Supply Chain Operations Reference Model

Version 10.0

www.supply-chain.org

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Thank you.

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Section 1

Introduction

Summary

The Supply-Chain Operations Reference model (SCOR®) is the product of the Supply-Chain Council (SCC) a global non-profit consortium whose methodology, diagnostic and benchmarking tools help organizations make dramatic and rapid improvements in supply-chain processes. SCC established the SCOR process reference model for evaluating and comparing supply-chain activities and performance. The SCOR-model captures the Council's consensus view of supply chain management. It provides a unique framework that links business process, metrics, best practices and technology 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. SCC membership is open to all companies and organizations interested in applying and advancing the state-of-the-art in supply-chain management systems and practices.

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 corporate members worldwide and has established international chapters in Australia/New Zealand, Latin America, 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 when tackling more complex applications of the Model for their businesses. Finally, it is provided to orient members to the changes between Version 9.0 and Version 10.0.

Version 10.0 of the SCOR-model is the twelfth 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 10.0 are outlined later in this Introduction.

SCOR 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.

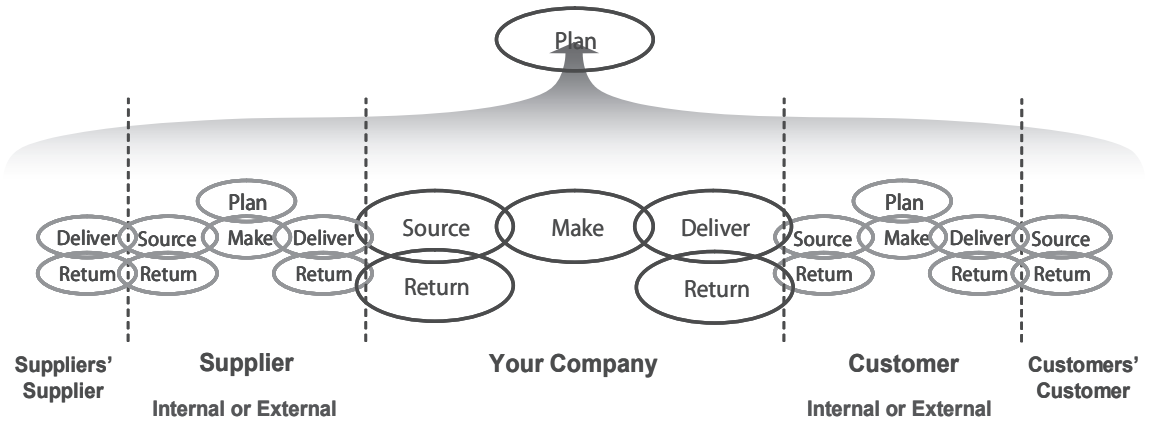


Figure 1 - SCOR is organized around five major management processes.

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 was 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.

Introduction

The Model is silent in the areas of human resources, training, and quality assurance. 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 activities, but they are currently out of scope for SCOR.

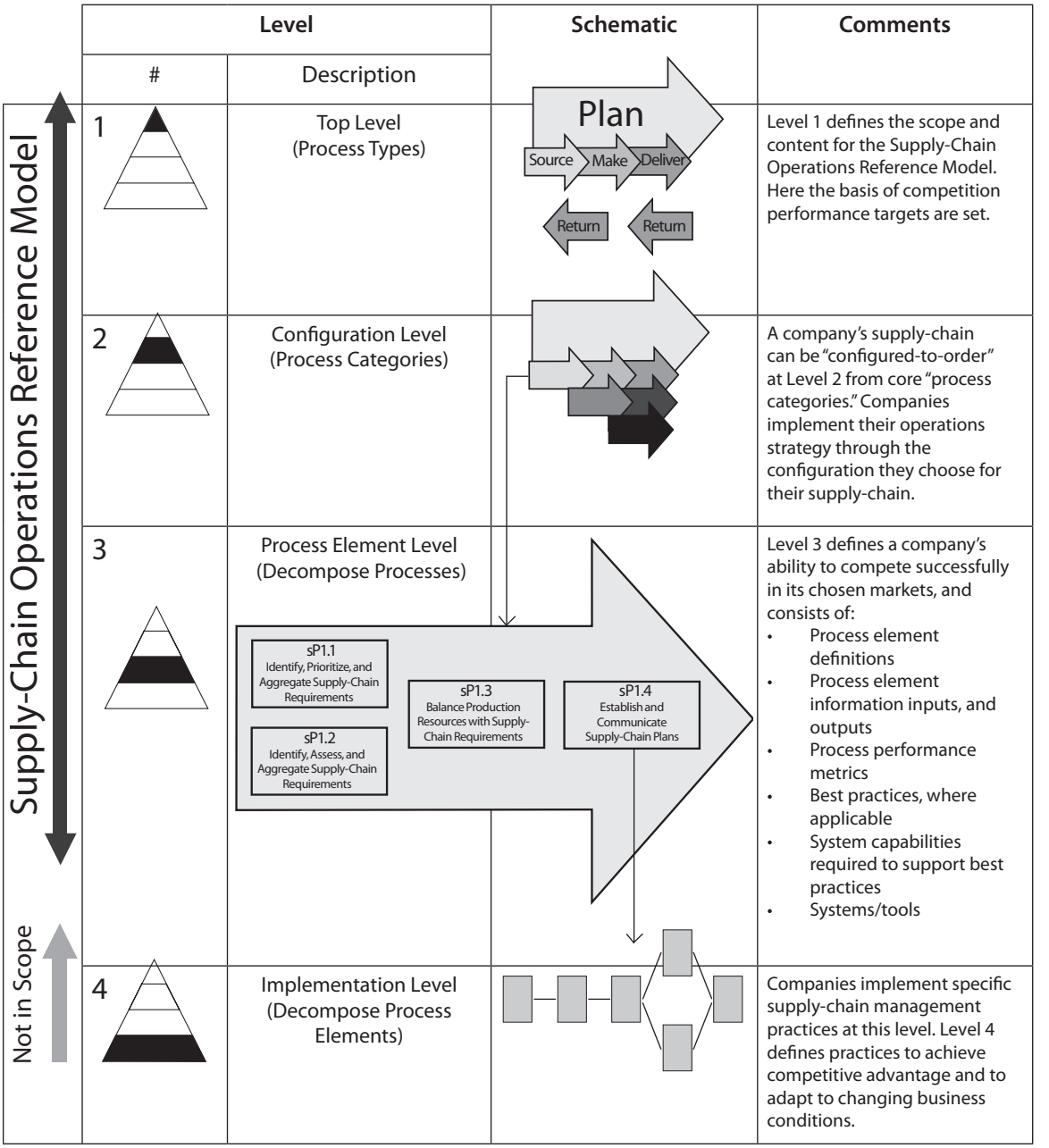


Figure 2 - SCOR is a hierarchical model with specific boundaries in regard to scope.

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.

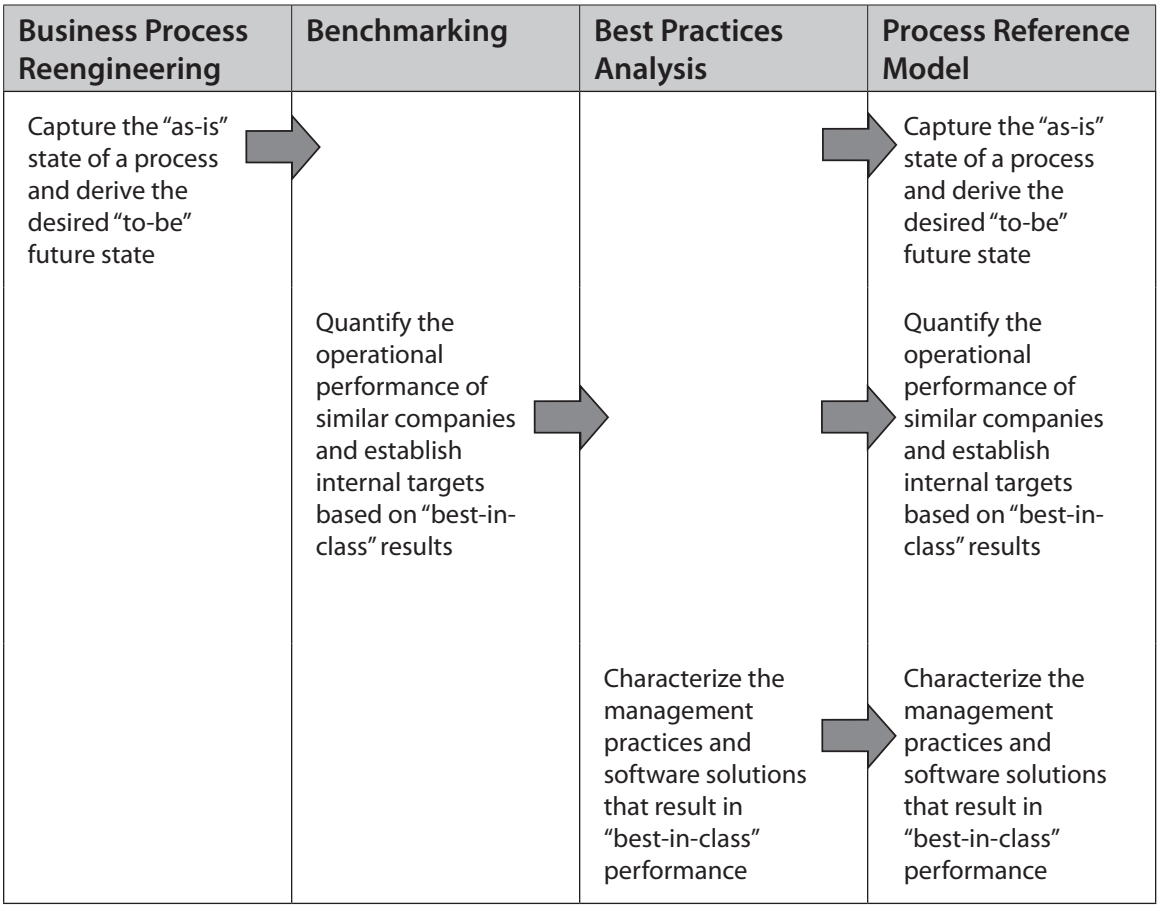


Figure 3 - SCOR is a business process reference model.

SCOR model structure

SCOR is a reference model. The purpose of a process reference model, or business process framework, is to describe your process architecture in a way that makes sense to key business partners. Architecture here means the way processes interact, how they perform, how they are configured and the requirements (skills) on staff operating the process.

The SCOR reference model consists of 4 major components:

- Performance: Standard metrics to describe process performance and define strategic goals (Section 2)
- Processes: Standard descriptions of management processes and process relationships (Section 3)
- (Best) Practices: Management practices that produce significant better process performance (Section 4)
- People: Standard definitions for skills required to perform supply chain processes. (Section 5)

Additional SCOR contains a section for special applications. Special applications is used for approved SCOR additions that have not yet been tested thoroughly for integration into the Model, but that SCC believes would be beneficial for SCOR users.

Performance

The performance section of SCOR consists of two types of elements: Performance Attributes and Metrics. A performance attribute is a grouping of metrics used to express a strategy. An attribute itself cannot be measured; it is used to set strategic direction. Metrics measure the ability of a supply chain to achieve these strategic attributes.

Performance Attribute	Definition
Reliability	The ability to perform tasks as expected. Reliability focuses on the predictability of the outcome of a process. Typical metrics for the reliability attribute include: On-time, the right quantity, the right quality.
Responsiveness	The speed at which tasks are performed. The speed at which a supply chain provides products to the customer. Examples include cycle-time metrics.
Agility	The ability to respond to external influences, the ability to respond to marketplace changes to gain or maintain competitive advantage. SCOR Agility metrics include Flexibility and Adaptability
Costs	The cost of operating the supply chain processes. This includes labor costs, material costs, management and transportation costs. A typical cost metric is Cost of Goods Sold.
Asset Management Efficiency (Assets)	The ability to efficiently utilize assets. Asset management strategies in a supply chain include inventory reduction and in-sourcing vs. outsourcing. Metrics include: Inventory days of supply and capacity utilization.

Reliabiliy, Responsiveness and Agility are considered customer-focused. Cost and Asset Management Efficiency are considered internal-focused.

Associated with the Performance Attributes are the Level 1 Strategic Metrics. These Level 1 Metrics are the calculations by which an organization can measure how successful it is in achieving its desired positioning within the competitive market space.

Performance Attributes and Associated Level 1 Metrics

Performance Attribute	Performance Attribute Definition	Level 1 Strategic 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 (RL.1.1)
Supply Chain Responsiveness	The speed at which a supply chain provides products to the customer.	Order Fulfillment Cycle Time (RS.1.1)
Supply Chain Agility	The agility of a supply chain in responding to marketplace changes to gain or maintain competitive advantage.	Upside Supply Chain Flexibility (AG.1.1)
		Upside Supply Chain Adaptability (AG.1.2)
		Downside Supply Chain Adaptability (AG.1.3)
		Overall Value At Risk (AG.1.4)
Supply Chain Costs	The costs associated with operating the supply chain.	Supply Chain Management Cost (CO.1.1)
		Cost of Goods Sold (CO.1.2)
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 (AM.1.1)
		Return on Supply Chain Fixed Assets (AM.1.2)
		Return on Working Capital (AM.1.3)

Figure 5 – Definitions for SCOR Performance Attributes and listing of associated Level 1 metrics.

The SCOR metrics are organized in a hierarchical structure. SCOR describes level 1, level 2 and level 3 metrics. The relationships between these levels is diagnostic. Level 2 metrics serve as diagnostics for level 1 metrics. This means that by looking at the performances of the level 2 metrics I can explain performance gaps or improvements for level 1 metrics. This type of analysis of the performance of a supply chain is referred to as metric decomposition or root-causing. Similarly level 3 metrics serve as diagnostics for level 2 metrics. The level of a metric is oncluded in the codification of the metric itself.

Introduction

Metrics codification has been introduced in SCOR 9.0 to ensure companies may adopt SCOR metrics without the need to rename their existing metrics.

The coding starts with the performance attributes: Reliability – RL, Responsiveness – RS, Agility – AG, Cost – CO, and Asset Management – AM. Each metric starts with this two letter code, followed by a number to indicate the level, followed by a unique identifier. For example: Perfect Order Fulfillment is RL.1.1 – a level 1 metric within the Reliability attribute. Perfect Condition is RL.2.4, a Reliability metric at level 2. And Direct Material Cost is CO.3.141.

Note: The second number in the ID – for example the 141 in CO.3.141 – does NOT indicate any kind of priority, importance, or other meaning. The numbers where assigned initially alphabetically, and later based on first come first serve.

Note: Over time SCC may retire metrics, which will mean there are unassigned metric IDs. This is intended, to ensure backward compatibility to older revisions.

Processes

The Process section in SCOR provides a set of pre-defined descriptions for activities most companies perform to effectively execute their supply chains. The five macro-level SCOR processes Plan, Source, Make, Deliver and Return are well-known and widely adopted. SCOR identifies 2 more levels of process. Level here indicates the span of the process: A level 3 process is focused on a more detailed activity. A level 1 process spans multiple level 3 processes. Figure 2 shows the levels within the SCOR model processes.

Level 2 process categories determine the capabilities within the level 1 processes. The key level 2 processes are Make-to-Stock vs. Make-to-Order vs. Engineer-to-Order for Source, Make and Deliver processes and Defective vs. MRO vs. Excess for the Return process. Level 3 processes are process steps that are performed in a certain sequence in order to plan supply chain activities, source materials, make products, deliver goods and services and handle product returns.

Companies may develop standard process descriptions of activities within the level 3 processes – so called level 4 processes. Level 4 processes are generally industry, product, location and/or technology specific. For example: Most if not all companies need to perform a task known as "receive, enter and validate a customer order". This is a level 3 process (for example sD1.2). The level 4 processes would describe the steps how the order was received. Examples would be EDI, fax, telephone, walk-in. Each of these may require a unique level 4 process description. Another step you would describe how the order was entered. EDI maybe automatically loaded by certain software, fax and phone orders are entered by the order desk, walk-ins are processed at the check out counter. And so on.

The level at which processes need to be described depends on the project. For most projects level 2 process diagrams help identify structural issues in the supply chain: "Why do we have a warehouse feeding a warehouse, feeding a warehouse?" or "Lead-time are long due to where we source some of these materials". Level 3 process diagrams help identify decision points, triggers and process disconnects. For example: A sourcing model where I only take inventory ownership after I shipped it to my customer – a.k.a. "supplier owned inventory" – is described at level 3. Another sourcing alternative vendor managed inventory is also defined at level 3. Both need the standard level 3 processes, but the way these processes are sequenced and who performs them is the differentiator.

Process codification differs by level. Level 1 processes are represented by a capital letter preceded by a the letter s (small caps): sP for Plan, sS for Source, sM for Make, sD for Deliver and sR for Return. Level 2 processes add a number for most level 2 processes: sD1 for Deliver Stocked Products, sP3 for Plan Make. Level 3 processes add a period followed by a unique number: sD1.1 for Process Inquiry and Quote, sD1.2 for Receive, Enter and Validate Order. Exceptions exist for Return processes and Enable processes: Level 2

Return processes are split into Source Return (sSRx) and Deliver Return (sDRx) processes to acknowledge the difference between returning something yourself or receiving a return from your customer. The level 3 processes are aligned with these codes: sDR1.1 is Authorize Defective Product Return. Enable processes fall within the level 1 processes Plan, Source, Make, Deliver and Return and are identified by a preceding E. For example the level 2 Enable Source process is sES. The level 3 process Assess Supplier Performance has ID sES.2

Note: Non of numbers in the ID indicate any kind of sequence, priority, importance, or other meaning. The numbers where assigned initially using an example sequence, and later based on first come first serve.

Practices

The Practices section consists of best practices organized by original objective:

- SCOR; Improving overall supply chain operational performance. These best practices focus on the Reliability, Responsiveness, Agility, Cost and/or Asset Management Efficiency performance attributes.
- GreenSCOR; Improving the environmental footprint of the supply chain.
- Risk Management; Improving (mitigating) the risks of an undesired event taking place, limiting the impact of such an event and improving the ability to recover from the event.

Best practices are best described as unique ways to configure a set of processes (Configuration), unique ways to automate a set of processes (Technology) and/or unique ways to perform a set of processes (Knowledge) that result in significant better results.

No codification exists for Best Practices at this time.

People

The People section of SCOR is new. Starting revision 10 SCOR incorporates a standard for describing skills required to perform tasks and manage processes. Generally these skills are supply chain specific. Some skills identified may be applicable outside the supply chain process domain.

Skills are described by a standard definition and association to other People aspects: Aptitudes, Experiences, Trainings and Competency level. Competency level is not included in the framework descriptions. SCOR recognizes 5 commonly accepted competency levels:

- Novice: Untrained beginner, no experience, requires and follows detailed documentation
- Beginner: Performs the work, with limited situational perception.
- Competent: Understands the work and can determine priorities to reach goals.
- Proficient: Oversees all aspects of the work and can prioritize based on situational aspects.
- Expert: Intuitive understanding. Experts can apply experience patterns to new situations.

These competency levels are used similarly as process or practice maturity levels. The person or job specification is evaluated on the found (person) or desired (job specification) level of competency.

Codification within the People section consists of coding of the Skills as well as the Aptitudes,

Experiences and Trainings that define the Skills. All People elements start with a capital letter H followed by a capital letter representing the element: S for Skills, A for Aptitudes, E for Experiences and T for Trainings. These are followed by a period and a for digit number. For example HS.0010 is the code for Basic Finance skill, HT.0039 is the code for CTPAT training.

Note: The number in the ID – for example the 0018 in HA.0018 – does NOT indicate any kind of priority, importance, or other meaning. It is a unique identifier.

Using SCOR

Since the inception of the SCOR model companies have looked at how to best utilize the rich content of SCOR. Supply Chain Council has supported and continuous to support practitioners by offering training focused on the interpretation and use of SCOR. Experience tells us that SCOR as a tool needs to be integrated into existing project methodologies used, where they exist. Effective supply chain organizations have learned that using SCOR is not a business goal; it is a tool to reach the true business goal: An integrated optimized supply chain, meeting market requirements.

A typical SCOR project comprises of the following phases:

1. Understand the scope. The scope of a SCOR project is defined by the following components:
    a. Business: Understanding the markets the supply chain serves, the products and/or services the supply chain delivers and competitive landscape for each product and market;
    b. Configuration: Understanding the high level processes. Develop geographic maps and thread diagrams to understand material flows and supporting processes;
    c. Performance: Understanding the areas of underperformance. Companies develop scorecards and may organize a benchmark to understand how their supply chains perform in comparison to similar supply chains;
    d. Opportunity: Defining the improvement opportunity. Setting the scope of the effort. Focus on one or few supply chains and one or few metrics per supply chain.
    e. Plan the next steps.
2. Investigate causes. Determine where the root causes are:
    a. Metrics decomposition: For each problem metric identify the diagnostic metrics and collect the data to calculate these diagnostic metrics. Determine the the problem metric or metrics. Repeat this process until no more diagnostic metrics can be identified;
    b. Process problem discovery: For all diagnostic metrics, determine the associated processes. For each process collect information about how the process operates. ('operates' not 'is supposed to operate'). Collect relevant information about who performs the work, sources or lack of relevant information to perform the work, rules and regulations that apply, tools and software supporting the process. Collect observed performance information from those who perform the work.
    c. Classify the problems: Group relevant observed process and performance problems together and determine how this impacts the overall problem. (Cause and Effect)
    d. Plan the next steps.
3. Identify solutions. Review different ways to solve the individual observed problems and the overall

problem.

a. Research better practices: Determine how others have solved similar problems. Identify best practices, leading practices and software and tools that may address individual problems and/or the overall problem;

b. Develop what-if scenarios: Using information about alternative practices, new technology, internal knowledge and external resources* describe new ways to configure and organize the processes. (*) External resources can be paid consultancies, peers in other industries or peers in other business units in the same company. Internal resources and knowledge refers to workers in or close to the process. Some IT resources may qualify as internal resources;

c. Review and select: Review each scenario. Weigh improvement impact against estimated cost, risk, effort, lead-time, and feasibility. Select the appropriate (or best) solution scenario for each problem. The collection of these solutions is the strategy to resolve the overall problem.

d. Plan the next steps.

4. Design solutions. Document the new processes, technologies and organizations. Describe the To-Be state.

a. Document processes: Develop the detailed transactional information.

b. Develop detailed process flows and descriptions. Document how the process is organized, who does what and what information is used and created in each process step.

c. Develop detailed work instructions. Document how the work is done. Develop Standard Operating Procedures (SOPs) for new processes. Update SOPs for all processes impacted by the change.

d. Document organizational designs:

i. Develop detailed job descriptions;

ii. Document authority, responsibility and span of control;

iii. Document training needs, develop training if needed;

iv. Document metrics, describe how the processes (and process owners) will be measured upon implementation of the new process.

e. Document technology requirements: Describe how existing and/or new technology will support the new process. A business requirements document will enable internal and/or external technology providers to match their tools to the process needs. Solution design may require significant resources and time for projects with large dependencies on technology and maybe considered separate IT projects.

f. Document transitions: Describe the dependencies and restrictions related to the change. Estimate resource needs

g. Plan the next steps.

5. Plan and launch change projects. Create a roadmap to implement the changes.

a. Define projects: Define unique projects for implementation. Combine changes that impact the same technology, organizations, products, processes as required. Note: Not all projects are

equal: Large scope changes need managed projects, small changes may need a memo to a manager with documentation.

b. Critical path and dependencies: Document the interdependencies of projects. “Project D requires Project K to be completed”. “Project F can start at any time”.

c. Manage the project portfolio. Prioritize projects based on expected return, business strategy and other relevant projects. Allocate resources; people, funds, time.

d. Launch and oversee the projects. Make sure the project deliverables result in the desired change.

Supply Chain Council recognizes that not every SCOR project is the same. Some projects require all or most detailed activities listed to take place to ensure the project outcomes. Most projects however do not. For example: Supply chains that have previously identified realistic improvement targets do not necessarily require another round of benchmarking. Or, if the changes do not require changes to software, do not spend months on documenting the technology requirements. Work smart not hard.

Supply Chain Council provides training for different types of project environments, such as lean/six sigma. For more information review the SCC training catalog: supply-chain.org/training.

SCOR Version 10.0 Changes

Summary of Changes

Revision 10.0 introduces standard definitions for People assets to SCOR. SCOR practitioners have asked for tools to help managing the organizational impacts (the people aspect) of supply chain projects. The People reference components of SCOR standardizes the classification of skills in a supply chain. As with all new extensions and additions, practitioners are asked to use the new SCOR People elements and provide feedback about usability, accuracy and gaps.

Revision 10 furthermore incorporates the proposed changes to the numbering structure the xCOR committee proposed in 2008. As additional frameworks have been developed (E.g. DCOR - SCOR for product and process design, and CCOR - SCOR for Sales and Support) the need for a framework identifier emerged. All processes are now preceded by a small letter to indicate the framework. Starting SCOR 10.0 all SCOR process have a small 's' preceding the former process ID. For example: D1.2 (Receive, Enter and Validate Order) is now sD1.2. Supply Chain Council recommends the leading s to be silent: sD1.2 would be pronounced as "Dee One point Two". The exception would be where multiple frameworks would be within scope of conversation. Metrics and skills numbering does not require the preceding letter as metrics and skills are considered spanning multiple domains (not all but many). Best practices numbering will be included in future revisions of the SCOR models.

SCOR 10 also brings updates to the Supply Chain Risk Management component of SCOR. The risk related metrics have been revised and new best practices are introduced. Supply Chain Risk Management was originally introduced in SCOR 9.0. The Overall Value-At-Risk metric has been reclassified.

Metric	Old ID	New ID
Overall Value-At-Risk (VAR)	CO.2.6	AG.1.4
Supplier's/Customer's/Products' Risk Rating	New	AG.2.14
Value at Risk (Plan)	New	AG.2.15
Value at Risk (Source)	CO.3.192	AG.2.16
Value at Risk (Make)	CO.3.190	AG.2.17
Value at Risk (Deliver)	CO.3.189	AG.2.18
Value at Risk (Return)	CO.3.191	AG.2.19
VAR of Supplier Performance	CO.3.194	AG.2.21

Figure 6, Summary of Risk metric changes

A complete list of all changes can be found at the end of this paragraph.

Online Access

With the release of revision 10 SCOR is introducing a new way to browse the reference: Online Access. Online Access offers a true browsing experience throughout the framework. Navigation through the SCOR model will be much easier than using the PDF. Linkages between metrics, processes, practices, skills and experiences, aptitudes and training are directly accessible.

Change #	Type of Change	SCOR Process #	Specific Change Description
1	Change	AG.1.1	Changed definition - add cost reference
2	Change	AG.1.2	Changed definition - add cost reference
3	Change	CO.3.151	Metric reclassification to AM.3.45
4	Change	RL.3.44	Metric reclassification to RS.3.142
5	Change	RS.3.51 and RS.3.52	Consolidate and Change Metric Name to RS.3.51
6	Change	RS.3.102 and RS.3.103	Consolidate and Change Metric Name to RS.3.102
7	Change	RS.3.131 and RS.3.132	Consolidate and Change Metric Name to RS3.131
8	Add	CO.2.2	Add new L3 Hierarchy
9	Add	CO.2.3	Added new text on calculation; data collection and discussion
10	Add	CO.2.4	Add new L3 CO.3.200
11	Change	CO.2.6	Reclassification to AG.1.4
12	Add	AG.2.14	Add Supplier's/Customer's/Products' Risk Rating
13	Add	AG.2.15	Add Value at Risk (Plan)
14	Change	CO.3.192	Reclassification to AG.2.16
15	Change	CO.3.190	Reclassification to AG.2.17
16	Change	CO.3.189	Reclassification to AG.2.18
17	Change	CO.3.191	Reclassification to AG.2.19
18	Change	CO.3.194	Reclassification to AG.2.21
19	Add	AG.2.21	Add text to definition
20	Add	AG.2.21	Add Process EP.9
21	Delete	AG2.21	Delete Process EM.9, ED.9 and ER.9
22	Add	RL.3.54	Changed definition - added text
23	Add	RL.3.54	Add Process EP.9
24	Delete	RL.3.54	Delete Process ES.9
25	Change	CO.3.193	Reclassification to AG.2.20
26	Add	AG.2.20	Add test to definition
27	Add	AG.2.20	Add process EP.9
28	Add	RL.3.30	Add text to definition
29	Delete	RL.3.30	Delete processes EM.9, ED.9, ER.9
30	Add	RL.3.29	Add text to definition
31	Delete	RL.3.29	Delete process ES.9
32	Add	RL.3.51	Add text to definition

Change #	Type of Change	SCOR Process #	Specific Change Description
33	Delete	RL.3.51	Delete Process EM.9, ED.9 and ER.9
34	Add	AG.2.14	Add metric AG.2.14 (not currently in SCOR 9.0)
35	Add	RS.3.31	Add Process EP.9
36	Add	AG.3.55	Add Process EP.9
37	Delete	AG.3.58	Options Rating metric to be deleted
38	Add	CO.3.157	Add text to definition
39	Add	CO.3.157	Add Process ES.9
40	Add	CO.3.154	Add Process ES.9
41	Add	CO.2.7	Added Metric Co.2.7 (not currently in SCOR 9.0)
42	Change	CO.3.149	Reclassification to AG.2.22
43	Change	CO.3.156	Reclassification to AG.2.23
44	Add	Risk Management Best Practice	Added Bowtie Risk Management
45	Add	Risk Management Best Practice	Added Risk Program Monitoring
46	Add	Risk Management Best Practice	Added Network Prioritization for Risk identification
47	Change	AM3.28 - 3.44	Metric Name + some text updates
48	Change	P3.2	Change cost metric text name
49	Change	P3.1	Workflow change
50	Delete	P5.2	responsiveness metric Balance Return Resources with Return Requirements Cycle Time
51	Delete	P5.3	Delete cost metric Cost to Identify, Assess, and Aggregate Return Resources
52	Change	M1.4	Workflow change
53	Change	M2.4	Workflow change
54	Change	M3.6	Workflow change
55	Change	S1.4	Workflow change
56	Change	S2.4	Workflow change
57	Change	S3.6	Workflow change
58	Change	D1.8	Workflow change
59	Change	D1.9	Workflow change
60	Change	D2.8	Workflow change
61	Change	D2.9	Workflow change
62	Change	D3.8	Workflow change
63	Change	D3.9	Workflow change

Change #	Type of Change	SCOR Process #	Specific Change Description
64	Change	Metrics Intro	insert between metrics tab and reliability tab
65	Change	Processes intro	insert between processes tab and plan tab
66	Change	Practices intro	insert between practices tab and SCOR tab
67	Change	Section 5 Special Applications	renumber Section 5 to 6
68	Add	Section 5 Skills	Insert new section 5 Skills (all skills pages)
69	Add	New Tab 5	Add People
70	Change	Artwork	714 pixels
71	Change	Artwork	PNG format
72	Change	Artwork	Transparent background
73	Change	Printed version	Scalable for typesetter
74	Change	RS.3.51	Add D1.11 - D1.11: Load Vehicle & Generate Shipping Documentation
75	Change	Copyright	Mass Modify from 2008 to 2010 on all pages
76	Change	adding a small s for all processes in the document	P1, P2, P3, P4, P5, EP, D1, D2, D3, D4, ED, M1, M2, M3, EM, S1, S2, S3, ES, SR1, SR2, SR3, DR1, DR2, DR3, ER
77	Change	Acknowledgement Page	Modify to the new spreadsheet names and company name
78	Add	People Introduction	insert between People 5.0 tab

The Technical Change Process

The SCOR-model is developed and maintained by the voluntary efforts of the Supply Chain Council (SCC) 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.

Today, 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 a group of elected volunteers, supported by a SCC project member (staff). Changes to the model are initiated by a Council member or members. The primary mechanism for changing the Model is the Project Team. These teams propose areas of investigation, pursue and develop proposals for Model development and publish research results on the Council website.

SCOR users (practitioners) can also provide feedback through the Supply Chain Council's website (Online Access). Member users can add comments to the SCOR metrics, processes, practices and skills. For more information about Online Access: http://supply-chain.org/online-access

Section 2

Metrics

Introduction to Metrics

The performance section of SCOR consists of two types of elements: Performance Attributes (attributes) and Metrics.

Performance Attribute
A performance attribute is a grouping of metrics used to express a strategy. An attribute itself cannot be measured; it is used to set strategic direction. For example: "The LX product needs to be best-in-class for reliability" and "The xy- market requires us to be among the top 10 agile manufacturers". Metrics measure the ability to achieve these strategic directions.

Metric
A metric is a standard for measurement of the performance of a process. SCOR metrics are diagnostic metrics. SCOR recognizes three levels of pre-defined metrics:

- Level 1 metrics are diagnostics for the overall health of the supply chain. These metrics are also known as strategic metrics and key performance indicators (KPI). Benchmarking level 1 metrics helps establishing realistic targets to support the strategic directions.
- Level 2 metrics serve as diagnostics for the level 1 metrics. The diagnostic relationship helps to identify the root cause or causes of a performance gap for a level 1 metric.
- Level 3 metrics serve as diagnostics for level 2 metrics.

The analysis of performance of metrics from level 1 through 3 is referred to as decomposition. Decomposition helps identify the processes that need to be future studied. (Processes are linked to level 1 and level 2 metrics).

SCOR recognizes 5 performance attributes:

Reliability
The Reliability attribute addresses the ability to perform tasks as expected. Reliability focuses on the predictability of the outcome of a process. Typical metrics for the reliability attribute include: On-time, the right quantity, the right quality. The SCOR key performance indicator (level 1 metric) is Perfect Order Fulfillment. Reliability is a customer focused attribute.

Responsiveness
The Responsiveness attribute describes the speed at which tasks are performed. Responsiveness addresses repeated speed of doing business. Agility describes a different speed, the speed to change the supply chain. Example metrics are cycle time metrics. The SCOR key performance indicator is Order Fulfillment Cycle Time. Responsiveness is a customer focused attribute.

Agility
The Agility attribute describes the ability to respond to external influences; the ability to change. External influences include: Non-forecastable increases or decreases in demand, suppliers or partners going out of business, natural disasters, acts of (cyber) terrorism, availability of financial

tools (the economy), labor issues. The SCOR key performance indicators include Flexibility and Adaptability. Agility is a customer focused attribute.

Cost

The Cost attribute describes the cost of operating the process. Typical cost includes labor cost, material cost, transportation cost. The SCOR key performance indicators are Cost of Goods Sold and Supply Chain Management Cost. These two indicators cover all supply chain spend. Cost is an internal focused attribute.

Assets

The Asset Management Efficiency ('Assets') attribute describes the ability to efficiently utilize assets. Asset management strategies in supply chain include inventory reduction and in source vs. outsource. Example metrics include: Inventory days of supply, capacity utilization. The SCOR key performance indicators include: Cash-to-Cash Cycle Time, Return on Fixed Assets. Asset Management Efficiency is an internal focused attribute.

Supply Chain Council recommends supply chain scorecards to contain at least one (1) metric for each performance attribute to ensure balanced decision making and governance.

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.

Qualitative Relationship Description

- An order is considered perfect if the products ordered are the products provided and the quantities ordered match the quantities provided (% In Full).
- A delivery is considered perfect if the location, specified customer entity and delivery time ordered is met upon receipt (Delivery Performance to Customer Commit Date).
- Documentation supporting the order line is considered perfect if it is all accurate, complete, and on time (Accurate Documentation).
- The product condition is considered perfect if the product is delivered / faultlessly installed (as applicable) on specification, with the correct configuration, with no damage, customer ready, and is accepted by the customer (Perfect Condition)

Quantitative Relationship (optional, if calculable)

None Identified

Calculation

[Total Perfect Orders] / [Total Number of Orders] x 100%
Note, an Order is Perfect if the individual line items making up that order are all perfect.

The Perfect Order Fulfillment calculation is based on the performance of each Level 2 component of the order line to be calculated (product & quantity, date & time & Customer, documentation and condition). For an order line to be perfect, all of the individual components must be perfect.

The calculation of line item perfect order line fulfillment is based on the Level 2 components:

- Each component receives a score of 1 if it is judged to be perfect.
- It receives a score of 0 if not perfect.

If the sum of the scores equal the number of components (in this case, 4) the order line is perfectly fulfilled.

Data Collection

Data for the components that are used to drive the calculation of supply chain performance are primarily taken from Deliver and impact Deliver Enable process elements. These are primarily associated with the original commitment (Customer Order Processing – sD1.2, sD 2.2, sD3.3) and the satisfaction of that commitment (Receipt and Installation (as appropriate) – sD1.11, sD1.13, sD1.14, sD1.15, sD2.11, sD2.13, sD2.14, sD2.15, sD3.11, sD3.13, sD3.14, sD3.15). In addition, the documents necessary for support of the supply chain process should be scored across the set of Deliver process elements. The Enable Deliver Process Element - Assess Delivery Performance (sED.2) should be updated from metrics derived.

RL.1.1

Discussion

The performance of the supply chain is considered "perfect" if the original commitment made to a customer is met through the supply chain.

An order is defined as a collection of one or more order lines representing a request to deliver specified quantities of goods or to render specific services. The order can further be defined as a request (with a specific identifier as a reference) to deliver specified items or to render specific services with specific prices, dates, and quantities. Commitments are made to a customer at the order line level, where an order line is defined as a line representing a commitment on a sales order. An order line always references a product or service.

For an order to be considered perfect the following standards must be met:

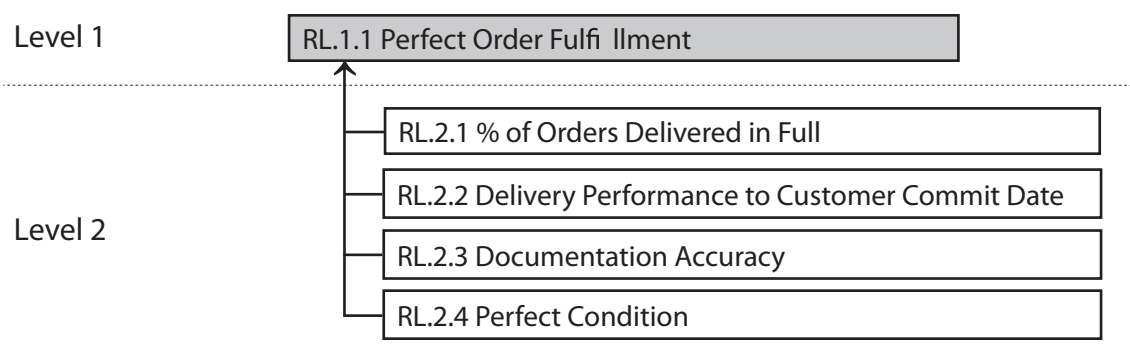
- Delivered complete; all items on the order line are delivered in the quantities specified
- Delivered on time to the initial commitment date, using the customer's definition of on-time delivery
- Documentation supporting the order including packing slips, bills of lading, invoices, quality certifications, etc., is complete and accurate
- Faultlessly installed (as applicable), correct configuration, customer-ready and accepted, no damage, on specification

Orders canceled by the customer are excluded from the metric. Order changes initiated by the customer and agreed to by the supplier supersede initial commitments and form a new comparative basis for the metric.
Often for date and quantity issues (and occasionally product), a range rather than a strict value is used. This is acknowledged as a standard practice; in those situations the standard measured is considered to be met perfectly if the range specified is satisfied.

The term "customer-ready" for the perfect condition standard may imply a subjective component based on the customer's satisfaction. Although condition may not be as rigorously measured as time or quantity it should be considered as a component if available, especially since this attribute measures performance of the supply chain which is, of course, ultimately measured by its customers.

It should also be noted that a corresponding evaluation of suppliers' performances could be determined by extending these standards to each supplier's ability to source products.

Hierarchical Metric Structure



% of Orders Delivered In Full

Percentage of orders which all of the items are received by customer in the quantities committed

Qualitative Relationship Description

An order is considered delivered "in full" if:

- All items ordered are the items actually provided, and no extra items are provided
- All quantities received by the customer match the order quantities (within mutually agreed tolerances)

Quantitative Relationship (optional, if calculable)

None Identified

Calculation

[Total number of orders delivered in full] / [Total number of orders delivered] x 100%

Data Collection

Data for the components that are used to drive the calculation of % In Full are primarily associated with the original order processing step of 'Reserve inventory and Determine Delivery Date' (sD1.3, sD2.3 & sD3.3), inventory availability (sM1.1, sM2.1, sM3.1) including inventory location accuracy, (sED.4), and the satisfaction of that commitment through the shipment and customer receiving processes (sD 1.12, sD1.13, sD2.12, sD.2.13, sD3.12, sD3.13)

Discussion

Order quantities are based on item / quantity original commitments agreed to by the customer. Orders canceled by the customer are excluded from the metric. Order changes initiated by the customer and agreed to by the supplier supersede original commitments and form a new comparative basis for the metric. This metric has no "timing" element, such that orders deliberately split by the supplier should still be considered "in full" so long as all metric criteria are met. In some cases, such as for supplying bulk materials, committed quantities refer to a range that is acceptable to the customer rather than a strict value.

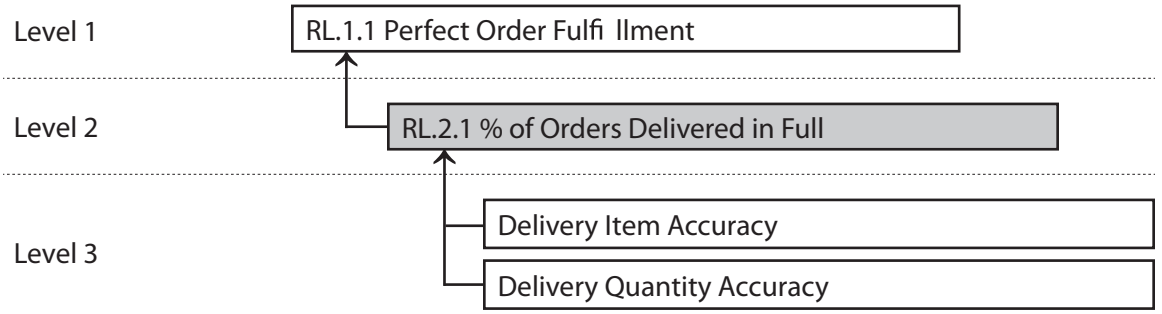
Several SCOR diagnostic metrics exist that can be used to focus "% In Full" improvement efforts. Some of these include:

- % Orders Scheduled to Requested Quantity
- Schedule Achievement
- Yield variability
- Planned Shipment Fill Rate (not yet defined)
- % Stock Outs (not yet defined)
- Inventory Cycle Count Accuracy (not yet defined)

Orders may not be filled completely to the customer's original request quantity due to the inability to schedule to the initial request. Breakdown may also occur from the inventory availability (including stock outs for MTS and schedule achievement for MTO and ETO) and inventory location accuracy. Lastly, a deviation from the shipment plan may lead to inability to fulfill an order completely.

RL.2.1

Hierarchical Metric Structure



Delivery Performance to Customer Commit Date

The percentage of orders that are fulfilled on the customer's originally scheduled or committed date

Qualitative Relationship Description

An order is considered delivered to the original Customer commitment date if:

- The order is received on time as defined by the customer
- The delivery is made to the correct location and Customer entity

Quantitative Relationship (optional, if calculable)

None Identified

Calculation

[Total number of orders delivered on the original commitment date] / [Total number of orders delivered] x 100%

Data Collection

Data for the components that are used to drive the calculation of Delivery Performance to Customer Commit Date are primarily associated with the original order processing step of 'Reserve inventory and Determine Delivery date' (sD1.3, sD2.3 & sD3.3), and the satisfaction of that commitment through the shipment and customer receiving processes (sD 1.12, sD1.13, sD2.12, sD2.13, sD3.12, sD3.13).

Discussion

Order delivery performance from a timing perspective is based on original commitments agreed to by the customer. The acceptable window for delivering on time should be defined in the customer' service level agreement. Orders canceled by the customer are excluded from the metric. Order changes impacting the timing of a delivery that are initiated by the customer and agreed to by the supplier supersede original commitments and form a new comparative basis for the metric. The original commitment date can refer to a range, rather than a strict date and time, that is acceptable to the customer (e.g. advanced shipments). This metric has no "In Full" element, such that partial deliveries can still be considered as meeting the Customer Commit Date so long as all metric criteria are met. Measuring the frequency of accepting the customer's original request date, vs. commit date, can be an important measure of customer satisfaction.

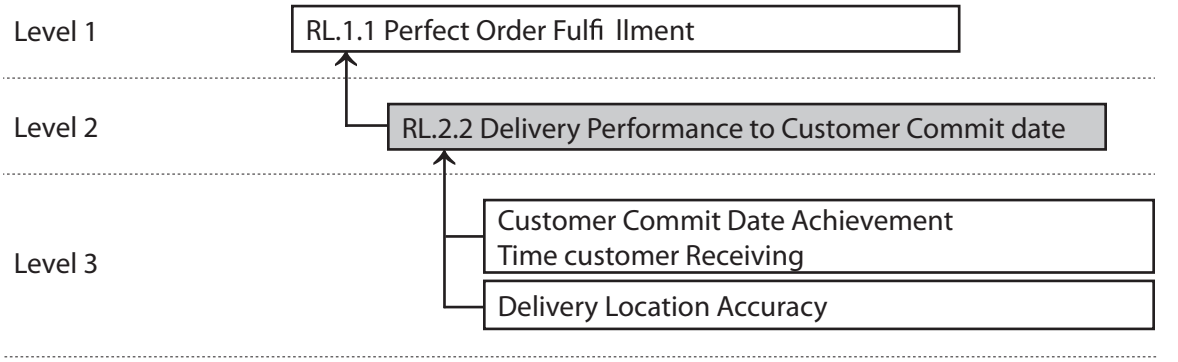
Several SCOR diagnostic metrics exist that can be used to focus delivery performance improvement efforts. Some of these include:

- % Orders Scheduled to Request
- % Orders Shipped on time (not yet defined)
- Carrier Performance Reliability (not yet defined)

Orders may not be delivered to the Customer Commit Date due to breakdowns in the order fulfillment and shipment process (e.g. Transportation availability). Orders may also be delivered late due to carrier delivery performance / issues.

RL.2.2

Hierarchical Metric Structure



Documentation Accuracy

Percentage of orders with accurate documentation supporting the order, including packing slips, bills of lading, invoices, etc.

Qualitative Relationship Description

An order is considered to have accurate documentation when the following are accepted by the customer:

- Shipping documentation
- Payment documentation
- Compliance documentation
- Other required documentation

All documentation must be complete, correct, and readily available when and how expected by the customer, Government and other supply chain regulatory entities.

Quantitative Relationship (optional, if calculable)

None Identified

Calculation

[Total number of orders delivered with accurate documentation] / [Total number of orders delivered] x 100%

Document supporting the order includes:

- Shipping documentation:
  - Packing slips (Customers)
  - Bill of lading (Carriers)
  - Government or Customs documentation / forms
- Payment Documentation:
  - Invoice
  - Contractual outline agreement
- Compliance documentation
  - Material Safety Data Sheets
- Other required documentation
  - Quality certification

Data Collection

Data for the components that are used to drive the calculation of Accurate Documentation are primarily associated with the Deliver processing step of 'Load Product & Generate Shipping Documentation' (sD1.11, sD2.11, sD3.11), and 'Invoice' (sD1.15, sD2.15, sD3.15).

The data collection step is part of Assess Delivery Performance (sED2) and Manage Deliver Information (sED3)

RL.2.3

Discussion

This metric is calculated at the order level. The timeliness and quality of the documentation is measured from the perspective of the customer, Government, and other regulatory entities. Documentation may be late or incomplete due to the inability to prepare / process the correct documentation on time. Inaccurate or late shipping documentation may prevent the product to be loaded or shipped, increase the customs delay, and delay the customer's acceptance of the order. Inaccurate or late invoices may also lead to the inability to fulfill the customer request.

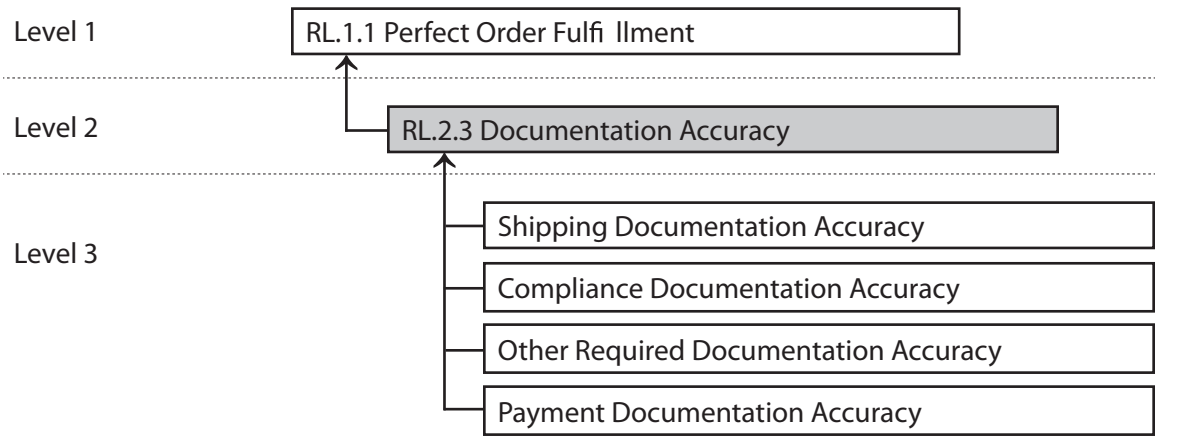
The definition encompasses On time and Accurate documentation. However, on-time documentation implies a scheduled ship date and scheduled invoice date.

Accurate documentation metrics are similar to what exists for SOURCE process metrics

Possible diagnostic metrics that can be used to focus Accurate Documentation improvement efforts include:

- % orders documentation (shipping and invoice) processed on time
- % faultless invoices

Hierarchical Metric Structure



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

Qualitative Relationship Description

An order is considered to be delivered in perfect condition if all items meet the following criteria:

- Undamaged
- Meet specification and has correct configuration (as applicable)
- Faultlessly installed (as applicable) and accepted by the customer
- Not returned for repair or replacement (within the warranty period)

Quantitative Relationship (optional, if calculable)

None Identified

Calculation

[Number of orders delivered in Perfect Condition] / [Number of orders delivered] x 100%

Data Collection

Data for the components that are used to drive the calculation of "Perfect Condition" are primarily associated with the receipt, installation (as applicable) and satisfaction of the order commitment (sD1.13, sD1.14, sD2.13, sD2.14, sD3.13, sD3.14). The Enable Deliver Process Element - Assess Delivery Performance (sED.2) should be updated to reflect this metric and its components.
This data is typically available from a complaints, claims, or warranty/returns database.

Discussion

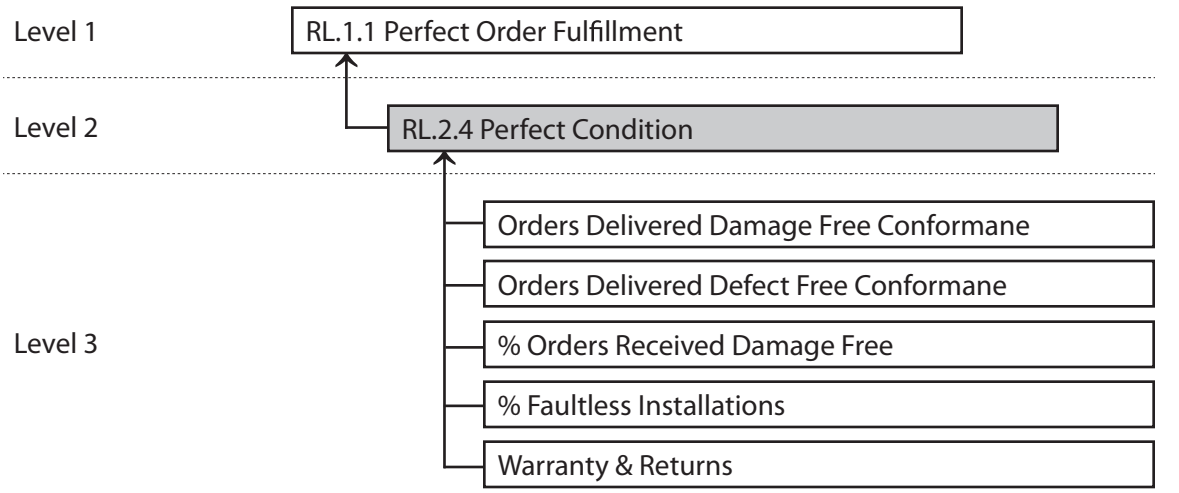
This metric, calculated at the order level, assesses the quality of products delivered through the supply chain from the customer's perspective. Justified and non-justified product quality issues, claims and returns within the warranty period are included and count against this metric. Improving this metric lowers the supply chain cost associated with claims and returns.

Several SCOR diagnostic metrics exist that can be used to focus Perfect Condition improvement efforts. Some of these include:

- Cost of Noncompliance
- Damage and Shrinkage
- Scrap Expense
- Warranty Costs
- Yield Variability

RL.2.4

Hierarchical Metric Structure



Level 3 Reliability Metrics

Metric ID	Metric Name	Metric Definition	Process
RL.3.1	# of complaints regarding missing environmental documentation	The number of products released without proper environmental documentation as a percent of total products released	sM1.6: Release Product to Deliver
RL.3.2	# of recordkeeping related NOVs	The number of recordkeeping related regulatory violations received per year	sM1.6: Release Product to Deliver
RL.3.3	# of staff-related environmental violations	The number of environmental violations per year that are a result of personnel error or improper training	sEM.2: Manage Production Performance
RL.3.4	% correct material documentation	The percent of total shipments that include the correct environmental documentation	sD1.10: Pack Product sD2.9: Pick Product sD3.8: Receive Product from Source or Make
RL.3.5	% Error-free Returns Shipped	% Error-free Returns Shipped	sSR2.5: Return MRO Product sSR1.5: Return Defective Product sSR3.5: Return Excess Product
RL.3.6	% Identified MRO Products Returned To Service	% Identified MRO Products Returned To Service	sSR2.2: Disposition MRO Product
RL.3.7	% Item Location Accuracy	% Item Location Accuracy	sD4.5: Fill Shopping Cart
RL.3.8	% of assets in compliance with scheduled maintenance requirements	The percent of capital equipment that is in compliance with manufacturer recommended maintenance requirements or maintenance best practice requirements.	sES.5: Manage Capital Assets
RL.3.9	% of employees trained on environmental requirements	The number of employees trained on environmental requirements as a percent of total Make employees	sEM.8: Manage Make Regulatory Environment
RL.3.10	% of Excess Product Returns Delivered Complete to the Designated Return Center	Correct destination, according to the schedule, with the correct part and documentation	sDR3: Deliver Return Excess Product sSR3: Source Return Excess Product

Metric ID	Metric Name	Metric Definition	Process
RL.3.11	% 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	sD1.15: Invoice sD2.15: Invoice sD3.15: Invoice
RL.3.12	% Of Faultless Installations	Number of Faultless Installations divided by Total Number of Units Installed.	sD1.14: Install Product sD2.14: Install Product
RL.3.13	% of MRO returns delivered to the correct service provider location	% of MRO returns delivered to the correct service provider location, within schedule, with the correct part and documentation	sDR2: Deliver Return MRO Product
RL.3.14	% of products meeting specified environmental performance requirements	The number of products that meet desired environmental performance specifications as a per cent of total products produced	sM2.6: Release Finished Product to Deliver
RL.3.15	% of products with proper environmental labeling (if required)	The number of products with proper environmental labels in place as a per cent of total products produced	sM2.6: Release Finished Product to Deliver
RL.3.16	% of suppliers meeting environmental metrics/criteria	Number of suppliers that completely meet agreement environmental criteria divided by the total number of suppliers used.	sES.7: Manage Supplier Network sES.2: Assess Supplier Performance sD2.7: Select Carriers and Rate Shipments sES.10: Manage Supplier Agreements sD1.7: Select Carriers and Rate Shipments
RL.3.17	% of suppliers with an EMS or ISO 14001 certification	Percent of suppliers used that have a validated Environmental Management System or ISO 14000 certification	sS3.2: Select Final Supplier (S) and Negotiate sS3.1: Identify Sources of Supply
RL.3.18	% Orders/ Lines Processed Complete	The number of orders / lines that are processed complete divided by the total orders / lines processed within the measurement period	sS2.2: Receive Product sS1.2: Receive Product sS3.4: Receive Product

Metric ID	Metric Name	Metric Definition	Process
RL.3.19	% 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.	sS1.3: Verify Product sS2.3: Verify Product sS3.5: Verify Product
RL.3.20	% 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	sS1.2: Receive Product sS2.2: Receive Product sS3.4: Receive Product
RL.3.21	% Orders/ lines received with correct content	Percent of orders or lines received that have the correct material content as specified in the product design specs and supplier agreements.	sS1.3: Verify Product sS2.3: Verify Product sS3.5: Verify Product
RL.3.22	% Orders/ lines received with correct packaging	Percent of orders or lines received that are packaged correctly with the right type and quantity of packaging material.	sS1.2: Receive Product sS2.2: Receive Product sS3.4: Receive Product
RL.3.23	% 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	sS1.2: Receive Product sS2.2: Receive Product sS3.4: Receive Product
RL.3.24	% Orders/ lines received damage free	The number of orders / lines that are processed damage free divided by the total orders / lines processed in the measurement period	sS1.3: Verify Product sS2.3: Verify Product sS3.5: Verify Product
RL.3.25	% 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	sS1.4: Transfer Product sS2.4: Transfer Product sS3.6: Transfer Product
RL.3.26	% Product Transferred without Transaction Errors	The number of transactions processed without error divided by the total transactions processed in the measurement period.	sS1.4: Transfer Product sS2.4: Transfer Product sS3.6: Transfer Product
RL.3.27	% 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	sS1.1: Schedule Product Deliveries sS2.1: Schedule Product Deliveries sS3.3: Schedule Product Deliveries

Metric ID	Metric Name	Metric Definition	Process
RL.3.28	% Shipping Schedules that Support Customer Required Return by Date	% Shipping Schedules that Support Customer Required Return by Date	sSR1.4: Schedule Defective Product Shipment sSR2.4: Schedule MRO Shipment sSR3.4: Schedule Excess Product Shipment
RL.3.29	Age of Product / Customer Risk Data (months)	The age in months of the product of customer risk data i.e. audit age, assessments, performance, etc. An average for the process area can be used to evaluate freshness of the data. For example: the date of the last audit for a customer, the age of the performance data, the age of the 3rd party data, etc.	sEM.9: Manage Supply Chain Make Risk sED.9: Manage Supply Chain Deliver Risk sER.9: Manage Supply Chain Return Risk
RL.3.30	Age of Supplier Risk Data (months)	The age in months of the supplier risk data i.e. audit age, assessments, performance, etc. An average for the process area can be used to evaluate freshness of the data. For example: the date of the last audit for a supplier, the age of the performance data, the age of the 3rd party data, etc	sES.9: Manage Supply Chain Source Risk
RL.3.31	Compliance Documentation Accuracy	Percentage of compliance documentations are complete, correct, and readily available when and how expected by customer, Government and other supply chain regulatory entities. Compliance documentations includes material safety data sheets	sD1.11: Load Vehicle & Generate Shipping Documentation sD2.11: Load Product & Generate Shipping Documentation sD3.11: Load Product & Generate Shipping Documents sM1.4: Package sM2.4: Package sM3.5: Package
RL.3.32	Customer Commit Date Achievement Time Customer Receiving	Percentage of orders which is received on time as defined by the customer	sD1.13: Receive & Verify Product by Customer sD2.13: Receive & Verify Product by Customer sD3.13: Receive & Verify Product by Customer

Metric ID	Metric Name	Metric Definition	Process
RL.3.33	Delivery Item Accuracy	Percentage of orders in which all items ordered are the items actually provided, and no extra items are provided	sD1.2: Receive, Enter & Validate Order sD1.4: Consolidate Orders sD1.11: Load Vehicle & Generate Shipping Documentation sD1.12: Ship Product sD1.13: Receive & Verify Product by Customer sD2.2: Receive, Configure, Enter & Validate Order sD2.4: Consolidate Orders sD2.11: Load Product & Generate Shipping Documentation sD2.12: Ship Product sD2.13: Receive & Verify Product by Customer sD3.3: Enter Order, Commit Resources & Launch Program sD3.6: Route Shipments sD3.11: Load Product & Generate Shipping Documents sD3.12: Ship Product sD3.13: Receive & Verify Product by Customer
RL.3.34	Delivery Location Accuracy	Percentage of orders which is delivered to the correct location and customer entity	sD1.2: Receive, Enter & Validate Order sD1.4: Consolidate Orders sD1.11: Load Vehicle & Generate Shipping Documentation sD1.12: Ship Product sD1.13: Receive & Verify Product by Customer sD2.2: Receive, Configure, Enter & Validate Order sD2.4: Consolidate Orders sD2.11: Load Product & Generate Shipping Documentation sD2.12: Ship Product sD2.13: Receive & Verify Product by Customer sD3.3: Enter Order, Commit Resources & Launch Program sD3.6: Route Shipments sD3.11: Load Product & Generate Shipping Documents sD3.12: Ship Product sD3.13: Receive & Verify Product by Customer

Metric ID	Metric Name	Metric Definition	Process
RL.3.35	Delivery Quantity Accuracy	Percentage of orders in which all quantities received by the customer match the order quantities (within mutually agreed tolerances)	sD1.2: Receive, Enter & Validate Order sD1.4: Consolidate Orders sD1.11: Load Vehicle & Generate Shipping Documentation sD1.12: Ship Product sD1.13: Receive & Verify Product by Customer sD2.2: Receive, Configure, Enter & Validate Order sD2.4: Consolidate Orders sD2.11: Load Product & Generate Shipping Documentation sD2.12: Ship Product sD2.13: Receive & Verify Product by Customer sD3.3: Enter Order, Commit Resources & Launch Program sD3.6: Route Shipments sD3.11: Load Product & Generate Shipping Documents sD3.12: Ship Product sD3.13: Receive & Verify Product by Customer
RL.3.36	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	sP1.3: Balance Supply Chain Resources with SC Requirements sP4.4: Establish Delivery Plans sM1.3: Produce and Test sD1.3: Reserve Inventory and Determine Delivery Date sD1.9: Pick Product
RL.3.37	Forecast Accuracy	Forecast accuracy is calculated for products and/or families for arkets/distribution channels, in unit measurement. Common calculation (Sum Actuals - Sum of Variance) / Sum Actuals to determine percentage error. *monitoring the delta of Forecast Accuracy over measured time periods can determine success rates.	sP1.1: Identify, Prioritize and Aggregate SC Requirements sP2.1: Identify, Prioritize and Aggregate Product Requirements sP3.1: Identify, Prioritize and Aggregate Production Requirements sP4.1: Identify, Prioritize and Aggregate Delivery Requirements sP4.2: Identify, Assess and Aggregate Delivery Resources sEP.4: Manage Integrated Supply Chain Inventory sEP.5: Manage Integrated Supply Chain Capital Assets sEP.6: Manage Integrated Supply Chain Transportation sEP.7: Manage Planning Configuration

Metric ID	Metric Name	Metric Definition	Process
RL.3.38	Number of notices of violation received	Number of violations issued by regulatory authorities per 12 month period	sEP.8: Manage Plan Regulatory Requirements and Compliance
RL.3.40	Number of occurrences where excessive inventory is returned and followed	Number of occurences where excessive inventory is returned and followed	sSR3.1: Identify Excess Product Condition
RL.3.41	Orders Delivered Damage Free Conformance	Percentage of orders which is delivered without damage	sD1.13: Receive and Verify Product by Customer sD2.13: Receive and Verify Product by Customer sD3.13: Receive and Verify Product by Customer
RL.3.42	Orders Delivered Defect Free Conformance	Percentage of orders which is delivered without defect	sD1.13: Receive and Verify Product by Customer sD2.13: Receive and Verify Product by Customer sD3.13: Receive and Verify Product by Customer
RL.3.43	Other Required Documentation Accuracy	Percentage of other required documentations (besides of compliance documentation, payment documentation and shipping documentation) are complete, correct, and readily available when and how expected by customer, Government and other supply chain regulatory entities. This kind of documentations includes quality certification	sD1.11: Load Vehicle & Generate Shipping Documentation sD2.11: Load Product & Generate Shipping Documentation sD3.11: Load Product & Generate Shipping Documents
RL.3.45	Payment Documentation Accuracy	Percentage of payment documentations are complete, correct, and readily available when and how expected by customer, Government and other supply chain regulatory entities. Payment documentations includes invoice, contractual outline agreement	sD1.11: Load Vehicle & Generate Shipping Documentation sD2.11: Load Product & Generate Shipping Documentation sD3.11: Load Product & Generate Shipping Documents
RL.3.46	Reportable Release Incidents	Number of reportable air, water, or solid waste accidental releases per year	sED.5: Manage Deliver Capital Assets
RL.3.47	Return Shipments Shipped on Time	Return Shipments Shipped on Time	sSR1.5: Return Defective Product sSR2.5: Return MRO Product sSR3.5: Return Excess Product

Metric ID	Metric Name	Metric Definition	Process
RL.3.48	Risk Mitigation Plan	% of sources with documented contingency plans and % of sourced items with alternate or redundant sources	sEP.9: Manage Supply Chain Plan Risk sES.9: Manage Supply Chain Source Risk sEM.9: Manage Supply Chain Make Risk sED.9: Manage Supply Chain Deliver Risk sER.9: Manage Supply Chain Return Risk
RL.3.49	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.	sM1.1: Schedule Production Activities sM2.1: Schedule Production Activities sM3.2: Schedule Production Activities
RL.3.50	Shipping Documentation Accuracy	Percentage of shipping documentations are complete, correct, and readily available when and how expected by customer, Government and other supply chain regulatory entities. Shipping documentations includes packing slips (customers), bill of lading (carriers) and government or customs documentation / forms	sD1.11: Load Vehicle & Generate Shipping Documentation sD2.11: Load Product & Generate Shipping Documentation sD3.11: Load Product & Generate Shipping Documents
RL.3.51	Supplier Mitigation Plans Implemented (percent)	The percent of mitigation plans implemented for specific supplier or supplier base to mitigate risk.	sES.9: Manage Supply Chain Source Risk
RL.3.52	Supplier return order cycle time reestablished and sustained in 30 days	Supplier return order cycle time reestablished and sustained for increased quantities produced given 30 days, including supplier return order processing cycle time, pick-to-ship cycle, transit time, etc.	sER.5: Manage Return Capital Assets sER.6: Manage Return Transportation sER.7: Manage Return Network Configuration
RL.3.53	Total # of Confirmed MRO Conditions/ Total # of MRO Service Requests Initiated	Total # of Confirmed MRO Conditions/ Total # of MRO Service Requests Initiated	sR2: Return MRO Product

Metric ID	Metric Name	Metric Definition	Process
RL.3.54	VAR of product/ customer performance	Value at Risk - the sum of the probability of risk events times the monetary impact of the events for the specific product or customer. For example: the company's historical On Time Delivery performance to a customer, the Customer Satisfaction Level, customer on time payment performance, customer bankruptcy, customer mergers, etc. can be used to calculate VaR.	sEP.9: Manage Supply Chain Plan Risk sEM.9: Manage Supply Chain Make Risk sED.9: Manage Supply Chain Deliver Risk sER.9: Manage Supply Chain Return Risk
RL.3.55	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.	sM1.3: Produce and Test sM1.4: Package
RL.3.56	Warranty Costs	Warranty costs include materials, labor and problem diagnosis for product defects.	sM1.3: Produce and Test sM1.4: Package sM2.3: Produce and Test sM2.4: Package sM3.4: Produce and Test sM3.5: Package
RL.3.57	Waste Processing Errors	Number of errors in waste transactions as a percent of total waste transactions	sM1.7: Waste Disposal sM2.7: Waste Disposal sM3.8: Waste Disposal
RL.3.58	Yield	The ratio of usable output from a process to its input.	sM1.3: Produce and Test sM1.4: Package sM2.3: Produce and Test sM2.4: Package sM3.4: Produce and Test sM3.5: Package
RL.3.59	Yield Variability	The condition that occurs when the output of a process is not consistently repeatable either in quantity, quality, or combination of these.	sM1.3: Produce and Test sM2.3: Produce and Test sM3.4: Produce and Test

Order Fulfillment Cycle Time

The average actual cycle time consistently achieved to fulfill customer orders. For each individual order, this cycle time starts from the order receipt and ends with customer acceptance of the order.

Qualitative Relationship Description
None Identified
Quantitative Relationship (optional, if calculable)
Order Fulfillment Cycle Time ≈ Source Cycle Time + Make Cycle Time + Deliver Cycle Time
Calculation
[Sum Actual Cycle Times For All Orders Delivered] / [Total Number Of Orders Delivered]
Data Collection
Data for the components that are used to drive the calculation of responsiveness are taken from the Source, Make and Deliver process elements.
Discussion

The order fulfillment cycle time as captured from the moment a customer places the order to the moment the order is fulfilled is considered to be a 'gross' cycle time. It represents all the time passed between these two events, regardless of whether this represented cycle time for the activities performed by the organization to fulfill the order (both value-add and non-value-add) or dwell time because the order was placed well in advance by the customer. As such, this gross order fulfillment cycle time does not truly reflect the responsiveness of the organization. Take for example an organization that needs six days to fulfill a certain customer order. If the customer places the order one day in advance, the gross order fulfillment cycle time will be seven days. If the customer places the order 3 months ahead (pre-ordering), the gross fulfillment cycle time will be 96 days. However, the fact that the customer pre-orders does not reduce the responsiveness of the organization. On the contrary, one can argue that it may increase the ability of the organization to meet that order as it allows the organization to plan ahead and fulfill the order in a more optimal way.

The responsiveness of the organization is determined by the cumulative cycle time for all activities that are required to fulfill the order, but should exclude any dwell time where no activity takes place.

Therefore the definition of Order Fulfillment Cycle Time consists of a 'gross' component and a 'net' component named Order Fulfillment Process Time, according to the following formula: Order Fulfillment Cycle Time = Order Fulfillment Process Time + Order Fulfillment Dwell Time. Note that dwell time will equal 0 for companies who do not utilize this metric, so Order Fulfillment Cycle Time will equal Order Fulfillment Process Time.

Order fulfillment dwell time is defined as '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 the gross order fulfillment cycle time.

RS.1.1

Discussion cont.

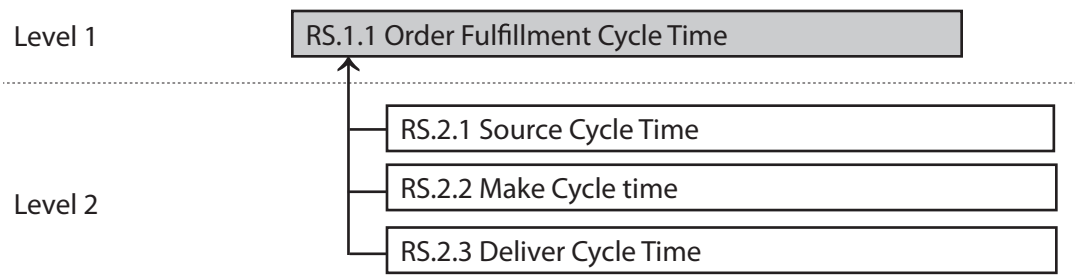
Dwell time is mostly associated with the ordering process, where a customer may place an order in advance to reserve capacity/materials etc, but where the actual steps in the order fulfillment process take place later on. It is also common in the delivery process where the organization may be in principle ready to ship the product/service, but is requested by the customer to wait (for example to follow a certain shipment schedule).

Note that for those organizations where dwell time does not play a role, the dwell time can be taken as zero days which results in the net order fulfillment cycle time to be equal to the gross order fulfillment cycle time.

For benchmarking purposes it is recommended to use the Order Fulfillment Process Time, as this is the cycle time reflecting most accurately the responsiveness of the organization. It will also ensure that those organizations in industries where dwell time is a factor can be benchmarked against organizations in industries where dwell time does not play a role.

The concept of dwell time applies not only to the level 1 metric, but alsoto all lower level metrics. This means that each lower level metric can have a gross component, consisting of the net component and dwell time. Because the lower level metrics are heirarchical (the cumulative sum of cycle times at level 2 or 3 should be equal to the cycle time at level 1.) The cumulative sum of dwell times at level 2 or 3 should total up to the dwell time at level 1.

Hierarchical Metric Structure



Source Cycle Time

The average time associated with Source Processes. (Processes: sS1, sS2, sS3)

Qualitative Relationship Description

None Identified

Quantitative Relationship (optional, if calculable)

Source Cycle Time ≈ (Identify Sources of Supply Cycle Time + Select Supplier and Negotiate Cycle Time) + Schedule Product Deliveries Cycle Time + Receive Product Cycle Time + Verify Product Cycle Time + Transfer Product Cycle Time + Authorize Supplier Payment Cycle Time

Calculation

None Identified

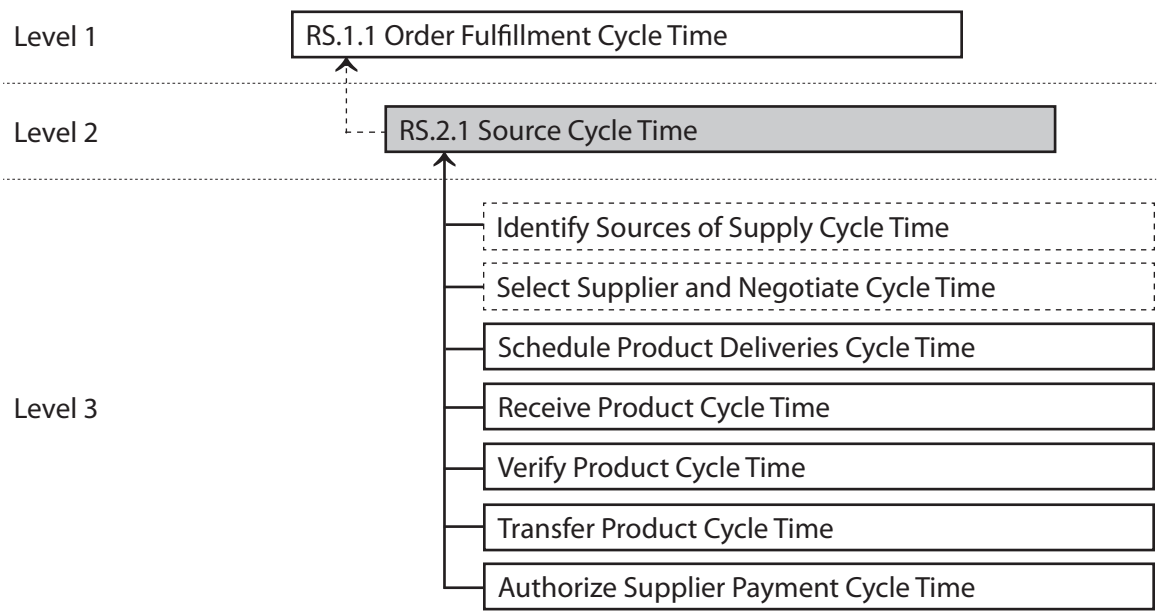
Data Collection

None Identified

Discussion

Metrics in Level 3 that are used to drive the calculation of 'Source Cycle time' are taken from the Source process elements, depending on the possible strategies deployed by companies to fulfill orders such as make-to-stock, make-to-order or engineer-to-order. When make-to-stock or make-to-order strategy is deployed, the dashed optional metrics 'Identify Sources of Supply Cycle Time' and 'Select Supplier and Negotiate Cycle Time' are not used in the calculation.

Hierarchical Metric Structure



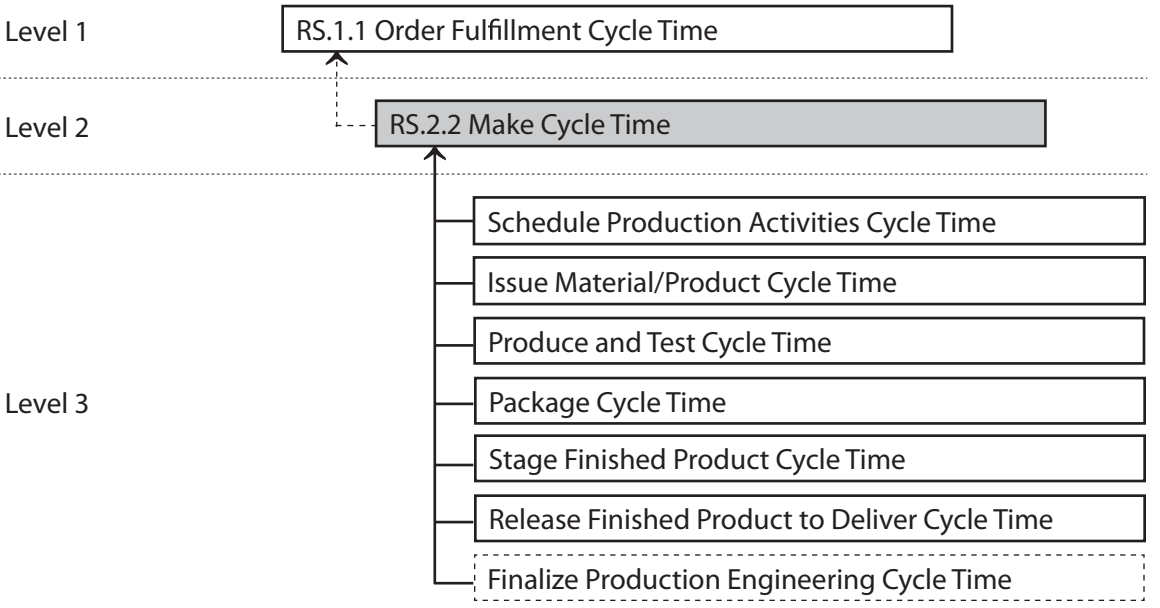
The dashed line boxes represent optional metrics associated with specific level 3 processes.

Make Cycle Time

The average time associated with Make Processes. (Processes: sM1,sM2, sM3)

Qualitative Relationship Description
None Identified
Quantitative Relationship (optional, if calculable)
Make Cycle Time ≈ (Finalize Production Engineering Cycle Time) + Schedule Production Activities Cycle Time + Issue Material/Product Cycle Time + Produce and Test Cycle Time + Package Cycle Time + Stage Finished Product Cycle Time + Release Finished Product To Deliver Cycle Time
Calculation
None Identified
Data Collection
None Identified
Discussion
Metrics in Level 3 that are used to drive the calculation of 'Make Cycle time' are taken from the Make process elements, depending on the possible strategies deployed by companies to fulfill orders such as make-to-stock, make-to-order or engineer-to-order. When make-to-stock or make-to-order strategy is deployed, the dashed optional metric 'Finalize Production Engineering Cycle Time' is not used in the calculation. And also, the data for the calculation of Level 3 metrics may also depends on different make strategies, e.g., when make-to-stock strategy is deployed, the metric 'Issue Material/ Product Cycle Time' means the time for issuing material; while when make-to-order or engineer-to-order is deployed, it will be a measure for calculating the cycle time for issuing sourced or in-process product. In Make Cycle Time, there may be overlaps in the processes, so the "least amount of time" should be applied rather than the total sum.

Hierarchical Metric Structure



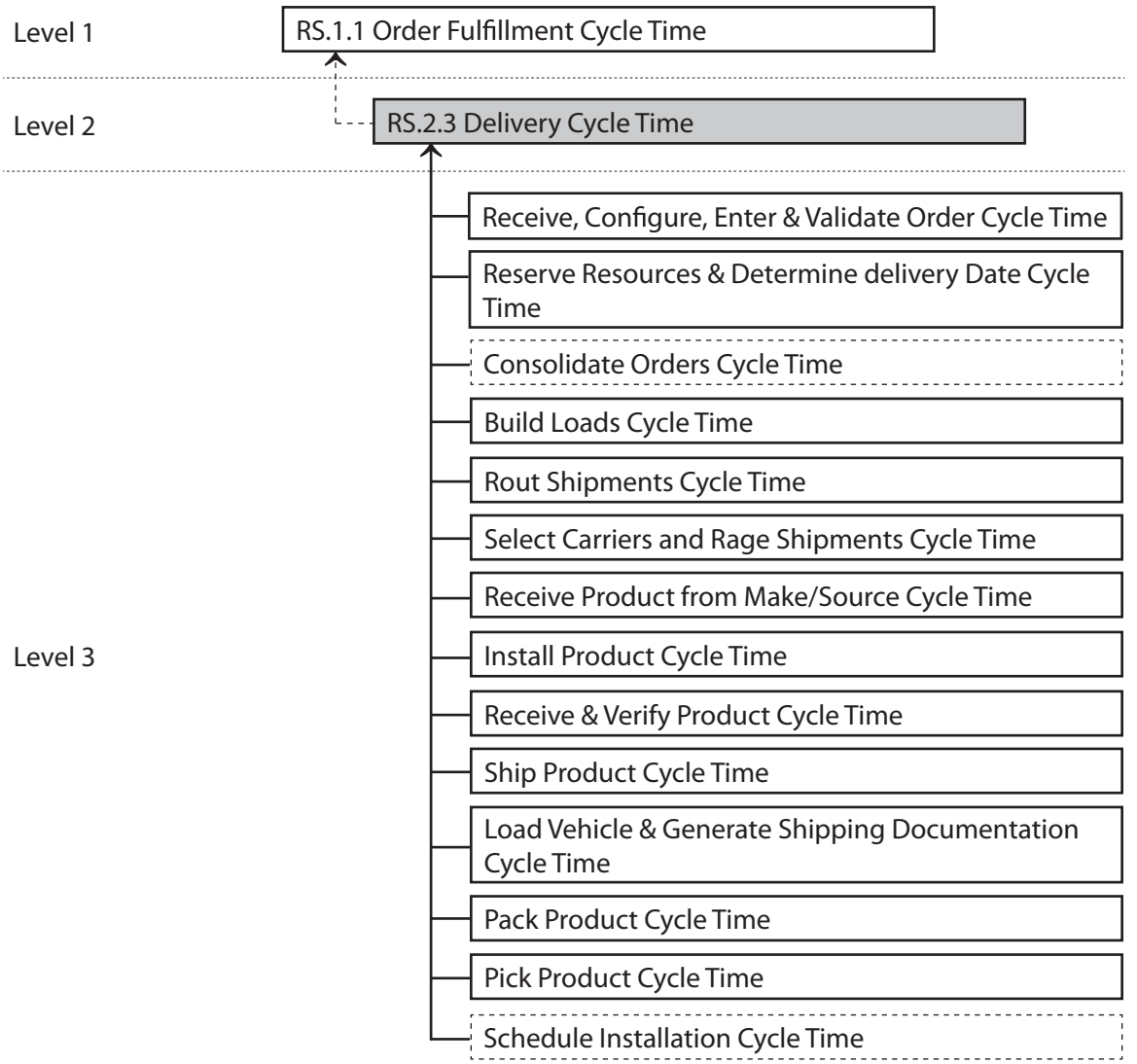
The dashed line boxes represent optional metrics associated with specific level 3 processes.

Delivery Cycle Time

The average time associated with Deliver Processes. (Processes: sD1, sD2, sD3)

Qualitative Relationship Description
None Identified
Quantitative Relationship (optional, if calculable)
Delivery Cycle Time ≈ MAX {[Receive, Configure, Enter and Validate Order Cycle Time + Reserve Resources & Determine Delivery Date Cycle Time + (Consolidate Orders Cycle Time + Schedule Installation Cycle Time) + Build Loads Cycle Time + Route Shipments Cycle Time + Select Carriers and Rate Shipments Cycle Time], Receive Product from Make/Source Cycle Time} + Pick Product Cycle Time + Pack Product Cycle Time + Load Vehicle & Generate Shipping Documentation Cycle Time + Ship Product Cycle Time + (Receive & Verify Product Cycle Time) + (Install Product Cycle Time) *The MAX function above is to indicate that sDx.3-sDx.7 may be in parallel with Dx.8and whichever takes longer should determine the cycle time.
Calculation
None Idetified
Data Collection
None Identified
Discussion
Metrics in Level 3 that are used to drive the calculation of 'Deliver Cycle time' are taken from the Deliver process elements, depending on the possible strategies deployed by companies to fulfill orders such as make-to-stock, make-to-order or engineer-to-order. When make-to-stock or make-to-order strategy is deployed, the optional metric 'Schedule Installation Cycle Time' is not used in the calculation, otherwise the metric 'Consolidate Orders Cycle Time' will not be used. And also, the data for the calculation of Level 3 metrics may also depends on different make strategies, e.g., when make-to-stock strategy is deployed, the metric 'Receive, Configure, Enter and Validate Order Cycle Time' may not include the Configure process.

Hierarchical Metric Structure

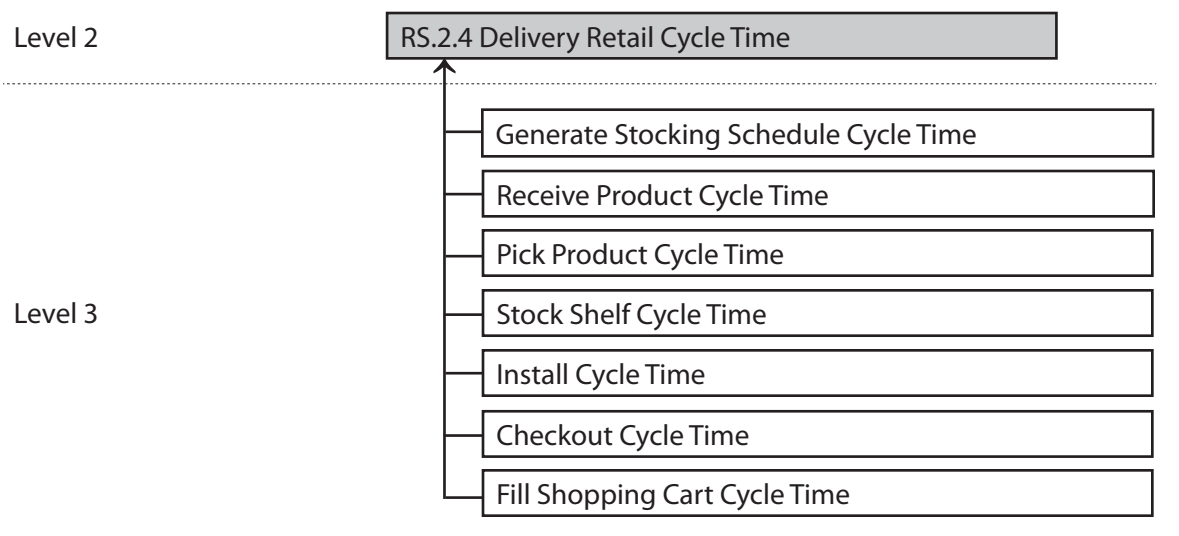


The dashed line boxes represent optional metrics associated with specific level 3 processes.

Delivery Retail Cycle Time

The average cycle time of the processes used to acquire, merchandise, and sell finished goods at a retail store. (Process: sD4)

Qualitative Relationship Description
None Identified
Quantitative Relationship (optional, if calculable)
Delivery Retail Cycle Time ≈ Generate Stocking Schedule Cycle Time + Receive Product Cycle Time + Pick Product Cycle Time + Stock Shelf Cycle Time + Fill Shopping Cart Cycle Time + Checkout Cycle Time + Install Cycle Time
Calculation
None Identified
Data Collection
None Identified
Discussion
None Identified
Hierarchical Metric Structure



Level 3 Responsiveness Metrics

Metric ID	Metric Name	Metric Definition	Process
RS.3.1	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	sEP.10: Align Supply Chain Unit Plan with Financial Plan
RS.3.2	Assess Delivery Performance Cycle Time	The average time associated with assessing the performance of deliver processes.	sED.2: Assess Delivery Performance
RS.3.3	Assess Supplier Performance Cycle Time	The average time associated with assessing the performance of supplier processes.	sES.2: Assess Supplier Performance
RS.3.4	Asset Turns	Total gross product revenue ÷ Total net assets	sM1.4: Package sM2.4: Package sM3.5: Package sM1.3: Produce and Test sM2.3: Produce and Test, sM3.4: Produce and Test
RS.3.5	Authorize Defective Product Return Cycle Time	The average time associated with authorizing the return of defective product.	sDR1.1: Authorize Defective Product Return
RS.3.6	Authorize Excess Product Return Cycle Time	The average time associated with authorizing the return of excess product.	sDR3.1: Authorize Excess Product Return
RS.3.7	Authorize MRO Product Return Cycle Time	The average time associated with authorizing the return of MRO product.	sDR2.1: Authorize MRO Product Return
RS.3.8	Authorize Supplier Payment Cycle Time	The average time associated with authorizing payment to suppliers.	sS1.5: Authorize Supplier Payment sS2.5: Authorize Supplier Payment sS3.7: Authorize Supplier Payment
RS.3.9	Average Days per Engineering Change	# of days each engineering change impacts the delivery date divided by the total # of changes.	sS1.1: Schedule Product Deliveries sS2.1: Schedule Product Deliveries sS3.3: Schedule Product Deliveries
RS.3.10	Average Days per Schedule Change	# of days each schedule change impacts the delivery date divided by the total # of changes.	sS1.1: Schedule Product Deliveries sS2.1: Schedule Product Deliveries sS3.3: Schedule Product Deliveries
RS.3.11	Average Release Cycle of Changes	Cycle time for implementing change notices divided by total number of changes.	sS1.1: Schedule Product Deliveries sS2.1: Schedule Product Deliveries sS3.3: Schedule Product Deliveries
RS.3.12	Balance Product Resources with Product Requirements Cycle Time	The average time associated with balancing product resources and product requirements.	sP2.3: Balance Product Resources with Product Requirements

Metric ID	Metric Name	Metric Definition	Process
RS.3.13	Balance Production Resources with Production Requirements Cycle Time	The average time associated with the identifying, prioritizing, and aggregating product requirements.	sP3.3: Balance Production Resources with Production Requirements
RS.3.14	Balance Return Resources with Return Requirements Cycle Time	The average time associated with balancing return resources and return requirements.	sP5.3: Balance Return Resources with Return Requirements P5.2: Identify, Assess, and Aggregate Return Resources
RS.3.15	Balance Supply Chain Resources with Supply Chain Requirements Cycle Time	The average time associated with balancing supply chain resources and supply chain requirements.	sP1.3: Balance Supply Chain Resources with SC Requirements
RS.3.16	Build Loads Cycle Time	The average time associated with building shipment loads.	sD1.5: Build Loads sD2.5: Build Loads sD3.5: Build Loads
RS.3.17	Checkout Cycle Time	The average time required for customer checkout.	sD4.6: Checkout
RS.3.18	Consolidate Orders Cycle Time	The average time required for customer order consolidation.	sD1.4: Consolidate Orders sD2.4: Consolidate Orders
RS.3.19	Current customer return order cycle time	Current return order cycle time, including customer return order processing cycle time, transit time, return processing and disposition cycle time, etc.	sDR1: Deliver Return Defective Product, sDR2: Deliver Return MRO Product, sDR3: Deliver Return Excess Product
RS.3.20	Current logistics order cycle time	Current logistics order cycle time, including customer order processing cycle time, dock-to-stock cycle time, pick-to-ship cycle, transit time, etc.	sD1: Deliver Stocked Product, D2: Deliver Make-to-Order Product, sD3: Deliver Engineer-to-Order Product
RS.3.21	Current manufacturing order cycle time	Current manufacturing cycle time	sM1: Make-to-Stock, sM2: Make-to-Order, sM3: Engineer-to-Order
RS.3.22	Current supplier return order cycle time	Current supplier return order cycle time, including supplier return order processing cycle time, pick-to-ship cycle time, transit time etc.	sSR1: Source Return Defective Product sSR3: Source Return Excess Product
RS.3.23	Customs Clearance Cycle Time	The average time associated with clearing an order through customs	sED.8: Manage Import/Export Requirements sES.8: Manage Import/Export Requirements
RS.3.24	Deliver and/or Install Cycle Time	The average time required to deliver and install product.	sD4.7: Deliver and/or Install

Metric ID	Metric Name	Metric Definition	Process
RS.3.25	Enter Order, Commit Resources & Launch Program Cycle Time	The average time associated with entering an order, committing resources and program launch	sD3.3: Enter Order, Commit Resources Launch Program
RS.3.26	Establish and Communicate Return Plans Cycle Time	The average time associated with establishing and communicating return plans	sP5.4: Establish and Communicate Return Plans
RS.3.27	Establish Delivery Plans Cycle Time	The average time associated with establishing and communicating deliver plans	sP4.4: Establish Delivery Plans
RS.3.28	Establish Production Plans Cycle Time	The average time associated with establishing and communicating production plans	sP3.4: Establish Production Plans
RS.3.29	Establish Sourcing Plans Cycle Time	The average time associated with establishing and communicating source plans	sP2.4: Establish Sourcing Plans
RS.3.30	Establish Supply Chain Plans Cycle Time	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.	sP1.4: Establish & Communicate Supply-Chain Plans
RS.3.31	External Event Response (average days)	The average response time (in days) to an external risk event from the time of the event (included detection lags)	sEP.9: Manage Supply Chain Plan Risk sES.9: Manage Supply Chain Source Risk sEM.9: Manage Supply Chain Make Risk sED.9: Manage Supply Chain Deliver Risk sER.9: Manage Supply Chain Return Risk
RS.3.32	Fill Shopping Cart Cycle Time	The average time associated with "filling the shopping cart"	sD4.5: Fill Shopping Cart
RS.3.33	Finalize Production Engineering Cycle Time	The average time associated with the finalization of production engineering	sM3.1: Finalize Production Engineering
RS.3.34	Generate Stocking Schedule Cycle Time	The average time associated with the generating a stocking schedule	sD4.1: Generate Stocking Schedule

Metric ID	Metric Name	Metric Definition	Process
RS.3.35	Identify Sources of Supply Cycle Time	The average time associated with the identification of sources of supply	sS3.1: Identify Sources of Supply
RS.3.36	Identify, Assess and Aggregate Production Resources Cycle Time	The average time associated with the identifying, prioritizing, and aggregating product requirements.	sP3.2: Identify, Assess and Aggregate Production Resources
RS.3.37	Identify, Assess, and Aggregate Delivery Resources Cycle Time	The average time associated with the identifying, assessing, and aggregating delivery resource availability	sP4.2: Identify, Assess and Aggregate Delivery Resources sP4.3: Balance Delivery Resources and Capabilities with Delivery Requirements
RS.3.38	Identify, Assess, and Aggregate Product Resources Cycle Time	The average time associated with the identifying, assessing, and aggregating product resource availability	sP3.2: Identify, Assess and Aggregate Production Resources sP2.2: Identify, Assess and Aggregate Product Resources
RS.3.39	Identify, Assess, and Aggregate Supply Chain Resources Cycle Time	The average time associated with the identifying, assessing, and aggregating supply chain resource availability	sP1.2: Identify, Prioritize and Aggregate SC Resources
RS.3.40	Identify, Prioritize, and Aggregate Delivery Requirements Cycle Time	The average time associated with the identifying, prioritizing, and aggregating delivery requirements	sP4.1: Identify, Prioritize and Aggregate Delivery Requirements
RS.3.41	Identify, Prioritize, and Aggregate Product Requirements Cycle Time	The average time associated with the identifying, prioritizing, and aggregating product requirements	sP2.1: Identify, Prioritize and Aggregate Product Requirements
RS.3.42	Identify, Prioritize, and Aggregate Production Requirements Cycle Time	The average time associated with the identifying, prioritizing, and aggregating production requirements	sP3.1: Identify, Prioritize and Aggregate Production Requirements
RS.3.43	Identify, Prioritize, and Aggregate Return Requirements Cycle Time	The average time associated with the identifying, prioritizing, and aggregating return requirements	sP5.1: Assess and Aggregate Return Requirements

Metric ID	Metric Name	Metric Definition	Process
RS.3.44	Identify, Prioritize, and Aggregate Supply Chain Requirements Cycle Time	The average time associated with the identifying, prioritizing, and aggregating supply chain requirements	sP1.1: Identify, Prioritize and Aggregate SC Requirements
RS.3.46	Install Product Cycle Time	The average time associated with product installation	sD1.14: Install Product sD2.14: Install Product sD3.14: Install Product
RS.3.47	In-stock %	Percentage of materials, components, or finished goods that are there when needed.	sD4.4: Stock Shelf
RS.3.48	Invoice Cycle Time	The average time associated with the generation and issuance of an invoice	sD1.15: Invoice sD3.15: Invoice
RS.3.49	Issue Material Cycle Time	The average time associated with the issuance of material to production	sM1.2: Issue Material
RS.3.50	Issue Sourced/In-Process Product Cycle Time	The average time associated with the issuance of material to production	sM2.2: Issue Sourced/In-Process Product sM3.3: Issue Sourced/In-Process Product
RS.3.51	Load Product & Generate Shipping Documentation Cycle Time	The average time associated with product loading and the generation of shipping documentation	sD1.11: Load Vehicle & Generate Shipping Documentation sD2.11: Load Product & Generate Shipping Documentation sD3.11: Load Product & Generate Shipping Documents
RS.3.53	Maintain Source Data Cycle Time	The average time associated with maintaining source data	sES.3: Maintain Source Data
RS.3.54	Manage Business Rules for PLAN Processes Cycle Time	The average time associated with managing plan business rules	sEP.1: Manage Business Rules for Plan Processes
RS.3.55	Manage Business Rules for Return Processes Cycle Time	The average time associated with managing rules for returns	sER.1: Manage Business Rules for Return Processes
RS.3.56	Manage Capital Assets Cycle Time	The average time associated with managing capital assets	sES.5: Manage Capital Assets
RS.3.57	Manage Deliver Business Rules Cycle Time	The average time associated with managing deliver business rules	sED.1: Manage Deliver Business Rules

Metric ID	Metric Name	Metric Definition	Process
RS.3.58	Manage Deliver Capital Assets Cycle Time	The average time associated with managing deliver capital assets	sED.5: Manage Deliver Capital Assets
RS.3.59	Manage Deliver Information Cycle Time	The average time associated with managing deliver information	sED.3: Manage Deliver Information
RS.3.60	Manage Finished Goods Inventories Cycle Time	The average time associated with managing finished good inventory	sED.4: Manage Finished Goods Inventories
RS.3.61	Manage Import/Export Requirements Cycle Time	The average time associated with managing import/export requirements	sED.8: Manage Import/Export Requirements sES.8: Manage Import/Export Requirements
RS.3.62	Manage Incoming Product Cycle Time	The average time associated with managing inbound raw material	sES.6: Manage Incoming Product
RS.3.63	Manage In-Process Products (WIP) Cycle Time	The average time associated with managing WIP inventory	sEM.4: Manage In-Process Products (WIP)
RS.3.64	Manage Integrated Supply Chain Capital Assets Cycle Time	The average time associated with managing integrated supply chain capital assets	sEP.5: Manage Integrated Supply Chain Capital Assets
RS.3.65	Manage Integrated Supply Chain Inventory Cycle Time	The average time associated with managing integrated supply chain inventory	sEP.4: Manage Integrated Supply Chain Inventory
RS.3.66	Manage Integrated Supply Chain Transportation Cycle Time	The average time associated with managing integrated supply chain transportation	sEP.6: Manage Integrated Supply Chain Transportation
RS.3.67	Manage MAKE Equipment and Facilities Cycle Time	The average time associated with managing production equipment and facilities	sEM.5: Manage Make Equipment and Facilities
RS.3.68	Manage MAKE Information Cycle Time	The average time associated with managing production information	sEM.3: Manage Make Information
RS.3.69	Manage MAKE Regulatory Compliance Cycle Time	The average time associated with managing compliance to the make regulatory environment	sEM.8: Manage Make Regulatory Environment

Metric ID	Metric Name	Metric Definition	Process
RS.3.70	Manage Performance of Return Processes Cycle Time	The average time associated with managing the performance of supply chain activities	sER.2: Manage Performance of Return Processes
RS.3.71	Manage Performance of Supply Chain Cycle Time	The average time associated with managing the performance of return activities	sEP.2: Manage Performance of Supply Chain
RS.3.72	Manage PLAN Data Collection Cycle Time	The average time associated with collecting plan data	sEP.3: Manage Plan Data Collection
RS.3.73	Manage Plan Regulatory Requirements and Compliance Cycle Time	The average time associated with managing the planning of regulatory requirements and compliance	sEP.8: Manage Plan Regulatory Requirements and Compliance
RS.3.74	Manage Planning Configuration Cycle Time	The average time associated with managing the planning of the supply chain configuration	sEP.7: Manage Planning Configuration
RS.3.75	Manage Product Inventory Cycle Time	The average time associated with managing raw material inventory	sES.4: Manage Product Inventory
RS.3.76	Manage Product Life Cycle Time	The average time associated with managing the product life cycle	sED.7: Manage Product Life Cycle
RS.3.77	Manage Production Network Cycle Time	The average time associated with managing the production network	sEM.7: Manage Production Network
RS.3.78	Manage Production Performance Cycle Time	The average time associated with managing production performance	sEM.2: Manage Production Performance
RS.3.79	Manage Production Rules Cycle Time	The average time associated with managing production rules	sEM.1: Manage Production Rules
RS.3.80	Manage Return Capital Assets Cycle Time	The average time associated with managing return capital assets	sEM.5: Manage Return CapitalAssets
RS.3.81	Manage Return Data Collection Cycle Time	The average time associated with managing return data collection	sER.3: Manage Return Data Collection
RS.3.82	Manage Return Inventory Cycle Time	The average time associated with managing return inventory	sER.4: Manage Return Inventory

Metric ID	Metric Name	Metric Definition	Process
RS.3.83	Manage Return Network Configuration Cycle Time	The average time associated with managing the return network configuration	sER.7: Manage Return Network Configuration
RS.3.84	Manage Return Regulatory Requirements and Compliance Cycle Time	The average time associated with compliance and regulatory requirements for return products	sER.7: Manage Return Network Configuration
RS.3.85	Manage Return Transportation Cycle Time	The average time associated with managing return transportation	sER.6: Manage Return Transportation
RS.3.86	Manage Sourcing Business Rules Cycle Time	The average time associated with managing source business rules	sES.1: Manage Sourcing Business Rules
RS.3.87	Manage Supplier Agreements Cycle Time	The average time associated with managing supplier agreements	sES.10: Manage Supplier Agreements
RS.3.88	Manage Supplier Network Cycle Time	The average time associated with managing the supplier network	sES.7: Manage Supplier Network
RS.3.89	Manage Transportation (WIP) Cycle Time	The average time associated with managing (WIP) transportation	sEM.6: Manage Transportation (WIP)
RS.3.90	Manage Transportation Cycle Time	The average time associated with managing transportation	sED.6: Manage Transportation
RS.3.91	Manufacturing cycle time reestablished and sustained for 30 days	The average time associated with managing transportation	sEM.5: Manage Make Equipment and Facilities sEM.6: Manage Make Transportation sEM.7: Manage Make Network
RS.3.92	Negotiate & Receive Contract Cycle Time	The average time associated with negotiating and receiving a contract	sD3.2: Negotiate and Receive Contract
RS.3.93	Obtain & Respond to Request for Quote (RFQ) / Request for Proposal (RFP) Cycle Time	The average time associated with obtaining and responding to RFQs/RFPs	sD3.1: Obtain and Respond to RFP/ RFQ

Metric ID	Metric Name	Metric Definition	Process
RS.3.94	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.	sD1.2: Receive, Enter and Validate Order sD1.3: Reserve Inventory and Determine Delivery Date sD2.2: Receive, Configure, Enter and Validate Order sD2.3: Reserve Inventory and Determine Delivery Date sD3.3: Enter Order, Commit Resources Launch Program
RS.3.95	Pack Product Cycle Time	The average time associated with packing a product for shipment.	sD1.10: Pack Product sD2.10: Pack Product sD3.10: Pack Product
RS.3.96	Pick Product Cycle Time	The average time associated with product pick	sD1.9: Pick Product sD2.9: Pick Product sD3.9: Pick Product
RS.3.97	Pick Product from Backroom Cycle Time	The average time associated with product pick from backroom	sD4.3: Pick Product from Backroom
RS.3.98	Plan Cycle Time	The average time associated with Plan Processes	sP1: Plan Supply Chain
RS.3.99	Plan Source Cycle Time	The average time associated with planning source activities	sP2: Plan Source
RS.3.100	Process Inquiry & Quote Cycle Time	The average time associated with processing inquiries and quotes	sD1.1: Process Inquiry and Quote sD2.1: Process Inquiry and Quote
RS.3.101	Produce and Test Cycle Time	The average time associated with production and test	sM1.3: Produce and Test sM2.3: Produce and Test sM3.4: Produce and Test
RS.3.102	Receive & Verify Product by Customer Cycle Time	The average time associated with receiving and verifying an order at the customer site	sD1.13: Receive and Verify Product by Customer sD2.13: Receive and Verify Product by Customer sD3.13: Receive and Verify Product by Customer
RS.3.104	Receive Defective Product Cycle Time	The average time associated with receiving defective product returns from the customer	sDR1.3: Receive Defective Product

Metric ID	Metric Name	Metric Definition	Process
RS.3.105	Receive Excess Product Cycle Time	The average time associated with receiving excess product returns from the customer	sDR3.3: Receive Excess Product
RS.3.106	Receive MRO Product Cycle Time	The average time associated with receiving MRO product returns from the customer	sDR2.3: Receive MRO Product
RS.3.107	Receive Product Cycle Time	The average time associated with receiving product	sD4.2: Receive Product at the Store
RS.3.108	Receive Product from Make/ Source Cycle Time	The average time associated with receiving product from Make/Source	sD1.8: Receive Product from Source or Make sD2.8: Receive Product from Source or Make sD3.8: Receive Product from Source or Make
RS.3.109	Receive Product at Store Cycle Time	The average time associated with receiving product at the customer store	sD4.2: Receive Product at the Store
RS.3.110	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	sD1.8: Receive Product from Source or Make sD2.8: Receive Product from Source or Make sD3.8: Receive Product from Source or Make
RS.3.111	Receive, Configure, Enter & Validate Order Cycle Time	The average time associated with receiving and verifying an order at the customer site	sD2.2: Receive, Configure, Enter and Validate Order
RS.3.112	Receive, Enter & Validate Order Cycle Time	The average time associated with receiving and verifying an order at the customer site	sD1.2: Receive, Enter and Validate Order
RS.3.113	Receiving Product Cycle Time	Total elapsed time from time product is received to time it is passed to next process	sS1.2: Receive Product sS2.2: Receive Product sS3.4: Receive Product
RS.3.114	Release Finished Product to Deliver Cycle Time	The average time associated with releasing finished product to deliver	sM1.6: Release Product to Deliver sM2.6: Release Finished Product to Deliver sM3.7: Release Product to Deliver
RS.3.115	Reserve Inventory & Determine Delivery Date Cycle Time	The average time associated with reserving inventory and determining a delivery date	sD2.3: Reserve Inventory and Determine Delivery Date

Metric ID	Metric Name	Metric Definition	Process
RS.3.116	Reserve Resources and Determine Delivery Date Cycle Time	The average time associated with reserving resources and determining a delivery date	sD1.3: Reserve Inventory and Determine Delivery Date sD2.3: Reserve Inventory and Determine Delivery Date
RS.3.117	Route Shipments Cycle Time	The average time associated with routing shipments	sD1.6: Route Shipments sD2.6: Route Shipments sD3.6: Route Shipments
RS.3.118	Schedule Defective Return Receipt Cycle Time	The average time associated with scheduling the receipt of the return of defective product	sDR1.2: Schedule Defective Return Receipt
RS.3.119	Schedule Excess Return Receipt Cycle Time	The average time associated with scheduling the receipt of the return of excess product	sDR3.2: Schedule Excess Return Receipt
RS.3.120	Schedule Installation Cycle Time	The average time associated with scheduling the installation of product	sD3.4: Schedule Installation
RS.3.121	Schedule MRO Return Receipt Cycle Time	The average time associated with scheduling the receipt of the return of MRO product	sDR2.2: Schedule MRO Return Receipt
RS.3.122	Schedule Product Deliveries Cycle Time	The average time associated with scheduling the shipment of the return of MRO product	sS1.1: Schedule Product Deliveries sS2.1: Schedule Product Deliveries sS3.3: Schedule Product Deliveries
RS.3.123	Schedule Production Activities Cycle Time	The average time associated with scheduling production activities	sM1.1: Schedule Production Activities sM2.1: Schedule Production Activities sM3.2: Schedule Production Activities
RS.3.124	Select Carriers & Rate Shipments Cycle Time	The average time associated with selecting carriers and rating shipments	sD1.7: Select Carriers and Rate Shipments sD1.7: Select Carriers and Rate Shipments sD3.7: Select Carriers & Rate Shipments
RS.3.125	Select Supplier and Negotiate Cycle Time	The average time associated with selecting a suppliler and negotiating	sS3.2: Select Final Supplier(s) and Negotiate
RS.3.126	Ship Product Cycle Time	The average time associated with shipping product	sD1.12: Ship Product sD2.12: Ship Product sD3.12: Ship Product
RS.3.127	Source Return Cycle Time	Average time associated with Sourcing Return	sSR1: Source Return Defective Product sSR3: Source Return Excess Product

Metric ID	Metric Name	Metric Definition	Process
RS.3.128	Stage Finished Product Cycle Time	The average time associated with staging finished product	sM1.5: Stage Product sM2.5: Stage Finished Product sM3.6: Stage Finished Product
RS.3.129	Stock Shelf Cycle Time	The average time associate with stocking shelves	sD4.4: Stock Shelf
RS.3.130	Supply chain down time due to compliance issues	Time the supply chain is disrupted by environmental compliance issues divided by the total potential available time	sEP.8: Manage Plan Regulatory Requirements and Compliance, sES.8: Manage Import/Export Requirements sEM.8: Manage Make Regulatory Environment sED.8: Manage Import/Export Requirements sER.8: Manage Return Regulatory Requirements and Compliance
RS.3.131	Time to reach and sustain current customer return order cycle time	Amount of time needed to reach and sustain current customer return order cycle time, including customer return order processing cycle time, transit time, return processing and disposition cycle time, etc.	sER.5: Manage Return Capital Assets sER.6: Manage Return Transportation sER.7: Manage Return Network Configuration
RS.3.133	Time to reach and sustain current manufacturing order cycle time	Amount of time needed to reach and sustain current manufacturing cycle time	sEM.5: Manage Make Equipment and Facilities sEM.6: Manage Make Transportation sEM.7: Manage Make Network
RS.3.134	Time to reach and sustain current purchase order cycle time	Amount of time needed to reach and sustain current procurement cycle time, including time to place a purchase order and supplier lead time	sES.5: Manage Source Capital Assets sES.6: Manage Incoming Product sES.7: Manage Supplier Network sES.10: Manage Supplier Agreements
RS.3.135	Time to reach and sustain current supplier return order cycle time	Amount of time needed to reach and sustain current supplier return order cycle time, including supplier return order processing cycle time, pick-to-ship cycle time, transit time, etc.	sES.5: Manage Source Capital Assets sES.6: Manage Incoming Product sES.7: Manage Supplier Network sES.10: Manage Supplier Agreements
RS.3.136	Transfer Defective Product Cycle Time	The average time associated transfer until product is moved to the next process.	sDR1.4: Transfer Defective Product

Metric ID	Metric Name	Metric Definition	Process
RS.3.137	Transfer Excess Product Cycle Time	The average time associated transfer until product is moved to the next process.	sDR3.4: Transfer Excess Product
RS.3.138	Transfer MRO Product Cycle Time	The average time associated transfer until product is moved to the next process.	sDR2.4: Transfer MRO Product
RS.3.139	Transfer Product Cycle Time	The average time associated transfer until product is moved to the next process.	sS1.4: Transfer Product sS2.4: Transfer Product sS3.6: Transfer Product
RS.3.140	Verify Product Cycle Time	The average time associated with verifying raw material product	sS1.3: Verify Product sS2.3: Verify Product sS3.5: Verify Product
RS.3.141	Waste accumulation time	The time required to collect and properly store production waste	sM1.7: Waste Disposal sM2.7: Waste Disposal sM3.8: Waste Disposal
RS.3.142	Package Cycle Time	The average time associated with Package	sM1.4: Package

Upside Supply Chain Flexibility

The number of days required to achieve an unplanned sustainable 20% increase in quantities delivered.
Note - 20% is a number provided for benchmarking purposes. For some industries and some organizations 20% may be in some cases unobtainable or in others too conservative. The new operating level needs to be achieved without a significant increase of cost per unit. Component metrics (Upside Source Flexibility, Upside Make Flexibility, etc) can be improved in parallel and as a result, this calculation requires the result to be the least amount of time to achieve the desired result).

Qualitative Relationship Description

Calculation: Total elapsed days between the occurrence of the unplanned event and the achievement of sustained plan, source, make, deliver and return performance.
Note: Elapsed days are not necessarily the sum of days required for all activities as some may occur simultaneously.

AG.2.1 Upside Source Flexibility: The number of days required to achieve an unplanned sustainable 20% increase in quantity of raw materials.

AG.2.2 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.

AG.2.3 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.

AG.2.4 Upside Source Return Flexibility: The number of days required to achieve an unplanned sustainable 20% increase in the return of raw materials to suppliers.

AG.2.5 Upside Deliver Return Flexibility: The number of days required to achieve an unplanned sustainable 20% increase in the return of finished goods from customers.

Quantitative Relationship (optional, if calculable)

None Identified

Calculation

The calculation of supply chain flexibility requires the calculation to be the least time required to achieve the unplanned sustainable increase when considering Source, Make, and Deliver components.
For example, if it requires 90 days achieve a 20% increase in raw material volume, 60 days for adding capital to support production, and no time to increase the ability to deliver, upside supply chain flexibility would be 90 days (if production changes can run concurrently with material acquisition activities) or as much as 150 days if production changes and material acquisition changes must run sequentially.

AG.1.1

Data Collection

Data for the components that are used to drive the calculation of supply chain flexibility are taken from the actual planning activities incurred in devising the actions to be taken and the execution activities themselves. Neither the complete set of activities nor any given subset of those activities can be identified except in either contingency plans (in which case they are hypothetical), special analytical simulations conducted for the purpose of predicting total elapsed time, or after the fact (when they have actually occurred and are unlikely to reoccur in the same combination). Flexibility measures are assumption based or based on historic events.

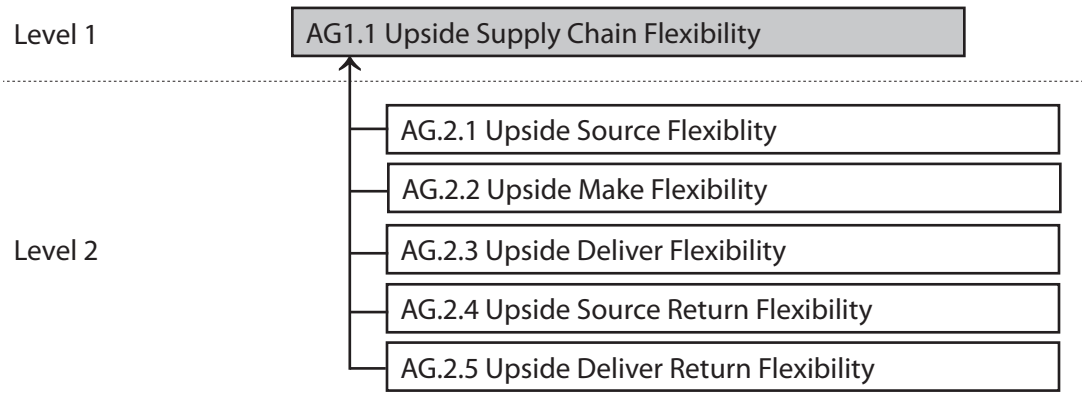
Discussion

Certainly enterprises deal with change all the time. In most cases, these changes are minor deviations from the "norm" or fleeting "blips" in the marketplace. Also, certainly, most supply chains move through these changes almost effortlessly and, in this regard, demonstrate equivalent flexibility. In many extreme cases, however, it is possible that a particular supply chain has reached a condition of relative rigidity (say, at capacity or rigid, constraining agreements with partners) and a seemingly minor increase in production requirement can consume much time and effort as the supply chain struggles to restore its capability to perform.

It is evidenced that enterprises engaged in appropriate business risk and competitive contingency planning activities will usually be in a better position to optimize overall supply chain performance and these activities are presented as best practices later in this document.

When change is known in advance (such as Wal-Mart requiring RFID devices on all delivered cases, or a major sourcing change is planned to occur), and is incorporated in the enterprise's operating plan, then the time incurred to undertake the adaptation isn't necessarily a reflection of the supply chain's flexibility. While flexibility is still addressed, it is frequently clouded by other considerations in the operating plan. Unplanned change is the primary consideration in measuring the supply chain's flexibility.

Hierarchical Metric Structure



Upside Supply Chain Adaptability

The maximum sustainable percentage increase in quantity delivered that can be achieved in 30 days.

Note: 30 days is an arbitrary number provided for benchmarking purposes. For some industries and some organizations 30 days may be in some cases unobtainable or in others too conservative.

Note: Component metrics (Upside Source Adaptability, Upside Make Adaptability, etc) can be improved in parallel and as a result, this calculation requires the result to be the least increase in quantity sustainable in 30 days. The new operating level needs to be achieved without a significant increase in cost per unit.

Qualitative Relationship Description

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

AG.2.6 Upside Source Adaptability: The maximum sustainable percentage increase in raw material quantities that can be acquired/received in 30 days.

AG.2.7 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.

AG.2.8 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.

AG.2.9 Upside Source Return Adaptability: The maximum sustainable percentage increase in returns of raw materials to suppliers that can be achieved in 30 days with the assumption of unconstrained finished goods availability.

AG.2.10 Upside Deliver Return Adaptability: The maximum sustainable percentage increase in returns of finished goods from customers that can be achieved in 30 days.

Quantitative Relationship (optional, if calculable)

Upside Source Adaptability + Upside Make Adaptability + Upside Deliver Adaptability

Calculation

Supply chain adaptability is the least quantity sustainable when considering Source, Make, Deliver and Return components.

Data Collection

Adaptability measures are assumption based or based on historic events. Some elements can be measured and taken as a basis for further considerations. Adaptability measures are based on the actual number of returns compared to the maximum number of returns which can be achieved within 30 days. The weakest component determines the overall volume.

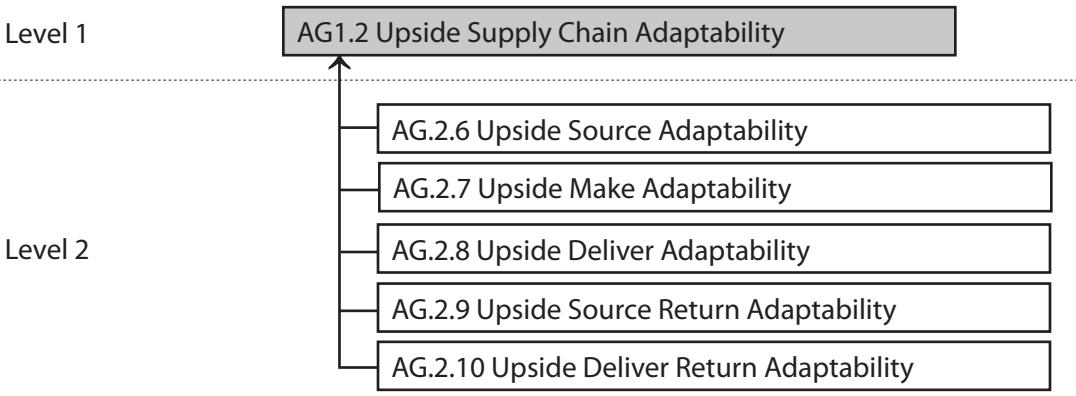
AG.1.2

Discussion

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

- P&L Impact
  - ⇨ Revenue
  - ⇨ COGS
  - ⇨ SGA
- Balance Sheet Impact
  - ⇨ Inventory

Hierarchical Metric Structure



Downside Supply Chain Adaptability

The reduction in quantities ordered sustainable at 30 days prior to delivery with no inventory or cost penalties.
Note: 30 days is an arbitrary number provided for benchmarking purposes. For some industries and some organizations 30 days may be in some cases unobtainable or in others too conservative.

Qualitative Relationship Description

The calculation of downside supply chain adaptability requires the calculation to be based on the least reduction sustainable when considering Source, Make, and Deliver components.

AG.2.11 Downside Source Adaptability: The raw material quantity reduction sustainable at 30 days prior to delivery with no inventory or cost penalties.

AG.2.12 Downside Make Adaptability: The production reduction sustainable at 30 days prior to delivery with no inventory or cost penalties.

AG.2.13 Downside Deliver Adaptability: The reduction in delivered quantities sustainable at 30 days prior to delivery with no inventory or cost penalties.

Quantitative Relationship (optional, if calculable)

Downside Source Adaptability + Downside Make Adaptability + Downside Deliver Adaptability

Calculation

None Identified

Data Collection

Adaptability measures are assumption based on historic events. Some elements can be measured and taken as a basis for further considerations.

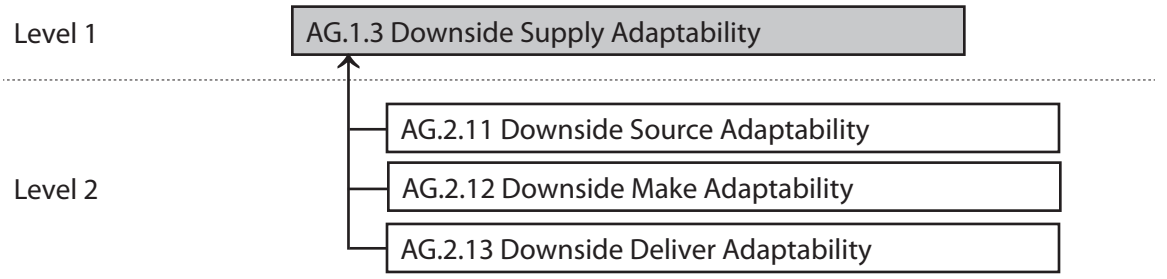
Discussion

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

- P&L Impact
  - ⇨ Revenue
  - ⇨ COGS
  - ⇨ SGA
- Balance Sheet Impact
  - ⇨ Inventory

AG.1.3

Hierarchical Metric Structure



Supply Chain Value at Risk (VAR)

Value at Risk – the sum of the probability of risk events times the monetary impact of the events for all the supply chain functions (e.g. Plan, Source, Make, Deliver and Return). (Processes: sEP.9, sES.9, sEM.9, sED.9, sER.9).

Qualitative Relationship Description

Value at Risk – the sum of the probability of risk events times the monetary impact of the events for all the supply chain functions (e.g. Plan, Source, Make, Deliver and Return).

Quantitative Relationship (optional, if calculable)

Supply Chain Risk VAR ($) = Sum of Supply Chain VAR $ (Plan + Source + Make + Deliver + Return)

Calculation

Supply Chain Risk VAR ($) = VAR $ (Plan) + VAR $ (Source) + VAR $ (Make) + VAR $ (Deliver) + VAR $ (Return)

Data Collection

The VaR calculation uses historical data on the specific event (on time delivery, quality, disruptions, failures, etc) to calculate the number of times the event performed below the target (probability) times the amount below the target. For disruptions, VaR would use estimated frequency based upon expert resources times the impact of the event.

Discussion

VaR can be used in the supply chain to evaluate the different aspects of risk. Suppliers can be evaluated base upon the VaR of performance measures. Customers can also be measured based upon performance measures (profitability, volume growth, returns, and complaints) as well as products (warranty claims, etc.). VaR can also be applied to internal supply chain entities such as manufacturing, distribution or sales locations.

Since VaR can be monitarized by accessing the cost of performance below target, VaR can be rolled up and examined by any demographic or data cut (by region, by customer, by supplier, etc.). Suppliers can be evaluated based upon VaR and ranked according to the risk of poor performance.

Caveats in using VaR :

VaR calculates the probability of non-adherence to metrics value (expected value) based on historical data. Hence, it is a retrospective view of the event risk. The same may or may not be applicable in the future.
VaR is a downside Risk Metrics. It calculates maximum loss for each level of confidence (probability). In a real life scenario, it is likely that the losses would be less than calculated using VaR.
Calculating VaR from historical data requires a large database of events and metrics, and it could be computationally intensive.

AG.1.4

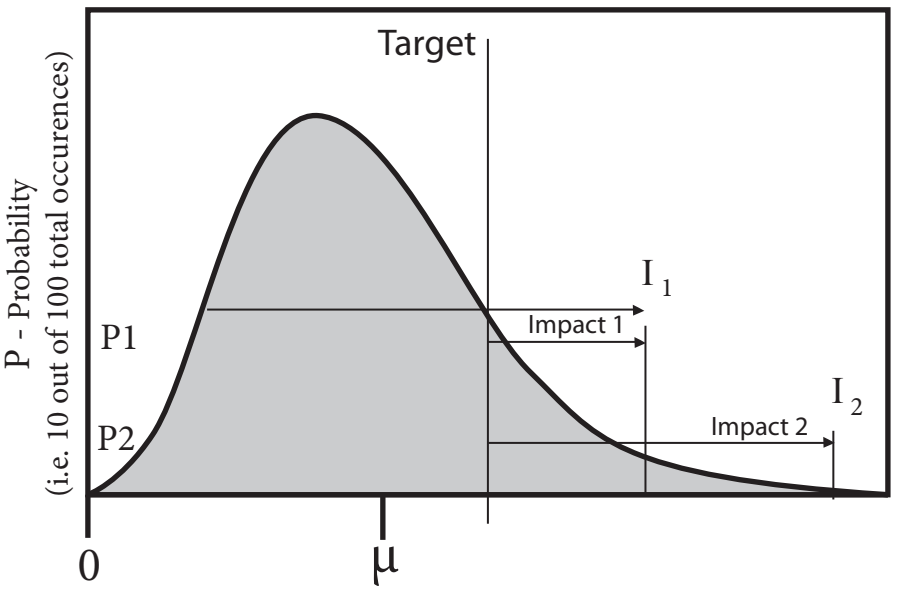
Hierarchical Metric Structure

Level 1

AG.1.4 Value At Risk (VAR $, % of Sales)

Level 2

- Value at Risk (VAR $) (Plan)
- Value at Risk (VAR $) (Make)
- Value at Risk (VAR $) (Return)
- Value at Risk (VAR $) (Deliver)
- Value at Risk (VAR $) (Source)



Upside Source Flexibility

The number of days required to achieve an unplanned sustainable 20% increase in quantity of raw materials.

Note: This is a planning activity normally considering constraints to increase delivery that results in an estimate. Possible constraint factors are included in this section.

Qualitative Relationship Description
Least time to pursue all necessary activities.
Quantitative Relationship (optional, if calculable)
None Identified
Calculation
None Identified
Data Collection
None Identified

Discussion

Source: Input

Current elements needed to fully understand future requirements, to establish 20% gap, based on the question "How long will it take for the company to sustain a 20% increase in quantities sourced?". These elements are mainly output metrics from other attributes . . . responsiveness, reliability, cost, asset management.

Demand

- Current source volumes
  - ⇨ Amount of each item purchased

Staffing

- Staff needed to meet current demand
  - ⇨ Productivity-purchase orders per FTE
  - ⇨ Needed, but may be underutilized

Capital

- Current capital requirements
  - ⇨ Credit line
  - ⇨ Cash on hand
  - ⇨ Accounting procedures

Materials

- All else equal in make, deliver, return, current inventory on hand (raw material and purchased finished goods), including safety stock required to sustain current order fulfillment.
  - ⇨ Assuming optimized inventory practices (no excess inventory)
- Current sourcing/supplier constraints
  - ⇨ Current contract terms.
  - ⇨ Nature of items; commodity/sole source.

Discussion cont.

Cycle Time

- Current procurement cycle time
  - ⇨ Time to place a purchase order

Supplier lead time

Source: Resource Availability Assessment & Ramp-up/Lead Time

Elements needed to establish 20% delta in resources and what is required to meet the 20% delta based on the question "How long will it take for the company to sustain a 20% increase in quantities sourced?"

Demand

- Additional source volume

Staffing

- Staff availability in procurement (underutilized FTE's)
- Amount of time needed to recruit/hire/train additional staff to fill gap between underutilized FTE's and staff needed to sustain 20% increase in quantities delivered

Capital

- Current capital availability
  - ⇨ Credit line
  - ⇨ Cash on hand
  - ⇨ Accounting procedures
- Amount of time needed to obtain capital to fill gap between current capital availability and capital needed to sustain 20% increase in quantities ordered

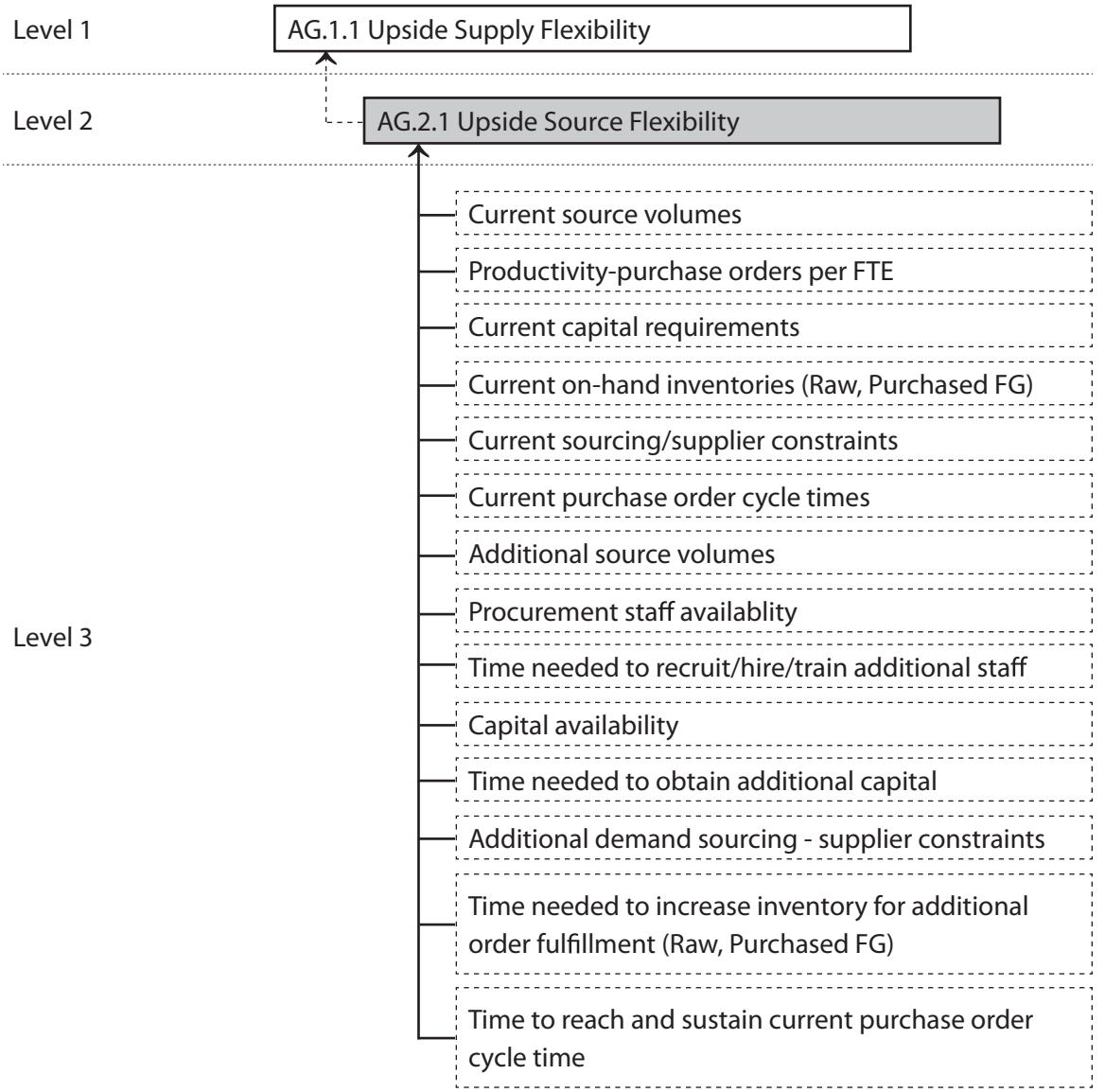
Materials

- Sourcing Constraints
  - ⇨ Time required in negotiating new source/volume contracts/terms
  - ⇨ Time required to find/obtain additional sources
- All else equal in make, deliver, return, amount of time needed to obtain, deliver and phase in inventory (raw material and purchased finished goods) for order fulfillment, including safety stock to sustain 20% increase in quantities sourced.

Cycle Time

- Amount of time needed to reach and sustain current procurement cycle time
  - ⇨ Time to place a purchase order
  - ⇨ Supplier lead time

Hierarchical Metric Structure



The dashed line boxes represent optional metrics associated with specific level 3 processes.

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.
Note: This is a planning activity normally considering constraints to increase delivery that results in an estimate.

Qualitative Relationship Description
Least time to pursue all necessary activities.
Quantitative Relationship (optional, if calculable)
None Identified
Calculation
None Identified
Data Collection
None Identified
Discussion

Make: Input

Current elements needed to fully understand future requirements, to establish 20% gap, based on the question "How long will it take for the company to sustain a 20% increase in quantities produced?". These elements are mainly output metrics from other attributes . . . responsiveness, reliability, cost, asset management.

Demand

- Current make volumes
  - ⇨ Amount of each item manufactured

Labor

- Labor needed to meet current demand
  - ⇨ Productivity-units/orders per FTE
  - ⇨ Needed, but may be underutilized

Capital/Assets

- Internal and External (outsourced) capacity needed for current demand throughput
  - ⇨ Facilities, space
  - ⇨ Manufacturing equipment, materials handling and packaging equipment, etc.
  - ⇨ *Needed, but may be underutilized*
- Current capital requirements
  - ⇨ Credit line
  - ⇨ Cash on hand
  - ⇨ Accounting procedures
  - ⇨ Finance Procedures (outsource vs. in-source, make vs. buy, lease vs. purchase)

Materials

- All else equal in source, deliver and return, current inventory on hand (WIP and finished goods), including safety stock required to sustain current order fulfillment.

Discussion cont.

- ⇨ Assuming optimized inventory practices (no excess inventory)

Cycle Time

- Current manufacturing cycle time (all else equal including procurement order cycle time and supplier lead time)

Make: Resource Availability Assessment & Ramp-up/Lead Time

Elements needed to establish 20% delta in resources and what is required to meet the 20% delta based on the question "How long will it take for the company to sustain a 20% increase in quantities produced?"

Demand

- Additional make volume

Labor

- Direct labor availability and percent of labor used in manufacturing, not used in direct activity (underutilized FTE's)
- Amount of time needed to recruit/hire/train additional labor to fill gap between underutilized FTE's and labor needed to sustain 20% increase in quantities manufactured

Capital/Assets

- Current Internal Capacity utilization
  - ⇨ Facilities, space
  - ⇨ Manufacturing equipment, materials handling and packaging equipment, etc.
- Current capital availability
  - ⇨ Credit line
  - ⇨ Cash on hand
  - ⇨ Accounting procedures
  - ⇨ Finance Procedures (outsource vs. in-source, lease vs. purchase)
- Amount of time needed to obtain capital to fill gap between underutilized asset capacity and assets needed to sustain 20% increase in quantities delivered
- Amount of time needed to obtain assets/capacity to fill gap between underutilized asset capacity and assets needed to sustain 20% increase in quantities delivered
  - ⇨ Facilities, space
  - ⇨ Manufacturing equipment, materials handling and packaging equipment, etc.

Outsourcing Alternatives to capital

- Supplemental Outsource/lease availability
  - ⇨ Facilities, lease building, etc.
  - ⇨ Lease manufacturing equipment, materials handling and packaging equipment, etc.
  - ⇨ Co-packers
- Amount of time needed to obtain supplemental outsourced or leased resources or facilities to sustain 20% increase in quantities made

Materials

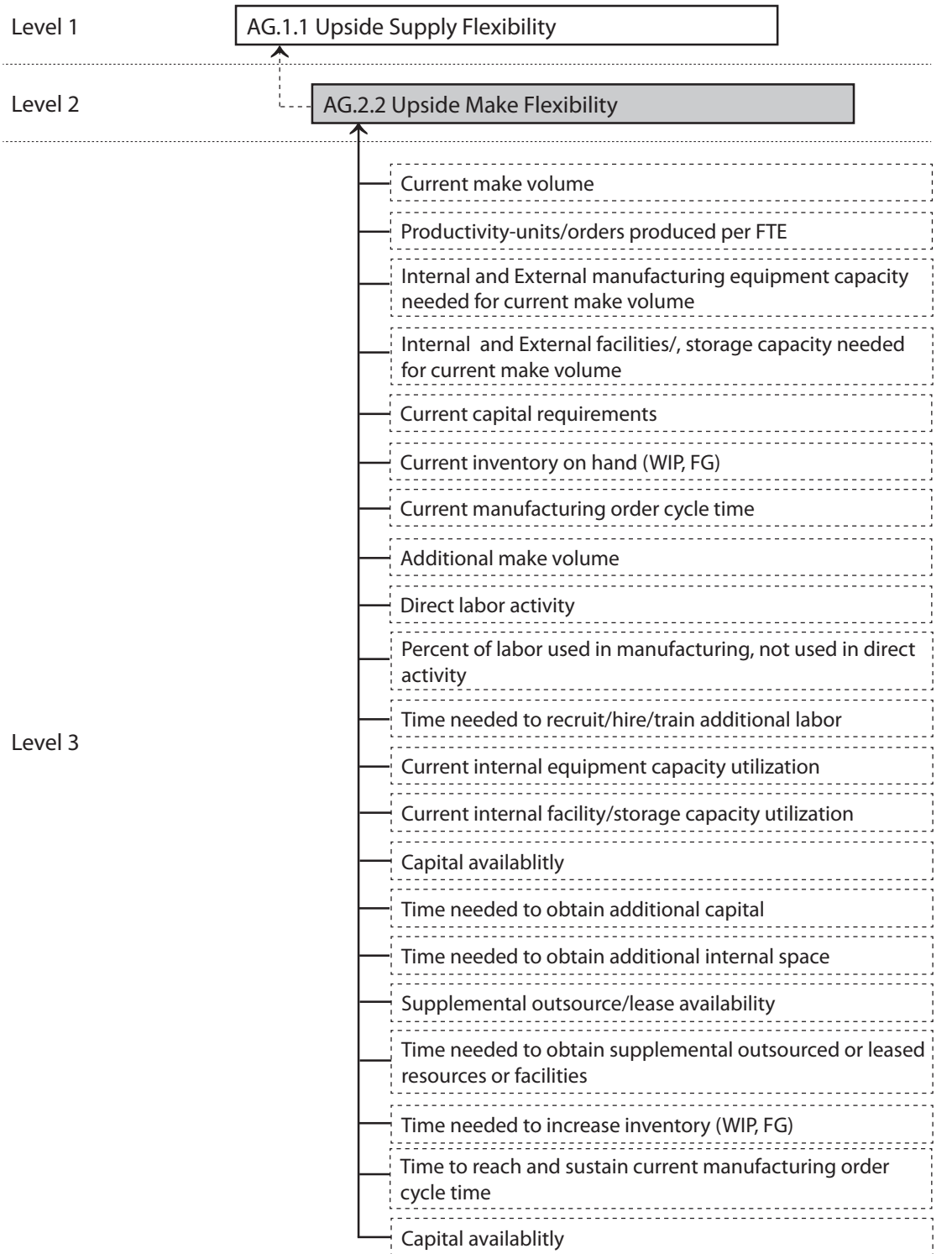
- All else equal in source, deliver and return, amount of time needed to receive and phase in raw material inventory for manufacturing and make WIP and FG inventory, including safety stock to sustain 20% increase in quantities manufactured)

Cycle Time

- Amount of time needed to reach and sustain current manufacturing cycle time (all else equal including procurement order cycle time and supplier lead time)

AG.2.2

Hierarchical Metric Structure



The dashed line boxes represent optional metrics associated with specific level 3 processes.

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.
Note: This is a planning activity normally considering constraints to increase delivery that results in an estimate.

Qualitative Relationship Description
Least time to pursue all necessary activities.
Quantitative Relationship (optional, if calculable)
None Identified
Calculation
None Identified
Data Collection
None Identified
Discussion

Deliver: Input
Current elements needed to fully understand future requirements, to establish 20% gap, based on the question "How long will it take for the company to sustain a 20% increase in quantities delivered?". These elements are mainly output metrics from other attributes . . . responsiveness, reliability, cost, asset management.

Demand
- Current delivery volume
  - ⇨ Number of orders shipped

Labor
- Labor needed to meet current demand
  - ⇨ Productivity-orders per FTE
  - ⇨ Needed, but may be underutilized

Capital/Assets
- Internal and External (3PL) capacity needed for current demand throughput
  - ⇨ Facilities, space
  - ⇨ Fleet equipment, outside carrier loads, materials handling equipment, etc.
  - ⇨ Needed, but may be underutilized

Current capital requirements
- Credit line
- Cash on hand
- Accounting procedures
- Finance Procedures (outsource vs. in-source, make vs. buy, lease vs. purchase)

Materials
- All else equal in source, make, return, current finished goods inventory on hand (including safety stock required to sustain current order fulfillment)

Discussion cont.

- ⇨ Assuming optimized inventory practices (no excess inventory)

Cycle Time

- Current logistics order cycle time (all else equal including procurement order cycle time, supplier lead time, manufacturing cycle time, etc.)
  - ⇨ Customer order processing cycle time (logistics only)
  - ⇨ Dock-to-stock cycle time
  - ⇨ Pick-to-ship cycle time
  - ⇨ Transit time

Deliver: Resource Availability Assessment & Ramp-up/Lead Time

Elements needed to establish 20% delta in resources and what is required to meet the 20% delta based on the question "How long will it take for the company to sustain a 20% increase in quantities delivered?"

Demand

- Additional delivery volume

Labor

- Direct labor availability and percent of labor used in logistics, not used in direct activity (underutilized FTE's)
- Amount of time needed to recruit/hire/train additional labor to fill gap between underutilized FTE's and labor needed to sustain 20% increase in quantities delivered

Capital/Assets

- Current Internal Capacity utilization
  - ⇨ Facilities, space
  - ⇨ Fleet equipment, materials handling equipment, etc.
- Current capital availability
  - ⇨ Credit line
  - ⇨ Cash on hand
  - ⇨ Accounting procedures
  - ⇨ Finance Procedures (outsource vs. in-source, lease vs. purchase)
- Amount of time needed to obtain capital to fill gap between underutilized asset capacity and assets needed to sustain 20% increase in quantities delivered
- Amount of time needed to obtain assets/capacity to fill gap between underutilized asset capacity and assets needed to sustain 20% increase in quantities delivered
  - ⇨ Facilities, space
  - ⇨ Fleet equipment, materials handling equipment, etc.

Outsourcing Alternatives to capital

- Supplemental Outsource/lease availability
  - ⇨ 3PL facilities, lease building, etc.
  - ⇨ Full service lease fleet, materials handling, etc. equipment
  - ⇨ Outside carriers
- Amount of time needed to obtain supplemental outsourced or leased resources or facilities to sustain 20% increase in quantities delivered

Materials

- All else equal in source, make, return, amount of time needed to increase finished inventory for order fulfillment (time to receive/stock inventory, including safety stock to sustain 20% increase in quantities delivered)

Discussion cont.

Cycle Time

- Amount of time needed to reach and sustain current logistics order cycle time (all esle equal including procurement order cycle time, supplier lead time, manufacturing cycle time, etc.)
  - ⇨ Customer order processing cycle time (logistics only)
  - ⇨ Dock-to-stock cycle time
  - ⇨ Pick-to-ship cycle time
  - ⇨ Transit time

AG.2.3

Hierarchical Metric Structure

The dashed line boxes represent optional metrics associated with specific level 3 processes.

Upside Source Return Flexibility

The number of days required to achieve an unplanned sustainable 20% increase in the return of raw materials to suppliers.

Note: This is a planning activity normally considering constraints to increase delivery that results in an estimate.

Data Collection

None Identified

Discussion

Source Return: Input

Assuming no supplier constraints, current elements needed to fully understand future requirements, to establish 20% gap, based on the question "How long will it take for the company to sustain a 20% increase in quantities returned to suppliers?" These elements are mainly output metrics from other attributes . . . responsiveness, reliability, cost, asset management.

Demand

- ⇨ Current return volume
- ⇨ Number of orders returned

Staff / Labor

- Procurement Staff / Logistics Labor needed to meet current returned volume
  - ⇨ Productivity-orders returned per FTE
  - ⇨ Needed, but may be underutilized

Capital/Assets

- Internal and External (3PL) capacity needed for current return throughput
  - ⇨ Facilities, space
  - ⇨ Fleet equipment, outside carrier loads, materials handling equipment, etc.
  - ⇨ Needed, but may be underutilized
- Current capital requirements
  - ⇨ Credit line
  - ⇨ Cash on hand
  - ⇨ Accounting procedures
  - ⇨ Finance Procedures (outsource vs. in-source, lease vs. purchase)

Cycle Time

- Current supplier return order cycle time
  - ⇨ Supplier return order processing cycle time (procurement and logistics)
  - ⇨ Pick-to-ship cycle time
  - ⇨ Transit time

Discussion cont.

Source Return: Resource Availability Assessment & Ramp-up/Lead Time

Assuming no supplier constraints, elements needed to establish 20% delta in resources and what is required to meet the 20% delta based on the question "How long will it take for the company to sustain a 20% increase in quantities returned to suppliers?"

Demand

- Additional supplier return volume

Staff / Labor

- Procurement staff / Logistics labor availability (underutilized FTE's)
- Amount of time needed to recruit/hire/train additional staff / labor to fill gap between underutilized FTE's and staff / labor needed to sustain 20% increase in quantities returned to suppliers

Capital/Assets

- Current Internal Capacity utilization
  - ⇨ Facilities, space
  - ⇨ Fleet equipment, materials handling equipment, etc.
- Current capital availability
  - ⇨ Credit line
  - ⇨ Cash on hand
  - ⇨ Accounting procedures
  - ⇨ Finance Procedures (outsource vs. in-source, lease vs. purchase)
- Amount of time needed to obtain capital to fill gap between underutilized asset capacity and assets needed to sustain 20% increase in quantities returned to suppliers
- Amount of time needed to obtain assets/capacity to fill gap between underutilized asset capacity and assets needed to sustain 20% increase in quantities returned to suppliers
  - ⇨ Facilities, space
  - ⇨ Fleet equipment, materials handling equipment, etc.

Outsourcing Alternatives to capital

- Supplemental Outsource/lease availability
  - ⇨ 3PL facilities, lease building, etc.
  - ⇨ Full service lease fleet, materials handling, etc. equipment
  - ⇨ Outside carriers
- Amount of time needed to obtain supplemental outsourced or leased resources or facilities to sustain 20% increase in quantities returned to suppliers

Cycle Time

- Amount of time needed to reach and sustain current supplier return order cycle time
  - ⇨ Supplier return order processing cycle time (procurement and logistics)
  - ⇨ Pick-to-ship cycle time
  - ⇨ Transit time

Hierarchical Metric Structure

Level 1: AG.1.1 Upside Supply Flexibility

Level 2: AG.2.4 Upside Source Return Flexibility

Constraint Factors

- Current source return volume
- Productivity-orders produced per FTE
- Internal and External (3PL) Equipment capacity needed for current return volume
- Internal and External (3PL) storage capacity needed for current return volume
- Current capital requirements
- Current supplier return order cycle time
- Additional source return volume
- Procurement staff/Logistics labor availability
- Time needed to recruit/hire/train additional staff/labor
- Current internal equipment capacity utilization
- Capital availability
- Time needed to obtain additional capital
- Time needed to obtain additional equipment
- Time needed to obtain additional internal space
- Supplemental outsource/lease availability
- Time needed to obtain supplemental outsourced (3PL) or leased resources or facilities
- Time to reach and sustain current logistics order cycle time

The dashed line boxes represent optional metrics associated with specific level 3 processes.

Upside Deliver Return Flexibility

The number of days required to achieve an unplanned sustainable 20% increase in the return of finished goods from customers.

Note: This is a planning activity normally considering constraints to increase delivery that results in an estimate.

Qualitative Relationship Description

Least time to pursue all necessary activities.

Quantitative Relationship (optional, if calculable)

None Identified

Calculation

None Identified

Data Collection

None Identified

Discussion

Deliver Return: Input

Assuming no customer constraints, current elements needed to fully understand future requirements, to establish 20% gap, based on the question "How long will it take for the company to sustain a 20% increase in quantities returned from customers?" These elements are mainly output metrics from other attributes . . . responsiveness, reliability, cost, asset management.

Demand

- Current return volume
  - ⇨ Number of orders returned

Staff / Labor

- Customer Service Staff / Logistics Labor needed to meet current returned volume
  - ⇨ Productivity-orders returned per FTE
  - ⇨ Needed, but may be underutilized

Capital/Assets

- Internal and External (3PL) capacity needed for current return throughput
  - ⇨ Facilities, space
  - ⇨ Fleet equipment, outside carrier loads, materials handling equipment, etc.
  - ⇨ Needed, but may be underutilized
- Current capital requirements
  - ⇨ Credit line
  - ⇨ Cash on hand
  - ⇨ Accounting procedures
  - ⇨ Finance Procedures (outsource vs. in-source, lease vs. purchase)

Cycle Time

- Current customer return order cycle time
  - ⇨ Customer return order processing cycle time (customer service and logistics)
  - ⇨ Transit time
  - ⇨ Return processing and disposition cycle time

Discussion cont.

Deliver Return: Resource Availability Assessment & Ramp-up/Lead Time

Assuming no customer constraints, elements needed to establish 20% delta in resources and what is required to meet the 20% delta based on the question "How long will it take for the company to sustain a 20% increase in quantities returned to suppliers?"

Demand

- Additional customer return volume

Staff / Labor

- Customer Service staff / Logistics labor availability (underutilized FTE's)
- Amount of time needed to recruit/hire/train additional staff / labor to fill gap between underutilized FTE's and staff / labor needed to sustain 20% increase in quantities returned from customers

Capital/Assets

- Current Internal Capacity utilization
  - ⇨ Facilities, space
  - ⇨ Fleet equipment, materials handling equipment, etc.
- Current capital availability
  - ⇨ Credit line
  - ⇨ Cash on hand
  - ⇨ Accounting procedures
  - ⇨ Finance Procedures (outsource vs. in-source, lease vs. purchase)
- Amount of time needed to obtain capital to fill gap between underutilized asset capacity and assets needed to sustain 20% increase in quantities returned from customers
- Amount of time needed to obtain assets/capacity to fill gap between underutilized asset capacity and assets needed to sustain 20% increase in quantities returned from customers
  - ⇨ Facilities, space
  - ⇨ Fleet equipment, materials handling equipment, etc.

Outsourcing Alternatives to capital

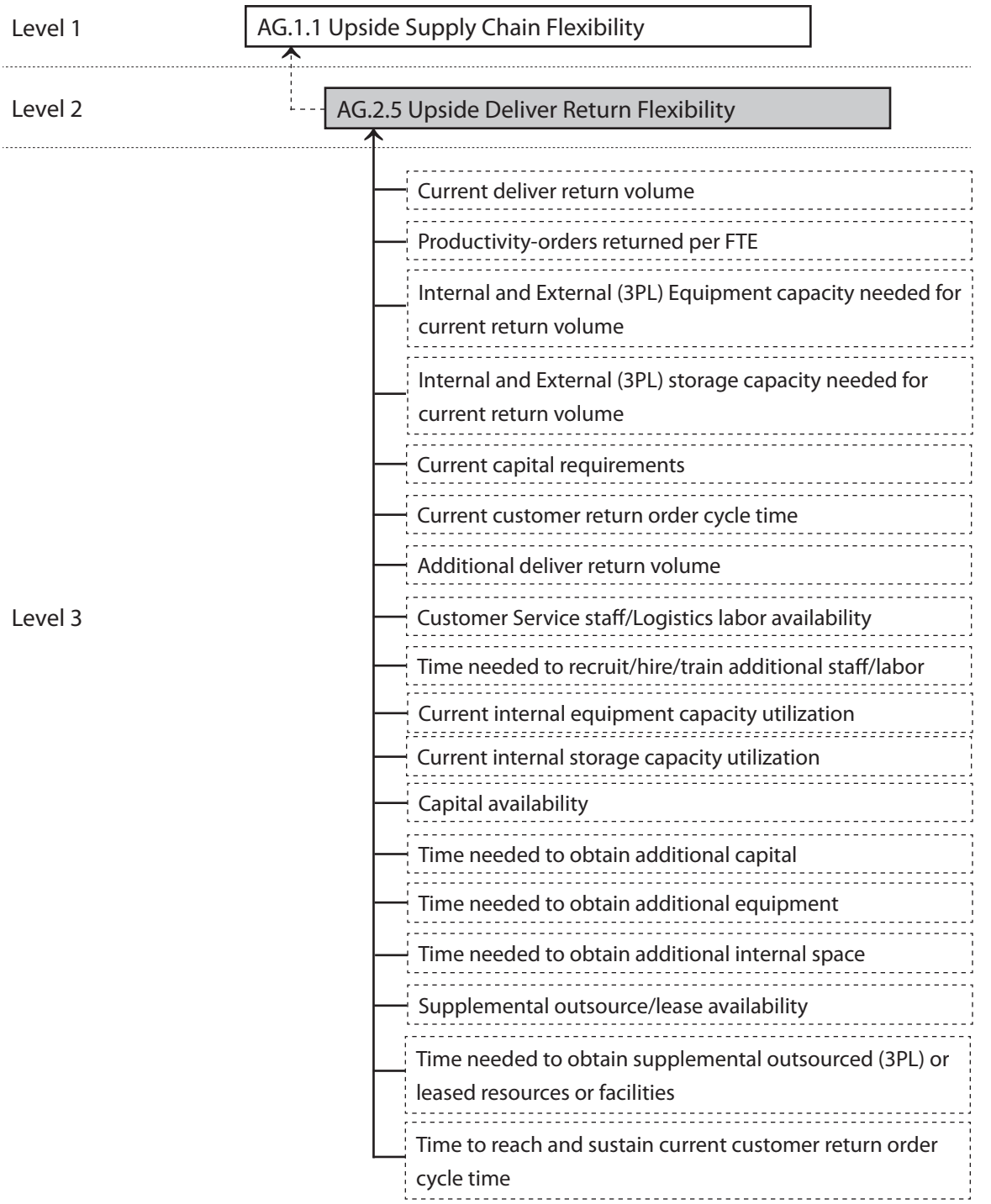
- Supplemental Outsource/lease availability
  - ⇨ 3PL facilities, lease building, etc.
  - ⇨ Full service lease fleet, materials handling, etc. equipment
  - ⇨ Outside carriers
- Amount of time needed to obtain supplemental outsourced or leased resources or facilities to sustain 20% increase in quantities returned from customers

Cycle Time

- Amount of time needed to reach and sustain current customer return order cycle time
  - ⇨ Customer return order processing cycle time (customer service and logistics)
  - ⇨ Transit time
  - ⇨ Return processing and disposition cycle time

AG.2.5

Hierarchical Metric Structure



The dashed line boxes represent optional metrics associated with specific level 3 processes.

Upside Source Adaptability

The maximum sustainable percentage increase in raw material quantities that can be acquired/received in 30 days.

Qualitative Relationship Description

Least quantity sustainable when considering all components

Quantitative Relationship (optional, if calculable)

None Identified

Calculation

None Identified

Data Collection

None Identified

Discussion

Source: Input

Current elements needed to fully understand future requirements, to establish the volume delta that can be sustained based on the question "How much of an increase in quantities sourced (expressed as a percentage) can the company sustain, given 30 days?" These elements are mainly output metrics from other attributes . . . responsiveness, reliability, cost, asset management.

Demand

- Current source volumes
  - ⇨ Amount of each item purchased

Staffing

- Staff needed to meet current demand
  - ⇨ Productivity-purchase orders per FTE
  - ⇨ *Needed, but may be underutilized*

Capital

- Current capital requirements
  - ⇨ Credit line
  - ⇨ Cash on hand
  - ⇨ Accounting procedures

Materials

- All else equal in make, deliver, return, current inventory on hand (raw material and purchased finished goods), including safety stock required to sustain current order fulfillment.
  - ⇨ Assuming optimized inventory practices *(no excess inventory)*
- Current sourcing/supplier constraints
  - ⇨ Current contract terms.
  - ⇨ Nature of items; commodity/sole source.

Cycle Time

- Current procurement cycle time
  - ⇨ Time to place a purchase order
  - ⇨ Supplier lead time

Discussion cont.

Source: Resource Availability Assessment & Ramp-up/Lead Time

Elements needed to establish delta in resources and what can be ramped up and sustained within 30 days based on the question "How much of an increase in quantities sourced (expressed as a percentage) can the company sustain, given 30 days"

Demand

- Additional source volume to be determined given ramped up resources below

Staffing

- Staff availability in procurement *(underutilized FTE's)*
- How much staff can be recruited/hired and trained fill gap between underutilized FTE's and FTE's needed to increase and sustain quantities sourced given 30 days

Capital

- Current capital availability
  - ⇨ Credit line
  - ⇨ Cash on hand
  - ⇨ Accounting procedures
- How much capital can be obtained to increase quantities sourced given 30 days

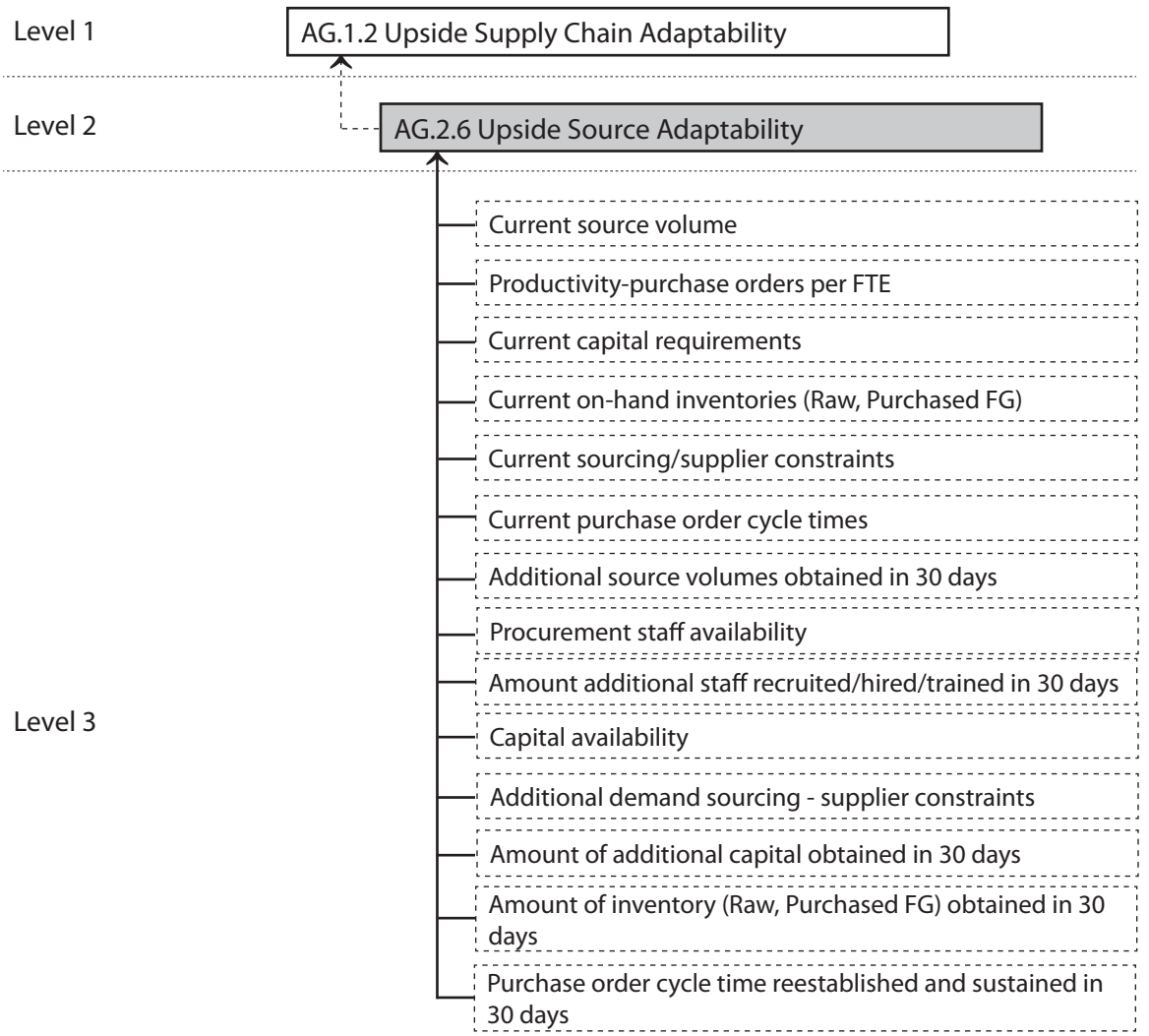
Materials

- Sourcing Constraints
  - ⇨ Time required in negotiating new source/volume contracts/terms
  - ⇨ Time required to find/obtain additional sources
- All else equal in make, deliver, return, how much inventory (raw material and purchased finished goods) can be obtained, delivered and phased in and sustained for order fulfillment, including safety stock given 30 days.

Cycle Time

- Procurement order cycle time reestablished and sustained for increased quantities sourced given 30 days.
  - ⇨ Time to place a purchase order
  - ⇨ Supplier lead time

Hierarchical Metric Structure



The dashed line boxes represent optional metrics associated with specific level 3 processes.

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.

Qualitative Relationship Description

Least quantity sustainable when considering all components

Quantitative Relationship (optional, if calculable)

None Identified

Calculation

None Identified

Data Collection

None Identified

Discussion

Make: Input

Current elements needed to fully understand future requirements, to establish the volume delta that can be sustained based on the question "How much of an increase in quantities produced (expressed as a percentage) can the company sustain, given 30 days?" These elements are mainly output metrics from other attributes . . . responsiveness, reliability, cost, asset management.

Demand

- Current make volumes
  - ⇨ Amount of each item manufactured

Labor

- Labor needed to meet current demand
  - ⇨ Productivity-units/orders per FTE
  - ⇨ *Needed, but may be underutilized*

Capital/Assets

- Internal and External (outsourced) capacity needed for current demand throughput
  - ⇨ Facilities, space
  - ⇨ Manufacturing equipment, materials handling and packaging equipment, etc.
  - ⇨ *Needed, but may be underutilized*
- Current capital requirements
  - ⇨ Credit line
  - ⇨ Cash on hand
  - ⇨ Accounting procedures
  - ⇨ Finance Procedures (outsource vs. in-source, make vs. buy, lease vs. purchase)

Materials

- All else equal in source, deliver and return, current inventory on hand (WIP and finished goods), including safety stock required to sustain current order fulfillment.
  - ⇨ Assuming optimized inventory practices *(no excess inventory)*

Cycle Time

- Current manufacturing cycle time (all else equal including procurement order cycle time and supplier lead time)

Discussion cont.

Make: Resource Availability Assessment & Ramp-up/Lead Time

Elements needed to establish delta in resources and what can be ramped up and sustained within 30 days based on the question "How much of an increase in quantities produced (expressed as a percentage) can the company sustain, given 30 days"

Demand

- Additional make volume to be determined given increased resources below

Labor

- Direct labor availability and percent of labor used in manufacturing, not used in direct activity *(underutilized FTE's)*
- How much labor can be recruited/hired and trained fill gap between underutilized FTE's and FTE's needed to increase and sustain quantities produced given 30 days

Capital/Assets

- Current Internal Capacity utilization
  - ⇨ Facilities, space
  - ⇨ Manufacturing equipment, materials handling and packaging equipment, etc.
- Current capital availability
  - ⇨ Credit line
  - ⇨ Cash on hand
  - ⇨ Accounting procedures
  - ⇨ Finance Procedures (outsource vs. in-source, lease vs. purchase)
- How much capital can be obtained to fill gap between underutilized asset capacity and assets needed to increase and sustain quantities produced given 30 days
- How much assets/capacity can be obtained to fill gap between underutilized asset capacity and assets needed to increase and sustain quantities produced given 30 days
  - ⇨ Facilities, space
  - ⇨ Manufacturing equipment, materials handling and packaging equipment, etc.

Outsourcing Alternatives to capital

- Supplemental Outsource/lease availability
  - ⇨ Facilities, lease building, etc.
  - ⇨ Lease manufacturing equipment, materials handling and packaging equipment, etc.
  - ⇨ Co-packers
- How much supplemental outsourced or leased resources or facilities can be obtained to increase and sustain quantities produced given 30 days

Materials

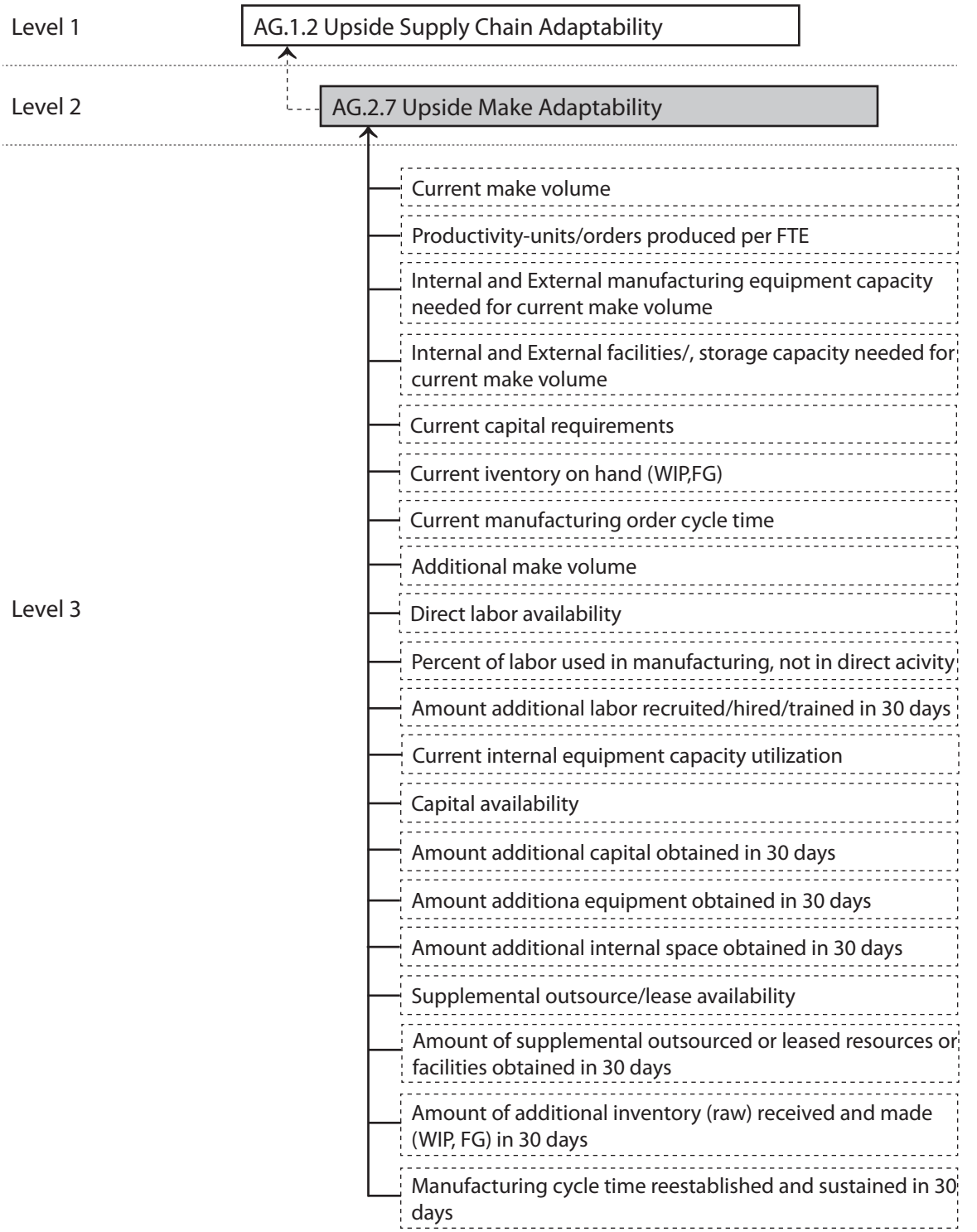
- All else equal in source, deliver and return, how much raw material inventory can be received and phased into manufacturing and produced into WIP and FG inventory, and sustained for order fulfillment, including safety stock given 30days.

Cycle Time

- Manufacturing cycle time reestablished and sustained for increased quantities produced given 30 days.

AG.2.7

Hierarchical Metric Structure



The dashed line boxes represent optional metrics associated with specific level 3 processes.

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.

Qualitative Relationship Description

Least quantity sustainable when considering all components

Quantitative Relationship (optional, if calculable)

None Identified

Calculation

None Identified

Data Collection

None Identified

Discussion

Deliver: Input

Current elements needed to fully understand future requirements, to establish the volume delta that can be sustained based on the question "How much of an increase in quantities delivered (expressed as a percentage) can the company sustain, given 30 days?" These elements are mainly output metrics from other attributes . . . responsiveness, reliability, cost, asset management.

Demand

- Current delivery volume
  - ⇨ Number of orders shipped

Labor

- Labor needed to meet current demand
  - ⇨ Productivity-orders per FTE
  - ⇨ *Needed, but may be underutilized*

Capital/Assets

- Internal and External (3PL) capacity needed for current demand throughput
  - ⇨ Facilities, space
  - ⇨ Fleet equipment, outside carrier loads, materials handling equipment, etc.
  - ⇨ *Needed, but may be underutilized*
- Current capital requirements
  - ⇨ Credit line
  - ⇨ Cash on hand
  - ⇨ Accounting procedures
  - ⇨ Finance Procedures (outsource vs. in-source, make vs. buy, lease vs. purchase)

Materials

- All else equal in source, make, return, current finished goods inventory on hand (including safety stock required to sustain current order fulfillment)
  - ⇨ Assuming optimized inventory practices *(no excess inventory)*

Discussion cont.

Cycle Time

- Current logistics order cycle time (all else equal including procurement order cycle time, supplier lead time, manufacturing cycle time, etc.)
  - ⇨ Customer order processing cycle time (logistics only)
  - ⇨ Dock-to-stock cycle time
  - ⇨ Pick-to-ship cycle time
  - ⇨ Transit time

Deliver: Resource Availability Assessment & Ramp-up/Lead Time

Elements needed to establish delta in resources and what can be ramped up and sustained within 30 days based on the question "How much of an increase in quantities delivered (expressed as a percentage) can the company sustain, given 30 days"

Demand

- Additional delivery volume to be determined given increased resources below

Labor

- Direct labor availability and percent of labor used in logistics, not used in direct activity *(underutilized FTE's)*
- How much labor can be recruited/hired and trained fill gap between underutilized FTE's and FTE's needed to increase and sustain quantities delivered given 30 days

Capital/Assets

- Current Internal Capacity utilization
  - ⇨ Facilities, space
  - ⇨ Fleet equipment, materials handling equipment, etc.
- Current capital availability
  - ⇨ Credit line
  - ⇨ Cash on hand
  - ⇨ Accounting procedures
  - ⇨ Finance Procedures (outsource vs. in-source, lease vs. purchase)
- How much capital can be obtained to fill gap between underutilized asset capacity and assets needed to increase and sustain quantities delivered given 30 days
- How much assets/capacity can be obtained to fill gap between underutilized asset capacity and assets needed to increase and sustain quantities delivered given 30 days
  - ⇨ Facilities, space
  - ⇨ Fleet equipment, materials handling equipment, etc.

Outsourcing Alternatives to capital

- Supplemental Outsource/lease availability
  - ⇨ 3PL facilities, lease building, etc.
  - ⇨ Full service lease fleet, materials handling, etc. equipment
  - ⇨ Outside carriers
- How much supplemental outsourced or leased resources or facilities can be obtained to increase and sustain quantities delivered given 30 days

Materials

- All else equal in source, make, return, amount of how much finished goods inventory can be received/stocked, including safety stock to sustain quantities delivered given 30 days

Discussion cont.

Cycle Time

- Logistics cycle time reestablished and sustained for increased quantities delivered given 30 days (all else equal including procurement order cycle time, supplier lead time, manufacturing cycle time, etc.)
  - ⇨ Customer order processing cycle time (logistics only)
  - ⇨ Dock-to-stock cycle time
  - ⇨ Pick-to-ship cycle time
  - ⇨ Transit time

AG.2.8

Hierarchical Metric Structure

The dashed line boxes represent optional metrics associated with specific level 3 processes.

Upside Source Return Adaptability

The maximum sustainable percentage increase in returns of raw materials to suppliers that can be achieved in 30 days.

Qualitative Relationship Description

The component which is the bottleneck determines the least volume for the increase of returns within 30 days. Least quantity sustainable when considering all components

Quantitative Relationship (optional, if calculable)

None Identified

Calculation

None Identified

Data Collection

None Identified

Discussion

Source Return: Input

Assuming no supplier constraints, current elements needed to fully understand future requirements, to establish the volume delta that can be sustained based on the question "How much of an increase in quantities returned to suppliers (expressed as a percentage) can the company sustain, given 30 days?" These elements are mainly output metrics from other attributes . . . responsiveness, reliability, cost, asset management.

Demand

- Current return volume
  - ⇨ Number of orders returned

Staff / Labor

- Procurement Staff / Logistics Labor needed to meet current returned volume
  - ⇨ Productivity-orders returned per FTE
  - ⇨ *Needed, but may be underutilized*

Capital/Assets

- Internal and External (3PL) capacity needed for current return throughput
  - ⇨ Facilities, space
  - ⇨ Fleet equipment, outside carrier loads, materials handling equipment, etc.
  - ⇨ *Needed, but may be underutilized*
- Current capital requirements
  - ⇨ Credit line
  - ⇨ Cash on hand
  - ⇨ Accounting procedures
  - ⇨ Finance Procedures (outsource vs. in-source, lease vs. purchase)

Cycle Time

- Current supplier return order cycle time
  - ⇨ Supplier return order processing cycle time (procurement and logistics)
  - ⇨ Pick-to-ship cycle time
  - ⇨ Transit time

Discussion cont.

Source Return: Resource Availability Assessment & Ramp-up/Lead Time

Assuming no supplier constraints, elements needed to establish delta in resources and what can be ramped up and sustained within 30 days based on the question "How much of an increase in quantities returned to suppliers (expressed as a percentage) can the company sustain, given 30 days"

Demand

- Additional supplier return volume to be determined given increased resources below

Staff / Labor

- Procurement staff / Logistics labor availability *(underutilized FTE's)*
- How much procurement staff/logistics labor can be recruited/hired and trained fill gap between underutilized FTE's and FTE's needed to increase and sustain quantities returned to suppliers given 30 days

Capital/Assets

- Current Internal Capacity utilization
  - ⇨ Facilities, space
  - ⇨ Fleet equipment, materials handling equipment, etc.
- Current capital availability
  - ⇨ Credit line
  - ⇨ Cash on hand
  - ⇨ Accounting procedures
  - ⇨ Finance Procedures (outsource vs. in-source, lease vs. purchase)
- How much capital can be obtained to fill gap between underutilized asset capacity and assets needed to increase and sustain quantities returned to suppliers given 30 days
- How much assets/capacity can be obtained to fill gap between underutilized asset capacity and assets needed to increase and sustain quantities returned to suppliers given 30 days
  - ⇨ Facilities, space
  - ⇨ Fleet equipment, materials handling equipment, etc.

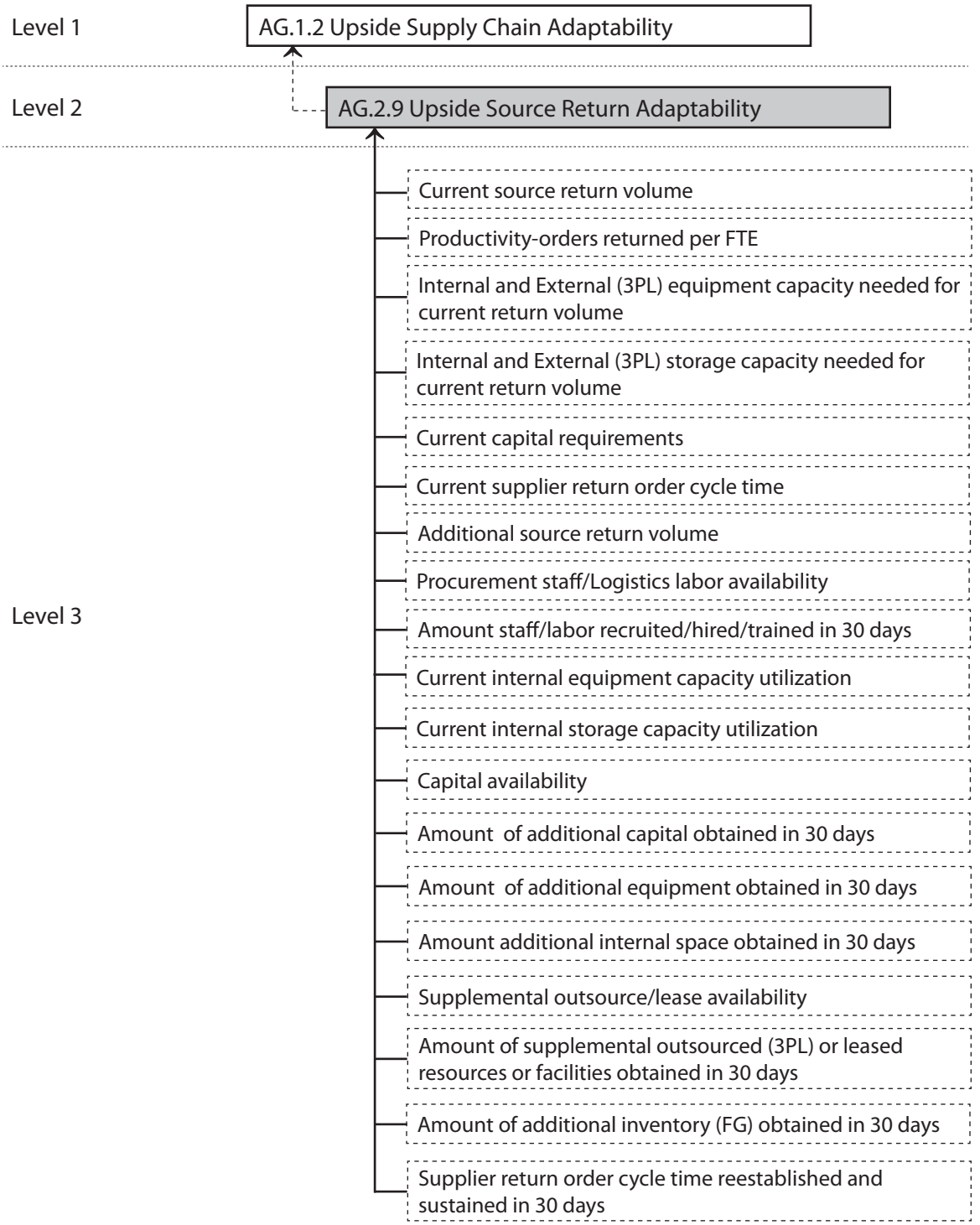
Outsourcing Alternatives to capital

- Supplemental Outsource/lease availability
  - ⇨ 3PL facilities, lease building, etc.
  - ⇨ Full service lease fleet, materials handling, etc. equipment
  - ⇨ Outside carriers
- How much supplemental outsourced or leased resources or facilities can be obtained to increase and sustain quantities returned to suppliers given 30 days

Cycle Time

- Source return cycle time reestablished and sustained for increased quantities returned to suppliers given 30 days
  - ⇨ Supplier return order processing cycle time (procurement and logistics)
  - ⇨ Pick-to-ship cycle time
  - ⇨ Transit time

Hierarchical Metric Structure



The dashed line boxes represent optional metrics associated with specific level 3 processes.

Upside Deliver Return Adaptability

The maximum sustainable percentage increase in returns of finished goods from customers that can be achieved in 30 days.

Qualitative Relationship Description

The component which is the bottleneck determines the least volume for the increase of returns within 30 days. Least quantity sustainable when considering all components

Quantitative Relationship (optional, if calculable)

None Identified

Calculation

None Identified

Data Collection

None Identified

Discussion

Deliver Return: Input

Assuming no customer constraints, current elements needed to fully understand future requirements, to establish the volume delta that can be sustained based on the question "How much of an increase in quantities returned from customers (expressed as a percentage) can the company sustain, given 30 days?" These elements are mainly output metrics from other attributes . . . responsiveness, reliability, cost, asset management.

Demand

- Current return volume
  - ⇨ Number of orders returned

Staff / Labor

- Customer Service Staff / Logistics Labor needed to meet current returned volume
  - ⇨ Productivity-orders returned per FTE
  - ⇨ *Needed, but may be underutilized*

Capital/Assets

- Internal and External (3PL) capacity needed for current return throughput
  - ⇨ Facilities, space
  - ⇨ Fleet equipment, outside carrier loads, materials handling equipment, etc.
  - ⇨ *Needed, but may be underutilized*
- Current capital requirements
  - ⇨ Credit line
  - ⇨ Cash on hand
  - ⇨ Accounting procedures
  - ⇨ Finance Procedures (outsource vs. in-source, lease vs. purchase)

Cycle Time

- Current customer return order cycle time
  - ⇨ Customer return order processing cycle time (customer service and logistics)
  - ⇨ Transit time
  - ⇨ Return processing and disposition cycle time

Discussion cont.

Deliver Return: Resource Availability Assessment & Ramp-up/Lead Time

Assuming no customer constraints, elements needed to establish delta in resources and what can be ramped up and sustained within 30 days based on the question "How much of an increase in quantities returned from customers (expressed as a percentage) can the company sustain, given 30 days"

Demand:

- Additional customer return volume to be determined given increased resouces below

Staff / Labor

- Customer Service staff / Logistics labor availability *(underutilized FTE's)*
- How much customer service staff/logistics labor can be recruited/hired and trained fill gap between underutilized FTE's and FTE's needed to increase and sustain quantities returned from customers given 30 days

Capital/Assets

- Current Internal Capacity utilization
  - ⇨ Facilities, space
  - ⇨ Fleet equipment, materials handling equipment, etc.
- Current capital availability
  - ⇨ Credit line
  - ⇨ Cash on hand
  - ⇨ Accounting procedures
  - ⇨ Finance Procedures (outsource vs. in-source, lease vs. purchase)
- How much capital can be obtained to fill gap between underutilized asset capacity and assets needed to increase and sustain quantities returned from customers given 30 days
- How much assets/capacity can be obtained to fill gap between underutilized asset capacity and assets needed to increase and sustain quantities returned from customers given 30 days
  - ⇨ Facilities, space
  - ⇨ Fleet equipment, materials handling equipment, etc.

Outsourcing Alternatives to capital

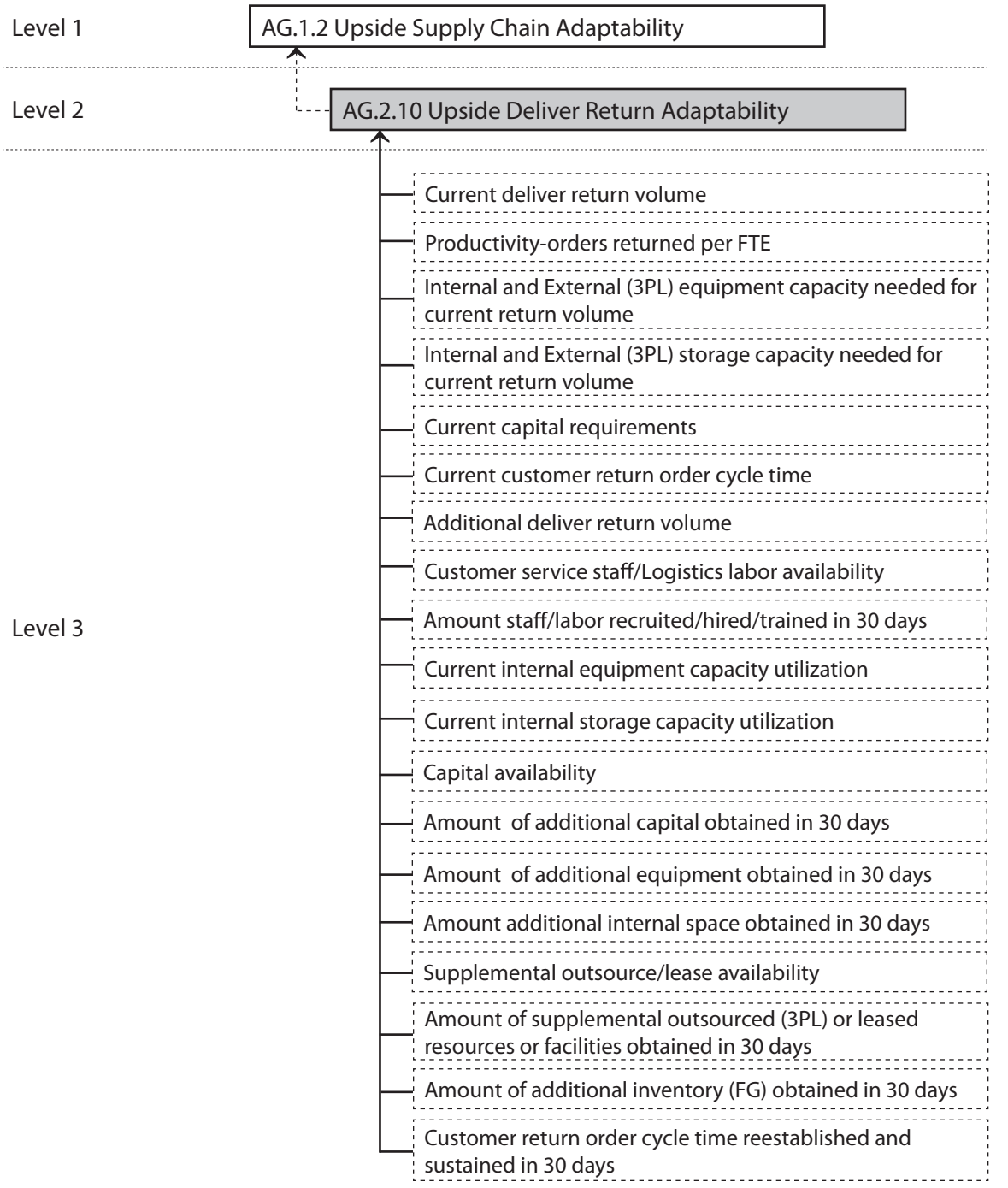
- Supplemental Outsource/lease availability
  - ⇨ 3PL facilities, lease building, etc.
  - ⇨ Full service lease fleet, materials handling, etc. equipment
  - ⇨ Outside carriers
- How much supplemental outsourced or leased resources or facilities can be obtained to increase and sustain quantities returned from customers given 30 days

Cycle Time

- Deliver return cycle time reestablished and sustained for increased quantities returned to suppliers given 30 days
- Customer return order processing cycle time (customer service and logistics)
  - ⇨ Transit time
  - ⇨ Return processing and disposition cycle time

AG.2.10

Hierarchical Metric Structure



The dashed line boxes represent optional metrics associated with specific level 3 processes.

Downside Source Adaptability

The raw material quantity reduction sustainable at 30 days prior to delivery with no inventory or cost penalties.

Qualitative Relationship Description
Least quantity reduction sustainable when considering all components
Quantitative Relationship (optional, if calculable)
None Identified
Calculation
None Identified
Data Collection
None Identified
Discussion

Source: Input

Current elements needed to fully understand future requirements, to establish the volume delta that can be sustained based on the question "How much of a reduction in quantities sourced (expressed as a percentage) can the company sustain, given 30 days?" These elements are mainly output metrics from other attributes . . . responsiveness, reliability, cost, asset management.

Demand

- Current source volumes
  - ⇨ Amount of each item purchased

Staffing

- Staff needed to meet current demand
  - ⇨ Productivity-purchase orders per FTE
  - ⇨ *Needed, but may be underutilized*

Capital

- Current capital requirements
  - ⇨ Accounting procedures

Materials

- All else equal in make, deliver, return, current inventory on hand (raw material and purchased finished goods), including safety stock required to sustain current order fulfillment.
  - ⇨ Assuming optimized inventory practices *(no excess inventory)*
- Current sourcing/supplier constraints
  - ⇨ Current contract terms.
  - ⇨ Nature of items; commodity/sole source.

Cycle Time

- Current procurement cycle time
  - ⇨ Time to place a purchase order
  - ⇨ Supplier lead time

Discussion cont.

Source: Resource Availability Assessment & Ramp-down/Lead Time

Elements needed to establish delta in resources and what can be ramped down and sustained at 30 days prior to delivery based on the question "How much of a decrease in quantities sourced (expressed as a percentage) can the company sustain without inventory or cost penalties, given 30 days notice prior to delivery"

Demand

- Reduced source volume to be determined given ramped down resources below

Staffing

- Staff availability in procurement *(underutilized FTE's)*
- How much staff can be laid-off or diverted to other activities, without cost penalty, to ramp down to decreased quantities delivered given 30 days notice

Capital

- Current capital requirements
  - ⇨ Accounting procedures for selling/diverting/recycling assets

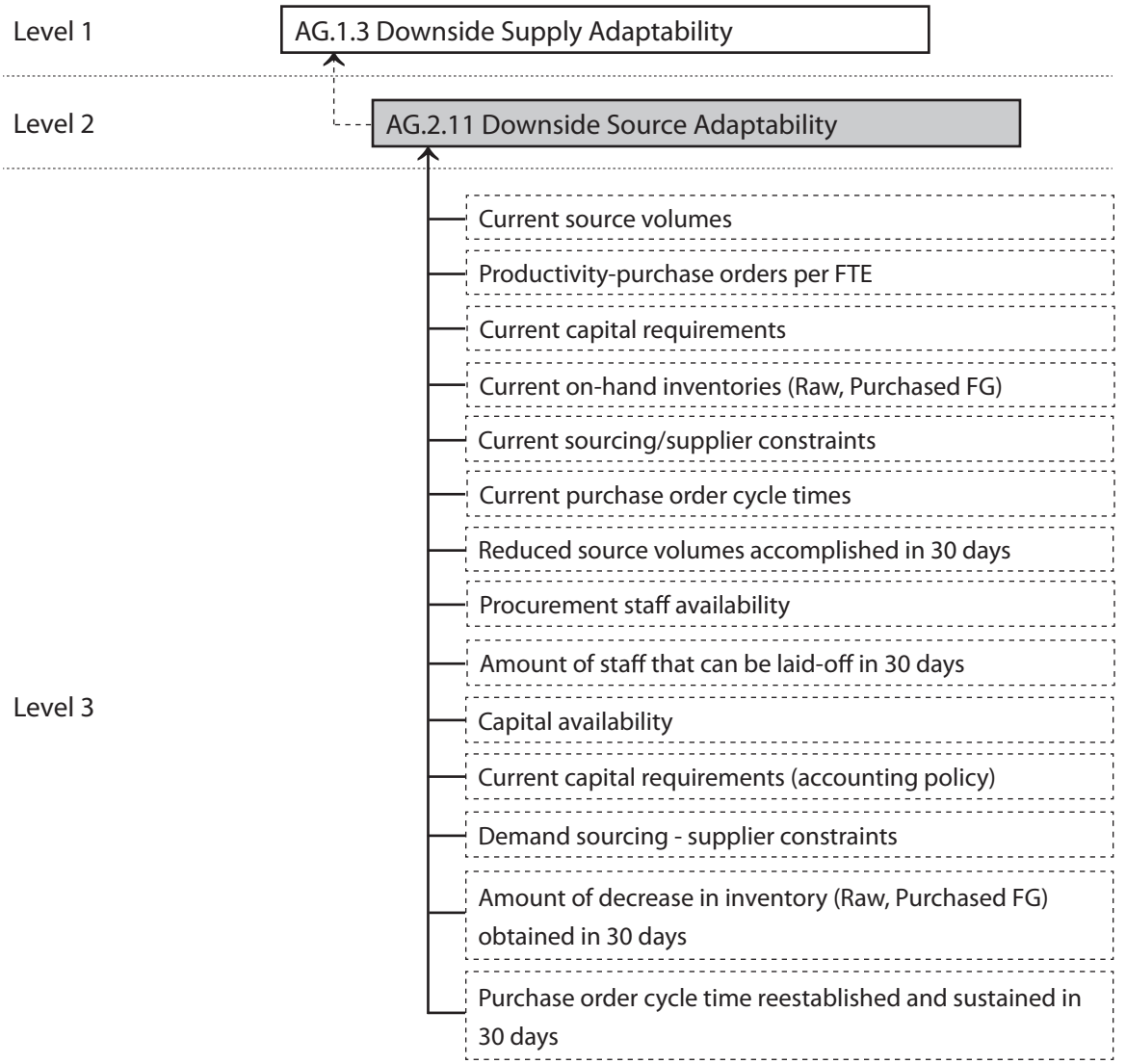
Materials

- Sourcing Constraints
  - ⇨ Time required in negotiating new source/volume contracts/terms
  - ⇨ Time required to ramp down supplier inventory
- How much inventory (raw material and purchased finished goods) can be returned, sold or diverted without cost penalty to ramp down to decreased quantities delivered given 30 days notice

Cycle Time

- Procurement order cycle time reestablished and sustained for decreased quantities sourced given 30 days.
  - ⇨ Time to place a purchase order
  - ⇨ Supplier lead time

Hierarchical Metric Structure



The dashed line boxes represent optional metrics associated with specific level 3 processes.

Downside Make Adaptability

The production reduction sustainable at 30 days prior to delivery with no inventory or cost penalties.

Qualitative Relationship Description
Least quantity reduction sustainable when considering all components
Quantitative Relationship (optional, if calculable)
None Identified
Calculation
None Identified
Data Collection
None Identified
Discussion

Make: Input

Current elements needed to fully understand future requirements, to establish the volume delta that can be sustained based on the question "How much of a reduction in quantities produced (expressed as a percentage) can the company sustain, given 30 days?" These elements are mainly output metrics from other attributes . . . responsiveness, reliability, cost, asset management.

Demand

- Current make volumes
  - ⇨ Amount of each item manufactured

Labor

- Labor needed to meet current demand
  - ⇨ Productivity-units/orders per FTE
  - ⇨ *Needed, but may be underutilized*

Capital/Assets

- Internal and External (outsourced) capacity needed for current demand throughput
  - ⇨ Facilities, space
  - ⇨ Manufacturing equipment, materials handling and packaging equipment, etc.
  - ⇨ *Needed, but may be underutilized*
- Current capital requirements
  - ⇨ Accounting procedures
  - ⇨ Finance Procedures (outsource vs. in-source, make vs. buy, lease vs. purchase)

Materials

- All else equal in source, deliver and return, current inventory on hand (WIP and finished goods), including safety stock required to sustain current order fulfillment.
  - ⇨ Assuming optimized inventory practices *(no excess inventory)*

Cycle Time

- Current manufacturing cycle time (all else equal including procurement order cycle time and supplier lead time)

Make: Resource Availability Assessment & Ramp-down/Lead Time

Elements needed to establish delta in resources and what can be ramped down and sustained at 30 days prior to delivery based on the question "How much of a decrease in quantities produced (expressed as a percentage) can the company sustain without inventory or cost penalties, given 30 days notice prior to delivery"

Demand

- Reduced make volume to be determined given ramped down resources below

Labor

- Direct labor availability and percent of labor used in manufacturing, not used in direct activity *(underutilized FTE's)*
- How much labor can be laid-off or diverted to other activities, without cost penalty, to ramp down to decreased quantities delivered given 30 days notice

Capital/Assets

- Current Internal Capacity utilization
  - ⇨ Facilities, space
  - ⇨ Manufacturing equipment, materials handling and packaging equipment, etc.
- Current capital requirements
  - ⇨ Accounting procedures for selling/diverting/recycling assets
  - ⇨ Finance Procedures (outsource vs. in-source, make vs. buy, lease vs. purchase) and their effect upon ability to terminate leases or sell capital equipment assets.
- How many capital equipment assets can be recycled, diverted or sold or subleased without cost penalty, to ramp down to decreased quantities delivered given 30 days notice
  - ⇨ Facilities, space
  - ⇨ Manufacturing equipment, materials handling and packaging equipment, etc.

Outsourcing Alternatives to capital

- Supplemental Outsource/lease availability
  - ⇨ Facilities, lease building, etc.
  - ⇨ Lease manufacturing equipment, materials handling and packaging equipment, etc.
  - ⇨ Co-packers
- How much supplemental outsourced or leased resources or facilities can be terminated to ramp down to decreased quantities delivered given 30 days notice

Materials

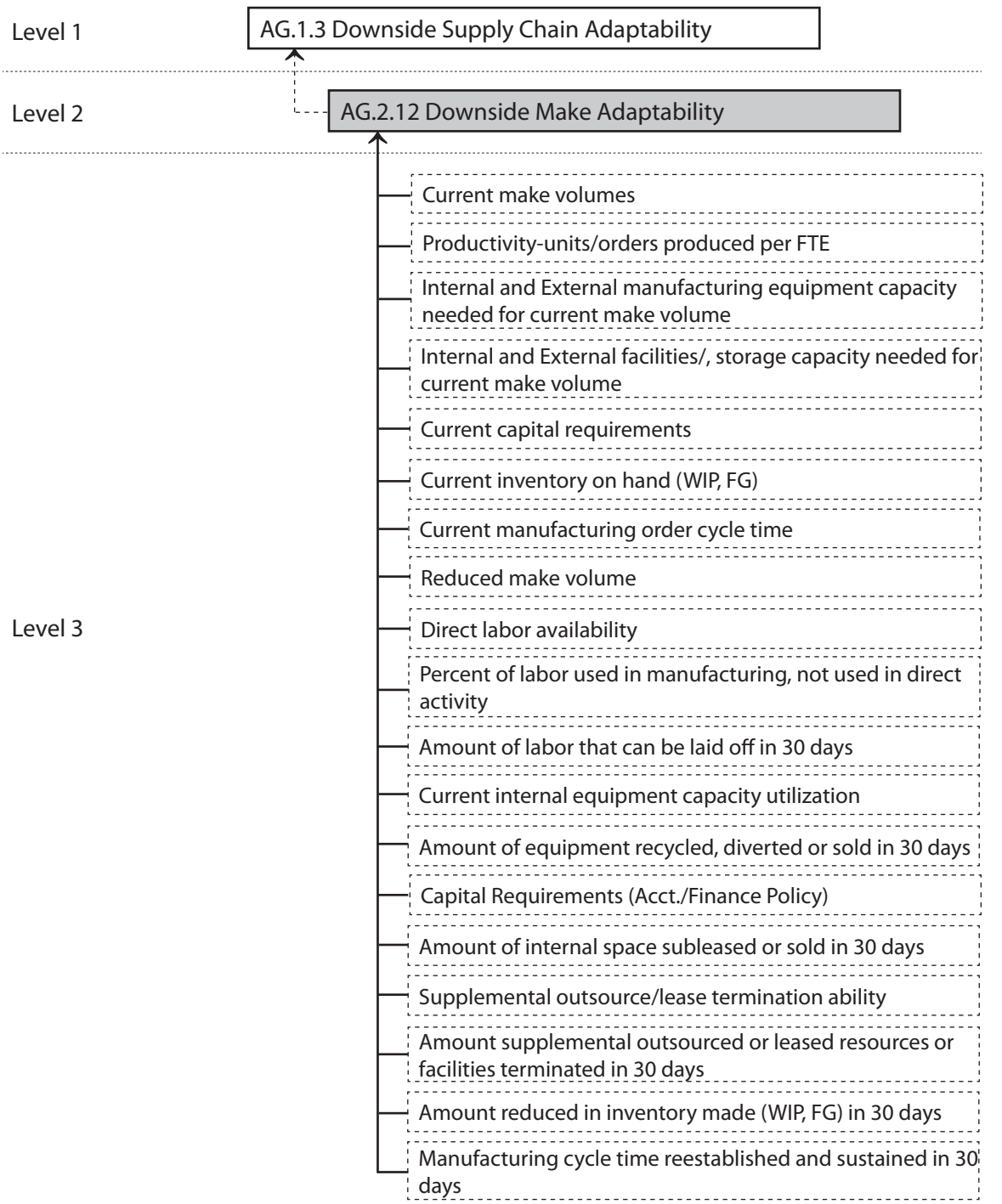
- All else equal in source, deliver and return, how much manufacturing quantities (WIP and FG inventory), including safety stock can be ramped down to decreased order fulfillment quantities given 30 days notice.

Cycle Time

- Manufacturing cycle time reestablished and sustained for decreased quantities produced given 30 days.

AG.2.12

Hierarchical Metric Structure



The dashed line boxes represent optional metrics associated with specific level 3 processes.

Downside Deliver Adaptability

Downside Deliver Adaptability = The reduction in delivered quantities sustainable at 30 days prior to delivery with no inventory or cost penalties.

Qualitative Relationship Description
Least quantity reduction sustainable when considering all components
Quantitative Relationship (optional, if calculable)
None Identified
Calculation
None Identified
Data Collection
None Identified
Discussion

Deliver: Input Elements

Current elements needed to fully understand future requirements, to establish what can be ramped down and sustained at 30 days prior to delivery, based on the question "How much of a decrease in quantities delivered (expressed as a percentage) can the company sustain without inventory or cost penalties, given 30 days notice prior to delivery?" These elements are mainly output metrics from other attributes . . . responsiveness, reliability, cost, asset management.

Demand

- Current delivery volume
  - ⇨ Number of orders shipped

Labor

- Labor needed to meet current demand
  - ⇨ Productivity-orders per FTE
  - ⇨ *Needed, but may be underutilized*

Capital/Assets

- Internal and External (3PL) capacity needed for current demand throughput
  - ⇨ Facilities, space
  - ⇨ Fleet equipment, outside carrier loads, materials handling equipment, etc.
  - ⇨ *Needed, but may be underutilized*
- Current capital requirements
  - ⇨ Accounting procedures
  - ⇨ Finance Procedures (outsource vs. in-source, make vs. buy, lease vs. purchase)

Materials

- All else equal in source, make, return, current finished goods inventory on hand (including safety stock required to sustain current order fulfillment)
  - Assuming optimized inventory practices *(no excess inventory)*

Discussion cont.

Cycle Time

- Current logistics order cycle time (all else equal including procurement order cycle time, supplier lead time, manufacturing cycle time, etc.)
  - ⇨ Customer order processing cycle time (logistics only)
  - ⇨ Dock-to-stock cycle time
  - ⇨ Pick-to-ship cycle time
  - ⇨ Transit time

Deliver: Availability Assessment & Ramp-down/Lead Time

Elements needed to establish delta in resources and what can be ramped down and sustained at 30 days prior to delivery based on the question "How much of a decrease in quantities delivered (expressed as a percentage) can the company sustain without inventory or cost penalties, given 30 days notice prior to delivery"

Demand:

- Reduced delivery volume to be determined given ramped down resources below

Labor

- Direct labor availability and percent of labor used in logistics, not used in direct activity *(underutilized FTE's)*
- How much labor can be laid-off or diverted to other activities, without cost penalty, to ramp down to decreased quantities delivered given 30 days notice

Capital/Assets

- Current Internal Capacity utilization
- Facilities, space
  - ⇨ Fleet equipment, materials handling equipment, etc.
- Current capital requirements
  - ⇨ Accounting procedures for selling/diverting/recycling assets
  - ⇨ Finance Procedures (outsource vs. in-source, make vs. buy, lease vs. purchase) and their effect upon ability to terminate leases or sell capital equipment assets.
- How many capital equipment assets can be recycled, diverted or sold without cost penalty, to ramp down to decreased quantities delivered given 30 days notice
  - ⇨ Facilities, space
  - ⇨ Fleet equipment, materials handling equipment, etc.

Outsourcing Alternatives to capital

- Supplemental Outsource/lease availability
  - ⇨ 3PL facilities, lease building, etc.
  - ⇨ Full service lease fleet, materials handling, etc. equipment
  - ⇨ Outside carriers
- How much supplemental outsourced or leased resources or facilities agreements can be terminated to ramp down to decreased quantities delivered given 30 days notice

Materials

- All else equal in source, make, return, how much inventory can be shipped or diverted without cost penalty to ramp down to decreased quantities delivered given 30 days notice (all else equal in source and make, includes safety stock)
  - ⇨ Transit time

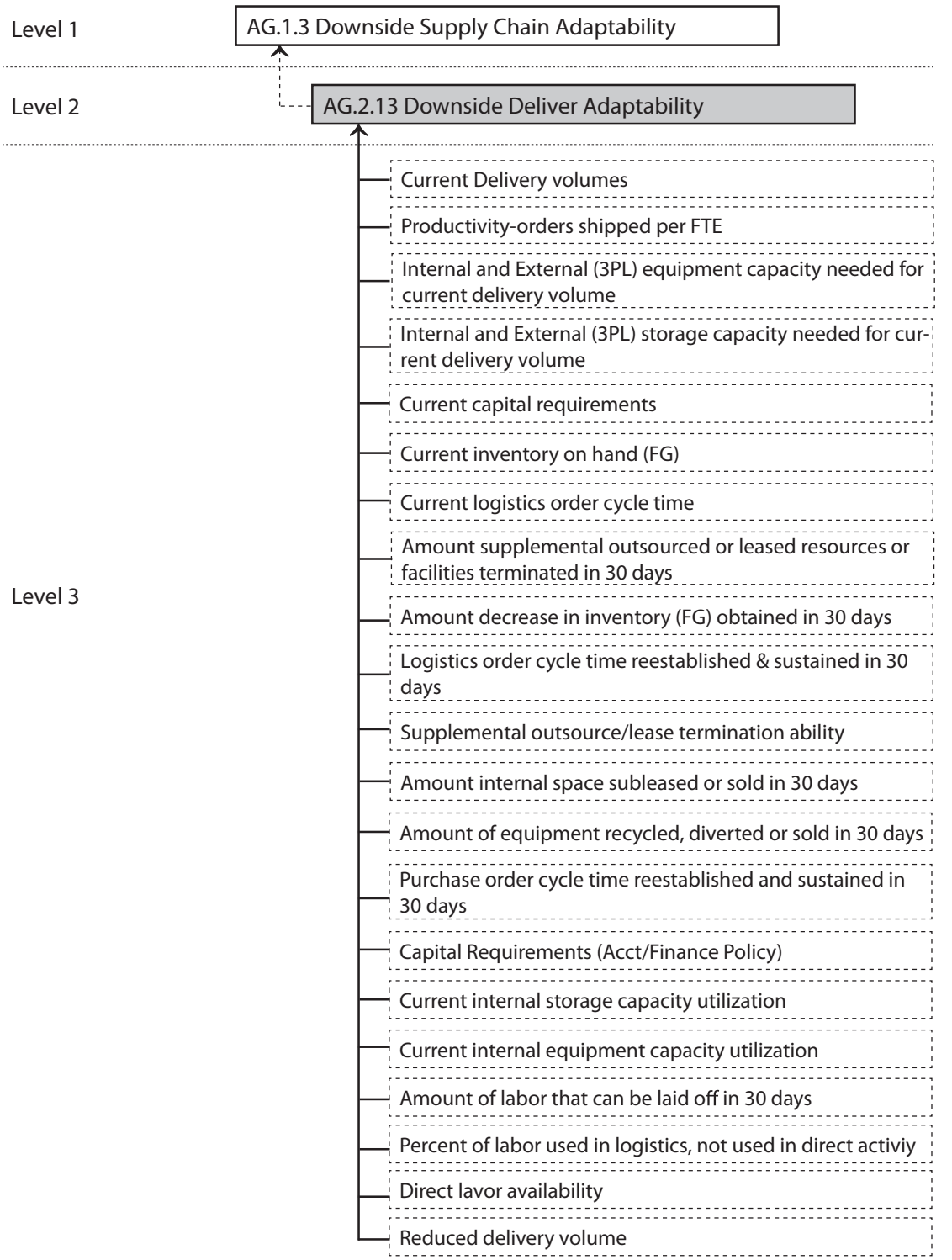
Discussion cont.

Cycle Time

- Logistics cycle time reestablished and sustained for decreased quantities delivered given 30 days (all else equal including procurement order cycle time, supplier lead time, manufacturing cycle time, etc.)
  - ⇨ Customer order processing cycle time (logistics only)
  - ⇨ Dock-to-stock cycle time
  - ⇨ Pick-to-ship cycle time

AG.2.13

Hierarchical Metric Structure



The dashed line boxes represent optional metrics associated with specific level 3 processes.

Level 2 Agility Metrics

Metric ID	Metric Name	Metric Definition	Process
AG.2.14	Supplier's/ Customer's/ Products's Risk Rating	The numerical risk rating for supplier, customer or product. Normalized and used for comparison purposes.	sEP.9 Manage Supply Chain Plan Risk sES.9 Manage Supply Chain Source Risk sEM.9 Manage Supply Chain Make Risk sED.9 Manage Supply Chain Deliver Risk sER.9 Manage Supply Chain Return Risk
AG.2.15	Value at Risk (Plan)	The sum of probability of risk events times the monetary impact of the events in all Planning activities. Risk event here could be defined as the deviation from expected metrics value for the process.	sEP.9 Manage Supply Chain Plan Risk
AG.2.16	Value at Risk (Source)	The sum of probability of risk events times the monetary impact of the events in all Sourcing activities. Risk event here could be defined as the deviation from expected metrics value for the process.	sES.9: Manage Supply Chain Source Risk
AG.2.17	Value at Risk (Make)	The sum of probability of risk events times the monetary impact of the events in all Make activities. Risk event here could be defined as the deviation from expected metrics value for the process.	sEM.9: Manage Supply Chain Make Risk
AG.2.18	Value at Risk (Deliver)	The sum of probability of risk events times the monetary impact of the events in all Deliver activities. Risk event here could be defined as the deviation from expected metrics value for the process.	sED.9: Manage Supply Chain Deliver Risk
AG.2.19	Value at Risk (Return)	The sum of probability of risk events times the monetary impact of the events in all Return activities. Risk event here could be defined as the deviation from expected metrics value for the process.	sER.9: Manage Supply Chain Return Risk

Metric ID	Metric Name	Metric Definition	Process
AG.2.20	VAR of Internal Process Performance	Value at Risk = the sum of the probability of risk events times the monetary impact of the events for the specific process. For example: historical data or estimates for unanticipated plant shut downs, fires, regulatory issues, strikes, production short falls, etc. can be used to calculate VaR.	sEP.9: Manage Supply Chain Plan Risk sES.9: Manage Supply Chain Source Risk sEM.9: Manage Supply Chain Make Risk sED.9: Manage Supply Chain Deliver Risk sER.9: Manage Supply Chain Return Risk
AG.2.21	VAR of Supplier Performance	Value at Risk = the sum of the probability of risk events times the monetary impact of the events for the specific supplier (or aggregate supply base). For example: supplier performance data for On time Deliveries, Perfect Order, etc. can be used to calculate VaR for a supplier.	sES.9: Manage Supply Chain Source Risk sEP.9: Manage Supply Chain Make Risk
AG.2.22	Event Risk (EVAR) ($)	The risk (probability X impact) of risk events. i.e. plant outage, transportation outage, product failure, etc.	sEP.9: Manage Supply Chain Plan Risk sES.9: Manage Supply Chain Source Risk sEM.9: Manage Supply Chain Make Risk sED.9: Manage Supply Chain Deliver Risk sER.9: Manage Supply Chain Return Risk
AG.2.23	Individual Process Area Event Rating (EVAR) ($)	The specific rating (probability X impact) of a specific event.	sEP.9: Manage Supply Chain Plan Risk sES.9: Manage Supply Chain Source Risk sEM.9: Manage Supply Chain Make Risk sED.9: Manage Supply Chain Deliver Risk sER.9: Manage Supply Chain Return Risk

Level 3 Agility Metrics

Metric ID	Metric Name	Metric Definition	Process
AG.3.1	% of labor used in logistics, not used in direct activity	Percent of labor used in logistics, not used in direct activity	sD1: Deliver Stocked Product sD2: Deliver Make-to-Order Product sD3: Deliver Engineer-to-Order Product
AG.3.2	% of labor used in manufacturing, not used in direct activity	Percent of labor used in manufacturing, not used in direct activity	sM1: Make-to-Stock sM2: Make-to-Order sM3: Engineer-to-Order
AG.3.3	Additional deliver return volume	Additional customer return volume	sDR1: Deliver Return Defective Product sDR2: Deliver Return MRO Product sDR3: Deliver Return Excess Product
AG.3.4	Additional Delivery volume	Additional delivery volume	sD1: Deliver Stocked Product sD2: Deliver Make-to-Order Product sD3: Deliver Engineer-to-Order Product
AG.3.5	Additional demand sourcing-supplier constraints	Time required in negotiating new source/volume contracts/terms and time required to find/obtain additional source	sES.7: Manage Supplier Network sES.10: Manage Supplier Agreements
AG.3.6	Additional make volume	Additional make volume to be determined given increased resources	sEM.5: Manage Make Equipment and Facilities sEM.6: Manage Make Transportation sEM.7: Manage Make Network
AG.3.7	Additional source return volume	Additional supplier return volume	sER.5: Manage Return Capital Assets sER.6: Manage Return Transportation sER.7: Manage Return Network Configuration
AG.3.8	Additional Source Volumes	Additional source volume	sES.5: Manage Source Capital Assets sES.6: Manage Incoming Product sES.7: Manage Supplier Network sES.10: Manae Supplier Agreements
AG.3.9	Additional source volumes obtained in 30 days	Additional source volume to be determined given ramped up resources	sS1: Source Stocked Product sS2: Source Make-to-Order Product sS3: Source Engineer-to-Order Product
AG.3.10	Amount additional capital obtained in 30 days	How much capital can be obtained to fill gap between underutilized asset capacity and assets needed to increase and sustain quantities delivered given 30 days	sEP.10: Align Supply Chain Unit Plan with Financial Plan

Metric ID	Metric Name	Metric Definition	Process
AG.3.11	Amount additional equipment obtained in 30 days	How much assets/capacity can be obtained to fill gap between underutilized asset capacity and assets needed to increased and sustain quantities produced given 30 days in equipment such as manufacturing equipment, materials handling and packaging equipment, etc	sEP.5: Manage Integrated Supply Chain Capital Assets, sES.5: Manage Capital Assets, sEM.5: Manage Make Equipment and Facilities, sED.5: Manage Deliver Capital Assets sER.5: Manage Return Capital Assets
AG.3.12	Amount additional internal space obtained in 30 days	How much assets/capacity can be obtained to fill gap between underutilized asset capacity and assets needed to increased and sustain quantities produced given 30 days in internal space	sEP.5: Manage Integrated Supply Chain Capital Assets, ES.5: Manage Capital Assets, sEM.5: Manage Make Equipment and Facilities, sED.5: Manage Deliver Capital Assets sER.5: Manage Return Capital Assets
AG.3.13	Amount additional inventory (raw) received and made (WIP, FG) in 30 days	How much raw material inventory can be received and phased into manufacturing and produced into WIP and FG inventory, and sustained for order fulfillment, including safety stock given 30 days	sES.4: Manage Product Inventory, sEM.4: Manage In-Process Products, sED.4: Manage Finished Goods Inventories
AG.3.14	Amount additional labor recruited/hired/ trained in 30 days	How much labor can be recruited/ hired and trained to fill gap between underutilized FTE's and FTE's needed to increase and sustain quantities produced given 30 days	
AG.3.15	Amount additional staff recruited/hired/ trained in 30 days	How much labor can be recruited/ hired and trained to fill gap between underutilized FTE's and FTE's needed to increase and sustain quantities produced given 30 days	
AG.3.16	Amount additional staff/ labor recruited/ hired/trained in 30 days	How much staff/labor can be recruited/ hired and trained fill gap between underutilized FTE's and FTE's needed to increase and sustain quantities sourced given 30 days	
AG.3.17	Amount decrease in inventory (FG) obtained in 30 days	How much inventory can be shipped or diverted without cost penalty to ramp down to decreased quantities delivered given 30 days notice (all else equal in source and make, includes safety stock)	sED.4: Manage Finished Goods Inventories
AG.3.18	Amount decrease in inventory (Raw, Purchased FG) obtained in 30 days	How much inventory (raw material and purchased finished goods) can be returned, sold or diverted without cost penalty to ramp down to decreased quantities delivered given 30 days notice	sES.4: Manage Product Inventory, sED.4: Manage Finished Goods Inventories

Metric ID	Metric Name	Metric Definition	Process
AG.3.19	Amount labor recruited/hired/ trained in 30 days	How much labor can be recruited/ hired and trained to fill gap between underutilized FTE's and FTE's needed to increase and sustain quantities delivered given 30 days	
AG.3.20	Amount labor that can be laid off in 30 days	How much labor can be laid-off or diverted to other activities, without cost penalty, to ramp down to decreased quantities delivered given 30 days notice	sEM.8: Manage Make Regulatory Environment
AG.3.21	Amount of Equipment recycled, diverted, or sold in 30 days	How many capital equipment assets can be recycled, diverted or sold or subleased without cost penalty, to ramp down to decreased quantities delivered given 30 days notice	sEP.5: Manage Integrated Supply Chain Capital Assets, sES.5: Manage Capital Assets, sEM.5: Manage Make Equipment and Facilities, sED.5: Manage Deliver Capital Assets sER.5: Manage Return Capital Assets
AG.3.22	Amount of inventory (Raw, Purchased FG) obtained in 30 days	How much inventory (raw material and purchased finished goods) can be obtained, delivered and phased in and sustained for order fulfillment, including safety stock given 30 days	sED.4: Manage Finished Goods Inventories
AG.3.23	Amount of staff that can be laid-off in 30 days	How much staff can be laid-off or diverted to other activities, without cost penalty, to ramp down to decreased quantities delivered given 30 days notice	
AG.3.24	Amount reduced inventory made (WIP, FG) in 30 days	How much manufacturing quantities (WIP and FG inventory), including safety stock can be ramped down to decreased order fulfillment quantities given 30 days notice	sEM.4: Manage In-Process Products, sED.4: Manage Finished Goods Inventories
AG.3.25	Amount supplemental outsourced or leased resources or facilities terminated in 30	How much supplemental outsourced or leased resources or facilities can be terminated to ramp down to decreased quantities delivered given 30 days notice	sEP.5: Manage Integrated Supply Chain Capital Assets, sES.5: Manage Capital Assets, sEM.5: Manage Make Equipment and Facilities, sED.5: Manage Deliver Capital Assets sER.5: Manage Return Capital Assets

Metric ID	Metric Name	Metric Definition	Process
AG.3.26	Amount supplemental outsourced or leased resources or faciltiies obtained in 30 days	How much supplemental outsourced or leased resources or facilities can be obtained to increased and sustain quantities returned to suppliers given 30 day.	sEP.5: Manage Integrated Supply Chain Capital Assets, sES.5: Manage Capital Assets, sEM.5: Manage Make Equipment and Facilities, sED.5: Manage Deliver Capital Assets sER.5: Manage Return Capital Assets
AG.3.27	Capital Availability	The percentage of orders that are fulfilled on the customer's original commit date	sEP.10: Align Supply Chain Unit Plan with Financial Plan
AG.3.28	Capital Requirements (Acct/Finance Policy)	The average time associated with Deliver Retail Processes	sEP.10: Align Supply Chain Unit Plan with Financial Plan
AG.3.29	Current Capital Requirements	Requirements on credit line, cash on hand and accounting procedures based on current sourcing situation	sEP.10: Align Supply Chain Unit Plan with Financial Plan
AG.3.30	Current capital requirements (accounting policy)	Accounting procedures for selling/ diverting/recycling assets	sEP.10: Align Supply Chain Unit Plan with Financial Plan
AG.3.31	Current Deliver Return Volume	current return volume, number of orders returned	sDR1: Deliver Return Defective Product sDR2: Deliver Return MRO Product sDR3: Deliver Return Excess Product
AG.3.32	Current Delivery Volume	Number of orders shipped	sD1: Deliver Stocked Product sD2: Deliver Make-to-Order Product sD3: Deliver Engineer-to-Order Product sD4: Deliver Retail Product
AG.3.33	Current internal equipment capacity utilization	Current utilization of internal equipment capacity, including manufacturing equipment, materials handling and packaging equipment, etc.	sEP.5: Manage Integrated Supply Chain Capital Assets, sES.5: Manage Capital Assets, sEM.5: Manage Make Equipment and Facilities, sED.5: Manage Deliver Capital Assets sER.5: Manage Return Capital Assets
AG.3.34	Current Internal facility/storage capacity utilization	Current utilization of internal facility/ storage capacity, including facilities, space.	sEP.5: Manage Integrated Supply Chain Capital Assets, sES.5: Manage Capital Assets, sEM.5: Manage Make Equipment and Facilities, sED.5: Manage Deliver Capital Assets sER.5: Manage Return Capital Assets

Metric ID	Metric Name	Metric Definition	Process
AG.3.35	Current Internal Storage capacity utilization	Current utilization of internal facility/ storage capacity, including facilities, space.	sEP.5: Manage Integrated Supply Chain Capital Assets, sES.5: Manage Capital Assets, sEM.5: Manage Make Equipment and Facilities, sED.5: Manage Deliver Capital Assets sER.5: Manage Return Capital Assets
AG.3.36	Current Inventory on hand (FG)	Current on hand inventories (finished goods), including safety stock required to sustain current order fulfillment, assuming optimized inventory practices	sED.4: Manage Finished Goods Inventories
AG.3.37	Current Inventory on Hand (WIP, FG)	Current on hand inventories (work in process and purchased finished goods), including safety stock required to sustain current order fulfillment, assuming optimized inventory practices	sEM.4: Manage In-Process Products, sED.4: Manage Finished Goods Inventories
AG.3.38	Current Make Volume	Amount of each item which are manufactured	sM1: Make-to-Stock sM2: Make-to-Order sM3: Engineer-to-Order
AG.3.39	Current On-hand inventories (Raw, Purchased, FG)	Current on hand inventories (raw material and purchased finished goods), including safety stock required to sustain current order fulfillment, assuming optimized inventory practices	sES.4: Manage Product Inventory, sEM.4: Manage In-Process Products, sED.4: Manage Finished Goods Inventories
AG.3.40	Current Purchase Order Cycle Times	Sum of time to place a purchase order and supplier lead time	sS1: Source Stocked Product sS2: Source Make-to-Order Product sS3: Source Engineer-to-Order Product
AG.3.41	Current source return volume	current return volume, number of orders returned	sSR1: Source Return Defective Product sSR3: Source Return Excess Product
AG.3.42	Current Source Volume	Amount of each item which are purchased	sS1: Source Stocked Product sS2: Source Make-to-Order Product sS3: Source Engineer-to-Order Product
AG.3.43	Current Sourcing/ Supplier Constraints	Current contract terms and nature of items (commodity/sole source)	sES.10: Manage Supplier Agreements
AG.3.44	Customer return order cycle time reestablished and sustained in 30 days	Customer return order cycle time reestablished and sustained for increased quantities returned from customer given 30 days, including customer return order processing cycle time, transit time, return processing and disposition cycle time, etc.	sDR1: Deliver Return Defective Product sDR2: Deliver Return MRO Product sDR3: Deliver Return Excess Product

Metric ID	Metric Name	Metric Definition	Process
AG.3.45	Customer Service staff/Logistics labor availability	Customer service staff / Logistics labor availability	
AG.3.46	Demand sourcing-supplier constraints	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%	sS1: Source Stocked Product sS2: Source Make-to-Order Product sS3: Source Engineer-to-Order Product
AG.3.47	Direct Labor Availability	Labor needed to meet current demand, productivity-units/orders per FTE	sEM.2: Manage Production Performance
AG.3.48	Internal and External (3PL) equipment capacity needed for current delivery volume	Internal and external (3PL) capacity needed for current demand throughput in fleet equipment, outside carrier loads, materials handling equipment, etc.	sED.5: Manage Deliver Capital Assets sED.6: Manage Transportation
AG.3.49	Internal and External (3PL) Equipment capacity needed for current return volume	Internal and external (3PL) capacity needed for current return throughput in fleet equipment, outside carrier loads, materials handling equipment, etc.	sER.5: Manage Return Capital Assets sER.6: Manage Return Transportation sER.7: Manage Return Network Configuration
AG.3.50	Internal and External (3PL) Equipment needed for current return volume	Internal and External (3PL) Equipment needed for current return volume	sER.5: Manage Return Capital Assets sER.6: Manage Return Transportation sER.7: Manage Return Network Configuration
AG.3.51	Internal and External (3PL) storage capacity needed for current delivery volume	Internal and external (3PL) capacity needed for current demand throughput in facilities and space.	sED.5: Manage Deliver Capital Assets sED.6: Manage Transportation
AG.3.52	Internal and External (3PL) storage capacity needed for current return volume	Internal and external (3PL) capacity needed for current return throughput in facilities and space.	sER.5: Manage Return Capital Assets sER.6: Manage Return Transportation sER.7: Manage Return Network Configuration

Metric ID	Metric Name	Metric Definition	Process
AG.3.53	Internal and External facilities/ storage capacity needed for current make volume	Internal and external (outsourced) capacity needed for current demand throughput in facilities and space	sEM.5: Manage Make Equipment and Facilities sEM.6: Manage Make Transportation sEM.7: Manage Make Network
AG.3.54	Internal and External manufacturing equipment capacity needed for current make volume	Internal and external (outsourced) capacity needed for current demand throughput in manufacturing equipment	sEM.5: Manage Make Equipment and Facilities sEM.6: Manage Make Transportation sEM.7: Manage Make Network
AG.3.55	Internal Event Response (average days)	The average response time (in days) to an internal risk event from the time of the event (included detection lags)	sEP.9: Manage Supply Chain Plan Risk sES.9: Manage Supply Chain Source Risk sEM.9: Manage Supply Chain Make Risk sED.9: Manage Supply Chain Deliver Risk sER.9: Manage Supply Chain Return Risk
AG.3.56	Logistics order cycle time reestablished and sustained in 30 days	Logistics order cycle time reestablished and sustained for increased quantities produced given 30 days, including customer order processing cycle time, dock-to-stock cycle time, pick-to-ship cycle, transit time, etc	sED.5: Manage Deliver Capital Assets, sED.6: Manage Transportation
AG.3.57	Manufacturing cycle time reestablished and sustained in 30 days	Manufacturing cycle time reestablished and sustained for increased quantities produced given 30 days	sEM.5: Manage Make Equipment and Facilities sEM.6: Manage Make Transportation sEM.7: Manage Make Network
AG.3.59	Procurement Staff Availability	Staff availability in procurement	sES.7: Manage Supplier Network
AG.3.60	Procurement staff/Logistics labor availability	Procurement staff / Logistics labor availability	sES.7: Manage Supplier Network

Metric ID	Metric Name	Metric Definition	Process
AG.3.61	Productivity orders shipped per FTE	Productivity-order shipped per FTE to meet current requirements	sED.2: Assess Delivery Performance
AG.3.62	Productivity-orders returned per FTE	Productivity orders returned per FTE	sER.2: Manage Performance of Return Processes
AG.3.63	Productivity-Purchase orders per FTE	Productivity-purchase order per FTE to meet current requirements	sES.2: Assess Supplier Performance
AG.3.64	Productivity-units/orders produced per FTE	Productivity-purchase order per FTE to meet current requirements	sEM.2: Manage Production Performance
AG.3.65	Purchase order cycle time reestablished and sustained in 30 days	Procurement order cycle time reestablishment and sustained for increased quantities sourced given 30 days, including time to place a purchase order and supplier lead time	sES.7: Manage Supplier Network sES.10: Manage Supplier Agreements
AG.3.66	Reduced delivery volume	Reduced delivery volume to be determined given ramped down resources	sED.5: Manage Deliver Capital Assets
AG.3.67	Reduced Make volume	Reduced make volume to be determined given ramped down resources	sEM.5: Manage Make Equipment and Facilities sEM.6: Manage Make Transportation sEM.7: Manage Make Network
AG.3.68	Reduced source volumes accomplished in 30 days	Reduced source volume to be determined given ramped down resources	sES.5: Manage Source Capital Assets sES.6: Manage Incoming Product sES.7: Manage Supplier Network sES.10: Manage Supplier Agreements
AG.3.69	Supplemental outsource/lease availability	Including facilities, leasing building, leasing manufacturing equipment, materials handling and packaging equipment, co packers, etc.	sEM.7: Manage Production Network
AG.3.70	Supplemental outsource/lease termination ability	Including facilities, leasing building, leasing manufacturing equipment, materials handling and packaging equipment, co packers, etc.	sEM.7: Manage Production Network
AG.3.71	Time needed to increase inventory (FG) for additional order fulfillment	Amount of time needed to increase finished inventory for order fulfillment (time to receive/stock inventory) including safety stock to sustain 20% increase in quantities sourced	sEP.4: Manage Integrated Supply Chain Inventory

Metric ID	Metric Name	Metric Definition	Process
AG.3.72	Time needed to increase inventory (WIP, FG) for additional order fulfillment	Amount of time needed to receive and phase in raw material inventory for manufacturing and make WIP and FG (work in process and purchased finished goods) inventory, including safety stock to sustain 20% increase in quantities sourced	sEP.4: Manage Integrated Supply Chain Inventory
AG.3.73	Time needed to increase inventory for additional order fulfillment (Raw, Purchase	Amount of time needed to obtain, deliver and phase in inventory (raw material and purchased finished goods) for order fulfillment, including safety stock to sustain 20% increase in quantities sourced	sEP.4: Manage Integrated Supply Chain Inventory
AG.3.74	Time needed to obtain additional capital	Amount of time needed to obtain capital to fill gap between current capital availability and capital needed to sustain 20% increase in quantities ordered	sEP.10: Align Supply Chain Unit Plan with Financial Plan
AG.3.75	Time needed to obtain additional equipment	Amount of time needed to obtain assets/capacity to fill gap between underutilized asset capacity and assets needed to sustain 20% increase in quantities delivered in equipments	sEP.5: Manage Integrated Supply Chain Capital Assets sES.5: Manage Capital Assets sEM.5: Manage Make Equipment and Facilities sED.5: Manage Deliver Capital Assets sER.5: Manage Return Capital Assets
AG.3.76	Time needed to obtain additional internal space	Amount of time needed to obtain assets/capacity to fill gap between underutilized asset capacity and assets needed to sustain 20% increase in quantities delivered in internal space	sEP.5: Manage Integrated Supply Chain Capital Assets sES.5: Manage Capital Assets sEM.5: Manage Make Equipment and Facilities sED.5: Manage Deliver Capital Assets sER.5: Manage Return Capital Assets
AG.3.77	Time needed to obtain supplemental outsourced (3PL) or leased resources or facilities	Amount of time needed to obtain supplemental outsourced or leased resources or facilities to sustain 20% increase in quantities delivered	sES.5: Manage Source Capital Assets sES.6: Manage Incoming Product sES.7: Manage Supplier Network, sEM.5: Manage Make Equipment and Facilities sEM.6: Manage Make Transportation sEM.7: Manage Make Network sED.5: Manage Deliver Capital Assets sED.6: Manage Transportation sER.5: Manage Return Capital Assets sER.6: Manage Return Transportation sER.7: Manage Return Network Configuration

Metric ID	Metric Name	Metric Definition	Process
AG.3.78	Time needed to obtain supplemental outsourced or leased resources or facilities	Amount of time needed to obtain supplemental outsourced or leased resources or facilities to sustain 20% increase in quantities made	sES.5: Manage Source Capital Assets sES.6: Manage Incoming Product sES.7: Manage Supplier Network, sEM.5: Manage Make Equipment and Facilities sEM.6: Manage Make Transportation sEM.7: Manage Make Network sED.5: Manage Deliver Capital Assets sED.6: Manage Transportation sER.5: Manage Return Capital Assets sER.6: Manage Return Transportation sER.7: Manage Return Network Configuration
AG.3.79	Time needed to recruit/hire/train additional labor	Amount of time needed to recruit/ hire/train additional labor to fill gap between underutilized FTE's and labor needed to sustain 20% increase in quantities manufactured	
AG.3.80	Time needed to recruit/hire/train additional staff	Amount of time needed to recruit/hire/ train additional staff to fill gap between underutilized FTE's and staff needed to sustain 20% increase in quantities delivered	
AG.3.81	Time needed to recruit/hire/train additional staff/ labor	Amount of time needed to recruit/ hire/train additional labor to fill gap between underutilized FTE's and labor needed to sustain 20% increase in quantities returned to suppliers	

Total Supply Chain Management Cost

The sum of the costs associated with the SCOR Level 2 processes to Plan, Source, Deliver, and Return.

Note - Cost of Raw Material and Make Costs are generally accounted for in COGS. It is recognized that there is likely to be overlap/ redundancy between supply chain management costs and COGS.

Qualitative Relationship Description

None Identified

Quantitative Relationship (optional, if calculable)

TSCMC = Cost to Plan + Source + Make + Deliver + Return + Mitigate Supply Chain Risk

Calculation

TSCMC = Sales – Profits – Cost to Serve (e.g., marketing, selling, administrative)

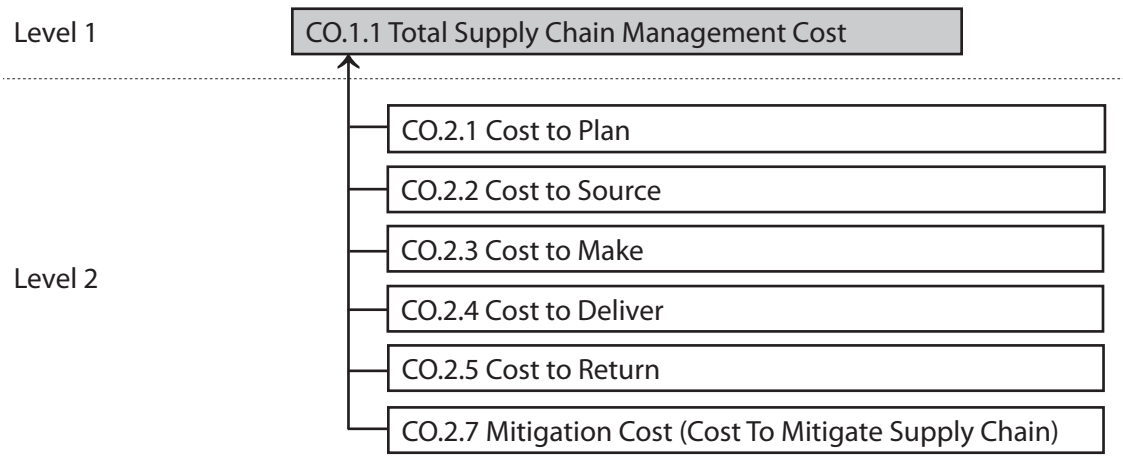
Data Collection

Resource expenses (e.g., salaries, supplies, etc.) are initially captured in the organization's general ledger accounting system. Then these expenses are traced and assigned (i.e., distributed) to the organizations "horizontal" core processes based employee time and non wage-related factors (drivers; e.g., # of units consumed). Data for these expense distribution assignments are collected from (1) employee time collection systems (or % split estimates), and (2) operational systems (e.g., enterprise resource planning [ERP] systems).

Discussion

Collecting transactional information, primarily resource expenses and operational "drivers", is now commonplace. The challenging task is to logically transform these expenses into calculated costs of the "horizontal" processes based on cause-and-effect relationships without the temptation of using broad averages or arbitrary factors.

Hierarchical Metric Structure



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).
Note - Cost of Raw Material and Make Costs are generally accounted for in COGS. It is recognized that there is likely to be overlap/ redundancy between supply chain management costs and COGS.

Qualitative Relationship Description

None Identified

Quantitative Relationship (optional, if calculable)

Cost of Goods Sold (COGS) = Cost to Make

Calculation

COGS = direct material costs + direct labor costs + indirect costs related to making product

Data Collection

Resource expenses (e.g., salaries, supplies, etc.) are initially captured in the organization's general ledger accounting system. Then these expenses are traced and assigned (i.e., distributed) to the organizations "horizontal" core processes based employee time and non wage-related factors (drivers; e.g., # of units consumed). Data for these expense distribution assignments are collected from (1) employee time collection systems (or % split estimates), and (2) operational systems (e.g., enterprise resource planning [ERP] systems).

Discussion

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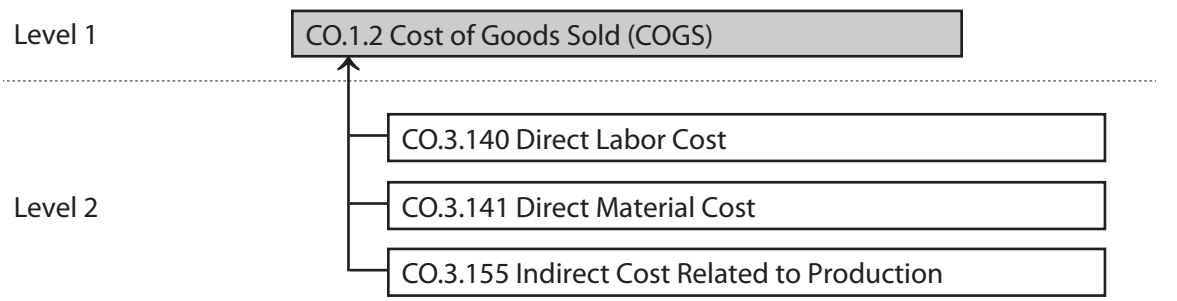
Hierarchical Metric Structure



Cost to Plan

The sum of the costs associated with Plan. (Processes: sP1, sP2, sP3, sP4, sP5)

Qualitative Relationship Description

None Identified

Quantitative Relationship (optional, if calculable)

Cost to Plan = Sum of Cost to Plan (Plan + Source + Make + Deliver + Return)

Calculation

None Identified

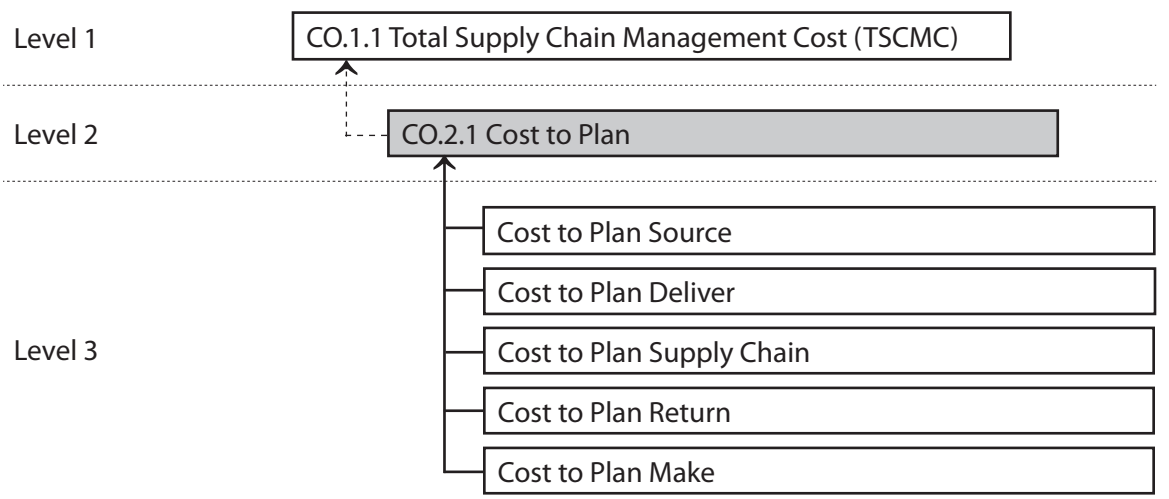
Data Collection

Resource expenses (e.g., salaries, supplies, etc.) are initially captured in the organization's general ledger accounting system. Then these expenses are traced and assigned (i.e., distributed) to the organizations "horizontal" core processes based employee time and non wage-related factors (drivers; e.g., # of units consumed). Data for these expense distribution assignments are collected from (1) employee time collection systems (or % split estimates), and (2) operational systems (e.g., enterprise resource planning [ERP] systems).

Discussion

Collecting transactional information, primarily resource expenses and operational "drivers", is now commonplace. The challenging task is to logically transform these expenses into calculated costs of the "horizontal" processes based on cause-and-effect relationships without the temptation of using broad averages or arbitrary factors.

Hierarchical Metric Structure



CO.2.2

Cost to Source

The sum of the costs associated with Source. (Processes: sS1, sS2, sS3)

Qualitative Relationship Description

None Identified

Quantitative Relationship (optional, if calculable)

Cost to Source = Sum of Cost for (Supplier Management + Material Acquisition Management)

Calculation

- Supplier Management = material planning + planning procurement staff + supplier negotiation and qualification + etc.
- Material Acquisition Management = bidding and quotations + ordering + receiving + incoming material inspection + material storage + payment authorization + sourcing business rules and rqmts. + inbound freight and duties + etc.

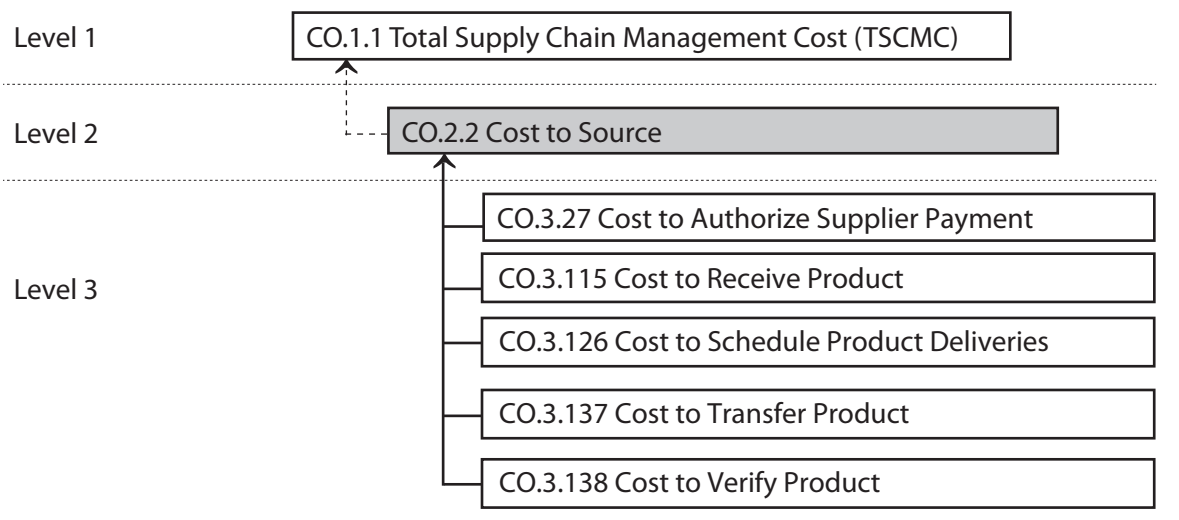
Data Collection

Resource expenses (e.g., salaries, supplies, etc.) are initially captured in the organization's general ledger accounting system. Then these expenses are traced and assigned (i.e., distributed) to the organizations "horizontal" core processes based employee time and non wage-related factors (drivers; e.g., # of units consumed). Data for these expense distribution assignments are collected from (1) employee time collection systems (or % split estimates), and (2) operational systems (e.g., enterprise resource planning [ERP] systems).

Discussion

Collecting transactional information, primarily resource expenses and operational "drivers", is now commonplace. The challenging task is to logically transform these expenses into calculated costs of the "horizontal" processes based on cause-and-effect relationships without the temptation of using broad averages or arbitrary factors.

Hierarchical Metric Structure



Cost to Make

The sum of the costs associated with Make.
Note - Cost of Raw Material and Make Costs are generally accounted for in COGS. It is recognized that there is likely to be overlap/ redundancy between supply chain management costs and COGS. (Processes: sM1, sM2, sM3)

Qualitative Relationship Description

None Identified

Quantitative Relationship (optional, if calculable)

Cost to Make = Sum of Direct Material, Direct Labor, and Direct non-Material Product-related Cost (equipment) and of Indirect Product-related Cost

Calculation

Cost to Make = Sum of Direct Material, Direct Labor, and Direct non-Material Product-related Cost (equipment) and Indirect Product-related Cost NOT part of CO.1.2 Cost of Goods Sold.

Data Collection

Resource expenses (e.g., salaries, supplies, etc.) are initially captured in the organization's general ledger accounting system. Then these expenses are traced and assigned (i.e., distributed) to the organizations "horizontal" core processes based employee time and non wage-related factors (drivers; e.g., # of units consumed). Data for these expense distribution assignments are collected from (1) Employee time collection systems (or % split estimates), and (2) Operational systems (e.g., enterprise resource planning [ERP] systems). In some cases, (1) direct material data is maintained at the "unit level" in bills of material (BOMs) or recipe formulas; and (2) direct labor and direct non-material product (equipment) data is maintained at the "unit level" in labor/machine routings or process sheets.

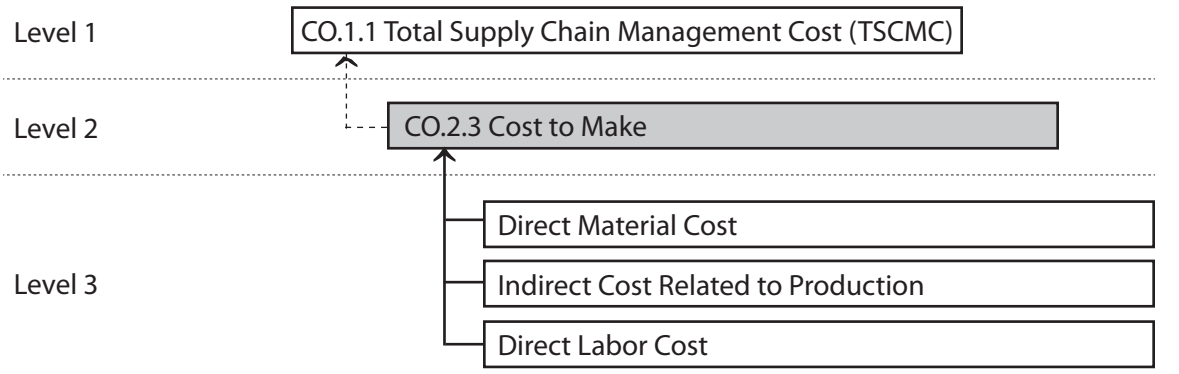
Discussion

Cost to Make includes all Make related cost NOT included in CO.1.2 Cost of Goods Sold. In SCOR 10 Cost of Goods Sold and Cost to Make have been clearly separated to avoid the ongoing confusion. CO.1.1 should not include any of the cost included in CO.1.2 Cost of Goods Sold.

Collecting transactional information, primarily resource expenses and operational "drivers", is now commonplace. The challenging task is to logically transform these expenses into calculated costs of (1) the "horizontal" processes (referenced in Lean environments as "value-stream mapping"), and (2) products (or intermediate outputs) – with both types of calculations based on cause-and-effect relationships without the temptation of using broad averages or arbitrary factors.

CO.2.3

Hierarchical Metric Structure



Cost to Deliver and/or Install

The sum of the costs associated with Deliver and/or Install. (Processes: sD1, sD2, sD3)

Qualitative Relationship Description

None Identified

Quantitative Relationship (optional, if calculable)

Cost to Deliver = Sum of Cost of (Sales order management + Customer Management)

Calculation

- Sales order management = inquiry & quotations + order entry & maintenance + channel management + order fulfillment + distribution + transportation + outbound freight and duties + installation + customer invoicing / accounting + new product release / phase-in + etc.
- Customer Management = financing + post-sales customer service + handling disputes + field repairs + enabling technologies + etc.

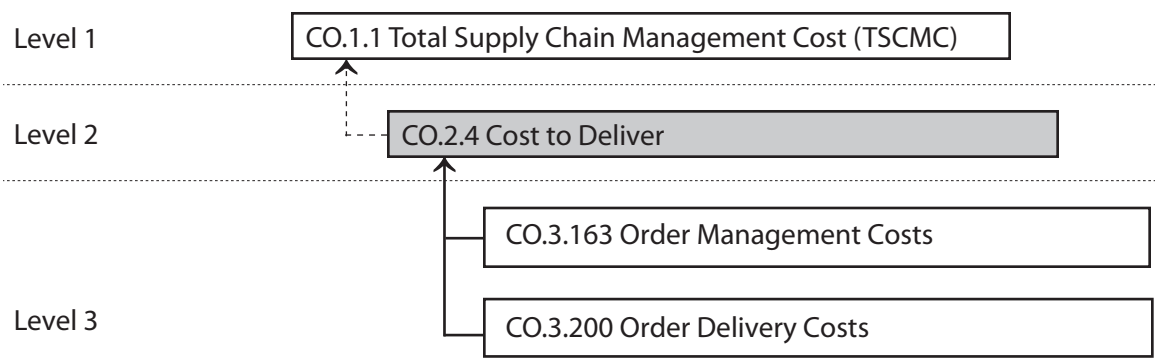
Data Collection

Resource expenses (e.g., salaries, supplies, etc.) are initially captured in the organization's general ledger accounting system. Then these expenses are traced and assigned (i.e., distributed) to the organizations "horizontal" core processes based employee time and non wage-related factors (drivers; e.g., # of units consumed). Data for these expense distribution assignments are collected from (1) employee time collection systems (or % split estimates), and (2) operational systems (e.g., enterprise resource planning [ERP] systems).

Discussion

Collecting transactional information, primarily resource expenses and operational "drivers", is now commonplace. The challenging task is to logically transform these expenses into calculated costs of the "horizontal" processes based on cause-and-effect relationships without the temptation of using broad averages or arbitrary factors.

Hierarchical Metric Structure



Cost to Return

Cost to Return Defective Product - The sum of the costs associated with returning a defective product to the supplier. (Processes: sSR1, sDR1) Cost to Return Excess Product - The sum of the costs associated with returning excess product to the supplier. (Processes: sSR3, sDR3) Cost to Return MRO Product - The sum of the costs associated with returning MRO product to the supplier. (Processes: sSR2, sDR2)

Qualitative Relationship Description

None Identified

Quantitative Relationship (optional, if calculable)

Cost to Return = Sum of Cost to Return (to Sources + from Customers)

Calculation

- Cost to Return to Source (sSRx) = Verify Defective Product Costs + Disposition of Defective Product Costs + Identify MRO Condition Costs + Request MRO Return Authorization Costs + Schedule MRO Shipment Costs + Return MRO Product Costs + etc.
- Cost to Return From Customer (sDRx) = Authorization Costs + Schedule Return Costs + Receive Costs + Authorize MRO Return Costs + Schedule MRO Return Costs + Receive MRO Return Costs + Transfer MRO Product Costs + etc.

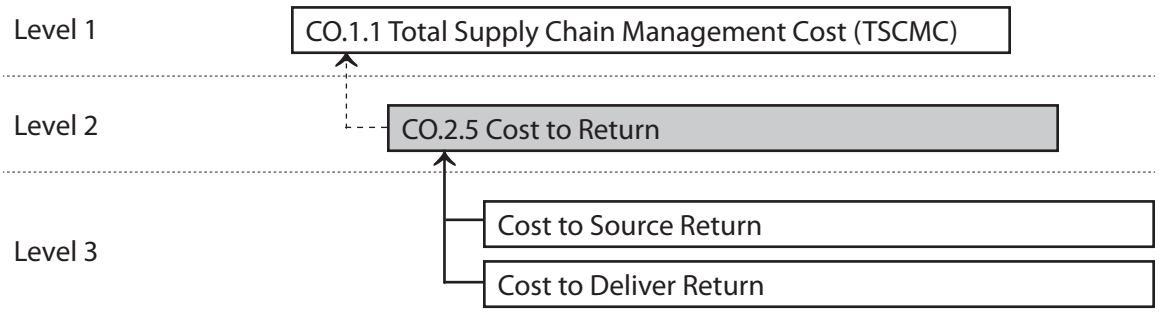
Data Collection

Resource expenses (e.g., salaries, supplies, etc.) are initially captured in the organization's general ledger accounting system. Then these expenses are traced and assigned (i.e., distributed) to the organizations "horizontal" core processes based employee time and non wage-related factors (drivers; e.g., # of units consumed). Data for these expense distribution assignments are collected from (1) employee time collection systems (or % split estimates), and (2) operational systems (e.g., enterprise resource planning [ERP] systems).

Discussion

Collecting transactional information, primarily resource expenses and operational "drivers", is now commonplace. The challenging task is to logically transform these expenses into calculated costs of the "horizontal" processes based on cause-and-effect relationships without the temptation of using broad averages or arbitrary factors.

Hierarchical Metric Structure



Mitigation Cost (Costs to Mitigate Supply Chain Risk)

Mitigation Cost ($) is a diagnostic metric for CO.1.1: Supply Chain Management Cost (total). The sum of the costs associated with managing non-systemic risks that arise from special cause variations withing the supply chain (defined as variations which are not predictable; have an assignable cause; and it's pattern of occurrence are not inherent to the system's behavior; rather are un-natural) (see Discussion section below for more information).

Qualitative Relationship Description

None Identified

Quantitative Relationship (optional, if calculable)

Mitigation Costs (Cost to Mitigate Supply Chain Risk) = Sum of Supply Chain Risk Mitigation Costs (Plan + Source + Make + Deliver + Return)

Calculation

Mitigation Costs (Cost to Mitigate Non-Systemic Supply Chain Risk) = Sum of Supply Chain Risk Mitigation Costs (Plan + Source + Make + Deliver + Return)

Data Collection

The total supply chain risk mitigation cost of all mitigation actions for non-systemic risks in a specific area, supplier, product, etc. ($)

Discussion

Sourced from the book "Risk Management Essentials - What Every Business Professional Should Know" by Rai Chowdhary

"Determining the costs for risk mitigation can be confusing – since one could argue much of what gets done in business is to manage risks of one form or another. How is one to decide between the normal cost of doing business, and the "extra" cost incurred for risk mitigation?

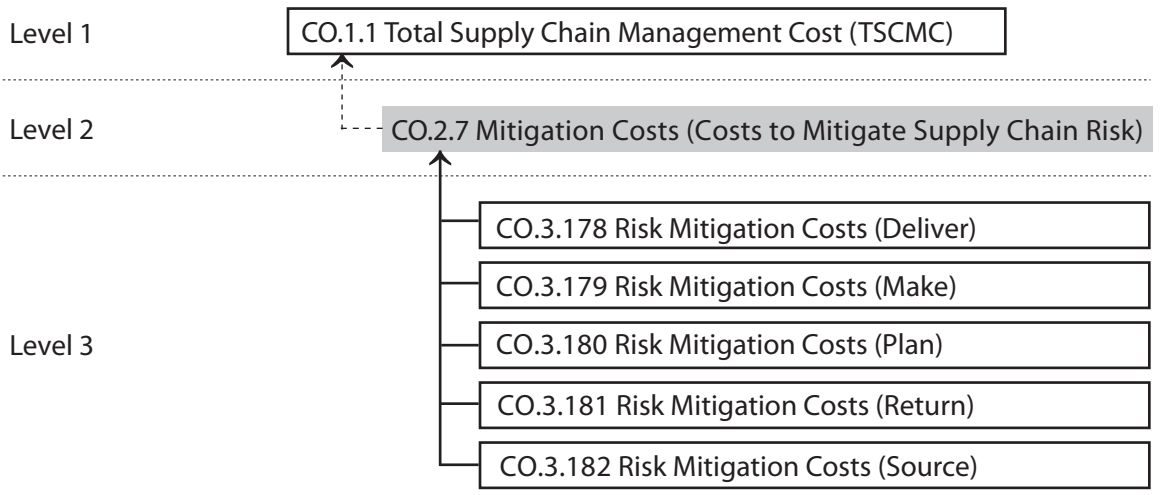
To address this question we will draw upon the terms used by Deming and Shewhart to describe Variation. Two distinct types of variation were defined - Common cause variation, and Special cause variation.

Common cause variation is that which is inherent to the system, and is predictable via probabilistic analysis. There are not clear assignable causes – but a multitude of causes might exist to give rise to such variation. To control common cause variation one needs to work on improving the system at large.

Special cause variation is that which is not predictable, and has an assignable cause. Its pattern of occurrence is not inherent to the system's behavior; rather it is un-natural.

Based on the above, we can say that risks can be categorized into two types – those that are inherent to the way the system is setup – these we will call Systemic Risks and the costs associated with the mitigation of these shall be treated as the normal cost of doing business. The other risks – those that arise out of assignable causes / events and are unpredictable shall be referred to as Non-Systemic Risks. The costs associated with the management of these risks should be captured separately - under mitigation costs. Doing so enables the organization to "see" the costs of such risks, and determine where additional controls and / or vigilance will be helpful. "

Hierarchical Metric Structure



Processes

sEP.9 Manage Supply Chain Plan Risk
sES.9 Manage Supply Chain Source Risk
sEM.9 Manage Supply Chain Make Risk
sED.9 Manage Supply Chain Deliver Risk
sER.9 Manage Supply Chain Return Risk

Level 3 Cost Metrics

Metric ID	Metric Name	Metric Definition	Process
CO.3.1	% Defective Product Scheduling Cost to Total Source Return Cost	% Defective Product Scheduling Cost to Total Source Return Cost	sSR1.4: Schedule Defective Product Shipment
CO.3.2	% Excess Product Scheduling Cost to Total Source Return Cost	% Excess Product Scheduling Cost to Total Source Return Cost	sSR3.4: Schedule Excess Product Shipment
CO.3.3	% MRO Scheduling Cost to Total Source Return Cost	% MRO Scheduling Cost to Total Source Return Cost	sSR2.4: Schedule MRO Shipment
CO.3.4	% of authorization request transmitted error-free/total authorization requests	% of authorization request transmitted error-free/total authorization requests	sSR3.3: Request Excess Product Return Authorization sSR2.3: Request MRO Return Authorization
CO.3.5	% of excess packaging per unit	Weight of packaging material that is not needed to protect the product during shipping as a per cent of total packaging material used	sM1.4: Package sM2.4: Package sM3.5: Package
CO.3.6	% of paints used that are non-toxic	The volume of paint that does not include toxic ingredients as a percent of total paint volume used	sEM.6: Manage Transportation (WIP)
CO.3.7	% of pallets that are reusable	Number of reusable pallets used as a percent of total pallets used	sEM.6: Manage Transportation (WIP)
CO.3.8	% of solid waste consisting of packaging material	The weight of packaging material waste as a percent of total solid waste generated.	sM1.3: Produce and Test sM3.4: Produce and Test sM2.3: Produce and Test
CO.3.9	% of trucks using retread tires	Number of trucks using retreaded tires as a percent of trucks in the carrier fleet	sEM.6: Manage Transportation (WIP)

Metric ID	Metric Name	Metric Definition	Process
CO.3.10	% of vehicle fuel derived from alternative fuels	The portion of transfer vehicle fuels that are non-petroleum based	sM1.2: Issue Material sS1.4: Transfer Product sM3.3: Issue Sourced/In-Process Product sEM.6: Manage Transportation (WIP) sED.6: Manage Transportation sM2.2: Issue Sourced/In-Process Product
CO.3.11	% of warehouse loading machinery using MFBs	The percent of warehouse machines using maintenance free batteries	sES.4: Manage Product Inventory
CO.3.12	% packaging material consisting of post-consumer recycled content	Weight of recycled packaging material as a per cent of total packaging material used	sM1.4: Package sM2.4: Package sM3.5: Package
CO.3.13	% packaging material that is biodegradable	Weight of biodegradable packaging material as a per cent of total packaging material used	sM1.4: Package sM2.4: Package sM3.5: Package
CO.3.14	% packaging material that is recyclable/ reusable	Weight of packaging material that can be effectively recycled as a per cent of total packaging material used	sM1.4: Package sM2.4: Package sM3.5: Package
CO.3.15	Air emissions	The weight of air pollutant emitted per weight of finished good produced	sM1.3: Produce and Test sM2.3: Produce and Test sM3.4: Produce and Test
CO.3.16	Assessment / Risk Management Costs ($)	The cost of risk assessment and management activities for a specific area, supplier, product, etc.($)	sEP.9: Manage Supply Chain Plan Risk sES.9: Manage Supply Chain Source Risk sEM.9: Manage Supply Chain Make Risk sED.9: Manage Supply Chain Deliver Risk sER.9: Manage Supply Chain Return Risk
CO.3.17	Cost of identifying the defective condition as a % of total Source cost	Cost of identifying the defective condition as a % of total Source cost	sSR1.1: Identify Defective Product Condition

Metric ID	Metric Name	Metric Definition	Process
CO.3.18	Cost of Identifying the MRO Condition as a % of Total Source Return Cost	Cost of Identifying the MRO Condition as a % of Total Source Return Cost	sSR2.1: Identify MRO Product Condition
CO.3.19	Cost of identifying the excess condition as a % of total Source cost	Cost of identifying the excess condition as a % of total Source cost	sSR3.1: Identify Excess Product Condition
CO.3.20	Cost per request authorization	Cost per request authorization	sSR1.5: Return Defective Product sSR2.5: Return MRO Product sSR3.5: Return Excess Product sSR1.3: Request Defective Product Return Authorization sSR2.3: Request MRO Return Authorization sSR3.3: Request Excess Product Return Authorization
CO.3.21	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.	sEP.10: Align Supply Chain Unit Plan with Financial Plan
CO.3.22	Cost to Assess Delivery Performance	The sum of the costs associated with assessing delivery performance.	sED.2: Assess Delivery Performance
CO.3.23	Cost to Assess Supplier Performance	The sum of the costs associated with assessing supplier performance.	sES.2: Assess Supplier Performance
CO.3.24	Cost to Authorize Defective Product Return	The sum of the costs associated with authorizing the return of defective product.	sDR1.1: Authorize Defective Product Return
CO.3.25	Cost to Authorize Excess Product Return	The sum of the costs associated with authorizing the return of excess product.	sDR3.1: Authorize Excess Product Return
CO.3.26	Cost to Authorize MRO Product Return	The sum of the costs associated with authorizing the return of product to be maintained, repaired, or overhauled.	sDR2.1: Authorize MRO Product Return
CO.3.27	Cost to Authorize Supplier Payment	The sum of the costs associated with authorizing supplier payment.	sS1.5: Authorize Supplier Payment sS2.5: Authorize Supplier Payment sS3.7: Authorize Supplier Payment

Metric ID	Metric Name	Metric Definition	Process
CO.3.28	Cost to Balance Production Resources with Production Requirements	The sum of the costs associated with identifying, assessing and aggregating production resources.	sP3.3: Balance Production Resources with Production Requirements
CO.3.29	Cost to Balance Product Resources with Product Requirements	The sum of the costs associated with balance of product resources with product requirements.	sP2.3: Balance Product Resources with Product Requirements
CO.3.30	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.	sP1.3: Balance Supply Chain Resources with SC Requirements
CO.3.31	Cost to Build Loads	The sum of the costs associated with building transportation loads.	sD1.5: Build Loads sD2.5: Build Loads sD3.5: Build Loads
CO.3.32	Cost to Checkout	The sum of the costs associated with product checkout.	sD4.6: Checkout
CO.3.33	Cost to Consolidate Orders	The sum of the costs associated with consolidating customer orders.	sD1.4: Consolidate Orders sD2.4: Consolidate Orders
CO.3.34	Cost to Deliver and/or Install	The sum of the costs associated with deliver and/or install	sD4.7: Deliver and/or Install
CO.3.35	Cost to Deliver Return	Cost to Return From Customer (DRx) = Authorization Costs + Schedule Return Costs + Receive Costs + Authorize MRO Return Costs + Schedule MRO Return Costs + Receive MRO Return Costs + Transfer MRO Product Costs + etc.	sDR1: Deliver Return Defective Product sDR2: Deliver Return MRO Product
CO.3.36	Cost to Enter Order, Commit Resources & Launch Program	The sum of the costs associated with entering the order, committing resources & launching a program.	sD3.3: Enter Order, Commit Resources Launch Program
CO.3.37	Cost to Establish and Communicate Return Plans	The sum of the costs associated with establishing and communicating return plans.	sP5.4: Establish and Communicate Return Plans
CO.3.38	Cost to Establish and Communicate Supply Chain Plans	The sum of the costs associated with establishing and communicating supply chain plans.	sP1.4: Establish & Communicate Supply-Chain Plans

Metric ID	Metric Name	Metric Definition	Process
CO.3.39	Cost to Establish Delivery Plans	The sum of the costs associated with establishing and communicating deliver plans.	sP4.4: Establish Delivery Plans
CO.3.40	Cost to Establish Production Plans	The sum of the costs associated with establishing and communicating production plans.	sP3.4: Establish Production Plans
CO.3.41	Cost to Establish Sourcing Plans	The sum of the costs associated with establishing and communicating source plans.	sP2.4: Establish Sourcing Plans
CO.3.42	Cost to Fill Shopping Cart	The sum of the costs associated with filling a shopping cart.	sD4.5: Fill Shopping Cart
CO.3.43	Cost to Finalize Production Engineering	The sum of the costs associated with finalizing production engineering.	sM3.1: Finalize Production Engineering
CO.3.44	Cost to Generate Stocking Schedule	The sum of the costs associated with generating a stocking schedule.	sD4.1: Generate Stocking Schedule
CO.3.45	Cost to Identify Sources of Supply	The sum of the costs associated with identifying sources of supply.	sS3.1: Identify Sources of Supply
CO.3.46	Cost to Identify, Assess, and Aggregate Delivery Resources	The sum of the costs associated with identifying, assessing and aggregating delivery resources.	sP4.2: Identify, Assess and Aggregate Delivery Resources sP4.3: Balance Delivery Resources and Capabilities with Delivery Requirements
CO.3.47	Cost to Identify, Assess, and Aggregate Product Resources	The sum of the costs associated with identifying, assessing and aggregating product resources.	sP2.2: Identify, Assess and Aggregate Product Resources
CO.3.48	Cost to Identify, Assess, and Aggregate Production Resources	The sum of the costs associated with identifying, assessing and aggregating production resources.	sP3.2: Identify, Assess and Aggregate Production Resources
CO.3.49	Cost to Identify, Assess, and Aggregate Return Resources	The sum of the costs associated with identifying, assessing and aggregating return resources.	sP5.2: Identify, Assess, and Aggregate Return Resources sP5.3: Balance Return Resources with Return Requirements
CO.3.50	Cost to Identify, Assess, and Aggregate Supply Chain Resources	The sum of the costs associated with identifying, assessing and aggregating supply chain resources.	sP1.2: Identify, Prioritize and Aggregate SC Resources

Metric ID	Metric Name	Metric Definition	Process
CO.3.51	Cost to Identify, Prioritize, and Aggregate Delivery Requirements	The sum of the costs associated with identifying, assessing and aggregating deliver requirements	sP4.1: Identify, Prioritize and Aggregate Delivery Requirements
CO.3.52	Cost to Identify, Prioritize, and Aggregate Product Requirements	The sum of the costs associated with identifying, assessing and aggregating deliver requirements.	sP2.1: Identify, Prioritize and Aggregate Product Requirements
CO.3.53	Cost to Identify, Prioritize, and Aggregate Production Requirements	The sum of the costs associated with identifying, assessing and aggregating production requirements	sP3.1: Identify, Prioritize and Aggregate Production Requirements
CO.3.54	Cost to Identify, Prioritize, and Aggregate Return Requirements	The sum of the costs associated with identifying, assessing and aggregating return requirements.	sP5.1: Assess and Aggregate Return Requirements
CO.3.55	Cost to Identify, Prioritize, and Aggregate Supply Chain Requirements	The sum of the costs associated with identifying, assessing and aggregating supply chain requirements.	sP1.1: Identify, Prioritize and Aggregate SC Requirements
CO.3.56	Cost to Install Product	The sum of the costs associated with product installation.	sD1.14: Install Product sD2.14: Install Product sD3.14: Install Product
CO.3.57	Cost to Invoice	The sum of the costs associated with invoicing.	sD1.15: Invoice
CO.3.58	Cost to Issue Material	The sum of the costs associated with issuing material.	sM1.2: Issue Material
CO.3.59	Cost to Issue Sourced/In-Process Product	The sum of the costs associated with issuing sourced or in-process material.	sM2.2: Issue Sourced/In-Process Product sM3.3: Issue Sourced/In-Process Product
CO.3.60	Cost to Load Product & Generate Shipping Documentation	The sum of the costs associated with loading product & generating shipping documentation.	sD1.11: Load Vehicle & Generate Shipping Documentation sD2.11: Load Product & Generate Shipping Documentation sD3.11: Load Product & Generate Shipping Documents
CO.3.61	Cost to Maintain Source Data	The sum of the costs associated with maintaining supplier data.	sES.3: Maintain Source Data

Metric ID	Metric Name	Metric Definition	Process
CO.3.62	Cost to Manage Business Rules for PLAN Processes	The sum of the .Costs to Manage Business Rules for PLAN Processes	sEP.1: Manage Business Rules for Plan Processes
CO.3.63	Cost to Manage Business Rules for Return Processes	The sum of the Cost to Manage Business Rules for Return Processes	sER.1: Manage Business Rules for Return Processes
CO.3.64	Cost to Manage Deliver Business Rules	The sum of the Costs to Manage Deliver Business Rules	sED.1: Manage Deliver Business Rules
CO.3.65	Cost to Manage Deliver Capital Assets	The sum of the Costs to Manage Deliver Capital Assets	sED.5: Manage Deliver Capital Assets
CO.3.66	Cost to Manage Deliver Information	The sum of the Cost to Manage Deliver Information	sED.3: Manage Deliver Information
CO.3.67	Cost to Manage Finished Goods Inventories	The sum of the Costs to Manage Finished Good Inventory	sED.4: Manage Finished Goods Inventories
CO.3.68	Cost to Manage Import/Export Requirements	The sum of the costs associated with the management of import/export requirements	sED.8: Manage Import/Export Requirements sES.8: Manage Import/Export Requirements
CO.3.69	Cost to Manage In-Process Products (WIP)	The sum of the costs associated with managing in-process products (WIP).	sEM.4: Manage In-Process Products (WIP)
CO.3.70	Cost to Manage Incoming Product	The sum of the costs associated with managing incoming product.	sES.6: Manage Incoming Product
CO.3.71	Cost to Manage Integrated Supply Chain Capital Assets	The sum of the costs associated with managing integrated supply chain assets.	sEP.5: Manage Integrated Supply Chain Capital Assets
CO.3.72	Cost to Manage Integrated Supply Chain Inventory	The sum of the costs associated with managing the integrated supply chain inventory.	sEP.4: Manage Integrated Supply Chain Inventory
CO.3.73	Cost to Manage Integrated Supply Chain Transportation	The sum of the costs associated with managing integrated supply chain transportation.	sEP.6: Manage Integrated Supply Chain Transportation
CO.3.74	Cost to Manage MAKE Equipment and Facilities	The sum of the costs associated with managing Make equipment and facilities.	sEM.5: Manage Make Equipment and Facilities

Metric ID	Metric Name	Metric Definition	Process
CO.3.75	Cost to Manage MAKE Information	The sum of the Cost to Manage MAKE Information	sEM.3: Manage Make Information
CO.3.76	Cost to Manage MAKE Regulatory Compliance	The sum of the Cost to Manage MAKE Regulatory Compliance	sEM.8: Manage Make Regulatory Environment
CO.3.77	Cost to Manage Performance of Return Processes	The sum of the costs to Manage Performance of Return Processes.	sER.2: Manage Performance of Return Processes
CO.3.78	Cost to Manage Performance of Supply Chain	The sum of the costs associated with assessing supplier performance.	sEP.2: Manage Performance of Supply Chain
CO.3.79	Cost to Manage PLAN Data Collection	The sum of the costs to Manage PLAN Data Collection.	sEP.3: Manage Plan Data Collection
CO.3.80	Cost to Manage Plan Regulatory Requirements and Compliance	The sum of the costs to Manage Plan Regulatory Requirements and Compliance.	sEP.8: Manage Plan Regulatory Requirements and Compliance
CO.3.81	Cost to Manage Planning Configuration	The sum of the Cost to Manage Planning Configuration	sEP.7: Manage Planning Configuration
CO.3.82	Cost to Manage Product Inventory	The sum of the Cost to Manage Product Inventory	sES.4: Manage Product Inventory
CO.3.83	Cost to Manage Product Life Cycle	The sum of the Cost to Manage Product Life Cycle	sED.7: Manage Product Life Cycle
CO.3.84	Cost to Manage Production Network	The sum of the costs to manage the production network	sEM.7: Manage Production Network
CO.3.85	Cost to Manage Production Performance	The sum of the costs to manage production performance.	sEM.2: Manage Production Performance
CO.3.86	Cost to Manage Production Rules	The sum of the costs to manage production rules.	sEM.1: Manage Production Rules
CO.3.87	Cost to Manage Return Capital Assets	The sum of the costs to manage the capital assets associated with returns.	sER.5: Manage Return Capital Assets
CO.3.88	Cost to Manage Return Data Collection	The sum of the costs to manage the capital assets associated with returns data collection.	sEM.1: Manage Production Rules
CO.3.89	Cost to Manage Return Inventory	The sum of the costs to manage the capital assets associated with return inventory.	sER.4: Manage Return Inventory

Metric ID	Metric Name	Metric Definition	Process
CO.3.90	Cost to Manage Return Network Configuration	The sum of the costs to manage the capital assets associated with configuring the return network.	sER.7: Manage Return Network Configuration
CO.3.91	Cost to Manage Return Regulatory Requirements and Compliance	The sum of the costs associated with managing compliance to return regulatory requirements.	sER.8: Manage Return Regulatory Requirements and Compliance
CO.3.92	Cost to Manage Return Transportation	The sum of the costs associated with managing return transportation.	sER.6: Manage Return Transportation
CO.3.93	Cost to Manage Source Capital Assets	The sum of the Costs to Manage Source Capital Assets	sES.5: Manage Capital Assets
CO.3.94	Cost to Manage Sourcing Business Rules	The sum of the costs associated with Source business rules.	sES.1: Manage Sourcing Business Rules
CO.3.95	Cost to Manage Supplier Agreements	The sum of the costs associated with managing supplier agreements.	sES.10: Manage Supplier Agreements
CO.3.96	Cost to Manage Supplier Network	The sum of the costs associated with managing the supplier network.	sES.7: Manage Supplier Network
CO.3.97	Cost to Manage Transportation	The sum of the costs associated with managing Finished Good Transportation	sEM.6: Manage Transportation (WIP) sED.6: Manage Transportation
CO.3.98	Cost to Negotiate & Receive Contract	The sum of the costs associated with negotiating and receiving contracts	sD3.2: Negotiate and Receive Contract
CO.3.99	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).	sD3.1: Obtain and Respond to RFP/ RFQ
CO.3.100	Cost to Pack Product	The sum of the costs associated with product packaging.	sD1.10: Pack Product sD2.10: Pack Product sD3.10: Pack Product
CO.3.101	Cost to Package	The sum of the costs associated with product packaging.	sM1.4: Package sM2.4: Package sM3.5: Package
CO.3.102	Cost to Pick Product	The sum of the costs associated with picking product.	sD1.9: Pick Product sD2.9: Pick Product sD3.9: Pick Product
CO.3.103	Cost to Pick Product from Backroom	The sum of the costs associated with picking product from backroom.	sD4.3: Pick Product from Backroom

Metric ID	Metric Name	Metric Definition	Process
CO.3.104	Cost to Plan Deliver	The sum of the costs associated with planning the delivery of product.	sP4: Plan Deliver
CO.3.105	Cost to Plan Make	The sum of the costs associated with planning the making of product.	sP3: Pan Make
CO.3.106	Cost to Plan Return	The sum of the costs associated with planning the returning of product.	sP5: Plan Return
CO.3.107	Cost to Plan Source	The sum of the costs associated with planning source activities.	sP2: Plan Source
CO.3.108	Cost to Plan Supply Chain	The sum of the costs associated with planning supply chain activities.	sP1: Plan Supply Chain
CO.3.109	Cost to Process Inquiry & Quote	The sum of the costs associated with processing inquiry and quotes.	sD1.1: Process Inquiry and Quote sD2.1: Process Inquiry and Quote
CO.3.110	Cost to Produce and Test	The sum of the costs associated with production and test.	sM1.3: Produce and Test sM2.3: Produce and Test sM3.4: Produce and Test
CO.3.111	Cost to Receive & Verify Product by Customer	The sum of the costs associated with receipt and verification at customer site.	sD1.13: Receive and Verify Product by Customer sD2.13: Receive and Verify Product by Customer sD3.13: Receive and Verify Product by Customer
CO.3.112	Cost to Receive Defective Product	The sum of the costs associated with receiving defective product returns.	sDR1.3: Receive Defective Product
CO.3.113	Cost to Receive Excess Product	The sum of the costs associated with receiving excess returns.	sDR3.3: Receive Excess Product
CO.3.114	Cost to Receive MRO Product	The sum of the costs associated with receiving MRO product returns.	sDR2.3: Receive MRO Product
CO.3.115	Cost to Receive Product	The sum of the costs associated with receiving product.	sS1.2: Receive Product sS2.2: Receive Product sS3.4: Receive Product
CO.3.116	Cost to Receive Product at Store	The sum of the costs associated with receiving product at the store.	sD4.2: Receive Product at the Store
CO.3.117	Cost to Receive Product from Source or Make	The sum of the costs associated with transferring product from source or make activities.	sD1.8: Receive Product from Source or Make sD2.8: Receive Product from Source or Make sD3.8: Receive Product from Source or Make
CO.3.118	Cost to Receive, Enter & Validate Order	The sum of the costs associated with receiving, entering and validating a customer order.	sD1.2: Receive, Enter and Validate Order sD2.2: Receive, Configure, Enter and Validate Order

Metric ID	Metric Name	Metric Definition	Process
CO.3.119	Cost to Release Finished Product to Deliver	The sum of the costs associated with releasing finished goods to deliver processes.	sM1.6: Release Product to Deliver sM2.6: Release Finished Product to Deliver sM3.7: Release Product to Deliver
CO.3.120	Cost to Reserve Resources & Determine Delivery Date	The sum of the costs associated with reserving resources and determining a delivery date.	sD1.3: Reserve Inventory and Determine Delivery Date sD2.3: Reserve Inventory and Determine Delivery Date
CO.3.121	Cost to Route Shipments	The sum of the costs associated with routing shipments.	sD1.6: Route Shipments sD2.6: Route Shipments sD3.6: Route Shipments
CO.3.122	Cost to Schedule Defective Product Receipt	The sum of the costs associated with scheduling defective product receipt.	sDR1.2: Schedule Defective Return Receipt
CO.3.123	Cost to Schedule Excess Product Receipt	The sum of the costs associated with scheduling excess product receipt.	sDR3.2: Schedule Excess Return Receipt
CO.3.124	Cost to Schedule Installation	The sum of the costs associated with scheduling product installation.	sD3.4: Schedule Installation
CO.3.125	Cost to Schedule MRO Product Receipt	The sum of the costs associated with scheduling MRO product receipt.	sDR2.2: Schedule MRO Return Receipt
CO.3.126	Cost to Schedule Product Deliveries	The sum of the costs associated with scheduling product deliveries.	sS1.1: Schedule Product Deliveries sS2.1: Schedule Product Deliveries sS3.3: Schedule Product Deliveries
CO.3.127	Cost to Schedule Production Activities	The sum of the costs associated with scheduling production activities.	sM1.1: Schedule Production Activities sM2.1: Schedule Production Activities sM3.2: Schedule Production Activities
CO.3.128	Cost to Select Carriers & Rate Shipments	The sum of the costs associated with selecting carriers and rating shipments.	sD1.7: Select Carriers and Rate Shipments sD2.7: Select Carriers and Rate Shipments sD3.7: Select Carriers & Rate Shipments
CO.3.129	Cost to Select Final Supplier(s) and Negotiate	The sum of the costs associated with selecting final suppliers and negotiating supplier agreements.	sS3.2: Select Final Supplier (S) and Negotiate
CO.3.130	Cost to Ship Product	The sum of the costs associated with shipping products.	sD1.12: Ship Product sD2.12: Ship Product sD3.12: Ship Product

Metric ID	Metric Name	Metric Definition	Process
CO.3.131	Cost to Source Return	The sum of the costs associated with SourceReturn	sSR1: Source Return Defective Product sSR3: Source Return Excess Product
CO.3.132	Cost to Stage Finished Product	The sum of the costs associated with staging finished goods.	sM1.5: Stage Product sM2.5: Stage Finished Product sM3.6: Stage Finished Product
CO.3.133	Cost to Stock Shelf	The sum of the costs associated with stocking shelves.	sD4.4: Stock Shelf
CO.3.134	Cost to Transfer Defective Product	The sum of the costs associated transferring defective product for disposition	sDR1.4: Transfer Defective Product
CO.3.135	Cost to Transfer Excess Product	The sum of the costs associated transferring excess product for disposition	sDR3.4: Transfer Excess Product
CO.3.136	Cost to Transfer MRO Product	The sum of the costs associated transferring MRO product for disposition	sDR2.4: Transfer MRO Product
CO.3.137	Cost to Transfer Product	The sum of the costs associated with transferring product to Make or Deliver processes	sS1.4: Transfer Product sS2.4: Transfer Product sS3.6: Transfer Product
CO.3.138	Cost to Verify Product	The sum of the costs associated with raw material verification.	sS1.3: Verify Product sS2.3: Verify Product sS3.5: Verify Product
CO.3.139	Customer Invoicing/ Accounting Costs	Includes costs for invoicing, processing customer payments, and verifying customer satisfaction.	sD1.15: Invoice, sD2.15: Invoice, sD3.15: Invoice
CO.3.140	Direct labor cost	Direct cost spent on production labor	sEM.2: Manage Production Performance
CO.3.141	Direct material cost	Direct cost spent on material for production	sEM.2: Manage Production Performance
CO.3.142	Distribution Costs	The costs of distribution (warehousing and transportation of finished goods) as a percent of total supply chain costs	sP4.4: Establish Delivery Plans
CO.3.143	Energy consumption	The energy consumed by the Make process per unit produced.	sM1.3: Produce and Test sM2.3: Produce and Test sM3.4: Produce and Test sP3: Plan Make
CO.3.144	Energy Cost per Unit	The cost of energy inputs for the Make process per unit produced.	sP3: Plan Make

Metric ID	Metric Name	Metric Definition	Process
CO.3.145	Energy Costs	the cost of energy inputs to S1.4 as a percent of total product transfer and storage costs.	sS1.4: Transfer Product sS2.4: Transfer Product sS3.6: Transfer Product sM2: Make-to- Order sD2: Deliver Make-to-Order Product sD1.6: Route Shipments sD2.6: Route Shipments sD3: Deliver Engineer-to-Order Products sDR1.3: Receive Defective Product sDR2.4: Transfer MRO Product sDR3.2: Schedule Excess Return Receipt
CO.3.146	Energy efficient upgrades	The percent of new equipment purchased over the past year that is more energy efficient than the equipment it replaces	sEM.5: Manage Make Equipment and Facilities
CO.3.147	Environmental Compliance Cost	The cost of complying with environmental regulations and policies as a percent of total supply chain costs.	sP1: Plan Supply Chain sEP.8: Manage Plan Regulatory Requirements and Compliance
CO.3.148	Environmental non-compliance cost	The cost impact of compliance violations with environmental regulations and policies as a percent of total supply chain costs.	sEP.8: Manage Plan Regulatory Requirements and Compliance
CO.3.150	Excess product disposition costs as % total Source cost	Excess product disposition costs as % total Source cost	sSR3.2: Disposition Excess Product

Metric ID	Metric Name	Metric Definition	Process
CO.3.152	Gross Risk ($)	The total unmitigated risk for a specific area, supplier, product, etc.($)	sEP.9: Manage Supply Chain Plan Risk sES.9: Manage Supply Chain Source Risk sEM.9: Manage Supply Chain Make Risk sED.9: Manage Supply Chain Deliver Risk sER.9: Manage Supply Chain Return Risk
CO.3.153	Hazardous waste generated at warehousing facilities as % of total waste generated	The weight of hazardous waste generated from warehousing operations as a percent of the total waste generated	sM1.3: Produce and Test sM3.4: Produce and Test sES.4: Manage Product Inventory
CO.3.154	Hedge Rating (Inventory DOS for risk management)	The amount of inventory in use as a risk mitigation tactic (DOS)	sEP.9: Manage Supply Chain Plan Risk sES.9: Manage Supply Chain Source Risk sEM.9: Manage Supply Chain Make Risk sED.9: Manage Supply Chain Deliver Risk sER.9: Manage Supply Chain Return Risk
CO.3.155	Indirect cost related to production	Indirect cost incurred in production indirectly	sEM.2: Manage Production Performance
CO.3.157	Industry Benchmark Comparison (%)	Industry Benchmark Comparison (%) For example: the benchmark for mitigation plans implemented is 60% and you are at 50%. You are at 83% of the benchmark.	sEP.9: Manage Supply Chain Plan Risk sES.9: Manage Supply Chain Source Risk sEM.9: Manage Supply Chain Make Risk sED.9: Manage Supply Chain Deliver Risk sER.9: Manage Supply Chain Return Risk

Metric ID	Metric Name	Metric Definition	Process
CO.3.158	Mitigated Risk ($)	The total mitigated risk for a specific area, supplier, product, etc.($)	sEP.9: Manage Supply Chain Plan Risk sES.9: Manage Supply Chain Source Risk sEM.9: Manage Supply Chain Make Risk sED.9: Manage Supply Chain Deliver Risk sER.9: Manage Supply Chain Return Risk
CO.3.159	Mitigation cost by Event ($)	The cost of mitigation for a specific risk event ($)	sEP.9: Manage Supply Chain Plan Risk sES.9: Manage Supply Chain Source Risk sEM.9: Manage Supply Chain Make Risk sED.9: Manage Supply Chain Deliver Risk sER.9: Manage Supply Chain Return Risk
CO.3.160	MRO Disposition Costs As % Total Source cost	MRO Disposition Costs As % Total Source cost	sSR2.2: Disposition MRO Product
CO.3.161	NPDES permitted water effluent	The weight of water pollutant emitted per weight of finished good produced	sM1.3: Produce and Test sM2.3: Produce and Test sM3.4: Produce and Test
CO.3.162	Number of worker absences due to poor IAQ	The annual hours of worker absences that can be attributed to indoor air quality issues	sES.4: Manage Product Inventory sEM.5: Manage Make Equipment and Facilities
CO.3.163	Order Management Costs	The aggregation of the following cost elements (contained in this glossary):	sD1: Deliver Stocked Products sD3: Deliver Engineer-to-Order Products
CO.3.164	Packaging material re-use	The percent of packaging materials that are reused	sM1.4: Package sM3.5: Package sES.4: Manage Product Inventory
CO.3.165	Packaging purchases	The cost of packaging materials used during transfer operations	sS1.4: Transfer Product
CO.3.166	Packaging volume	Total volume of packaging material per unit divided by total unit volume	sEM.6: Manage Transportation (WIP)
CO.3.167	Peak Time Energy Use	% of total energy consumption that occurs during regional peak demand times	sM2.1: Schedule Production Activities sM1.1: Schedule Production Activities
CO.3.168	Pollution Prevention Ratio	Compliance costs directed to pollution prevention activities as a percent of total compliance costs.	sEM.8: Manage Make Regulatory Environment

Metric ID	Metric Name	Metric Definition	Process
CO.3.169	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.	sS1: Source Stocked Product sS2: Source Make-to-Order Product sS3: Source Engineer-to-Order Product
CO.3.170	Product Packaging costs	The cost of material and labor to package items for transfer divided by the number of items transferred	sS1.4: Transfer Product
CO.3.171	Product Shipped per delivery	The average number of units transferred per vehicle	sD1.5: Build Loads sD2.5: Build Loads sD3.5: Build Loads
CO.3.172	Quantity per shipment	The average number of units transferred per vehicle	sS1.1: Schedule Product Deliveries sS1.4: Transfer Product sS2.1: Schedule Product Deliveries sS3.3: Schedule Product Deliveries sM1.2: Issue Material sM2.2: Issue Sourced/In-Process Product sM3.3: Issue Sourced/In-Process Product sD1.5: Build Loads sD2.5: Build Loads
CO.3.173	Ratio of Authorization Cost To Total Source Cost	Ratio of Authorization Cost To Total Source Cost	sSR3.3: Request Excess Product Return Authorization
CO.3.174	Ratio of Authorization Cost to Total Source Return cost	Ratio of Authorization Cost to Total Source Return cost	sSR2.3: Request MRO Return Authorization
CO.3.175	Ratio of authorization costs to total source return cost	Ratio of authorization costs to total source return cost	sSR1.3: Request Defective Product Return Authorization

Metric ID	Metric Name	Metric Definition	Process
CO.3.176	Residual Risk ($)	The residual (gross – mitigated) risk for a specific area, supplier, product, etc.($)	sEP.9: Manage Supply Chain Plan Risk sES.9: Manage Supply Chain Source Risk sEM.9: Manage Supply Chain Make Risk sED.9: Manage Supply Chain Deliver Risk sER.9: Manage Supply Chain Return Risk
CO.3.177	Return transportation costs	Sum of the costs associated with return transportion	sSR1.5: Return Defective Product sSR2.5: Return MRO Product sSR3.5: Return Excess Product
CO.3.178	Risk Mitigation Costs (Deliver)	The total supply chain risk mitigation cost of all DELIVER mitigation actions for a specific area, supplier, product, etc. ($)	sED.9: Manage Supply Chain Deliver Risk
CO.3.179	Risk Mitigation Costs (Make)	The total supply chain risk mitigation cost of all MAKE mitigation actions for a specific area, supplier, product, etc. ($)	sEM.9: Manage Supply Chain Make Risk
CO.3.180	Risk Mitigation Costs (Plan)	The total supply chain risk mitigation cost of all PLAN mitigation actions for a specific area, supplier, product, etc. ($)	sEP.9: Manage Supply Chain Plan Risk
CO.3.181	Risk Mitigation Costs (Return)	The total supply chain risk mitigation cost of all RETURN mitigation actions for a specific area, supplier, product, etc. ($)	sER.9: Manage Supply Chain Return Risk
CO.3.182	Risk Mitigation Costs (Source)	The total supply chain risk mitigation cost of all SOURCE mitigation actions for a specific area, supplier, product, etc. ($)	sES.9: Manage Supply Chain Source Risk
CO.3.183	Scrap packaging expense	The cost of packaging material that is scrapped as part of the packaging process	sM1.4: Package sM2.4: Package sM3.5: Package
CO.3.184	Supply / Customer / Product Base Rated (%)	The percent of the assessed area (suppliers, customers, etc.) that has been systematically evaluated.	sEP.9: Manage Supply Chain Plan Risk sES.9: Manage Supply Chain Source Risk sEM.9: Manage Supply Chain Make Risk sED.9: Manage Supply Chain Deliver Risk sER.9: Manage Supply Chain Return Risk
CO.3.185	Total Deliver Costs	The sum of the costs associated with the Deliver processes.	sP4: Plan Deliver

Metric ID	Metric Name	Metric Definition	Process
CO.3.186	Total Excess Material Return Costs	The sum of the costs associated with the receipt of returned excess products from the customer	sSR3: Source Return Excess Product
CO.3.187	Total Source Return Costs	The sum of the costs associated with the return of raw materials to the supplier.	sSR2: Return MRO Product
CO.3.188	Transportation Costs	The costs of transportation per unit shipped	sP4.1: Identify, Prioritize and Aggregate Delivery Requirements sP4.3: Balance Delivery Resources and Capabilities with Delivery Requirements
CO.3.195	Warehouse energy costs	The cost of energy inputs for warehouse operations as a % of total storage costs	sES.4: Manage Product Inventory
CO.3.196	Warehousing solid waste	The annual weight of waste generated from warehousing processes	sES.4: Manage Product Inventory
CO.3.197	Waste produced as % of product produced	The weight of waste (air, liquid and solid) divided by the weight of finished goods product produced.	sM1.3: Produce and Test sM2.3: Produce and Test
CO.3.198	Waste storage costs as % of Make costs	The cost to store and manage production waste as a per cent of total Make costs	sM1.7: Waste Disposal sM2.7: Waste Disposal sM3.8: Waste Disposal
CO.3.199	Water use reduction	The annual % reduction in water use per warehousing cost	sES.4: Manage Product Inventory

Cash-to-Cash Cycle Time

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.

Qualitative Relationship Description

The longer the cash-to-cash cycle, the more current assets needed (relative to current liabilities) since it takes longer to convert inventories and receivables into cash. In other words, the longer the cash-to-cash cycle, the more net working capital required.

Quantitative Relationship (optional, if calculable)

The Cash-to-Cash Cycle time is measured by converting into days the supply of inventory in stock and the number of days outstanding for accounts receivable and accounts payable. The inventory days of supply is added to the days outstanding for accounts receivable. The accounts payable days outstanding is subtracted from this total to determine the cash-to-cash cycle time.

Calculation

Cash-to-Cash Cycle Time = Inventory Days of Supply + Days Sales Outstanding – Days Payable Outstanding

Level 2 Metrics:

AM.2.2 Inventory Days of Supply = the amount of inventory (stock) expressed in days of sales. The [5 point rolling average of gross value of inventory at standard cost] / [annual cost of goods sold (COGS) / 365]

Example: If 2 items a day are sold and 20 items are held in inventory, this represents 10 days' (20/2) sales in inventory.
(Other names: Days cost-of-sales in inventory, Days' sales in inventory)

AM.2.1 Days Sales Outstanding = the length of time from when a sale is made until cash for it is received from customers. The amount of sales outstanding expressed in days. The [5 point rolling average of gross accounts receivable (AR)] / [total gross annual sales / 365].

Example: If $5000 worth of sales were made per day and $50,000 worth of sales were outstanding, this would represent 10 days' ($50,000/$5000) of sales outstanding.
(Other names: Days sales in Accounts receivables)

AM.2.3 Days Payable Outstanding = the length of time from purchasing materials, labor and/or conversion resources until cash payments must be made expressed in days. The [5 point rolling average of gross accounts payable (AP)] / [total gross annual material purchases / 365].
(Other names: Average payment period for materials, Days purchases in accounts payable, Days'

Calculation cont.

The "5 point rolling average" calculation uses a combination of both historical and forward-looking data. This means that the rolling average value has to be calculated based on the average over the four previous quarters and the projection for the current or next quarter.

The 5 point rolling average calculation is:
[Sum of the 4 previous quarters + projection for next quarter) / 5]

Data Collection

Unlike the other SCOR attributes, where data requirements are specified, typically all of the cash-to-cash cycle time source data is already captured by business operating systems:

- general ledger system
- accounts receivable system
- accounts payable system
- purchasing system
- production reporting system
- customer relationship management system

As a result, information is 'calculated' by importing data from these systems and transforming them into the prescribed analytics/information. The transformation is accomplished using business rules.

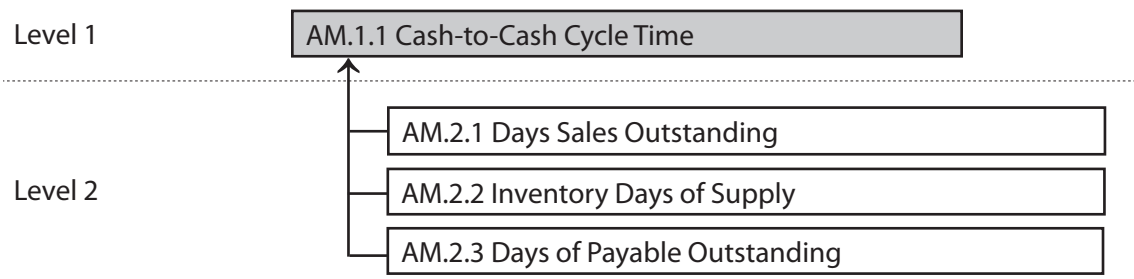
Discussion

Cash-to-cash Cycle Time is a value metric used to measure how efficiently a company manages its working capital assets.

This metric is a generally accepted Supply Chain metric within many industries and is used to benchmark supply chain asset management performance.

The term "5 point annual average" can be confusing in that it can imply a measure over a year's period of time when the data points are taken over 5 quarters. The intent of the approach is to smooth the seasonal peaks and valleys over time and to balance projected data with historical data. The measurement can be taken quarterly or at any given consistent time frame.

Hierarchical Metric Structure



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.

Qualitative Relationship Description

None Identified

Quantitative Relationship (optional, if calculable)

The return on supply chain fixed assets is measured by monetizing the supply chain revenue, cost of goods sold and supply chain management costs to determine the profit from the respective supply chain. This amount is divided by the supply chain fixed assets to determine the return generated from the respective supply chain.

Calculation

Return on Supply Chain Fixed Assets = (Supply Chain Revenue – COGS – Supply Chain Management Costs) / Supply-Chain Fixed Assets

"Supply Chain Revenue" is used in the metric rather than just Net Revenue.

There is a need for a more specific "revenue" number than "Net Revenue" for use in the "Supply Chain Revenue" level 2 metric. Net Revenue could include revenue from sources other than the supply chain, such as investments, leasing real estate, court settlements, etc... Supply Chain Revenue will be used and will be only the portion of Net Revenue that is generated by the specific supply chain being measured and analyzed.

Level 2 Metrics

Supply-Chain Revenue
Operating revenue generated from a supply chain. This does not include non-operating revenue, such as leasing real estate, investments, court settlements, sale of office buildings, etc...

CO.1.2 COGS (Cost of Goods Sold)
Calculation - Refer to the section for COGS in the Attribute for Costs.

CO.1.1 Total Supply Chain Management Costs
Calculation - refer to the section for Supply-Chain Management Costs in the Attribute for Costs.

AM.2.5 Supply Chain Fixed Assets

Source Fixed Asset Value +
Make Fixed Asset Value +
Deliver Fixed Asset Value +
Return Fixed Asset Value +
Plan Fixed Asset Value

Calculation cont.

Level 3 Metrics

Plan Fixed Asset Value- The current value of the supply chain assets used in supply chain integration (See sEP.5)

Source Fixed Asset Value - The current value of the supply chain assets used in the Source process. (See sES.5)

Make Fixed Asset Value- The current value of the supply chain assets used in the Make process. (See sEM.5)

Deliver Fixed Asset Value - The current value of the supply chain assets used in the Deliver process. (See sED.5)

Return Fixed Asset Value - The current value of the supply chain assets used in the Return process. (See sER.5)

A Revised Capital Plan is an output of the Manage Integrated Supply Chain Fixed Assets (sEP.5) process element and would contain supply chain capital asset information that could be used in measuring the Supply Chain Fixed Assets.

Data Collection

Unlike the other SCOR attributes, where data requirements are specified, typically all of the return on working capital's source data is already captured by business operating systems:

- general ledger system
- fixed asset system
- purchasing system
- labor reporting system
- production reporting system
- customer relationship management system

As a result, information is 'calculated' by importing data from these systems and transforming them into the prescribed analytics/information. The transformation is accomplished using business rules.

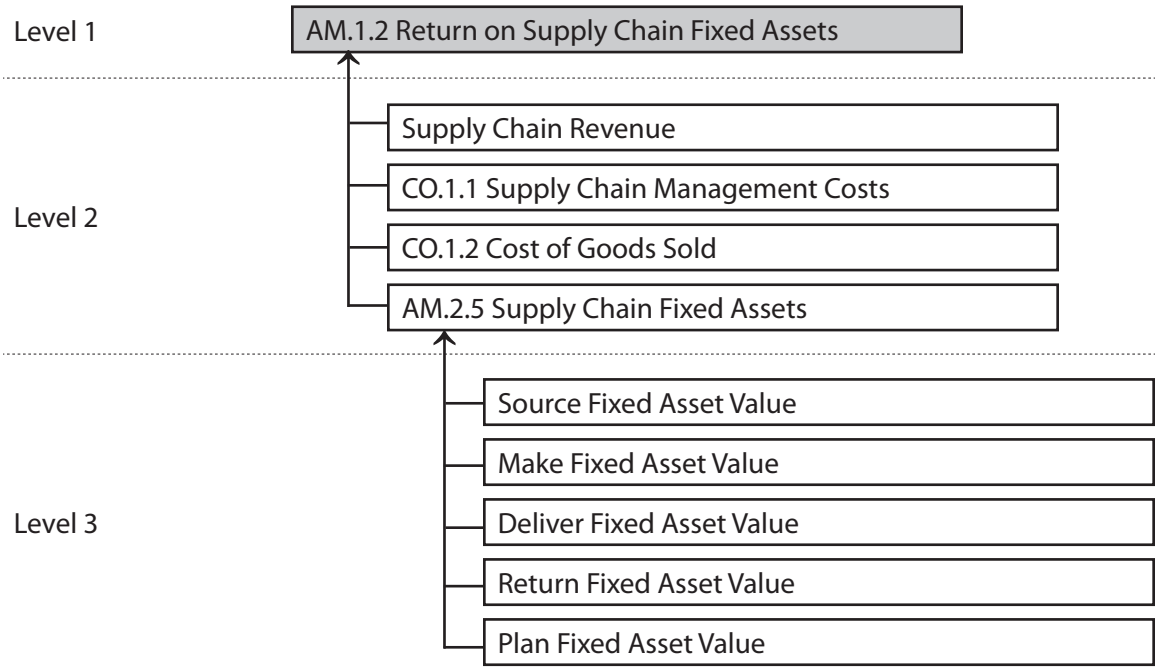
In order to measure Return on Supply Chain Fixed Assets, the investment in supply chain capital assets needs to be known. This requires a clear understanding of what is a "supply chain fixed asset". SCOR Ex.5 process elements were used since these are all focused on managing SC capital assets. It is the assets managed in these Enable processes that comprise Supply Chain Fixed Assets. The value of these assets is the denominator of the metric.

Discussion

Range of fixed assets used in an organization that have the character of permanency rather than being rapidly replaced (or expensed); examples include land, warehouse, trucks, buildings, investments, and plant and machinery.

Fixed assets used to operate the Supply Chain in each of the categories (sP, sS, sM, sD, sR) are tracked within the Ex.5 process elements. A Revised Capital Plan is an output of the Manage Integrated Supply Chain Fixed Assets (sEP.5) process element and would contain supply chain capital asset information that could be used in measuring the Supply Chain Fixed Asset Value.

Hierarchical Metric Structure



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. (Processes: sP1, sP2, sP3, sP4, sS1, sS2, sS3, sM1, sM2, sM3, sD1, sD2, sD3, sD4)

Qualitative Relationship Description

None Identified

Quantitative Relationship (optional, if calculable)

The return on working capital is measured by monetizing the supply chain profit and dividing into the calculated amount the supply chain working capital position.

Calculation

Return on Working Capital = (Supply Chain Revenue – COGS – Supply Chain Management Costs) / (Inventory + Accounts Receivable – Accounts Payable)

Level 2 Metrics:

Supply-Chain Revenue
Operating revenue generated from a supply chain. This does not include non-operating revenue, such as leasing real estate, investments, court settlements, sale of office buildings, etc...

CO.1.2 COGS (Cost of Goods Sold)
Calculation - Refer to the section for COGS in the Attribute for Costs.

CO.1.1 Total Supply Chain Management Costs
Calculation - refer to the section for Supply-Chain Management Costs in the Attribute for Costs.

AM.2.8 Inventory = the amount of inventory (stock) expressed in dollars. The [5 point rolling average of gross value of inventory at standard cost]

AM.2.7 Sales Outstanding = the amount of **accounts receivable** outstanding expressed in dollars. The [5 point rolling average of gross accounts receivable (AR)]

AM.2.6 Payables Outstanding = expressed in dollars, the amount of purchased materials, labor and/or conversion resources that are to be paid (**accounts payable**). The [5 point rolling average of gross accounts payable (A/P)]

The "5 point rolling average" calculation uses a combination of both historical and forward-looking data. This means that the rolling average value has to be calculated based on the average over the four previous quarters and the projection for the current or next quarter.

The 5 point rolling average calculation is: [Sum of the 4 previous quarters + projection for next quarter) / 5]

Calculation cont.

Level 3 Metrics

Plan Fixed Asset Value- The current value of the supply chain assets used in supply chain integration (See sEP.5)

Source Fixed Asset Value - The current value of the supply chain assets used in the Source process. (See sES.5)

Make Fixed Asset Value- The current value of the supply chain assets used in the Make process. (See sEM.5)

Deliver Fixed Asset Value - The current value of the supply chain assets used in the Deliver process. (See sED.5)

Return Fixed Asset Value - The current value of the supply chain assets used in the Return process. (See sER.5)

A Revised Capital Plan is an output of the Manage Integrated Supply Chain Fixed Assets (sEP.5) process element and would contain supply chain capital asset information that could be used in measuring the Supply Chain Fixed Assets.

Data Collection

Unlike the other SCOR attributes, where data requirements are specified, typically all of the return on working capital's source data is already captured by business operating systems:

- general ledger system
- accounts receivable system
- accounts payable system
- purchasing system
- labor reporting system
- production reporting system
- customer relationship management system

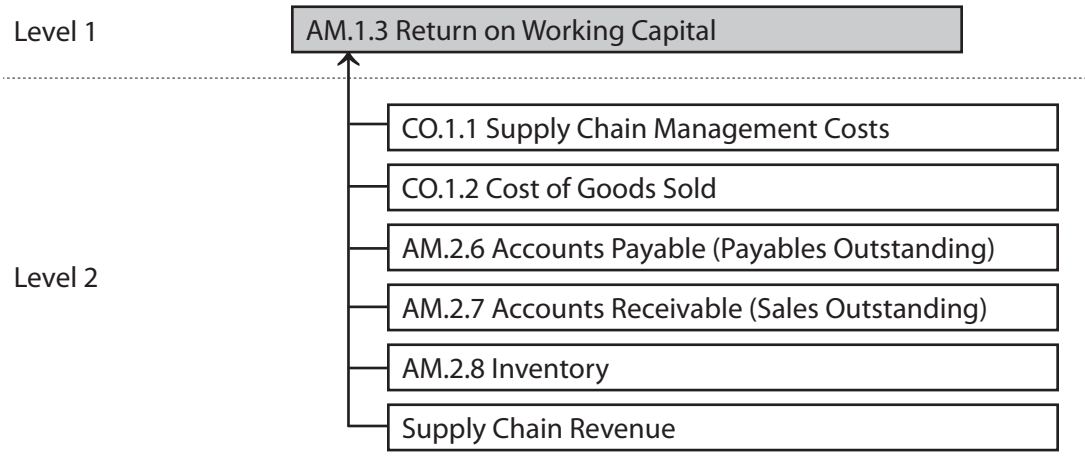
As a result, information is 'calculated' by importing data from these systems and transforming them into the prescribed analytics/information. The transformation is accomplished using business rules.

Discussion

"Supply Chain Revenue" is used in the metric rather than just Net Revenue. There is a need for a more specific "revenue" number than "Net Revenue" for use in the "Supply Chain Revenue" level 2 metric. Net Revenue could include revenue from sources other than the supply chain, such as investments, leasing real estate, court settlements, etc... Supply Chain Revenue will be used and will be only the portion of Net Revenue that is generated by the specific supply chain being measured and analyzed.

AM.1.3

Hierarchical Metric Structure



Level 3 Asset Management Metrics

Metric ID	Metric Name	Metric Definition	Process
AM.3.1	% of hazardous material in inventory	The weight of hazardous material in inventory as a percent of total inventory weight	sED.4: Manage Finished Goods Inventories
AM.3.2	% of material that has a valid "Take-back" program	% of the product content that has a supplier take-back program for recycling or reuse.	sS3.1: Identify Sources of Supply
AM.3.3	% of materials that are recyclable/ reusable	% of the product content that is recyclable or reusable	sS3.1: Identify Sources of Supply
AM.3.4	% of packaging/shipping materials reused internally	The percent of scrap from packaging that is immediately reused in the packaging process	sM2.4: Package
AM.3.5	% of production materials reused	The percent of scrap from production that is immediately reused in the production process	sM3.4: Produce and Test sM1.3: Produce and Test sM2.3: Produce and Test
AM.3.6	% of products consisting of previously used components	the weight of recycled material in the product as a percent of total product weight	sM3.4: Produce and Test sM1.3: Produce and Test sM2.3: Produce and Test
AM.3.7	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.	sEM.5: Manage Make Equipment and Facilities
AM.3.8	Average age of Excess Inventory	Average age of Excess Inventory	sSR3: Source Return Excess Product
AM.3.9	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.	sM3.4: Produce and Test sM1.3: Produce and Test sM2.3: Produce and Test sM1.4: Package sM2.4: Package sM3.5: Package sM1.1: Schedule Production Activities sM2.1: Schedule Production Activities sM3.2: Schedule Production Activities

Metric ID	Metric Name	Metric Definition	Process
AM.3.10	Defective product disposition costs as % total Source Return cost	Defective product disposition costs as % total Source Return cost	sER.2: Manage Performance of Return Processes
AM.3.11	Deliver Fixed Asset Value	Deliver Fixed Asset Value - The current value of the supply chain assets used in the Deliver process.	sED.5: Manage Deliver Capital Assets
AM.3.12	Deliver Return Cycle Time	The average time associated with returns.	sDR1: Deliver Return Defective Product sDR2: Deliver Return MRO Product
AM.3.13	Equipment energy efficiency	The number of capital equipment units that meet energy efficiency standards as a per cent of total capital equipment units	sEM.5: Manage Make Equipment and Facilities
AM.3.14	Hazardous materials used during production process as a % of all materials	The % of material (by weight) issued for production that is classified as hazardous material	sM1.3: Produce and Test sM2.3: Produce and Test sM3.4: Produce and Test
AM.3.15	Hazardous waste as % of total waste	The % of waste (by weight) generated from production that is classified as hazardous material	sM1.7: Waste Disposal sM2.7: Waste Disposal sM3.8: Waste Disposal
AM.3.16	Inventory Days of Supply (Raw Material)	Value of raw materials ÷ (COGS ÷ 365).	sS1: Source Stocked Product sS2: Source Make-to-Order Product sS3: Source Engineer-to-Order Product
AM.3.17	Inventory Days of Supply (WIP)	Total value of Work in Process ÷ (COGS ÷ 365).	sM2: Make-to- Order sM3: Engineer-to-Order
AM.3.18	Make Fixed Asset Value	The current value of the supply chain assets used in the Make process	sEM.5: Manage Make sEquipment and Facilities
AM.3.19	Packaging as % of total material	The % by weight of packaging material to total raw material weight	sM1.2: Issue Material sM2.2: Issue Sourced/In-Process Product sM3.3: Issue Sourced/In-Process Product sEM.6: Manage Transportation (WIP)
AM.3.20	Plan Fixed Asset Value	The current value of the supply chain assets used in supply chain integration	sEP.5: Manage Integrated Supply Chain Capital Assets

Metric ID	Metric Name	Metric Definition	Process
AM.3.21	Rebuild or recycle rate	Number of returned products that are rebuilt or recycled as a percent of the total number of products returned	sSR1: Source Return Defective Product sSR1.5: Return Defective Product sSR2: Return MRO Product
AM.3.22	Recyclable waste as % of total waste	The % of waste (by weight) generated from production that is recyclable	sM1: Make-to-stock sM2: Make-to- Order sM3: Engineer-to-Order
AM.3.23	Recycle DOS	Days of supply of recyclable inventory awaiting processing	sER.4: Manage Return Inventory
AM.3.24	Return Fixed Asset Value	The current value of the supply chain assets used in the Return process	sER.5: Manage Return Capital Assets
AM.3.25	Return for Recycle Rate	Number of returns that are for recycling or re use as a per cent of the total number of products returned	sDR3: Deliver Return Excess Product
AM.3.26	Return Rate	Weight of products returned divided by the weight of product shipped	sDR1: Deliver Return Defective Product
AM.3.27	Source Fixed Asset Value	The current value of the supply chain assets used in the Source process	sES.5: Manage Capital Assets
AM.3.28	Percentage of defective inventory	The value of defective product inventory as a percentage of the value of total inventory (%). [Total Defective Product Inventory Value] / [Total Inventory Value] x 100%	sDR1: Deliver Return Defective Product
AM.3.29	Percentage of Defective Inventory in Dispostion	The value of defective product awaiting a disposition decision as a percentage of the value of the total defective product inventory (%). [Value of Defective Inventory in Disposition Stage] / [Total Inventory Value] x 100%	sSR1.1: Identify Defective Product Condition sSR1.2: Disposition Defective Product sSR2.2: Disposition MRO Product
AM.3.30	Percentage of Defective Inventory in Return Authorization	The value of defective product awaiting return authorization as a percentage of the total defective product inventory value (%). [Value of Defective Product Inventory in Request Return Authorization Stage] / [Total Defective Product Inventory Value] x 100%	sSR1.3: Request Defective Product Return Authorization sDR1.1: Authorize Defective Product Return

Metric ID	Metric Name	Metric Definition	Process
AM.3.31	Percentage Defective Product Inventory in Transportation	The value of defective product inventory in transportation as a percentage of total defective product inventory (%).[Value of Defective Product Inventory in Physical Return and Transportation Stage] / [Total Defective Product Inventory Value] x 100%	sSR1.5: Return Defective Product
AM.3.32	Percentage Defective Product Inventory in Scheduling	The value of defective product inventory awaiting scheduling as a percentage of the total defective product inventory value (%). [Value of Defective Product in Scheduling Stage] / [Total Defective Product Inventory Value] x 100%	sSR1.4: Schedule Defective Product Shipment
AM.3.33	Percentage Excess Inventory in Disposition	Inventory awaiting return in the disposition decision stage. [Excess Inventory in Disposition Stage] / [Total Inventory Value] x 100%	sSR3.2: Disposition Excess Product
AM.3.34	Percentage Excess Inventory in Transportation	Excess process in physcial return and transportation stage as a percentage of total excess product inventory (%). [Value of excess product inventory in physcial return and transportation stage] / [Total excess inventory value] x 100%	sSR3.5: Return Excess Product
AM.3.35	Percentage Excess Inventory in Request Return Authorization	Inventory awaiting return authorization (%).[Value of excess product in request return authorization stage] / [Value of total excess inventory] x 100%	sSR3.3: Request Excess Product Return Authorization
AM.3.36	Percentage Excess Inventory in Identification	Inventory awaiting return in the identification stage as a percentage of total excess inventory (%).[Value of Excess Inventory in Identification Stage] / [Total Inventory Value] x 100%	sSR3.1: Identify Excess Product Condition
AM.3.37	Percentage Excess Inventory	The value of excess inventory as a percentage of the value of total inventory (%).[Value of Excess Inventory] / [Total Inventory Value] x 100%	sSR3: Source Return Excess Product

Metric ID	Metric Name	Metric Definition	Process
AM.3.38	Percentage Excess Inventory in Scheduling	Percentage of excess inventory awaiting scheduling the return (%) [Value of Excess Product Inventory In Scheduling Stage] / [Total Excess Product Inventory Value] x 100%	sSR3.4: Schedule Excess Product Shipment
AM.3.39	Percentage Unserviceable MRO Inventory in Disposition	The value of unserviceable MRO Inventory in disposition stage as a percentage of total MRO inventory value (%). [Value of Unserviceable MRO Inventory in Disposition Stage] / [Total MRO Inventory Value] x 100%	sSR2.2: Disposition MRO Product sDR2: Deliver Return MRO Product
AM.3.40	Percentage Unserviceable MRO Inventory in Transportation	The value of unserviceable MRO inventory in transportation as a percentage of the total MRO inventory value (%). [Value of Unserviceable MRO Inventory in Physical Return and Transportation Stage] / [Total MRO Inventory Value] x 100%	sSR2.5: Return MRO Product
AM.3.41	Percentage Unserviceable MRO Inventory in Return Authorization	The value of unserviceable MRO inventory awaiting return authorization as a percentage of the total MRO inventory value (%). [Value of Unserviceable MRO Inventory in Request Return Authorization Stage] / Total MRO Inventory Value] x 100%	sSR2.3: Request MRO Return Authorization
AM.3.42	Percentage Unserviceable MRO Inventory in Identification	The value of unserviceable MRO Inventory awaiting identification as a percentage of total MRO inventory value (%). [Value of Unserviceable MRO Inventory in Identification Stage] / [Total MRO Inventory Value] x 100%	sSR2.1: Identify MRO Product Condition
AM.3.43	Percentage Unserviceable MRO Inventory in Scheduling	The value of unserviceable MRO inventory awaiting scheduling as a percentage of the total MRO inventory value (%). [Value of Unserviceable MRO inventory in Scheduling Stage] / [Total MRO Inventory Value] x 100%	sSR2.4: Schedule MRO Shipment

Metric ID	Metric Name	Metric Definition	Process
AM.3.44	Percentage Unserviceable MRO Inventory	The percentage of the value of unserviceable MRO inventory as a percentage of total MRO inventory value (%). [Value of Unserviceable MRO Inventory in Deliver Return Process] / [Total MRO Inventory Value] x 100%	sER.4: Manage Return Inventory
AM.3.45	Finished Goods Inventory Days of Supply	Finished goods inventory days of supply are calculated as gross finished goods inventory ÷ (value of transfers/365 days).	sD1: Deliver Stocked Products sD2: Deliver Make-to-Order Product sD3: Deliver Engineer-to-Order Products sD.4: Manage Finished Goods Inventories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