



# Digital operations transform the physical

*How real-time insights can revolutionize value chains*

IBM Institute for Business Value

## Executive Report

Digital operations

### Digital operations for today's world

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## ***Digital operations: A new business imperative***

*Digital operations requires real-time optimization across the end-to-end value chain so organizations can instantly respond to their “always on” customers and business partners. However, for the last few years, most supply chain executives have been “kicking the can down the road” and failing to achieve this vision. Turning supply chain data into information in real time is a critical component in making business decisions and managing core objectives. So, how are today’s leaders of the pack integrating end-to-end processes and creating fluid value chains?*

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## **Executive summary**

In 2010, Chief Supply Chain Officers (CSCOs) predicted that their supply chain flows would be optimized within five years.<sup>1</sup> But as we approach that five-year mark, only a handful of CSCOs can claim success.

In fact, the CSCO role is increasingly changing in scope. Today, senior operations executives, no matter what their titles (CSCO, COO, Senior Vice President of Operations and the like) can be responsible for managing three major types of operations: manufacturing and overall supply chain; service delivery, including field service and customer service; and related functions that may include sales and information technology.

With today’s new technologies, the senior operations executive must also determine the digital operations strategy that encompasses instrumented value chains – integrated with the IoT, cloud applications, advanced analytics and real-time insights – all of which require a different set of skills than in the past.

Senior operations executives in some leading companies are implementing a digital operations strategy that includes real-time information and reaction. They are using perpetual planning, optimal orders and dynamic distribution. By applying analytics and real-time optimization to predict outcomes, these leaders are able to prescribe actions and propel operational performance as digital transforms the physical world.

Digitization is moving fast – really fast. In our 2014 Chief Supply Chain Officer executive report, we learned through direct interviews that operations executives are working hard to integrate their entire value chain ecosystems and sharpen visibility.<sup>2</sup> Only 22 percent stated that they have effective integration and visibility across the supply chain today, but 74 percent expect to have integrated the end-to-end process for real-time visibility in the next two to five years.

**85%** of interviewed companies expect to have dynamic real-time distribution capabilities in the next 2-5 years

**75%** of interviewed companies say they will use real-time predictive demand capabilities in the next 2-5 years

Only **29%** of interviewed companies report having an integrated digital-physical strategy

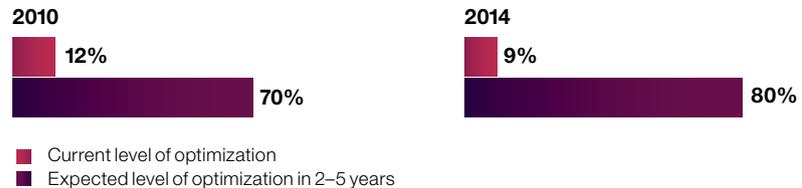
## Digital operations transform the physical

A value chain is the connected set of activities in a specific industry that are performed to deliver a valuable product or service to market. As executives seek to improve data integration and visibility across their own value chain, they must synchronize product, information, financial, and work or process flows. Improving synchronization can optimize these flows. Typically, such optimization includes applying analytics, modeling and other advanced technologies to gain real-time insights and take real-time actions.

In our 2010 conversations, executives predicted that their value chain flows would be optimized within five years. So far, few report success – only 9 percent, a disappointing decrease from 12 percent in 2010 (see Figure 1). Yet today, operations executives' expectations are even higher than before: now, 80 percent plan to optimize in the next two to five years).

**Figure 1**

*Most executives plan to optimize value chain flows, yet a mere 9 percent have done so*



Source: 2010 and 2014 IBM Chief Supply Chain Officer Studies. Question: To what extent have you optimized all flows (product, information, work, financial) from a global value chain effectiveness perspective (already have" versus "next 2-5 years")?

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Senior operations executives are battling with the same challenges as the rest of the C-suite in integrating data and using advanced analytics to predict demand. They estimate the amount of information generated by “smart” devices and objects has more than doubled since 2010, but they still lag far behind in synthesizing all of this information into insights that will let them both forecast what customers need and respond quickly to event alerts.

Even more important, operations executives are still trying to figure out how to integrate customer-related data – marketing analytics, customer feedback, social networking data and so forth – into their value chain processes and product flows. They must deal with a growing volume of data, arriving ever faster, from an increasing number of sources. And they’re finding it difficult.

In this report, we will demonstrate how leading organizations are integrating and optimizing end-to-end processes and making their value chain flows fluid. Their examples show how to operate in the new digital era using:

- Perpetual planning
- Optimal orders, and
- Dynamic distribution.

What can those leading in digital operations teach us? No longer can critical operational information be provided to customers and business partners next week, tomorrow or even in an hour or two. Digital operations efforts are intense, but the rewards can be rich. They can include better customer service, fewer supply chain disruptions, greater operational efficiency, lower inventory levels, and improvements in working capital, cash flow and market share.

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*“The greatest challenge in the next few years will be embracing technology to enhance visibility across the entire supply chain to allow for real-time decision making.”*

**CSCO**, Industrial Products, Singapore

## Perpetual planning: A continuous planning strategy

Sales and operations planning (S&OP) has made major strides in the past several years. S&OP is an integrated business management process to synchronize all functions, including an updated forecast that leads to a sales, production, inventory, new product development and finance plan. Plan frequency and horizons depend on the specifics of the industry. Short product life cycles and high demand volatility require a tighter S&OP planning process than steadily consumed products.

Many companies intend to do more integrated planning with business partners. Some are even inviting customers to the planning table. But the S&OP “single version of the truth” is still based upon yesterday’s data. As a result, many study participants are moving toward, or planning to move to, a perpetual planning model which will continually update their S&OP with actual demand signals such as point-of-sale, live orders and continuous replenishment signals.

Eighty-seven percent of operations executives plan to begin using actual demand signals for collaborative S&OP planning in the next two to five years, and 34 percent already use it (see Figure 2). Very few have today mastered the ability to predict demand by combining real-time data. In 2010, 69 percent expected to implement predictive demand in the next five years. But as of 2014, only 16 percent have combined real-time information with analytics to predict demand.

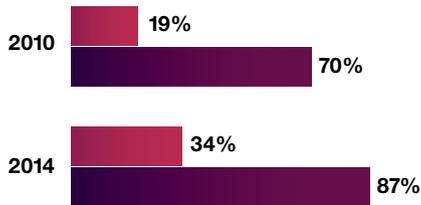
Coca-Cola Bottling Company Consolidated (CCBCC) is a strong example of using real-time signals to predict demand.<sup>3</sup> CCBCC is the United States’ largest independent Coca-Cola bottler. It makes, sells and distributes Coca-Cola products and other beverages. Manufacturing operations run 24 hours a day, seven days a week to satisfy the huge demand for its products.

Given the scale of operations, CCBC needs precise, up-to-date demand information to produce the right amount of the right products. However, it had been making product based on sales history and production plans instead of current consumption. Then it implemented a specialized supply chain demand planning application with store-level insights to predict customer demand. This solution delivers three significant benefits: deeper demand insights, four times faster than before; a better match between manufacturing output and demand, which reduces the risk of over- or under-stocking; and earlier logistics planning, thereby increasing profitability.

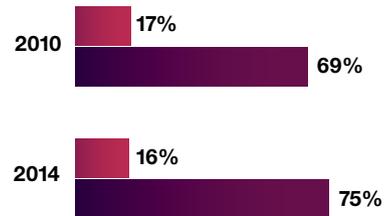
**Figure 2**

*Most operations executives aim to tame market variability with real-time demand signals*

**Actual demand signals for collaborative S&OP**



**Combining real-time information with predictive demand**



■ Current level of implementation today  
 ■ Expected level of implementation in 2-5 years

■ Current level of predictive analysis today  
 ■ Expected level of analysis in 2-5 years

Source: 2010 and 2014 IBM Chief Supply Chain Officer Studies. Questions: To what extent have you/plan to implement actual demand signals for collaboration S&OP? To what extent have you/plan to use advanced analytics to predict demand ("already have" versus "next 2-5 years")?

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*Perpetual planning enables more accurate demand and supply knowledge, as well as more accurate production and assembly status that can lower processing and inventory carrying costs.*

Another digital operations role model is Maruti Suzuki India.<sup>4</sup> The company uses sophisticated statistical analytics to predict demand with greater precision. A subsidiary of the Suzuki Motor Corporation in Japan, Maruti Suzuki has been a leader in the Indian automotive marketplace for more than 25 years. To manage operational complexity and prepare for growth, it implemented a perpetual planning, forecasting and inventory optimization solution that accounts for the impact of trends, seasonal fluctuations, external events and demand volatility.

The solution generates production recommendations and validates them against inventory optimization rules and stocking strategies (based on value, quantity, demand variability and criticality). It supports distributed stocking, automatic reordering at defined thresholds and simulation of inventory impact on service levels and costs. Perpetual planning has reduced inventory levels, lowered costs and increased production efficiencies to free up capacity for future growth.

**Analytics + real-time signals = perpetual planning to optimize value chain flows**

These examples, as well as others that are ahead in their industries, implement solutions that combine analytics with real-time demand, supply and operational signals. Such capabilities allow companies to predict demand, monitor production schedules, view inventory status across phases and better satisfy customers.

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The benefits are numerous: more accurate demand knowledge versus forecasts; accurate supply knowledge versus last supplier commitment; and accurate production and assembly status. These can lead to decreased processing costs, decreased inventory carrying costs and a realistic view of today – as well as the future – to aid in predicting customer activity against its own volatility.

*Become real-time demand-driven*

Evaluate demand signals from your customers and channel partners. Remove any latency and move to a real-time environment. Build business rule engines to automatically alert management to out-of-tolerance situations. Message them anywhere through mobile device access to enable immediate responses when critical discrepancies occur.

*Collaborate at both ends of the value chain*

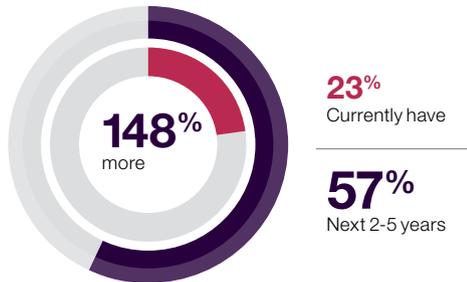
Integrate with marketing insights for better knowledge of customer demand and buying patterns. Incorporate these insights in the planning and product lifecycle management processes. Also collaborate with suppliers and business partners on customer demand plans and bring real-time visibility to all key planning processes (such as manufacturing, transportation and logistics).

*Plan continually*

Shrink planning horizons from weeks or days to a continuous planning cadence. Start by implementing your S&OP in an environment for global access by stakeholders “24 hours a day, seven days a week” to support real-time collaboration. Then build an analytics engine to yield predictive and prescriptive business intelligence and insights.

**Figure 3**

*Senior operations executives want to build a network of partners, with order status information integrated in real time to allow agility in reviewing insights and making real-time adjustments for predictive and immediate action*



Source: 2010 and 2014 IBM Chief Supply Chain Officer Studies. Question: To what extent have you/are you building an agile, on-demand network of partners to sense, respond, predict and act (“already have” versus “next 2-5 years”)?

## Optimal orders: Get it right the first time

At the heart of any supply chain transaction between partners and among networks is “the order.” There are many types of orders: sales orders, production or manufacturing orders, purchase orders and service orders. Our conversations with operations executives in 2014 revealed that they want to build agile, on-demand networks of partners (suppliers, service providers, and others such as financial and regulatory institutions) 148 percent more in the next few years (see Figure 3).

The key performance indicator of a “perfect order” is easier to define than to achieve. It is the percentage of orders delivered to customers at the right time, with the right product, the right condition and the right price. We believe that the principle of a perfect order applies to all types of orders – and further, that order transactions today must flow in real-time – hence, move beyond “perfect” to “optimal.” The status of order-to-cash, order-to-pay, schedule-to-produce and order-to-service completed must be available virtually all the time. We are seeing many companies moving in this direction.

An aerospace manufacturer has implemented advanced monitoring and alerting tools to reduce the percentage of non-conforming work orders by 65 percent. Final component assembly takes place in three days. With a zero error tolerance within the assembly process flow, any out-of-sequence work or parts shortage needs to be rectified immediately.

So the company implemented a manufacturing performance analytics engine that monitors the precise orchestration of the assembly process in real time. Predictive analytics monitors current tasks and downstream activities to perform just-in-time assembly. It also uses predictive analytics to monitor parts for proper calibration. The tools capture work order status from more than 30 systems while providing a real-time dashboard view of over 8,000 work orders and creating new levels of collaboration within its global manufacturing ecosystem.

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Perhaps the most difficult of optimal orders to achieve is the sales order. In consumer-touching industries, this involves consumers on mobile devices sharing purchasing and pricing decisions with friends. In business-to-business industry environments, it requires perfecting the collaborative ability to meet customers' ever-increasing demands, as well as real-time order status information.

A consumer electronics manufacturer in Asia has optimized its worldwide network with analytics and real-time operations. To operate a lean global supply chain for phone components, it must precisely, rapidly and frequently balance component supplies with production demand. This requires accuracy of worldwide production to the component part level so that procurement managers can make informed, fact-based decisions on the spot.

The company implemented a cloud-based solution to manage supply and demand metrics and detailed transactions while evaluating production and capacity requirements for optimal order fulfillment. The core analytics engine solves resource-constrained supply chain variables in a cognitive computing environment: artificial intelligence and machine learning algorithms to sense, predict, infer and, in some ways, think. The computer analyzes alternatives and makes decisions without human intervention. As a result, the company has improved its on-time order fulfillment rate by 7 percent.

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### **How does the IBM Transparent Supply Chain (TSC) work?**

The TSC integrates virtually all of our information and analytics on the status of our supply chain. It enables us to better collaborate with suppliers, manufacturers, business partners, sales teams and clients, then to take faster corrective actions when issues arise. TSC utilizes social, mobile, analytics and cloud capabilities, including the following examples:

**Quality Early Warning System.** Collaborates upstream with our suppliers to provide predictive quality management.

**Critical Parts Management Tool.** Looks upstream and provides supply assurance avoiding disruptions in manufacturing and assembly.

**The IBM Buy Analysis Tool (iBAT).** Looks downstream to get the correct levels of inventory flowing to the marketplace. We also apply it inside our own manufacturing to send the right amounts of parts and subassemblies to the right IBM operations for final assembly.

**Real-time visibility.** View order status, service level commitments and finished good inventory levels.

**Alerts.** Send notifications throughout the supply chain via our mobile platform.

**Analytics + real-time order flows = optimal orders to keep customers loyal**

In these real-world examples, leading companies are creating optimal orders. They are integrating analytics engines, including cognitive computing capabilities, into their order-to-cash, service-to-cash and purchase-to-pay processes. These processes often offer the greatest opportunity for improving efficiency and effectiveness since they have significant cost impact on other areas of the business and can increase productivity by taking an end-to-end view.

*Create a unified internal view of real-time order fulfillment*

Optimize your order-to-cash (OTC) processes across the enterprise for labor utilization, cost efficiency and data integration. Review end-to-end processes and remove activities that don't add value. Start with an end-to-end OTC performance evaluation of costs and time-to-service. Next, as these cross-functional processes are simplified and standardized across geographies and business units, apply advanced technologies – such as analytics, modeling and simulation of processes – in a seamless environment that immediately conveys order status from beginning to end.

*Integrate to provide external order-to-cash visibility*

Integrate enterprise applications with business partners and suppliers to provide real-time visibility of the status of all order-to-cash, service-to-cash and purchase-to-pay processes. Order status must be available simultaneously and instantaneously to corporate management, suppliers, transportation/distribution service providers and third-party manufacturers. ERP and logistics systems that contain order status information become real-time and available for immediate access by all stakeholders (customers, suppliers, logistics providers, management) when such information resides in a cloud-based environment.

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*Create an order environment conducive to your goal*

As customers and consumers demand more, measure and monitor customer touch points to aim for that optimal order experience. From order-to-cash transactional activities, measure the customer's view – not the enterprise view – of right time, right product quantities, right condition and right price. For example, the customer's original delivery date/time should be honored and measured, not adjusted delivery times. This applies to quantities, price and condition as well. An optimal order environment is designed to increase customer satisfaction and loyalty by consistently meeting requirements. Create a customer measurement and monitoring system that continually monitors customer satisfaction criteria.

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*“Our goal is to provide transparency, while individualizing the customer experience.”*

**Operations executive**, Transportation, United States

## Dynamic distribution: Automated resource and delivery adjustments

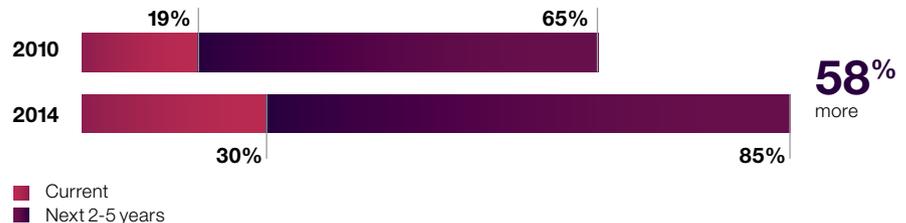
Operations is not just about making products, and aligning supply and demand. Executives are under constant pressure to create enterprise value. Each interaction in the value network represents an opportunity to perform more efficiently and productively.

In the digital operations era, operations executives must evaluate their distribution networks in real time for efficiencies in outbound distribution and transportation flows. They must also continually optimize pipeline inventory at critical points, such as inbound supply logistics.

We refer to this as dynamic distribution: the ability to automatically reroute or redirect products based upon a real-time demand signal, or a tap on a smartphone or tablet. Thirty percent of operations executives told us in 2014 that they were positioning for dynamic allocation and distribution of products and assets across their value networks in the next two to five years (see Figure 4).

**Figure 4**

*Dynamic distribution is a capability that has grown in the past 4 years*



Source: 2010 and 2014 IBM Chief Supply Chain Officer Studies. Question: To what extent have you/do you plan to implement dynamic distribution and allocation practices ("already have" versus "next 2-5 years")?

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More than half of interviewed executives want to become better at dynamically sourcing and distributing talent, products and other assets. These capabilities enable an enterprise to handle variations in demand more effectively and immediately. For example, it can re-route shipments already in transit as a result of demand signals from point-of-sale data in stores. A change in a customer order could result in immediate redistribution and reallocation of inventories. In 2014, 30 percent were on the way to achieving this vision. Most (another 55 percent) will implement solutions for global dynamic distribution in the years to come.

A fast-growing, mid-sized European packaging company, Richter & Hess (R&H) is improving visibility and inventory management with sensor-based tracking.<sup>5</sup> It applied analytics to mobile applications to do real-time distribution management.

The company implemented a first-of-a-kind solution for midsized companies that deploy radio frequency identification tags and specialized track-and-trace software for product lifecycle management. The solution enables R&H with transparency of its inventory and business processes with anytime, anywhere insight into current stock levels and inventory positioning. Both executives and customers have web-based access to current shipment information.

Pharmaceuticals is perhaps one of the most challenging product distribution scenarios. A government agency in Africa delivers pharmaceutical products and medical supplies in some of the world's most remote locations. With no visibility into the distribution and storage processes, it operated on a push supply system, estimating product demand from historical consumption. Distribution challenges that were not considered include: flooding, demographic variations including age, education and gender, frequency of specific illnesses, seasonality and more.

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*“As we fuse the physical network with the digital network, we must rely upon collaborative teamwork with partners for rapid consumer responses.”*

**Operations executive**, Retail, United States

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*Dynamic distribution can increase global efficiencies, and reduce unnecessary inventory and handling labor – all while lowering the cost of transportation and distribution logistics operations.*

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The agency developed an enhanced inventory control system – for dynamic distribution – that exploits mobility, integration, analytics, forecasting and optimization technologies. Drug stock and usage is immediately captured using a product coding system. Statistical demand is optimized and accounts for dynamic factors such as lead time, seasonal changes and demographic variances. Comprehensive dashboards report usage, epidemic outbreaks and a host of other pertinent information. This solution has doubled the accuracy of shipment contacts, expedited the receipt of inventory by 90 percent and cut the time to dispatch and receive pharmaceutical products by 50 percent. But most importantly, medications now reach patients faster and save lives.<sup>6</sup>

**Analytics + real-time logistics tracking = dynamic distribution to deliver on the customer promise**

Dynamic distribution supports the promise made to customers to meet a distinct delivery time or window. It delivers the product at the right hour, in the right condition. Dynamic distribution practices increase global efficiencies, reducing unnecessary inventory and handling labor. The cost of transportation and distribution logistics operations is reduced via analytics that optimize the global logistics network. A predictive analytics tool can be used to determine the financial and environmental impact of changes to any element within a company's vast operational distribution network.

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### *Optimize your networks*

A key component of dynamic distribution is optimizing the network of manufacturers/ assemblers, suppliers, third-party logistics and other service providers to seamlessly deliver across a multitude of touch points. The complexities of today's markets and rapid distribution needs require an active and aggressive network optimization capability. Evaluate the trade-offs: inventory versus costs for various transportation modes; and distribution points against constraints such as time, fuel, labor, energy usage, carbon footprint and others. Network optimization is not a "study" to be conducted every couple of years. In today's era, where technological advancement meets volatile customer demand, networks must be optimized continually.

### *Implement real-time logistics operations*

Real-time logistics – tracking end-to-end across the entire value chain network – is no simple feat. Many companies implement cloud applications to deliver the "real-time promise" of providing product whereabouts and delivery schedules at the tap of a finger. Leading practices include web-based connectivity, but also collaborative and social applications to support communications with a myriad logistics partners.

### *Incorporate dynamic distribution*

Provide monitoring of real-time logistics and order/demand signals to be able to re-route and re-distribute products and services – even in transit – while automatically reallocating inventories at various distribution points along the value chain. Inform appropriate parties of the disposition of product whereabouts – through automatic notifications, messages and alerts.

## Join the revolution: Transforming operations

The window for competitive differentiation in all industries continues to shrink. In the current marketplace, executive leaders must race to convert data-driven insights into meaningful results.

True real-time operations will provide information to make decisions about the most vital functions of the company, from manufacturing and logistics to customer service and product life cycle management. With real-time information, business leaders can better manage their core objectives – whether they are focused on the bottom line, business growth or both – and make better predictions.

Leaders will use real-time stimuli and insights to respond instantaneously to operational changes as they occur, but also to anticipate them. Examples include re-routing a shipment based upon new demand knowledge, re-directing a supply order based upon an anticipated weather event, or sensing a critical part failure and changing a bill of materials or assembly point.

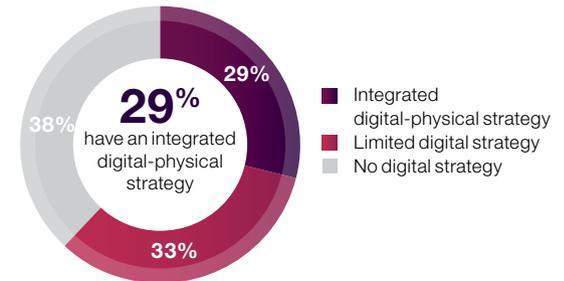
Those leaders who invest in digital operations ahead of the pack will be positioned to help define the new era, in which real-time information enhances the ability to address even the smallest nuances, meet the most critical business challenges and increase the return on their investments. There is a lot to consider as you develop and implement your operational digital-physical strategy. But you're not alone.

A last statistic to share: The executives we spoke with admit that they lack an integrated digital-physical strategy. They agree that providing accurate and immediate response to customer demands and business partner requirements necessitates real-time information – anytime and anywhere. Yet, only 29 percent have an integrated strategy, and most have no digital strategy (see Figure 5). Clearly, there is much work to be done, starting with a well laid-out plan.

Still, it's important to remember that the implementation of a technology (such as analytics, IoT or cloud) is not the game changer. Instead, the combination of the technologies, the people and the processes – enabling work to be performed anywhere, everywhere, all of the time – is what will impact business processes, change business models and transform industries.

**Figure 5**

*Executives remain focused on physical operations and are slow to develop an integrated digital strategy*



Source: 2010 and 2014 IBM Chief Supply Chain Officer Studies. Question: What kind of digital strategy does your enterprise have?

## Ready or not: How will you implement digital operations?

- How will you use predictive modeling with advanced analytics to gain instantaneous reaction to operational disruptions and customer demand volatility?
- How can you engage your operations, finance, strategists, business partners and customers in a perpetual planning strategy that uses real-time demand, and supply and operations signals to update S&OP continually?
- How will you comprehensively implement real-time sales, purchase, production and service orders for optimal “perfect” order attainment in response to demand volatility?
- How dynamic are your distribution processes? How will you provide global real-time warehouse and transportation management to dynamically allocate and distribute products based upon instantaneous customer demand and buying signals?
- What is your plan to enable mobile enterprise applications to communicate alerts and management dashboards to address operational needs anywhere and anytime?

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### For more information

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**Notes and sources**

- 1 "New rules for a new decade." IBM Institute for Business Value. October 2010. <http://www.ibm.com/services/us/gbs/thoughtleadership/ibv-new-rules-new-decade.html>
- 2 "Orchestrating a customer activated supply chain: CSCO insights from the Global C-Suite Study." IBM Institute for Business Value. May 2014. <http://www-01.ibm.com/common/ssi/cgi-bin/ssialias?infotype=PM&subtype=XB&htmlfid=GBE03602USEN#loaded>
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