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Supply Chain Visibility Is an Enabler of Descriptive and Diagnostic Analytics

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Gaining insights into disruptions as early as possible is key for companies in today's complex supply chain structures. For supply chain IT leaders, visibility provides great examples of how it can feed analytics, help establish mitigation actions and improve performance while reducing risk.

Key Challenges

- Supply chain teams generally succeed in their mission to set up reporting and dashboard tools, but often struggle to utilize a broader set of analytical capabilities.
- Information hub capabilities are the current focus of many supply chain organizations. But the lack of combining those with advanced analytics prevents supply chain organizations from addressing a wider array of supply chain problems more effectively.
- The broad range of visibility use cases and tools available in the market makes it very challenging for supply chain executives to know what use cases to prioritize, which tools to invest and how to integrate into the existing supply chain application portfolio.

Recommendations

Supply chain IT leaders:

- Understand the different analytics capabilities needed for various use cases and how an information hub can be part of a broader process to improve decision making in our extended supply chain.
- Create a road map that outlines the goals and milestones of adopting supply chain analytics, starting with the basic capabilities of descriptive and diagnostic, and then further enhancing into advanced analytics.
- Use analytics in combination with information hubs and build a portfolio of capabilities to bring supply chain processes into fuller control and higher maturity.

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Introduction

With today's complex supply chain structures, any disruptions — no matter the source — can cause a whole series of problems. It would, therefore, be extremely valuable to have insights as early as possible, knowing about disruptions or events. This amplifies the need for building visibility and managing risk at potential disruption points not only within the company's own supply chains, but also — more importantly — in their extended supply chains. Supply chain visibility provides a great example of how descriptive and diagnostic analytics — the two basic types of analytics capabilities — can help putting mitigation actions in place, improving supply chains while reducing risk.

Analytics Capabilities

Supply chain organizations know there is value in data and analytics, but often they expect different benefits out of it. However, a common goal is to apply logic and mathematics to data in order to provide insights for making better decisions. There are four fundamental analytics capabilities defined (see Table 1) that ask different questions of data, use different tools and techniques, and

require varying levels of human input to arrive at a decision and ultimately take action (see "Extend Your Portfolio of Analytics Capabilities").

Table 1. Analytics Capabilities

Type	Characteristic	Example
Descriptive	The "what" — Applying logic and mathematics to data to understand what is currently happening or has happened	Provisioning of information (past and present) for human decision making: ▪ Reports, dashboards, statistics, alerts
Diagnostic	The "why" — Applying logic and mathematics to data to understand why outcomes, events or trends occurred	Applying additional analytics (in more detail) to support decision making: ▪ Visualization, online analytical processing (OLAP) cubes
Predictive	Applying logic and mathematics to data to anticipate future behavior or estimate unknown outcomes	Providing forward-looking insights in support of decision making, even taking corrective action before the impact: ▪ Reasoning, regression, time series, decision trees
Prescriptive	Applying logic and mathematics to data to specify a preferred course of action	Calculating outcomes and proposing a "best" alternative as decision support (human) or decision automation: ▪ Decision management, optimization, control systems

Source: Gartner (March 2015)

Visibility as an Enabler of Analytics

Information hub capabilities — connectivity, interoperability, and visibility — are the foundation of gaining visibility, capturing data and providing filtering. These initial analytics would then allow companies to start acting on the insight gathered (see "Evolving Concepts in Supply Chain Visibility").

Analytics capabilities used together at different stages of the decision process, and also for different use cases at different maturity stages of an organization, allow addressing a wider set of decisions in more detail and creating a culture of data-driven decision making, ultimately increasing a company's supply chain maturity. Descriptive and diagnostic analytics uses visibility for analyzing what happened ("the past"), while advanced analytics allows organizations to act on that visibility for better decision making ("the future").

This research outlines how supply chain visibility and, specifically, descriptive and diagnostic analytics correlate, with supply chain visibility being an application for these two analytics categories. And then how advanced analytics can add additional value managing complex multienterprise supply chains.

Analysis

Here we provide an overview on research themes and insights, combining the supply chain visibility and analytics aspects:

- **Basic capabilities —** The information hub as enabler for descriptive and diagnostic analytics
- **Advanced capabilities 1 —** Advanced analytics as value generation capability
- **Advanced capabilities 2 —** Leverage public domain data for increased visibility and risk management

The following sections describe each of the capabilities in more detail, provide example techniques and use cases, and discuss how they correlate to supply chain visibility with a focus point to the information hub.

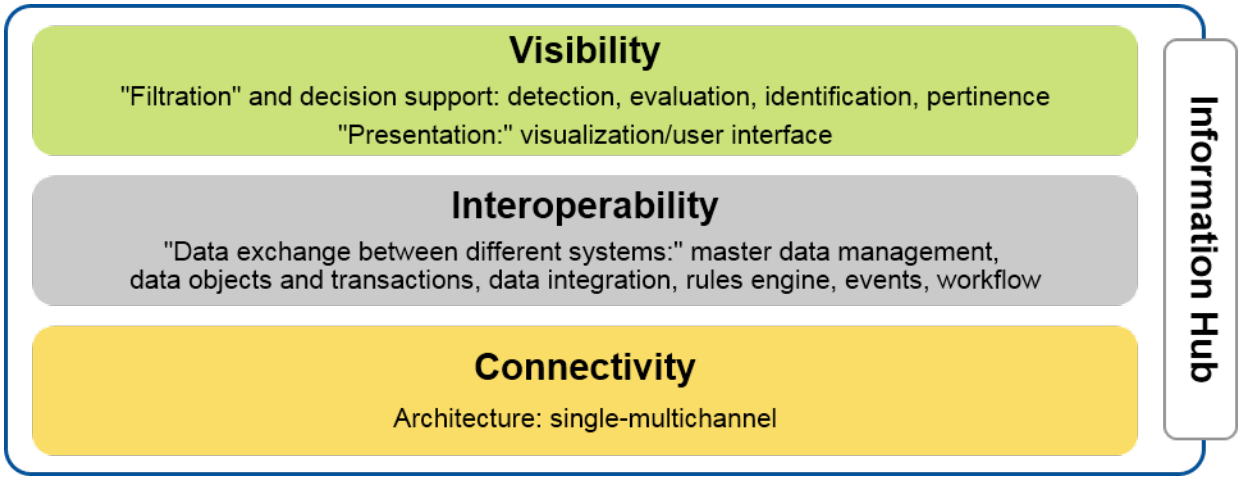
Utilize Information Hubs to Support Visibility

Document references:

- "Why Supply Chain Leaders Should Aim for End-to-End Supply Chain Visibility by 2016"
- "Evolving Concepts in Supply Chain Visibility"

The information hub (as described in Figure 1) 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), which sets 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.

Figure 1. Information Hub Layers



Source: Gartner (March 2015)

Note that within the information hub layer model "filtration," an initial analytics capability, is included. The information hub is then enabler for descriptive and diagnostic analytics.

The information hub is a useful foundational building block by helping users better understand the state of a company's supply chain, asking the two questions "what" (descriptive analytics) and "why" (diagnostic analytics):

- Starting with the present, organizations create awareness that a decision must be made using descriptive capabilities (such as dashboards and alerts) and also some diagnostic analysis (such as data visualization).
- Then descriptive and diagnostic capabilities will be applied on past data in order to understand relationships and trends.

Table 2 shows examples of supply chain-relevant basic analytics.

Table 2. Basic Analytics: Examples

Type	Characteristic	Supply chain example
Descriptive	Provisioning of information (past and present) for human decision making	▪ Sales report by product and region ▪ Segmentation of customers by past revenue ▪ On-time delivery/order fulfillment rate ▪ Current view of shipments
Diagnostic	Applying additional analytics (in more detail) to support decision making	▪ Analysis to understand sales patterns ▪ Delivery delay reasons ▪ Diagnose reasons for low SLA conformance

Source: Gartner (March 2015)

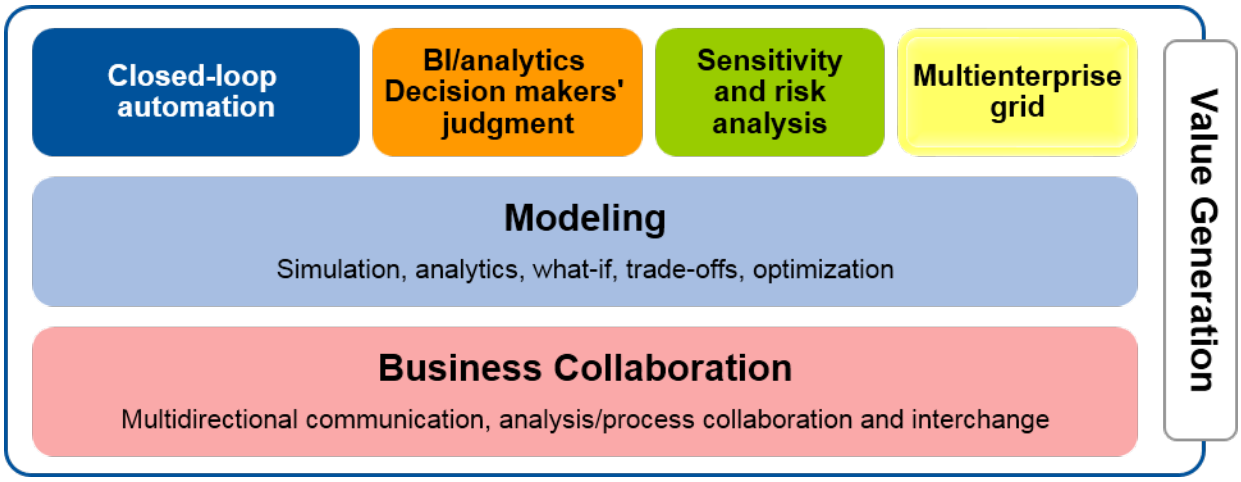
Leverage Visibility to Support Advanced Supply Chain Analytics

Document references:

- "How to Enable End-to-End Supply Chain Visibility"
- "Evolving Concepts in Supply Chain Visibility"

Once an organization has implemented information hub capabilities, thus having tightened its supply chain maturity with incorporating multienterprise abilities, it will look out to leverage additional capabilities (see Figure 2). With visibility now in place, advanced supply chain analytics will then be leveraged when thinking through likely outcomes before making a decision. Predictive analytics will help in making better estimates of outcomes, and finally prescriptive capabilities will identify the best course of action.

Figure 2. Value Generation Layers



Source: Gartner (March 2015)

After having established basic analytic capabilities, organizations will start asking two further questions: "what will happen" (predictive analytics) and "what should I do" (prescriptive analytics). They will leverage predictive and prescriptive analytics to build on the visibility provided by descriptive and diagnostic analytics to make better business decisions.

- Organizations might address predictive analytics in two ways. First, it is often used as a natural extension of experiences with basic analytics, driven by curiosity about the future and whether observed trends will continue. Second, predictive analytics can be driven by a business need to assess a future outcome. Here, predictive analytics can help make better estimates of outcomes through simulation and forecasting.
  - Supply chain example: Visibility as basis for predictive asset maintenance, transportation congestion/simulation, business partner risk and fraud detection.
- Finally, organizations will not only use a report, statistics, or estimates of future outcomes to answer the question of "what should I do" — the option of decision support when a human is in the loop — but also more broadly "what should be done" as the option of decision automation where the decision is carried out by the system automatically.
  - Supply chain example: Visibility as basis for supply network optimization, fleet scheduling and routing.

As a summary, and more generally, organizations can use advanced analytics to address the following:

- Predictive analytics — To answer questions about the future or to determine the likelihood of unknown outcomes, such as anticipating business partner behavior of classifying events and risks.
- Prescriptive analytics — To optimize decisions, efficiently allocate resources, or find the best business partner treatments.

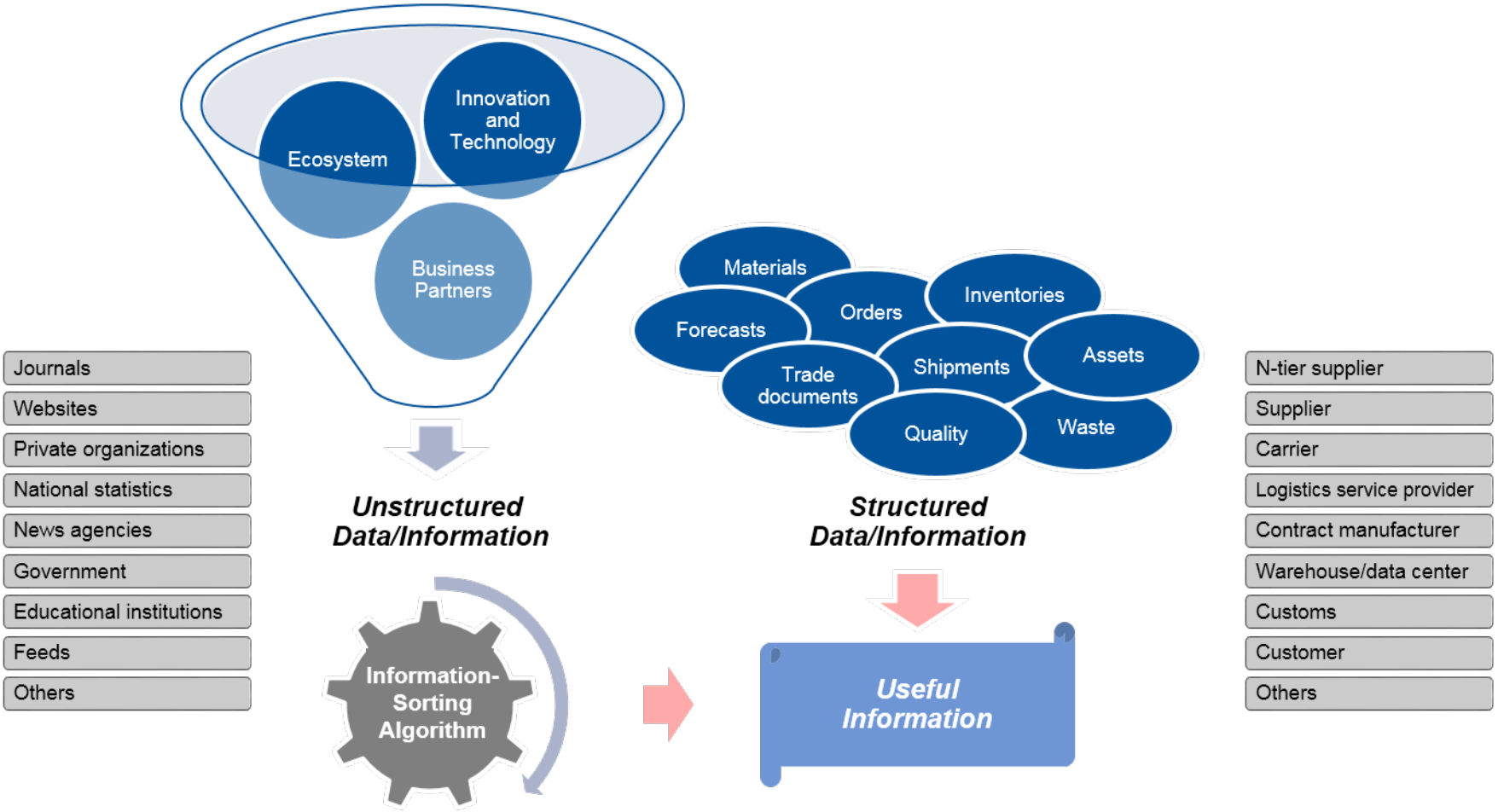
Leverage Public Domain Data for Increased Supply Chain Visibility

Document references:

- "How to Leverage Public Domain Data for Increased Supply Chain Visibility"
- "Evolving Concepts in Supply Chain Visibility"

Providing forward looking insights in support of decision making, even taking corrective action before the impact occurs, is the theme of predictive analytics. The more data and information is available in support of this process, the better, since crucial data has many sources with different partners in the extended value chain having control of that data (see Figure 3).

Figure 3. Data Sources



Source: Gartner (March 2015)

Traditionally, when talking about relevant data for supply chain visibility, we think about current or historical data coming from core business systems. This data differs 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 that provides additional visibility:

- Public domain — Data that is publicly available. Data collected in this ecosystem includes market intelligence, statutory and trade agreements, carrier safety ratings, national statistics, financial and legal data in listings.
- Unstructured — Text in other forms such as documents, images, videos and audio.
- Transient — Temporary data that is discarded after it is no longer needed by the computation. This data is not stored in any database and could be any mobility data or carriage and cargo connectivity.

Today's data sources are moving beyond the conventional domain of structured data, such as materials (products and components), forecasts, orders (purchase, production and sales), inventories, shipments (inbound and outbound), trade documents, assets, quality and waste, just to name the most common ones. Today's data sources are extending into the unstructured data zone. We see leaders merge structured datasets with unstructured ones to enhance visibility into end-to-end supply chains and create information insights for better decision making.

Gartner Recommended Reading

Some documents may not be available as part of your current Gartner subscription.

"Gartner's Business Analytics Framework"

"Common Themes From 19 Supply Chain Visibility Initiatives: An Overview"

"Supply Management and Logistics Leaders Can Leverage Upstream Visibility to Generate Value and Reduce Risk"

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