

# Supply Chain Management

& IoT:

Just  
Another  
Evolution?



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# TABLE OF CONTENTS

- I. IF SUPPLY CHAIN MANAGEMENT KEEPS EVOLVING, HOW CAN I KEEP UP? .....1
- II. WHAT’S SO DIFFERENT ABOUT IOT AND BIG DATA, AND WHY SHOULD SUPPLY CHAIN EXECUTIVES CARE? .....1
- III. CHAINS & NETWORKS ARE GOOD, BUT STREAMS & LAKES ARE BETTER.....3
- IV. THE ANALYTICS VALUE CHAIN – HOW TO GET VALUE QUICKLY.....5
  - a) Fast Data Ingestion
  - b) Real-Time Streaming Analytics
  - c) Historical Analytics
  - d) Predictive Analytics
  - e) Prescriptive Analytics & Intelligent Actions
- V. CONCLUSION.....7

## **I. IF SUPPLY CHAIN MANAGEMENT KEEPS EVOLVING, HOW CAN I KEEP UP?**

With constant advances, the bar for Supply Chain Management continues to rise. We have seen changes to the “right tools” needed to manage Manufacturing and Supply Chain evolve dramatically over the last 50 years. The 1960’s brought us MRP, followed by MRPII in the 1970’s. The 1980’s moved us from a focus on materials to the overall processes with the concept of Supply Chain Management and the beginning of the almost ubiquitous adoption of ERP technologies. The SCOR model arrived in the 1990’s, and with it technology investments in “Plan” were dominated by the addition of Advanced Planning Systems, and in “Design” by PLM. With the change of the century, we’ve seen a focus on Demand Driven Supply Networks and Collaboration between trading partners and the cloud. Now we find ourselves well into the 2010’s, and the advances are in Internet of Things (IoT), and Big Data.

What do these new technology paradigms mean for Supply Chain Management, and how can you take advantage of them for better performance and business results? This white paper is intended to address the questions behind adoption and use of IoT and Big Data to better manage Supply Chains. It is the thesis of this paper that Big Data and IoT is much more than just another evolution, but rather is a major “inflection point” for supply chain management.

## **II. WHAT’S SO DIFFERENT ABOUT IOT AND BIG DATA, AND WHY SHOULD SUPPLY CHAIN EXECUTIVES CARE?**

IoT and Big Data bring dramatically new concepts and capabilities to the art and science of supply chain management – but why? If we look back at the progression over the last half century, the core concepts and technologies are all rooted in business processes and systems that followed pre-defined workflows with well-defined actors, and were driven by a set of business transactions and well-structured data formats.

Let’s take the example of a purchase order (PO) lifecycle. POs follow a rigorous workflow process with a structured approval hierarchy. As a PO moves from a customer to supplier there are well defined standards like an EDI 850, EDIFACT ORDERS, or RosettaNet 3A4 PIP.

The advancements in Supply Chain technology seen over the last half century were primarily based on improvements in these three dimensions:

- Increased breadth of process orchestration (e.g. MRP to ERP)
- Increased depth of process orchestration (e.g. multi-tier supplier integration)
- Increased speed of process execution (e.g. from monthly to weekly to daily planning)

In retrospect, despite how groundbreaking each seemed at the time, this series of innovations in tools and techniques were all somewhat incremental.

IoT and Big Data capabilities are revolutionary for a variety of reasons, including:

- IoT connected assets have both a device or local level impact as well as a role in critical overall processes
- Information flows are streams of continuous events and can often be unstructured, unlike the traditional batches or transactions
- Big Data analytic tools allow for the processing of enormous amounts of data collected in data lakes
- Streaming analytic tools enable real-time analysis of incoming event streams of up to 1 million events per second, which can be used for both exception alerting and continuous predictions

When we bring these factors together with the foundation of existing investments in Supply Chain management tools, organizations have the opportunity to move from an operating model founded on best-guess planning and reactive fire-fighting, to one of continuous predictions and proactive execution. Capitalizing on this opportunity requires:

- Adoption of a new set of capabilities to gain higher productivity, operational efficiencies, asset visibility, operational flexibility and supply chain optimization
- Extraction of value from the enormous gap between the data currently being used in business operations and the explosion of data that can or is already collected but not utilized
- Allowing streaming data to enable actionable insights that drive improved operational performance at the speed and cadence of today's ever-accelerating technology

The opportunities are vast, diverse and as such can be rather intimidating. Many organizations are searching for a clear path to insights and actions, to drive better business outcomes based on utilizing the data available from sensors, devices and external data sources. Unfortunately, many have found themselves overwhelmed by the size and scope of such a project.

Traditional Supply Chain technology projects designed and developed around a single focus or issue, tended to be monolithic in size and deployed function by function. However, initiatives based around the new IoT and Big Data technology are best approached differently. We have found that the best practice is to focus not on the technology landscape itself, but rather the target-rich business use-cases where these types of technologies can be applied. This gives an organization the ability to do continued improvements to existing use-cases, as well open the door for the additional new use-cases. This ability to deliver value quickly and repeatedly through incremental capability deployments allows organizations to both address changes in their business and capitalize on the ever-evolving availability of connected IoT assets and external data sources.

Being able to move quickly, though, requires a new type of unified and open IoT analytics platform that integrates critical existing supply chain data with new IoT streams to enable advanced analytics and intelligent supply chain management. Combining traditional supply chain data with IoT data streams is essential to achieving success in this new era of supply chain management.

### III. CHAINS & NETWORKS ARE GOOD, BUT STREAMS & LAKES ARE BETTER

Organizations have spent years building information systems to represent their Supply Chains and Supply networks in an electronic fashion. With the combination of existing Supply Chain system investments, new IoT data streams, Big Data Lakes and a unified analytics platform, organizations gain the building blocks for intelligent real-time Supply Chain Command Centers. While the specifics of what’s important to focus on in your market will vary based on industry and your organization’s role in the overall value chain, the organizational competencies and enabling technology platforms to do so are the same.

First, let’s consider the landscape of potential data sources that could be leveraged in building your Supply Chain Command Center. Figure 1 below depicts a summary of the types of data sources available today to just about every organization, and plots them based on variety (from structured to unstructured) and volume and velocity.

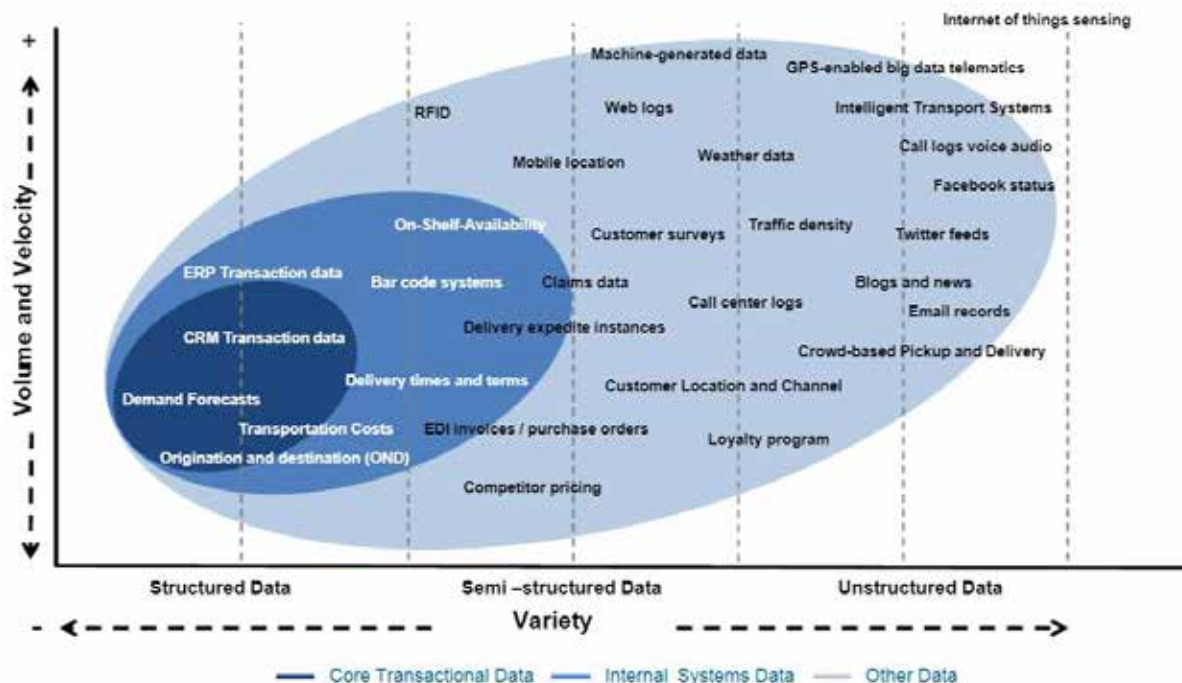


Figure 1: Variety vs. Volume and Velocity of Supply Chain Data

Source: *Big Data Analytics in Supply Chain Management: Trends and Related Research. Presented at 6th International Conference on Operations and Supply Chain Management, Bali, 2014.*

The vast majority of organizations are managing their supply chains primarily based on systems handling data sources that fall in the “structured data” category above. That means the bulk of the data volume, as well as the real-time data, goes unused despite the obvious potential it provides for game-changing capability improvements. At this early stage of evolution, the details of each of these use-cases are not as important as the central concept of finding a starting point so that your organization can start taking advantage of all the available “unstructured” data in your supply chain optimization initiatives.

Supply Chain Use-Cases that could benefit from semi-structured and un-structured data sources from IoT and Big Data include:

USE CASES	With Only Structured Data and Traditional Technologies	Leveraging IoT, Big Data and Advanced Analytics
Demand Forecasting	Weekly cycles based on internal sales data and judgement	Continuous analysis of POS, Loyalty App, Social Media and weather to predict demand / supply exceptions and recommended remediation.
Inventory Replenishment	Weekly requests with exception identification only after receiving supplier and carrier status updates, or stocking out	Predictive analytics constantly project actual replenishment based on transaction data, tracking of tagged inventory & connected transportation assets, traffic conditions and historical supplier performance
Shop Floor Management	Preventative maintenance is scheduled and performed “just in case”.	Products and services enabled by new and diagnostic information provided by advanced analytics
Operators report line down situations after they occur, then call in maintenance personnel to diagnose and repair machines and equipment.	Connected shop floor equipment streams log files and telemetry data enabling failure prediction by advanced analytics. Maintenance personnel are automatically alerted with the diagnosis, urgency, recommended actions and required parts. Potential machine failure avoided by performing preventative maintenance “just in time”.	Characterized by a range of options and rapid resolution of issues vs. outages only; also detects and sets up smarter actions to avoid power loss along the grid

#### IV. THE ANALYTICS VALUE CHAIN – HOW TO GET VALUE QUICKLY

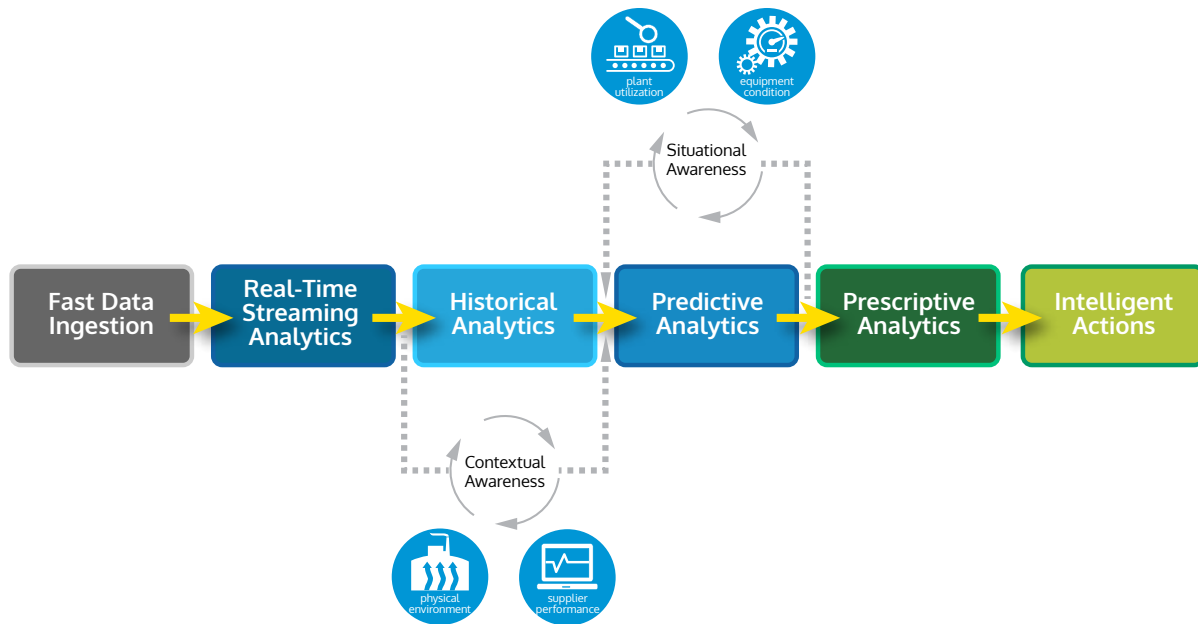
Vitria's VIA IoT analytics platform empowers organizations to transform their Supply Chain operations with faster analytics, smarter actions, and rapid innovation to get better outcomes faster. With VIA, organizations can leverage their existing investments in systems and tools, build new models rapidly, analyze data quickly and act on newly available insights in a timely manner to meet the ever more demanding needs of a complex global supply chain.

The platform enables organizations to improve operational performance and to drive revenue growth through business transformation with:

- Faster, predictive analytics
- Smarter decisions and actions
- Rapid innovative solutions
- Better business outcomes

The irony of the IoT era for brand owners is that while it offers great promise because of the ability to leverage the high volume of data and interactions, it is also very complex and difficult to make sense of it all and take meaningful actions that will have an economic impact. The applications and use cases outlined above offer strong potential for application of analytics, but a methodology is needed to sort through and prioritize the opportunities and projects. Looking at all the available IoT and Big Data Source can be overwhelming, however if we look at it with a unified approach to the analytics we can see the great opportunities it presents. An Analytics Value Chain is a great approach to leverage IoT data and advanced analytics. The Analytics Value Chain contains a series of steps and is accomplished using streaming, historical, predictive, and prescriptive analytics with relevant contextual and situational data in real-time. Approaching IoT Projects in this way, organizations are able to have analytics executed in real-time, and projects deployed in an iterative and incremental fashion. This capability paired with the next best action creates the greatest value. Figure 2 on page 6 shows how the Analytics Value Chain applies to Supply Chain Management.

Understanding and taking advantage of the analytics value chain is the key to getting value quickly. Applying these steps in a focused, iterative fashion enables organizations to take advantage of the new tools and techniques of IoT, Big Data and Advanced Analytics without getting overwhelmed by the technology itself.



**Figure 2: Analytics Value Chain in Supply Chain Management**

a) **Fast Data Ingestion** - Ingesting data at speed and volume throughout the supply chain sets the stage for additional processing.

b) **Real-Time Streaming Analytics** - Real-time Streaming Analytics processes incoming streams of data from sensors and devices all along the supply chain, including your own and 3rd party sources

c) **Historical Analytics** - This refined data is then correlated with contextual and historical data to provide a baseline for advanced analytics. Contextual data can include information like the changing weather conditions or historical performance of suppliers.

d) **Predictive Analytics** - The next step is to predict exceptions, anomalies, or patterns that are based on machine learning over situational data such as external events like current consumption rates or the current location, movement and behaviors of customers.

e) **Prescriptive Analytics & Intelligent Actions** - The final steps in the analytics value chain are to apply prescriptive analytics and intelligent actions to execute the next best actions to take. This action could be a wide variety of actions associated with capitalizing on demand upside, demand shaping around an inventory shortage, or other timely actions that enable more profitable throughput of your supply chain.



## V. CONCLUSION

For leaders and practitioners who are looking to take their supply chain performance to the next level, leveraging IoT, Big Data and advanced analytics is an excellent strategy. In addition to the core benefits for supply chain management, adopting advanced analytics can also set the stage for adoption for a wider set of use cases. For example, retailers could leverage their IoT data and analytics to offer in-store 1/1 promotions, fine tune shipment logistics and optimize inventory procedures. One important development with modern platforms is that organizations can get started with a single use case such as supply chain management, and then integrate other IoT data for more use cases based on requirements, data availability and business goals.

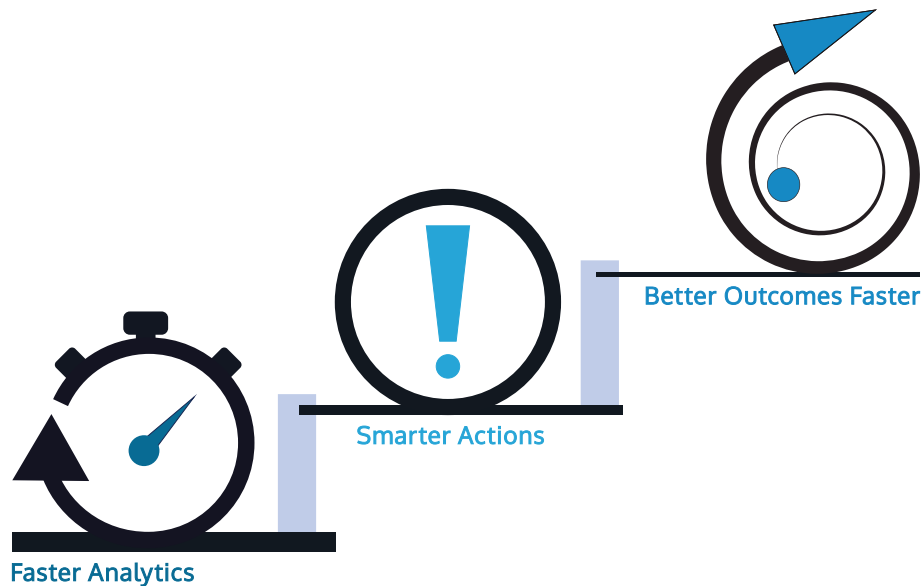
Vitria's VIA platform was designed to handle the broad spectrum of IoT use cases. Supply Chain managers looking to leverage IoT and advanced analytics can easily do so with VIA, and then later add in new use cases to their existing platform over time. This provides business value and benefits today for supply chain optimization, and then extended benefits and growth later without the hassle of setting up another platform or system. VIA can be the platform for the full spectrum of IoT use cases.

## ABOUT VITRIA

Vitria's advanced analytics solutions empower enterprises and industrial customers to achieve better outcomes faster in their business operations.

The company was founded in 1994 and has a long history of success in streaming analytics, business process management, enterprise application integration, and operational intelligence. Vitria is also a leading player in the rapidly growing IoT (Internet of Things) analytics market. Customers include Fortune 500 companies and enterprises across a wide range of industries, including finance, manufacturing, telecommunications, utilities, retail and more. For more information, visit [www.vitria.com](http://www.vitria.com)

**Contact us** to learn more about how our platform can help you achieve better outcomes faster



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