



Who's leading the cognitive pack in digital operations?

Progress, priorities and profits

Executive Report

Operations and supply chain, Cognitive computing

How IBM can help

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The road to the cognitive future runs through operations

Senior executives are reinventing their companies and industries with analytics-enabled digital operations. For many, both strategy and execution have a way to go, as a new generation of cognitive computing promises greater value – and presents fresh challenges. Our research shows the business case for digital operations is compelling, with high-growth/high-profit companies acting more on company-wide, integrated strategies. These high performers are getting more out of the still-maturing cognitive technologies that power businesses behind the scenes. In this report, we discuss progress, priorities and profits along the road to the cognitive future.

Executive summary

Many Chief Operating Officers (COOs) are guiding their organizations to take advantage of intelligent, responsive processes that provide “anytime, anywhere,” analytics-led insights. Their objective is to decrease the amount of human intervention required to perform real-time actions across their operations. To do so, they are connecting every possible Internet of Things (IoT) device using today’s digital technologies. This is happening across industries as they:

- Optimize assets and enable them to control their own environments
- Automate factories with IoT sensor/actuator controls and robotics
- Reduce energy consumption and give back to the grid
- Operate heavy industrial equipment and vehicles autonomously
- Manage inventory in warehouses and deliveries with drones.

Previously, operations executives told us that they were reinventing their operations. Top priorities were IoT, predictive analytics, cloud and mobile. Core operating functions were well underway, but both strategy and execution lagged behind. Companies struggled to keep up the talent demands imposed by the switch to digital operations.¹



Pack leaders transform operations with an integrated digital/physical strategy and execution plan **2.5X more** than peers



1 in 2 surveyed executives report **significant ROI** from implementing critical digital technologies



Executives said they expect to **double their use of cognitive computing** for operational optimization in the next 3 years

This year, we employed a real-time assessment tool and global survey to follow up and measure progress in adoption and maturity. In addition, several in-depth interviews with executives explored their experiences in digital operations transformation. So, how can our findings help you? To summarize:

High performers, “pack leaders” as we shall call them, are ahead. Respondents reporting higher revenue growth and profitability act more than others on a company-wide, integrated strategy for digital operations and they have highly-developed processes in critical areas.

Key technologies are proving to be more than hype. Getting multiple technologies, each experiencing its own evolution, to work together in support of complex internal and customer-facing operations takes a lot of time, effort and expertise. Critical technologies such as IoT, cloud, analytics and mobile are delivering on their promised value, as seen through realized returns on investment.

The path to cognitive is accelerating. Predictive analytics are advancing, as the path to cognitive computing accelerates, industry-by-industry, process-by-process. Top-level buy-in for advanced analytics initiatives has jumped over the past year as executives increasingly recognize the business benefits.

Most companies are still building the basic infrastructure needed to support digital operations transformation. They remain focused on foundational technologies of the digital era, including cloud and mobile, over advanced tools like IoT and robotics in manufacturing. However, they are making progress in those areas as well.

But many companies lack a clear strategic vision and plan for digital operations, a serious shortcoming that could hobble efforts at transformation. In fact, those respondents with the most integrated digital operations strategies report much higher maturity in significant applications – and their less-prepared peers risk falling further behind.

And having a plan pays off. Companies that operate smoothly behind the scenes should have a big edge over less-efficient competitors, and digital operations are an important way to establish that edge. Ultimately, the move to digital operations is about building competitive advantage – and avoiding disruption at the hands of more digitally capable rivals.

“The only thing people will want to talk about in the future is, ‘How are you going to help me transform my business model?’” said Alexandre Attal, who sees digital transformation up close as Executive Vice President and Head of Digital Services and Incubation and Business and Application Services at Fujitsu America. “Because somebody is trying to disrupt me somewhere, and the way they’re disrupting me is through technology.”

“The rate of change in technology is so unpredictable that it’s hard to know where we are as opposed to others. So we’re focusing on the critical technologies (cloud, mobile, analytics, IoT) to remain competitive.”

CEO, Industrial Products, United Kingdom

Figure 1*Driving with a map offered more success*

Have an integrated digital/physical operations strategy and execution plan, and have taken steps to transform



Source: IBM Institute for Business Value analysis.

Pack leaders provide direction

Successful companies are more focused on digital operations than their competitors. We identified the pack leaders, a group of 63 respondents (12.5 percent of the total sample) with stronger financial performance than their peers. These companies report annual revenue growth and profit margin increases of more than 5 percent and annual profit margins of more than 15 percent over the past two years.

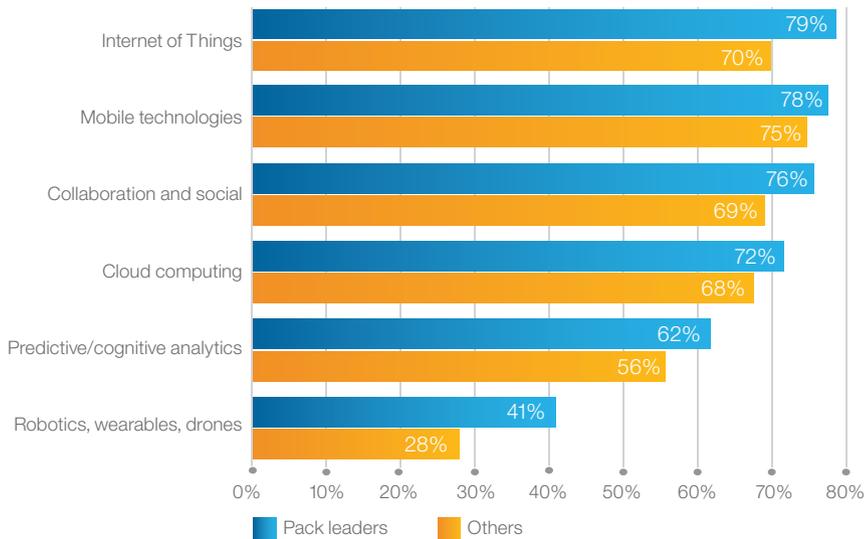
We found that pack leaders are further along the digital operations reinvention journey. They are following a strategic roadmap and 2.5 times more of them have taken steps to act on their integrated digital operations strategy, compared to others (see Figure 1). This group has worked hard to develop an integrated strategy across the C-suite with consensus on priorities, goals and a communication plan.

Pack leaders have developed a 3-5 year execution plan and they have a technology roadmap to drive their successful development/operations activities, IT platform development and application development. But there is plenty of room for improvement – 83 percent of surveyed organizations have a high-level strategy with no formalized plan of action.

We cannot untangle cause and effect to determine if digital operations are driving financial results, or if thriving businesses are investing in digital operations, or both. But these healthy, wealthy organizations did tend to have relatively mature digital operations compared to other respondents. This relationship makes sense given the power of digital operations to both reduce costs and enhance business opportunities. Both are important, but “supporting growth and customer-facing initiatives provides the greatest value over time,” said Subbu Allamaraju, Vice President, Technology at Expedia, Inc.

Our analysis shows that the most financially robust companies are following a transformation roadmap. Pack leaders are more focused on and investing in the critical technologies. Their investments are similar to or slightly greater than others in IoT, mobile technologies, collaboration and social applications, cloud computing, predictive analytics, as well as industry-specific automation, such as robotics in manufacturing and drones in distribution (see Figure 2).

Figure 2
Companies are investing in critical technologies



Source: IBM Institute for Business Value analysis.

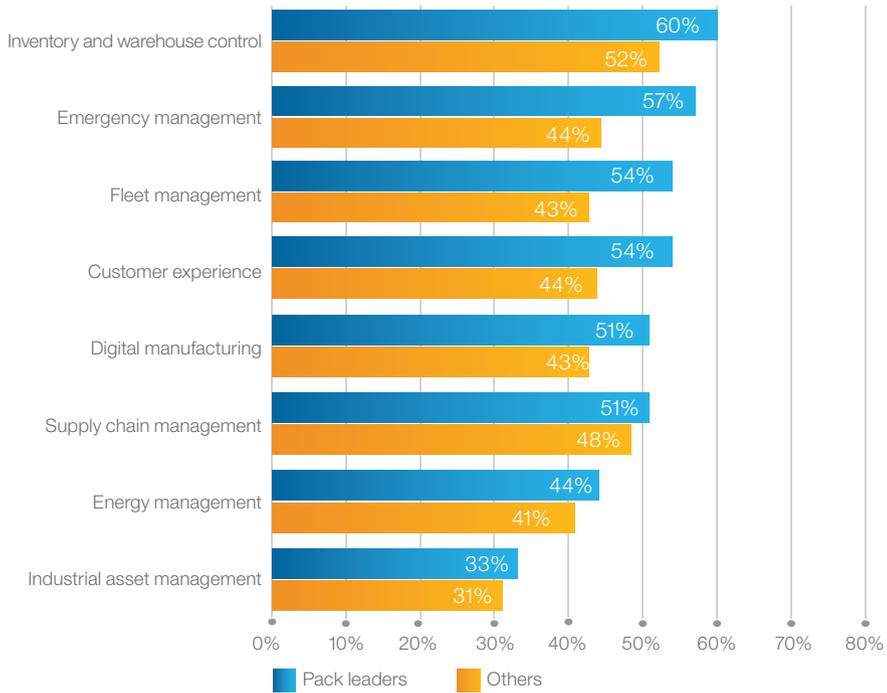
“The ‘anchor’ for products won’t be the physical asset; it will be the digital entity – the product plus all the information associated with it.”

COO, Consumer Products, Italy

Another area of differentiation is in the maturing of digital operational processes. Our pack leaders also have more advanced strategies and plans; all reporting quite- to highly-developed levels of maturity (see Figure 3).

A German rail service provider is a great example of implementing an integrated solution that marries IoT and predictive analytics with fleet, asset and energy management. Modern trains are equipped with intelligent sensors, recording devices and cameras which constantly record variables such as the temperature, energy use, switching time and component condition, position and deterioration.

Sensor readings are sent to the predictive maintenance system over communication links and via wireless networks in train stations. Continuous streams of data from sensors at railway crossings, tracks, signals and switching points are also received. That is a lot to sense, detect and monitor. This optimized maintenance system has reduced operating cost by 30 percent, increased first-time-fix rates and improved passenger safety.

Figure 3*Maturity of digital operations apps*

Source: IBM Institute for Business Value analysis.

Moving through the hype to value

Digital operations transformation is hard work. It involves several different technologies, each at a different stage of maturity, which must work together and be integrated into existing processes – all without disrupting the flow of business. Having a strategic vision is an important, and too often overlooked, first step.

The road to digital operations starts with foundational technologies of our era: cloud and mobile. More survey respondents named these two pillars of digital operations as “most important to business strategy” of any technology on our list. “My focus is to help the company migrate from the data center to the cloud,” said Expedia’s Mr. Allamaraju. “It’s a multi-year journey.”

Even with migration as an ongoing task, cloud can make it easier for operations to integrate diverse digital tools. Fujitsu is able to quickly realize value from acquired technology, said Mr. Attal, thanks to cloud-based APIs. “Even if you’re running a mainframe, you can create a digital and visible supply chain on top of it.”

Visibility has always been a global issue in supply chain management. However, in the last year, the criticality of increasing real-time visibility into global operations has surged 44 percent. Cloud-based apps provide this needed instantaneous awareness of operational transactions, and companies are eagerly implementing them – at a growth rate of 32 percent – to manage their operations anywhere, at a moment’s notice.

An example of improving visibility is real-time data gathered across different IoT devices to support a connected vehicle. One automaker is building brand loyalty by making its connected vehicles a gateway to a wider array of apps and onboard commerce offerings to enhance the driving experience, such as location-based gas or food discounts. A global mining equipment service provider integrates vast volumes of data from multiple sources, including streaming equipment sensor data. With constant monitoring of equipment performance, it has significantly reduced costs by preventing downtime.

Top-level buy-in for advanced analytics initiatives has escalated over the past year. Most COOs told us they plan to use advanced analytics, modeling and real-time data to streamline their operations even more in the next few years. It's high on their agendas because they realize it will help them predict demand and monitor their production schedules more accurately, and make their supply chains more transparent. These, in turn, enable lower processing and inventory-carrying costs and faster responses to changing customer preferences.

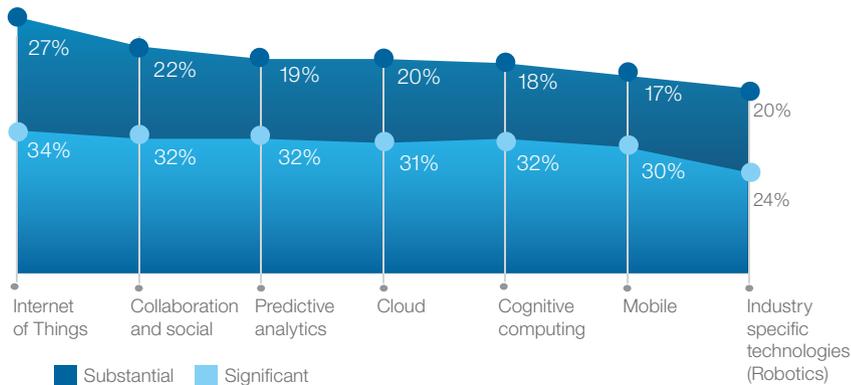
We now see many client examples of applying IoT and predictive analytics with cloud apps to achieve real-time monitoring and visibility across a wide spectrum of industries and use cases. And this innovation is paying off for adopters. In every area, the reported level of return on investment (ROI) was substantial to significant (see Figure 4).

“With real-time data, advanced analytics and single view of the customer, we’ll be more agile and able to respond more rapidly.”

COO, Banking and Financial Markets, Ireland

Figure 4

Level of ROI realized based on implementation of critical technologies



Source: IBM Institute for Business Value analysis.

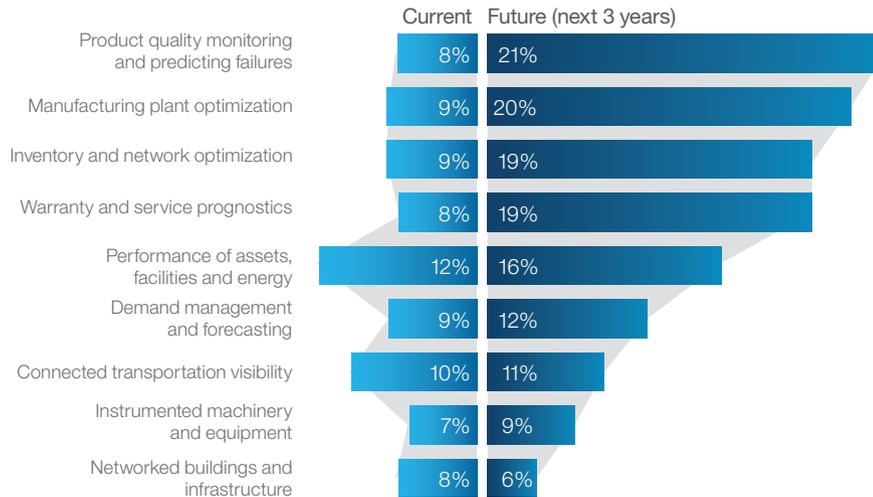
The path to cognitive accelerates

Another essential building block of digital operations is analytics, without which the flood of data created by other technologies is of limited value. Making meaning from data is essential, and immediate, proactive operational response is one of the most pressing business goals of respondents over the next three years.

Analytics is a component of digital operations that is following its own maturation curve, as mathematical computing progresses from predictive to cognitive “learning” diagnostic powers. The increasing prevalence of cognitive computing over the next three years is expected to be most visible in customer- and cost-centric areas, including product quality warranties and service, and optimization of manufacturing plants, networks and inventory. Fujitsu even predicts a business opportunity in the rich information to be gleaned from advanced analytics insights. “Selling that knowledge back to the market in a different form or product – that’s where we see the future going,” said Shobhit Porwal, VP Digital Business Services and Head of Hybrid IT at Fujitsu America.

Executives said they expect to double their use of cognitive computing for operational optimization in the next 3 years (see Figure 5). Companies are planning prototypes and pilots to explore cognitive computing in all areas of operations. Predictive asset optimization, including building and facility management, and plant optimization are areas of particular interest to executives for continued automation.

A commercial building solutions provider was designing a simple, user-friendly way to capture and analyze sensor data in homes, offices, and in the wider environment. It knew that an autonomous solution was vital. Equally, it required cloud connectivity to enable more sophisticated analytics and the aggregation of large datasets by its operational ecosystem.

Figure 5*Growing use of cognitive computing*

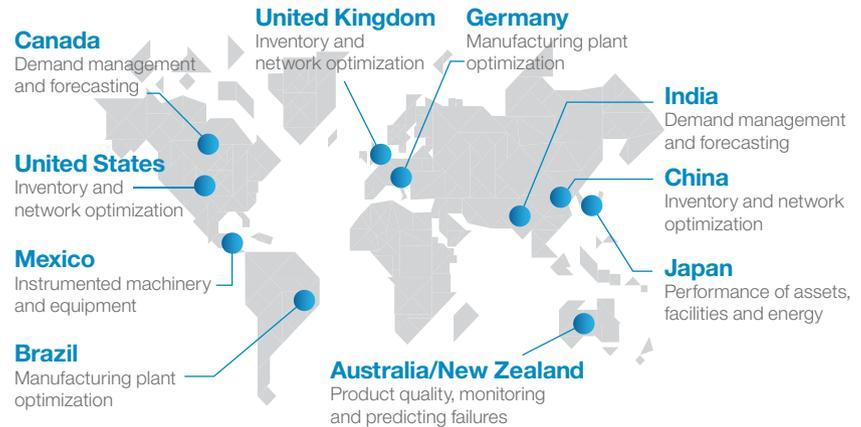
Source: IBM Institute for Business Value analysis.

The solution is one of a kind – collecting, consolidating and self-analyzing environmental data from just about any source. Intelligence “at the edge” enables fast insight from potentially billions of devices. One example is doing useful processing of the data as close to the collection point as possible and allowing systems to make some operational decisions there, possibly autonomously. Innovative architecture supports high-performance and in-depth cognitive computing automation.

Every industry, every region and even individual countries are at different points in bringing cognitive capabilities into their operations (see Figure 6 and sidebar, “Industries go with what they know”). Latin America (Mexico and Brazil, in this study) is the most active in pursuit of cognitive computing in the near term (2-3 years), within a broad range of process areas. Companies are especially focused on instrumented machinery/equipment and manufacturing plant optimization as that region progresses with digital manufacturing automation. Germany, known for engineering excellence, is also concentrating on automating production and manufacturing plant optimization.

Figure 6

Primary process areas for cognitive computing in the next three years, by region



Source: IBM Institute for Business Value analysis.

Some companies in India have begun prototype experimentation in applying cognitive APIs to their demand management and forecasting processes to improve customer responsiveness. Japan, known for precision, is more heavily focused on performance of assets, facilities and energy management. Australia/New Zealand are planning to add cognitive computing to predictive maintenance and product quality initiatives.

China leads this pack in inventory and network optimization, followed by the U.S. The U.S. and Canada are keeping a close eye on changing customer/consumer needs and demand variability as they look to cognitive computing to support future demand management/forecasting, with immediate customer order response to personalize the customer experience.

Industries go with what they know

Our analysis shows that specific industries tend to be strongest in those areas of digital operations in which they have some existing expertise. Thus, retailers excel at using analytics for connected transportation, and consumer products companies are leaders in inventory management. Meanwhile, companies from banking and financial markets are more focused on cyber security risk.

But industries need to look beyond their core competences and develop strategies in other areas, especially as disruptive companies blur traditional lines between sectors. Most companies seem to understand this imperative. For example, companies across industries expect to ramp up efforts in analytics over the next three years, as understanding data in depth becomes a universal need.

Recommendations

Plan your work and work your plan. Devise a clear and comprehensive strategy for digital operations, and then stick with it. Too many companies skip this serious step.

Conduct executive visioning and design workshops to develop your integrated digital strategy. From that, develop your execution plan for continued building of your foundational cloud and mobile infrastructures and apps. Plan to infuse predictive analytics and cognitive computing to analyze go-to-market processes and optimize supply chain partner networks.

Tackle issues and innovate by designing new operational processes of high business value. Ideate potential use cases and prioritize them based on business value and readiness to implement. Prototype, develop using agile techniques, test and scale. Then, start again with the next use case. Target use cases may include automating factories with robotics and sensor and actuator controls or enabling buildings to monitor and adjust temperatures while regulating energy usage.

Incrementally envision digital innovations and improvement opportunities. New innovations may be realized sooner by leveraging digital services from a broad ecosystem. Experts can supplement talent and skill gaps in critical areas, augment infrastructure needs, and oftentimes bring, much-needed technological proficiencies to jumpstart your digital prowess.

Build from the cloud down. Get the technology basics in place to create a healthy environment for the cognitive, data-driven future.

Infuse new intelligence into products and services. Integrate the data from IoT-connected devices and cloud-based transactional apps to engage new audiences while creating new channels of product/service distribution. Provide personalized customer experiences by tailoring services that range from embedded product maintenance and replenishment to specialized delivery options.

Optimize asset utilization, maintenance and physical operations via sensing, integration and advanced analytics through connected devices. Improve return on assets across all asset classes. Predict failures and improve part quality, while foreseeing product availability.

Automate real-time, live decisions, while building all-encompassing value chain visibility and transparency. Leverage nontraditional sources of data (such as weather or social trends) into your transparent, operational control tower. Apply supply chain analytics and network optimization in real time, enabling automated decisions and mitigating risk.

Follow the money. Understanding the business imperatives – and payoffs – of digital operations helps clarify plans and solidify top-level buy-in.

Develop new revenue streams from existing products and services, or create entirely new products and services. Data and insights from digital operations may be the new competitive advantage. Some forward-thinking companies are actually offering “knowledge from data” as a market and even product differentiator.

Extend operational optimization modeling to include embedded financial modeling with profitability constraints and goals. Apply profit- and loss-based modeling with macro and micro forecasting to your global network, along with customer responsiveness optimization scenarios. Allow for real-time, “what-if” analysis as operational dynamics constantly change.

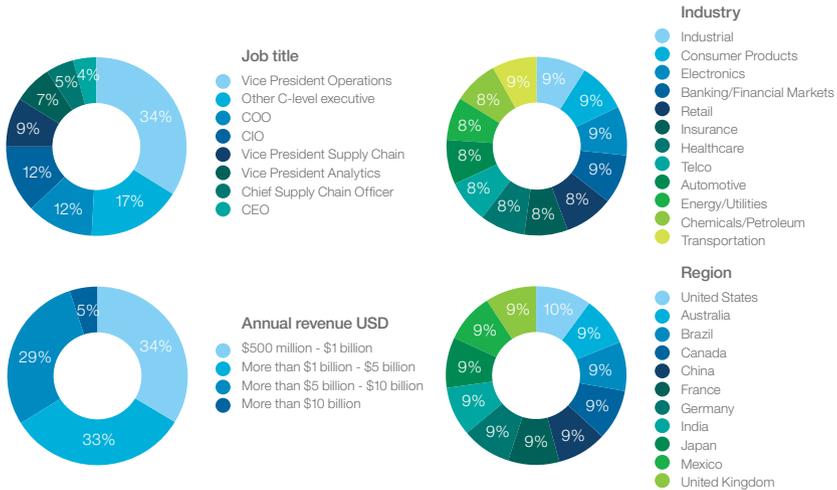
Consider energy management as a major enhancement to your operations profitability portfolio. Model and evaluate energy usage and methods for efficiency opportunities to reduce usage. Make the most of alternative energy investments by selling back to the grid.

Are you ready to join, or better yet, lead the pack?

- How will you drive the digital agenda in your industry rather than having it imposed on you by competitors?
- How are you optimizing digital and physical components across the different aspects of your business strategy and operating model?
- Will your company engage in deployment of critical technologies such as IoT, cloud, analytics, mobile, collaborative/social tools and robotics to innovate, differentiate and grow?
- Why might your organization be reluctant to implement the latest technologies as it aims to increase operating efficiencies, improve the customer experience and drive innovation?
- In which areas of your operations will you advance from predictive insights to cognitive computing insights and learning processes? Who will sponsor these initiatives at an executive level to ensure commitment and resource availability?

Methodology: How we conducted our research

IBM and Oxford Economics surveyed 500 executives, most of them from the operations function and all with direct knowledge of it, about how their companies are reinventing themselves to improve digital operations. This research included respondents from companies with at least USD 500 million in revenue in 11 countries around the world and across a variety of industries.



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Related IBV publications

Butner, Karen and Dave Lubowe. "Thinking out of the toolbox: How digital technologies are powering the operations revolution." IBM Institute for Business Value. November 2015.

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1 Butner, Karen and Dave Lubowe. "Thinking out of the toolbox." IBM Institute for Business Value. November 2015. <http://www.ibm.com/services/us/gbs/thoughtleadership/operationstoolbox/>

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