The supply chain is experiencing a period of significant change. Changing business and customer requirements are putting new and greater pressures on the business, and emerging technologies are offering intriguing new ways of working.

The Path to a Thinking Supply Chain

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Written by: Simon Ellis, Program Vice President, and John Santagate, Research Director

Introduction

Digital transformation is poised to change the supply chain more profoundly than any other functional area and more dramatically than at any point in its history in terms of driving efficiency and resiliency to disruption. In the context of the challenges facing supply chains, both now and in the future, it becomes clear that the old ways of working will not suffice and that even best-in-class performance today is unlikely to be good enough in the future. It is the view of IDC that the supply chain must become a "thinking" supply chain, one that is intimately connected to all data sources, enabled with comprehensive and fast analytics, openly collaborative through cloud-based commerce networks, conscious of cyberthreats, and cognitively interwoven. According to IDC supply chain research, technology is emerging as a prime driver of change, particularly artificial intelligence, blockchain, and the Internet of Things (IoT).

Data is also a driver of change. In 2018, supply chains have over 50 times more data available to them than just five years ago, with less than a quarter of that data being analyzed in near real time for value; and it's not just structured enterprise data that the company "owns" but also a mixture of both structured and unstructured data from myriad sources such as IoT, unstructured social media, news feeds, weather, and even emerging blockchain-enabled networks. Within the next three years, half of all applications will have embedded cognitive capabilities — making them able not only to do things better and faster but also to do things that simply couldn't have been done. In a recent supply chain survey conducted by IDC, 55% of supply chain organizations believe themselves to be past the midpoint of digital maturity, with almost 8% saying they are at the most advanced stage. While we might justifiably suspect a case of "rose-colored glasses," the reality is that leading companies are moving quickly and laggards may soon find themselves uncompetitive.

In 2018, supply chains are being asked to be more customer centric, with direct selling to individual consumers a real near-term possibility for many. Supply chains are expected to be both dynamic and agile to meet customer needs, with the ability to respond more quickly than ever while maintaining accuracy and integrity. They must increasingly be always "on." Supply chains are expected to be data driven and demand aware, and they must have access to and the ability to analyze disparate data sources in the time frames required, with profound implications for business-to-business (B2B) processes and their underpinning technology. If that weren't enough, they must be resilient in the face of external forces such as weather, war, workers, and regulation.

AT A GLANCE

KEY STATS

» In 2018, supply chains have over 50 times more data available to them than five years ago.

» 55% of supply chain organizations believe themselves to be past the midpoint of digital maturity.

» Only 8% of supply chain organizations say they are at the most advanced stage of digital maturity.

Indeed, the notion of "disruption" is now central to discussions of supply chain strategy and the necessary capabilities required to be competitive in the future. Disruption exists along two dimensions. First are the more traditional disruptions — the "black swan" events, anomalies that cannot be easily planned for and that present opportunities to make critical decisions. These events can be broad reaching, such as earthquakes or tsunamis that affect strategic decisions; they can also be more tactical, such as when a storm imperils a critical shipment. Although these daily events may be less newsworthy, they are often, in aggregate, more disruptive than the big or rare events. Either way, the supply chain must be able to either anticipate or react quickly to mitigate any disruptions.

Second are the disruptions related to the emerging wave of revolutionary technology available to the supply chain that is likely to be a key element of competitive differentiation. While technology must ultimately serve the interest of the business, it is critically important to understand that these technologies will enable new capabilities or new business models — across all industries and all regions — that are not currently possible. Indeed, in the supply chain survey cited previously, 57% of survey respondents felt that their business would be disrupted by either an existing competitor or a new market entry within the next year. It's happening now!

Benefits of a Digitally Enabled, "Thinking" Supply Chain

In the context of the challenges facing supply chains, both now and in the future, it becomes clear that the old ways of working will not suffice and that even a best-in-class performance today is unlikely to be good enough in the future. It is the view of IDC that the supply chain must become a "thinking" supply chain, one that is intimately connected to disparate internal and external data sources such as social sentiment and the IoT, enabled with comprehensive and fast artificial intelligence (AI)–driven analytics, openly collaborative through cloud-based commerce networks, conscious of cyberthreats, and cognitively interwoven. The notion of a thinking supply chain is a powerful one that offers the prospect of a self-learning, intervention-free system. Technologies such as AI have moved from the research lab to become practical for the supply chain, and in 2018 we are seeing investments in blockchain initiatives to elevate how companies collaborate with partners for accuracy, speed, and lower cost to serve.

If we broadly assess the typical supply chain, two major "gaps" emerge, as articulated in Figure 1. The first gap is an analytics gap whereby available analytics and even AI capabilities are not keeping up with the growth and diversification of data and data sources. If a supply chain aspires to being best in class, or even above average, available data must be fully leveraged — whether it is traditional structured data that is easily searchable by basic algorithms or unstructured data more akin to human language. Unstructured data doesn't fit nicely into relational databases, and searching it based on traditional algorithms ranges from difficult to impossible. Then there is also dark data, broadly defined as data that is not visible, or not yet visible, to an organization. Regardless of the nature of data, however, the thinking supply chain must have access to the data, and be able to analyze it for value, in real time.

Figure 1
The Analytics and Attention Gaps
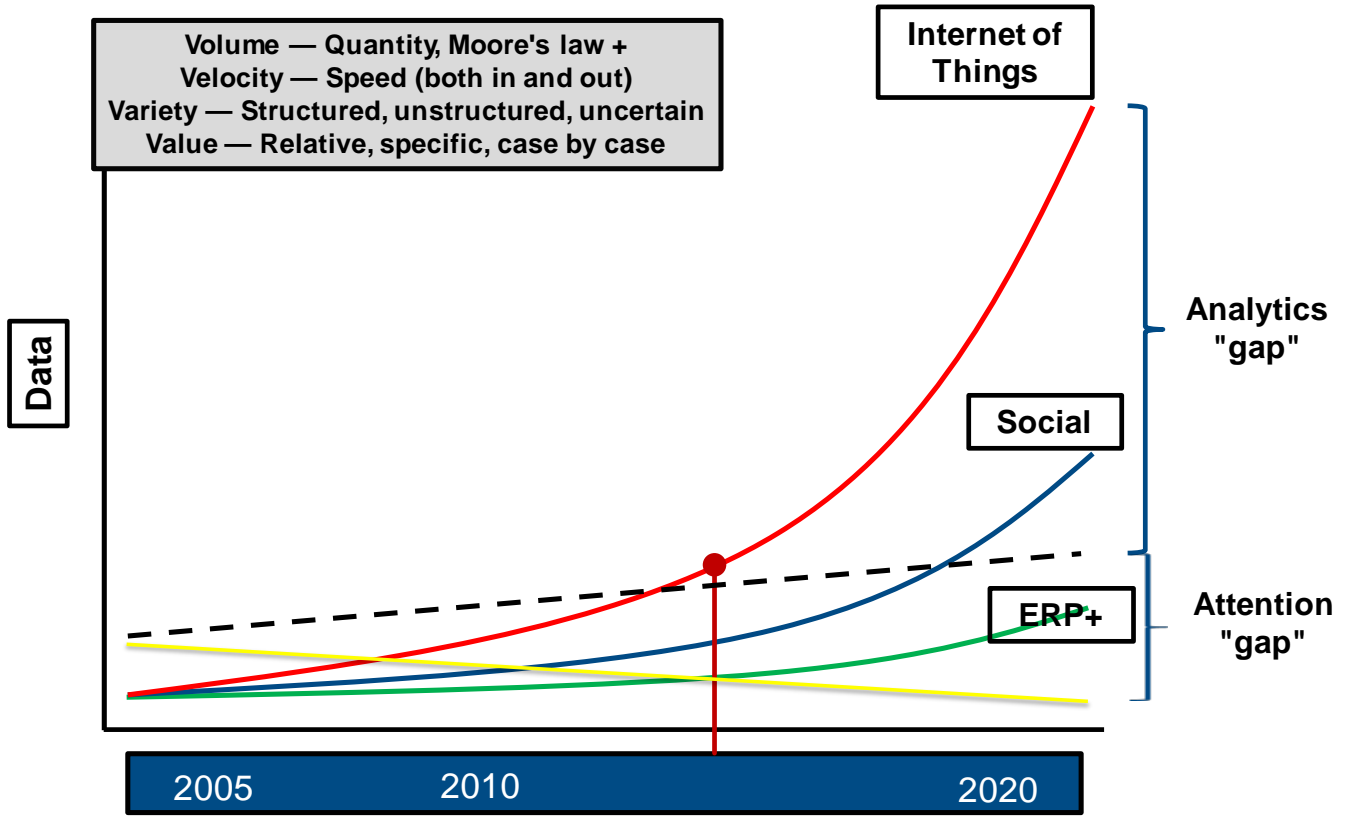
Source: IDC, 2018

The second gap is one of attention and knowledge. Supply chain organizations have pursued cost reduction and traditional lean practices to the point that there are fewer people in the organization than at any time in the past, and as baby boomers retire, they take with them knowledge and practical experience that is not replaced by the millennials who succeed them. While this may be productive in the short term, as data analytics capabilities invariably grow in the supply chain, there likely won't be enough "eyeballs" available to act upon the resulting insights. Thus, the role of AI and machine learning becomes critical.

The imperative exists, therefore, for a digitally enabled, thinking supply chain that can manage, in real time, massive amounts of structured and unstructured data from both internal and external sources, including data sets that might previously have been elusive. Imagine a thinking supply chain that could aggregate data across regions to both anticipate future demand accurately and manage current replenishment or that could manage asset, inventory, and shipments through real-time tracking and optimization and then configure and change orders even in the middle of production — all done automatically without direct human intervention. This supply chain would not replace people necessarily — they would have oversight, of course; rather, it would enhance and augment the decision-making process. A thinking supply chain could iterate decisions far faster than any human could.

The benefits of a thinking supply chain will be enormous. Data not previously utilized (or utilizable such as natural language) will now be analyzed in real time. Insight not previously acted upon will now be part of the decision-making process. Companies will have far broader supply chain intelligence, which will allow them to be more efficient and effective, avoid internal and external disruptions, and support new business models. The supply chain will better understand the risks and potential disruptions not only to itself but also to its suppliers and customers, and its executives will have greater insight into the bottom-line impact of their decisions. Another benefit of the thinking supply chain is prioritization. As analytics improve, both traditional and AI driven, they can recognize situations that are problematic and issue alerts, overwhelming human monitors. Cognitive allows for the prioritizing of alerts based on potential business impact. Supply chains are alerted to the meaningful and impactful problems rather than trying to sift through all issues.

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Key Technology Trends

Making the digitally enabled, thinking supply chain a reality is not a trivial undertaking, yet it is a process that we now see playing out before us. If we consider this process to be an aspirational journey, with capabilities acquired over time, then many supply chains have already begun their transformation. In a recent IDC survey of digital transformation, half of manufacturers believed themselves to be beyond the midpoint of digital maturity. This does not mean that they have a thinking supply chain yet — rather, they are on the journey to acquire the capabilities that will make such a system possible.

In our supply chain research, IDC has defined the thinking supply chain in the context of five "Cs": connected, collaborative, cyberaware, cognitively enabled, and possessed of comprehensive analytics. Each of these areas contributes critically to the thinking whole:

» **Connected.** Ultimately, the base of the thinking supply chain is data and the ability to access as much data as possible. Integration with all data sources is critical, as is automation of all documents across both internal functions and process and supply chain partners. A thinking supply chain can't learn from data it doesn't have. Connected means being able to access unstructured data from social media, IoT (including structured, semistructured, and unstructured data), and structured data from traditional data sets available via traditional ERP and B2B integration tools.

» **Collaborative.** IDC has estimated that over 50% of the value creation in manufactured products comes from outside the traditional manufacturing enterprise. Much of the value comes from suppliers and ranges from simple contract manufacturing that specifies intellectual property contributions to new products. The value varies by subsegment, being higher in discrete manufacturing than in process manufacturing, yet all value creation is material across the full breadth of the industry. Improving collaboration with suppliers is critical, and in the digitally enabled, thinking supply chain, this increasingly means the use of cloud-based commerce networks to enable multienterprise collaboration and engagement. Blockchain has a big role to play here with the promise of a trusted data layer, integrating multiple sources of data to provide greater transparency and efficiency into supply chain transactions.

» **Cyberaware.** Although not a focus of this paper, the ability of the supply chain to harden its systems and databases from cyberintrusions and hacks is critical; it becomes only more important as we move into the era of the thinking supply chain. It is unrealistic to think that the supply chain will become a cybersecurity expert anytime soon, so this ends up being more of an enterprisewide concern.

» **Cognitively enabled.** The AI platform becomes the modern supply chain's control tower by collating, coordinating, and conducting decisions and next best actions across the chain in an automated and timely way to augment the role of people. It can understand the business impact of data and events and prioritize attention based on potential impact. Certain exceptions would require human intervention, but much of the supply chain could be automated and self-learning.

» **Comprehensive.** Analytics capabilities must be scaled with data and in real time. If the thinking supply chain is to perform better than humans could and support the required increases in supply chain speed, then insights must be comprehensive and fast. Latency is both unnecessary and unacceptable in the supply chain of the future.

If we accept these five "Cs" as critical to the thinking supply chain, then it becomes business critical to begin the process of acquiring these capabilities. Many supply chains have begun that process, with participation in cloud-based commerce networks at an all-time high and major efforts under way to bolster analytics capabilities. Although IoT implementations are growing, the ability to utilize sensor data is still in its relative infancy and must improve. Likewise, true cognitive/AI systems for the supply chain are the exception rather than the rule and represent the biggest opportunity moving forward to enable the thinking supply chain.

Last is the notion of platforms versus applications. Data and analytics exist in both places, and while IDC believes both have a role to play in the thinking supply chain, they must be integrated transparently. As noted, a thinking supply chain cannot act on, or learn from, data that it cannot see.

> Digital capability, with cognitive enablement as a key element, is already defining the competitive edge.

Digital capability, with cognitive enablement as a key element, is already defining the competitive edge. There are increasing examples of companies born into the digital age with a business model that would not have been possible just a few short years ago. Whether it is a Netflix content streaming model exposing the antiquity of physical movie rentals or a small business such as Mink enabling cosmetics personalization with 3D printer technology, the world of business is changing forever. And it's not just about innovative business models and disruption, though they get most of the press; it's also about innovating and improving business processes in ways that drive significant competitive edge. The digitally enabled, thinking supply chain is not an "if" but a "when" — and that "when'" increasingly appears to be now.

It is IDC's view that supply chains that successfully enable enterprise visibility, adopt comprehensive analytics, participate in next-generation blockchain-enabled collaborative networks, and employ cognitive technologies will have a step up on competitors that do not. Early adopters will find their supply chains more efficient and effective and more able to embrace new business models.

Considering IBM

IBM has emerged as a pioneer in the AI space with its Watson technology. Recent announcements from IBM have brought some notable capabilities to bear on the supply chain space, including some early blockchain initiatives and partnerships.

IBM Supply Chain Optimization solutions leverage the power of AI and blockchain to help organizations architect for the future, optimize decisions and actions throughout supply chain execution, and build a smarter supply chain — one that is more resilient, agile, and customer centric:

» IBM Supply Chain Insights (SCI) uses AI technology to provide comprehensive search, visibility, and insights across the entire supply chain. With SCI, organizations can predict, quickly assess, and more effectively mitigate disruptions and risks to optimize supply chain decision making and performance.

   ■ SCI Operations Center proactively monitors and governs operations with speed and agility and provides smart alerts for exceptions and disruptions. SCI Resolution Rooms provide cognitive-enabled insights and recommendations based on learned best practices to drive collaboration in responding to disruptions and events. Digital Playbooks curate organizational knowledge and leverage AI to enable better and quicker responses to future events.

   ■ Benefits include slashing information retrieval and disruption management time from days to minutes.

» IBM Supply Chain Business Network (SCBN) establishes digital connections with suppliers and partners to automate and digitize supply chain transactions and correlates all B2B documents to deliver deep search and visibility into the B2B transaction life cycle and partner performance. IT and business users can search and view the entire business transaction landscape and obtain the real-time information and intelligence they need.

   ■ SCBN leverages AI to enable supply chain, IT, and line-of-business users to search and visualize the entire life cycle of a transaction in real time and in context or drill down to the granular detail of a specific transaction.

   ■ SCBN's intuitive features give business users access to previously hidden or incomprehensible supply chain information and translate into improved performance in key business functions including customer service, supply chain management, and accounts payable/receivable.

» IBM Shared Ledger provides permissioned trading partners with a transparent shared record of real-time digital transactions that leverages existing systems and network investments with data privacy and security powered by IBM Blockchain.

   ■ Supply chain experts can tackle a challenge such as shipment visibility today and add applications such as invoice dispute resolution and unsaleable goods management over time.

   ■ Shipment Visibility, the first Shared Ledger application, provides unmatched real-time visibility for multiple partners. Trading partners view a chronological, immutable transaction history that removes blind spots and enables monitoring of critical milestones.

   ■ Shared business rules and agreements on specified data views for each trading partner on the blockchain ensure secure visibility to only the data provisioned for each partner.

Challenges

IBM Watson is well known in the technology space but not in the supply chain space. Thus it will be incumbent upon IBM to be very clear about the role Watson can play and the benefits that will result. Watson is dependent both upon data and on the ability to interact with supply chain application systems. Watson cannot advise or learn from data it does not have access to, and it cannot help make operational decisions without clear connections to the operational supply chain systems. The established partnership with SAP Ariba is a perfect example of how Watson Supply Chain must become integrated with the systems that run the supply chain on a day-to-day basis.

Conclusion

Supply chains face enormous pressure to be more efficient and more effective — and even to be enablers of new business models. While technology isn't the only "lever" able to accomplish changing requirements, it is a powerful one. The notion of a digitally enabled, thinking supply chain that acts on all available structured and unstructured data to prioritize actions and deliver superior results is something that can be a driver of sustainable competitive differentiation.

If we consider this shift to a thinking supply chain to be an aspirational journey, with capabilities acquired over time, then many supply chains have already begun their transformations. But they need to become digitally enabled quickly, otherwise that aspirational supply chain might become a reality somewhere else. Being digitally enabled means connecting and automating internally across functional areas or with end-to-end processes such as order to cash and with suppliers, customers, and consumers. There will be a "network" effect where value grows exponentially with the automation of transactions, documents, and key partner enablement.

While the notion of a thinking supply chain remains aspirational for most companies, progress is fast. It is IDC's view that companies should begin exploring the thinking supply chain now. We suggest the following steps:

- » Understand what digital transformation means to your business and the role for the supply chain.

- » Do a digital self-assessment of your supply chain. What can competitors do that we cannot?

- » Educate yourself about the potential opportunities digital technologies can bring to the supply chain.

- » Identify key technology partners to collaborate on the best way to begin adopting these new technologies.

The supply chain is the most obvious "face" of the business for customers and consumers. The better and more effective the supply chain is, the better it protects business reputation and long-term sustainability.

About the analysts:
Simon Ellis, *Program Vice President*

As a program vice president, Simon Ellis is responsible for providing research, analysis, and guidance on key business and IT issues for manufacturers. He currently leads the Supply Chain Strategies practices at IDC Manufacturing Insights, one of IDC's industry research companies that address the current market gap by providing fact-based research and analysis on best practices and the use of information technology to assist clients in improving their capabilities in critical process areas.

John Santagate, *Research Director*

John Santagate is a Research Director at IDC responsible for the service robotics market. Mr. Santagate's core research coverage includes market trends and forecasts for service robotics, business process evolution through the use of service robots, and the integration of robotics into business processes and business IT architecture.

IDC Custom Solutions

IDC Corporate USA

5 Speen Street
Framingham, MA 01701, USA

T 508.872.8200

F 508.935.4015

Twitter @IDC

idc-insights-community.com

www.idc.com