Evolving Concepts in Supply Chain Visibility

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VIEW SUMMARY

Visibility capabilities allow business partners to connect and exchange data through an information hub solution, and then leverage those insights within supply chain processes to drive value and mitigate risk. This note provides supply chain leaders an update to our existing visibility research.

Overview

Key Challenges

Companies often lack a road map that links disconnected functional or departmental efforts for the goal of end-to-end supply chain visibility (EZESC), preventing organizations from moving to a higher maturity stage.

Taking the next step and extending supply chain visibility (SCV) upstream and/or downstream is less familiar to many companies and requires a mindset shift about approaches to technology and relationships.

Technology connectivity has made it easier to integrate business partners on a multienterprise platform, but business partner trust is still a challenging hurdle to overcome.

Recommendations

Map your extended upstream and downstream network and available data to assess gaps and to define EZESC initiatives. Leverage the findings in this research to enhance your visibility solutions.

Build the foundational SCV capability, the information hub — with its layers of connectivity, interoperability and visibility — and leverage it for use cases that call for cooperation, such as risk management or compliance.

Explore further ways to leverage the information hub for value-add capabilities in supply chain planning and/or execution processes.

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Introduction
This research elaborates on additional findings and further insights with respect to SCV. It is based on multiple internal and external interactions (end-user organizations and software vendors) since we started the research series on E2ESCV back in January 2013 (see Evidence). Here are the most important additions:

1. A modified definition of E2ESCV
2. A diversity of data and challenges to define minimum essential visibility datasets
3. An expanded set of use cases
4. Positioning the information hub as the foundation of E2ESCV
5. Having visibility as the building block for value generation and enabling risk management
6. Further differentiating of dominant partner and multienterprise styles

Analysis
Modified Definition of E2ESCV

Document reference:

"Understanding the Drivers, Terminology and Context for Supply Chain Visibility"

By connecting a company's network of business partners into an information hub, E2ESCV lays the foundation for further leveraging those insights in supply-chain-specific processes. Initially, Gartner defined E2ESCV as "The aim of end-to-end supply chain visibility (E2ESCV) is to provide controlled access and transparency to accurate, timely and complete events and data — transactions, content and relevant supply chain information — within and across organizations and services operating supply chains."

Additional Evidence
Aspect: Definition adoption

We slightly adapted the definition to better highlight the planning and executional aspects within visibility. Therefore, it's not only to collect events and data, but also to get insight into plans, with the main purpose to support supply chain processes.

"E2ESCV is a capability that provides controlled access and transparency to accurate, timely and complete plans, events and data — transactions, content and relevant supply chain information — within and across organizations and services to support effective planning and execution of supply chain operations."

Note that data becomes information when it has value from the insights through analysis and some initial analytics, bringing the perspective on the networkwide value chain. This we recognize through the term "information hub," which we discuss later on in this note.

Diversity of Data and Challenges to Define Minimum Essential Visibility Datasets

Document reference:

"Multiple Processes, Partners and Data Objects Must Be Considered to Obtain Benefits From Supply Chain Visibility"

"How to Leverage Public Domain Data for Increased Supply Chain Visibility"

Crucial data has many sources where different partners in the extended value chain have different data objects under control and available. In an initial attempt, we categorized those sources into two categories: structured data — materials (products, components), forecasts, orders (purchase, production, sales), inventories, shipments (inbound and outbound), trade documents, assets, quality, GRC/performance and waste — and then unstructured data — for example, data from social media (e.g., pictures, videos, text and content) and publicly available data sources (e.g., weather, traffic, risks from government institutions, national statistics and journals).

Of course, we also talked about the time aspect, having data available in a timely manner — meaning
in real time or at least near real time. So, we categorized relevant supply chain data so far into type, source and availability as summarized in Table 1.

**Table 1. Data Categories**

<table>
<thead>
<tr>
<th>Data Categories</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type</strong> Structured vs. Unstructured</td>
<td>Structured&lt;br&gt;Master or transactional data in a defined text format; such as materials, orders, shipments&lt;br&gt;Rules and regulations; like trade compliance content&lt;br&gt;Unstructured&lt;br&gt;Text in other forms; like documents, images, videos, audio and other objects</td>
</tr>
<tr>
<td><strong>Source</strong> Enterprise vs. Public domain</td>
<td>Enterprise systems&lt;br&gt;Core business systems as primary origin; such as ERP and CRM&lt;br&gt;Public domain&lt;br&gt;Data publicly available; includes social media and national statistics</td>
</tr>
<tr>
<td><strong>Availability</strong> Timely vs. Delayed</td>
<td>Timely&lt;br&gt;Having data available in a timely manner; real time or at least near real time (also taking about &quot;right-time&quot;)&lt;br&gt;Delayed&lt;br&gt;Getting data with some degree of detention, like via batch-upload</td>
</tr>
</tbody>
</table>

Source: Gartner (January 2015)

**Additional Evidence**

**Aspect:** Further categories

Data classification, as part of information life cycle management (ILM), has multiple aspects, but basically, it tries to answer the following questions: What data types are available? Where is the data located? What access levels are implemented?

Traditionally, when talking about relevant data for SCV, we think about current or historical data coming from core business systems (both being operational data). And they differ by use case and by partner tier-level in the extended network. Certainly, there is much more data available in the whole supply chain ecosystem. So, another point of view to classify data for supply chain relevance is to expand it to include the following categories and related attributes as listed in Table 2.

**Table 2. Expanded Data Categories**

<table>
<thead>
<tr>
<th>Data Categories</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Current vs. Historical</strong></td>
<td>Current&lt;br&gt;Data (e.g., master and transactional data such) coming from mainly core business applications such as ERP, TMS, WMS, asset management systems and others that can be operated by different business partners (company, suppliers, customers, 3PLs). Their relevance is related to current operations&lt;br&gt;Historical&lt;br&gt;past relevant data stored in core business applications such as ERP or BI/EDW, having no direct relation to current operations</td>
</tr>
<tr>
<td><strong>Stored vs. Transient</strong></td>
<td>Stored&lt;br&gt;Traditional in databases, stored data of any kind&lt;br&gt;Transient&lt;br&gt;Temporary data that is discarded after it is no longer needed by the computation, not stored in any database; could be any mobility data or carriage and cargo connectivity</td>
</tr>
<tr>
<td><strong>Open-Shared vs. Restricted</strong></td>
<td>Open-Shared&lt;br&gt;Data being openly available, collected in the ecosystem, such as market intelligence, statutory and trade agreements, carrier safety ratings&lt;br&gt;Restricted&lt;br&gt;Data being confidential and restricted in usage by users (mainly owned and controlled by business companies)</td>
</tr>
</tbody>
</table>

Source: Gartner (January 2015)

Another big challenge for companies is to define what data is relevant to operate supply chains efficiently, getting the right insight and not an information overload. And the necessity to get additional data is also increasing, thinking about data now needed for risk management such as time-to-recover (TTR) or value-at-risk (VAR).

Figure 1 gives an example of common milestones and data used within logistics execution (inbound supply side), collecting that data to gain visibility along the flow of goods, including multiple business partners.

**Figure 1. Illustrative Inbound Milestones**
Note that from a pure logistics perspective the milestone "goods arrival" is the end of the process. However, the receipt must be processed to close out the purchase order line item, setting the stage to process the supplier invoice as part of the three-way match — purchase to pay (P2P) and source to settle (S2S).

**Expanded Set of Use Cases**

Document reference:

"Use Cases for Supply Chain Visibility"

E2ESCV is gaining interest in today’s global supply chains because there is an increasing need for network visibility and the continuing collaboration which it supports to help reduce business and partner risk, while maintaining efficiency and improving performance. Visibility solutions help support multienterprise, multitier collaboration by providing real-time/near-real-time visibility into the extended value network.

There are several use cases for which SCV is a building block. Based on our survey conducted back in 2013, we identified 12 major ones (Figure 2 pictures the Lego bricks, now slightly adopted to split the service block and move new product introduction [NPI]).

**Figure 2. Visibility Use Cases**

Note: SCE = supply chain execution, SCP = supply chain planning

Source: Gartner (January 2015)

**New Evidence**

**Aspect:** Additional use cases with modified categorization

We want to clarify the "other" use case category for SCV and bring in a more precise categorization (see Figure 3):
**Core use cases** — Covering the standard Supply Chain Operations Reference (SCOR) model (NP/plan/source/make/deliver/service) capabilities, with a transformation over time from purely functional, enterprise visibility (achieving visibility within the four walls of the company) toward an extended multienterprise visibility involving business partners (as processes mature, the same happens to capabilities within these core use cases; the “vertical” evolution of SCV).

**Comprehensive use cases** — Ones with cross-supply-chain domain span, driving another set of visibility requirements (but always in combination with process capabilities as these areas go beyond SCV). This is in recognition of the emergence of risk management as a key driver of visibility (which is not outside SCOR; it is in plan/source/make/deliver, just typically at a higher stage of maturity of these supply chain domains; the “horizontal” expansion of SCV).

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**Figure 3. Additional Use Cases**

![Additional Use Cases Diagram](image)

*Source: Gartner (January 2015)*

Here, the most important use case is risk management (as indicated in blue), with SCV being a key element of risk management. Others offer partial support/enablement, with predominantly process capabilities. Practical examples may include:

- Risk management is the status of raw materials inventory or supplier capacity to make the brand owner’s products and a time to recover to a specific level after a significant supply disruption; within projects (e.g., engineer to order [ETO]), the status of supplier orders and the status of components delivered to an assembly location or an installation site could be of interest to optimize inventory levels and guarantee fewer disruptions.

- Sustainability — Collecting CO2 emission data through logistics operations for regulatory reporting or improvements throughout transportation options.

Note that the actual selection of use cases is heavily dependent on the maturity of the organization. We see companies executing on a road map to gain SCV. First, they gain enterprise visibility — mainly through ERP consolidation and application integration — and then they start for multienterprise one, implementing an information hub for gaining visibility in logistics execution inbound (see "Supply Management and Logistics Leaders Can Leverage Upstream Visibility to Generate Value and Reduce Risk").

**Positioning the Information Hub as the Foundation of E2ESCV**

Document reference:

- "Use Cases for Supply Chain Visibility"
- "Why Supply Chain Leaders Should Aim for End-to-End Supply Chain Visibility by 2016"

Technology connects internal and external business partners in the networkwide value chain, allowing integration among all of the players as basis for further activities along supply chain processes. It requires capabilities that are beyond the established ones found in business applications. Basically, it is the architectural transformation from simple, traditional point-to-point data exchange to a multienterprise platform.

**New Evidence**

**Aspect:** Clarification on capabilities

There are three layers or capabilities necessary to lay the foundation of E2ESCV (through the information hub). Those are still the same, but we clarified terminology and added some new aspects to that model, summarized in the model below (see Figure 4).

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**Figure 4. Visibility and Collaboration Model**
Enhancements to the model and its layers/capabilities:

**Interoperability layer** — Changed from the term "technology collaboration" to better distinguish between visibility and collaboration (collaboration leverages the visibility gathered and refers to activities in which decision makers can participate, the multidirectional business partner and process collaboration, communication and interchange). Interoperability defines the data exchange mechanism (also changed from "information exchange" to "data exchange"), mainly, between different systems, but, alternatively, also via a portal.

**Visibility layer** — Added to include some basic analysis aspects, with the filtration/decision support one in detail. The visibility layer not only presents results, more importantly, it does filtration — the detection, evaluation, identification or pertinence — in order to provide decision-making support (like that the SCV solution filters all the relevant data, evaluates it to become information of relevance, and transfers it into easy-to-read formats, colored dashboards, to allow decision making and further drill-down activities if required).

**Information hub** — Changed from the term "collaboration hub." The information hub provides combined visibility capabilities, also referred to as "capture and analyze" activities. The information hub (1) provides the architectural setup, connecting the company with its many business partners and systems in their networks, (2) allows interoperability, the information exchange between different systems, setting the stage for partner/system interactions, along with rules, events and workflows and (3) facilitates the filtration and evaluation of captured plans, events and data, and their presentation.

**Multienterprise grid aspect** — A unique set of capabilities such as shared dashboards, combined information on data objects from multiple parties or analytics, and intelligence a community can collectively use.

Note that additional capabilities/layers (see Note 1) will appear once the company matures on its supply chain processes overall:

Like along supply chain processes, with capitalizing on visibility through business logic and application functionalities in the planning and execution domains (the "vertical" emergence in this model). An example would be leveraging visibility from logistics use cases — alerts on disruptions — to simulate different scenarios — so-called response planning — in order to solve the disruption through, e.g., alternative transportation modes.

Or through the addition of comprehensive use cases, but also the utilization of more advanced analytics or leveraging multienterprise grid functionalities (the "horizontal" emergence, see: "Hype Cycle for Multienterprise Solutions, 2014"). Examples would be adding risk aspects in source/make/deliver use cases or sharing KPIs collectively with multiple business partners.

Visibility as Building Block for Value Generation and Enabling Risk Management

Document reference:

"How to Enable End-to-End Supply Chain Visibility"

Supply chain leaders can use SCV capabilities to improve the operational and financial performance of
complex, global value networks. SCV software is multienterprise, providing a group of supply chain business partners at different tiers with controlled, near-real-time access and transparency to accurate and complete plans, events and data. The software’s core capability is providing an information hub with event/risk management and alert functionalities (for more details see the Appendix).

New Evidence
Aspect: Positioning SCV as building block

Visibility — the information hub — is a key building block for value generation. Gaining visibility through planning and executional data/information via the three layers of connectivity, interoperability and visibility, will allow companies to then utilize this visibility for supply chain domain-specific functionalities in planning (SCP) or execution (SCE) processes. From an evolving aspect, we could distinguish between basically three levels where visibility is leveraged:

1. Simple data exchange — The foundation with the connectivity and interoperability layer in place (often represented by point-to-point connectivity).
2. Process integration — Gaining end-to-end visibility by utilizing, e.g., event- and workflow-management on a central platform together with business partners. Adding the visibility layer with its analysis capabilities to transform data into meaningful information.
3. Supporting the value-generating capabilities — Optimization, such as response planning (in response to executional disruptions); note that this is not visibility per se; it’s the higher maturity aspect where visibility is utilized through supply chain process capabilities or more advanced analytics!

Figure 5 summarizes key tasks and objects that make up the information hub, clearly outlining that the hub is the foundation, fed by executional or planning data and information, and acting as the building block for value generation within SCP and SCE processes.

Figure 5. Information Hub Integration

Think about the following two scenarios:

Visibility in planning
Allows getting accurate, timely and complete plans and data from business partners on, e.g., inventory, capacity and forecasts — the multienterprise view.

Once having that information collected, it will allow executing core planning functions such as S&OP from a tactical perspective, balancing demand and supply and interacting with business partners.

Visibility in execution
In this example — logistics execution — we collect status information (accurate, timely and complete) on orders and shipments (data and events) along the material flow. It will monitor the flow across multiple business partners (suppliers, logistic service providers) and send alerts if any disruption occurs — again, the multienterprise view.

This information will then allow again executing core planning functions — response planning — to simulate possible what-if scenarios to solve the disruption.

Or it also could be a trigger point for supply chain process functions such as customs or trade compliance.

Visibility is also a key building block for supply chain risk management. Lately, we’ve seen interest and adoption of visibility applications that help to provide opportunity/risk avoidance. Event notifications, particularly at Tier-2 suppliers and further upstream, help brand owners and channel masters to "trust,
but verify" network plans, which then are being executed according to replenishment and demand plans. Using visibility application notifications of unplanned events, companies are seeking to quickly mitigate those risks in near real time, update plans and leverage the data to optimize E2E inventories. Data from information hubs is used to assess value at risk and time-to-recover (TTR) to help improve supply network design and business continuity plans (BCPs).

Once companies advance on their supply chain maturity overall — along the five stages of our DDVN maturity model — we see the following SCV expansions/advancements happening (see Figure 6).

**Figure 6. Visibility Advancement**

![Visibility Advancement Diagram](image)

Source: Gartner (January 2015)

**Differentiation of Dominant Partner and Multienterprise Styles**

Document reference:

"Market Guide for Supply Chain Visibility Software"

Implementation styles are shifting from point-to-point application integration toward shared multienterprise styles (which include the two peculiarities of dominant-partner or multienterprise). Also, the movement toward a multitenancy architecture — where the software is offered as a single code page and shared among business partners — opens innovative new approaches to software marketing and pricing.

**New Evidence**

**Aspect:** Variety of implementation styles

There are three implementation styles (or architectural setup options) to gain SCV — from an internal to a dominant partner to a multienterprise setup — with each having its strengths and weaknesses. As companies connect a number of diverse enterprise processes via an information hub, they can gain the following general benefits/strengths:

- **Dominant partner** — A selectively shared version of the truth for the brand owner, but also to some degree for the partners; accessibility to key partners via a portal; business activity monitoring and event management to expose shared processes.

- **Multienterprise** — Massive scalability for all business partners; fully centralized and shared logic and master data.

Solution providers might offer both options, a dedicated or shared environment with the following characteristics (see Table 3):
Table 3. Implementation Style Characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Dominant Partner</th>
<th>Multienterprise</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environment</td>
<td>Dedicated</td>
<td>Shared</td>
</tr>
<tr>
<td></td>
<td>Copy of code page</td>
<td>Single code page</td>
</tr>
<tr>
<td>Connectivity</td>
<td>Extended enterprise</td>
<td>Network community</td>
</tr>
<tr>
<td></td>
<td>One-to-many</td>
<td>Many-to-many</td>
</tr>
<tr>
<td>Drivers</td>
<td>Brand owner</td>
<td>Community</td>
</tr>
<tr>
<td></td>
<td>Visibility, accuracy, control</td>
<td>Collaboration, agility, compliance</td>
</tr>
<tr>
<td>Benefits</td>
<td>Secure environment</td>
<td>Scalability</td>
</tr>
<tr>
<td></td>
<td>Flexibility for tool adoption</td>
<td>Lower cost (shared IT + higher speed)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Degree of business partner existence</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Multienterprise grid capabilities</td>
</tr>
<tr>
<td>Challenges</td>
<td>Higher cost (deployment + maintenance)</td>
<td>Security (although role-based access)</td>
</tr>
<tr>
<td></td>
<td>Business partner onboarding effort</td>
<td>Inflexibility for tool adoption</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&quot;The cloud&quot;</td>
</tr>
</tbody>
</table>

Source: Gartner (January 2015)

Looking into the market (vendor view) and deployments (client view) we see the following adoption:

For planning use cases, platforms/applications are predominantly on-premises or in a private cloud/dedicated environment (because for planning, the analytics capabilities are still more important to companies than the multienterprise aspect, as well as security concerns of critical company data being "in the cloud").

For executional use cases, platforms/applications are offered as public cloud, a real multitenant setup or, if clients request, in a private cloud.

Risk management tools are predominantly in the cloud, leveraging multiple data sources/feeds. More and more providers not only offer the information hub capabilities, but also supply chain process/domain-specific functionalities for increased value provisioning.

Achieving E2ESCV means mapping SKUs across multiple parties to enable multtier visibility; this is recognized by providers often offering embedded data management capabilities and services.

Appendix

Visibility Software Core Characteristics

Let’s recap what the seven differentiating capabilities that characterize a visibility solution are:

Table 4. Seven Differentiating Capabilities

<table>
<thead>
<tr>
<th>Capability</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implementation Style</td>
<td>The type of collaboration among business partners in support of a multienterprise setup (one-to-many or many-to-many).</td>
</tr>
<tr>
<td>Embedded Functionalities</td>
<td>The degree of software-embedded capabilities in support of collaborative business functions (e.g., master data management).</td>
</tr>
<tr>
<td>Architecture/Tenancy</td>
<td>Depending on the use case, the software’s ability to execute on a shared environment.</td>
</tr>
<tr>
<td>Data Collection</td>
<td>The software’s ability to collect data and content in real time or near real time with real-time transmission and processing (providing an information hub).</td>
</tr>
<tr>
<td>Data Sources</td>
<td>The software’s ability to utilize different data sources, not only structured data, but also unstructured and public domain data.</td>
</tr>
<tr>
<td>Connectivity</td>
<td>The ability of the software to offer multichannel integration along different media and formats, and universal, reusable maps and standards for interoperability.</td>
</tr>
<tr>
<td>Integration</td>
<td>Ability to integrate with back-office systems — aspects of types and tools (e.g., event management) — and the different capabilities required.</td>
</tr>
</tbody>
</table>

Source: Gartner (January 2015)
organization without input or influence from these firms, funds or their managers. For further information on the independence and integrity of Gartner research, see “Guiding Principles on Independence and Objectivity.”