



# **The Evolution of the Transparent and Cognitive Supply Chain**

by Dr. Robert Handfield

**Watson Supply Chain**

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Many organizations face questions relative to the strategies they should put in place to thrive in a customer-centric economy – and in an environment where deep infrastructural changes are being driven by disruptive technologies and the rapid emergence of digital commerce channels.

Faced with these forces, supply chain managers are recognizing that while cost optimization is important, equally important is improved agility in responding to shifts in customer demands and market conditions. In this dynamic environment, successful organizations must be able to respond and react quickly to information and events, such as supply chain disruptions.

Supply chain visibility and transparency are highly necessary capability for enabling supply chain responsiveness. However, they must be accompanied by a deep set of capabilities that drive alignment between parties both upstream and downstream and provide access to real-time data to drive improved responsiveness, performance and value.

But how does a large company undertake this journey? How do they build a truly transparent and responsive supply chain fit for the digital era? Is this a function of technology investment, analytical skillsets, a new orientation, or an organizational redesign? In this paper, we examine how one organization, IBM, launched their journey towards a more transparent, intelligent and agile supply chain.

## The IBM Supply Chain: Roots of Change

IBM, like many large enterprises, is under continuous pressure to drive value – and the supply chain is certainly a primary source in driving that value. The IBM Supply Chain organization, frequently an early adopter of new technologies, understood that the market was at a new inflection point with several transformative technologies – including Cloud, analytics, the Internet of Things (IoT) and cognitive technologies – reaching a level of maturity, ubiquity and affordability.

The leadership team recognized that these technologies could play a transformative role in the supply chain; helping the company develop a more intelligent and agile supply chain. After a thorough self-evaluation, the leadership team identified four areas in which to drive supply chain improvement:

- 1) **Responding to Disruptions** – As one IBM executive noted, “we didn’t identify risks and issues early enough.” In retrospect, the signs of a disruption were usually evident, but the company did not have sufficient data and insight to consistently look for them ahead of time. The pace of information and team response went along like a raft in the river. The organization was not consistently looking ahead or steering the raft. It typically was a reaction to events.
- 2) **Real Time Insights** - Some of the company’s risk management systems provided alerts. However, like an alert on a car dash panel, they didn’t provide information about the nature of the problem, nor the technical details on how the problem could be solved. IBM thought it was critical to identify the elements associated with events/problems, as well as the touchpoints in the network that needed to come together to address these issues. The leadership team defined an ideal alert and solution as characterized by immediate notification accompanied by the right information to make a decision.
- 3) **Collaboration and Team Decision Making** - The third critical insight was the recognition that in a large organization important decisions are made by cross-functional, cross-enterprise, and multiple tiers of people, not by individuals in a void. The speed of decision-making is critical. The challenge became, how IBM could improve team collaboration and quickly bring people together to make business decisions.
- 4) **Learning and Capturing Institutional Knowledge** – Finally, the team recognized that while they were creating “gold nuggets” in learnings and insights each time in response to a disruption or issue, there was no standard and effective way to capture and apply the key “lessons learned” to create organizational learning and improvement.

In sum, there was a real desire to have information more quickly and in real-time – to be able to access information about what was happening more quickly, to respond to problems more quickly, but also to drive business insights and exploit opportunities to add value.

## The Transparent Supply Chain: Underpinned by a Cognitive Platform

These needs led IBM to pursue what they described as the IBM **Transparent Supply Chain Initiative**: a real-time connected, transparent supply chain system enabled by cognitive technology.

- IBM Supply Chain Definition: Cognitive technologies, such as IBM’s Watson, are systems that can actually understand, learn, think and interact – and do so at enormous scale and speed. They use natural language processing and machine learning to learn about and analyze data – both structured and unstructured, both internal and external. Cognitive technologies can understand all forms of data and continually learn about that data and related subjects and processes.

The facets of the IBM Transparent Supply Chain Initiative are illustrated below: the green triangle signifies the

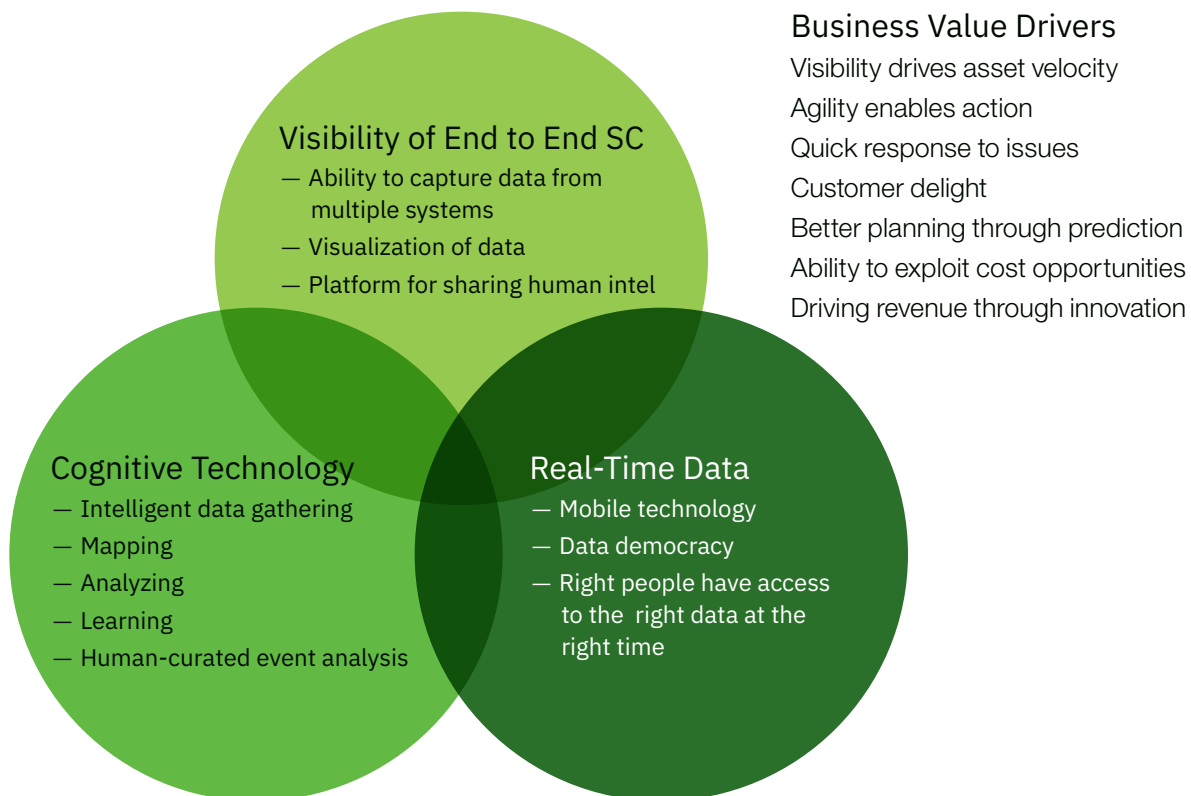
synergistic power of combining deep visibility, real-time data and analytics and cognitive technology. Together these components create a supply chain with:

- A single version of the truth (enabling trusted, shared visibility)
- Data captured and available in real-time (enabling agile response)
- Cognitive systems that connect and collate information from multiple systems\sources (enabling deep insights and recommendations).

Together, these elements create an unparalleled, intelligent solution that continuously accrues knowledge and delivers value. The core values of the transparent supply chain are enabled by technology, but the cultural and business process shifts that accompany its use also drive success.

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## Core Values of the Transparent Supply Chain



## Detailed Visibility Across the Supply Chain

IBM leveraged its Watson cognitive technology, advanced analytics and visualization of data to provide deep and detailed visibility across its supply chain. The team established end-to-end links to help understand risks on component supply and transparency into:

- where parts are produced
- who they are purchased from
- when there is a disruption or event
- what parts numbers are impacted
- which products are impacted
- which customer orders will be impacted

The system is also tied into quality analytics, creating a warning system that managers look at to understand the impact of changes in material, and every aspect of quality including Key Performance Indicators (KPI's) such as manufacturing floor defects, field warranty rates, and repairs with suppliers. These KPI's are tied in to impacts on end to end system efficiencies, throughput rates, and clarity on sources of potential waste throughout the system.

Finally, IBM captures insights on weather, IoT data (like shipment tracking), social data, fulfillment systems, and customer data to create a real-time feed of data on delays in product flows, which is translated into external shipping delay alerts to clients, communicated in real time.

## Real-Time Data

IBM also recognized that organizations are rapidly moving into the era of real-time supply chains, which enable managers to understand and predict what internal users and customers will need as soon as new demand data becomes available – or even before customers themselves recognize their needs.

IBM understood that response velocity is becoming a capability that will define competitive survival. To quickly respond to changes, IBM established real-time transparency into events and material flows, which in turn leveraged inexpensive cloud-based computing, distributed computing “at the edge” and the growth of digital ecosystems.

IBM, and other large\complex manufacturers, rely on not only internal data in real-time, but external demand signals from ‘big data’ collected through multiple channels. Cognitive technologies and connected sources of data will allow supply chains to sense and respond to more diverse forms information than in the past, being generated

through digital sensors (Internet of Things), analysis of social media and e-commerce. Organizations are only now beginning to understand how to leverage that data to make informed decisions around order fulfillment, forecasting, logistics and supplier management that enables them to support customers’ changing needs. This is a major shift, as organizations have very rigid planning systems and can no longer afford to drop forecasts into spreadsheets and run manual planning methods.

IBM has seen its data retrieval times reduced by more than 75 percent and supply chain disruption management shortened from 18-21 days down to just hours since using Watson cognitive technology and starting its Transparent Supply Chain Initiative.

The faster and better decision making has saved the company more than \$40 million based on improvements and reductions in inventory and freight costs.

## Cognitive Insights And Continuous Learning

When process data is rapidly digitized and communicated, it becomes easier for individuals to spot disruptions and risks, providing that the data is structured and highlighted in a manner that draws people’s attentions to the right things.

IBM recognized that a lot of money was being spent on expedited shipments and quality misses, because supply chain processes were not operating in the proper fashion and therefore disruptions were not optimally mitigated. As real-time visibility systems mature, it becomes clear that users may become overwhelmed with streams of data, and can no longer sort the wheat from the chaff. And to make this even more complex, information required to make decisions quickly will often include data from both “structured” sources (ERP systems, warehouse management systems, transportation systems, quality systems, order management systems, etc.) as well as “unstructured sources” (emails, texts, social media, Twitter accounts, and others), especially when trying to make sense and add context to a situation.

This is where the power of cognitive technology is of particular advantage. As individuals deal with information flows around different types of events (a supplier disruption, a quality miss, a sudden shift in demand, a change in product lead-time, a weather disruption, etc.), cognitive technology is capable of monitoring the information, making sense of it and rendering a recommendation or decision.

Watson learns from the successes and mistakes of decision-makers, and encodes this knowledge to help guide future planning and responses.

## Cognitive Play Books

Cognitive technology is elevating the IBM supply chain workforce to a higher level by allowing individuals to have a deeper, comprehensive view of the supply chain and enabling higher value tasks. As Watson begins to capture information and historical activities, it builds a learning capability around situational intelligence that can be used to derive multiple benefits, including:

1. Rapidly enabling new employees. A new employee could access years of supply chain experience in minutes with help from Watson.
2. Watson will enable supply chain workers to be better equipped with market and customer intelligence, which supports the supply chain's alignment with business to become more of a "trusted advisor."
3. Watson developed playbooks create competitive advantages in the form of captured knowledge and institutional intelligence.

These playbooks reflect common processes that might arise under different conditions in specific industries. Several characteristics of these "playbooks" that are worth noting:

First is that the playbooks will have a foundational structure that is oriented towards domain-specific knowledge. A playbook will be based on some foundational components in an industry, but what differentiates them is the ability to capture the knowledge and capability of each unique organization's "ways of working." Playbooks can be embedded in the context of each organizations' particular processes, and will mold and adapt to their unique elements.

Second is the fact that playbooks produce information that is selective and filtered, thereby giving individuals only the information they need when they need it. So, while there may be multiple transactions occurring every minute, an individual in order management role may want to only be informed as to what are the top three orders received in the last hour. An individual no longer must hunt through multiple screens of orders to find that information, but is asking Watson to produce that knowledge. Other examples may include asking for which partners have missed their top promise dates, which are the worst offenders in terms of missing deliveries, the value of those orders to outbound clients, and seeking to correlate that information with the potential reasons for these problems. The point here is that Watson pulls from the digital representation of activities in the supply chain and informs individuals of

the impact of what is happening out there, and what it means in terms of the business.

Third is the fact that Watson can help identify when bad things happen – and can also reassure individuals about good things that haven't happened yet. For instance, updates and status notices can provide information on whether a product has cleared customs, how production can be rescheduled based on idle capacity, and which containers are leaving ports without delays at any point in time. As Watson consumes data from multiple sources, it can begin to look for patterns and suggest things that may be of interest and which you might want to know about. In this way, Watson begins to evolve into a powerful predictive engine that gets smarter over time.

## SUMMARY

This evolution of the human-machine interaction has the potential to be very powerful, as Watson will eventually become a 'trusted advisor' to individuals in the supply chain. This is about having the platform "wrap around" the individual, and learning how they interact with the system: creating cohort mapping systems, identifying data sources and making that individual more effective.

This can lead to improved productivity, with individuals no longer having to comb through mountains of data to make a decision, as well as helping new individuals to adapt to a new project or role. Watson's ability to emulate at both the organization and individual level will help to grow a new and capable workforce, one that is proficient in working with Watson's cognitive capabilities, and able to adopt their queries and thinking to exploit the cognitive ecosystem.

The key benefits of the Watson Supply Chain are threefold:

- First, Watson will process and correlate multiple data sources in a systematic manner to provide rapid insights into supply chain events in real time.
- Second, Watson enables cross-functional decision-making using a common source of truth.
- Third, Watson will grow institutional knowledge by capturing expert decisions, thereby spreading well-informed decision-making across the organization, and delivering a competitive advantage.

As transparency and cognitive capability develops, the true goal of optimizing the end-to-end supply chain becomes possible. Optimization occurs not through step-changes in supply chain design, but in real-time through faster decision-making, shifts in customer requirements, and rapid response to unexpected supply chain disruptions.

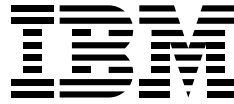


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Dr. Handfield is the consulting editor of the Journal of Operations Management, one of the leading supply chain management journals

in the field, and is the author of several books on supply chain management, the most recent being Supply Market Intelligence, Supply Chain Re-Design and Introduction to Supply Chain Management. He has lectured on supply chain subjects across the globe including China, Turkey, Latin America, Europe, Japan and other locals.

Dr. Handfield has consulted with more than 25 Fortune 500 companies – and his research with leading SCM organizations across a variety of industries has identified that companies who excel in the consistent application of “best-in-class” supply management processes and practices have demonstrated significantly higher financial performance than their competitors.



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