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The Digital
Supply Network

A New Paradigm for Supply Chain Management

Gary Hanifan, Aditya Sharma and Carrie Newberry High performance. Delivered.



Digital technology is disrupting traditional operations and now every business is a digital business. The impact on supply chain management is particularly great. Businesses cannot unlock the full potential of digital without re-inventing their supply chains. This Accenture Point of View looks closely at how companies could generate higher levels of value by re-imagining their supply chains as "digital supply networks."

Digital technology has radically altered almost every business. On the one hand, companies now provide untold numbers of products and services with digital capabilities or components. Smart phones and SaaS (software as a service) are two good examples. On the other hand, digital technology has changed how many businesses design, source, make, move, store and service products. Consider 3-D printing, which lets companies produce parts locally using a digital template, thereby creating easily customizable goods that can be moved to market quickly. Another illustration is advanced visibility and analytics, which make it possible for businesses to sense changes more quickly and analyze data more thoroughly, thus creating new revenue opportunities.

Most companies understand how elemental these changes are. And many are working to introduce new digital capabilities into their operations. But even companies that embrace these challenges often overlook the difference between traditional supply chains that have been "digitally enhanced" and truly integrated, re-invented supply chains whose DNA is fundamentally digital. Most organizations, in fact, are doing the former: They're welding digital capabilities onto traditional supply chains, thus creating hybrid models that combine older paper-based and newer IT-optimized processes. In effect, these organizations are trying to construct new buildings on old foundations: re-fitting, re-wiring and re-adapting instead of re-inventing. But the cards are stacked against them. Digital is too different. The physical footprint of modern supply chains is too vast. Traditional governance mechanisms

and business processes are too inflexible. Frequent results include reams of inconsistent, redundant data; myriad inefficiencies; and (most important) huge amounts of unrealized performance potential.

Piecemeal digitization of supply chain elements is counterproductive. Re-imagining the supply chain as an integrated digital supply network is essential to generating value.

Accenture recognizes that real digital transformations—as opposed to digital add-ons—are a huge challenge. However, the potential growth and profit-enhancement opportunities that digital embodies are even larger. But for technology to create mammoth new supply chain opportunities, a new perspective is needed: re-imagining the supply chain as a digital supply network (DSN) that unites not just physical flows but also talent, information and finance. In a metaphorical sense, people and data—as well as materials, products and supplies-must travel together across the extended enterprise. This is vastly different from traditional or hybrid supply chains which (because they are never stronger than their weakest links) have less potential to help companies develop new synergies, relate more fully to customers, rapidly reach new markets and quickly build and scale new offerings.

Digital Technology Renders Traditional Supply Chain Models Obsolete

To one extent or another, digital technology is changing how supply chains need to be organized and managed, as well as their potential to help organizations improve market and financial performance. Consider how, and how much, disruption is being driven by digital technology (Figure 1).

Organization

At a minimum, digital can engender organizational change. Take Amazon.com, Inc., which has empowered its fulfillment centers by using robots to bring products and racks to workers. A broad rollout of this approach is expected to reduce the processing cost of an average order by up to 40 percent and save Amazon up to \$916 million annually.¹

Control Points

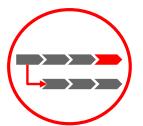
At another level, digital can change the nature of a company's control points. A good example is Tesco PLC, whose virtual Homeplus Co., Ltd supermarkets on the Seoul, South Korea, subway lets smartphone users scan QR codes associated with 500 health, beauty and grocery items whose images line the walls. Purchases are tallied and same-day deliveries are made to buyers' homes. Tesco customers enjoy huge time savings. Tesco benefits in multiple ways, including reduced investments in store inventories and infrastructure.²

Figure 1: The varying degrees to which digital technologies can disrupt traditional supply chains.











Engender organization change

Change the nature of control points

Change the role and value of data

Shift the level of value creation at each stage of the value chain

Create or destroy business and/or operationg models

Role and Value of Data

More impact can be associated with digital's ability to enhance the role and value of data. The Coca-Cola Company uses a methodology called Black Book to help ensure that consumers have consistent orange juice 12 months a year, even though the peak growing season lasts about three months. The Black Book algorithm analyzes up to 1 quintillion data points, with information linked to a profile that details acidity, sweetness and other attributes. By examining external factors, such as weather, expected crop yields and cost pressures, the company can formulate manufacturing plans up to 15 months in advance.³

Value Chain

Digital also can shift the level of value creation at each stage of the value chain. Starbucks Corporation has concluded that R&D innovations don't have to come from within the organization. Almost 300 customer ideas—received through the company's portal, MyStarbucksIdea.com—have been incorporated in recent years, including free wi-fi in stores and mobile payments at drive-through windows.⁴

Business and Operating Models

At the highest level, digital technology can create or destroy companies' business and/ or operating models. Think what digital did for (or to) the publishing, music, photography and telecommunications industries. Less familiar may be the stories of Uber, Inc. or Lyft, Inc: startups that seek to disrupt not just the livery business but the entire way people and companies think about urban transportation. By leveraging mobile technology to connect riders with rides, these companies are looking to "make securing temporary transportation as easy as booking a reservation on OpenTable or checking a price on Amazon.com: just another thing you do with your smartphone."5

So how does this relate to supply chain management? The most important insight is not the specific examples but the implications. On one end of the supply chain continuum you have digital technology "enhancing" an existing business process, model or methodology. On the other end, you have a wholly re-invented way to think about and operate your supply chain. The difference is immense. Consider Cisco Systems, Inc's recent pronouncement that supply chain and logistics constitute almost \$3 trillion in "value at stake: the combination of increased revenues and lower costs that [as a result of digital innovations] will migrate among companies and industries from 2013 to 2022."6

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Figure 2: Digitalization is helping to combine traditionally distinct supply chain elements into seamless digital supply networks.



The Emergence of the Digital Supply Network

Much of the "increased revenues and lower costs" to which Cisco is referring are the result of creating flows that (along with tangible goods) include talent, information and financial transactions. To help illustrate this point, imagine a sailing vessel in the 1700s: At that time, everything (product, talent, information, currency) departed together and arrived together. Over the centuries, those categories did not become less necessary but their channels diverged. Today, companies might have a data center in Prague, production in Asia, invested capital in the Middle East, and employees working worldwide.

Digital technology isn't about re-uniting these entities in a physical way. It's about the opportunity to glean billions of dollars in new revenue and savings by re-uniting product, talent, information and currency electronically via a digital supply network. As shown in Figure 2, four of our era's most disruptive technologies—social media, mobile communications, analytics and cloud computing—set the stage for this convergence.

 Social media can help companies tap innovation from outside the walls of the organization (the talent supply chain), generate demand triggers for specific products and services (the physical supply chain), engender customized treatment through social channels and targeted product and service offerings (the information supply chain), and showcase products to solicit early feedback and reduce selling costs (the financial supply chain).

- Mobile communications can provide real-time support for corporate field forces (the talent supply chain), offer a platform for store-specific apps that drive demand (the physical supply chain), provide status updates on product deliveries (the information supply chain), and set the stage for remote payments and new buying opportunities (the financial supply chain).
- Analytics can help companies analyze employee behaviors and improve efficiency (the talent supply chain), implement alerts and response actions and assist with predictive maintenance (the physical supply chain), understand customer behaviors that inspire new products, services and customization opportunities (the information supply chain), and probe contracts to optimize procurement spend (the financial supply chain).
- Cloud computing can provide remote access by experts to help companies educate employees and solve problems (the talent supply chain), raise the contribution of partners and suppliers through portals hosted in the cloud (the physical supply chain), increase access to applications and crowd-sourcing opportunities (the information supply chain), and provide end-to-end source-topay functionality (the financial supply chain).

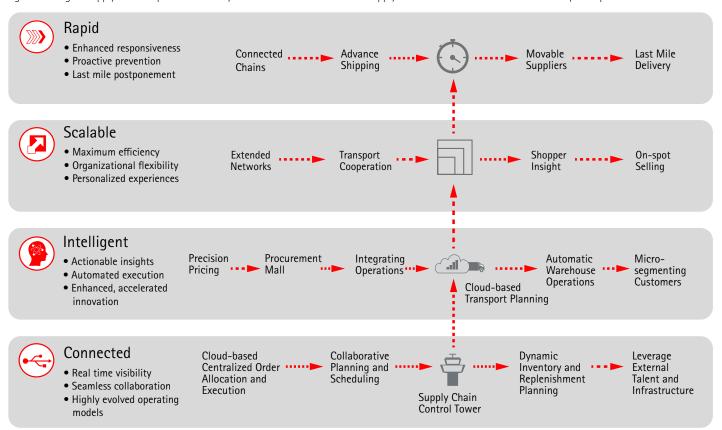
The Digital Supply Network: Connected, Intelligent, Scalable, Rapid

Digital technology has the power to drive a convergence of supply chain elements. In so doing, it can help companies capture huge savings and competitive advantages by fostering networked processes; optimizing the complete enterprise instead of individual functions; uniting designers, suppliers, manufacturers, distributors, logistics services providers, retailers and even customers; and inspiring new ways of thinking and working by enhancing visibility, collaboration and innovation.

Of course, not every digital capability is relevant to every company. Thus there is no one-size-fits-all prescription for a digital supply network. However, there are four distinct advantages that should be associated with virtually every digital supply network: connected, intelligent, scalable and rapid (Figure 3). The more these advantages are realized, the better a company's market and financial performance is likely to be. Following is a closer look at the digital nature, role and rewards associated with connected, intelligent, scalable and rapid.

Digital technology can help companies mass-produce capabilities as effectively as they mass-customize products or services.

Figure 3: A digital supply network provides four key attributes to enable a modern supply chain. Illustrated here is a retail industry example.





Connected

Connected is the foundation. Leveraging various digital capabilities, connected companies enjoy extensive visibility, outsized influence and high levels of control. Connected companies interact more fully with the entire business ecosystem. Often in real time, they can react, relate and communicate more completely with customers—diagnosing the latters' needs and involving them in product planning and design initiatives. As shown in Figure 3, the connected advantage comprises:

- Real-time visibility: Supply chains become more dynamic, secure and interactive.
- Seamless collaboration: Capabilities are harmonized within and beyond physical boundaries.
- Highly evolved operating models: Product/ service functions can be altered easily to meet customers' changing demands.

The connected advantage can result in improved planning, execution and collaboration. The connected advantage also means that more data is being captured—a starting point for the intelligent advantage. Gartner, Inc., forecasts that a 30-fold increase in Internet-connected physical devices by 2020 will significantly alter how the supply chain operates.⁷

Ariba, Inc. is a great example of helping companies get connected. Via the company's Ariba Network, more than 1 million suppliers and 4 million users in 190 countries work together through the cloud. As circumstances require, complete connectivity (real-time visibility and collaboration) exists between any user and any vendor. On the cloud (and thus fully accessible) are some 1,400 catalogs and invoice templates. The net effect is a complete and seamless source-to-pay process.



Intelligent

The connected advantage provides access to data. Savvy companies extend their connectivity advantage by using digital to turn that data into valuable information. The key is leveraging analytics, cognitive equipment and smart apps to provide the right information for decision making. This higher level of intelligence leads to the creation of an intelligent network. As shown in Figure 3, the intelligent advantage comprises:

- Actionable insights: Advanced data analysis improves decision making.
- Automated execution: Seamless human-machine interactions increase operational efficiency.

• Enhanced, accelerated innovation: Digital inspires and abets innovations in design, operations and customer relationships.

Taleris America LLC, a joint venture company that serves the airline industry, epitomizes the use of digital technology to operate more intelligently.

Taleris technology leverages predictive analytics to 1) analyze data from sensors installed on aircraft parts, components and systems and 2) make predictive recommendations regarding aircraft maintenance and operations. Clients thus can turn unscheduled maintenance into scheduled maintenance, identify potential disruptions before they occur and recover more quickly from delays.⁸



Scalable

Companies often struggle to scale their supply chains up or down as circumstances require. However, smooth scalability becomes more attainable when a supply chain has been imbued with high levels of (digitally enabled) connectivity and intelligence. Processes become easier to optimize and duplicate. Errors and anomalies are simpler to spot. Companies are better able to add or reduce partners and suppliers as needed. They also may become more effective at targeting niche markets, segments and customers. As shown in Figure 3, the scalable advantage comprises:

- Maximum efficiency: Seamless integration of people, processes and technology.
- Organizational flexibility: Digital plug-andplay capabilities make it easier to configure and re-configure.
- Personalized experiences: Channel-centric supply networks support customized products and services.

Lockheed Martin Corporation provides a great example of scalability. To help streamline its manufacturing process, reduce cycle times and control production costs, Lockheed Martin developed Digital Tapestry. This scale-focused innovation brings digital design to every stage of Lockheed Martin's production process: from 3-D virtual simulations for design to 3-D printing technologies for prototyping and production. The result is less-expensive, more-reliable space systems created in a completely artificial environment. Designers can manipulate parts or entire machines to see how they go together and operate. The system responds with a constant stream of automatically updated specifications.⁹



Rapid

Speed is going to be one of the future's most important currencies. The further ahead we look, the more companies' processes and priorities may well need to change as fast, or faster, than their products. In response, they will need to use digital technology to diagnose more quickly, adjust more rapidly and execute more efficiently. They'll need accelerated access to resources, as well as the ability to swiftly shift resources within the company and across the extended enterprise. Perhaps most important, they'll need to rapidly increase or decrease production levels in response to shifting levels of demand. As shown in Figure 3, the rapid advantage comprises:

- Enhanced responsiveness: Better information and sophisticated analytics can help accelerate responses to competitors' moves, technology shifts, and changing demand and supply signals.
- Proactive prevention: Decision support, driven by predictive analytics, can increase reliability and adaptability.
- Last mile postponement: Swiftly repurposing organizational assets helps ensure that supplies are aligned with evolving demands.

Speed is the essence of Dell, Inc's recently launched global command center, which helps companies monitor supply chain activities and make adjustments in real time. Linked to a geographical

data system, the command center's Clear View monitoring platform rapidly notes service-dispatch activity, thus making it possible to match the dispatch with the optimal parts location. Clear View also considers the impact of events such as storms, flight delays and traffic congestion on a parts shipment, and helps customers develop contingency plans. Dell also was thinking "speed" when it implemented technology to analyze data collected through social media. The resultant information helps Dell quickly spot trends and issues, and serves as an early warning and feedback system.¹⁰

Speed will be the currency of the future. The further ahead we look, the more companies' processes and priorities will need to change as fast, or faster, than their products.

Leveraging the Inevitable

As this Accenture Point of View illustrates, companies are already embedding aspects of the digital supply network into their operations—making them more connected, intelligent, scalable and rapid. But does this mean that numerous organizations have already constructed digital supply networks? And if so, wouldn't that mean DSNs are just broad conglomerations of digital capabilities that help companies manage their supply chains more effectively? The answer is yes and no.

On the one hand, digital supply networks are the result of smart decisions about when, where and how to implement digital tools. It also is true that many companies have benefited greatly from their imaginative use of digital technology.

However, a digital supply network represents much more than the widespread application of technology. The difference lies in the changing nature of supply chain management. Simply put, the supply chain is evolving from a function concerned with the expedient movement of materials to an interenterprise discipline whose mission is the concurrent optimization of materials, talent, information and finances. So digital supply networks aren't about isolated improvements to discrete parts of the supply chain. They represent the enterprise wide realization of outcome-focused missions like "accelerate innovation," "achieve perfect order rates" or "create more differentiated customer experiences."

Perhaps most important, the modern supply chain—the digital supply network—is built with digital DNA. Thus the key is re-inventing the supply chain itself—thinking differently about how to concurrently move and optimize people, information and finances, as well as designs, materials, parts and products.

The Way Forward: Plugging into the Digital Supply Network

Now that we have defined and explored the digital supply network, it is essential to touch upon how an organization can establish one. Directly adopting a proven digital technology may be useful, but whether it will help unlock the full value potential of an organization's supply chain is debatable. Hence, it is essential to follow a systematic process to transform a traditional supply chain into a digital supply network. This process follows three primary steps.

- 1. Envision the Power of the Network. At the outset, it is essential to define the digital supply network vision for the organization. Since there is greater pressure on supply chains to deliver value to the organization, the digital supply network must be designed to deliver increased competitiveness. Therefore the vision should identify the specific business outcomes to be realized from the digital supply network. A primary input for the vision is the new demands and services being required by the digital customer, today and in 10-15 years from now.
- 2. Forget Functional Excellence. Once the vision is defined, the next step is to conduct a value chain analysis to identify the value-creating activities that will to be at the core of the digital supply network. This analysis is a top down approach which consolidates all activities required to help realize the business outcomes, regardless of their function or process origin. The analysis will reveal the path that the enterprise transactions take in delivering value, depicting the way work actually gets done in terms of interrelated value streams that traverse the business.
- 3. Map Your Digital Journey. With the vision defined and the core activities revealed, a digital blueprint for the organization can be created. The blueprint sets the milestones for the transformational journey and acts as the prioritized roadmap for change. The blueprint should take into consideration the people, process, technology and governance aspects of the transformation. It should also outline how the convergence of the talent, physical, information and financial supply chains into one cohesive network will deliver leapfrog performance through a vibrant, interconnected ecosystem. Finally, it should take into account the current technology landscape and where digital technologies can be leveraged for quick wins.

Taken together, these three steps will help identify the individual changes that need to be made and equip the organization to establish their Digital Supply Network.

The modern supply chain the digital supply network—is built with digital DNA.

A Digital Supply Network Scenario

Modern customer expectations of a seamless shopping experience and multiple delivery options drive the need for a highly integrated Supply Chain. To illustrate how a Digital Supply Network enables a business to exceed customer expectations, let's consider the shopping behaviors of Jennifer, a prototypical customer. Jennifer is a busy 34 year old wife, mother and office manager. She is the epitome of the 24/7 digital customer, blending the convenience of subscription purchasing and online shopping with visits to physical stores to manage the ever changing needs of her family.

Jennifer likes to use subscription services to manage recurring purchases, consolidating orders and scheduling fast shipping. At the same time, she does not hesitate to change her shopping habits to take advantage of online catalogues and shopping applications that highlight cost savings from promotions. In addition, she seeks alternate delivery options depending upon the category of products. For example, she prefers non-perishable grocery items to be consolidated and shipped home each Saturday, perishables to be delivered to a cooler closer to work twice a week, and health and beauty items shipped home once a month. For items such as clothing, she likes to reserve them at the store before heading in to try them on.

Jennifer's shopping behaviors exceed the abilities of most existing retail supply chains. Let's look at how applying the advantages of a Digital Supply Network can allow retailers to go beyond Jennifer's expectations.

The connected advantage can allow organizations to obtain real time visibility and enjoy seamless collaboration across the supply chain to meet changing customer needs. This will allow retailers to capitalize on the wealth of information that exists throughout their supply chain ecosystem, and begin to enhance operations in response to the expectations of digital customers. In our retail scenario, adopting the following capabilities would increase connectedness:

- Supply Chain control tower coordinates strategic planning and execution to improve product availability and speed of delivery through analytics, technology enablement and cross supply chain information management. For example, a control tower enables seamless information sharing across fulfillment channels, enabling transparency and flexible shipping options for the customer.
- Cloud based centralized order allocation and execution system provides a single view of customer orders and greater ability to match customer's desires on order lead time and access to wider assortment.

- Collaborative planning and scheduling with network partners provides a wide range of delivery and return options to customers. For example, optimizing inventory holding and storage allows for delivery within hours to a customer for a premium fee, or lower cost options for free.
- Dynamic inventory and replenishment planning based on real time visibility across the extended supply chains gives customers greater assortment, allows faster delivery and streamlines product flows.
- Leverage external talent and infrastructure
 is collaborating beyond customer boundaries.
 Leveraging social networks, interest groups or
 developing customer product development
 forums creates a new way of innovation, and
 this combined with up skilling internal employees
 enables customer experience and service
 unachievable otherwise.

Once connected, the intelligent advantage can allow organizations to derive deeper customer insights from their information and then innovate and automate supply chain operations to drive improved performance. Retailers can anticipate Jenny's shopping habits, and plan inventory and fulfillment options in line with her desires. In our retail scenario, adopting the following capabilities would increase intelligence:

- Precision pricing refers to the ability to collect intelligence on the ground and online, perform analytics and disseminate information to provide pricing specifics to the customer.
- Procurement mall is an online IT system and helpdesk to provide intelligent choices for procurement and facilitate end to end procurement operations on a self-service basis. This allows merchants to access best practices from across the global enterprise.
- Integrated operations to improve decisions across network through actionable insights from data and deliver value through prime value chain performance improvement.
- Transport planning based on supply side intelligence, providing cloud based industry wide collaboration, internal real time demand visibility and dynamic route planning based on real time analytics.
- Automating warehouse operations by optimally deploying smart equipment that connects people and IT systems on a real time basis, such as RFID enabled warehouse picking systems which improve accuracy and efficiency.
- Micro-segmenting customers based on customer behavior and social media data, to improve store layouts, customized offers and product mix.

After connected and intelligent, the scalable advantage can enable organizations to increase or decrease operations efficiently and cost effectively with minimum impact on flexibility. Retailers can customize products and services at a store or even at a personal level. In our retail scenario, adopting the following capabilities would increase scalability:

- Extending networks to an online market place and physical infrastructure for a fee to a large number of suppliers, to provide customers unprecedented access to assortments. In addition, on-demand access to inventory in the supply network offers wider assortments on the fly.
- Transport Cooperation refers to analysis that enables sharing transport with channel partners and even other retailers to boost efficiency.
- Shopper Insight is where customer preferences drive product mix, promotions and sales through fast data analytics, including alerts provided to customer and in-store devices.
- On-spot selling includes arming in-store employees with customer-specific information, advice and upselling.

With connected, intelligent operations at scale organizations can leverage the rapid advantage for faster planning and execution on the move. Retailers can postpone production and fulfillment to rapidly respond to demand signals, and can automate decisions in response to specific triggers. In our retail scenario, adopting the following capabilities would increase rapidness:

- Connected chains refers to a centralized order management system, access to extended network and collaborative transport planning, coupled with automation and oversight from SC control towers. These chains enable faster deliveries and enhanced customer experience.
- Advance shipping pre-positions supplies to the nearest delivery centers before actual orders based on forecasting through Big Data predictive algorithms.
- Movable supplies includes demand sensing and movable warehousing capacity to bring products closer to the customer and help reduce delivery time.
- Last Mile delivery consolidates deliveries through analytics, automates deliveries and collaborate across network, SC partners, other retailers and customers to expedite delivery.

In this scenario, the advantages of a Digital Supply Network clearly help a retailer align operations with Jennifer's preferences and exceed her expectations. The more an organization adopts these advantages to transform their supply chains to cater to customers, the better poised the organization will be to lead the market and serve the digital customer.

About the Authors

Gary Hanifan

Gary Hanifan is a Managing Director in Accenture Strategy—Operations. He leads the Operations North America Practice and is based in Seattle. Gary can be reached at gary.hanifan@accenture.com.

Aditya Sharma

Aditya Sharma is a Senior Manager in Accenture Strategy—Operations. He leads Accenture North America Digital Supply Chain and Sustainable Supply Chain services. Aditya is based in New York and can be reached at aditya.e.sharma@accenture.com.

Carrie Newberry

Carrie Newberry is a Senior Manager in Accenture Strategy—Operations. She leads the Offering and Asset Development team for the Global Operations Practice and is based in Virginia. Carrie can be reached at carrie.newberry@accenture.com.

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