The Self-Learning Supply Chain

Most companies have some basic form of analytics. This is the next step for the truly competitive: A supply chain that intuitively learns from your business reality to offer a level of accuracy and insight once thought impossible. And the best part? Anyone can use it.
The world’s most innovative companies have two things in common: Great products and world-class supply chains embedded with advanced analytics. These masters of data and knowledge have supply chains that are more resilient, more responsive, and light years ahead of the competition.1

Analytics is no longer new; most companies practice some form of it. Gartner reports that 70% of companies surveyed are in the earliest stage of analytics (descriptive). Only 30% are in the advanced stages: 15–25% practice predictive analytics and 1–5% prescriptive.2 The use of advanced analytics is not yet widespread, and its application to the supply chain, even less so. However, it is surging to the top of corporate agendas.

Companies without advanced analytics struggle with inaccurate estimates, inefficient planning, and wastage. Stuck in descriptive analytics, which looks to the past to describe what has happened, they wonder why they are not seeing the promised returns of big data. They need to move from “What has happened?” to “What will happen?” and ultimately, “What actions should we take?”.

The need for advanced analytics is not lost on ambitious executives. 71% recognize that their current tools need to be more predictive and 73% plan to upgrade or replace their tools with more predictive features.3

The answer is an advanced analytics model that is embedded into the supply chain, 100%-fit to business reality, and powered by optimization technology. It is equipped with a self-learning capability that enables it to learn from recent data and use the resulting knowledge as input for planning and optimization. This continuous loop of learning and application forms the basis of the Self-Learning Supply Chain.

In this solution paper, we take a closer look at the Self-Learning Supply Chain:

- Why is this the right time for advanced analytics?
- What are the benefits of a supply chain driven by advanced analytics?
- How will the Self-Learning Supply Chain transform your business?

1 Barry Jarzelski, John Loehr, Richard Holman; Global innovation 1000 (Booz & Company, 2012)
2 Jeanne Harris, Thomas Davenport; Competing on analytics: The new science of winning (Gartner)
3 Jennifer Bajko; Betting on analytics as supply chain’s next big thing (EBN, 2013)
Advanced analytics is within your reach

There is no better time than now to accelerate your company's position in the analytics value chain.

**Reduced cost of computing**
Computing power is rising and costs are dropping. What used to take hours or days, now takes minutes, and at a fraction of the cost. For many companies, it is no longer a pipe dream to have enough computing power to gather and analyze data in real time, and continuously update as conditions change. Advanced analytics is well within reach and increasingly practical for daily use.

**Increased usability**
Analytics is no longer exclusive to data scientists. Technological advancements are making it available to a wider variety of end users. User-friendly interfaces, visualization capabilities, and high levels of configurability make software easier — and more enjoyable — to use than ever before.

**New competitive advantage**
Data is a competitive asset and advanced analytics, a strategic advantage. Ambitious companies see the need to exploit both as a differentiator when they can no longer beat their competitors solely on cost.

**Big data is here to stay (and it’s getting bigger)**
The volume of data being collected, aggregated, and analyzed continues to grow. It is critical to find ways to more effectively manage and analyze data for a competitive advantage. The faster you harness advanced analytics to tame this complexity, the better positioned your company will be to beat the competition.

**Big value trumps big data**
Most companies have some form of descriptive analytics in place. It is sometimes called business intelligence (BI). It is a good start, but still just a first step. 90% of companies with a BI foundation are actively exploring predictive initiatives. Why? Because just looking to the past does not bring you value. Looking to the future does.

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4 Fern Halper; Predictive analytics for business advantage (TDWI Research, 2014)
Benefits of a supply chain driven by advanced analytics

The number of advanced analytics success stories was small and easy to ignore. This is no longer the case. TDWI Research reports that 45% of companies surveyed measured top- or bottom-line gains with predictive analytics and 30% experienced more effectiveness or efficiency. The reasons behind these gains include:

**High data accuracy**
Unlike conventional supply chains, which operate using knowledge based on human estimates, a supply chain driven by advanced analytics derives knowledge from data sourced from reality. Human effort and extra costs are minimal, so updates and analyses can be done continuously. Because data is accurate and up-to-date, the risks of poor planning and decision-making are reduced.

**Faster, better quality decisions**
Business operations is essentially a series of decisions — big and small, thousands upon thousands. The better the quality of your decisions, the better your business performance. Harvard Business Review reports that companies with advanced analytics make decisions faster and execute them better.

**Increased supply chain efficiency**
Because predictions are based on accurate data, companies consistently produce plans that can be executed in a real environment. These plans take into account rules and constraints, as well as last-minute changes, to deliver business KPIs. When operations go according to plan, inefficiencies (e.g. unnecessary waiting times, accumulation of delays, etc.) and their corresponding costs are reduced.

**Increased human productivity**
Advanced analytics automates the collection and analysis of critical information — a task previously done by people. Human experts have more time to focus on the strategic aspects of their role. Advanced analytics also enhances users’ judgment and expands their expertise by keeping them better informed and data-driven in their decision-making.

| 2x | more likely to use data to make decisions |
| 5x | more likely to make them faster |
| 3x | more effective at executing decisions |
| 2x | more likely to be top-quartile financial performers |

5  Fern Halper; Predictive analytics for business advantage (TDWI Research, 2014)
6  Dominic Barton, David Court; Making advanced analytics work for you (Harvard Business Review, 2012)
The Self-Learning Supply Chain is our vision at Quintiq to turn supply chain planning and optimization into a self-learning process. It combines planning, optimization, and advanced analytics on a single platform to harness your data for better performance and profits. Here's how:

**Real-world data**
The Self-Learning Supply Chain uses machine learning methods to capture real-world data flowing through your supply chain. The data is continuously updated. The system then analyzes and draws connections between various factors of interest to develop meaningful insights.

Take manufacturing, for example, where accurate data is critical for good planning. The system captures data such as order characteristics, setup times, processing times, waiting times, and so on. From the data, it learns the relation between order characteristics and setup or processing times (or any other measurable data). It then generates accurate estimates and offers insights into the factors that drive processing and setup times, as well as the distribution of times. Such insight is humanly impossible to derive and even if possible, it would be much too time-consuming to do.

**Accurate predictions**
Using the data it has gathered and analyzed, the Self-Learning Supply Chain makes predictions of possible future outcomes. For example, a manufacturer learns that a particular machine runs a few minutes more slowly with every year of its life. A logistics planner gains insight into the length and frequency of delays in an area of coverage. A rail infrastructure manager learns when maintenance is due on a section of the track.

**Workable plans — every time**
Using accurate predictions, the system generates plans that can be executed in an actual environment. You no longer have to contend with deviations from a plan, or worse, an unrealistic plan that is discarded by the shop floor. When plans work, you prevent disruptions, improve delivery performance, and increase customer satisfaction. Bottom line gains can be significant.

**Master your data and knowledge**

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Self-learning intelligence
The quality of plans generated by the system increases as it learns more about your operations and the best practices of your human experts. Its self-learning capability captures expert logic, judgment, and experience, and models them throughout the supply chain. This not only increases the quality of decisions, but consistency and scalability as well. As understanding grows, planning becomes more accurate. You can expect to see business performance start to stabilize and bottom line gains increase.

World-class optimization
Advanced analytics is at its highest level when the Self-Learning Supply Chain is combined with world-class optimization. Quintiq’s record-breaking optimization algorithms consider seemingly infinite numbers of potential decisions and prescribes the best actions to take in a given set of circumstances. It helps you answer the question: “What actions should we take?”. The prescribed solutions respect all rules and constraints while meeting KPIs that are critical to your business.

This third and most advanced stage of analytics is powerful. By prescribing optimal actions, the Self-Learning Supply Chain empowers you not only to respond to market conditions, but to direct the future of your business.

100%-fit
The Self-Learning Supply Chain is 100%-fit to your company’s requirements. Quintiq achieves this fit by combining actual data with input from those who know your business best — your human experts.

Ease of use
The system was built with the end user in mind. Business users will find the Self-Learning Supply Chain easy enough to use every day without the support of data scientists.
Pricing optimization in logistics
The pricing strategies of logistics providers are often based on analysts’ gut feelings and legacy systems. The lack of data hampers their ability to quote optimal short-term spot prices and negotiate effective contracts. A supply chain with self-learning capabilities solves this by capturing data from the logistics provider’s reality (e.g. pricing history, current and projected capacity utilization, developments in customer markets around the world, etc.) to predict the future distribution of demand and corresponding capacity. Based on these predictions, it prescribes optimal prices analysts can quote to customers. A data-driven approach to pricing is the key to better customer service and higher margins in logistics.

Quintiq is a supply chain planning and optimization software company with headquarters in the Netherlands and the USA, and offices around the world. Approximately 12,000 users in over 80 countries rely on Quintiq software to plan and optimize their workforces, logistics, and production. For more information, visit www.quintiq.com.