the costs associated with reserving resources and determining a delivery date.
Delivery Performance to Customer Commit Date	The percentage of orders that are fulfilled on the customer's original commit date
Fill Rate	The percentage of ship-from-stock orders shipped within 24 hours of order receipt. For services, this metric is the proportion for services that are filled so that the service is completed within 24 hours
Order Fulfillment Dwell Time	Any lead time during the order fulfillment process where no activity takes place, which is imposed by customer requirements. Note that this dwell time is different from 'idle time' or 'non-value-add lead time', which is caused by inefficiencies in the organization's processes and therefore ultimately under responsibility of the organization. This kind of idle time should not be deducted from Order Fulfillment Cycle Time.
Reserve Inventory & Determine Delivery Date Cycle Time	The average time associated with reserving inventory and determining a delivery date

Best Practices:

Automatic Reservation of Inventory and Dynamic Sourcing of Product for Single Shipment to Customer	Integrated order management system that treats each order line as a separate order with integration to inventory source and status; Real-time inventory management
Available-to-Promise (ATP)	Available-to-Promise (ATP) provides an availability and feasibility check concerning a customer request or a customer order.
EDI Links between Manufacturing and Distributor to Achieve Visibility of Complete Finished Goods Inventory and Expected Shipments	None identified
Inventory Allocation Exception Process is Clearly Defined and Jointly Owned by Manufacturing and Sales	None identified
Priority-Based Inventory Reservations, for Key Customers, with FIFO Allocation for All Others	None identified

Inputs:

Delivery Plans from P4.4 Establish Delivery Plans	A plan for a course of action over specified time periods that involves a projected appropriation of supply resources to meet delivery requirements.
Inventory Availability from M1.2 Issue Material	Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts).
Inventory Availability from S1.4 Transfer Product	Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts).

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Production Plans from P3.4 Establish Production Plans	A master production plan used to allocate capacity among manufacturing resources and schedule finite manufacturing activities or executing the performance of a service. Production Plan includes production capability.
Production Schedule from M1.1 Schedule Production Activities	A plan that authorizes the factory to manufacture or repair a certain quantity of a specific item.
Sourcing Plans from P2.4 Establish Sourcing Plans	An aggregate material requirements plan used to schedule material deliveries to meet production plan.
Validated Order from D1.2 Receive, Enter & Validate Order	An order that has had the instructions / requirements validated i.e. the information that the order contains is accurate , consistent with previous information and does not violate business policies or rules. Note 1 - this does not make the order ““committed““ there may be other tasks to be performed before a commitment can be made. Note 2 - this order could be customer, internal , purchase or production.

Outputs:

Delivery Date to D1.4 Consolidate Orders	Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts). Determination of the time required from the receipt of the order until the item should be delivered.
Inventory Availability/Delivery Date to P4.2 Identify, Assess, and Aggregate Delivery Resources and Capabilities	Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts). Determination of the time required from the receipt of the order until the item should be delivered.
Order Backlog to P1.1 Identify, Prioritize, and Aggregate Supply Chain Requirements	Orders that have been received and entered into the order processing system and are in a queue waiting to be processed and shipped.
Order Backlog to P4.1 Identify, Prioritize, and Aggregate Delivery Requirements	Orders that have been received and entered into the order processing system and are in a queue waiting to be processed and shipped.
Replenishment Signal to S1.1 Schedule Product Deliveries	Any signal that indicates when to produce or transport Items in a pull replenishment system.
Replenishment Signal to S2.4 Transfer Product	Any signal that indicates when to produce or transport Items in a pull replenishment system.
Replenishment Signal to S3.6 Transfer Product	Any signal that indicates when to produce or transport Items in a pull replenishment system.
Replenishment Signal to S1.4 Transfer Product	Any signal that indicates when to produce or transport Items in a pull replenishment system.
Shipments to P1.1 Identify, Prioritize, and Aggregate Supply Chain Requirements	Transactions related to sending the product to the customer.

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D1.4 Consolidate Orders

The process of analyzing orders to determine the groupings that result in least cost/best service fulfillment and transportation.

Metrics (see Appendix A for metrics attributes):

Consolidate Orders Cycle Time	The average time required for customer order consolidation.
Cost to Consolidate Orders	The sum of the costs associated with consolidating customer orders.

Best Practices:

Combine Consolidation Needs with Other Products/Divisions/Companies	None identified
Consolidate Orders by Customer, Source, Traffic Lane, Carrier, Etc.	Integrated load planning and building with warehouse management

Inputs:

Delivery Date from D1.3 Reserve Inventory & Determine Delivery Date	Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts). Determination of the time required from the receipt of the order until the item should be delivered.

Outputs:

Daily Shipment Volume to Carrier	Daily Shipment Volume categorized by customer, source, traffic lane, carrier, etc.
Daily Shipment Volume to D1.5 Build Loads	Daily Shipment Volume categorized by customer, source, traffic lane, carrier, etc.

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D1.5 Build Loads

Transportation modes are selected and efficient loads are built.

Metrics (see Appendix A for metrics attributes):

Build Loads Cycle Time	The average time associated with building shipment loads.
Cost to Build Loads	The sum of the costs associated with building transportation loads.

Best Practices:

Build Load in Stop Sequence	Integrated inbound/outbound transportation planning (i.e. 1st truck destination loaded last, etc.).
Consolidation of Inbound and Outbound Requirements	Integrated inbound/outbound transportation planning
CRP & VMI Loads Optimized for Utilization	Integration with CRP/VMI vendor systems
Vendor Managed Inventory	VMI is a concept for planning and control of inventory, in which the supplier has access to the customer's inventory data and is responsible for maintaining the inventory level required by the customer. Re-supply is performed by the vendor through regularly scheduled reviews of the on-site inventory. The on-site inventory is counted, damaged or outdated goods are removed, and the inventory is restocked to predefined levels.

Inputs:

Daily Shipment Volume from D1.4 Consolidate Orders	Daily Shipment Volume categorized by customer, source, traffic lane, carrier, etc.

Outputs:

Load Information to P4.2 Identify, Assess, and Aggregate Delivery Resources and Capabilities	Information relative to a load that is built and shipped, i.e. customer, items, destinations, weight, etc
Load Information to D1.6 Route Shipments	Information relative to a load that is built and shipped, i.e. customer, items, destinations, weight, etc
Plan and Build Loads Information to SR2.4 Schedule MRO Shipment	Transportation modes are selected and efficient loads are built.
Plan and Build Loads Information to SR3.4 Schedule Excess Product Shipment	Transportation modes are selected and efficient loads are built.
Plan and Build Loads Information to SR1.4 Schedule Defective Product Shipment	Transportation modes are selected and efficient loads are built.

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D1.6 Route Shipments

Loads are consolidated and routed by mode, lane and location.

Metrics (see Appendix A for metrics attributes):

Cost to Route Shipments	The sum of the costs associated with routing shipments.
Route Shipments Cycle Time	The average time associated with routing shipments

Best Practices:

Carrier/Route Optimization Based on Continuous Movement and Consolidation/Pooling	Route scheduling, carrier selection, and rating
Consolidation of Carriers	Transportation modeling and rate analysis
CRP/VMI	Integrated Load Building; Routing & Scheduling with Advanced Ship Notice (ASN)
Shipment Tracking and Tracing	Satellite communications, GPS, RFID
Vendor Managed Inventory	VMI is a concept for planning and control of inventory, in which the supplier has access to the customer's inventory data and is responsible for maintaining the inventory level required by the customer. Re-supply is performed by the vendor through regularly scheduled reviews of the on-site inventory. The on-site inventory is counted, damaged or outdated goods are removed, and the inventory is restocked to predefined levels.

Inputs:

Load Information from D1.5 Build Loads	Information relative to a load that is built and shipped, i.e. customer, items, destinations, weight, etc
Rated Carrier Data from Source: Carrier	Contract rates and tariffs from carriers by commodity, lane, mode, etc. for shipments.
Routing Guide from Source: Carrier	Information used to select modes, transportation lanes, available carriers, etc. Listing or routes, carriers & rates.

Outputs:

Shipment Routes to D1.7 Select Carriers & Rate Shipments	Routes for shipping by consolidating loads.

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D1.7 Select Carriers & Rate Shipments

Specific carriers are selected by lowest cost per route and shipments are rated and tendered.

Metrics (see Appendix A for metrics attributes):

Cost to Select Carriers & Rate Shipments	The sum of the costs associated with selecting carriers and rating shipments.
Select Carriers & Rate Shipments Cycle Time	The average time associated with selecting carriers and rating shipments

Best Practices:

Select Carriers by Least Cost per Shipment and Rate Using Actual Rates Prior to Release to Billing	Rules based carrier selection and actual rate database

Inputs:

Shipment Routes from D1.6 Route Shipments	Routes for shipping by consolidating loads.

Outputs:

Scheduled Deliveries to Plan	The required or agreed time or rate of delivery of goods or services purchased for a future period.
Scheduled Deliveries to D1.9 Pick Product	The required or agreed time or rate of delivery of goods or services purchased for a future period.

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D1.8 Receive Product from Source or Make

The activities such as receiving product, verifying, recording product receipt, determining put-away location, putting away and recording location that a company performs at its own warehouses. May include quality inspection.

Metrics (see Appendix A for metrics attributes):

Cost to Receive Product from Source or Make	The sum of the costs associated with transferring product from source or make activities.
Receive Product from Source or Make Cycle Time	The average time associated with receiving a transfer of product to deliver processes from source or make

Best Practices:

Automatic Identification	Bar Coding & Radio Frequency Communications
Cross-Docking	Used in many distribution centers (DC) to increase inventory velocity while maintaining shipping efficiency. In a traditional DC, the receiving process is disjointed from the shipping process and storage acts as an intermediary between the two processes. Cross docking actively links the receiving and shipping processes. In a DC, both cross docking (no storage) and traditional (with storage) operations might take place.
Download P.O. & Advanced Ship Notices for Automated Receiving and Put Away	Integration with Procurement Systems & Electronic Commerce with Vendors
Dynamic Location Assignment Including Lot Control, Zoned Put Away, Quality Assurance, ABC Frequency of Access	Real time inventory control, stock locator, and rules based put away logic
Merge-in-Transit	Merge-in-Transit is a practice to combine items from multiple sources into a single customer shipment. This includes items on stock in the distribution center, from which the shipment is sent, items on stock in other distribution centers, items on stock elsewhere (e.g. at a plant or a supplier) as well as make-to-order items. The items to be merged are cross-docked from inbound receipt to outbound shipping. Merging is usually performed in a shipper's distribution center (DC) or in a carrier's terminal.

Inputs:

Authorization to Return to Service from SR2.2 Disposition MRO Product	Permission to return to service an item that has been repaired and found to be within specifications and operable.
Authorization to Return to Service from SR1.2 Disposition Defective Product	Permission to return to service an item that has been repaired and found to be within specifications and operable.
Authorization to Return to Service from SR3.2 Disposition Excess Product	Permission to return to service an item that has been repaired and found to be within specifications and operable.
Authorization to Scrap from SR3.2 Disposition Excess Product	Permission to scrap material or item outside of specifications and possessing characteristics that make rework impractical.
Authorization to Scrap from SR1.2 Disposition Defective Product	Permission to scrap material or item outside of specifications and possessing characteristics that make rework impractical.
Authorization to Scrap from SR2.2 Disposition MRO Product	Permission to scrap material or item outside of specifications and possessing characteristics that make rework impractical.

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Finished Product Release from M1.6 Release Product to Deliver	The authorization to ship a finished product that has been ordered.
Inventory Availability from S1.4 Transfer Product	Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts).
Production Schedule from M1.1 Schedule Production Activities	A plan that authorizes the factory to manufacture or repair a certain quantity of a specific item.
Scheduled Receipts from S1.1 Schedule Product Deliveries	Product due to arrive.

Outputs:

Existing Inventory Data to ED.4 Manage Finished Goods Inventories	Available data that characterizes and quantifies raw material, work in process, and finished goods inventories
Inventory Availability to D1.9 Pick Product	Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts).

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D1.9 Pick Product

The series of activities including retrieving orders to pick, determining inventory availability, building the pick wave, picking the product, recording the pick and delivering product to shipping in response to an order.

Metrics (see Appendix A for metrics attributes):

Cost to Pick Product	The sum of the costs associated with picking product.
Fill Rate	The percentage of ship-from-stock orders shipped within 24 hours of order receipt. For services, this metric is the proportion for services that are filled so that the service is completed within 24 hours
Pick Product Cycle Time	The average time associated with product pick

Best Practices:

Dynamic Location Assignment Including Lot Control, Zoned Picking, Quality Assurance	Real time inventory control, stock locator, and rules based picking logic
Dynamic Simulation of Picking Requirements Optimized for Labor, Cost, and Time	Rules based picking logic and simulation
Merge-in-Transit	Merge-in-Transit is a practice to combine items from multiple sources into a single customer shipment. This includes items on stock in the distribution center, from which the shipment is sent, items on stock in other distribution centers, items on stock elsewhere (e.g. at a plant or a supplier) as well as make-to-order items. The items to be merged are cross-docked from inbound receipt to outbound shipping. Merging is usually performed in a shipper's distribution center (DC) or in a carrier's terminal.
Use of Speed Racks for Automated Material Handling	None identified
Wave picking	A practice used in many DC operations to increase labor picking productivity and reduce the labor cost per pick. In some DC's, orders are scheduled to be picked when they are received. Wave picking consolidates orders into "waves" where multiple orders with similar characteristics are picked at one time. Orders can be consolidated by customer, geography, or any other criteria that makes sense for the DC operation.

Inputs:

Scheduled Deliveries from D1.7 Select Carriers & Rate Shipments	The required or agreed time or rate of delivery of goods or services purchased for a future period.
Inventory Availability from D1.8 Receive Product from Source or Make	Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts).

Outputs:

Workflow to D1.10 Pack Product

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D1.10 Pack Product

The activities such as sorting / combining the products, packing / kitting the products, paste labels, barcodes etc. and delivering the products to the shipping area for loading.

Metrics (see Appendix A for metrics attributes):

Cost to Pack Product	The sum of the costs associated with product packaging.
Pack Product Cycle Time	The average time associated with packing a product for shipment.

Inputs:

Workflow from D1.9 Pick Product

Outputs:

Workflow to D1.11 Load Vehicle & Generate Shipping Documentation

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D1.11 Load Vehicle & Generate Shipping Documentation

The series of tasks including placing/loading product onto modes of transportation and generating the documentation necessary to meet internal, customer, carrier and government needs.

Metrics (see Appendix A for metrics attributes):

Cost to Load Product & Generate Shipping Documentation	The sum of the costs associated with loading product & generating shipping documentation.
Delivery Performance to Customer Commit Date	The percentage of orders that are fulfilled on the customer's original commit date
Documentation Accuracy	Percentage of orders with on time and accurate documentation supporting the order, including packing slips, bills of lading, invoices, etc. [Total number of orders delivered with correct and timely documentation] / [Total number of orders delivered] x 100%
Load Product & Generate Shipping Documentation Cycle Time	The average time associated with product loading and the generation of shipping documentation

Best Practices:

Advanced Shipping Notices & UCC128 Container Labeling	Bar coding; EDI; integrated transportation/warehouse management
Carrier Agreement	Carrier agreements are agreements between a company and its domestic and global carriers (for both, inbound raw materials and outbound finished goods) specifying service levels, payment terms, and other conditions.
Cross-Docking	Used in many distribution centers (DC) to increase inventory velocity while maintaining shipping efficiency. In a traditional DC, the receiving process is disjointed from the shipping process and storage acts as an intermediary between the two processes. Cross docking actively links the receiving and shipping processes. In a DC, both cross docking (no storage) and traditional (with storage) operations might take place.
Electronic Generation and Download of Shipping Documents	None identified
Full Visibility of Credit History by Shipping Personnel	None identified
Integrated Credit Checking	Interface to supplier's shipping system to financials
Shipment Tracking	None identified

Inputs:

Shipping Export Parameters and Documentation from ED.8 Manage Import/Export Requirements	Shipping and documentation requirements established by a government which must be met before allowing the shipping or delivery of a product across national boundaries.
Shipping Parameters and Documentation from ED.6 Manage Transportation	Shipping parameters, such as weight, size, cube and route decide carrier and cost. Legal documentation of the contents of a shipment (e.g. way bill, bill of lading, export papers, etc.) are required.

Outputs:

Delivered End Items to Customer	Products that have been acknowledged as received by the customer.
Load, Shipping, Verify, and Credit Information to SR1.5 Return Defective Product	The function that performs tasks for the outgoing shipment of parts, components, and products. It includes packaging, marking, weighing, and loading for shipment. Also, verify the shipment and customer credit information.

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Load, Shipping, Verify, and Credit Information to SR2.5 Return MRO Product	The function that performs tasks for the outgoing shipment of parts, components, and products. It includes packaging, marking, weighing, and loading for shipment. Also, verify the shipment and customer credit information.
Load, Shipping, Verify, and Credit Information to SR3.5 Return Excess Product	The function that performs tasks for the outgoing shipment of parts, components, and products. It includes packaging, marking, weighing, and loading for shipment. Also, verify the shipment and customer credit information.
Order Backlog to P1.1 Identify, Prioritize, and Aggregate Supply Chain Requirements	Orders that have been received and entered into the order processing system and are in a queue waiting to be processed and shipped.
Shipments to P1.1 Identify, Prioritize, and Aggregate Supply Chain Requirements	Transactions related to sending the product to the customer.
Shipping Documents to Government	Legal documentation of the contents of a shipment (e.g. way bill, bill of lading, export papers, etc....).
Shipping Documents to Customer	Legal documentation of the contents of a shipment (e.g. way bill, bill of lading, export papers, etc....).
Shipping Documents to Carrier	Legal documentation of the contents of a shipment (e.g. way bill, bill of lading, export papers, etc....).
Shipping History to ED.8 Manage Import/Export Requirements	The transaction history of the physical shipment of an item to another internal location or to a customer.

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D1.12 Ship Product

The process of shipping the product to the customer site.

Metrics (see Appendix A for metrics attributes):

% of Orders Delivered in Full	Percentage of orders which all of the items are received by customer in the quantities committed The number of orders that are received by the customer in the quantities committed divided by the total orders [Total number of orders delivered in full] / [Total number of orders delivered] x 100%
Cost to Ship Product	The sum of the costs associated with shipping products.
Delivery Performance to Customer Commit Date	The percentage of orders that are fulfilled on the customer's original commit date
Ship Product Cycle Time	The average time associated with shipping product

Best Practices:

Cross-Docking	Used in many distribution centers (DC) to increase inventory velocity while maintaining shipping efficiency. In a traditional DC, the receiving process is disjointed from the shipping process and storage acts as an intermediary between the two processes. Cross docking actively links the receiving and shipping processes. In a DC, both cross docking (no storage) and traditional (with storage) operations might take place.
Shipment Tracking	None identified

Inputs:

Workflow from D1.11 Load Vehicle & Generate Shipping Documentation

Outputs:

Workflow to D1.13 Receive & Verify Product by Customer

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D1.13 Receive & Verify Product by Customer

The process of receiving the shipment by the customer site (either at customer site or at shipping area in case of self-collection) and verifying that the order was shipped complete and that the product meets delivery terms.

Metrics (see Appendix A for metrics attributes):

% of Orders Delivered in Full	Percentage of orders which all of the items are received by customer in the quantities committed The number of orders that are received by the customer in the quantities committed divided by the total orders [Total number of orders delivered in full] / [Total number of orders delivered] x 100%
Cost to Receive & Verify Product by Customer	The sum of the costs associated with receipt and verification at customer site.
Delivery Performance to Customer Commit Date	The percentage of orders that are fulfilled on the customer's original commit date
Perfect Condition	Percentage of orders delivered in an undamaged state that meet specification, have the correct configuration, are faultlessly installed (as applicable), and accepted by the customer [Number of orders delivered in Perfect Condition] / [Number of orders delivered] x 100%
Receive & Verify Product by Customer Cycle Time	The average time associated with receiving and verifying an order at the customer site

Best Practices:

Advanced Shipping Notices & UCC128 Container Labeling	Bar coding; EDI; integrated transportation/warehouse management

Inputs:

Workflow from D1.12 Ship Product

Outputs:

Product to D1.14 Install Product	The end object of a transformation process that includes physical objects, information or services.

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D1.14 Install Product

When necessary, the process of preparing, testing and installing the product at the customer site. The product is fully functional upon completion.
Each occurrence consumes time:

Metrics (see Appendix A for metrics attributes):

% of Faultless Installations	Number of Faultless Installations divided by Total Number of Units Installed.
Cost to Install Product	The sum of the costs associated with product installation.
Install Product Cycle Time	The average time associated with product installation
Perfect Condition	Percentage of orders delivered in an undamaged state that meet specification, have the correct configuration, are faultlessly installed (as applicable), and accepted by the customer [Number of orders delivered in Perfect Condition] / [Number of orders delivered] x 100%

Best Practices:

Joint Service Agreements to Document Acceptable Service Levels in Terms of Installation Costs, Installation Cycle Time, Etc.	Collaborative planning tools with the Source suppliers (This would be effective between customer and supplier, and between internal functions such as Field Service, Manufacturing, Marketing and Order Management)

Inputs:

Product from D1.13 Receive & Verify Product by Customer	The end object of a transformation process that includes physical objects, information or services.

Outputs:

Installed Product to D1.15 Invoice	The process of preparing, testing and installing the product at the customer site. The standalone product is fully functional upon completion, but there may be requirement for subsequent integration.

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D1.15 Invoice

A signal is sent to the financial organization that the order has been shipped and that the billing process should begin and payment be received or be closed out if payment has already been received. Payment is received from the customer within the payment terms of the invoice.

Metrics (see Appendix A for metrics attributes):

% of Faultless Invoices	The number of invoices processed without issues and or errors divided by the total number of invoices. Examples of potential invoice defects are: Change from customer purchase order without proper customer involvement Wrong Customer Information (e.g., name, address, telephone number) Wrong Product Information (e.g., part number, product description) Wrong Price (e.g., discounts not applied) Wrong Quantity or Wrong Terms or Wrong Date
Cost to Invoice	The sum of the costs associated with invoicing.
Documentation Accuracy	Percentage of orders with on time and accurate documentation supporting the order, including packing slips, bills of lading, invoices, etc. [Total number of orders delivered with correct and timely documentation] / [Total number of orders delivered] x 100%
Invoice Cycle Time	The average time associated with the the generation and issuance of an invoice

Best Practices:

Electronic Transfer of Shipment Information to Finance	None identified
Provide Visibility to and Quickly Escalate Delinquent Accounts for Resolution	Integrated accounts receivables
Utilize EDI and EFT for Payment to Speed Closing of Receivables and to Reduce Processing Costs	EDI transaction and network services

Inputs:

Installed Product from D1.14 Install Product	The process of preparing, testing and installing the product at the customer site. The standalone product is fully functional upon completion, but there may be requirement for subsequent integration.

Outputs:

Payment to Company	Receipt of payment for goods and services per contract or purchase order.

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D2 Deliver Make-to-Order Product

The process of delivering product that is manufactured, assembled or configured from standard parts or subassemblies. Manufacture, assembly or configuration will begins only after the receipt and validation of a firm customer order.

The Category D2 includes fifteen Level 3 Elements:

D2.1 Process Inquiry & Quote	Receive and respond to general customer inquiries and requests for quotes.
D2.10 Pack Product	The activities such as sorting / combining the products, packing / kitting the products, paste labels, barcodes etc. ande delivering the products to the shipping area for loading.
D2.11 Load Product & Generate Shipping Documentation	The series of tasks including placing/loading product onto modes of transportation and generating the documentation necessary to meet internal, customer, carrier and government needs..
D2.12 Ship Product	The process of shipping the product to the customer site.
D2.13 Receive & Verify Product by Customer	The process of receiving the shipment at the customer (either at customer site or at shipping area in case of self-collection) site and verifying that the order was shipped complete and that the product meets delivery terms.
D2.14 Install Product	When necessary, the process of preparing, testing and installing the product at the customer site. The product is fully functional upon completion.
D2.15 Invoice	A signal is sent to the financial organization that the order has been shipped and that the billing process should begin and payment be received or be closed out if payment has already been received. Payment is received from the customer within the payment terms of the invoice.
D2.2 Receive, Configure, Enter and Validate Order	Receive orders from the customer and enter them into a company's order processing system. Orders can be received through phone, fax, or through electronic media. Configure your product to the customer's specific needs, based on standard available parts or options. "Technically" examine order to ensure an orderable configuration and provide accurate price. Check the customer's credit. Optionally accept payment.
D2.3 Reserve Resources & Determine Delivery Date	Inventory and/or planned capacity is identified and reserved for specific orders, and a delivery date is committed and scheduled.
D2.4 Consolidate Orders	The process of analyzing orders to determine the groupings that result in least cost/best service fulfillment and transportation.
D2.5 Build Loads	Transportation modes are selected and efficient loads are built.
D2.6 Route Shipments	Loads are consolidated and routed by mode, lane and location.
D2.7 Select Carriers & Rate Shipments	Specific carriers are selected by lowest cost per route and shipments are rated and tendered.
D2.8 Receive Product from Source or Make	The activities such as receiving product, verifying, recording product receipt, determining put-away location, putting away and recording location that a company performs at its own warehouses. May include quality inspection.
D2.9 Pick Product	The series of activities including retrieving orders to pick, verifying inventory availability, building the pick wave, picking the product, recording the pick and delivering product to packing area in response to an order.

Metrics (see Appendix A for metrics attributes):

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Cash-To-Cash Cycle Time	[Inventory Days of Supply + Days Sales Outstanding - Days Payable Outstanding] The time it takes for an investment made to flow back into a company after it has been spent for raw materials. For services, this represents the time from the point where a company pays for the resources consumed in the performance of a service to the time that the company received payment from the customer for those services.
Cost to Deliver	The sum of the costs associated with deliver
Deliver Cycle Time	The average time associated with Deliver Processes
Downside Deliver Adaptability	The reduction in delivered quantities sustainable at 30 days prior to delivery with no inventory or cost penalties.
Finished Goods Inventory Days of Supply	Plant finished goods inventory days of supply are calculated as gross plant finished goods inventory ÷ (value of transfers/365 days).
Order Fulfillment Cycle Time	The average actual cycle time consistently achieved to fulfill customer orders.
Perfect Order Fulfillment	The percentage of orders meeting delivery performance with complete and accurate documentation and no delivery damage. Components include all items and quantities on-time using the customer's definition of on-time, and documentation - packing slips, bills of lading, invoices, etc.
Return on Supply Chain Fixed Assets	Return on Supply Chain Fixed Assets measures the return an organization receives on its invested capital in supply chain fixed assets. This includes the fixed assets used in Plan, Source, Make, Deliver, and Return. The levels of aggregation can be at any element associated with a supply chain asset.
Return on Working Capital	Return on working capital is a measurement which assesses the magnitude of investment relative to a company's working capital position verses the revenue generated from a supply chain. Components include accounts receivable, accounts payable, inventory, supply chain revenue, cost of goods sold and supply chain management costs.
Upside Deliver Adaptability	The maximum sustainable percentage increase in quantities delivered that can be achieved in 30 days with the assumption of unconstrained finished good availability.
Upside Deliver Flexibility	The number of days required to achieve an unplanned sustainable 20% increase in quantity delivered with the assumption of no other constraints.

Best Practices:

Postponement	Postponement (delayed differentiation) is a supply chain concept where a product is kept as long as possible in a generic state. Differentiation of the generic product into a specific end-product is shifted closer to the consumer by postponing identify changes, such as assembly or packaging, to the last possible supply chain location.

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D2.1 Process Inquiry & Quote

Receive and respond to general customer inquiries and requests for quotes.

Metrics (see Appendix A for metrics attributes):

.		Cost to Process Inquiry & Quote		The sum of the costs associated with processing inquiry and quotes.
.		Process Inquiry & Quote Cycle Time		The average time associated with processing inquiries and quotes

Best Practices:

.		Quote Capability, without Reserving Inventory, Which Can Be Converted into an Order in a Single Step		None identified
.		Quote Capability, without Reserving Inventory, Which Can be Converted into an Order, But Does Not Generate Build Signal or Reserve Inventory Capacity		None identified
.		Single Point of Contact for All Order Inquiries (Including Order Entry)		None identified

Inputs:

.		Customer Inquiry from Source: Customer		General customer inquiries for information concerning products, availability, cost, and requests for quotes.

Outputs:

.		Order Quote (Customer) to Customer		A statement of price, terms of sale, and description of goods or services offered by a supplier to a prospective purchaser; a bid. When given in response to an inquiry, it is usually considered an offer to sell.
.		Order Quote (Customer) to D2.2 Receive, Configure, Enter and Validate Order		A statement of price, terms of sale, and description of goods or services offered by a supplier to a prospective purchaser; a bid. When given in response to an inquiry, it is usually considered an offer to sell.

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D2.2 Receive, Configure, Enter and Validate Order

Receive orders from the customer and enter them into a company's order processing system. Orders can be received through phone, fax, or through electronic media. Configure your product to the customer's specific needs, based on standard available parts or options. "Technically" examine order to ensure an orderable configuration and provide accurate price. Check the customer's credit. Optionally accept payment.

Metrics (see Appendix A for metrics attributes):

.	Cost to Receive, Enter & Validate Order		The sum of the costs associated with receiving, entering and validating a customer order.
.	Order Fulfillment Dwell Time		Any lead time during the order fulfillment process where no activity takes place, which is imposed by customer requirements. Note that this dwell time is different from 'idle time' or 'non-value-add lead time', which is caused by inefficiencies in the organization's processes and therefore ultimately under responsibility of the organization. This kind of idle time should not be deducted from Order Fulfillment Cycle Time.
.	Receive, Configure, Enter & Validate Order Cycle Time		The average time associated with receiving and verifying an order at the customer site

Best Practices:

.	Automated Configuration Management		Configuration
.	Automatic Multi-level Credit Checking: Dollar Limits; Days Sales Outstanding; Margin Testing		Integrated Order/Financial Management
.	Continuous Replenishment Programs; Vendor Managed Inventory, Telemetry to Automatically Communicate Replenishment of Chemicals		Integrated demand/deployment planning to customer location driven by POS; Customer movement data
.	Electronic Commerce (Customer Visibility of Stock Availability, Use of Hand-Held Terminals for Direct Order Entry, Confirmation, Credit Approval), On-Line Stock Check and Reservation of Inventory		EDI applications and integrated order management
.	Enable Real-Time Visibility into Backlog, Order Status, Shipments, Scheduled Material Receipts, Customer Credit History, and Current Inventory Positions		None identified
.	Order Entry is Organized by Customer Segment Customers Receive Differentiated Service Based on Volume of Business Customer Team is Empowered to Fully Service Customer Requests, Including Formal Orders and Ad Hoc Requests Customers Have One Point of Contact for All Products		None identified
.	Remote (Sales, Customers) Order Entry Capability		None identified
.	Value Pricing Based on "Cost to Serve"; EDLP; Cost Plus Pricing		Activity Based Costing; Integrated Order Management by Customer by Line Item

Inputs:

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.	Configuration Rules from ED.1 Manage Deliver Business Rules		The rules for the management of product configuration, which includes the management of critical sub processes needed to manage the life cycle of individual item numbers including item masters, routings, rationalization, and bill of materials.
.	Contract Terms from Source: Customer		All the provisions and agreements of a contract.
.	Credit History from Source: Customer		Report that portrays a potential customer's payment history and debt, indicating the ability to pay in a timely manner in the future.
.	Order Quote (Customer) from D2.1 Process Inquiry & Quote		A statement of price, terms of sale, and description of goods or services offered by a supplier to a prospective purchaser; a bid. When given in response to an inquiry, it is usually considered an offer to sell.
.	Order Rules from ED.1 Manage Deliver Business Rules		Rules for the function that encompasses receiving, entering, and promising orders from customers, distribution centers, and interplant operations.

Outputs:

.	Actual Sales History to P5.1 Assess, and Aggregate Return Requirements		Amount of past sales spanning any specified period of time (weeks, months, years, etc.) and expressed in any specified increments (per day, week, month, year, etc.)
.	Booked Order to D2.3 Reserve Resources & Determine Delivery Date		The process of accepting and translating what a customer wants into terms used by the manufacturer or distributor. The commitment should be based on the available-to-promise line (ATP) in the master schedule. This can be as simple as creating shipping documents for finished goods in a make-to-stock environment, or it might be a more complicated series of activities, including design efforts for make-to-order products
.	Booked Order to ED.3 Manage Deliver Information		The process of accepting and translating what a customer wants into terms used by the manufacturer or distributor. The commitment should be based on the available-to-promise line (ATP) in the master schedule. This can be as simple as creating shipping documents for finished goods in a make-to-stock environment, or it might be a more complicated series of activities, including design efforts for make-to-order products
.	Contract Status to ED.3 Manage Deliver Information		Customer profile, which include address data, credit and purchase histories, customer preferences including shipping, status, and delivery requirements, etc.
.	Credit History to ED.3 Manage Deliver Information		Report that portrays a potential customer's payment history and debt, indicating the ability to pay in a timely manner in the future.
.	Customer Address Data to ED.3 Manage Deliver Information		Customer profile, which include address data, credit and purchase histories, customer preferences including shipping, status, and delivery requirements, etc.
.	Customer Order Size, Weight, and Freight Class to ED.6 Manage Transportation		Coupled with cube and route, these criteria determine type of carrier and cost of shipment

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.		Location of Customers to ED.7 Manage Product Life Cycle		Customer profile, which includes address and location data, credit and purchase histories, customer preferences including shipping, status, and delivery requirements, etc.
.		Optional Payment to Company		Payment at the time of order, maybe partial or in full.
.		Purchase History to ED.3 Manage Deliver Information		The amount of purchased products for a certain time in history per specific intervals
.		Shipping Preferences to ED.3 Manage Deliver Information		Customer preferences including shipping, status, and delivery requirements, etc., and customer profile, which includes address data, credit and purchase histories,

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D2.3 Reserve Resources & Determine Delivery Date

Inventory and/or planned capacity is identified and reserved for specific orders, and a delivery date is committed and scheduled.

Metrics (see Appendix A for metrics attributes):

.		% of Orders Delivered in Full		Percentage of orders which all of the items are received by customer in the quantities committed The number of orders that are received by the customer in the quantities committed divided by the total orders [Total number of orders delivered in full] / [Total number of orders delivered] x 100%
.		Cost to Reserve Resources & Determine Delivery Date		The sum of the costs associated with reserving resources and determining a delivery date.
.		Delivery Performance to Customer Commit Date		The percentage of orders that are fulfilled on the customer's original commit date
.		Order Fulfillment Dwell Time		Any lead time during the order fulfillment process where no activity takes place, which is imposed by customer requirements. Note that this dwell time is different from 'idle time' or 'non-value-add lead time', which is caused by inefficiencies in the organization's processes and therefore ultimately under responsibility of the organization. This kind of idle time should not be deducted from Order Fulfillment Cycle Time.
.		Reserve Resources & Determine Delivery Date Cycle Time		The average time associated with reserving resources and determining a delivery date

Best Practices:

.		Automatic Reservation of Inventory and Dynamic Sourcing of Product for Single Shipment to Customer		Integrated order management system that treats each order line as a separate order with integration to inventory source and status; Real-time inventory management
.		Available-to-Promise (ATP)		Available-to-Promise (ATP) provides an availability and feasibility check concerning a customer request or a customer order.
.		Dynamic Deployment Based on Constraint Based Planning and Optimal Scheduling		Advanced planning and scheduling logic with constraint, cost, and resource optimization

Inputs:

.		Booked Order from D2.2 Receive, Configure, Enter and Validate Order		The process of accepting and translating what a customer wants into terms used by the manufacturer or distributor. The commitment should be based on the available-to-promise line (ATP) in the master schedule. This can be as simple as creating shipping documents for finished goods in a make-to-stock environment, or it might be a more complicated series of activities, including design efforts for make-to-order products
.		Delivery Plans from P4.4 Establish Delivery Plans		A plan for a course of action over specified time periods that involves a projected appropriation of supply resources to meet delivery requirements.
.		Inventory Availability from S2.4 Transfer Product		Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts).

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.	Production Plans from P3.4 Establish Production Plans		A master production plan used to allocate capacity among manufacturing resources and schedule finite manufacturing activities or executing the performance of a service. Production Plan includes production capability.
.	Production Schedule from M2.1 Schedule Production Activities		A plan that authorizes the factory to manufacture or repair a certain quantity of a specific item.
.	Sourcing Plans from P2.4 Establish Sourcing Plans		An aggregate material requirements plan used to schedule material deliveries to meet production plan.

Outputs:

.	Available to Promise Date to Make		The uncommitted portion of a company's inventory and planned production maintained in the master schedule to support customer-order promising. The ATP quantity is the uncommitted inventory balance in the first period and is normally calculated for each period in which an MPS receipt is scheduled. In the first period, ATP includes on-hand inventory less customer orders that are due and overdue
.	Customer Order to ED.2 Assess Delivery Performance		An order from a customer for a particular product or a number of products. It is often referred to as an actual demand to distinguish it from a forecasted demand.
.	Delivery Date to D2.4 Consolidate Orders		Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts). Determination of the time required from the receipt of the order until the item should be delivered.
.	Inventory Availability/Delivery Date to P4.2 Identify, Assess, and Aggregate Delivery Resources and Capabilities		Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts). Determination of the time required from the receipt of the order until the item should be delivered.
.	Inventory Status to Deliver		A periodic report showing the inventory on hand and usually showing the inventory on order and some sales or usage history for the products that are covered in the stock status report.
.	Inventory Status to Plan		A periodic report showing the inventory on hand and usually showing the inventory on order and some sales or usage history for the products that are covered in the stock status report.
.	Inventory Status to Make		A periodic report showing the inventory on hand and usually showing the inventory on order and some sales or usage history for the products that are covered in the stock status report.
.	Inventory Status to Source		A periodic report showing the inventory on hand and usually showing the inventory on order and some sales or usage history for the products that are covered in the stock status report.
.	Order Backlog to P4.1 Identify, Prioritize, and Aggregate Delivery Requirements		Orders that have been received and entered into the order processing system and are in a queue waiting to be processed and shipped.

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.		Order Signal to P3.1 Identify, Prioritize, and Aggregate Production Requirements		Reserved inventory and/or planned capacity and delivery date for a specific order.
.		Order Signal to P2.1 Identify, Prioritize, and Aggregate Product Requirements		Reserved inventory and/or planned capacity and delivery date for a specific order.
.		Replenishment Signal to S2.1 Schedule Product Deliveries		Any signal that indicates when to produce or transport Items in a pull replenishment system.

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D2.4 Consolidate Orders

The process of analyzing orders to determine the groupings that result in least cost/best service fulfillment and transportation.

Metrics (see Appendix A for metrics attributes):

.		Consolidate Orders Cycle Time		The average time required for customer order consolidation.
.		Cost to Consolidate Orders		The sum of the costs associated with consolidating customer orders.

Best Practices:

.		Consolidate Orders by Customer, Source, Traffic Lane, Carrier, Etc.		Integrated load planning and building with warehouse management

Inputs:

.		Delivery Date from D2.3 Reserve Resources & Determine Delivery Date		Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts). Determination of the time required from the receipt of the order until the item should be delivered.

Outputs:

.		Consolidated Orders to D2.5 Build Loads		The process of analyzing orders to determine the groupings that result in least cost/best service fulfillment and transportation.

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D2.5 Build Loads

Transportation modes are selected and efficient loads are built.

Metrics (see Appendix A for metrics attributes):

.		Build Loads Cycle Time		The average time associated with building shipment loads.
.		Cost to Build Loads		The sum of the costs associated with building transportation loads.

Best Practices:

.		Build Load in Stop Sequence		Integrated inbound/outbound transportation planning (i.e. 1st truck destination loaded last, etc.).
.		Consolidation of Inbound and Outbound Requirements		Integrated inbound/outbound transportation planning
.		CRP & VMI Loads Optimized for Utilization		Integration with CRP/VMI vendor systems

Inputs:

.		Consolidated Orders from D2.4 Consolidate Orders		The process of analyzing orders to determine the groupings that result in least cost/best service fulfillment and transportation.

Outputs:

.		Load Information to D2.6 Route Shipments		Information relative to a load that is built and shipped, i.e. customer, items, destinations, weight, etc

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D2.6 Route Shipments

Loads are consolidated and routed by mode, lane and location.

Metrics (see Appendix A for metrics attributes):

.		Cost to Route Shipments		The sum of the costs associated with routing shipments.
.		Route Shipments Cycle Time		The average time associated with routing shipments

Best Practices:

.		Carrier/Route Optimization Based on Continuous Movement and Consolidation/Pooling		Route scheduling, carrier selection, and rating
.		Consolidation of Carriers		Transportation modeling and rate analysis
.		CRP/VMI		Integrated Load Building; Routing & Scheduling with Advanced Ship Notice (ASN)
.		Shipment Tracking and Tracing		Satellite communications, GPS, RFID
.		Vendor Managed Inventory		VMI is a concept for planning and control of inventory, in which the supplier has access to the customer's inventory data and is responsible for maintaining the inventory level required by the customer. Re-supply is performed by the vendor through regularly scheduled reviews of the on-site inventory. The on-site inventory is counted, damaged or outdated goods are removed, and the inventory is restocked to predefined levels.

Inputs:

.		Load Information from D2.5 Build Loads		Information relative to a load that is built and shipped, i.e. customer, items, destinations, weight, etc
.		Rated Carrier Data from Source: Company		Contract rates and tariffs from carriers by commodity, lane, mode, etc. for shipments.
.		Routing Guide from Source: Company		Information used to select modes, transportation lanes, available carriers, etc. Listing or routes, carriers & rates.

Outputs:

.		Scheduled Deliveries to Plan		The required or agreed time or rate of delivery of goods or services purchased for a future period.
.		Shipment Routes to D2.7 Select Carriers & Rate Shipments		Routes for shipping by consolidating loads.

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D2.7 Select Carriers & Rate Shipments

Specific carriers are selected by lowest cost per route and shipments are rated and tendered.

Metrics (see Appendix A for metrics attributes):

.	Cost to Select Carriers & Rate Shipments		The sum of the costs associated with selecting carriers and rating shipments.
.	Select Carriers & Rate Shipments Cycle Time		The average time associated with selecting carriers and rating shipments

Best Practices:

.	Select Carriers by Least Cost per Shipment and Rate Using Actual Rates Prior to Release to Billing		Rules based carrier selection and actual rate database

Inputs:

.	Shipment Routes from D2.6 Route Shipments		Routes for shipping by consolidating loads.

Outputs:

.	Workflow to D2.9 Pick Product

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D2.8 Receive Product from Source or Make

The activities such as receiving product, verifying, recording product receipt, determining put-away location, putting away and recording location that a company performs at its own warehouses. May include quality inspection.

Metrics (see Appendix A for metrics attributes):

.		Cost to Receive Product from Source or Make		The sum of the costs associated with transferring product from source or make activities.
.		Receive Product from Source or Make Cycle Time		The average time associated with receiving a transfer of product to deliver processes from source or make

Best Practices:

.		Automatic Identification		Bar Coding & Radio Frequency Communications
.		Cross-Docking		Used in many distribution centers (DC) to increase inventory velocity while maintaining shipping efficiency. In a traditional DC, the receiving process is disjointed from the shipping process and storage acts as an intermediary between the two processes. Cross docking actively links the receiving and shipping processes. In a DC, both cross docking (no storage) and traditional (with storage) operations might take place.
.		Download P.O. & Advanced Ship Notices for Automated Receiving and Put Away		Integration with Procurement Systems & Electronic Commerce with Vendors
.		Dynamic Location Assignment Including Lot Control, Zoned Picking, Quality Assurance		Real time inventory control, stock locator, and rules based picking logic

Outputs:

.		Workflow to D2.9 Pick Product

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D2.9 Pick Product

The series of activities including retrieving orders to pick, verifying inventory availability, building the pick wave, picking the product, recording the pick and delivering product to packing area in response to an order.

Metrics (see Appendix A for metrics attributes):

.	Cost to Pick Product		The sum of the costs associated with picking product.
.	Pick Product Cycle Time		The average time associated with product pick

Best Practices:

.	Dynamic Location Assignment Including Lot Control, Zoned Picking, Quality Assurance		Real time inventory control, stock locator, and rules based picking logic
.	Dynamic Simulation of Picking Requirements Optimized for Labor, Cost, and Time		Rules based picking logic and simulation
.	Use of Speed Racks for Automated Material Handling		None identified

Inputs:

.	Workflow from D2.7 Select Carriers & Rate Shipments		
.	Workflow from D2.8 Receive Product from Source or Make		
.	Finished Product Release from M2.6 Release Finished Product to Deliver		The authorization to ship a finished product that has been ordered.
.	Inventory Availability from S2.4 Transfer Product		Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts).
.	Inventory Availability from M2.2 Issue Sourced/In-Process Product		Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts).
.	Production Schedule from M2.1 Schedule Production Activities		A plan that authorizes the factory to manufacture or repair a certain quantity of a specific item.
.	WIP Location Rules from EM.6 Manage Transportation		The process and rules for establishing and maintaining in-process item inventory ownership and stocking locations.

Outputs:

.	Workflow to D2.10 Pack Product

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D2.10 Pack Product

The activities such as sorting / combining the products, packing / kitting the products, paste labels, barcodes etc. and delivering the products to the shipping area for loading.

Metrics (see Appendix A for metrics attributes):

.	Cost to Pack Product		The sum of the costs associated with product packaging.
.	Pack Product Cycle Time		The average time associated with packing a product for shipment.

Inputs:

.	Workflow from D2.9 Pick Product

Outputs:

.	Workflow to D2.11 Load Product & Generate Shipping Documentation

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D2.11 Load Product & Generate Shipping Documentation

The series of tasks including placing/loading product onto modes of transportation and generating the documentation necessary to meet internal, customer, carrier and government needs.

Metrics (see Appendix A for metrics attributes):

.	Cost to Load Product & Generate Shipping Documentation		The sum of the costs associated with loading product & generating shipping documentation.
.	Delivery Performance to Customer Commit Date		The percentage of orders that are fulfilled on the customer's original commit date
.	Documentation Accuracy		Percentage of orders with on time and accurate documentation supporting the order, including packing slips, bills of lading, invoices, etc. [Total number of orders delivered with correct and timely documentation] / [Total number of orders delivered] x 100%
.	Load Product & Generate Shipping Documentation Cycle Time		The average time associated with product loading and the generation of shipping documentation

Best Practices:

.	Advanced Shipping Notices & UCC128 Container Labeling		Bar coding; EDI; integrated transportation/warehouse management
.	Carrier Agreement		Carrier agreements are agreements between a company and its domestic and global carriers (for both, inbound raw materials and outbound finished goods) specifying service levels, payment terms, and other conditions.
.	Cross-Docking		Used in many distribution centers (DC) to increase inventory velocity while maintaining shipping efficiency. In a traditional DC, the receiving process is disjointed from the shipping process and storage acts as an intermediary between the two processes. Cross docking actively links the receiving and shipping processes. In a DC, both cross docking (no storage) and traditional (with storage) operations might take place.
.	Electronic Generation and Download of Shipping Documents		None identified
.	Full Visibility of Credit History by Shipping Personnel		None identified
.	Integrated Credit Checking		Interface to supplier's shipping system to financials

Inputs:

.	Workflow from D2.10 Pack Product		
.	Shipping Export Parameters and Documentation from ED.8 Manage Import/Export Requirements		Shipping and documentation requirements established by a government which must be met before allowing the shipping or delivery of a product across national boundaries.
.	Shipping Parameters and Documentation from ED.6 Manage Transportation		Shipping parameters, such as weight, size, cube and route decide carrier and cost. Legal documentation of the contents of a shipment (e.g. way bill, bill of lading, export papers, etc.) are required.

Outputs:

.	Workflow to D2.12 Ship Product		
.	Advanced Ship Notice to D2.13 Receive & Verify Product by Customer		An EDI notification of shipment of product.

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.		Delivered End Items to Customer		Products that have been acknowledged as received by the customer.
.		Shipping Documents to Carrier		Legal documentation of the contents of a shipment (e.g. way bill, bill of lading, export papers, etc....).
.		Shipping History to ED.8 Manage Import/Export Requirements		The transaction history of the physical shipment of an item to another internal location or to a customer.

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D2.12 Ship Product

The process of shipping the product to the customer site.

Metrics (see Appendix A for metrics attributes):

.	% of Orders Delivered in Full		Percentage of orders which all of the items are received by customer in the quantities committed The number of orders that are received by the customer in the quantities committed divided by the total orders [Total number of orders delivered in full] / [Total number of orders delivered] x 100%
.	Cost to Ship Product		The sum of the costs associated with shipping products.
.	Delivery Performance to Customer Commit Date		The percentage of orders that are fulfilled on the customer's original commit date
.	Ship Product Cycle Time		The average time associated with shipping product

Best Practices:

.	Cross-Docking		Used in many distribution centers (DC) to increase inventory velocity while maintaining shipping efficiency. In a traditional DC, the receiving process is disjointed from the shipping process and storage acts as an intermediary between the two processes. Cross docking actively links the receiving and shipping processes. In a DC, both cross docking (no storage) and traditional (with storage) operations might take place.
.	Shipment Tracking		None identified

Inputs:

.	Workflow from D2.11 Load Product & Generate Shipping Documentation

Outputs:

.	Workflow to D2.13 Receive & Verify Product by Customer

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D2.13 Receive & Verify Product by Customer

The process of receiving the shipment at the customer (either at customer site or at shipping area in case of self-collection) site and verifying that the order was shipped complete and that the product meets delivery terms.

Metrics (see Appendix A for metrics attributes):

. Cost to Receive & Verify Product by Customer	The sum of the costs associated with receipt and verification at customer site.
. Delivery Performance to Customer Commit Date	The percentage of orders that are fulfilled on the customer's original commit date
. Perfect Condition	Percentage of orders delivered in an undamaged state that meet specification, have the correct configuration, are faultlessly installed (as applicable), and accepted by the customer [Number of orders delivered in Perfect Condition] / [Number of orders delivered] x 100%
. Receive & Verify Product by Customer Cycle Time	The average time associated with receiving and verifying an order at the customer site

Best Practices:

.	Advanced Shipping Notices & UCC128 Container Labeling		Bar coding; EDI; integrated transportation/warehouse management
.	Shipment Tracking		None identified

Inputs:

.	Workflow from D2.12 Ship Product		
.	Advanced Ship Notice from D2.11 Load Product & Generate Shipping Documentation		An EDI notification of shipment of product.

Outputs:

.	Product to D2.14 Install Product		The end object of a transformation process that includes physical objects, information or services.

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D2.14 Install Product

When necessary, the process of preparing, testing and installing the product at the customer site. The product is fully functional upon completion.

Metrics (see Appendix A for metrics attributes):

.		% of Faultless Installations		Number of Faultless Installations divided by Total Number of Units Installed.
.		Cost to Install Product		The sum of the costs associated with product installation.
.		Install Product Cycle Time		The average time associated with product installation
.		Perfect Condition		Percentage of orders delivered in an undamaged state that meet specification, have the correct configuration, are faultlessly installed (as applicable), and accepted by the customer [Number of orders delivered in Perfect Condition] / [Number of orders delivered] x 100%

Best Practices:

.		Joint Service Agreements to Document Acceptable Service Levels in Terms of Installation Costs, Installation Cycle Time, Etc.		Collaborative planning tools with the Source suppliers (This would be effective between customer and supplier, and between internal functions such as Field Service, Manufacturing, Marketing and Order Management)

Inputs:

.		Product from D2.13 Receive & Verify Product by Customer		The end object of a transformation process that includes physical objects, information or services.

Outputs:

.		Installed Product to D2.15 Invoice		The process of preparing, testing and installing the product at the customer site. The standalone product is fully functional upon completion, but there may be requirement for subsequent integration.
.		Installed Product to Customer		The process of preparing, testing and installing the product at the customer site. The standalone product is fully functional upon completion, but there may be requirement for subsequent integration.

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D2.15 Invoice

A signal is sent to the financial organization that the order has been shipped and that the billing process should begin and payment be received or be closed out if payment has already been received. Payment is received from the customer within the payment terms of the invoice.

Metrics (see Appendix A for metrics attributes):

.	% of Faultless Invoices		The number of invoices processed without issues and or errors divided by the total number of invoices. Examples of potential invoice defects are: Change from customer purchase order without proper customer involvement Wrong Customer Information (e.g., name, address, telephone number) Wrong Product Information (e.g., part number, product description) Wrong Price (e.g., discounts not applied) Wrong Quantity or Wrong Terms or Wrong Date
.	Customer Invoicing/ Accounting Costs		
.	Days Sales Outstanding		5 point annual average of gross accounts receivable ÷ (total gross annual sales ÷ 365)
.	Deliver Cycle Time		The average time associated with Deliver Processes
.	Documentation Accuracy		Percentage of orders with on time and accurate documentation supporting the order, including packing slips, bills of lading, invoices, etc. [Total number of orders delivered with correct and timely documentation] / [Total number of orders delivered] x 100%

Best Practices:

.	Electronic Transfer of Shipment Information to Finance		None identified
.	Provide Visibility to and Quickly Escalate Delinquent Accounts for Resolution		Integrated accounts receivables
.	Utilize EDI and EFT for Payment to Speed Closing of Receivables and to Reduce Processing Costs		EDI transaction and network services

Inputs:

.	Installed Product from D2.14 Install Product		The process of preparing, testing and installing the product at the customer site. The standalone product is fully functional upon completion, but there may be requirement for subsequent integration.

Outputs:

.	Payment to Company		Receipt of payment for goods and services per contract or purchase order.

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D3 Deliver Engineer-to-Order Product

The process of delivering a product that is designed, manufactured, and assembled from a bill of materials that includes one or more custom parts. Design will begin only after the receipt and validation of a firm customer order.

The Category D3 includes fifteen Level 3 Elements:

.		D3.1 Obtain and Respond to RFP/RFQ		The process of receiving a request for proposal or request for quote, evaluating the request (estimating the schedule, developing costs estimates, establishing price), and responding to the potential customer.
.		D3.10 Pack Product		The activities such as sorting / combining the products, packing / kitting the products, paste labels, barcodes etc. ande delivering the products to the shipping area for loading.
.		D3.11 Load Product & Generate Ship Documents		The series of tasks including placing product onto vehicles, generating the documentation necessary to meet internal, customer, carrier and government needs.
.		D3.12 Ship Product		The process of shipping the product to the customer site
.		D3.13 Receive & Verify Product by Customer		The process of receiving the shipment (either at customer site or at shipping area in case of self-collection) and verifying that the order was shipped complete and that the product meets delivery terms.
.		D3.14 Install Product		When necessary, the process of preparing, testing and installing the product at the customer site. The product is fully functional upon completion.
.		D3.15 Invoice		A signal is sent to the financial organization that the order has been shipped and that the billing process should begin and payment be received or be closed out if payment has already been received. Payment is received from the customer within the payment terms of the invoice.
.		D3.2 Negotiate & Receive Contract		The process of negotiating order details with customer (e.g., price, schedule, product performance) and finalizing the contract. Optionally accept payment.
.		D3.3 Enter Order, Commit Resources & Launch Program		The process of entering/finalizing the customers order, approving the planned resources (e.g., engineering, manufacturing, etc.) and officially launching the program.
.		D3.4 Schedule Installation		The process of evaluating the design and build schedules relative to customer requested installation date to determine installation schedule.
.		D3.5 Build Loads		Transportation loads are selected and efficient loads are built.
.		D3.6 Route Shipments		The process of consolidating and routing shipments by mode, lane, and location.
.		D3.7 Select Carriers and Rate Shipments		Specific carriers are selected by lowest cost per route and shipments are rated and tendered.
.		D3.8 Receive Product from Source or Make		The activities such as receiving product, verifying, recording product receipt, determining put-away location, putting away and recording location that a company performs at its own warehouses. May include quality inspection.
.		D3.9 Pick Product		The series of activities including retrieving orders to pick, verifying inventory availability, building the pick wave, picking the product, recording the pick and delivering product to packing area in response to an order.

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Metrics (see Appendix A for metrics attributes):

.		Cash-To-Cash Cycle Time		[Inventory Days of Supply + Days Sales Outstanding - Days Payable Outstanding] The time it takes for an investment made to flow back into a company after it has been spent for raw materials. For services, this represents the time from the point where a company pays for the resources consumed in the performance of a service to the time that the company received payment from the customer for those services.
		Cost to Deliver		The sum of the costs associated with deliver
.		Deliver Cycle Time		The average time associated with Deliver Processes
.		Downside Deliver Adaptability		The reduction in delivered quantities sustainable at 30 days prior to delivery with no inventory or cost penalties.
.		Finished Goods Inventory Days of Supply		Plant finished goods inventory days of supply are calculated as gross plant finished goods inventory ÷ (value of transfers/365 days).
.		Order Fulfillment Cycle Time		The average actual cycle time consistently achieved to fulfill customer orders.
.		Order Management Costs		The aggregation of the following cost elements (contained in this glossary):
.		Perfect Order Fulfillment		The percentage of orders meeting delivery performance with complete and accurate documentation and no delivery damage. Components include all items and quantities on-time using the customer's definition of on-time, and documentation - packing slips, bills of lading, invoices, etc.
.		Return on Supply Chain Fixed Assets		Return on Supply Chain Fixed Assets measures the return an organization receives on its invested capital in supply chain fixed assets. This includes the fixed assets used in Plan, Source, Make, Deliver, and Return. The levels of aggregation can be at any element associated with a supply chain asset.
.		Return on Working Capital		Return on working capital is a measurement which assesses the magnitude of investment relative to a company's working capital position verses the revenue generated from a supply chain. Components include accounts receivable, accounts payable, inventory, supply chain revenue, cost of goods sold and supply chain management costs.
.		Upside Deliver Adaptability		The maximum sustainable percentage increase in quantities delivered that can be achieved in 30 days with the assumption of unconstrained finished good availability.
.		Upside Deliver Flexibility		The number of days required to achieve an unplanned sustainable 20% increase in quantity delivered with the assumption of no other constraints.

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D3.1 Obtain and Respond to RFP/RFQ

The process of receiving a request for proposal or request for quote, evaluating the request (estimating the schedule, developing costs estimates, establishing price), and responding to the potential customer.

Metrics (see Appendix A for metrics attributes):

.	Cost to Obtain & Respond to Request for Quote (RFQ) / Request for Proposal (RFP)		The sum of the costs associated with obtaining and responding to Request for Quote (RFQ) / Request for Proposal (RFP).
.	Obtain & Respond to Request for Quote (RFQ) / Request for Proposal (RFP) Cycle Time		The average time associated with obtaining and responding to RFQs/RFPs

Best Practices:

.	Partnership with Outside Design Firms to Provide Skills and Capacity, as Needed		None identified
.	Use of CAD/CAE Applications to Simulate Design, Cost and Manufacturing Process		None identified

Inputs:

.	RFQ/RFP from Source: Customer		Request for Quote - A document used to solicit vendor responses when a product has been selected and price quotations are needed from several vendors. Request for Proposal - A document used to solicit vendor responses when the functional requirements and features are known but no specific product is in mind.

Outputs:

.	Completed Proposal to Customer		A document submitted in response to the a request for proposal from a customer with all the terms and conditions of sale of a product or service
.	Completed Proposal to D3.2 Negotiate & Receive Contract		A document submitted in response to the a request for proposal from a customer with all the terms and conditions of sale of a product or service
.	Contract Status to ED.3 Manage Deliver Information		Customer profile, which include address data, credit and purchase histories, customer preferences including shipping, status, and delivery requirements, etc.
.	Credit History to ED.3 Manage Deliver Information		Report that portrays a potential customer's payment history and debt, indicating the ability to pay in a timely manner in the future.
.	Customer Address Data to ED.3 Manage Deliver Information		Customer profile, which include address data, credit and purchase histories, customer preferences including shipping, status, and delivery requirements, etc.
.	Purchase History to ED.3 Manage Deliver Information		The amount of purchased products for a certain time in history per specific intervals
.	Shipping Preferences to ED.3 Manage Deliver Information		Customer preferences including shipping, status, and delivery requirements, etc., and customer profile, which includes address data, credit and purchase histories,

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D3.2 Negotiate & Receive Contract

The process of negotiating order details with customer (e.g., price, schedule, product performance) and finalizing the contract. Optionally accept payment.

Metrics (see Appendix A for metrics attributes):

.		Cost to Negotiate & Receive Contract		The sum of the costs associated with negotiating and receiving contracts
.		Negotiate & Receive Contract Cycle Time		The average time associated with negotiating and receiving a contract

Inputs:

.		Completed Proposal from D3.1 Obtain and Respond to RFP/RFQ		A document submitted in response to the a request for proposal from a customer with all the terms and conditions of sale of a product or service
.		Order Rules from ED.1 Manage Deliver Business Rules		Rules for the function that encompasses receiving, entering, and promising orders from customers, distribution centers, and interplant operations.

Outputs:

.		Approved Contract to D3.3 Enter Order, Commit Resources & Launch Program		Acceptance of an agreement between two or more competent persons or companies to perform or not to perform specific acts or services or to deliver merchandise. A contract may be oral or written.
.		Customer Order to ED.2 Assess Delivery Performance		An order from a customer for a particular product or a number of products. It is often referred to as an actual demand to distinguish it from a forecasted demand.
.		Customer Order Size, Weight, and Freight Class to ED.6 Manage Transportation		Coupled with cube and route, these criteria determine type of carrier and cost of shipment
.		Location of Customers to ED.7 Manage Product Life Cycle		Customer profile, which includes address and location data, credit and purchase histories, customer preferences including shipping, status, and delivery requirements, etc.
.		Optional Payment to Company		Payment at the time of order, maybe partial or in full.

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D3.3 Enter Order, Commit Resources & Launch Program

The process of entering/finalizing the customers order, approving the planned resources (e.g., engineering, manufacturing, etc.) and officially launching the program.

Metrics (see Appendix A for metrics attributes):

.		% of Orders Delivered in Full		Percentage of orders which all of the items are received by customer in the quantities committed The number of orders that are received by the customer in the quantities committed divided by the total orders [Total number of orders delivered in full] / [Total number of orders delivered] x 100%
.		Cost to Enter Order, Commit Resources & Launch Program		The sum of the costs associated with entering the order, committing resources & launching a program.
.		Delivery Performance to Customer Commit Date		The percentage of orders that are fulfilled on the customer's original commit date
.		Enter Order, Commit Resources & Launch Program Cycle Time		The average time associated with entering an order, committing resources and program launch
.		Order Fulfillment Dwell Time		Any lead time during the order fulfillment process where no activity takes place, which is imposed by customer requirements. Note that this dwell time is different from 'idle time' or 'non-value-add lead time', which is caused by inefficiencies in the organization's processes and therefore ultimately under responsibility of the organization. This kind of idle time should not be deducted from Order Fulfillment Cycle Time.

Inputs:

.		Approved Contract from D3.2 Negotiate & Receive Contract		Acceptance of an agreement between two or more competent persons or companies to perform or not to perform specific acts or services or to deliver merchandise. A contract may be oral or written.
.		Delivery Plans from P4.4 Establish Delivery Plans		A plan for a course of action over specified time periods that involves a projected appropriation of supply resources to meet delivery requirements.
.		Production Plans from P3.4 Establish Production Plans		A master production plan used to allocate capacity among manufacturing resources and schedule finite manufacturing activities or executing the performance of a service. Production Plan includes production capability.
.		Production Schedule from M3.2 Schedule Production Activities		A plan that authorizes the factory to manufacture or repair a certain quantity of a specific item.
.		Sourcing Plans from P2.4 Establish Sourcing Plans		An aggregate material requirements plan used to schedule material deliveries to meet production plan.

Outputs:

.		Actual Sales History to P5.1 Assess, and Aggregate Return Requirements		Amount of past sales spanning any specified period of time (weeks, months, years, etc.) and expressed in any specified increments (per day, week, month, year, etc.)
.		Customer Order to D3.4 Schedule Installation		An order from a customer for a particular product or a number of products. It is often referred to as an actual demand to distinguish it from a forecasted demand.

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.		Order Backlog to P4.1 Identify, Prioritize, and Aggregate Delivery Requirements		Orders that have been received and entered into the order processing system and are in a queue waiting to be processed and shipped.
.		Order Information to M3.1 Finalize Production Engineering		The function encompasses receiving and entering all data necessary on orders, so the order can be finalized and entered into the order system.
.		Order Signal to P2.1 Identify, Prioritize, and Aggregate Product Requirements		Reserved inventory and/or planned capacity and delivery date for a specific order.
.		Order Signal to P3.1 Identify, Prioritize, and Aggregate Production Requirements		Reserved inventory and/or planned capacity and delivery date for a specific order.
.		Replenishment Signal to S3.3 Schedule Product Deliveries		Any signal that indicates when to produce or transport Items in a pull replenishment system.
.		Resource Availability to P4.2 Identify, Assess, and Aggregate Delivery Resources and Capabilities		The capability of a system or resource to produce a quantity of output in a particular time period, or the available resources at a point in time able to generate an output.

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D3.4 Schedule Installation

The process of evaluating the design and build schedules relative to customer requested installation date to determine installation schedule.

Metrics (see Appendix A for metrics attributes):

.		Cost to Schedule Installation		The sum of the costs associated with scheduling product installation.
.		Schedule Installation Cycle Time		The average time associated with scheduling the installation of product

Inputs:

.		Customer Order from D3.3 Enter Order, Commit Resources & Launch Program		An order from a customer for a particular product or a number of products. It is often referred to as an actual demand to distinguish it from a forecasted demand.

Outputs:

.		Scheduled Installation to Customer		The process of evaluating the design and build schedules relative to customer requested installation date to determine installation schedule.
.		Scheduled Installation to D3.5 Build Loads		The process of evaluating the design and build schedules relative to customer requested installation date to determine installation schedule.

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D3.5 Build Loads

Transportation loads are selected and efficient loads are built.

Metrics (see Appendix A for metrics attributes):

.		Build Loads Cycle Time		The average time associated with building shipment loads.
.		Cost to Build Loads		The sum of the costs associated with building transportation loads.

Best Practices:

.		Build Load in Stop Sequence		Integrated inbound/outbound transportation planning (i.e. 1st truck destination loaded last, etc.).
.		Consolidation of Inbound and Outbound Requirements		Integrated inbound/outbound transportation planning
.		CRP & VMI Loads Optimized for Utilization		Integration with CRP/VMI vendor systems
.		Vendor Managed Inventory		VMI is a concept for planning and control of inventory, in which the supplier has access to the customer's inventory data and is responsible for maintaining the inventory level required by the customer. Re-supply is performed by the vendor through regularly scheduled reviews of the on-site inventory. The on-site inventory is counted, damaged or outdated goods are removed, and the inventory is restocked to predefined levels.

Inputs:

.		Scheduled Installation from D3.4 Schedule Installation		The process of evaluating the design and build schedules relative to customer requested installation date to determine installation schedule.

Outputs:

.		Load Information to D3.6 Route Shipments		Information relative to a load that is built and shipped, i.e. customer, items, destinations, weight, etc
.		Scheduled Deliveries to Plan		The required or agreed time or rate of delivery of goods or services purchased for a future period.

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D3.6 Route Shipments

The process of consolidating and routing shipments by mode, lane, and location.

Metrics (see Appendix A for metrics attributes):

.		Cost to Route Shipments		The sum of the costs associated with routing shipments.
.		Route Shipments Cycle Time		The average time associated with routing shipments

Best Practices:

.		Carrier/Route Optimization Based on Continuous Movement and Consolidation/Pooling		Route scheduling, carrier selection, and rating
.		Consolidation of Carriers		Transportation modeling and rate analysis
.		CRP/VMI		Integrated Load Building; Routing & Scheduling with Advanced Ship Notice (ASN)
.		Select Carriers by Least Cost per Shipment and Rate Using Actual Rates Prior to Release to Billing		Rules based carrier selection and actual rate database
.		Shipment Tracking and Tracing		Satellite communications, GPS, RFID

Inputs:

.		Load Information from D3.5 Build Loads		Information relative to a load that is built and shipped, i.e. customer, items, destinations, weight, etc
.		Rated Carrier Data from Source: Company		Contract rates and tariffs from carriers by commodity, lane, mode, etc. for shipments.
.		Routing Guide from Source: Company		Information used to select modes, transportation lanes, available carriers, etc. Listing or routes, carriers & rates.

Outputs:

.		Workflow to D3.7 Select Carriers and Rate Shipments

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D3.7 Select Carriers and Rate Shipments

Specific carriers are selected by lowest cost per route and shipments are rated and tendered.

Metrics (see Appendix A for metrics attributes):

.	Cost to Select Carriers & Rate Shipments		The sum of the costs associated with selecting carriers and rating shipments.
.	Select Carriers & Rate Shipments Cycle Time		The average time associated with selecting carriers and rating shipments

Best Practices:

.	Select Carriers by Least Cost per Shipment and Rate Using Actual Rates Prior to Release to Billing		Rules based carrier selection and actual rate database

Inputs:

.	Workflow from D3.6 Route Shipments

Outputs:

.	Workflow to D3.9 Pick Product

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D3.8 Receive Product from Source or Make

The activities such as receiving product, verifying, recording product receipt, determining put-away location, putting away and recording location that a company performs at its own warehouses. May include quality inspection.

Metrics (see Appendix A for metrics attributes):

.		Cost to Receive Product from Source or Make		The sum of the costs associated with transferring product from source or make activities.
.		Receive Product from Source or Make Cycle Time		The average time associated with receiving a transfer of product to deliver processes from source or make

Best Practices:

.		Automatic Identification		Bar Coding & Radio Frequency Communications
.		Cross-Docking		Used in many distribution centers (DC) to increase inventory velocity while maintaining shipping efficiency. In a traditional DC, the receiving process is disjointed from the shipping process and storage acts as an intermediary between the two processes. Cross docking actively links the receiving and shipping processes. In a DC, both cross docking (no storage) and traditional (with storage) operations might take place.
.		Download P.O. & Advanced Ship Notices for Automated Receiving and Put Away		Integration with Procurement Systems & Electronic Commerce with Vendors
.		Dynamic Location Assignment Including Lot Control, Zoned Put Away, Quality Assurance, ABC Frequency of Access		Real time inventory control, stock locator, and rules based put away logic

Outputs:

.		Workflow to D3.9 Pick Product

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D3.9 Pick Product

The series of activities including retrieving orders to pick, verifying inventory availability, building the pick wave, picking the product, recording the pick and delivering product to packing area in response to an order.

Metrics (see Appendix A for metrics attributes):

.		Cost to Pick Product		The sum of the costs associated with picking product.
.		Pick Product Cycle Time		The average time associated with product pick

Best Practices:

.		Dynamic Location Assignment Including Lot Control, Zoned Picking, Quality Assurance		Real time inventory control, stock locator, and rules based picking logic
.		Dynamic Simulation of Picking Requirements Optimized for Labor, Cost, and Time		Rules based picking logic and simulation

Inputs:

.		Workflow from D3.7 Select Carriers and Rate Shipments		
.		Workflow from D3.8 Receive Product from Source or Make		
.		Finished Product Release from M3.7 Release Product to Deliver		The authorization to ship a finished product that has been ordered.
.		Inventory Availability from M3.3 Issue Sourced/In-Process Product		Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts).
.		Inventory Availability from S3.6 Transfer Product		Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts).
.		Production Schedule from M3.2 Schedule Production Activities		A plan that authorizes the factory to manufacture or repair a certain quantity of a specific item.

Outputs:

.		Workflow to D3.10 Pack Product

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D3.10 Pack Product

The activities such as sorting / combining the products, packing / kitting the products, paste labels, barcodes etc. ande delivering the products to the shipping area for loading.

Metrics (see Appendix A for metrics attributes):

.	Cost to Pack Product		The sum of the costs associated with product packaging.
.	Pack Product Cycle Time		The average time associated with packing a product for shipment.

Inputs:

.	Workflow from D3.9 Pick Product

Outputs:

.	Workflow to D3.11 Load Product & Generate Ship Documents

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D3.11 Load Product & Generate Ship Documents

The series of tasks including placing product onto vehicles, generating the documentation necessary to meet internal, customer, carrier and government needs.

Metrics (see Appendix A for metrics attributes):

.	Cost to Load Product & Generate Shipping Documentation		The sum of the costs associated with loading product & generating shipping documentation.
.	Documentation Accuracy		Percentage of orders with on time and accurate documentation supporting the order, including packing slips, bills of lading, invoices, etc. [Total number of orders delivered with correct and timely documentation] / [Total number of orders delivered] x 100%
.	Load Product & Generate Shipping Documentation Cycle Time		The average time associated with product loading and the generation of shipping documentation

Best Practices:

.	Advanced Shipping Notices & UCC128 Container Labeling		Bar coding; EDI; integrated transportation/warehouse management
.	Carrier Agreement		Carrier agreements are agreements between a company and its domestic and global carriers (for both, inbound raw materials and outbound finished goods) specifying service levels, payment terms, and other conditions.
.	Cross-Docking		Used in many distribution centers (DC) to increase inventory velocity while maintaining shipping efficiency. In a traditional DC, the receiving process is disjointed from the shipping process and storage acts as an intermediary between the two processes. Cross docking actively links the receiving and shipping processes. In a DC, both cross docking (no storage) and traditional (with storage) operations might take place.
.	Electronic Generation and Download of Shipping Documents		None identified
.	Full Visibility of Credit History by Shipping Personnel		None identified
.	Integrated Credit Checking		Interface to supplier's shipping system to financials

Inputs:

.	Workflow from D3.10 Pack Product		
.	Shipping Export Parameters and Documentation from ED.8 Manage Import/Export Requirements		Shipping and documentation requirements established by a government which must be met before allowing the shipping or delivery of a product across national boundaries.
.	Shipping Parameters and Documentation from ED.6 Manage Transportation		Shipping parameters, such as weight, size, cube and route decide carrier and cost. Legal documentation of the contents of a shipment (e.g. way bill, bill of lading, export papers, etc.) are required.

Outputs:

.	Workflow to D3.12 Ship Product		
.	Shipping Documents to Carrier		Legal documentation of the contents of a shipment (e.g. way bill, bill of lading, export papers, etc....).
.	Shipping History to ED.8 Manage Import/Export Requirements		The transaction history of the physical shipment of an item to another internal location or to a customer.

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D3.12 Ship Product

The process of shipping the product to the customer site

Metrics (see Appendix A for metrics attributes):

.		% of Orders Delivered in Full		Percentage of orders which all of the items are received by customer in the quantities committed The number of orders that are received by the customer in the quantities committed divided by the total orders [Total number of orders delivered in full] / [Total number of orders delivered] x 100%
.		Cost to Ship Product		The sum of the costs associated with shipping products.
.		Delivery Performance to Customer Commit Date		The percentage of orders that are fulfilled on the customer's original commit date
.		Ship Product Cycle Time		The average time associated with shipping product

Best Practices:

.		Cross-Docking		Used in many distribution centers (DC) to increase inventory velocity while maintaining shipping efficiency. In a traditional DC, the receiving process is disjointed from the shipping process and storage acts as an intermediary between the two processes. Cross docking actively links the receiving and shipping processes. In a DC, both cross docking (no storage) and traditional (with storage) operations might take place.
.		Shipment Tracking		None identified

Inputs:

.		Workflow from D3.11 Load Product & Generate Ship Documents

Outputs:

.		Workflow to D3.13 Receive & Verify Product by Customer

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D3.13 Receive & Verify Product by Customer

The process of receiving the shipment (either at customer site or at shipping area in case of self-collection) and verifying that the order was shipped complete and that the product meets delivery terms.

Metrics (see Appendix A for metrics attributes):

.		% of Orders Delivered in Full		Percentage of orders which all of the items are received by customer in the quantities committed The number of orders that are received by the customer in the quantities committed divided by the total orders [Total number of orders delivered in full] / [Total number of orders delivered] x 100%
.		Cost to Receive & Verify Product by Customer		The sum of the costs associated with receipt and verification at customer site.
.		Delivery Performance to Customer Commit Date		The percentage of orders that are fulfilled on the customer's original commit date
.		Perfect Condition		Percentage of orders delivered in an undamaged state that meet specification, have the correct configuration, are faultlessly installed (as applicable), and accepted by the customer [Number of orders delivered in Perfect Condition] / [Number of orders delivered] x 100%
.		Receive & Verify Product by Customer Cycle Time		The average time associated with receiving and verifying an order at the customer site

Best Practices:

.		Advanced Shipping Notices & UCC128 Container Labeling		Bar coding; EDI; integrated transportation/warehouse management
.		Shipment Tracking		None identified

Inputs:

.		Workflow from D3.12 Ship Product

Outputs:

.		Product to D3.14 Install Product		The end object of a transformation process that includes physical objects, information or services.

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D3.14 Install Product

When necessary, the process of preparing, testing and installing the product at the customer site. The product is fully functional upon completion.

Metrics (see Appendix A for metrics attributes):

.	Cost to Install Product		The sum of the costs associated with product installation.
.	Install Product Cycle Time		The average time associated with product installation
.	Perfect Condition		Percentage of orders delivered in an undamaged state that meet specification, have the correct configuration, are faultlessly installed (as applicable), and accepted by the customer [Number of orders delivered in Perfect Condition] / [Number of orders delivered] x 100%

It initiates event:

.	Product Installed for D3.15 Invoice

Inputs:

.	Product from D3.13 Receive & Verify Product by Customer		The end object of a transformation process that includes physical objects, information or services.

Outputs:

.	Workflow to D3.15 Invoice		
.	Installed Product to Customer		The process of preparing, testing and installing the product at the customer site. The standalone product is fully functional upon completion, but there may be requirement for subsequent integration.

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D3.15 Invoice

A signal is sent to the financial organization that the order has been shipped and that the billing process should begin and payment be received or be closed out if payment has already been received. Payment is received from the customer within the payment terms of the invoice.

Metrics (see Appendix A for metrics attributes):

.		% of Faultless Invoices		The number of invoices processed without issues and or errors divided by the total number of invoices. Examples of potential invoice defects are: Change from customer purchase order without proper customer involvement Wrong Customer Information (e.g., name, address, telephone number) Wrong Product Information (e.g., part number, product description) Wrong Price (e.g., discounts not applied) Wrong Quantity or Wrong Terms or Wrong Date
.		Cost to Invoice		The sum of the costs associated with invoicing.
.		Documentation Accuracy		Percentage of orders with on time and accurate documentation supporting the order, including packing slips, bills of lading, invoices, etc. [Total number of orders delivered with correct and timely documentation] / [Total number of orders delivered] x 100%
.		Invoice Cycle Time		The average time associated with the the generation and issuance of an invoice

Best Practices:

.		Electronic Transfer of Shipment Information to Finance		None identified
.		Provide Visibility to and Quickly Escalate Delinquent Accounts for Resolution		Integrated accounts receivables
.		Utilize EDI and EFT for Payment to Speed Closing of Receivables and to Reduce Processing Costs		EDI transaction and network services

It is initiated by event:

.		Product Installed from D3.14 Install Product

Inputs:

.		Workflow from D3.14 Install Product

Outputs:

.		Payment to Company		Receipt of payment for goods and services per contract or purchase order.

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D4 Deliver Retail Product

Deliver Retail Products are the processes used to acquire, merchandise, and sell finished goods at a retail store. A retail store is a physical location that sells products (and services) direct to the consumer using a point of sale process (manual or automated) to collect payment. Merchandising at a store level is the stocking and restocking of products in designated storage locations to generate sales in a retail store.

The Category D4 includes seven Level 3 Elements:

D4.1 Generate Stocking Schedule	The process of scheduling resources to support item-stocking requirements.
D4.2 Receive Product at Store	The activities such as receiving product, verifying, recording product receipt, determining put-away location, putting away and recording location that a company performs at its own stores. May include quality inspection.
D4.3 Pick Product from Backroom	The process of retrieving restocking orders to pick, determining inventory availability, building a pick wave, picking item and quantity from a designated backroom warehouse location, recording the resulting inventory transaction, and delivering the product to point of stock
D4.4 Stock Shelf	For restocks, the tasks associated with identifying the item location, stocking the shelf according to merchandise plans, and recording the appropriate inventory transaction. For promotional items and stock repositioning the tasks associated with shelf and point of sale preparation, stock placement, and end of sale activities.
D4.5 Fill Shopping Cart	Typical set of tasks associated with product selection, storage and movement through to checkout.
D4.6 Checkout	The processes and tasks associated with product checkout including scanning, method of payment, credit application and approval, service agreement, order confirmation, and/or invoice or receipt.
D4.7 Deliver and/or Install	The process of preparing and installing the product at the customer site. The product is fully functional upon completion.

Metrics (see Appendix A for metrics attributes):

Cash-To-Cash Cycle Time	[Inventory Days of Supply + Days Sales Outstanding - Days Payable Outstanding] The time it takes for an investment made to flow back into a company after it has been spent for raw materials. For services, this represents the time from the point where a company pays for the resources consumed in the performance of a service to the time that the company received payment from the customer for those services.
Cost to Deliver	The sum of the costs associated with deliver
Deliver Cycle Time	The average time associated with Deliver Processes
Downside Deliver Adaptability	The reduction in delivered quantities sustainable at 30 days prior to delivery with no inventory or cost penalties.
Order Fulfillment Cycle Time	The average actual cycle time consistently achieved to fulfill customer orders.
Return on Supply Chain Fixed Assets	Return on Supply Chain Fixed Assets measures the return an organization receives on its invested capital in supply chain fixed assets. This includes the fixed assets used in Plan, Source, Make, Deliver, and Return. The levels of aggregation can be at any element associated with a supply chain asset.

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Return on Working Capital	Return on working capital is a measurement which assesses the magnitude of investment relative to a company's working capital position verses the revenue generated from a supply chain. Components include accounts receivable, accounts payable, inventory, supply chain revenue, cost of goods sold and supply chain management costs.
Upside Deliver Adaptability	The maximum sustainable percentage increase in quantities delivered that can be achieved in 30 days with the assumption of unconstrained finished good availability.
Upside Deliver Flexibility	The number of days required to achieve an unplanned sustainable 20% increase in quantity delivered with the assumption of no other constraints.

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D4.1 Generate Stocking Schedule

The process of scheduling resources to support item-stocking requirements.

Metrics (see Appendix A for metrics attributes):

Cost to Generate Stocking Schedule	The sum of the costs associated with generating a stocking schedule.
Generate Stocking Schedule Cycle Time	The average time associated with the generating a stocking schedule

Best Practices:

.	Automated Pick List		System generated pick-lists based on picking / batching rules.
.	Labor Scheduling that Matches Product Flow		Workforce management solution with flexible rules.
.	Push Product on Trailer Arrival		System prioritization of items coming off trucks vs. picked from back room.

It initiates event:

.	Item Stocking Resources Scheduled for D4.2 Receive Product at Store

Inputs:

.	Daily Replenishment Requirements from S1.4 Transfer Product		Resources needed to meet Item stocking schedule requirement.
.	On-demand Replenishment Requirements from Source: Company		Requirements for the triggering of material movement to a work center only when that work center is ready to begin the next job.
.	Resource Availability from Source: Company		The capability of a system or resource to produce a quantity of output in a particular time period, or the available resources at a point in time able to generate an output.
.	Shipping Schedules (internal or 3PL) from Source: Company		Scheduling of direct deliveries of material to a specified location on a plant floor near the operation where it is to be used.
.	Stocking Requirements from P4.4 Establish Delivery Plans		The activities and techniques of determining the desired levels of items, whether raw materials, work in process, or finished products. Demand for inventory may be dependant or independent. Inventory functions are anticipation, hedge, cycle (lot size), fluctuation (safety, buffer or reserve), transportation (pipeline), and service parts.
.	Store Allocation Instructions from P4.1 Identify, Prioritize, and Aggregate Delivery Requirements		
.	Vendor/DC inventory availability from Source: Company		Vendor/DC inventory available to a customer to supply demands. (Where the customer has access to the supplier's inventory and the supplier has access to the customer's requirements and inventory or vendor managed inventory).

Outputs:

.	Workflow to D4.2 Receive Product at Store		
.	Stocking Schedule to D4.4 Stock Shelf		A timetable for the planned movement of material from a bulk storage area to an order pick storage area.

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D4.2 Receive Product at Store

The activities such as receiving product, verifying, recording product receipt, determining put-away location, putting away and recording location that a company performs at its own stores. May include quality inspection.

Metrics (see Appendix A for metrics attributes):

.		Cost to Receive Product at Store		The sum of the costs associated with receiving product at the store.
.		Receive Product at Store Cycle Time		The average time associated with receiving product at the customer store

Best Practices:

.		Automated Pick List		System generated pick-lists based on picking / batching rules.
.		Labor Scheduling that Matches Product Flow		Workforce management solution with flexible rules.
.		Push Product on Trailer Arrival		System prioritization of items coming off trucks vs. picked from back room.

It is initiated by event:

.		Item Stocking Resources Scheduled from D4.1 Generate Stocking Schedule

Inputs:

.		Workflow from D4.1 Generate Stocking Schedule		
.		Finished Product Release from M1.6 Release Product to Deliver		The authorization to ship a finished product that has been ordered.
.		Inventory Availability from S1.4 Transfer Product		Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts).
.		Item Stocking Requirements from P4.1 Identify, Prioritize, and Aggregate Delivery Requirements		The activities and techniques of determining the desired levels of items, whether raw materials, work in process, or finished products. Demand for inventory maybe dependant or independent. Inventory functions are anticipation, hedge, cycle (lot size), fluctuation (safety, buffer or reserve), transportation (pipeline), an service parts.
.		Production Schedule from M1.1 Schedule Production Activities		A plan that authorizes the factory to manufacture or repair a certain quantity of a specific item.
.		Scheduled Receipts from S1.1 Schedule Product Deliveries		Product due to arrive.

Outputs:

.		Inventory Availability to D4.3 Pick Product from Backroom		Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts).
.		Item Pick Sheet for Stocking Schedule to D4.3 Pick Product from Backroom		A document that lists the material to be picked to meet the schedule for the planned movement of material from a bulk storage area to an order pick storage area.

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D4.3 Pick Product from Backroom

The process of retrieving restocking orders to pick, determining inventory availability, building a pick wave, picking item and quantity from a designated backroom warehouse location, recording the resulting inventory transaction, and delivering the product to point of stock

Metrics (see Appendix A for metrics attributes):

.		Cost to Pick Product from Backroom		The sum of the costs associated with picking product from backroom.
.		Pick Product from Backroom Cycle Time		The average time associated with product pick from backroom

Best Practices:

.		Automated Directed Picking		A pick list displayed on a handheld device that directs picks and relieves inventory from backroom locations
.		Automated Replenishment of Back Stock Based on Minimum Stocking Levels		None identified
.		Defined Stocking Levels and Criteria		None identified
.		Staging Based on In-store Zones		Items are staged for re-stocking based on zones within the store. This minimizes restocking effort.

Inputs:

.		Workflow from Source: Company		
.		Inventory Availability from D4.2 Receive Product at Store		Those stocks or items on hand used to support production (raw materials and work in process items), supporting activities (maintenance, repairs and operating supplies), and customer service (finished goods and spare parts).
.		Inventory in Stock from Source: Company		Stored products or service parts ready for sale, as distinguished from stores, which are usually components or raw materials.
.		Item Pick Sheet for Stocking Schedule from D4.2 Receive Product at Store		A document that lists the material to be picked to meet the schedule for the planned movement of material from a bulk storage area to an order pick storage area.
.		On-Order/Backorder from Source: Company		An unfilled customer order or commitment. A backorder is an immediate (or past due) demand against an item whose inventory is insufficient to satisfy the demand.
.		Replenishment Quantities from Source: Company		In a fixed-reorder quantity system of inventory control, the fixed quantity that should be ordered each time the available stock (on-hand plus on-order) falls to or below the reorder point.

Outputs:

.		Assorted by Shelf Order to Company		The function of physically separating a homogeneous subgroup from a heterogeneous population of items
.		Loaded Retail Cart or Pallet to D4.4 Stock Shelf		Customer selected retail finished goods transferred to the point of sale.

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D4.4 Stock Shelf

For restocks, the tasks associated with identifying the item location, stocking the shelf according to merchandise plans, and recording the appropriate inventory transaction. For promotional items and stock repositioning the tasks associated with shelf and point of sale preparation, stock placement, and end of sale activities.

Metrics (see Appendix A for metrics attributes):

.		Cost to Stock Shelf		The sum of the costs associated with stocking shelves.
.		In-Stock %		Percentage of materials, components, or finished goods that are there when needed.
.		Stock Shelf Cycle Time		The average time associate with stocking shelves

Best Practices:

.		Item/Shelf Scanning Upon Put-A-Way		Scan store shelves / bar codes to confirm put-a-way.
.		Off Peak Stocking		The majority of stocking is completed with minimal impact to or visibility from the customer.
.		Proof of Performance (Promotion Management)		Scan store shelves / bar codes to confirm put-a-way. Scan using handheld and match with ad.
.		Scan Displays for Promotion Conformance		None identified
.		Stocking is Completed in Zones		Each area of the store has its own stocking plan and items are routed specifically to that area.

Inputs:

.		Loaded Retail Cart or Pallet from D4.3 Pick Product from Backroom		Customer selected retail finished goods transferred to the point of sale.
.		Loaded Retail Cart or Pallet from S1.4 Transfer Product		Customer selected retail finished goods transferred to the point of sale.
.		Plan-o-gram Data from Source: Company		Data required to develop and build a Plan-O-Gram display to help minimize setup time by showing specific placement of all items, by product number, on the display.
.		Stocking Schedule from D4.1 Generate Stocking Schedule		A timetable for the planned movement of material from a bulk storage area to an order pick storage area.
.		Vendor Merchandising / Co-op advertising agreements from Source: Company		The plan for a promotional product offering and how it is communicated to the customer and includes public relations, advertising, sales promotions, and other tools to persuade customers to purchase the product offering.

Outputs:

.		Full Shelf Locations to D4.5 Fill Shopping Cart		Determination of the best retail locations for implementation of full shelf equipment.
.		Store Shelf Inventory Counts to P4.1 Identify, Prioritize, and Aggregate Delivery Requirements		The determination of inventory quantity by actual count. Physical inventories can be taken on a continuous, periodic or annual basis.

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D4.5 Fill Shopping Cart

Typical set of tasks associated with product selection, storage and movement through to checkout.

Metrics (see Appendix A for metrics attributes):

.	% Item Location Accuracy		
.	Cost to Fill Shopping Cart		The sum of the costs associated with filling a shopping cart.
.	Fill Shopping Cart Cycle Time		The average time associated with “filling the shopping cart“

Best Practices:

.	Items Are Relieved from Inventory When Item is Removed from Shelf		RFID, smart cart or customer self-service reduces system inventory upon item pick.
.	Loyalty Card Data		Use for comparison to previous sales activity/track new consumers, etc.
.	Measured and Compared with Same Activity Previous Period		DSS or portal tool that shows previous period performance and comparison for store management (whether it is a year ago, period ago, etc.).
.	Multiple Locations Throughout Store		Planned and tracked via a plan-o-gram system; Location specific product labeling.
.	Substitution		Trained staff or automated systems (Internet) that recommend up-sell, cross-sell, and/or substitution See Up and cross selling
.	Up and Cross Selling and/or Substitution		Trained staff or automated systems (Internet) that recommend up-sell, cross-sell, and/or substitution.

Inputs:

.	Customer Data (preference) from Source: Company		Customer profile, which includes history, customer preferences, status, and delivery requirements, etc.
.	Full Shelf Locations from D4.4 Stock Shelf		Determination of the best retail locations for implementation of full shelf equipment.
.	Lost or Dropped Shopping Carts from Source: Company		On-line orders that are missing due to internet, software, or hardware malfunctions.
.	Merchandising Plan (Supplier) from Source: Company		The merchandising plan includes the current market position, opportunity and issue analysis, merchandising objectives and strategies, action plans, programs, projects, budgets, and pro forma profit and loss statement and management controls.
.	Product Data (linked/related SKU’s) from Source: Company		The properties and characteristics of a product (e.g. the part number and a text description of the product) and the relationships to other items in the product family and linked / related SKU’s.
.	Promotional Plan from Source: Company		The plan for a promotional product offering and how it is communicated to the customer and includes public relations, advertising, sales promotions, and other tools to persuade customers to purchase the product offering

Outputs:

.	Full Cart Ready for Checkout to D4.6 Checkout		Customer selected goods transferred to the point of sale.

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D4.6 Checkout

The processes and tasks associated with product checkout including scanning, method of payment, credit application and approval, service agreement, order confirmation, and/or invoice or receipt.

Metrics (see Appendix A for metrics attributes):

.	Checkout Cycle Time		The average time required for customer checkout.
.	Cost to Checkout		The sum of the costs associated with product checkout.

Best Practices:

.	Automatic Customer Payment		RFID, smart cart or customer self-service charges goods to card upon store departure.
.	Customer Profile Drive Recognition Upon Checkout		None identified
.	Notification of Existing/Future Event or Promotions		None identified

It initiates event:

.	Checkout Completed for D4.7 Deliver and/or Install

Inputs:

.	Customer Profile/Data from Source: Company		Customer profile, which includes history, customer preferences, status, and delivery requirements, etc.
.	Full Cart Ready for Checkout from D4.5 Fill Shopping Cart		Customer selected goods transferred to the point of sale.
.	Promotion Event Calendar from Source: Company		Time phased promotion / event tasks where the product offering is communicated to the customer and includes public relations, advertising, sales promotions, and other tools to persuade customers to purchase the product offering during the year.

Outputs:

.	Workflow to D4.7 Deliver and/or Install		
.	Customer Loyalty / Recurring Visits to Company		Input to customer profile, frequency of visits, recurring, time frame, what purchased, numbers and rings. Measure of customer satisfaction with products and service.
.	Full Cart (Empty Cart) to Company		Completion of customer checkout, sale of the selected goods, cart transitions from full to empty.
.	Loyalty Customer Profile Changes to Company		More units, higher average ring, etc.
.	Point of Sale Data (Daily) to P4.1 Identify, Prioritize, and Aggregate Delivery Requirements		The relief of inventory and computation of sales data at the time and place of the sales, generally (may be manual) through the use of bar-coding, or magnetic media and equipment.
.	Satisfied Customer to Company		Customers who are satisfied with the product or service delivered by the suppliers, including the aspects such as time, quality, cost, etc.

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D4.7 Deliver and/or Install

The process of preparing and installing the product at the customer site. The product is fully functional upon completion.

Metrics (see Appendix A for metrics attributes):

.	Cost to Deliver and/or Install		The sum of the costs associated with deliver and/or install
.	Deliver and/or Install Cycle Time		The average time required to deliver and install product.

Best Practices:

.	Goals / Performance Plans		None identified
.	Measurement, Monitoring and Adjustment of Service or Product Installation		None identified
.	Provide Product or Service Training to Employees or FAQ's Online		None identified
.	Stage Product or Service Adoption		None identified

It is initiated by event:

.	Checkout Completed from D4.6 Checkout

Inputs:

.	Workflow from D4.6 Checkout

Outputs:

.	Consistently High Adoption Rates to Company		Indication of product and service quality, i.e. customer satisfaction.
.	High Customer Services Satisfaction Levels to Company		Indication of product and service quality.
.	Low Rates of Failure to Company		Indication of quality in workmanship and design.
.	Successful Installation / Live System to Company		The installation of product is completed at the customer site, and the product is fully functional.

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ED Enable DELIVER

Enable Processes prepare, maintain, or manage information or relationships on which planning and execution processes rely.

The Category ED includes eight Level 3 Elements:

ED.1 Manage Deliver Business Rules	The process of defining and maintaining rules which affect the acceptance of an order, based on quantity, method of delivery, credit, customer experience, etc. (Include distribution channel rules)
ED.2 Assess Delivery Performance	The process of defining the requirement and monitoring the performance of the delivery of product to a customer. When physical delivery is out-sourced the performance is passed on to source for contract administration.
ED.3 Manage Deliver Information	The process of collecting, maintaining, and communicating information to support deliver planning and execution processes. The information to be managed includes: order data - (customer preference, history, status, and delivery requirements, etc.), warehouse data, transportation data, and deliver data.
ED.4 Manage Finished Goods Inventories	The process of establishing and maintaining finished goods, inventory limits or levels, replenishment models, ownership, product mix, stocking locations.
ED.5 Manage Deliver Capital Assets	Acquisition, maintenance, and disposition of order management, warehouse, and transportation capital assets. Determine material handling (inventory) pick pack & ship methods (inventory), and equipment.
ED.6 Manage Transportation	The process of 1) defining and maintaining the information which characterizes product, containerization, vehicle, route, terminals, regulations, rates/tariffs and backhaul opportunity (Characterization include information necessary to support maintenance of internal Outbound Transportation equipment - CAPITAL ASSETS) and 2) the management of transporters.
ED.7 Manage Product Life Cycle	The process of defining and maintaining the distribution channel/ network for a specific product line (no capital asset or transportation management).
ED.8 Manage Import/Export Requirements	The process of recording and maintaining regulations and rates, which constrain the ordering and delivering of product. Determine customs requirements, establish letters of credit terms and conditions, etc.

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ED.1 Manage Deliver Business Rules

The process of defining and maintaining rules which affect the acceptance of an order, based on quantity, method of delivery, credit, customer experience, etc. (Include distribution channel rules)

Metrics (see Appendix A for metrics attributes):

.		Cost to Manage Deliver Business Rules		The sum of the Costs to Manage Deliver Business Rules
.		Manage Deliver Business Rules Cycle Time		The average time associated with managing deliver business rules

Best Practices:

.		Integrated Edit at Order Entry Time		Customer Master Record
.		On-Line Rule Base		None identified

Inputs:

.		Configuration Rules from Source: Company		The rules for the management of product configuration, which includes the management of critical sub processes needed to manage the life cycle of individual item numbers including item masters, routings, rationalization, and bill of materials.
.		Management Process Reports from ED.2 Assess Delivery Performance		Reports which provide management with the process information required to evaluate prescribed activities to ensure that the stated objectives of a project, manufactured good, or service are achieved.
.		Planning Decision Policies from Source: Plan		Any company policies that affect how a planning process is defined, approved, and performed.
.		Supply-Chain Performance Metrics from ED.2 Assess Delivery Performance		Standard measures that indicate how well a supply chain performs within certain categories of performance known as Performance Attributes, e.g. delivery reliability, flexibility and responsiveness, cost, and asset management.

Outputs:

.		Configuration Rules to D2.2 Receive, Configure, Enter and Validate Order		The rules for the management of product configuration, which includes the management of critical sub processes needed to manage the life cycle of individual item numbers including item masters, routings, rationalization, and bill of materials.
.		Order Rules to ED.5 Manage Deliver Capital Assets		Rules for the function that encompasses receiving, entering, and promising orders from customers, distribution centers, and interplant operations.
.		Order Rules to ED.4 Manage Finished Goods Inventories		Rules for the function that encompasses receiving, entering, and promising orders from customers, distribution centers, and interplant operations.
.		Order Rules to D2.2 Receive, Configure, Enter and Validate Order		Rules for the function that encompasses receiving, entering, and promising orders from customers, distribution centers, and interplant operations.
.		Order Rules to D1.2 Receive, Enter & Validate Order		Rules for the function that encompasses receiving, entering, and promising orders from customers, distribution centers, and interplant operations.
.		Order Rules to D3.2 Negotiate & Receive Contract		Rules for the function that encompasses receiving, entering, and promising orders from customers, distribution centers, and interplant operations.

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ED.2 Assess Delivery Performance

The process of defining the requirement and monitoring the performance of the delivery of product to a customer. When physical delivery is out-sourced the performance is passed on to source for contract administration.

Metrics (see Appendix A for metrics attributes):

.		Assess Delivery Performance Cycle Time		The average time associated with assessing the performance of deliver processes.
.		Cost to Assess Delivery Performance		The sum of the costs associated with assessing delivery performance.
.		Documentation Accuracy		Percentage of orders with on time and accurate documentation supporting the order, including packing slips, bills of lading, invoices, etc. [Total number of orders delivered with correct and timely documentation] / [Total number of orders delivered] x 100%
.		Perfect Condition		Percentage of orders delivered in an undamaged state that meet specification, have the correct configuration, are faultlessly installed (as applicable), and accepted by the customer [Number of orders delivered in Perfect Condition] / [Number of orders delivered] x 100%

Best Practices:

.		Customer Initiated Package Tracking		WEB based Shared systems
.		Real Time Package Tracking		Tracking and tracing

Inputs:

.		Benchmark Data from Source: Company		A set of measurements (or metrics) that is used to establish goals for improvements in processes, functions, products, and so on Benchmark measures are often derived from other firms that display “best in class“ achievement
.		Carrier Contracts (Customer) from Source: Source		Contracts that customers have with specific freight carriers through which suppliers have to work for the delivery of products. Customer manages carrier selection, shipment of purchased product, and payment of carrier.
.		Customer Order from D1.2 Receive, Enter & Validate Order		An order from a customer for a particular product or a number of products. It is often referred to as an actual demand to distinguish it from a forecasted demand.
.		Customer Order from D2.3 Reserve Resources & Determine Delivery Date		An order from a customer for a particular product or a number of products. It is often referred to as an actual demand to distinguish it from a forecasted demand.
.		Customer Order from D3.2 Negotiate & Receive Contract		An order from a customer for a particular product or a number of products. It is often referred to as an actual demand to distinguish it from a forecasted demand.
.		Delivery Performance from ED.5 Manage Deliver Capital Assets		The process of measuring actual supplier performance against internal and/or external standards, providing feedback to achieve and maintain the performance required to meet the customers’ business and/or competitive needs.

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.	Delivery Performance from ED.6 Manage Transportation		The process of measuring actual supplier performance against internal and/or external standards, providing feedback to achieve and maintain the performance required to meet the customers' business and/or competitive needs.
.	Delivery Performance from ED.4 Manage Finished Goods Inventories		The process of measuring actual supplier performance against internal and/or external standards, providing feedback to achieve and maintain the performance required to meet the customers' business and/or competitive needs.

Outputs:

.	Customer Service Requirements to ED.6 Manage Transportation		Supply chain requirements related to the customer's needs, including service requirements, sales forecasts and actual orders/backorders.
.	Customer Service Requirements to Plan		Supply chain requirements related to the customer's needs, including service requirements, sales forecasts and actual orders/backorders.
.	Management Process Reports to ED.1 Manage Deliver Business Rules		Reports which provide management with the process information required to evaluate prescribed activities to ensure that the stated objectives of a project, manufactured good, or service are achieved.
.	Supply-Chain Performance Metrics to EP.2 Manage Performance of Supply Chain		Standard measures that indicate how well a supply chain performs within certain categories of performance known as Performance Attributes, e.g. delivery reliability, flexibility and responsiveness, cost, and asset management.
.	Supply-Chain Performance Metrics to ED.1 Manage Deliver Business Rules		Standard measures that indicate how well a supply chain performs within certain categories of performance known as Performance Attributes, e.g. delivery reliability, flexibility and responsiveness, cost, and asset management.
.	Supply-Chain Performance Metrics to ED.5 Manage Deliver Capital Assets		Standard measures that indicate how well a supply chain performs within certain categories of performance known as Performance Attributes, e.g. delivery reliability, flexibility and responsiveness, cost, and asset management.

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ED.3 Manage Deliver Information

The process of collecting, maintaining, and communicating information to support deliver planning and execution processes. The information to be managed includes: order data - (customer preference, history, status, and delivery requirements, etc.), warehouse data, transportation data, and deliver data.

Metrics (see Appendix A for metrics attributes):

.		Cost to Manage Deliver Information		The sum of the Cost to Manage Deliver Information
.		Manage Deliver Information Cycle Time		The average time associated with managing deliver information

Best Practices:

.		Comprehensive History of Customer Interactions Including Order History, Claims, Problems, Etc.		None identified
.		Customer Access to Online Tracking of Order Status and Shipping Information		Internet-enabled package/shipment tracking
.		Customer Service Data Validation Including Geo-Coding		None identified
.		Online Real-Time Customer Entry and Edit		On-line Customer Service Module CRM (Customer resource Management) software is getting a big push in the E-Commerce/E-Business areas and generally provides a means to fulfill this requirement
.		Provide Single Source of Information on the Customer (Single Group / Owner Responsible for Accuracy / Quality of Customer Data)		Secure E-Commerce Server and integrated Order Management System (OMS) Warehouse Management System (WMS) and Transportation Management System (TMS)

Inputs:

.		Booked Order from D2.2 Receive, Configure, Enter and Validate Order		The process of accepting and translating what a customer wants into terms used by the manufacturer or distributor. The commitment should be based on the available-to-promise line (ATP) in the master schedule. This can be as simple as creating shipping documents for finished goods in a make-to-stock environment, or it might be a more complicated series of activities, including design efforts for make-to-order products
.		Contract Status from D3.1 Obtain and Respond to RFP/RFQ		Customer profile, which include address data, credit and purchase histories, customer preferences including shipping, status, and delivery requirements, etc.
.		Contract Status from D2.2 Receive, Configure, Enter and Validate Order		Customer profile, which include address data, credit and purchase histories, customer preferences including shipping, status, and delivery requirements, etc.
.		Contract Status from D1.2 Receive, Enter & Validate Order		Customer profile, which include address data, credit and purchase histories, customer preferences including shipping, status, and delivery requirements, etc.
.		Credit History from D3.1 Obtain and Respond to RFP/RFQ		Report that portrays a potential customer's payment history and debt, indicating the ability to pay in a timely manner in the future.
.		Credit History from D2.2 Receive, Configure, Enter and Validate Order		Report that portrays a potential customer's payment history and debt, indicating the ability to pay in a timely manner in the future.

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.		Credit History from D1.2 Receive, Enter & Validate Order		Report that portrays a potential customer's payment history and debt, indicating the ability to pay in a timely manner in the future.
.		Customer Address Data from D1.2 Receive, Enter & Validate Order		Customer profile, which include address data, credit and purchase histories, customer preferences including shipping, status, and delivery requirements, etc.
.		Customer Address Data from D3.1 Obtain and Respond to RFP/RFQ		Customer profile, which include address data, credit and purchase histories, customer preferences including shipping, status, and delivery requirements, etc.
.		Customer Address Data from D2.2 Receive, Configure, Enter and Validate Order		Customer profile, which include address data, credit and purchase histories, customer preferences including shipping, status, and delivery requirements, etc.
.		Purchase History from D1.2 Receive, Enter & Validate Order		The amount of purchased products for a certain time in history per specific intervals
.		Purchase History from D3.1 Obtain and Respond to RFP/RFQ		The amount of purchased products for a certain time in history per specific intervals
.		Purchase History from D2.2 Receive, Configure, Enter and Validate Order		The amount of purchased products for a certain time in history per specific intervals
.		Shipping Preferences from D3.1 Obtain and Respond to RFP/RFQ		Customer preferences including shipping, status, and delivery requirements, etc., and customer profile, which includes address data, credit and purchase histories,
.		Shipping Preferences from D2.2 Receive, Configure, Enter and Validate Order		Customer preferences including shipping, status, and delivery requirements, etc., and customer profile, which includes address data, credit and purchase histories,
.		Shipping Preferences from D1.2 Receive, Enter & Validate Order		Customer preferences including shipping, status, and delivery requirements, etc., and customer profile, which includes address data, credit and purchase histories,

Outputs:

.		Customer Master Database/Up to Date to ED.4 Manage Finished Goods Inventories		This database contains all information relative to customers as a group or singly and is updated when ever new information is received about a customer, includes customer profiles.

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ED.4 Manage Finished Goods Inventories

The process of establishing and maintaining finished goods, inventory limits or levels, replenishment models, ownership, product mix, stocking locations.

Metrics (see Appendix A for metrics attributes):

.		% of Orders Delivered in Full		Percentage of orders which all of the items are received by customer in the quantities committed The number of orders that are received by the customer in the quantities committed divided by the total orders [Total number of orders delivered in full] / [Total number of orders delivered] x 100%
.		Cost to Manage Finished Goods Inventories		The sum of the Costs to Manage Finished Good Inventory
.		Finished Goods Inventory Days of Supply		Plant finished goods inventory days of supply are calculated as gross plant finished goods inventory ÷ (value of transfers/365 days).
.		Inventory Days of Supply		Five point annual average of the sum of all gross inventories (raw materials & WIP, plant FG, field FG, field samples, other) ÷ (COGS ÷ 365). Total gross value of inventory at standard cost before reserves for excess and obsolescence. Only includes inventory on company books, future liabilities should not be included
.		Manage Finished Goods Inventories Cycle Time		The average time associated with managing finished good inventory

Best Practices:

.		Periodic Review of Metrics and Strategy with Comparisons to Industry Benchmarks		Real time view of data.
.		Real Time Data on Current Status		Dynamic calculation of safety stock based on actual sales.
.		Statistical Test Count		The Statistical Test Count (STC) process is a method of validating inventory on-hand values by physically counting and reconciling a statistical sample of the entire inventory population. This sample is then extrapolated across the inventory population, which provides an indicative measure of entire inventory population. Furthermore, with extrapolation the net and gross percentage of error is determined.

Inputs:

.		Customer Master Database/Up to Date from ED.3 Manage Deliver Information		This database contains all information relative to customers as a group or singly and is updated when ever new information is received about a customer, includes customer profiles.
.		Existing Inventory Data from D1.8 Receive Product from Source or Make		Available data that characterizes and quantifies raw material, work in process, and finished goods inventories
.		Integrated Supply Chain Plan from Source: Plan		Communication of courses of action over the appropriate time-defined planning horizon and interval, representing a projected appropriation of supply chain resource to meet supply-chain requirements as they affect the customer.
.		Inventory Rules from Source: Plan		The rules that determining the desired levels of items, whether raw materials, work in process, or finished products including order quantities and safety stock levels.

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.		Order Rules from ED.1 Manage Deliver Business Rules		Rules for the function that encompasses receiving, entering, and promising orders from customers, distribution centers, and interplant operations.
.		Product Mix and Plans from Source: Plan		The proportion of individual products that make up the total production or sales volume and plan that authorizes the factory to manufacture a certain quantity of a specific item, or the portfolio of products the company has to cover the targeted customer need and the plans of how to manage that portfolio.
.		Returns Data from ED.8 Manage Import/Export Requirements		The properties, characteristics and information relating to returns, including failure information, excess, obsolete, MRO, customer, etc.
.		Scrap Authorization from ED.8 Manage Import/Export Requirements		Permission to scrap material or item outside of specifications and possessing characteristics that make rework impractical.

Outputs:

.		Delivery Performance to ED.2 Assess Delivery Performance		The process of measuring actual supplier performance against internal and/or external standards, providing feedback to achieve and maintain the performance required to meet the customers' business and/or competitive needs.
.		Finish Goods Inventory Target Levels to P4.2 Identify, Assess, and Aggregate Delivery Resources and Capabilities		In a min-max inventory system, the equivalent of the maximum. The target inventory is equal to the order point plus a variable order quantity.
.		Finished Goods Inventory Location to S3.6 Transfer Product		The physical storage location where Finished Product inventory is held in stock prior to use or shipment.
.		Finished Goods Inventory Location to S2.4 Transfer Product		The physical storage location where Finished Product inventory is held in stock prior to use or shipment.
.		Finished Goods Inventory Location to S1.4 Transfer Product		The physical storage location where Finished Product inventory is held in stock prior to use or shipment.
.		Inventory Rules to ED.5 Manage Deliver Capital Assets		The rules that determining the desired levels of items, whether raw materials, work in process, or finished products including order quantities and safety stock levels.

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ED.5 Manage Deliver Capital Assets

Acquisition, maintenance, and disposition of order management, warehouse, and transportation capital assets. Determine material handling (inventory) pick pack & ship methods (inventory), and equipment.

Metrics (see Appendix A for metrics attributes):

.		Cost to Manage Deliver Capital Assets		The sum of the Costs to Manage Deliver Capital Assets
.		Manage Deliver Capital Assets Cycle Time		The average time associated with managing deliver capital assets

Best Practices:

.		Automated Data Entry		Scanning with RFID/Bar-codes systems
.		Facility Master Plan		Automated Item Cubing and Weighting systems
.		Measure Customer Service		Advanced Shipping Notices (ASN)Parcel and Container Routing and Rating Compliance Labeling Real time shipment tracking
.		Removal of Obsolete Stock		Automated Calculation of ABC Velocity Movement
.		Standard Operating Procedures and Methodology		None identified
.		Storage Location Zoning		Automated or Optimized Slotting (Storage Location) Systems

Inputs:

.		Approved Item Master from Source: Plan		The “master“ record for an item. Typically, it contains identifying and descriptive data and control values (lead times, lot sizes, etc.) and may contain data on inventory status, requirements, planned orders, and costs. Item records are linked by bill of material records (or product structure records), thus defining the bill of material.
.		Budgets from Source: Plan		A plan that includes an estimate of future costs and revenues related to expected activities. The budget serves as a pattern for and a control over future operations.
.		Inventory Rules from ED.4 Manage Finished Goods Inventories		The rules that determining the desired levels of items, whether raw materials, work in process, or finished products including order quantities and safety stock levels.
.		Inventory Rules from Source: Plan		The rules that determining the desired levels of items, whether raw materials, work in process, or finished products including order quantities and safety stock levels.
.		Order Rules from ED.1 Manage Deliver Business Rules		Rules for the function that encompasses receiving, entering, and promising orders from customers, distribution centers, and interplant operations.
.		Supply-Chain Performance Metrics from ED.2 Assess Delivery Performance		Standard measures that indicate how well a supply chain performs within certain categories of performance known as Performance Attributes, e.g. delivery reliability, flexibility and responsiveness, cost, and asset management.

Outputs:

.		Delivery Performance to ED.2 Assess Delivery Performance		The process of measuring actual supplier performance against internal and/or external standards, providing feedback to achieve and maintain the performance required to meet the customers’ business and/or competitive needs.
.		Warehouse Operating Constraints to Plan		Warehouse constraints are those storage items that impact on the

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				supply chain efficiency, including material handling equipment and personnel, equipment maintenance, building maintenance, and security personnel.

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ED.6 Manage Transportation

The process of 1) defining and maintaining the information which characterizes product, containerization, vehicle, route, terminals, regulations, rates/tariffs and backhaul opportunity (Characterization include information necessary to support maintenance of internal Outbound Transportation equipment - CAPITAL ASSETS) and 2) the management of transporters.

Metrics (see Appendix A for metrics attributes):

.		Cost to Manage Transportation		The sum of the costs associated with managing Finished Good Transportation
.		Manage Transportation Cycle Time		The average time associated with managing transportation

Best Practices:

.		Appointment Scheduling for Pickup and Delivery of Customer Shipments		Transportation Management System (TMS) Maintenance Management
.		Automated Documentation for International Shipments		Transportation Management System (TMS) Maintenance Management
.		Backhaul Trading Exchange		Pooling
.		Capture and Maintain Mode Specific Data		Transportation Management System (TMS) Maintenance Management
.		Electronic Manifest and Electronic Billing		Transportation Management System (TMS) Maintenance Management
.		Integrated Order Management, Warehouse Management, and Transportation Management Systems View for analysis for all orders and shipments the following data: Logistics, Product, Cost, GL Charging		Transportation Management System (TMS) Maintenance Management
.		Internet Pooling (Electronic Brokerage of Shipments)		Rating & Routing
.		Manage Information Across 100% of Shipments		Transportation Management System (TMS) Maintenance Management
.		Measurement of Carrier Performance for On-time Delivery and Completeness		Transportation Management System (TMS) Maintenance Management
.		Real-Time Optimized Shipment Method Selection (Air Parcel, Ground Parcel, LTL, etc.) Based on Customer Service Requirements		Transportation Management System (TMS) Maintenance Management
.		Real-Time Shipment Tracking, (via internet)		Transportation Management System (TMS) Maintenance Management
.		View for Analysis for All Orders and Shipments the Following Data: Logistics, Product, Cost, GL Charging		Transportation Management System (TMS) Maintenance Management

Inputs:

.		Air, Ground....Carrier Rate Tables from Source: Company		Rates charged by common carriers to move goods, or freight.
.		Contract Carrier Rates from ES.8 Manage Import/Export Requirements		The rates charged by a carrier that does not serve the general public, but provides transportation for hire for one or a limited number of shippers under a specific contract.
.		Customer Order Size, Weight, and Freight Class from D3.2 Negotiate & Receive Contract		Coupled with cube and route, these criteria determine type of carrier and cost of shipment
.		Customer Order Size, Weight, and Freight Class from D1.2 Receive, Enter & Validate		Coupled with cube and route, these criteria determine type of carrier and cost of shipment

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		Order		
.		Customer Order Size, Weight, and Freight Class from D2.2 Receive, Configure, Enter and Validate Order		Coupled with cube and route, these criteria determine type of carrier and cost of shipment
.		Customer Service Requirements from ED.2 Assess Delivery Performance		Supply chain requirements related to the customer's needs, including service requirements, sales forecasts and actual orders/backorders.
.		Projected Delivery Requirements from Source: Make		The company's goal for the time to ship the product after the receipt of a customer's order. The policy is sometimes stated as "our quoted delivery time," or an estimate of the customer delivery requirements of a product or service, e.g. which kind of packaging, should the parts be shipped one by one or in bulks etc.
.		Standard Practices/Rules from Source: Plan		Industry established common practices, rules, and methods of doing business.

Outputs:

.		Delivery Performance to ED.2 Assess Delivery Performance		The process of measuring actual supplier performance against internal and/or external standards, providing feedback to achieve and maintain the performance required to meet the customers' business and/or competitive needs.
.		Shipping Parameters and Documentation to D2.11 Load Product & Generate Shipping Documentation		Shipping parameters, such as weight, size, cube and route decide carrier and cost. Legal documentation of the contents of a shipment (e.g. way bill, bill of lading, export papers, etc.) are required.
.		Shipping Parameters and Documentation to D1.11 Load Vehicle & Generate Shipping Documentation		Shipping parameters, such as weight, size, cube and route decide carrier and cost. Legal documentation of the contents of a shipment (e.g. way bill, bill of lading, export papers, etc.) are required.
.		Shipping Parameters and Documentation to D3.11 Load Product & Generate Ship Documents		Shipping parameters, such as weight, size, cube and route decide carrier and cost. Legal documentation of the contents of a shipment (e.g. way bill, bill of lading, export papers, etc.) are required.

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ED.7 Manage Product Life Cycle

The process of defining and maintaining the distribution channel/ network for a specific product line (no capital asset or transportation management).

Metrics (see Appendix A for metrics attributes):

.	Cost to Manage Product Life Cycle		The sum of the Cost to Manage Product Life Cycle
.	Manage Product Life Cycle Time		The average time associated with managing the product life cycle

Best Practices:

.	Integrated Facility Management		None identified
.	Operations and Network Analysis		None identified
.	Standard Operating Procedures and Methodology		None identified

Inputs:

.	Budgets from Source: Plan		A plan that includes an estimate of future costs and revenues related to expected activities. The budget serves as a pattern for and a control over future operations.
.	Current Inventory Source Data from ES.3 Maintain Source Data		Data which will provide measurement of actual supplier performance against internal and or external standards to provide feedback to achieve and maintain the performance required to meet the customer's needs.
.	Government Constraints from ED.8 Manage Import/Export Requirements		Requirements established by a government which must be met before allowing the shipping, delivery of a product or manufacture of an item.
.	Location of Customers from D2.2 Receive, Configure, Enter and Validate Order		Customer profile, which includes address and location data, credit and purchase histories, customer preferences including shipping, status, and delivery requirements, etc.
.	Location of Customers from D3.2 Negotiate & Receive Contract		Customer profile, which includes address and location data, credit and purchase histories, customer preferences including shipping, status, and delivery requirements, etc.
.	Location of Customers from D1.2 Receive, Enter & Validate Order		Customer profile, which includes address and location data, credit and purchase histories, customer preferences including shipping, status, and delivery requirements, etc.
.	Product Mix and Plans from Source: Plan		The proportion of individual products that make up the total production or sales volume and plan that authorizes the factory to manufacture a certain quantity of a specific item, or the portfolio of products the company has to cover the targeted customer need and the plans of how to manage that portfolio.
.	Revised Business Assumptions from Source: Plan		An update to the expected cause and effect statements that are the base for the Revised Aggregate Forecast and Projections. These are reviewed periodically with actual results to verify the linkage of actual cause and effect.

Outputs:

.	Enterprise Distribution Model to Plan		Model of the distribution enterprise including the flows, processes, inputs, outputs, metrics, and best business practices.

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ED.8 Manage Import/Export Requirements

The process of recording and maintaining regulations and rates, which constrain the ordering and delivering of product. Determine customs requirements, establish letters of credit terms and conditions, etc.

Metrics (see Appendix A for metrics attributes):

.		Cost to Manage Import/Export Requirements		The sum of the costs associated with the management of import/export requirements
.		Customs Clearance Cycle Time		The average time associated with clearing an order through customs
.		Manage Import/Export Requirements Cycle Time		The average time associated with managing import/export requirements

Best Practices:

.		Ability to Track Component/Sub-Component Manufacturing Country of Origin		Component/lot tracking (lot trace-ability)
.		Assessing Export/Import Requirements during Time of Product Development/Manufacture		Multi-country Export/Import documentation compliance
.		Direct Connection to Customs Clearance		Electronic documentation submission via EDI and/or internet.
.		Direct Transfer of Documents to Recipient and Forwarder		Electronic documentation submission via EDI and/or internet.
.		Documents Generated Automatically During Shipment Preparation.		Electronic documentation submission via EDI and/or internet.
.		Multi-country Export/Import documentation compliance		None identified

Inputs:

.		Government Regulations from Source: Government		Documents the implement law and requirements concerning the import and export of items and the manufacture of item.
.		Receipt Verification from S1.2 Receive Product		Acknowledgement that the product received conforms to specified requirements and criteria.
.		Receipt Verification from S2.2 Receive Product		Acknowledgement that the product received conforms to specified requirements and criteria.
.		Receipt Verification from S3.4 Receive Product		Acknowledgement that the product received conforms to specified requirements and criteria.
.		Shipping History from D1.11 Load Vehicle & Generate Shipping Documentation		The transaction history of the physical shipment of an item to another internal location or to a customer.
.		Shipping History from D3.11 Load Product & Generate Ship Documents		The transaction history of the physical shipment of an item to another internal location or to a customer.
.		Shipping History from D2.11 Load Product & Generate Shipping Documentation		The transaction history of the physical shipment of an item to another internal location or to a customer.
.		Tariffs and Duties from Source: Company		Charges established by a government which must be met before allowing the shipping or delivery of a product across national boundaries.

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Outputs:

.		Duty Drawback Claims to Company		Claims for the refund of duties as a result of a ruling by a government agency.
.		Government Constraints to Plan		Requirements established by a government which must be met before allowing the shipping, delivery of a product or manufacture of an item.
.		Government Constraints to ED.7 Manage Product Life Cycle		Requirements established by a government which must be met before allowing the shipping, delivery of a product or manufacture of an item.
.		Returns Data to ED.4 Manage Finished Goods Inventories		The properties, characteristics and information relating to returns, including failure information, excess, obsolete, MRO, customer, etc.
.		Scrap Authorization to ED.4 Manage Finished Goods Inventories		Permission to scrap material or item outside of specifications and possessing characteristics that make rework impractical.
.		Shipping Export Parameters and Documentation to D2.11 Load Product & Generate Shipping Documentation		Shipping and documentation requirements established by a government which must be met before allowing the shipping or delivery of a product across national boundaries.
.		Shipping Export Parameters and Documentation to D1.11 Load Vehicle & Generate Shipping Documentation		Shipping and documentation requirements established by a government which must be met before allowing the shipping or delivery of a product across national boundaries.
.		Shipping Export Parameters and Documentation to D3.11 Load Product & Generate Ship Documents		Shipping and documentation requirements established by a government which must be met before allowing the shipping or delivery of a product across national boundaries.

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SR1 Source Return Defective Product

The process, initiated by the customer, of returning material deemed defective by to the last known holder or designated return center. Process includes: customer identification that an action is required and determining what that action should be, communicating with the last known holder, generating return documentation, and physically returning of the excess product.

The Category SR1 includes five Level 3 Elements:

SR1.1 Identify Defective Product Condition	The process where the customer utilizes planned policies, business rules and product operating conditions inspection as criteria to identify and confirm that material is excess to requirements defective.
SR1.2 Disposition Defective Product	The process of the customer determining whether to return the defective item and the appropriate source contact for a return authorization.
SR1.3 Request Defective Return Authorization	The process of a customer requesting and obtaining authorization, from last known holder or designated return center, for the return of defective product. Additionally, the customer and last known holder or designated return center would discuss enabling conditions such as return replacement or credit, packaging, handling, transportation and import / export requirements to facilitate the efficient return of the defective product.
SR1.4 Schedule Defective Product Shipment	The process where the customer develops the schedule for a carrier to pick-up for delivery of the defective product. Activities include selecting the carrier and rates, preparing the item for transfer, preparing scheduling documentation and managing overall scheduling administration.
SR1.5 Return Defective Product	The process where the customer packages, and handles the defective product in preparation for shipping in accord with pre-determined conditions. The product is then provided by the customer to the carrier who physically transports the product and its associated documentation to the last known holder or designated return center.

Metrics (see Appendix A for metrics attributes):

Cost to Source Return	The sum of the costs associated with Source Return.
Order Fulfillment Cycle Time	The average actual cycle time consistently achieved to fulfill customer orders.
Return on Supply Chain Fixed Assets	Return on Supply Chain Fixed Assets measures the return an organization receives on its invested capital in supply chain fixed assets. This includes the fixed assets used in Plan, Source, Make, Deliver, and Return. The levels of aggregation can be at any element associated with a supply chain asset.
Return on Working Capital	Return on working capital is a measurement which assesses the magnitude of investment relative to a company's working capital position verses the revenue generated from a supply chain. Components include accounts receivable, accounts payable, inventory, supply chain revenue, cost of goods sold and supply chain management costs.
Source Return Cycle Time	The average time associated with Source Return Processes

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SR1.1 Identify Defective Product Condition

The process where the customer utilizes planned policies, business rules and product operating conditions inspection as criteria to identify and confirm that material is excess to requirements defective.

Metrics (see Appendix A for metrics attributes):

.		Cost of Identifying the Defective Condition as a % of Total Source Return Cost
.		Value of Defective Inventory in Identification Stage/ Total Inventory Value

Best Practices:

.		Enterprise Level Policies/Rules with Local Execution		Web based access to enterprise level business rules

Inputs:

.		Business Rules for Return Processes from ER.1 Manage Business Rules for Return Processes		Rules for conducting business, i.e. developing and maintaining customer and channel performance standards of an return processes such as service levels, given service requirements by supply chain stakeholders/trading partners. Business rules align Return process policies with business strategy, goals, and objectives.
.		Manage Regulatory Return Policy from ER.8 Manage Return Regulatory Requirements		The process of identifying and complying with regulatory documentation and process standards set by external entities (i.e. government, trade officials, etc.) when planning for the Return and Recovery of Assets.
.		Warranty Data from ER.8 Manage Return Regulatory Requirements		All data relevant to a warranty claim for a customer for replacement, repair or credit because the product received did not meet a commitment, either expressed or implied, concerning a certain fact regarding the product

Outputs:

.		Returned Defective Product to SR1.2 Disposition Defective Product		Product being returned that is in a defective condition.

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SR1.2 Disposition Defective Product

The process of the customer determining whether to return the defective item and the appropriate source contact for a return authorization.

Metrics (see Appendix A for metrics attributes):

.		Defective Product Disposition Costs as % Total Source Return Cost		
.		Value of Defective Inventory in Disposition Stage/ Total Inventory Value		Inventory Awaiting Return

Best Practices:

.		Confirm Asset Return Condition Codes Are Clearly Understood by All Employees, Especially Those Who Are New to the Process		None identified
.		Confirm Changes in Condition Code Policies Are Promptly Communicated to All Employees and Supply-Chain Partners.		None identified
.		Drive Returns Directly to Return Stock Point of Disposition to Reduce Cost and Cycle Time		Specify return disposition location and time.

Inputs:

.		Return Plans from P5.4 Establish and Communicate Return Plans		Courses of action over specified time periods that represent the projected appropriation of required return resources and or assets to meet the return process requirements.
.		Returned Defective Product from SR1.1 Identify Defective Product Condition		Product being returned that is in a defective condition.

Outputs:

.		Authorization to Return to Service to D1.8 Receive Product from Source or Make		Permission to return to service an item that has been repaired and found to be within specifications and operable.
.		Authorization to Scrap to D1.8 Receive Product from Source or Make		Permission to scrap material or item outside of specifications and possessing characteristics that make rework impractical.
.		Return Inventory Availability to ER.4 Manage Return Inventory		Inventory relative to return process available for use.
.		Return Product Location to ER.4 Manage Return Inventory		The physical location where the returned product inventory is held prior to disposition
.		Returned Defective Product to SR1.3 Request Defective Return Authorization		Product being returned that is in a defective condition.

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SR1.3 Request Defective Return Authorization

The process of a customer requesting and obtaining authorization, from last known holder or designated return center, for the return of defective product. Additionally, the customer and last known holder or designated return center would discuss enabling conditions such as return replacement or credit, packaging, handling, transportation and import / export requirements to facilitate the efficient return of the defective product.

Metrics (see Appendix A for metrics attributes):

.		Cost per Request Authorization		
.		Ratio of Authorization Cost to Total Source Return cost		
.		Value of Defective Product Inventory in Request Return Authorization Stage/ Total Defective Product Inventory Value		Inventory awaiting return authorization.

Best Practices:

.		Clarify Point of Contact and Return Location		Electronic rules for business relationships and transactions.
.		Develop and Clarify Mutually Understood Cycle Times to Process Return Authorizations		Clarification as to who will pay in-bound and out-bound freight cost.
.		Enable Customer-Service Representatives to Complete the Bill Of Lading for the Customer Including Carrier Routing, Weight, Description and Class to Minimize Guesswork & Wrong Estimates		Clarification of policy if authorizations are not processed within the expected cycle time.
.		Long-Term Return Agreements / Partnerships		None identified

Inputs:

.		Defective Product Return Authorization Response from DR1.1 Authorize Defective Product Return		The approved or disapproved Return Product Authorization (RPA) for excess inventory, unserviceable products and/or serviceable or obsolete products as defined by the terms and conditions of a customer/supplier contract.
.		Return Inventory Availability from ER.4 Manage Return Inventory		Inventory relative to return process available for use.
.		Return Schedule Instructions from DR1.2 Schedule Defective Return Receipt		A list of operations and procedures for scheduling the return of product.
.		Returned Defective Product from SR1.2 Disposition Defective Product		Product being returned that is in a defective condition.

Outputs:

.		Credit/ Exchange Options to SR1.4 Schedule Defective Product Shipment		The options available on the return of a repairable item, credit for the cost of the item, repair of the repairable item, receipt of a serviceable item from stock.
.		Defective Product Disposition Request to DR1.1 Authorize Defective Product Return		The customer request for disposition instructions for a defective product from the appropriate source.
.		Defective Product Return Authorization Request to DR1.1 Authorize Defective Product Return		The customer request for disposition instructions for a defective product from the appropriate source.
.		Historical Return Rates to P5.1 Assess, and Aggregate Return Requirements		A judgmental forecasting technique based upon the a return history that is analogous to a present situation, such as the return history

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				on a similar product, and using the past pattern to predict future returns.
.		Returned Defective Product to SR1.4 Schedule Defective Product Shipment		Product being returned that is in a defective condition.
.		Ship-to Data to SR1.4 Schedule Defective Product Shipment		Data about the destination of a retun delivery.
.		Validated Return Material Authorization to SR1.4 Schedule Defective Product Shipment		A validated and approved Return Product Authorization (RPA).

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SR1.4 Schedule Defective Product Shipment

The process where the customer develops the schedule for a carrier to pick-up for delivery of the defective product. Activities include selecting the carrier and rates, preparing the item for transfer, preparing scheduling documentation and managing overall scheduling administration.

Metrics (see Appendix A for metrics attributes):

.		% Defective Product Scheduling Cost to Total Source Return Cost
.		% Shipping Schedules that Support Customer Required Return by Date
.		Value of Defective Product Inventory in Scheduling Stage/ Total Defective Product Inventory Value

Best Practices:

.		Carrier Selection Based on Performance Criteria at Least Cost		Scheduling, carrier selection, and rating
.		Consolidation of Return Carriers		Outbound logistics software to assist with route.
.		Transportation Modeling and Rate Analysis		None identified

Inputs:

.		Validated Return Material Authorization from SR1.3 Request Defective Return Authorization		
.		Credit/ Exchange Options from SR1.3 Request Defective Return Authorization		
.		Returned Defective Product from SR1.3 Request Defective Return Authorization		
.		Ship-to Data from SR1.3 Request Defective Return Authorization		
.		Plan and Build Loads Information from D1.5 Build Loads		Transportation modes are selected and efficient loads are built.
.		Return Inventory Availability from ER.4 Manage Return Inventory		Inventory relative to return process available for use.
.		Ship-to Data from DR1.1 Authorize Defective Product Return		Data about the destination of a retun delivery.

Outputs:

.		Returned Defective Product to SR1.5 Return Defective Product		Product being returned that is in a defective condition.
.		Scheduled Defective Product Return to SR1.5 Return Defective Product		Planned or scheduled returning of material deemed defective for some certain time or times

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SR1.5 Return Defective Product

The process where the customer packages, and handles the defective product in preparation for shipping in accord with pre-determined conditions. The product is then provided by the customer to the carrier who physically transports the product and its associated documentation to the last known holder or designated return center.

Metrics (see Appendix A for metrics attributes):

.		% Error-Free Returns Shipped
.		Cost per Request Authorization
.		Return Shipments Shipped on Time
.		Return Transportation Costs
.		Value of Defective Product Inventory in Physical Return and Transportation Stage/ Total Defective Inventory Value

Best Practices:

.		Advanced Shipping Notice		Integrated data sharing with repair facility.
.		Shipment Tracking and Tracing		Satellite communications, GPS, RFID

Inputs:

.		Scheduled Defective Product Return from SR1.4 Schedule Defective Product Shipment		
.		Returned Defective Product from SR1.4 Schedule Defective Product Shipment		
.		Load, Shipping, Verify, and Credit Information from D1.11 Load Vehicle & Generate Shipping Documentation		The function that performs tasks for the outgoing shipment of parts, components, and products. It includes packaging, marking, weighing, and loading for shipment. Also, verify the shipment and customer credit information.
.		Return Inventory Availability from ER.4 Manage Return Inventory		Inventory relative to return process available for use.

Outputs:

.		Returned Defective Product to DR1.3 Receive Defective Product		Product being returned that is in a defective condition.
.		Shipment Documents to Government		Legal documentation of the contents of a shipment (e.g. way bill, bill of lading, export papers, etc....).
.		Shipment Documents to Customer		Legal documentation of the contents of a shipment (e.g. way bill, bill of lading, export papers, etc....).
.		Shipment Documents to Carrier		Legal documentation of the contents of a shipment (e.g. way bill, bill of lading, export papers, etc....).

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DR1 Deliver Return Defective Product

The processes of the last known holder or designated return center authorizing and scheduling the defective product return and the physical receipt of the item by the last known holder or known return center and their transfer of the item for final disposition determination. The process includes communication between the customer and last known holder or known return center and the generation of associated documentation.

The Category DR1 includes four Level 3 Elements:

.		DR1.1 Authorize Defective Product Return		The process where the last known holder or designated return center receives a defective product return authorization request from a customer, determines if the item can be accepted and communicates decision to the customer. Accepting the request would include negotiating the conditions of the return with the customer, including authorizing return replacement or credit. Rejecting the request would include providing a reason for the rejection to the customer.
.		DR1.2 Schedule Defective Return Receipt		The process where the last known holder or designated return center evaluates the defective product handling requirements including negotiated conditions and develops a schedule that tells the Customer when to ship the product. The scheduling activity would also inform Receiving when to expect the shipment and where to send the product, for disposition, upon receipt.
.		DR1.3 Receive Defective Product		The process where the last known holder or designated return center receives and verifies the returned defective product against the return authorization and other documentation and prepares the item for transfer.
.		DR1.4 Transfer Defective Product		The process where the last known holder or designated return center transfers the defective product to the appropriate process to implement the disposition decision.

Metrics (see Appendix A for metrics attributes):

.		Cost to Deliver Return		
.		Deliver Return Cycle Time		The average time associated with returns.
.		Order Fulfillment Cycle Time		The average actual cycle time consistently achieved to fulfill customer orders.
.		Return on Supply Chain Fixed Assets		Return on Supply Chain Fixed Assets measures the return an organization receives on its invested capital in supply chain fixed assets. This includes the fixed assets used in Plan, Source, Make, Deliver, and Return. The levels of aggregation can be at any element associated with a supply chain asset.
.		Return on Working Capital		Return on working capital is a measurement which assesses the magnitude of investment relative to a company's working capital position verses the revenue generated from a supply chain. Components include accounts receivable, accounts payable, inventory, supply chain revenue, cost of goods sold and supply chain management costs.
.		Value of Defective Product Inventory in Deliver Return Process/ Total Defective Product Inventory Value		

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DR1.1 Authorize Defective Product Return

The process where the last known holder or designated return center receives a defective product return authorization request from a customer, determines if the item can be accepted and communicates decision to the customer. Accepting the request would include negotiating the conditions of the return with the customer, including authorizing return replacement or credit. Rejecting the request would include providing a reason for the rejection to the customer.

Metrics (see Appendix A for metrics attributes):

.	Authorize Defective Product Return Cycle Time		The average time associated with authorizing the return of defective product.
.	Cost to Authorize Defective Product Return		The sum of the costs associated with authorizing the return of defective product.
.	Value of Defective Product Inventory in Authorization Stage/ Total Defective Product Inventory Value		

Best Practices:

.	Communicate with Customer before the Return to Establish What Types of Returns Are Acceptable		None identified
.	Set Up Electronic or Pre-authorized Returns		None identified
.	Use an Exchange System Where Customer is Issued a Serviceable Item Upon Submitting an Unserviceable Item		None identified

Inputs:

.	Business Rules for Return Processes from ER.1 Manage Business Rules for Return Processes		Rules for conducting business, i.e. developing and maintaining customer and channel performance standards of an return processes such as service levels, given service requirements by supply chain stakeholders/trading partners. Business rules align Return process policies with business strategy, goals, and objectives.
.	Defective Product Disposition Request from SR1.3 Request Defective Return Authorization		The customer request for disposition instructions for a defective product from the appropriate source.
.	Defective Product Return Authorization Request from SR1.3 Request Defective Return Authorization		The customer request for disposition instructions for a defective product from the appropriate source.
.	Manage Integrated Supply Chain Inventory Information from EP.4 Manage Integrated Supply Chain Inventory		Managing the flow of raw materials and products in a supply chain based on uncertain demand for the finished products
.	Product Return Capabilities from P5.4 Establish and Communicate Return Plans		The capability of a system or resources to produce a quantity output in a particular time period; and, any element or factor that constrains the system or resources from achieving a higher level of performance in respect to its goal. The ability the supply chain has to return products in a valid and accurate way.
.	Return Plans from P5.4 Establish and Communicate Return Plans		Courses of action over specified time periods that represent the projected appropriation of required return resources and or assets to meet the return process requirements.

Outputs:

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.		Defective Product Return Authorization Response to SR1.3 Request Defective Return Authorization		The approved or disapproved Return Product Authorization (RPA) for excess inventory, unserviceable products and/or serviceable or obsolete products as defined by the terms and conditions of a customer/supplier contract.
.		Historical Return Rates to P5.1 Assess, and Aggregate Return Requirements		A judgmental forecasting technique based upon the a return history that is analogous to a present situation, such as the return history on a similar product, and using the past pattern to predict future returns.
.		Manage Integrated Supply Chain Inventory Information to EP.4 Manage Integrated Supply Chain Inventory		Managing the flow of raw materials and products in a supply chain based on uncertain demand for the finished products
.		Ship-to Data to SR1.4 Schedule Defective Product Shipment		Data about the destination of a retun delivery.
.		Valid Returns Request to DR1.2 Schedule Defective Return Receipt		Requests for returns that are valid.

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DR1.2 Schedule Defective Return Receipt

The process where the last known holder or designated return center evaluates the defective product handling requirements including negotiated conditions and develops a schedule that tells the Customer when to ship the product. The scheduling activity would also inform Receiving when to expect the shipment and where to send the product, for disposition, upon receipt.

Metrics (see Appendix A for metrics attributes):

.		Cost to Schedule Defective Product Receipt		The sum of the costs associated with scheduling defective product receipt.
.		Schedule Defective Return Receipt Cycle Time		The average time associated with scheduling the receipt of the return of defective product

Best Practices:

.		Integrate Return Planning with Maintenance and Inventory Planning to Optimize the System		Both customer and Service Provider departments are alerted at the same time and viewing the same information.

It is initiated by event:

.		Fault Found from DR1.1 Authorize Defective Product Return

Inputs:

.		Valid Returns Request from DR1.1 Authorize Defective Product Return		Requests for returns that are valid.

Outputs:

.		Return Schedule Instructions to SR1.3 Request Defective Return Authorization		A list of operations and procedures for scheduling the return of product.
.		Return Schedule Instructions to DR1.3 Receive Defective Product		A list of operations and procedures for scheduling the return of product.

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DR1.3 Receive Defective Product

The process where the last known holder or designated return center receives and verifies the returned defective product against the return authorization and other documentation and prepares the item for transfer.

Metrics (see Appendix A for metrics attributes):

.		Cost to Receive Defective Product		The sum of the costs associated with receiving defective product returns.
.		Receive Defective Product Cycle Time		The average time associated with receiving defective product returns from the customer

Best Practices:

.		Bar Coding is Used to Minimize Handling Time and Maximize Data Accuracy		- Bar code interface for data collection devices - Generate bar coded receiving documents - Product serial number used as identifier - RFID
.		Customer Sends Receiving Advanced Shipment Notification Prior to Shipment		Electronically link Return authorization, Return schedule and shipping documents. .
.		Develop Local Receiving Process Close to Repair		Minimize time spent in product movement.
.		Electronically Track Shipment from Customer to Service Provider		None Identified
.		Pre-Certify Supplier Capability to Send Return Products Correctly to Minimize the Need for Receipt Verification		- Push inspection to SOURCE - Receiving quality criteria connected to ISO 9000 practices
.		Receivers on the Dock Communicate Directly with the Buyer to Efficiently Resolve Any Discrepancies		Buyer's name for every receipt is clearly visible on Receiver.

Inputs:

.		Receipt Data from ER.4 Manage Return Inventory		A collection of related receipt data records organized in a specific manner.
.		Receipt Data from ER.3 Manage Return Data Collection		A collection of related receipt data records organized in a specific manner.
.		Return Regulatory Requirements from ER.8 Manage Return Regulatory Requirements		Return requirements dictated by process standards set by external entities (i.e. government, trade officials, etc.).
.		Return Schedule Instructions from DR1.2 Schedule Defective Return Receipt		A list of operations and procedures for scheduling the return of product.
.		Return Transportation Guidelines, Policies, & Agreements from ER.6 Manage Return Transportation		Guidelines, policies and agreements for the transportation activities around return process.
.		Returned Defective Product from SR1.5 Return Defective Product		Product being returned that is in a defective condition.

Outputs:

.		Receipt Discrepancy Notification to Enable Return		Notification of a discrepancy relating to a receipt, including: damage, packaging, quantity, etc.
.		Receipt Discrepancy Notification to Plan		Notification of a discrepancy relating to a receipt, including: damage, packaging, quantity, etc.

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.		Receipt Discrepancy Notification to Source		Notification of a discrepancy relating to a receipt, including: damage, packaging, quantity, etc.
.		Return Inventory Transfer Data to ER.4 Manage Return Inventory		The process of receipt and verification of the returned item against the return authorization and other documentation and prepares the item for transfer.
.		Return Inventory Transfer Data to P5.2 Identify, Assess, and Aggregate Return Resources		The process of receipt and verification of the returned item against the return authorization and other documentation and prepares the item for transfer.
.		Returned Defective Product to DR1.4 Transfer Defective Product		Product being returned that is in a defective condition.

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DR1.4 Transfer Defective Product

The process where the last known holder or designated return center transfers the defective product to the appropriate process to implement the disposition decision.

Metrics (see Appendix A for metrics attributes):

.		Cost to Transfer Defective Product		The sum of the costs associated transferring defective product for disposition
.		Transfer Defective Product Cycle Time		The average time associated transfer until product is moved to the next process.

Best Practices:

.		Defective Products Scheduling Identifies Next Destination (Source, Make, or Deliver) on Return Authorization		Utilize electronic links
.		Receiving Equipment and Packaging Materials to Transfer Product Are Planned for In Advance and Readily Available When Needed		Include packaging materials in inventory management system and treat as any other inventory to minimize potential of stock-out.
.		Return Process Electronically Tracks Transfer from Station to Station		Utilize Bar coding
.		Review Transfer Cycle Time Trends and Determine If Equipment Capacity is Properly Balanced with Projected Usage		Periodic review of capital asset plan to determine if additional equipment, if needed, can be funded.

Inputs:

.		Return Inventory for Transfer from ER.4 Manage Return Inventory		Inventory relative to return process available for transfer to other destination.
.		Returned Defective Product from DR1.3 Receive Defective Product		Product being returned that is in a defective condition.
.		Sourcing Plans from P2.4 Establish Sourcing Plans		An aggregate material requirements plan used to schedule material deliveries to meet production plan.

Outputs:

.		Defective Products to S1.2 Receive Product		Maintenance, Repair and Overhaul spare parts used to support of operations and maintenance.
.		Defective Products to S2.2 Receive Product		Maintenance, Repair and Overhaul spare parts used to support of operations and maintenance.
.		Return Inventory Transfer Data to P5.2 Identify, Assess, and Aggregate Return Resources		The process of receipt and verification of the returned item against the return authorization and other documentation and prepares the item for transfer.
.		Return Inventory Transfer Data to S1.1 Schedule Product Deliveries		The process of receipt and verification of the returned item against the return authorization and other documentation and prepares the item for transfer.
.		Return Inventory Transfer Data to S3.3 Schedule Product Deliveries		The process of receipt and verification of the returned item against the return authorization and other documentation and prepares the item for transfer.
.		Return Inventory Transfer Data to ER.4 Manage Return Inventory		The process of receipt and verification of the returned item against the return authorization and other documentation and prepares the item for transfer.

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.		Return Inventory Transfer Data to S2.1 Schedule Product Deliveries		The process of receipt and verification of the returned item against the return authorization and other documentation and prepares the item for transfer.

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SR2 Source Return MRO Product

The process, initiated by the customer, of returning maintenance, repair, and overhaul items to a service provider. Process includes: customer identification that an action is required and determining what that action should be, communicating with the service provider, generating return documentation, and physically returning or disposing of the product.

The Category SR2 includes five Level 3 Elements:

SR2.1 Identify MRO Product Condition	The process where the customer utilizes pre-determined MRO policies, business rules and product operating conditions as criteria to identify and confirm that an item requires maintenance, repair, overhaul or disposal. Includes operating failures and planned maintenance requirements.
SR2.2 Disposition MRO Product	The process of the customer determining whether to service the item, what service is required, and who the appropriate service provider would be to service the item. Outputs include a decision to: (1) send a return authorization request to a service provider, (2) send the product back into service without requiring a return authorization request, or (3) discard the item.
SR2.3 Request MRO Return Authorization	The process of a customer requesting and obtaining authorization, from a service provider, for the return of an MRO product. In addition to discussing the MRO issue, the customer and service provider would discuss enabling conditions such as return replacement or credit, packaging, handling, transportation and import / export requirements to facilitate the efficient return of the MRO product to the service provider. The customer may need to go through several return authorization iterations with multiple service providers before authorization is received.
SR2.4 Schedule MRO Shipment	The process where the customer develops the schedule for a carrier to pick-up and deliver the MRO product. Activities include selecting the carrier and rates, preparing the item for transfer, preparing scheduling documentation and managing overall scheduling administration.
SR2.5 Return MRO Product	The process where the customer packages, and handles the MRO product in preparation for shipping in accord with pre-determined conditions. The product is then provided by the customer to the carrier who physically transports the product and its associated documentation to the service provider.

Metrics (see Appendix A for metrics attributes):

Order Fulfillment Cycle Time	The average actual cycle time consistently achieved to fulfill customer orders.
Return on Supply Chain Fixed Assets	Return on Supply Chain Fixed Assets measures the return an organization receives on its invested capital in supply chain fixed assets. This includes the fixed assets used in Plan, Source, Make, Deliver, and Return. The levels of aggregation can be at any element associated with a supply chain asset.
Return on Working Capital	Return on working capital is a measurement which assesses the magnitude of investment relative to a company's working capital position verses the revenue generated from a supply chain. Components include accounts receivable, accounts payable, inventory, supply chain revenue, cost of goods sold and supply chain management costs.
Total Source Return Costs	The sum of the costs associated with the return of raw materials to the supplier.

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SR2.1 Identify MRO Product Condition

The process where the customer utilizes pre-determined MRO policies, business rules and product operating conditions as criteria to identify and confirm that an item requires maintenance, repair, overhaul or disposal. Includes operating failures and planned maintenance requirements.

Metrics (see Appendix A for metrics attributes):

.		Cost of Identifying the MRO Condition as a % of Total Source Return Cost
.		Total Number of Confirmed MRO Conditions / Total Number of MRO Service Requests Initiated
.		Value of Unserviceable MRO Inventory In Identification Stage/Total MRO Inventory Value

Inputs:

.		Business Rules for Return Processes from ER.1 Manage Business Rules for Return Processes		Rules for conducting business, i.e. developing and maintaining customer and channel performance standards of an return processes such as service levels, given service requirements by supply chain stakeholders/trading partners. Business rules align Return process policies with business strategy, goals, and objectives.
.		Manage Regulatory Return Policy from ER.8 Manage Return Regulatory Requirements		The process of identifying and complying with regulatory documentation and process standards set by external entities (i.e. government, trade officials, etc.) when planning for the Return and Recovery of Assets.
.		Warranty Data from ER.8 Manage Return Regulatory Requirements		All data relevant to a warranty claim for a customer for replacement, repair or credit because the product received did not meet a commitment, either expressed or implied, concerning a certain fact regarding the product

Outputs:

.		Returned MRO Product to SR2.2 Disposition MRO Product		Product being returned for maintenance, repair, or overhaul.

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SR2.2 Disposition MRO Product

The process of the customer determining whether to service the item, what service is required, and who the appropriate service provider would be to service the item. Outputs include a decision to: (1) send a return authorization request to a service provider, (2) send the product back into service without requiring a return authorization request, or (3) discard the item.

Metrics (see Appendix A for metrics attributes):

.	% Identified MRO Products Returned to Service			
.	MRO Disposition Costs as % Total Source Return Cost			
.	Value of Defective Inventory in Disposition Stage/ Total Inventory Value		Inventory Awaiting Return	
.	Value of Unserviceable MRO Inventory In Disposition Stage/ Total MRO Inventory Value		Inventory awaiting disposition	

Inputs:

.	Return Plans from P5.4 Establish and Communicate Return Plans		Courses of action over specified time periods that represent the projected appropriation of required return resources and or assets to meet the return process requirements.	
.	Returned MRO Product from SR2.1 Identify MRO Product Condition		Product being returned for maintenance, repair, or overhaul.	

Outputs:

.	Authorization to Return to Service to D1.8 Receive Product from Source or Make		Permission to return to service an item that has been repaired and found to be within specifications and operable.	
.	Authorization to Scrap to D1.8 Receive Product from Source or Make		Permission to scrap material or item outside of specifications and possessing characteristics that make rework impractical.	
.	Return Inventory Availability to ER.4 Manage Return Inventory		Inventory relative to return process available for use.	
.	Returned MRO Product to SR2.3 Request MRO Return Authorization		Product being returned for maintenance, repair, or overhaul.	
.	Returned Product Location to ER.4 Manage Return Inventory		The storage location of those items being returned.	

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SR2.3 Request MRO Return Authorization

The process of a customer requesting and obtaining authorization, from a service provider, for the return of an MRO product. In addition to discussing the MRO issue, the customer and service provider would discuss enabling conditions such as return replacement or credit, packaging, handling, transportation and import / export requirements to facilitate the efficient return of the MRO product to the service provider. The customer may need to go through several return authorization iterations with multiple service providers before authorization is received.

Metrics (see Appendix A for metrics attributes):

.	% Authorization Requests Transmitted Error-Free / Total Authorizations Requested		
.	Cost per Request Authorization		
.	Ratio of Authorization Cost To Total Source Return Cost		
.	Value of Unserviceable MRO Inventory in Request Return Authorization Stage/ Total MRO Inventory Value		Inventory awaiting return authorization

Inputs:

.	MRO Return Authorization Response from DR2.1 Authorize MRO Product Return		The process of a customer obtaining authorization, from a service provider, for the return of an MRO product
.	Return Inventory Availability from ER.4 Manage Return Inventory		Inventory relative to return process available for use.
.	Return Schedule Instructions from DR2.2 Schedule MRO Return Receipt		A list of operations and procedures for scheduling the return of product.
.	Returned MRO Product from SR2.2 Disposition MRO Product		Product being returned for maintenance, repair, or overhaul.

Outputs:

.	Workflow to SR2.4 Schedule MRO Shipment		
.	Credit Exchange Options to SR2.4 Schedule MRO Shipment		The options available on the return of a repairable item, credit for the cost of the item, repair of the repairable item, receipt of a serviceable item from stock.
.	Historical Return Rates to P5.1 Assess, and Aggregate Return Requirements		A judgmental forecasting technique based upon the a return history that is analogous to a present situation, such as the return history on a similar product, and using the past pattern to predict future returns.
.	MRO Disposition Request to DR2.1 Authorize MRO Product Return		Request disposition instructions for an MRO item from the Supplier.
.	MRO Return Authorization Request to DR2.1 Authorize MRO Product Return		The process of a customer requesting authorization from a service provider, for the return of an MRO product. In addition to discussing the MRO issue, the customer and service provider would discuss enabling conditions such as return replacement or credit, packaging, handling, transportation and import / export requirements to facilitate the efficient return of the MRO product to the service provider. The customer may need to go through several return authorization iterations with multiple service providers before authorization is received.
.	Returned MRO Product to SR2.4 Schedule MRO Shipment		Product being returned for maintenance, repair, or overhaul.
.	Ship-to Data to SR2.4 Schedule MRO		Data about the destination of a return delivery.

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		Shipment		

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SR2.4 Schedule MRO Shipment

The process where the customer develops the schedule for a carrier to pick-up and deliver the MRO product. Activities include selecting the carrier and rates, preparing the item for transfer, preparing scheduling documentation and managing overall scheduling administration.

Metrics (see Appendix A for metrics attributes):

.	% MRO Scheduling Cost to Total Source Return Cost
.	% Shipping Schedules that Support Customer Required Return by Date
.	Value of Unserviceable MRO inventory in Scheduling Stage/ Total MRO Inventory Value

Best Practices:

.	Carrier Selection Based on Performance Criteria at Least Cost		Scheduling, carrier selection, and rating
.	Consolidation of Return Carriers		Outbound logistics software to assist with route.
.	Transportation Modeling and Rate Analysis		None identified

Inputs:

.	Workflow from SR2.3 Request MRO Return Authorization		
.	Returned MRO Product from SR2.3 Request MRO Return Authorization		
.	Ship-to Data from SR2.3 Request MRO Return Authorization		
.	Credit Exchange Options from SR2.3 Request MRO Return Authorization		
.	Plan and Build Loads Information from D1.5 Build Loads		Transportation modes are selected and efficient loads are built.
.	Return Inventory Availability from ER.4 Manage Return Inventory		Inventory relative to return process available for use.
.	Ship-to Data from DR2.1 Authorize MRO Product Return		Data about the destination of a return delivery.

Outputs:

.	Returned MRO Product to SR2.5 Return MRO Product		Product being returned for maintenance, repair, or overhaul.
.	Scheduled MRO Return to SR2.5 Return MRO Product		Planned or scheduled act of installing something for some certain time or times.

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SR2.5 Return MRO Product

The process where the customer packages, and handles the MRO product in preparation for shipping in accord with pre-determined conditions. The product is then provided by the customer to the carrier who physically transports the product and its associated documentation to the service provider.

Metrics (see Appendix A for metrics attributes):

.		% Error-Free Returns Shipped
.		Cost per Request Authorization
.		Return Shipments Shipped on Time
.		Return Transportation Costs
.		Value of Unserviceable MRO Inventory in Physical Return and Transportation Stage/ Total MRO Inventory Value

Best Practices:

.		Advanced Shipping Notice		Integrated data sharing with repair facility.
.		Shipment Tracking and Tracing		Satellite communications, GPS, RFID

Inputs:

.		Returned MRO Product from SR2.4 Schedule MRO Shipment		
.		Scheduled MRO Return from SR2.4 Schedule MRO Shipment		
.		Load, Shipping, Verify, and Credit Information from D1.11 Load Vehicle & Generate Shipping Documentation		The function that performs tasks for the outgoing shipment of parts, components, and products. It includes packaging, marking, weighing, and loading for shipment. Also, verify the shipment and customer credit information.
.		Return Inventory Availability from ER.4 Manage Return Inventory		Inventory relative to return process available for use.

Outputs:

.		Returned MRO Product to DR2.3 Receive MRO Product		Product being returned for maintenance, repair, or overhaul.
.		Shipment Documents to Government		Legal documentation of the contents of a shipment (e.g. way bill, bill of lading, export papers, etc....).
.		Shipment Documents to Carrier		Legal documentation of the contents of a shipment (e.g. way bill, bill of lading, export papers, etc....).
.		Shipment Documents to Customer		Legal documentation of the contents of a shipment (e.g. way bill, bill of lading, export papers, etc....).

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DR2 Deliver Return MRO Product

The processes of the service provider authorizing and scheduling the MRO return product and the physical receipt of the item by the service provider and their transfer of the item for final disposition determination. The process includes communication between the customer and service provider and the generation of associated documentation.

The Category DR2 includes four Level 3 Elements:

DR2.1 Authorize MRO Product Return	The process where a service provider receives an MRO product return authorization request from a customer, determines if the item can be accepted for MRO and communicates their decision to the customer. Accepting the request would include negotiating the conditions of the return with the customer, including authorizing return replacement or credit. Rejecting the request would include providing a reason for the rejection to the customer.
DR2.2 Schedule MRO Return Receipt	The process where the service provider evaluates the MRO service requirements including negotiated conditions and develops a schedule that tells the Customer when to ship the part. The scheduling activity would also inform Receiving when to expect the shipment and where to send the part, for induction or storage, upon receipt.
DR2.3 Receive MRO Product	The process where the service provider receives and verifies the returned MRO item against the return authorization and other documentation and prepares the item for transfer (includes verify).
DR2.4 Transfer MRO Product	The process where the service provider transfers the MRO product to the appropriate process to implement the disposition decision.

Metrics (see Appendix A for metrics attributes):

% of MRO Returns Delivered to the Correct Service Provider Location, within Schedule, with the Correct Part and Documentation	
Cost to Deliver Return	
Deliver Return Cycle Time	The average time associated with returns.
Order Fulfillment Cycle Time	The average actual cycle time consistently achieved to fulfill customer orders.
Return on Supply Chain Fixed Assets	Return on Supply Chain Fixed Assets measures the return an organization receives on its invested capital in supply chain fixed assets. This includes the fixed assets used in Plan, Source, Make, Deliver, and Return. The levels of aggregation can be at any element associated with a supply chain asset.
Return on Working Capital	Return on working capital is a measurement which assesses the magnitude of investment relative to a company's working capital position verses the revenue generated from a supply chain. Components include accounts receivable, accounts payable, inventory, supply chain revenue, cost of goods sold and supply chain management costs.
Upside Deliver Return Adaptability	The maximum sustainable percentage increase in returns of finished goods from customers that can be achieved in 30 days.
Upside Deliver Return Flexibility	The number of days required to achieve an unplanned sustainable 20% increase in the return of finished goods from customers.
Value of Unserviceable MRO Inventory in Deliver Return Process/ Total MRO Inventory Value	

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DR2.1 Authorize MRO Product Return

The process where a service provider receives an MRO product return authorization request from a customer, determines if the item can be accepted for MRO and communicates their decision to the customer. Accepting the request would include negotiating the conditions of the return with the customer, including authorizing return replacement or credit. Rejecting the request would include providing a reason for the rejection to the customer.

Metrics (see Appendix A for metrics attributes):

.		Authorize MRO Product Return Cycle Time		The average time associated with authorizing the return of MRO product.
.		Cost to Authorize MRO Product Return		The sum of the costs associated with authorizing the return of product to be maintained, repaired, or overhauled.

Best Practices:

.		Communicate with Customer before the Return to Establish What Types of Returns Are Acceptable		None identified
.		Set Up Electronic or Pre-authorized Returns		None identified
.		Use an Exchange System Where Customer is Issued a Serviceable Item Upon Submitting an Unserviceable Item		None identified

Inputs:

.		Business Rules for Return Processes from ER.1 Manage Business Rules for Return Processes		Rules for conducting business, i.e. developing and maintaining customer and channel performance standards of an return processes such as service levels, given service requirements by supply chain stakeholders/trading partners. Business rules align Return process policies with business strategy, goals, and objectives.
.		Manage Integrated Supply Chain Inventory Information from EP.4 Manage Integrated Supply Chain Inventory		Managing the flow of raw materials and products in a supply chain based on uncertain demand for the finished products
.		MRO Disposition Request from SR2.3 Request MRO Return Authorization		Request disposition instructions for an MRO item from the Supplier.
.		MRO Return Authorization Request from SR2.3 Request MRO Return Authorization		The process of a customer requesting authorization from a service provider, for the return of an MRO product. In addition to discussing the MRO issue, the customer and service provider would discuss enabling conditions such as return replacement or credit, packaging, handling, transportation and import / export requirements to facilitate the efficient return of the MRO product to the service provider. The customer may need to go through several return authorization iterations with multiple service providers before authorization is received.
.		Product Return Capabilities from P5.4 Establish and Communicate Return Plans		The capability of a system or resources to produce a quantity output in a particular time period; and, any element or factor that constrains the system or resources from achieving a higher level of performance in respect to its goal. The ability the supply chain has to return products in a valid and accurate way.
.		Return Plans from P5.4 Establish and Communicate Return Plans		Courses of action over specified time periods that represent the projected appropriation of required return resources and or assets to meet the return process requirements.

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Outputs:

.		Historical Return Rates to P5.1 Assess, and Aggregate Return Requirements		A judgmental forecasting technique based upon the a return history that is analogous to a present situation, such as the return history on a similar product, and using the past pattern to predict future returns.
.		Manage Integrated Supply Chain Inventory Information to EP.4 Manage Integrated Supply Chain Inventory		Managing the flow of raw materials and products in a supply chain based on uncertain demand for the finished products
.		MRO Return Authorization Response to SR2.3 Request MRO Return Authorization		The process of a customer obtaining authorization, from a service provider, for the return of an MRO product
.		Ship-to Data to SR2.4 Schedule MRO Shipment		Data about the destination of a retun delivery.
.		Valid Returns Request to DR2.2 Schedule MRO Return Receipt		Requests for returns that are valid.

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DR2.2 Schedule MRO Return Receipt

The process where the service provider evaluates the MRO service requirements including negotiated conditions and develops a schedule that tells the Customer when to ship the part. The scheduling activity would also inform Receiving when to expect the shipment and where to send the part, for induction or storage, upon receipt.

Metrics (see Appendix A for metrics attributes):

.		Cost to Schedule MRO Product Receipt		The sum of the costs associated with scheduling MRO product receipt.
.		Schedule MRO Return Receipt Cycle Time		The average time associated with scheduling the receipt of the return of MRO product

Best Practices:

.		Integrate Return Planning with Maintenance and Inventory Planning to Optimize the System		Both customer and Service Provider departments are alerted at the same time and viewing the same information.

Inputs:

.		Valid Returns Request from DR2.1 Authorize MRO Product Return		Requests for returns that are valid.

Outputs:

.	Return Schedule Instructions to SR2.3 Request MRO Return Authorization	A list of operations and procedures for scheduling the return of product.
.	Return Schedule Instructions to DR2.3 Receive MRO Product	A list of operations and procedures for scheduling the return of product.

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DR2.3 Receive MRO Product

The process where the service provider receives and verifies the returned MRO item against the return authorization and other documentation and prepares the item for transfer (includes verify).

Metrics (see Appendix A for metrics attributes):

.		Cost to Receive MRO Product		The sum of the costs associated with receiving MRO product returns.
.		Receive MRO Product Cycle Time		The average time associated with receiving MRO product returns from the customer

Best Practices:

.		Bar Coding is Used to Minimize Handling Time and Maximize Data Accuracy		- Bar code interface for data collection devices - Generate bar coded receiving documents - Product serial number used as identifier - RFID
.		Customer Sends Receiving Advanced Shipment Notification Prior to Shipment		Electronically link Return authorization, Return schedule and shipping documents. .
.		Develop Local Receiving Process Close to Repair		Minimize time spent in product movement.
.		Electronically Track Shipment from Customer to Service Provider		None Identified
.		Pre-Certify Supplier Capability to Send Return Products Correctly to Minimize the Need for Receipt Verification		- Push inspection to SOURCE - Receiving quality criteria connected to ISO 9000 practices
.		Receivers on the Dock Communicate Directly with the Buyer to Efficiently Resolve Any Discrepancies		Buyer's name for every receipt is clearly visible on Receiver.

Inputs:

.		Receipt Data from ER.4 Manage Return Inventory		A collection of related receipt data records organized in a specific manner.
.		Receipt Data from ER.3 Manage Return Data Collection		A collection of related receipt data records organized in a specific manner.
.		Return Regulatory Requirements from ER.8 Manage Return Regulatory Requirements		Return requirements dictated by process standards set by external entities (i.e. government, trade officials, etc.).
.		Return Schedule Instructions from DR2.2 Schedule MRO Return Receipt		A list of operations and procedures for scheduling the return of product.
.		Return Transportation Guidelines, Policies, & Agreements from ER.6 Manage Return Transportation		Guidelines, policies and agreements for the transportation activities around return process.
.		Returned MRO Product from SR2.5 Return MRO Product		Product being returned for maintenance, repair, or overhaul.

Outputs:

.		Receipt Discrepancy Notification to Enable Return		Notification of a discrepancy relating to a receipt, including: damage, packaging, quantity, etc.
.		Receipt Discrepancy Notification to Plan		Notification of a discrepancy relating to a receipt, including: damage, packaging, quantity, etc.

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.		Receipt Discrepancy Notification to Source		Notification of a discrepancy relating to a receipt, including: damage, packaging, quantity, etc.
.		Return Inventory Transfer Data to ER.4 Manage Return Inventory		The process of receipt and verification of the returned item against the return authorization and other documentation and prepares the item for transfer.
.		Return Inventory Transfer Data to P5.2 Identify, Assess, and Aggregate Return Resources		The process of receipt and verification of the returned item against the return authorization and other documentation and prepares the item for transfer.
.		Returned MRO Product to DR2.4 Transfer MRO Product		Product being returned for maintenance, repair, or overhaul.

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DR2.4 Transfer MRO Product

The process where the service provider transfers the MRO product to the appropriate process to implement the disposition decision.

Metrics (see Appendix A for metrics attributes):

.		Cost to Transfer MRO Product		The sum of the costs associated transferring MRO product for disposition
.		Transfer MRO Product Cycle Time		The average time associated transfer until product is moved to the next process.

Best Practices:

.		MRO Scheduling Identifies Next Destination (Stores or Repair Station) on Return Authorization		Utilize electronic links
.		Receiving Equipment and Packaging Materials to Transfer Product Are Planned for In Advance and Readily Available When Needed		Include packaging materials in inventory management system and treat as any other inventory to minimize potential of stock-out.
.		Return Process Electronically Tracks Transfer from Station to Station		Utilize Bar coding
.		Review Transfer Cycle Time Trends and Determine If Equipment Capacity is Properly Balanced with Projected Usage		Periodic review of capital asset plan to determine if additional equipment, if needed, can be funded.

Inputs:

.		Return Inventory for Transfer from ER.4 Manage Return Inventory		Inventory relative to return process available for transfer to other destination.
.		Returned MRO Product from DR2.3 Receive MRO Product		Product being returned for maintenance, repair, or overhaul.
.		Sourcing Plans from P2.4 Establish Sourcing Plans		An aggregate material requirements plan used to schedule material deliveries to meet production plan.

Outputs:

.		MRO Products to S2.2 Receive Product		Maintenance, Repair and Overhaul spare parts used to support of operations and maintenance.
.		MRO Products to S1.2 Receive Product		Maintenance, Repair and Overhaul spare parts used to support of operations and maintenance.
.		Return Inventory Transfer Data to S2.1 Schedule Product Deliveries		The process of receipt and verification of the returned item against the return authorization and other documentation and prepares the item for transfer.
.		Return Inventory Transfer Data to S1.1 Schedule Product Deliveries		The process of receipt and verification of the returned item against the return authorization and other documentation and prepares the item for transfer.
.		Return Inventory Transfer Data to ER.4 Manage Return Inventory		The process of receipt and verification of the returned item against the return authorization and other documentation and prepares the item for transfer.

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.		Return Inventory Transfer Data to P5.2 Identify, Assess, and Aggregate Return Resources		The process of receipt and verification of the returned item against the return authorization and other documentation and prepares the item for transfer.
.		Return Inventory Transfer Data to S3.3 Schedule Product Deliveries		The process of receipt and verification of the returned item against the return authorization and other documentation and prepares the item for transfer.

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SR3 Source Return Excess Product

The process, initiated by the customer, of returning material deemed in excess of current requirements to the designated return center. Process includes: customer identification that an action is required, determining what that action should be, requesting authorization from the designated return center, generating return documentation, and physically returning the excess product.

The Category SR3 includes five Level 3 Elements:

SR3.1 Identify Excess Product Condition	The process where the customer utilizes planned policies, business rules and product inspection as criteria to identify and confirm that material is in excess of the current requirements.
SR3.2 Disposition Excess Product	The process of the customer determining whether to return the excess material and identification of a designated return center a return authorization.
SR3.3 Request Excess Return Authorization	The process of a customer requesting and obtaining authorization, from the designated return center, for the return of excess product. Additionally, the customer and designated return center would negotiate enabling conditions such as return credit or cash discount, packaging, handling, transportation and import / export requirements to facilitate the efficient return of the excess product.
SR3.4 Schedule Excess Product Shipment	The process where the customer develops the schedule for a carrier to pick-up the excess product. Activities include selecting the carrier and rates, preparing the item for transfer, preparing scheduling documentation and managing overall scheduling administration.
SR3.5 Return Excess Product	The process where the customer packages, and handles the excess product in preparation for shipping in accord with pre-determined conditions. The product is then provided by the customer to the carrier who physically transports the product and its associated documentation to the last known holder or designated return center.

Metrics (see Appendix A for metrics attributes):

% of Excess Product Returns Delivered Complete to the Designated Return Center	Correct destination, according to the schedule, with the correct part and documentation
Average Age of Excess Inventory	
Cost to Source Return	
Order Fulfillment Cycle Time	The average actual cycle time consistently achieved to fulfill customer orders.
Return on Supply Chain Fixed Assets	Return on Supply Chain Fixed Assets measures the return an organization receives on its invested capital in supply chain fixed assets. This includes the fixed assets used in Plan, Source, Make, Deliver, and Return. The levels of aggregation can be at any element associated with a supply chain asset.
Return on Working Capital	Return on working capital is a measurement which assesses the magnitude of investment relative to a company's working capital position verses the revenue generated from a supply chain. Components include accounts receivable, accounts payable, inventory, supply chain revenue, cost of goods sold and supply chain management costs.
Source Return Cycle Time	
Total Excess Material Return Costs	The sum of the costs associated with the receipt of returned excess products from the customer
Value of Excess Inventory/ Total Inventory Value	

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SR3.1 Identify Excess Product Condition

The process where the customer utilizes planned policies, business rules and product inspection as criteria to identify and confirm that material is in excess of the current requirements.

Metrics (see Appendix A for metrics attributes):

.		Cost of Identifying the Excess Condition as a % of Total Source Return Cost		
.		Number of Occurrences Where Excess Inventory is Returned and Subsequently Followed by an Expedite Request		
.		Return on Working Capital		Return on working capital is a measurement which assesses the magnitude of investment relative to a company's working capital position verses the revenue generated from a supply chain. Components include accounts receivable, accounts payable, inventory, supply chain revenue, cost of goods sold and supply chain management costs.
.		Value of Excess Inventory in Identification Stage/ Total Inventory Value		

Best Practices:

.		Automated Inventory Visibility and Planning System to Highlight Inventory in Excess of Requirements		Automated inventory planning package linked to real time demand data and inventory business rules.
.		Enterprise Level Policies/Rules with Local Execution		Web based access to enterprise level business rules

Inputs:

.		Business Rules for Return Processes from ER.1 Manage Business Rules for Return Processes		Rules for conducting business, i.e. developing and maintaining customer and channel performance standards of an return processes such as service levels, given service requirements by supply chain stakeholders/trading partners. Business rules align Return process policies with business strategy, goals, and objectives.
.		Manage Regulatory Return Policy from ER.8 Manage Return Regulatory Requirements		The process of identifying and complying with regulatory documentation and process standards set by external entities (i.e. government, trade officials, etc.) when planning for the Return and Recovery of Assets.

Outputs:

.		Returned Excess Product to SR3.2 Disposition Excess Product		Product being returned as defined by the terms and conditions of a customer/supplier contract as available inventory and disposition excess not usable for sale.

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SR3.2 Disposition Excess Product

The process of the customer determining whether to return the excess material and identification of a designated return center a return authorization.

Metrics (see Appendix A for metrics attributes):

.	Excess Product Disposition Costs as % Total Source Return Cost		
.	Number of Occurrences of Incorrect Designated Return Center		
.	Value of Excess Inventory in Disposition Stage/ Total Inventory Value		Inventory Awaiting Return

Best Practices:

.	Automated Registry of Inventory Return Locations by Item to Speed Identification of Proper Return Location		None identified
.	Drive Returns Directly to Return Stock Point of Disposition to Reduce Cost and Cycle Time		Specify return disposition location and time.

Inputs:

.	Return Plans from P5.4 Establish and Communicate Return Plans		Courses of action over specified time periods that represent the projected appropriation of required return resources and or assets to meet the return process requirements.
.	Returned Excess Product from SR3.1 Identify Excess Product Condition		Product being returned as defined by the terms and conditions of a customer/supplier contract as available inventory and disposition excess not usable for sale.

Outputs:

.	Authorization to Return to Service to D1.8 Receive Product from Source or Make		Permission to return to service an item that has been repaired and found to be within specifications and operable.
.	Authorization to Scrap to D1.8 Receive Product from Source or Make		Permission to scrap material or item outside of specifications and possessing characteristics that make rework impractical.
.	Return Inventory Availability to ER.4 Manage Return Inventory		Inventory relative to return process available for use.
.	Return Product Location to ER.4 Manage Return Inventory		The physical location where the returned product inventory is held prior to disposition
.	Returned Excess Product to SR3.3 Request Excess Return Authorization		Product being returned as defined by the terms and conditions of a customer/supplier contract as available inventory and disposition excess not usable for sale.

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SR3.3 Request Excess Return Authorization

The process of a customer requesting and obtaining authorization, from the designated return center, for the return of excess product. Additionally, the customer and designated return center would negotiate enabling conditions such as return credit or cash discount, packaging, handling, transportation and import / export requirements to facilitate the efficient return of the excess product.

Metrics (see Appendix A for metrics attributes):

.		% Authorization Requests Transmitted Error-Free / Total Authorizations Requested		
.		Cost per Request Authorization		
.		Ratio of Authorization Cost to Total Source Return cost		
.		Value of Excess Product Inventory in Request Return Authorization Stage/ Total Excess Product Inventory Value		Inventory Awaiting Return Authorization

Best Practices:

.		Clarify Point of Contact and Return Location		Electronic rules for business relationships and transactions.
.		Develop and Clarify Mutually Understood Cycle Times to Process Return Authorizations		Clarification as to who will pay in-bound and out-bound freight cost.
.		Enable Customer-Service Representatives to Complete the Bill Of Lading for the Customer Including Carrier Routing, Weight, Description and Class to Minimize Guesswork & Wrong Estimates		Clarification of policy if authorizations are not processed within the expected cycle time.
.		Long-Term Return Agreements / Partnerships		None identified

Inputs:

.		Excess Product Return Authorization Response from DR3.1 Authorize Excess Product Return		The process of a customer obtaining authorization, from a service provider, for the return of excess product
.		Return Inventory Availability from ER.4 Manage Return Inventory		Inventory relative to return process available for use.
.		Return Schedule Instructions from DR3.2 Schedule Excess Return Receipt		A list of operations and procedures for scheduling the return of product.
.		Returned Excess Product from SR3.2 Disposition Excess Product		Product being returned as defined by the terms and conditions of a customer/supplier contract as available inventory and disposition excess not usable for sale.

Outputs:

.		Credit/ Exchange Options to SR3.4 Schedule Excess Product Shipment		The options available on the return of a repairable item, credit for the cost of the item, repair of the repairable item, receipt of a serviceable item from stock.
.		Excess Product Disposition Request to DR3.1 Authorize Excess Product Return		Request disposition instructions for an excess item from the Supplier.

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.		Excess Product Return Authorization Request to DR3.1 Authorize Excess Product Return		The process of a customer requesting authorization from a service provider, for the return of excess. In addition to discussing the excess, the customer and service provider would discuss enabling conditions such as return replacement or credit, packaging, handling, transportation and import / export requirements to facilitate the efficient return of excess to the service provider. The customer may need to go through several return authorization iterations with multiple service providers before authorization is received.
.		Historical Return Rates to P5.1 Assess, and Aggregate Return Requirements		A judgmental forecasting technique based upon the a return history that is analogous to a present situation, such as the return history on a similar product, and using the past pattern to predict future returns.
.		Returned Excess Product to SR3.4 Schedule Excess Product Shipment		Product being returned as defined by the terms and conditions of a customer/supplier contract as available inventory and disposition excess not usable for sale.
.		Ship-to Data to SR3.4 Schedule Excess Product Shipment		Data about the destination of a return delivery.
.		Validated Return Material Authorization to SR3.4 Schedule Excess Product Shipment		A validated and approved Return Product Authorization (RPA).

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SR3.4 Schedule Excess Product Shipment

The process where the customer develops the schedule for a carrier to pick-up the excess product. Activities include selecting the carrier and rates, preparing the item for transfer, preparing scheduling documentation and managing overall scheduling administration.

Metrics (see Appendix A for metrics attributes):

.		% Excess Product Scheduling Cost to Total Source Return Cost
.		% Shipping Schedules that Support Customer Required Return by Date
.		Value of Excess Product Inventory in Scheduling Stage/ Total Excess Product Inventory Value

Best Practices:

.		Arrange for Shipping Insurance in Case Of In-Transit Loss or Damage		Preventative management
.		Carrier Selection Based on Performance Criteria at Least Cost		Scheduling, carrier selection, and rating
.		Consolidation of Return Carriers		Outbound logistics software to assist with route.
.		Transportation Modeling and Rate Analysis		None identified

Inputs:

.		Validated Return Material Authorization from SR3.3 Request Excess Return Authorization		
.		Returned Excess Product from SR3.3 Request Excess Return Authorization		
.		Credit/ Exchange Options from SR3.3 Request Excess Return Authorization		
.		Ship-to Data from SR3.3 Request Excess Return Authorization		
.		Plan and Build Loads Information from D1.5 Build Loads		Transportation modes are selected and efficient loads are built.
.		Return Inventory Availability from ER.4 Manage Return Inventory		Inventory relative to return process available for use.
.		Ship-to Data from DR3.1 Authorize Excess Product Return		Data about the destination of a retun delivery.

Outputs:

.		Returned Excess Product to SR3.5 Return Excess Product		Product being returned as defined by the terms and conditions of a customer/supplier contract as available inventory and disposition excess not usable for sale.
.		Scheduled Excess Product Return to SR3.5 Return Excess Product		Planned or scheduled returning of material deemed in excess of current requirements for some certain time or times.

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SR3.5 Return Excess Product

The process where the customer packages, and handles the excess product in preparation for shipping in accord with pre-determined conditions. The product is then provided by the customer to the carrier who physically transports the product and its associated documentation to the last known holder or designated return center.

Metrics (see Appendix A for metrics attributes):

.		% Error-Free Returns Shipped
.		Cost per Request Authorization
.		Return Shipments Shipped on Time
.		Return Transportation Costs
.		Value of Excess Product Inventory in Physical Return and Transportation Stage/ Total Excess Inventory Value

Best Practices:

.		Advanced Shipping Notice		Integrated data sharing with repair facility.
.		Shipment Tracking and Tracing		Satellite communications, GPS, RFID

Inputs:

.		Scheduled Excess Product Return from SR3.4 Schedule Excess Product Shipment		
.		Returned Excess Product from SR3.4 Schedule Excess Product Shipment		
.		Load, Shipping, Verify, and Credit Information from D1.11 Load Vehicle & Generate Shipping Documentation		The function that performs tasks for the outgoing shipment of parts, components, and products. It includes packaging, marking, weighing, and loading for shipment. Also, verify the shipment and customer credit information.
.		Return Inventory Availability from ER.4 Manage Return Inventory		Inventory relative to return process available for use.

Outputs:

.		Returned Excess Product to DR3.3 Receive Excess Product		Product being returned as defined by the terms and conditions of a customer/supplier contract as available inventory and disposition excess not usable for sale.
.		Shipment Documents to Government		Legal documentation of the contents of a shipment (e.g. way bill, bill of lading, export papers, etc....).
.		Shipment Documents to Carrier		Legal documentation of the contents of a shipment (e.g. way bill, bill of lading, export papers, etc....).
.		Shipment Documents to Customer		Legal documentation of the contents of a shipment (e.g. way bill, bill of lading, export papers, etc....).

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DR3 Deliver Return Excess Product

The processes of the designated return center authorizing and scheduling the excess product return, the physical receipt of the item by the designated return center and transfer of the item for final disposition The process includes communication between the customer and designated return center and the generation of associated documentation.

The Category DR3 includes four Level 3 Elements:

DR3.1 Authorize Excess Product Return	The process where the designated return center receives an excess product return authorization request from a customer, determines if the item can be accepted and communicates their decision to the customer. Accepting the request would include negotiating the conditions of the return with the customer, including authorizing credit or cash discount. Rejecting the request would include providing a reason for the rejection to the customer.
DR3.2 Schedule Excess Return Receipt	The process where the designated return center evaluates an authorized excess material return to determine packaging and handling requirements. This assessment will lead to the development of a return disposition decision and a return schedule with terms and conditions that will tell the Customer how and when to ship the product. The scheduling activity would also inform the Return Center's Receiving department when to expect the shipment and where to send the product, for disposition, upon receipt.
DR3.3 Receive Excess Product	The process where the designated return center receives and verifies the returned excess product and associated documentation against the return authorization and other documentation and prepares the item for transfer. Administrate any discrepancies that arise.
DR3.4 Transfer Excess Product	The process where the designated return center transfers the excess product to the appropriate process to implement the disposition decision.

Metrics (see Appendix A for metrics attributes):

% of Excess Product Returns Delivered Complete to the Designated Return Center	Correct destination, according to the schedule, with the correct part and documentation
Order Fulfillment Cycle Time	The average actual cycle time consistently achieved to fulfill customer orders.
Return on Supply Chain Fixed Assets	Return on Supply Chain Fixed Assets measures the return an organization receives on its invested capital in supply chain fixed assets. This includes the fixed assets used in Plan, Source, Make, Deliver, and Return. The levels of aggregation can be at any element associated with a supply chain asset.
Return on Working Capital	Return on working capital is a measurement which assesses the magnitude of investment relative to a company's working capital position verses the revenue generated from a supply chain. Components include accounts receivable, accounts payable, inventory, supply chain revenue, cost of goods sold and supply chain management costs.
Upside Deliver Return Adaptability	The maximum sustainable percentage increase in returns of finished goods from customers that can be achieved in 30 days.
Upside Deliver Return Flexibility	The number of days required to achieve an unplanned sustainable 20% increase in the return of finished goods from customers.

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DR3.1 Authorize Excess Product Return

The process where the designated return center receives an excess product return authorization request from a customer, determines if the item can be accepted and communicates their decision to the customer. Accepting the request would include negotiating the conditions of the return with the customer, including authorizing credit or cash discount. Rejecting the request would include providing a reason for the rejection to the customer.

Metrics (see Appendix A for metrics attributes):

.		Authorize Excess Product Return Cycle Time		The average time associated with authorizing the return of excess product.
.		Cost to Authorize Excess Product Return		The sum of the costs associated with authorizing the return of excess product.

Best Practices:

.		Communicate with Customer before the Return to Establish What Types of Returns Are Acceptable		None identified
.		Set Up Electronic or Pre-authorized Returns		None identified

Inputs:

.		Business Rules for Return Processes from ER.1 Manage Business Rules for Return Processes		Rules for conducting business, i.e. developing and maintaining customer and channel performance standards of an return processes such as service levels, given service requirements by supply chain stakeholders/trading partners. Business rules align Return process policies with business strategy, goals, and objectives.
.		Excess Product Disposition Request from SR3.3 Request Excess Return Authorization		Request disposition instructions for an excess item from the Supplier.
.		Excess Product Return Authorization Request from SR3.3 Request Excess Return Authorization		The process of a customer requesting authorization from a service provider, for the return of excess. In addition to discussing the excess, the customer and service provider would discuss enabling conditions such as return replacement or credit, packaging, handling, transportation and import / export requirements to facilitate the efficient return of excess to the service provider. The customer may need to go through several return authorization iterations with multiple service providers before authorization is received.
.		Manage Integrated Supply Chain Inventory Information from EP.4 Manage Integrated Supply Chain Inventory		Managing the flow of raw materials and products in a supply chain based on uncertain demand for the finished products
.		Product Return Capabilities from P5.4 Establish and Communicate Return Plans		The capability of a system or resources to produce a quantity output in a particular time period; and, any element or factor that constrains the system or resources from achieving a higher level of performance in respect to its goal. The ability the supply chain has to return products in a valid and accurate way.
.		Return Plans from P5.4 Establish and Communicate Return Plans		Courses of action over specified time periods that represent the projected appropriation of required return resources and or assets to meet the return process requirements.

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Outputs:

.		Excess Product Return Authorization Response to SR3.3 Request Excess Return Authorization		The process of a customer obtaining authorization, from a service provider, for the return of excess product
.		Historical Return Rates to P5.1 Assess, and Aggregate Return Requirements		A judgmental forecasting technique based upon the a return history that is analogous to a present situation, such as the return history on a similar product, and using the past pattern to predict future returns.
.		Manage Integrated Supply Chain Inventory Information to EP.4 Manage Integrated Supply Chain Inventory		Managing the flow of raw materials and products in a supply chain based on uncertain demand for the finished products
.		Return Product Authorization to DR3.2 Schedule Excess Return Receipt		Permission to accept an excess product return for the designated return center, after communicating with the customer.
.		Ship-to Data to SR3.4 Schedule Excess Product Shipment		Data about the destination of a retun delivery.

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DR3.2 Schedule Excess Return Receipt

The process where the designated return center evaluates an authorized excess material return to determine packaging and handling requirements. This assessment will lead to the development of a return disposition decision and a return schedule with terms and conditions that will tell the Customer how and when to ship the product. The scheduling activity would also inform the Return Center's Receiving department when to expect the shipment and where to send the product, for disposition, upon receipt.

Metrics (see Appendix A for metrics attributes):

.		Cost to Schedule Excess Product Receipt		The sum of the costs associated with scheduling excess product receipt.
.		Schedule Excess Return Receipt Cycle Time		The average time associated with scheduling the receipt of the return of excess product

Best Practices:

.		Establish Designated Processes for Scheduling and Receiving Excess Inventory		None Identified

Inputs:

.		Return Product Authorization from DR3.1 Authorize Excess Product Return		Permission to accept an excess product return for the designated return center, after communicating with the customer.

Outputs:

.		Return Schedule Instructions to SR3.3 Request Excess Return Authorization		A list of operations and procedures for scheduling the return of product.
.		Return Schedule Instructions to DR3.3 Receive Excess Product		A list of operations and procedures for scheduling the return of product.

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DR3.3 Receive Excess Product

The process where the designated return center receives and verifies the returned excess product and associated documentation against the return authorization and other documentation and prepares the item for transfer. Administrate any discrepancies that arise.

Metrics (see Appendix A for metrics attributes):

.		Cost to Receive Excess Product		The sum of the costs associated with receiving excess returns.
.		Receive Excess Product Cycle Time		The average time associated with receiving excess product returns from the customer

Best Practices:

.		Bar Coding is Used to Minimize Handling Time and Maximize Data Accuracy		- Bar code interface for data collection devices - Generate bar coded receiving documents - Product serial number used as identifier - RFID
.		Customer Sends Receiving Advanced Shipment Notification Prior to Shipment		Electronically link Return authorization, Return schedule and shipping documents. .
.		Develop Local Receiving Process Close to Repair		Minimize time spent in product movement.
.		Electronically Track Shipment from Customer to Service Provider		None Identified
.		Pre-Certify Supplier Capability to Send Return Products Correctly to Minimize the Need for Receipt Verification		- Push inspection to SOURCE - Receiving quality criteria connected to ISO 9000 practices
.		Receivers on the Dock Communicate Directly with the Buyer to Efficiently Resolve Any Discrepancies		Buyer's name for every receipt is clearly visible on Receiver.

Inputs:

.		Receipt Data from ER.3 Manage Return Data Collection		A collection of related receipt data records organized in a specific manner.
.		Receipt Data from ER.4 Manage Return Inventory		A collection of related receipt data records organized in a specific manner.
.		Return Regulatory Requirements from ER.8 Manage Return Regulatory Requirements		Return requirements dictated by process standards set by external entities (i.e. government, trade officials, etc.).
.		Return Schedule Instructions from DR3.2 Schedule Excess Return Receipt		A list of operations and procedures for scheduling the return of product.
.		Return Transportation Guidelines, Policies, & Agreements from ER.6 Manage Return Transportation		Guidelines, policies and agreements for the transportation activities around return process.
.		Returned Excess Product from SR3.5 Return Excess Product		Product being returned as defined by the terms and conditions of a customer/supplier contract as available inventory and disposition excess not usable for sale.

Outputs:

.		Receipt Discrepancy Notification to Plan		Notification of a discrepancy relating to a receipt, including: damage, packaging, quantity, etc.

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.		Receipt Discrepancy Notification to Source		Notification of a discrepancy relating to a receipt, including: damage, packaging, quantity, etc.
.		Receipt Discrepancy Notification to Enable Return		Notification of a discrepancy relating to a receipt, including: damage, packaging, quantity, etc.
.		Return Inventory Transfer Data to ER.4 Manage Return Inventory		The process of receipt and verification of the returned item against the return authorization and other documentation and prepares the item for transfer.
.		Return Inventory Transfer Data to P5.2 Identify, Assess, and Aggregate Return Resources		The process of receipt and verification of the returned item against the return authorization and other documentation and prepares the item for transfer.
.		Returned Excess Product to DR3.4 Transfer Excess Product		Product being returned as defined by the terms and conditions of a customer/supplier contract as available inventory and disposition excess not usable for sale.

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DR3.4 Transfer Excess Product

The process where the designated return center transfers the excess product to the appropriate process to implement the disposition decision.

Metrics (see Appendix A for metrics attributes):

.		Cost to Transfer Excess Product		The sum of the costs associated transferring excess product for disposition
.		Transfer Excess Product Cycle Time		The average time associated transfer until product is moved to the next process.

Best Practices:

.		Excess Products Scheduling Identifies Next Destination (Source, Make, or Deliver) on Return Authorization		Utilize electronic links
.		Receiving Equipment and Packaging Materials to Transfer Product Are Planned for In Advance and Readily Available When Needed		Include packaging materials in inventory management system and treat as any other inventory to minimize potential of stock-out.
.		Return Process Electronically Tracks Transfer from Station to Station		Utilize Bar coding
.		Review Transfer Cycle Time Trends and Determine If Equipment Capacity is Properly Balanced with Projected Usage		Periodic review of capital asset plan to determine if additional equipment, if needed, can be funded.

Inputs:

.		Return Inventory for Transfer from ER.4 Manage Return Inventory		Inventory relative to return process available for transfer to other destination.
.		Returned Excess Product from DR3.3 Receive Excess Product		Product being returned as defined by the terms and conditions of a customer/supplier contract as available inventory and disposition excess not usable for sale.
.		Sourcing Plans from P2.4 Establish Sourcing Plans		An aggregate material requirements plan used to schedule material deliveries to meet production plan.

Outputs:

.		Excess Products to S2.2 Receive Product		Material in excess of the current requirements.
.		Excess Products to S1.2 Receive Product		Material in excess of the current requirements.
.		Return Inventory Transfer Data to S2.1 Schedule Product Deliveries		The process of receipt and verification of the returned item against the return authorization and other documentation and prepares the item for transfer.
.		Return Inventory Transfer Data to S3.3 Schedule Product Deliveries		The process of receipt and verification of the returned item against the return authorization and other documentation and prepares the item for transfer.
.		Return Inventory Transfer Data to P5.2 Identify, Assess, and Aggregate Return Resources		The process of receipt and verification of the returned item against the return authorization and other documentation and prepares the item for transfer.

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.		Return Inventory Transfer Data to S1.1 Schedule Product Deliveries		The process of receipt and verification of the returned item against the return authorization and other documentation and prepares the item for transfer.
.		Return Inventory Transfer Data to ER.4 Manage Return Inventory		The process of receipt and verification of the returned item against the return authorization and other documentation and prepares the item for transfer.

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ER Enable RETURN

Enable Processes prepare, maintain, or manage information or relationships on which planning and execution processes rely.

The Category ER includes eight Level 3 Elements:

ER.1 Manage Business Rules for Return Processes	The process of establishing, maintaining, and enforcing decision support criteria for Return Planning that are translated into rules for conducting business. These rules align Return process policies with business strategy, goals, and objectives. Examples of business rules include those that (1) Enable customers to identify when scheduled and unscheduled conditions occur that require a return authorization request, (2) Enable a service provider to confirm a part is authorized to be returned, (3) Identify the waiting period to confirm a return item has been shipped and received before following up (4) Develop and maintain customer and channel performance standards of return processes such as service levels, given service requirements by supply chain stakeholders/trading partners.(5) Communicate to customers the allowable amount of elapsed time from purchase and condition in which excess material must be received in order for it to be accepted as a return (6) Negotiate any restocking charge stipulations.
ER.2 Manage Performance of Return Processes	The process of measuring actual Return Process performance against internal and/or external standards to develop and implement a course of action to achieve targeted performance levels.
ER.3 Manage Return Data Collection	The process of collecting, cleansing, integrating and maintaining the accuracy of return execution information necessary to plan the recovery of supply chain resources.
ER.4 Manage Return Inventory	The process of establishing a return process inventory strategy and planning the recovery process inventory limits or levels (unserviceable carcasses ready for teardown/evaluation and those carcasses already evaluated and ready for repair) including replenishment models, ownership, product mix, and stocking locations, both inter and intra company.
ER.5 Manage Return Capital Assets	The process of acquiring, maintaining and dispositioning capital assets such as fork lift trucks, information systems and equipment in receiving docks that are utilized in support of Return. Management activities would include defining asset requirements, determining resource availability and conducting gap analysis and resolution. The process includes lease-buy and outsourcing decisions.
ER.6 Manage Return Transportation	The process of providing the least cost transportation of a returned product from a customer location to the appropriate service provider location within specified time frames. Can include interim transportation activities conducted within more than one service provider locations. Includes defining and implementing a Return transportation strategy throughout the supply chain, maintaining transportation-related information (rates, lead times) and managing transportation performance.
ER.7 Manage Return Network Configuration	The process where customer and service provider locations involved in the flow of returns are defined and maintained throughout the supply chain. Locations include retail and wholesale customer and supplier sites, manufacturing facilities, distribution centers, warehouses, repair depots and military bases. How unserviceable material flow throughout the network is governed by the specific supply chain's business rules. (See ER1)
ER.8 Manage Return Regulatory Requirements	The process of identifying and complying with regulatory documentation and process standards set by external entities (i.e. government, trade officials, etc.) when planning for the Return of Assets. Includes Customs requirements and Import / Export Controls.

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ER.1 Manage Business Rules for Return Processes

The process of establishing, maintaining, and enforcing decision support criteria for Return Planning that are translated into rules for conducting business. These rules align Return process policies with business strategy, goals, and objectives. Examples of business rules include those that (1) Enable customers to identify when scheduled and unscheduled conditions occur that require a return authorization request, (2) Enable a service provider to confirm a part is authorized to be returned, (3) Identify the waiting period to confirm a return item has been shipped and received before following up (4) Develop and maintain customer and channel performance standards of return processes such as service levels, given service requirements by supply chain stakeholders/trading partners.(5) Communicate to customers the allowable amount of elapsed time from purchase and condition in which excess material must be received in order for it to be accepted as a return (6) Negotiate any restocking charge stipulations.

Metrics (see Appendix A for metrics attributes):

Cost to Manage Business Rules for Return Processes	The sum of the Cost to Manage Business Rules for Return Processes
Manage Business Rules for Return Processes Cycle Time	The average time associated with managing rules for returns

Best Practices:

Electronic Reminders of Possible Scheduled Maintenance	Pull signals.
Evaluate the Benefits of Out-Sourcing the Excess Material Return Process	Enables customer to focus on core competencies.
Publish Return Policy	Easy access to return business rules.
Standard Inventory Policy to Determine Excess	None Identified
Utilize Real-World Cases in Employee Training	None Identified

Inputs:

Process Procedures from P5.4 Establish and Communicate Return Plans	A planned series of actions or operations that advances returns from one stage to another, or established procedures to manage and execute all activities in the process.
Return Rules and Policies from P5.4 Establish and Communicate Return Plans	Rules and Policies for conducting business, i.e. developing and maintaining customer and channel performance standards of return processes such as service levels, given service requirements by supply chain stakeholders/trading partners. Rules and policies align the Return process with the organization's business strategy, goals and objectives.

Outputs:

Business Rules for Return Processes to DR3.1 Authorize Excess Product Return	Rules for conducting business, i.e. developing and maintaining customer and channel performance standards of an return processes such as service levels, given service requirements by supply chain stakeholders/trading partners. Business rules align Return process policies with business strategy, goals, and objectives.

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Business Rules for Return Processes to ER.4 Manage Return Inventory	Rules for conducting business, i.e. developing and maintaining customer and channel performance standards of an return processes such as service levels, given service requirements by supply chain stakeholders/trading partners. Business rules align Return process policies with business strategy, goals, and objectives.
Business Rules for Return Processes to ER.5 Manage Return Capital Assets	Rules for conducting business, i.e. developing and maintaining customer and channel performance standards of an return processes such as service levels, given service requirements by supply chain stakeholders/trading partners. Business rules align Return process policies with business strategy, goals, and objectives.
Business Rules for Return Processes to P5.2 Identify, Assess, and Aggregate Return Resources	Rules for conducting business, i.e. developing and maintaining customer and channel performance standards of an return processes such as service levels, given service requirements by supply chain stakeholders/trading partners. Business rules align Return process policies with business strategy, goals, and objectives.
Business Rules for Return Processes to DR1.1 Authorize Defective Product Return	Rules for conducting business, i.e. developing and maintaining customer and channel performance standards of an return processes such as service levels, given service requirements by supply chain stakeholders/trading partners. Business rules align Return process policies with business strategy, goals, and objectives.
Business Rules for Return Processes to SR2.1 Identify MRO Product Condition	Rules for conducting business, i.e. developing and maintaining customer and channel performance standards of an return processes such as service levels, given service requirements by supply chain stakeholders/trading partners. Business rules align Return process policies with business strategy, goals, and objectives.
Business Rules for Return Processes to ER.7 Manage Return Network Configuration	Rules for conducting business, i.e. developing and maintaining customer and channel performance standards of an return processes such as service levels, given service requirements by supply chain stakeholders/trading partners. Business rules align Return process policies with business strategy, goals, and objectives.
Business Rules for Return Processes to DR2.1 Authorize MRO Product Return	Rules for conducting business, i.e. developing and maintaining customer and channel performance standards of an return processes such as service levels, given service requirements by supply chain stakeholders/trading partners. Business rules align Return process policies with business strategy, goals, and objectives.
Business Rules for Return Processes to ER.8 Manage Return Regulatory Requirements	Rules for conducting business, i.e. developing and maintaining customer and channel performance standards of an return processes such as service levels, given service requirements by supply chain stakeholders/trading partners. Business rules align Return process policies with business strategy, goals, and objectives.
Business Rules for Return Processes to SR1.1 Identify Defective Product Condition	Rules for conducting business, i.e. developing and maintaining customer and channel performance standards of an return processes such as service levels, given service requirements by supply chain stakeholders/trading partners. Business rules align Return process policies with business strategy, goals, and objectives.

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Business Rules for Return Processes to P5.1 Assess, and Aggregate Return Requirements	Rules for conducting business, i.e. developing and maintaining customer and channel performance standards of an return processes such as service levels, given service requirements by supply chain stakeholders/trading partners. Business rules align Return process policies with business strategy, goals, and objectives.
Business Rules for Return Processes to SR3.1 Identify Excess Product Condition	Rules for conducting business, i.e. developing and maintaining customer and channel performance standards of an return processes such as service levels, given service requirements by supply chain stakeholders/trading partners. Business rules align Return process policies with business strategy, goals, and objectives.

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ER.2 Manage Performance of Return Processes

The process of measuring actual Return Process performance against internal and/or external standards to develop and implement a course of action to achieve targeted performance levels. Each occurrence consumes time:

Metrics (see Appendix A for metrics attributes):

Cost to Manage Performance of Return Processes	The sum of the costs to Manage Performance of Return Processes.
Manage Performance of Return Processes Cycle Time	The average time associated with managing the performance of supply chain activities

Best Practices:

Business Rules Are Clearly Communicated with the Customer	Convenient availability to business rules and return criteria.
Continuous Improvement is Planned through Process Reviews and Customer Feedback	Avenue to receive customer comments.

Inputs:

MRO Product Return Capabilities from ER.5 Manage Return Capital Assets	See “Product Return Capabilities“
Process Procedures from P5.4 Establish and Communicate Return Plans	A planned series of actions or operations that advances returns from one stage to another, or established procedures to manage and execute all activities in the process.
Receipt Data from ER.3 Manage Return Data Collection	A collection of related receipt data records organized in a specific manner.
Receipt Data from ER.4 Manage Return Inventory	A collection of related receipt data records organized in a specific manner.
Return Benchmark Data from Source: Company	Data relative to the return process utilized to compare the company’s actual results to selected values identified as reference.

Outputs:

MRO Product Return Capabilities to P5.2 Identify, Assess, and Aggregate Return Resources	See “Product Return Capabilities“
Return Performance to ER.5 Manage Return Capital Assets	Performance measurement information for the Return Process (the actual value of measured for the criterion).
Return Performance to ER.6 Manage Return Transportation	Performance measurement information for the Return Process (the actual value of measured for the criterion).
Return Product History to ER.3 Manage Return Data Collection	The return history of product including failure rates, failure causes, etc.
Supply-Chain Performance Metrics to EP.2 Manage Performance of Supply Chain	Standard measures that indicate how well a supply chain performs within certain categories of performance known as Performance Attributes, e.g. delivery reliability, flexibility and responsiveness, cost, and asset management.

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ER.3 Manage Return Data Collection

The process of collecting, cleansing, integrating and maintaining the accuracy of return execution information necessary to plan the recovery of supply chain resources.

Metrics (see Appendix A for metrics attributes):

Cost to Manage Return Data Collection	The sum of the costs to manage the capital assets associated with returns data collection.
Manage Return Data Collection Cycle Time	The average time associated with managing return data collection

Best Practices:

Automated Update of Customer Excess Material Return Transaction History	- Use trend analysis to influence inventory level decisions. - Web-based alerts to identify update occurred and when pre-determined thresholds are exceeded.
Data Accessibility across the Enterprise for Visibility by Discrete Business Units	Web based access to various levels of enterprise data

Inputs:

Data Cleansing Procedure from Source: Company	The procedure that outlines the cleansing of return data to insure its validity and accuracy during the return process.
Data System Requirements from Source: Company	List of requirements of the data system that insure cleansed data is compatible and usable, or the data system requirements to fully automate the return process.
Return Product History from ER.2 Manage Performance of Return Processes	The return history of product including failure rates, failure causes, etc.

Outputs:

Data About Return Capabilities to P5.2 Identify, Assess, and Aggregate Return Resources	Information required in the process of integrating and maintaining the accuracy of return execution.
Receipt Data to DR1.3 Receive Defective Product	A collection of related receipt data records organized in a specific manner.
Receipt Data to ER.2 Manage Performance of Return Processes	A collection of related receipt data records organized in a specific manner.
Receipt Data to DR2.3 Receive MRO Product	A collection of related receipt data records organized in a specific manner.
Receipt Data to DR3.3 Receive Excess Product	A collection of related receipt data records organized in a specific manner.

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ER.4 Manage Return Inventory

The process of establishing a return process inventory strategy and planning the recovery process inventory limits or levels (unserviceable carcasses ready for teardown/evaluation and those carcasses already evaluated and ready for repair) including replenishment models, ownership, product mix, and stocking locations, both inter and intra company.

Metrics (see Appendix A for metrics attributes):

Cost to Manage Return Inventory	The sum of the costs to manage the capital assets associated with return inventory.
Manage Return Inventory Cycle Time	The average time associated with managing return inventory

Best Practices:

Periodic Review of Metrics and Strategy with Comparisons to Industry Benchmarks	Real time view of data.
Real Time Data on Current Status	Dynamic calculation of safety stock based on actual sales.
Statistical Test Count	The Statistical Test Count (STC) process is a method of validating inventory on-hand values by physically counting and reconciling a statistical sample of the entire inventory population. This sample is then extrapolated across the inventory population, which provides an indicative measure of entire inventory population. Furthermore, with extrapolation the net and gross percentage of error is determined.
Unique Identifier Tag for Each Repairable Asset	Asset management software using bar code, RFI tag, etc.

Inputs:

Business Rules for Return Processes from ER.1 Manage Business Rules for Return Processes	Rules for conducting business, i.e. developing and maintaining customer and channel performance standards of an return processes such as service levels, given service requirements by supply chain stakeholders/trading partners. Business rules align Return process policies with business strategy, goals, and objectives.
Return Inventory Availability from SR1.2 Disposition Defective Product	Inventory relative to return process available for use.
Return Inventory Availability from SR3.2 Disposition Excess Product	Inventory relative to return process available for use.
Return Inventory Availability from SR2.2 Disposition MRO Product	Inventory relative to return process available for use.
Return Inventory Transfer Data from DR3.3 Receive Excess Product	The process of receipt and verification of the returned item against the return authorization and other documentation and prepares the item for transfer.
Return Inventory Transfer Data from DR2.3 Receive MRO Product	The process of receipt and verification of the returned item against the return authorization and other documentation and prepares the item for transfer.
Return Inventory Transfer Data from DR3.4 Transfer Excess Product	The process of receipt and verification of the returned item against the return authorization and other documentation and prepares the item for transfer.
Return Inventory Transfer Data from DR1.4 Transfer Defective Product	The process of receipt and verification of the returned item against the return authorization and other documentation and prepares the item for transfer.

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Return Inventory Transfer Data from DR2.4 Transfer MRO Product	The process of receipt and verification of the returned item against the return authorization and other documentation and prepares the item for transfer.
Return Inventory Transfer Data from DR1.3 Receive Defective Product	The process of receipt and verification of the returned item against the return authorization and other documentation and prepares the item for transfer.
Return Plans from P5.4 Establish and Communicate Return Plans	Courses of action over specified time periods that represent the projected appropriation of required return resources and or assets to meet the return process requirements.
Return Product Location from SR3.2 Disposition Excess Product	The physical location where the returned product inventory is held prior to disposition
Return Product Location from SR1.2 Disposition Defective Product	The physical location where the returned product inventory is held prior to disposition
Returned Product Location from SR2.2 Disposition MRO Product	The storage location of those items being returned.

Outputs:

Receipt Data to DR1.3 Receive Defective Product	A collection of related receipt data records organized in a specific manner.
Receipt Data to DR2.3 Receive MRO Product	A collection of related receipt data records organized in a specific manner.
Receipt Data to ER.2 Manage Performance of Return Processes	A collection of related receipt data records organized in a specific manner.
Receipt Data to DR3.3 Receive Excess Product	A collection of related receipt data records organized in a specific manner.
Return Inventory Availability to SR2.3 Request MRO Return Authorization	Inventory relative to return process available for use.
Return Inventory Availability to SR3.3 Request Excess Return Authorization	Inventory relative to return process available for use.
Return Inventory Availability to SR3.5 Return Excess Product	Inventory relative to return process available for use.
Return Inventory Availability to SR1.4 Schedule Defective Product Shipment	Inventory relative to return process available for use.
Return Inventory Availability to SR3.4 Schedule Excess Product Shipment	Inventory relative to return process available for use.
Return Inventory Availability to SR1.5 Return Defective Product	Inventory relative to return process available for use.
Return Inventory Availability to SR2.5 Return MRO Product	Inventory relative to return process available for use.
Return Inventory Availability to SR1.3 Request Defective Return Authorization	Inventory relative to return process available for use.
Return Inventory Availability to SR2.4 Schedule MRO Shipment	Inventory relative to return process available for use.
Return Inventory for Transfer to DR2.4 Transfer MRO Product	Inventory relative to return process available for transfer to other destination.
Return Inventory for Transfer to DR3.4 Transfer Excess Product	Inventory relative to return process available for transfer to other destination.

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Return Inventory for Transfer to DR1.4 Transfer Defective Product	Inventory relative to return process available for transfer to other destination.
Return Inventory Targets to P5.2 Identify, Assess, and Aggregate Return Resources	The goals and approach to the management of return inventories.

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ER.5 Manage Return Capital Assets

The process of acquiring, maintaining and dispositioning capital assets such as fork lift trucks, information systems and equipment in receiving docks that are utilized in support of Return. Management activities would include defining asset requirements, determining resource availability and conducting gap analysis and resolution. The process includes lease-buy and outsourcing decisions.

Metrics (see Appendix A for metrics attributes):

Cost to Manage Return Capital Assets	The sum of the costs to manage the capital assets associated with returns.
Manage Return Capital Assets Cycle Time	The average time associated with managing return capital assets

Best Practices:

Automated Data Entry	Scanning with RFID/Bar-codes systems
Automated Disposition Instructions for Returns Based on Data Interchange with Strategic Providers	Advanced planning and scheduling capability coupled with decision support logic.
Integrated Transportation Visibility	- Advanced shipping notices - Real time shipping tracking
Outsource If Not a Core Competency	Use 4PL to manage and move.

Inputs:

Business Rules for Return Processes from ER.1 Manage Business Rules for Return Processes	Rules for conducting business, i.e. developing and maintaining customer and channel performance standards of an return processes such as service levels, given service requirements by supply chain stakeholders/trading partners. Business rules align Return process policies with business strategy, goals, and objectives.
Return Performance from ER.2 Manage Performance of Return Processes	Performance measurement information for the Return Process (the actual value of measured for the criterion).
Return Plans from P5.4 Establish and Communicate Return Plans	Courses of action over specified time periods that represent the projected appropriation of required return resources and or assets to meet the return process requirements.

Outputs:

MRO Product Return Capabilities to ER.2 Manage Performance of Return Processes	See “Product Return Capabilities“
MRO Product Return Capabilities to P5.2 Identify, Assess, and Aggregate Return Resources	See “Product Return Capabilities“

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ER.6 Manage Return Transportation

The process of providing the least cost transportation of a returned product from a customer location to the appropriate service provider location within specified time frames. Can include interim transportation activities conducted within more than one service provider locations. Includes defining and implementing a Return transportation strategy throughout the supply chain, maintaining transportation-related information (rates, lead times) and managing transportation performance.

Metrics (see Appendix A for metrics attributes):

Cost to Manage Return Transportation	The sum of the costs associated with managing return transportation.
Manage Return Transportation Cycle Time	The average time associated with managing return transportation

Best Practices:

Appointment Scheduling for Pickup and Delivery of Customer Shipments	Transportation Management System (TMS) Maintenance Management
Automated Documentation for International Shipments	Transportation Management System (TMS) Maintenance Management
Backhaul Trading Exchange	Pooling
Capture and Maintain Mode Specific Data	Transportation Management System (TMS) Maintenance Management
Consolidate Shipments Through Cross Docking - Coordinate with Other Shipments	None Identified
Develop Proactive Transit Damage Programs	None Identified
Electronic Manifest and Electronic Billing	Transportation Management System (TMS) Maintenance Management
Integrated Order Management, Warehouse Management, and Transportation Management Systems View for analysis for all orders and shipments the following data: Logistics, Product, Cost, GL Charging	Transportation Management System (TMS) Maintenance Management
Internet Pooling (Electronic Brokerage of Shipments)	Rating & Routing
Involve Your Other Supply-Chain Partners If Possible to Leverage Transportation throughout the Chain	Utilization of transportation management system (TMS) to manage returns. Maximization of TMS use, both intra and inter-company within the supply chain.
Limit the Number of Carriers, Treat Them as Partners and Build a Strong Relationship with Each One Geared Toward Continually Improving Service and Lowering Cost	Utilization of transportation management system (TMS) to manage returns. Maximization of TMS use, both intra and inter-company within the supply chain.
Manage Information Across 100% of Shipments	Transportation Management System (TMS) Maintenance Management
Measurement of Carrier Performance for On-time Delivery and Completeness	Transportation Management System (TMS) Maintenance Management
Real-Time Optimized Shipment Method Selection (Air Parcel, Ground Parcel, LTL, etc.) Based on Customer Service Requirements	Transportation Management System (TMS) Maintenance Management
Real-Time Shipment Tracking, (via internet)	Transportation Management System (TMS) Maintenance Management
Segregate In-Bound Carcass Return Cost from Other Transportation Costs	None Identified
Utilize Internet-Based Freight Bidding Built Around Shared Shipping Volume Projections	None Identified
Utilize Invoice-less Freight Payment	None Identified
View for Analysis for All Orders and Shipments the Following Data: Logistics, Product, Cost, GL Charging	Transportation Management System (TMS) Maintenance Management

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Inputs:

Return Performance from ER.2 Manage Performance of Return Processes	Performance measurement information for the Return Process (the actual value of measured for the criterion).
Return Plans from P5.4 Establish and Communicate Return Plans	Courses of action over specified time periods that represent the projected appropriation of required return resources and or assets to meet the return process requirements.

Outputs:

Return Transportation Guidelines, Policies, & Agreements to DR3.3 Receive Excess Product	Guidelines, policies and agreements for the transportation activities around return process.
Return Transportation Guidelines, Policies, & Agreements to DR1.3 Receive Defective Product	Guidelines, policies and agreements for the transportation activities around return process.
Return Transportation Guidelines, Policies, & Agreements to P5.2 Identify, Assess, and Aggregate Return Resources	Guidelines, policies and agreements for the transportation activities around return process.
Return Transportation Guidelines, Policies, & Agreements to DR2.3 Receive MRO Product	Guidelines, policies and agreements for the transportation activities around return process.

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ER.7 Manage Return Network Configuration

The process where customer and service provider locations involved in the flow of returns are defined and maintained throughout the supply chain. Locations include retail and wholesale customer and supplier sites, manufacturing facilities, distribution centers, warehouses, repair depots and military bases. How unserviceable material flow throughout the network is governed by the specific supply chain's business rules. (See ER1)

Metrics (see Appendix A for metrics attributes):

Cost to Manage Return Network Configuration	The sum of the costs to manage the capital assets associated with configuring the return network.
Manage Return Network Configuration Cycle Time	The average time associated with managing the return network configuration

Best Practices:

Service Provider Utilizes Web-Based Communicate to Identify New and Discontinued Repair Sites to Customers	Continuously updated authorized repair sites
Utilize Web-Based Collaboration between Asset Manager and Repair Sites Regarding Capacity and Scheduling	Total return asset visibility throughout the network
Utilize Web-Based Collaboration between Customer and Service Provider on In-Bound Return Forecasts and Asset Tracking	Shared return forecasts
Utilize Web-Based Collaboration to Identify Potential New Repair Sites Prior to Their Selection	Shared knowledge of resource availability and bottlenecks

Inputs:

Business Rules for Return Processes from ER.1 Manage Business Rules for Return Processes	Rules for conducting business, i.e. developing and maintaining customer and channel performance standards of an return processes such as service levels, given service requirements by supply chain stakeholders/trading partners. Business rules align Return process policies with business strategy, goals, and objectives.
Return Plans from P5.4 Establish and Communicate Return Plans	Courses of action over specified time periods that represent the projected appropriation of required return resources and or assets to meet the return process requirements.

Outputs:

Return Network Configuration to ER.8 Manage Return Regulatory Requirements	The business rules that govern the flow of unserviceable material through the network, i.e. the network configuration.
Return Process Workflow Definition and Policies to P5.2 Identify, Assess, and Aggregate Return Resources	Definition and maintenance of the information flow about the Returns supply chain network for a group of similar or complimentary items through out their life cycle

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ER.8 Manage Return Regulatory Requirements

The process of identifying and complying with regulatory documentation and process standards set by external entities (i.e. government, trade officials, etc.) when planning for the Return of Assets. Includes Customs requirements and Import / Export Controls.

Metrics (see Appendix A for metrics attributes):

Cost to Manage Return Regulatory Requirements and Compliance	The sum of the costs associated with managing compliance to return regulatory requirements.
Manage Return Regulatory Requirements and Compliance Cycle Time	The average time associated with compliance and regulatory requirements for return products

Best Practices:

Clarify in Advance Hazardous Material Packaging, Labeling and Shipping Requirements	Overseas packaging, labeling and shipping regulatory requirements are given specific attention.
Clarify in Advance If the Product to be Returned Requires Specific, Formal Authorization from the Service Provider per Federal, State or Local Regulation, Prior to Returning	Participants at all customer and service provider locations involved clearly understand all regulatory requirements at each step in the return process .
Compare Local Customs Requirements to Your Process Procedures to Ensure All Requirements Are Accounted for Before Shipping	None Identified
Confirm All Documentation and Inspection Requirements Before Shipping	None Identified
Note and Communicate Shelf Life Requirements Carefully Before Shipping	Hazardous material regulations are given specific attention.

Inputs:

Business Rules for Return Processes from ER.1 Manage Business Rules for Return Processes	Rules for conducting business, i.e. developing and maintaining customer and channel performance standards of return processes such as service levels, given service requirements by supply chain stakeholders/trading partners. Business rules align Return process policies with business strategy, goals, and objectives.
Process Procedures from P5.4 Establish and Communicate Return Plans	A planned series of actions or operations that advances returns from one stage to another, or established procedures to manage and execute all activities in the process.
Return Network Configuration from ER.7 Manage Return Network Configuration	The business rules that govern the flow of unserviceable material through the network, i.e. the network configuration.

Outputs:

Manage Regulatory Return Policy to SR2.1 Identify MRO Product Condition	The process of identifying and complying with regulatory documentation and process standards set by external entities (i.e. government, trade officials, etc.) when planning for the Return and Recovery of Assets.
Manage Regulatory Return Policy to SR1.1 Identify Defective Product Condition	The process of identifying and complying with regulatory documentation and process standards set by external entities (i.e. government, trade officials, etc.) when planning for the Return and Recovery of Assets.

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Manage Regulatory Return Policy to SR3.1 Identify Excess Product Condition	The process of identifying and complying with regulatory documentation and process standards set by external entities (i.e. government, trade officials, etc.) when planning for the Return and Recovery of Assets.
Return Regulatory Requirements to DR3.3 Receive Excess Product	Return requirements dictated by process standards set by external entities (i.e. government, trade officials, etc.).
Return Regulatory Requirements to DR1.3 Receive Defective Product	Return requirements dictated by process standards set by external entities (i.e. government, trade officials, etc.).
Return Regulatory Requirements to P5.1 Assess, and Aggregate Return Requirements	Return requirements dictated by process standards set by external entities (i.e. government, trade officials, etc.).
Return Regulatory Requirements to P5.2 Identify, Assess, and Aggregate Return Resources	Return requirements dictated by process standards set by external entities (i.e. government, trade officials, etc.).
Return Regulatory Requirements to DR2.3 Receive MRO Product	Return requirements dictated by process standards set by external entities (i.e. government, trade officials, etc.).
Warranty Data to SR2.1 Identify MRO Product Condition	All data relevant to a warranty claim for a customer for replacement, repair or credit because the product received did not meet a commitment, either expressed or implied, concerning a certain fact regarding the product
Warranty Data to SR1.1 Identify Defective Product Condition	All data relevant to a warranty claim for a customer for replacement, repair or credit because the product received did not meet a commitment, either expressed or implied, concerning a certain fact regarding the product

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