



Procurement's Next Frontier

The Future Will Give Rise to an Organization of One

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A grayscale image of a futuristic robotic hand with a human finger pointing at a circular interface. The background features a world map and various geometric shapes.

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Introduction

In January 2012, Eastman Kodak Co. filed for Chapter 11 bankruptcy. It marked the end of an era for one of the world's greatest innovators, a company that played an important part in the lives of millions of people for more than 130 years through the famous "Kodak moment." The change came swiftly: In the span of just seven years, from 2005 to 2012, the company lost half its revenue.¹

This remarkable decline wasn't due to Kodak's lack of innovation or to waning interest in photography. In fact, the company invented the very technology that creates the more than 70 billion digital photos uploaded to Facebook each year today.² Rather, what led to Kodak's downfall was fear—fear that digital technology would cannibalize its lucrative film business.³ This fear led Kodak to ignore the trend toward accelerating digitization for 37 years after creating the digital camera in 1975,⁴ and prevented the company from making the changes necessary to capitalize on consumers' rapid embrace of it.

Kodak's experience is not all that uncommon. The business landscape is littered with companies that have been unable or unwilling to take bold steps in the face of new trends or challenges. Comfort with the current way of doing things and aversion to risk can freeze companies in time, making them vulnerable to more forward-thinking competitors.

In many ways, the procurement organization finds itself at the same kind of crossroads Kodak faced. In the past two decades, procurement has had tremendous success in centralization and cost savings. Yet that very success may make procurement organizations fearful of taking the drastic steps required to completely rebuild

procurement with digital technologies to evolve to meet tomorrow's demands. The precedent exists: Procurement has not truly reevaluated how technology could fundamentally shift its essential components, some of which hail from more than 3,000 years ago,⁵ in at least two decades.

This report, based on a comprehensive research effort involving interviews with more than 50 leading executives and procurement experts (see About the Research for details), explores in depth the challenges and opportunities facing today's procurement organization. It reveals how digital technologies will revolutionize the procurement organization and its professionals in five to seven

Our research paints a vivid picture of what the procurement organization of the future will look like. The question is, which companies are prepared to embrace it and which will remain rooted in the past?

years, and the far-reaching effects this revolution will have on the very essence of how procurement interacts with internal business stakeholders and the external supply base. It also suggests that this new digitally powered procurement organization will continue to significantly drive down its operating costs while delivering more strategic value to the larger enterprise. Our research paints a vivid picture of what the procurement organization of the future will look like. The question is, which companies are prepared to embrace it and which will remain rooted in the past?

A New Digitally Driven, Strategically Focused Procurement Organization

After decades of effort, procurement has harvested the low-hanging fruit: It has helped the business optimize its purchasing spend while becoming much more efficient in its own right.

Consider the 2007 Accenture High Performance in Procurement study,⁶ which found that procurement masters saved 10 times as much as it cost to run their procurement organizations—in short, it paid to be good. Just four years later, the 2011 update of that study⁷ found that procurement masters had evolved in their approach to procurement: They still focused on savings and cost-effective operations, but were also asked to take on far more, with a focus on quality, sustainability, innovation and risk management. More was asked of procurement masters than ever before, and the masters delivered (see figures 1 and 2).

Today, procurement is even more efficient. The typical procurement organization's operating cost is approximately 0.8 percent of the enterprise's overall spending⁸ (down from about 1 percent in 2007⁹). Some industries, given the nature of their business and spend distribution, do even better, averaging between 0.5 percent and 0.7 percent.¹⁰

In the next several years, our research suggests the definition of "value" will evolve from a focus exclusively on cost reduction and savings to work that helps differentiate the company strategically. Procurement increasingly will be evaluated by more advanced measures, ones that are intimately linked to the company's strategy and financial metrics. How will procurement respond to this new set of demands?

We anticipate the emergence of what's called the virtually integrated enterprise, founded on intimate relationships with a smaller group of strategic suppliers that allow both buyer and seller to derive much greater mutual and strategic benefit than in the past. In such a relationship, the demarcation between buyer and supplier becomes blurred, to

the point that strategic suppliers are seen as simply part of the overall company. This relationship will be greatly enhanced by the use of technology, allowing tight collaboration for virtual integration. This tighter collaboration will be conducted, most critically, in the area of innovation. As part of the virtually integrated enterprise, suppliers will increasingly be relied on as a major source of new ideas that can help give the company a competitive edge.

Within the business, we also foresee a dramatic change in the procurement organization itself, as it evolves into a new structure featuring procurement

professionals embedded within the business and uniquely connected back to a smaller, central, core decision-making team supported by advanced technology. The embedded professionals will spend the bulk of their time addressing business issues while applying procurement knowledge. The core team will use real-time transparency of information on demand, supply and pricing to handle business strategy, global demand and supply, policy, compliance, and global strategic supplier management. This new structure, which will require new skills and roles with a more strategic focus, will

Figure 1. In 2007, Procurement Masters saved 10 times what it costs to run procurement
2007: It pays to be good

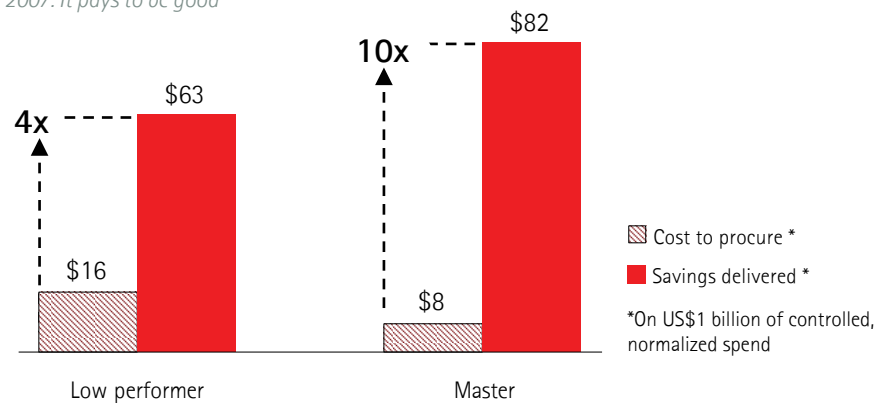
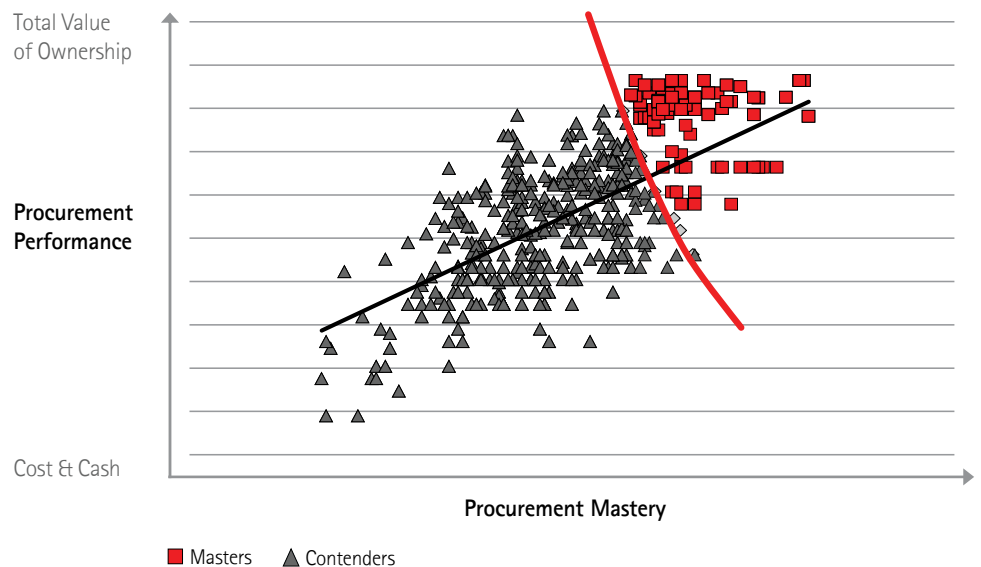


Figure 2. In 2011, Procurement Masters expanded their focus to generating value beyond cost savings
2011: More is asked and more is delivered



enable the procurement organization to focus on strategically differentiating activities and generate much broader value (see figure 3).

The catalysts for and enablers of this new vision of procurement are four key digital technologies. *Cloud computing* will serve as a foundation for procurement's digital strategy: It will be characterized by greater usability, making employees more productive and engaged; and it will provide access to more content the organization can use to facilitate core procurement activities. Real-time *analytics*, paired with advanced use of the *Industrial Internet of Things*, will generate deeper and more valuable insights that can greatly enhance decision-making as well as identify potential issues and mitigation strategies. And *cognitive systems* will serve as digital agents integrated into the fabric of procurement, eventually handling not just transactional activities (such as help desks), but also more strategic pursuits (including spot-buying and even intelligence augmentation for category management).

Perhaps the most significant finding of our research is that these digital technologies will do far more than enable procurement to continue to incrementally improve how it works. Rather, they allow the organization to gather and analyze more and richer real-time data to drive better, smarter and more accurate decisions. Ultimately, they make it possible for procurement to literally question everything it does, even some things that have been core to procurement for decades or longer (such as the purchase order). Questioning the fundamentals of the organization and its processes is vital to transform procurement into the organization necessary to deliver the strategic, high-value results that senior executives now expect it to deliver.

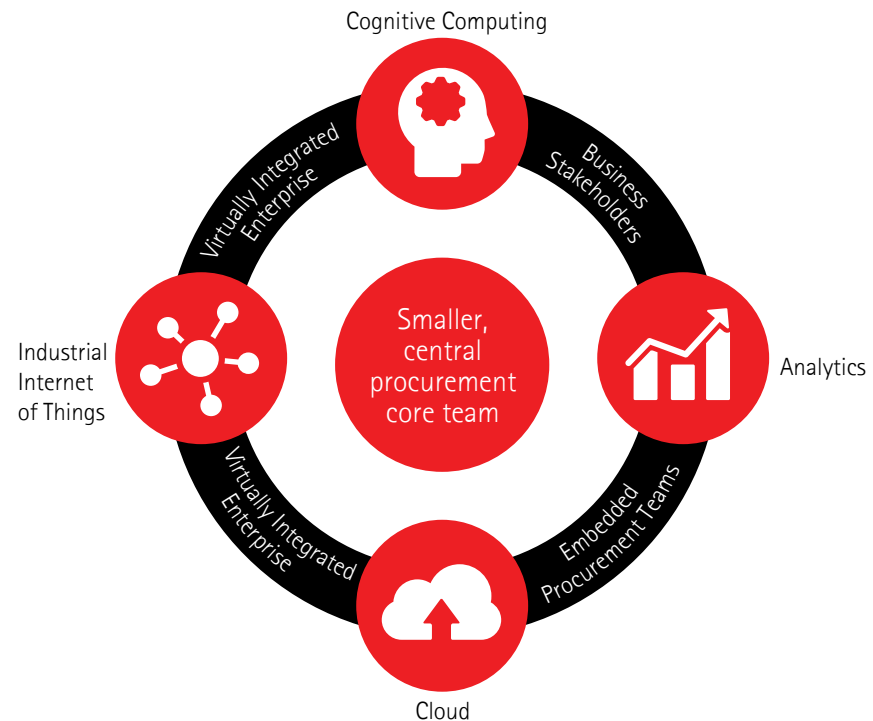
The 5 Apps: The Technology Foundation of the New Procurement Organization

Our research shows that procurement will undergo a fundamental shift in the next five to seven years, both in how it is organized and how it interacts with the business and the virtually integrated enterprise. Digital disruptors are catalysts and enablers of this overall shift, supporting procurement in every aspect of what it knows, decides and does. The infrastructure supporting procurement's needs by 2020 consists of what Accenture calls The 5 Apps, representing the main "app bundles" that will be required for procurement to be successful in the future (see figure 4). The 5 Apps are as follows:

The Virtual Company Mall

Owned and managed by procurement, the Company Mall will feature a cloud-based set

Figure 3. 2015-2022: The future will give rise to an organization of one



of pre-approved private and public "shops" (i.e., including content from outside the company) from which internal customers can select goods and services, supported with business logic that guides their purchasing based on policies, preferred suppliers and contracts. The mall will include a robust service desk that directs customers to the right shops and provides spot-buy services as required, as well as virtual agents delivering consistent and automated buying support. These services will be enabled by a mix of digital disruptors, including cognitive systems through intelligence augmentation and, where possible, intelligent automation (see Chapter 6).

Supply Analytics

The Supply Analytics apps will bring together a wide variety of data and, through a standard dashboard, will enable both procurement and business users to interpret analytics to solve specific problems or answer questions. Big Data will be a key component of the Supply Analytics apps, bringing in information from outside sources such as the Industrial Internet of Things (see Chapter 4). Crucially, Supply Analytics apps will no longer simply provide information and insights. They will mature to a point at which, via cognitive computing capabilities, they can recommend decisions and opportunities for procurement to capitalize on (such as supply optimization and savings opportunities).

Virtual Supplier Room

This virtual collaboration room is a critical component of the virtually integrated enterprise. It will enable the company to virtually interact

with strategic suppliers to share insights and ideas, as well as collaborate on innovation programs via common social media methods. It will also provide uncharted suppliers with an avenue to collaborate with the company on possible future innovations (see Chapter 1).

Virtual Category Room

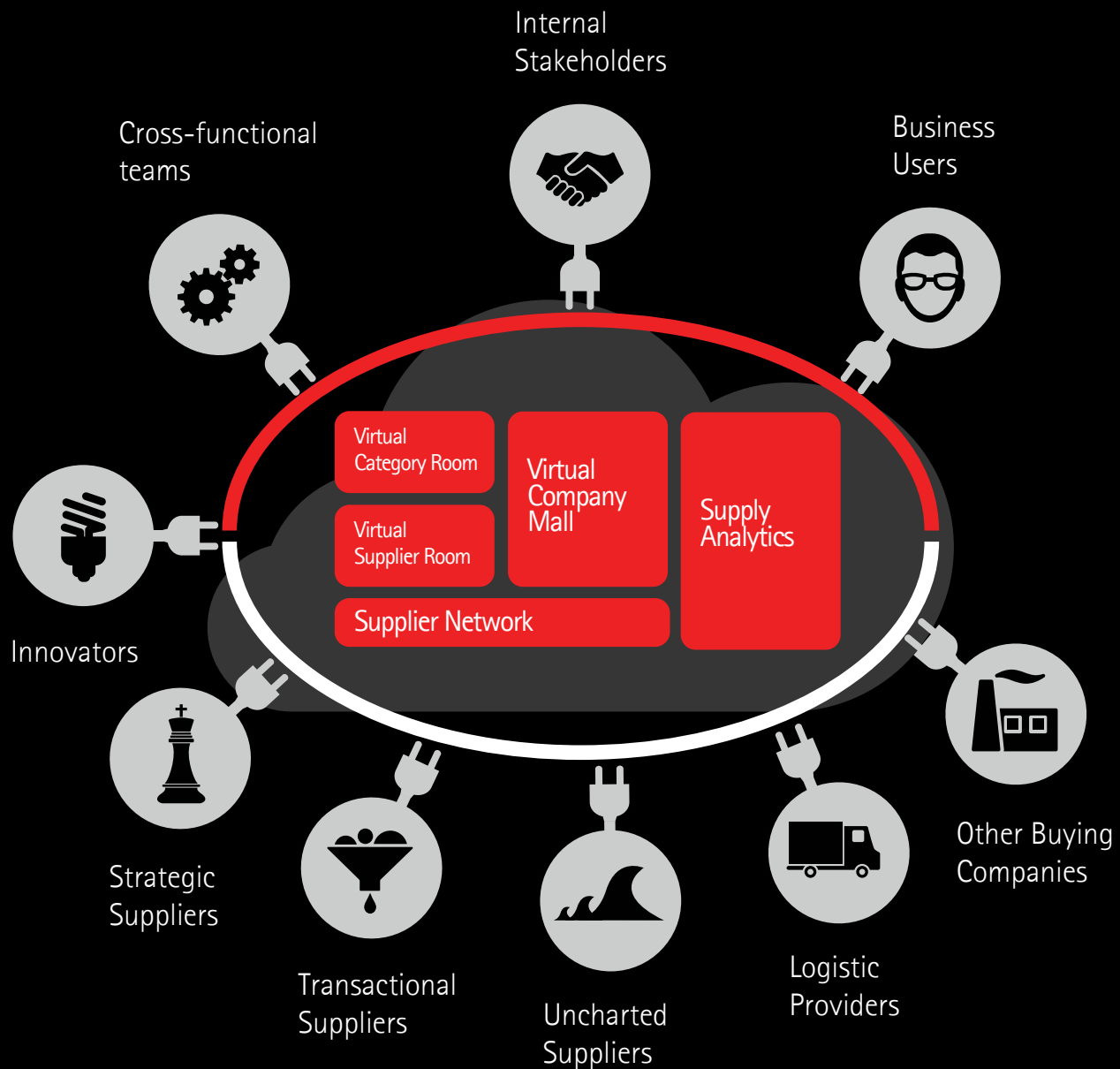
This is a virtual central gathering place to which a company's category managers will go to keep track of their in-flight projects based on where they are in the process by category. In addition, category managers will be able to find relevant market intelligence data for their category—both what the category managers upload themselves as well as content that is pushed to them automatically by content aggregators. Because the Virtual Category Room is powered by social media, it is context driven. Category managers' preferences and collaboration behavior will influence recommendations they receive, for example, for contacts or opportunities.

Supplier Network

The Supplier Network, which will be accessed via an app, connects a company seamlessly with the supply market, the Virtual Company Mall (i.e., for transactions of purchase orders and invoices), and to the Supply Analytics apps. Powered by technology solutions supporting tendering, performance assessment, supplier discovery and supplier interaction, the app is also linked to both the Virtual Supplier Room and the Virtual Category Room.

These technologies will serve as the underlying infrastructure of procurement in 2020, in the form of The 5 Apps.

Figure 4. The 5 Apps



Chapter 1:

The Emergence of the Virtually Integrated Enterprise

Companies will rely more heavily than ever on a small group of strategic suppliers that will be asked to help substantially reduce costs and risk but, even more important, to significantly boost the top line through more effective innovation.

Suppliers are not created equal, and shouldn't be managed as such. While this has always been true, our research suggests this maxim will be even more relevant in the next five to seven years. We expect the polarization between strategic suppliers and all others to become even more extreme, and strategic suppliers to have a much greater impact on a company's growth agenda.

Indeed, our research strongly points to a future in which a company will develop a more intimate relationship with fewer strategic suppliers. In this relationship, the demarcation between buyer and seller will become less distinct, and suppliers will act and be treated as part of the buyer's company. For instance, in the future, strategic suppliers likely will be seen as simply an extension of the company's manufacturing or product design and development processes. If the relationship is truly intimate, suppliers could even end up assuming a fully integrated role on the product development team, participating in all internal meetings without separation alongside the company's employees, helping to come up with next-generation products.

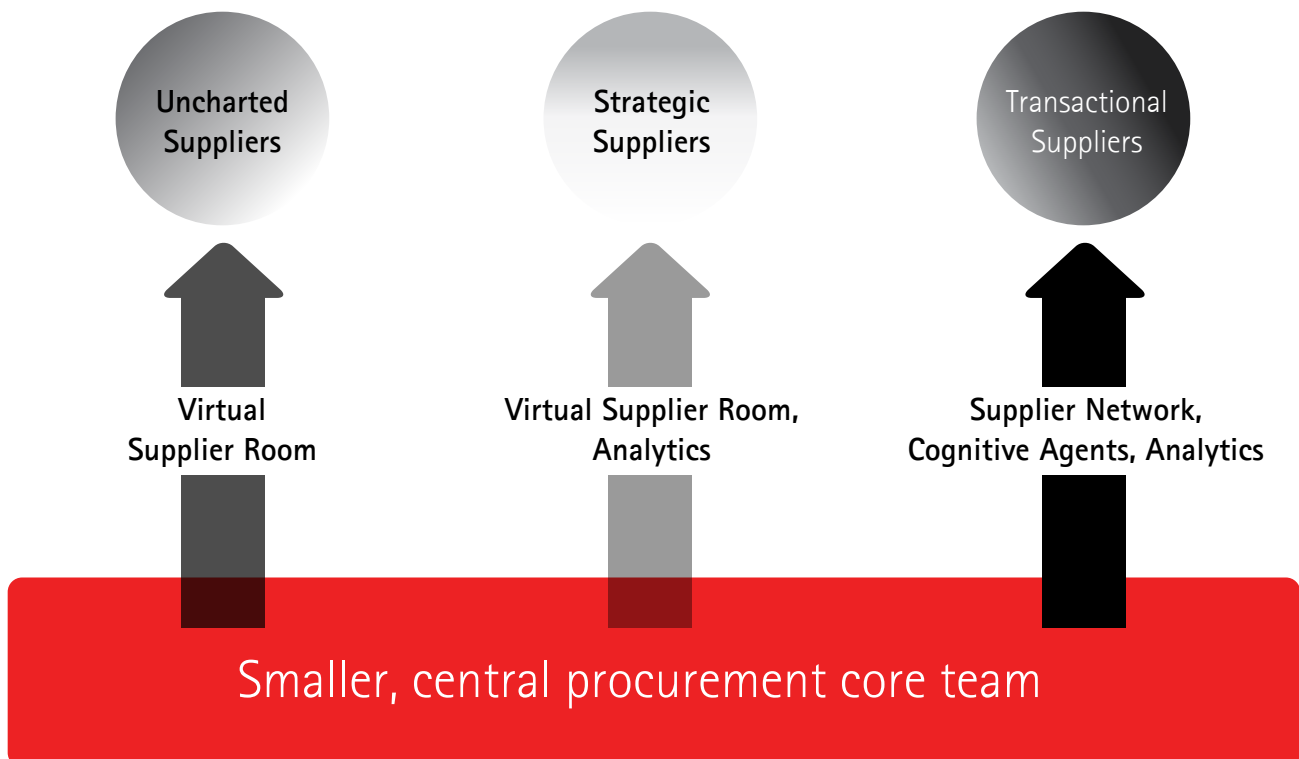
By thus becoming what Tom Linton, chief procurement and supply chain officer of Flextronics, calls a "virtually integrated enterprise," a company takes another step in the evolution from the vertically integrated enterprise of the past, shedding ownership of physical assets and processes in favor of a portfolio of external organizations operating those for them.

In the virtually integrated enterprise, Linton envisions a scenario in which strategic suppliers could actually set up shop inside his own facilities—such as the Starbucks cafe in Target stores or the Ralph Lauren boutique inside Nordstrom or Macy's—so parts could be ordered directly from suppliers and paid for without the need for purchase orders. "In that way, suppliers have direct access to all the demand signals from all of our factory floors," he explained. Linton said he could even see charging suppliers for such access—similar to the slotting fees major retailers charge consumer goods manufacturers to guarantee prime shelf and display space in the store.

Another example of the virtually integrated enterprise in action is the alliance a leading communications company is building with more than 30 key suppliers. The focus is on both cost-reduction initiatives and new services that they can jointly provide to enhance revenue. But the virtually integrated enterprise is not necessarily limited to suppliers. Other entities—including universities, supply institutes and complementary companies—may also participate. For instance, four consumer goods companies that share the same private equity owners and some board members have teamed up on initiatives to collaboratively source and reduce costs.

Yet although strategic suppliers and partners typically have the most impact on an organization, with future-looking plans for full integration, they form only the top of the three-tiered supplier ecosystem of the future (see figure 5). Similar to today, companies will also maintain a network of tactical suppliers on which the focus will be extreme efficiency. As we discuss later in this report, the routine, non-strategic nature of these relationships and transactions will lend themselves to a high degree of automation and much less human interaction.

Figure 5. In the Virtually Integrated Enterprise, procurement becomes one with selected suppliers



"We created a team with one of our suppliers to develop a totally new product that could solve some of the problems and issues that our customers had," noted Eva Andrén, vice president and head of group sourcing at Ericsson. "This new product was first on the market..."

The third tier comprises a set of providers companies will use more extensively and effectively than they do today: "uncharted" suppliers, which are currently unknown to a company but may provide relevant products, services, and innovation that could be useful to the company at some point.

In the future, a company's access to its supplier ecosystem will be managed through digital technologies. Strategic suppliers will be connected to the company via the Virtual Supplier Room, allowing the intimate collaboration and exchange of information necessary to be mutually beneficial to both buyer and seller. For the uncharted tier, supplier networks and a controlled portion of the Virtual Supplier Room will allow appropriate access and communication channels between buyer and seller to facilitate innovative ideas.

"Procurement is 50 percent responsible for innovation."

The full supplier ecosystem will remain important to a company's competitiveness. However, strategic suppliers, operating as part of the virtually integrated enterprise, will have an even greater impact on a company's ability to grow profitably. They will, of course, continue to play a major role in helping to reduce waste and risk. But much more important, they will be looked to as a major source of innovation that can give a company a substantial competitive edge.

Virtual Integration Drives Greater Innovation

Indeed, the biggest benefit by far of the virtually integrated enterprise model is more robust innovation that can dramatically increase revenue. In fact, several companies participating in our research are beginning to work in such a way today, providing a signpost for the future.

One company is high-tech manufacturer Ericsson.

"We created a team with one of our suppliers to develop a totally new product that could solve some of the problems and issues that our customers had," noted Eva Andrén, vice president and head of group sourcing. "This new product was first on the market, where we were way ahead of our competitors in developing and delivering to our customers before any other player on the market had a similar product."

When relevant, BASF Corporation's Chris Toomey "bring[s] in a group of suppliers for three or four days" to address a growth challenge.

Similarly, a chief procurement officer of another company related that, "Procurement is 50 percent responsible for innovation. Category managers are responsible for asking the innovation question any time they're having a strategic conversation with a supplier. R&D or innovation technology never tackle a challenge on their own—we take them out to the supply base to look for solutions."

Currently, in most organizations, teams from buyer and seller come together for an innovation challenge. Sometimes, the teams are charged with focusing on a specific idea, other times they are gathered to brainstorm ideas about a more general topic. Typical of these approaches is how BASF Corporation operates.

"We work very closely with our businesses to identify what their growth priorities and their growth challenges are," explained Chris Toomey, BASF Corporation's senior vice president for procurement for North America. "And then one of two things happens: Either we bring in a group of suppliers for three or four days and task them with trying to address this growth challenge with us; or we have 'connect-the-dots-type' meetings, where we bring the supplier together with our representatives from across our

organization and we allow the supplier to discuss their philosophy and the business units to talk about their challenges. The idea of 'connect the dots' is to take pieces and parts from across the breadth of our organization, match them up with a supplier's capability, and create meaningful projects out of that."

The future approach to innovation may look more like what McDonald's does today. The company runs a series of permanent supplier councils, each focused on new product development in a specific category or area of the business. "We have a chefs' council, in which all of our suppliers' chefs come here [at McDonald's headquarters] and work with our chef on new product development," said Francesca DeBiase, the company's vice president of Worldwide Supply Chain. "We also have supplier councils for each product—potatoes, chicken, beef, and toys, for example."

The unique aspect of the council system is that it brings together companies that are otherwise fierce competitors to have them focus on innovations that benefit McDonald's. "Suppliers who would otherwise not speak to each other come to our Council Meetings and talk about best practices and what they can do to help the McDonald's system," DeBiase explained. "If one of them comes up with an idea that's a process improvement—that drives the business and saves money—they know that part of their responsibility as a supplier to McDonald's is to share that with their competitors for the value of the system."

DeBiase says these suppliers are willing to do this not just because McDonald's is a massive company with an equally massive purchase volume, but also because "they know we're going to be with them," she said. "They all know they're all going to have a certain part of the business. I think that goes back to the fact that we do have long-term suppliers who have business units dedicated to us, and with which we've developed long-term commitments and partnerships on trust."

Flextronics has taken things a step further with its Product Innovation Centers, where the company features capabilities or pre-built

modules from its suite of strategic suppliers. Such centers are particularly valuable for entrepreneurial ventures looking for help in getting a new product off the ground. "Say you're a start-up company and you've got an idea for new headphones," said Tom Linton. "You would walk into our innovation center and find, for example, resin suppliers, components for wi-fi, components for wiring and components for acoustics. You would walk out of there in 90 days with a set of headphones designed the way you want them. We also have 3-D plastic and metal printers that actually will produce a 3-D version of a blueprint overnight."

Flextronics has changed their model to capture new ways of product innovation to accelerate time to market, improve quality, and reduce cost.

According to Linton, the Product Innovation Centers—which, at this writing, are working with approximately 100 start-ups—leverage the capabilities of Flextronics' strategic suppliers to accelerate promising new products to market. If the product is successful and the start-up wants to scale it, Flextronics can immediately ramp up those capabilities in production facilities around the world.

The focus on start-ups is critical, Linton says, because of how innovation has changed.

"It used to be, big companies did a tremendous amount of innovation. Now, 90 percent of innovation and new products are coming from new companies, or off the back of a napkin. What we've done is change our models to adapt to capturing new ways of innovating products, and trying to do that in a way that accelerates time to market and improves product quality and reduces cost."

Executives we spoke with generally acknowledged that collaborative innovation between procurement and suppliers is key to their company's survival. But to be effective, it must be based on a relationship in which everybody from both buyer and supplier realizes that innovating together will benefit both companies, and that there is no barrier to sharing ideas. That's not always easy to do. For example, asking engineers to share or even cede responsibility can be met with considerable resistance. One global manufacturer removed that obstacle by instituting the well-known concept of a "Not Invented Here Award," which it gives to its own R&D people who exhibit the open minds needed to capitalize on innovation from outside the company. The point is, a company needs to break down internal barriers before it can effectively integrate outside suppliers into its innovation process.

A company also must have a formal process and technology to support innovation so the right ideas are identified and nurtured. Some examples

exist today of a tightly integrated process that spans the supplier's and buyer's teams, and of technologies that can support such a process (e.g., the automotive industry). But there is still room to grow across a number of industries.

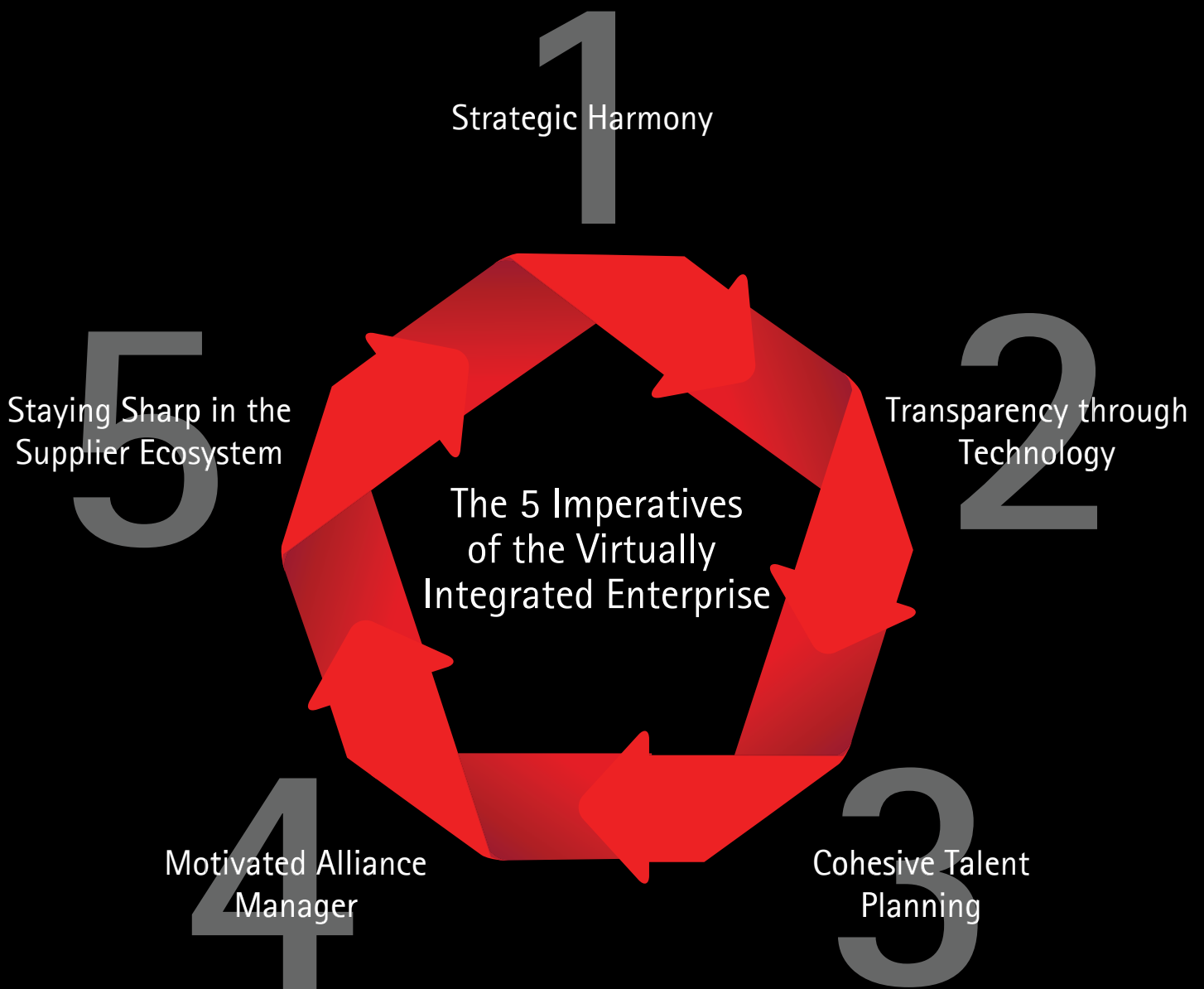
One emerging technology that shows promise is the Virtual Supplier Room, which serves as a virtual central gathering place to which a company and its suppliers can go to stay in touch with each other (see figure 6). Among other features, it includes a dashboard with key metrics (such as supplier performance, demand information, supplier capacity and material availability); a platform based on current and emerging technology that supports increasingly tight virtual collaboration on specific projects; and a collaboration board that provides an overview of ideas and challenges affecting both parties, consolidated across the key domains of innovation, cost management, market volatility, supply risk and sustainability. A built-in tool helps facilitate ideation and opportunity selection among teams.

To support innovation beyond core strategic suppliers, the Virtual Supplier Room could contain a special sub-room for uncharted suppliers. Through this room, uncharted suppliers could learn about the company's key issues, introduce themselves and present their own solutions. Uncharted suppliers would have limited access to other features of the broader Virtual Supplier Room to maintain the confidentiality of discussions between the company and strategic suppliers.

Figure 6. The Virtual Supplier Room provides transparency and collaboration with the right suppliers at the right time



Figure 7. The 5 Imperatives of the Virtually Integrated Enterprise



Five Key Structural Elements of a Virtually Integrated Enterprise Model

As the preceding discussion on innovation suggests, a prerequisite of a virtually integrated supplier model is complete transparency that fosters a high degree of trust and enables a more seamless flow of innovation ideas across company and supplier. This means there can be no secrets on either side. Both buyer and supplier must be completely open about their strategies, plans, capabilities and limitations. That kind of honesty and openness is the foundation of the relationships McDonald's has with its small group of strategic suppliers, which represent the vast majority of the restaurant chain's spend.

"We've had [strategic suppliers] tell us, '...The level of transparency, the level of trust that you put in us, it's at a different level than with other customers.' And we really believe that's a competitive advantage for us," said Francesca DeBiase of McDonald's.

"We spend a lot of time with those suppliers talking about our growth plans, our development plans and where we want to innovate," explained Francesca DeBiase. "We share with them a large volume of information. And we've had them tell us, 'You guys are totally different. The level of transparency, the level of trust that you put in us, it's at a different level than with other customers.' And we really believe that that's a competitive advantage for us."

"Open and honest feedback from both sides establishes a less defensive ground," according to Volker Bargon of Boehringer Ingelheim.

Ongoing assessment of the relationships is critical to maintaining transparency. For example, in areas where co-creation is vital to generate desired results, Boehringer Ingelheim runs 360-degree feedback evaluations of the supplier relationship. "We are interested how both partners on their different organizational levels mutually perceive

each other in the relationship, and then jointly share all the strengths and weaknesses we have seen," noted Volker Bargon, the company's corporate senior vice president of purchasing. "Open and honest feedback from both sides establishes a less defensive ground for important discussions—what can we do to improve the relationship and what do we need to get out of our way?"

However, assessments are just one part of the equation. Developing the truly open, transparent relationships necessary for a virtually integrated enterprise requires five other, more "structural" elements (see figure 7).

At a high level, there must be *tight alignment between buyer and seller* in strategies, business plans, goals and targets. The keys to maintaining such alignment are strong formal governance (led by very senior executives on both sides), joint metrics, appropriate contractual components and supplier incentives that include profit sharing.

Technology will be a crucial driver of transparency, giving both parties vital information on such things as inventory levels, buyer and seller capacity, downtimes of crucial production facilities or machines, and shipment status, as well as access to a broader ecosystem of suppliers from which to draw as the business evolves. Although currently no mature software tool exists to provide the full range of information that will be required over time—the few solutions that do exist today are largely custom systems—that's expected to change in the next few years.

Transparency also extends to *talent*.

"We're spending a lot more time on reviewing talent plans with our suppliers," said DeBiase. "We ask them the same questions we ask ourselves: Do you have the right people, and the right number of people, to support our growth?"

In the future, companies and strategic suppliers will likely conduct joint recruiting to ensure the quality of talent, and may even consider job rotation across companies.

One of the biggest issues companies need to address as they adopt the virtually integrated enterprise model is *organizational* in nature. Today, responsibility for strategic supplier management is generally part of the scope of the category manager's job. But as suppliers are seen less as an outsourced part of manufacturing and become more integrated with the company, a formal role responsible for strategic suppliers is emerging. This "alliance manager" won't get involved in negotiations, but rather will concentrate on building and nurturing the

relationship with each supplier. And the role—typically filled by a very senior executive—may not even be part of procurement; it could reside in manufacturing or in a business unit. By placing responsibility for strategic suppliers in a role separate from traditional procurement category management, a company makes it a focus area for that person. He or she can, on a full-time basis, concentrate on making the endeavor successful.

Regardless of who is in charge, the skills required for alliance managers are the same. They must be adept at relationship management and have a deep understanding of the sourcing process. They also must have expertise that matches that of the suppliers being managed—for instance, a strong engineering background in the case of an alliance manager for high-tech suppliers.

The final key element involves keeping the supplier ecosystem robust and sharp. To that end, procurement will need a capability to conduct ongoing *supplier scouting*. That's where having uncharted suppliers as part of the ecosystem can be valuable. For example, a procurement organization may find uncharted suppliers a viable option to handle travel spend (via a company such as booking.com, which could assume ownership of the entire category). It also can help a company easily tap into a network of providers that aren't actively selling products or services to the company (but could or should be) uncover new technology the company may be missing out on, and determine if current strategic partners are still competitive with other suppliers.

Conclusion

While there's plenty of evidence to suggest that deeper, more substantive relationships with key suppliers can be an advantage for both buyer and seller, executives we spoke with also agreed that establishing such relationships is neither easy nor quick. It requires a significant change in culture, as well as patience and determination. And even when the initial transformation is complete, companies must remain diligent to ensure the strategic relationships that took so much time and effort to establish continue to be productive, and that suppliers don't become lazy or complacent or begin to take advantage of their "embedded" status.

Implementation challenges notwithstanding, based on our research we believe the virtually integrated enterprise will become a reality in the next few years. Companies such as McDonald's and Flextronics give a glimpse of the benefits that can accrue when they make deep supplier partnering a core element of their procurement and overall business strategies.

Chapter 2:

The Organization of One Takes Shape

A new strategically focused procurement organization is taking shape that promises to help procurement deliver value to the business far beyond securing needed supply at the best possible cost.

What will the procurement organization look like in 2020 from a structure and skills standpoint? The majority of the executives we spoke with as part of our research agreed we'll likely see procurement evolve to a fundamentally new model that enables the function to more effectively align value with the business' strategies. This new "ideal" procurement organization of the future will focus on strategically differentiating activities, with procurement professionals becoming embedded within the business and uniquely connected back to a smaller, central, core decision-making team supported by advanced technology. Any non-differentiating activities will either be conducted by technology or managed by the virtually integrated enterprise (see figure 8).

However, while many are attracted to this ideal state and believe it's realistic, questions remain as to what it would take to become reality. Many recognize that achieving a successful embedded state will require procurement to first formalize, professionalize and fully coordinate itself as an organization to capture as much of the value and synergies as possible. Thus, a number of those we interviewed tend to approach the evolution a bit more cautiously. In all cases, where companies ultimately end up—and how long it takes them to get there—will be influenced greatly by a variety of factors, most notably their culture and industry, the maturity of their current procurement organization's structure and capabilities, and the pace of technology's evolution.

A Focus on Delivering Value Beyond Cost Savings

According to our research, the value delivered by the ideal procurement organization of the future will assume a much broader meaning. Most executives we spoke with agreed that cost savings will continue to be part of value.

"There's always going to be a component of savings—that's the fact of life," said Bill Mangen, vice president of strategic sourcing and procurement for Cox Communications. "I don't think that's ever going to go away from what we're doing."

Figure 8. Embedded procurement teams and the virtually integrated enterprise will operate as one entity

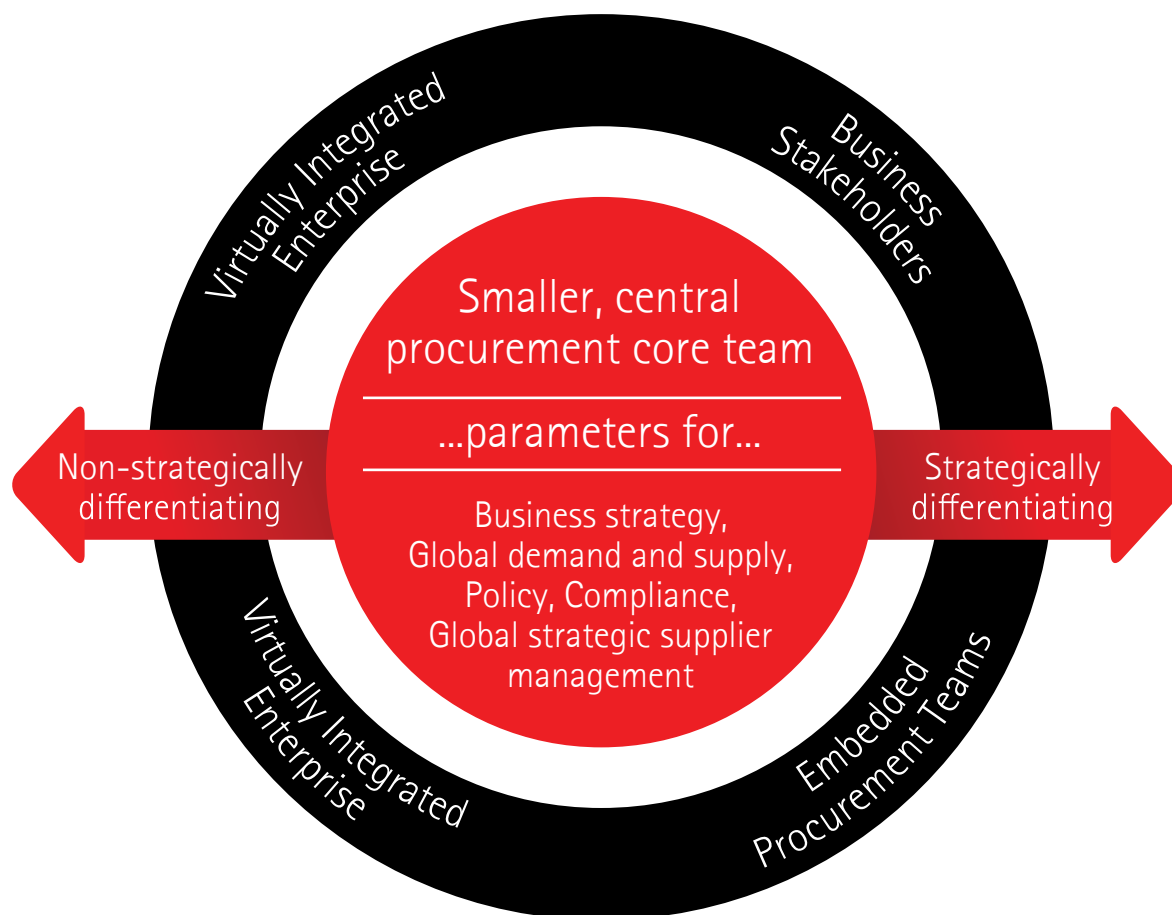


Figure 9. How will your future procurement organization measure value?

☐	EBITDA	
☐	EPS	
☐	Reduction in function's budget	
☐	Supplier innovation	
☒	Time to market	
☐	Other	

But, as Mangen noted, in the future, value will be thought of much less in terms of how much procurement saved the business on a particular deal or at the end of the year. "I think [value] is going to be broader in terms of how we align to the company's strategy." (see figure 9).

Next-generation procurement organizations will be measured and rewarded on their contribution to a variety of business results the larger enterprise is trying to achieve. These include, for example, EBITDA (earnings before interest, taxes, depreciation and amortization), EPS (earnings per share), reduction in functions' budgets, risk mitigation, supplier innovation, time to market, sustainability, diversity, commodity price risk management, driving continuous improvement and compliance. One company that participated in our research, ASML, is already headed down that path, according to Paul van Attekum, the

executive vice president responsible for strategic sourcing and procurement. The Dutch high-tech company's chief procurement officer has a seat at the executive committee level—he's one of ASML's top 10 executives—and, as such, has significant input in shaping the company's strategy. At this level, the CPO is no longer focused on advising what suppliers will do, but instead, on what ASML will do—a massive shift in perspective and responsibility. For example, he can determine that certain suppliers could do a far better job than ASML managing specific activities and subsequently transfer responsibility to those suppliers.

Another benefit of this broader view of value is that it enhances the organization's reputation. As one executive told us, it makes procurement important to the entire company even in boom times, not just during a recession when the main focus is saving money.

"Most of the low-hanging fruit has already been sourced," agreed David Annett, vice president, sourcing and real estate at the National Bank of Canada. "[Procurement] can go to a business unit and say, 'We can shave X percent off of your spend by doing this.' That's great, but most of that has been done. So it's really now about what is strategic and what the priorities of your internal partner groups are where you need to focus to go to the next level. Procurement will have a leadership role to play, but the partnership with internal business units is where the success in the future years is going to come from."

New Roles and New Skills Doing More Strategic Work

To deliver this broader kind of value and focus on strategically differentiating activities, procurement organizations will need a model comprising new skills and roles with a more strategic focus. Our research found that two groups will emerge. The first is a group of procurement professionals who are fully embedded in the business as business leaders, and who spend the bulk of their time addressing business issues while applying procurement knowledge as appropriate. This is what André Le Lerre, vice president at Ericsson, called “the thin front line.”

André Le Lerre of Ericsson sees a “thin front line” of procurement professionals embedded in the business, focused on strategically differentiating activities.

The second is a smaller, core decision-making team supported by cognitive computing (which we explore in Chapter 6) and analytics (which we discuss in Chapter 5), with real-time transparency of information on demand, supply and pricing. This team will tackle higher-level cross-business unit procurement requirements. The technology infrastructure required to make this new, smaller core team a reality will largely reside in The 5 Apps, as we described in the introduction to this report.

Embedded Resources

Embedded resources in the business will focus on strategically differentiating activities by becoming an integrated part of the business. For instance, they will help the business create more value by working with R&D, product development and suppliers to develop new products, reduce time to market and solve problems with products or production. They will help implement supply and demand strategies through product innovation, product cost management, specification rationalization and consolidation (working with the core decision-making team on demand as appropriate). And they will help manage commodity price and supply risk at both the business unit and market levels, in conjunction with a global team as conditions warrant.

Given this more strategic focus, these individuals will have markedly more advanced and diverse skills. This new professional will need to at once be a change agent, collaborator and risk advisor who is technically savvy, has deep finance knowledge, understands how products are developed and is adept at building relationships. Often, he will be a specialist with expert knowledge in some business domain—such as biochemistry, depending on the need—and likely will come from an area of

the company other than procurement. Many organizations are already at this point, or are on their way. For instance, today there are cross-functional teams combining procurement and specialist (e.g., engineer) resources. In the future, these two skills will commonly be embodied in one person who will be embedded in the business.

Importantly, the concept of embedded resources does not mean that the business will build their own procurement organizations again (much as what happened with shadow procurement, in which ungoverned distributed procurement organizations flourished). These embedded resources, who will be skilled in procurement and working in the business, will continue to be governed by the company's procurement mandate coordinated by the central core team. The non-strategic demand will either be handled by the business in a skilled and compliant manner through the use of automation, or it will be managed by members of the virtually integrated enterprise.

At ASML, the Dutch high-tech company's chief procurement officer has a seat at the executive committee level—he's one of ASML's top 10 executives—and, as such, has significant input in shaping the company's strategy.

Core Team

The core team of decision makers will likely be much smaller than the typical central procurement organization of today. That's largely because of technology, which will assume a bigger role in handling day-to-day procurement activities (even ones currently considered strategic and requiring significant human involvement). Accenture experts believe this team, which will have far different responsibilities than the larger central organization of today, will concentrate mainly on five key parameters:

- Business strategy
- Global demand and supply
- Policy
- Compliance
- Global strategic supplier management

Each of these will be handled by a combination of people and technology (including cognitive systems). In the most advanced cases, core team members will be responsible primarily for defining the underlying parameters of the digital technologies (e.g., intelligent virtual agents and analytic algorithms) and managing stakeholders in the business who are willfully non-compliant.

Business strategy parameters will be owned by the chief procurement officer and will set out the principles and guardrails required to allow

this smaller, central core team to support and enable the business strategy. Therefore, the business strategy parameters will concentrate on identifying and prioritizing ways in which the company generates business value (beyond cost savings). For example, the team may monitor prevailing and forecast economic conditions and alter the company's balance between top-line growth and cost reduction accordingly.

Global demand and supply parameters will include using advanced analytics to better understand evolving trends and forecasts in demand (e.g., aggregated demand across business units and aggregation partners) and implementing potential changes in sources of supply.

Consider the example of a manufacturing company. An embedded team member who is responsible for multiple categories and business requirements could be informed by the global demand and supply intelligent agent (a computerized agent) that there is an opportunity to save money in a number of ways: aggregating the purchasing of components across business units, understanding demand, identifying alternate or equivalent components, technically certifying the use of the new components, and recommending and securing a source of supply. The embedded lead could then decide to connect the appropriate embedded business unit teams with the global demand and supply intelligent

agent to work together to aggregate demand and improve the cross-business unit purchasing of components through the "normal" procurement activities (i.e., aggregate demand, find best source and contract). In this scenario, the intelligent agent would be responsible for augmenting (and where possible, providing automation to) the embedded teams throughout the process of securing supply. See Chapter 6 for more on cognitive computing and intelligent agents.

Policy parameters will manage the specific way in which the purchasing of core and non-core categories are governed to give a company a competitive advantage. In the same way that travel policies dictate pre-purchasing timelines of itineraries, class of travel allowed by level, and consequences for non-compliance, policy parameters will equally manage additional categories (such as research and development or contract labor).

Compliance parameters will enforce demand, supply and policy parameters. This will involve understanding maverick behavior, agreeing with the business on how to adapt the automated algorithms to manage compliance, and defining the interventions required for non-compliant individuals. Non-compliance will, for example, extend into using predictive analytics to flag for review and intervention requisitions that have a high likelihood of being fraudulent.

Figure 10. In advanced cases, the smaller, central team will manage parameters more than people and processes



Finally, *global strategic supplier management* will address overall risk in global strategy. This will also involve identifying the company's unique, strategic relationships and coordinating those relationships at the highest levels (see Chapter 1 on the Virtually Integrated Enterprise). The core team will work in conjunction with the embedded business unit teams, which will be operating with suppliers at a more granular level on initiatives such as co-innovation and other projects.

As this team evolves in the near term, non-strategic, tactical procurement activities will be eliminated, completely automated or handled by a member of the virtually integrated enterprise. Travel purchasing is a good example of this path to automation. Just over two decades ago, travel was purchased in the business as employees needed it, with little regard for policy, preferred suppliers or optimum pricing. By the 1990s, travel purchasing had been centralized through official travel help desks. In the early 2000s, technology enabled travel purchasing to be pushed back into the business, as it funneled people to specific vendors. Eventually, the tools became sophisticated enough to be able to control compliance based on policy restrictions. We expect other similar categories to follow this path toward automation.

In the next five years, the team will use more advanced technology and analytics that recommend decisions. As we discuss in more detail in Chapter 6, in 10 years, advanced technology in cognitive computing will be able to facilitate more strategic procurement activities as the system learns over time—including, for example, the use of intelligent virtual agents in key aspects of category management. This expanding use of technology in more sophisticated ways will be key to enabling the right people to make the right decision at the right time with the right information or advice.

Considerations for the Road Ahead

For this new organization to come to fruition, three key issues must be addressed.

The *first* is a *distinct lack of consensus among executives on what's exactly involved in making the transition* to the future-state organization—in part, of course, because the starting point varies by organization. But other reasons also play a role. Cost, the structure and complexity of the current organization, the nature of the market in which the company operates, the corporate culture, and government regulations are just some of the issues executives said will influence the route taken.

People, arguably, are the biggest wild card in the transition. Change, especially as dramatic as the one our research is pointing to, is difficult. Legacy procurement people with long-standing, traditional methods, as well as others affected, will need help to make the transition.

"People tend to hold onto certain aspects of their jobs that they feel most comfortable with," observed Al Williams, chief procurement officer at Accenture.

"People tend to hold onto certain aspects of their jobs that they feel most comfortable with," observed Al Williams, chief procurement officer at Accenture. "If you have a category manager who has been doing strategic sourcing for 15 years, and his job is now more of a relationship manager spend advisor, that's a big change to deal with."

The *second issue involves technology*. Executives were unsure of whether the technology exists to make the future-state organization possible. And even if it does exist, many believe the time, cost and complexity to implement it would be a major obstacle. In fact, interviewees generally agreed that their organizations often struggle even getting basic effective procurement technology in place, let alone more advanced solutions. The key factor in the speed of the adoption of more advanced technologies is whether those technologies will be pervasive (such as the internet or a phone app is today) or will require implementation (such as an ERP or eProcurement system), which will take longer.

The *third issue revolves around the core decision-making team*. Although executives agreed there would be a central procurement team—even if much of procurement is embedded in the business—the size, scale and function of such a team was another matter for debate. What fits one organization may be completely unworkable in another.

Conclusion

The preceding "ideal" future-state procurement organization reflects the next step in the evolution of procurement's focus and scope, one that we believe will generate a substantial reduction in the cost of the organization itself and a corresponding shift in the value it generates for the business. Previous Accenture research efforts found the typical procurement organization cut its operating costs from about 1 percent of the enterprise's overall spending in 2007¹¹ to

approximately 0.8 percent today.¹² Best-in-class industries do even better, averaging between 0.5 percent and 0.7 percent.¹³ Our most recent research suggests the aggressive use of digital technologies in the future may both significantly reduce the cost of the procurement function and dramatically increase the function's return on investment (ROI) by delivering much greater business value beyond cost savings.

According to several executives, some elements of this new organization—such as the advanced skill set, business advisory capabilities and focus on strategically differentiating activities—are already in place or on the agenda. These companies have a head start on the journey, and their progress from here can be instructive to other companies looking to reshape their procurement organization and skills to thrive in a future where much more will be expected of them.

The bottom line: Today's chief procurement officers will be required to take themselves, their team and the business on a significant journey. But the time and effort will ultimately pay off in the form of a procurement organization that can interact with the business more strategically, support the business more effectively and generate business value as never before.

In the remainder of this report, we take a closer look at how four key digital technologies—cloud computing, the Industrial Internet of Things, analytics and cognitive computing—will form the foundation of the procurement organization of the future and will be key to procurement's ability to evolve to meet the increasing demands of the business.

Chapter 3:

Cloud Computing—Leading Through Content

As late movers more aggressively embrace cloud solutions, usability and content will replace low costs, standardization and faster access to new technology as the source of cloud-based competitive advantage.

Cloud computing is about to make its mark on procurement in a very big way. At the World Procurement Congress in 2013, Flextronics chief procurement and supply chain officer Tom Linton presented cloud computing as one of the top 10 trends that will affect procurement in the next 10 years.¹⁴ And by far, most executives we spoke with believe the cloud will play a strong role in procurement in the coming years. That's critical, as the cloud is the stepping stone to being virtually connected to the external world in a meaningful way. It provides access to powerful new content and analytics-based insights, as well as ways to connect and collaborate more deeply with the supply network.

However, as late adopters of procurement cloud make an aggressive shift to using cloud technologies, the historical benefits of lower costs, process and technology standardization, and faster access to new functionality will become commonplace. While these benefits once gave leading adopters of procurement cloud technology a competitive advantage, they will not be differentiating in the next three to five years. Thus, with the majority of procurement organizations capitalizing on cloud benefits, leaders of the future will need to look elsewhere for cloud-based competitive advantage.

The Next Battleground: Usability and Content

What's the new source of cloud-based competitive advantage when everyone is using the same standardized, best-practice processes and technology? Our research suggests leaders will find an edge in two ways: by choosing the solutions that boost productivity and engagement by offering superior usability; and by enriching content and applying analytics to that content to generate insights that lead to better procurement decisions.

From lower costs to higher productivity and engagement

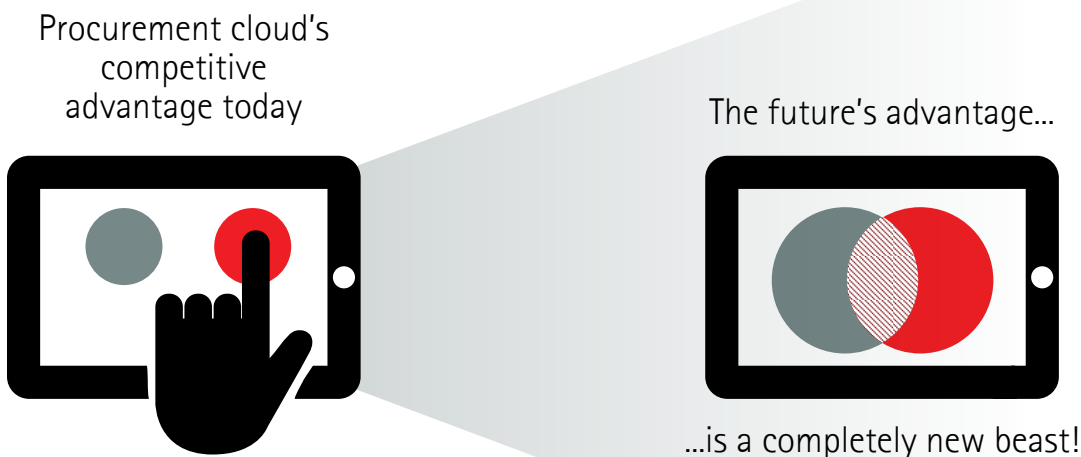
To date, one of the most common benefits of cloud computing has been a lower operational cost structure. For example, in one consumer goods and services survey of source-to-pay technology costs against net revenue, ranges of 0.046 percent to 0.132 percent were common, with the best-in-class numbers reached by greater cloud adoption.¹⁵ The cloud changes the financial requirements of procurement technology from an initial outlay of cash for implementation plus maintenance to a service-based fee over time. This shift lowers a procurement organization's overall cost to serve stakeholders.

However, as more procurement organizations join the early cloud adopters, lower costs are no longer the key driver of competitive advantage. To recapture that competitive advantage, former early adopters must set their sights on productivity and engagement gains, a major driver of which is usability.

Refreshed as well as completely new cloud solution options offer simple, friendly and intuitive user interfaces while maintaining the functionality needed by global procurement organizations. Such features make the solutions eminently more usable and, hence, become a key lever for keeping employees engaged and more productive. The key to capitalizing on usability in the future will be finding the right mix of usability and robust functionality. This will get easier as existing cloud providers enhance the usability of their solutions and new cloud providers complement high usability with functionality that matches that of mature providers.

Hans Melotte, vice president and chief procurement officer at Johnson & Johnson, sees the benefits of improving the overall user friendliness of purchasing interfaces. He says employees increasingly wonder why the technology at work can't be as easy and intuitive to use as the tools they use in their personal lives. It frustrates them. More importantly, it impacts their productivity at work, and therefore also impacts a company's ability to innovate and grow.

Figure 11. There will be a new source of competitive advantage for future procurement cloud adopters



Content will drive far better procurement decisions

From a functional perspective, today's true cloud solutions are purpose-built for the cloud, not existing technology that has simply been reengineered on a cloud infrastructure. As such, they provide standardized technology that supports best-in-class key procurement processes, which reduces complexity (and cost) and makes them easier to maintain. These solutions also enable companies to operate with greater speed, agility and flexibility due to quicker access to new functionality and faster deployment of applications (particularly those that are not core to the organization).

However, with best-in-class procurement processes and quick access to new functionality being available to all who have joined the cloud, these benefits will no longer be differentiating. The new ranks of leaders will need to capitalize on future benefits in a different way: They will have to more effectively execute and use the content in the cloud to facilitate core activities such as supply base management, category management, compliance management and risk management, among others.

Enriching and using content to gain a competitive advantage comes in many forms. For example, it may mean simply managing content layout and information in a catalog available to the buyer. Or it may involve the more complex action of including and interpreting information from the internet at large to allow access to lower-priced items using a dynamic price search capability. It may also include having access to content available in next generation eMarketplaces.

Another example of enriched content is the case of a consumer packaged goods company, in which the chief procurement officer sees 150 should-cost models as a core piece of content that provides a key competitive advantage. In the future, these models will be housed in the Virtual Category Room, built as, for example, dynamic cost models (see The 5 Apps and Chapter 5 for more on the technology and dynamic nature of future analytics). Other models that are increasingly becoming a part of companies' key intellectual property and that create a competitive advantage include Commodity Price Risk Management (CPRM) models. They include scenario models for different hedging strategies, using advanced analytics on cloud-based CPRM systems.

Using content more effectively also means leaders must excel at applying greater business intelligence and insights from data through analytics. According to one study, 66 percent of

data in 2014 resided in the cloud, and that figure is expected to grow to 73 percent in two years—with 80 percent of that data being unstructured (i.e., contained in a written word form, not in a database or spreadsheet, and hence hard to analyze).¹⁶ As companies move more of their procurement activity to the cloud, cloud providers are collecting and consolidating more operational data in a central place, a growing percentage of which is coming from mobile apps connected to their solutions. They then can apply analytics to this richer data set to generate supply and risk management insights for both procurement organizations and suppliers (see Chapter 5 for more on analytics).

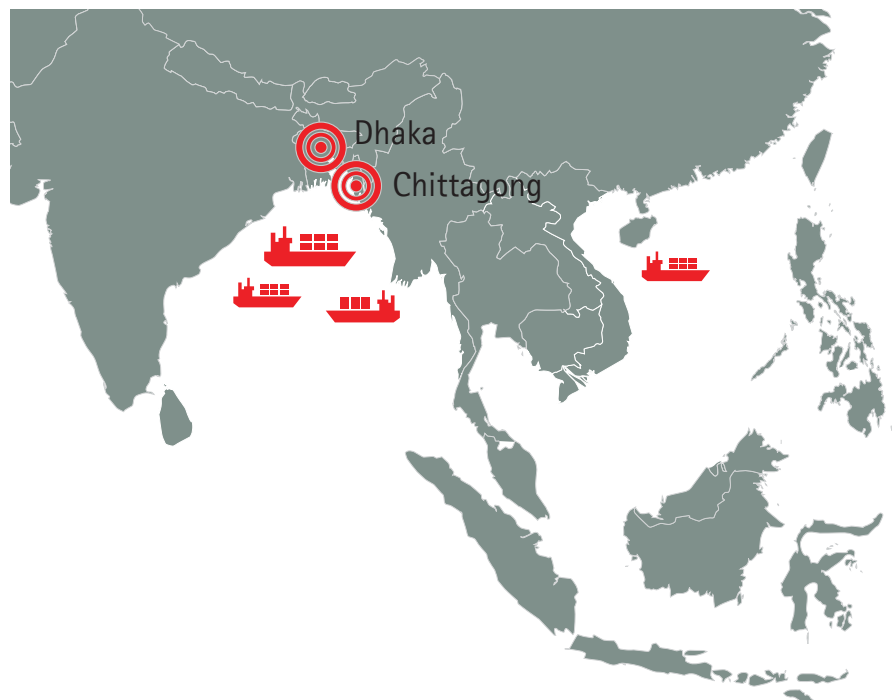
For instance, in one example, a cloud provider can see a huge uptick in orders for a commodity by its clients in a certain industry. By matching these orders to the current available global supply of that commodity, the provider can predict a likely shortage that could undermine clients' plans. The companies that are best able to receive and interpret these insights will become the next wave of leaders.

Another example in which analytics on content has a significant impact: A cloud provider could identify trends that indicate trade is migrating to a certain location, and use predictive analytics to determine whether bottlenecks will make it more difficult for companies to do business there in the future. Kurt Cavano, founder, vice chairman and chief strategy officer of GT Nexus, related how the company was able to do just that when it saw the beginnings of a movement to shift manufacturing from some areas of China to Bangladesh. "As we

get a bunch of people moving their production to Bangladesh, we can say, 'We're going to have problems in Dhaka and Chittagong because we're going to have more trade than the ports can handle, and there are going to be delays there,' or 'You're going to see increases in dwell times because of the volume of trade that's moving there,'" he explained. An even more impactful, short-term use of this data would be to identify port delays due to the acute onset of an adverse condition at a port, such as a work stoppage, customs delay or equipment malfunction at that port. How companies internalize such intelligence and mobilize rapidly to respond to it will play a critical role in their ability to outpace competitors (see figure 12).

Content knowledge also will separate leaders from others in terms of how well companies can share vital information and intelligence via the cloud with their supplier networks (especially strategic partners) to influence, for example, their supply base management and compliance strategies. Companies will need to become adept at leveraging the cloud platform to spur deep collaboration with suppliers on a wide variety of issues. This can include the sharing of real-time, transparent information via the cloud to improve compliance control, and in some cases encourage the use of cloud applications to systematize compliance control. Tighter integration between buyer and seller organizations enables procurement to more easily and effectively gain access to and interact with a much broader marketplace with a network of suppliers.

Figure 12. Cloud-based data will allow analytics to predict risks for mitigation



According to one study, 66 percent of data in 2014 resided in the cloud, and that figure is expected to grow to 73 percent in two years—with 80 percent of that data being unstructured.¹⁶

Learning How to Address Privacy and Security Risks

Yet for all the potential benefits and opportunities the cloud offers, companies also are aware of a variety of risks, threats and challenges that can make cloud adoption difficult. Consistent with the results of other research studies,¹⁷ data privacy and data security were the most prevalent of those cited by procurement executives in our study. As they begin adopting cloud solutions in the next several years, procurement organizations will become more experienced in mitigating these risks, and will be able to apply their learning to help other areas in the company make their transition more smoothly.

Data privacy, which involves ensuring the appropriate use of data by those authorized to use it, is a major concern for companies with global operations. That's especially true for companies dealing with different countries' regulations on personal and confidential information. In cases where such regulations threaten a rollout of cloud-based applications, some companies in our study have opted to retain core parts of the process and data in question behind their firewall to help alleviate privacy concerns.

Balan Nair of Liberty Global recognized that "...when you take on the role of managing somebody's data for them, you are also taking on a huge risk in this new world where everybody wants a piece of somebody else's data."

With so much data in the cloud, it's also logical to ask what happens if there's a malfunction and one company gets unauthorized access to another's, or data is somehow misused, compromised or stolen by another party (i.e., data security). Vigilance in protecting data is especially

crucial given the fact that data breaches today are neither insignificant nor materially quantifiable. For example, a data breach clause in a cloud provider contract that specifies an indemnification limit of \$20 million, \$50 million or even \$100 million is no longer relevant in a world in which breaches can cost billions of dollars.

"If something in the cloud breaks and data gets hacked, the damage is not a material loss that you can measure in millions any longer," said Balan Nair, an executive vice president at Liberty Global. "So our suppliers are starting to get used to the fact that when you take on the role of managing somebody's data for them, you are also taking on a huge risk in this new world where everybody wants a piece of somebody else's data."

Yet even with the ever-increasing frequency and sophistication of hacking, research suggests that the number of incidents involving cloud providers is miniscule compared with those involving companies themselves. For example, a survey of 250 senior IT and business decision makers in the UK found that only 2 percent of organizations believed they had experienced a cloud-based service-related security breach.¹⁸ That contrasts with a different study involving 400 large companies in the US and UK, which revealed that 53 percent of corporations have experienced a data breach with their traditional on-premises IT solutions.¹⁹ This discrepancy is likely due largely to the fact that cloud providers go to far greater lengths than many corporations to keep security breaches to an absolute minimum.

Leading cloud providers employ many techniques to ensure, as much as possible, that their customers' data is safe. These include using the highest level of encryption and authentication, conducting security audits, hiring third-party "hackers" to test for vulnerabilities, and putting all employees in the company through active security training on an ongoing basis. One cloud provider we interviewed complements its technological test hacking with "sociological" hacking—having "undercover" parties break into and wander through the office or call employees,

impersonating a customer, to see how much information they can gain and how easy it is to get it. Essentially, this cloud provider believes, as do most, that while security is absolutely critical, it's also completely manageable if made a priority.

Conclusion

As our interviews revealed, there's significant interest among procurement executives in taking advantage of the benefits of cloud technology—benefits that now go beyond process and technology standardization and low costs to enhanced usability and more effective use of content. The usability aspect is especially powerful, given procurement systems' historical inability to match the user experience that employees enjoy from consumer-oriented technologies. Amazon and Apple, for example, have set the usability bar so high that procurement professionals should, rightfully, expect the same from existing procurement applications. Using the cloud, procurement organizations can match the consumer-user experience and benefit from greater productivity as a result.

To continue the analogy in the consumer space, complementing usability is a depth of content easily available to consumers with the right data informing the user at the right time. In fact, at this point, there's very little content in the consumer space that cannot be found. For the enterprise, the future procurement organization will master enriched and deep content—be it catalog content, compliance information related to policies or dynamic cost models—to inform its buyers and business stakeholders when they need it.

Turning interest into action will take some time. But executives' opinions clearly indicate there will be a steady march toward cloud-based procurement solutions in the next five years—to the point that procurement will likely be on par with other corporate functions in its use of this powerful enabling technology.

Chapter 4:

The Industrial Internet of Things—A Wake Up Call for Procurement

Mobile networks and their connection to the Industrial Internet of Things promise to fundamentally transform key aspects of procurement, including changing or even entirely eliminating certain business processes.

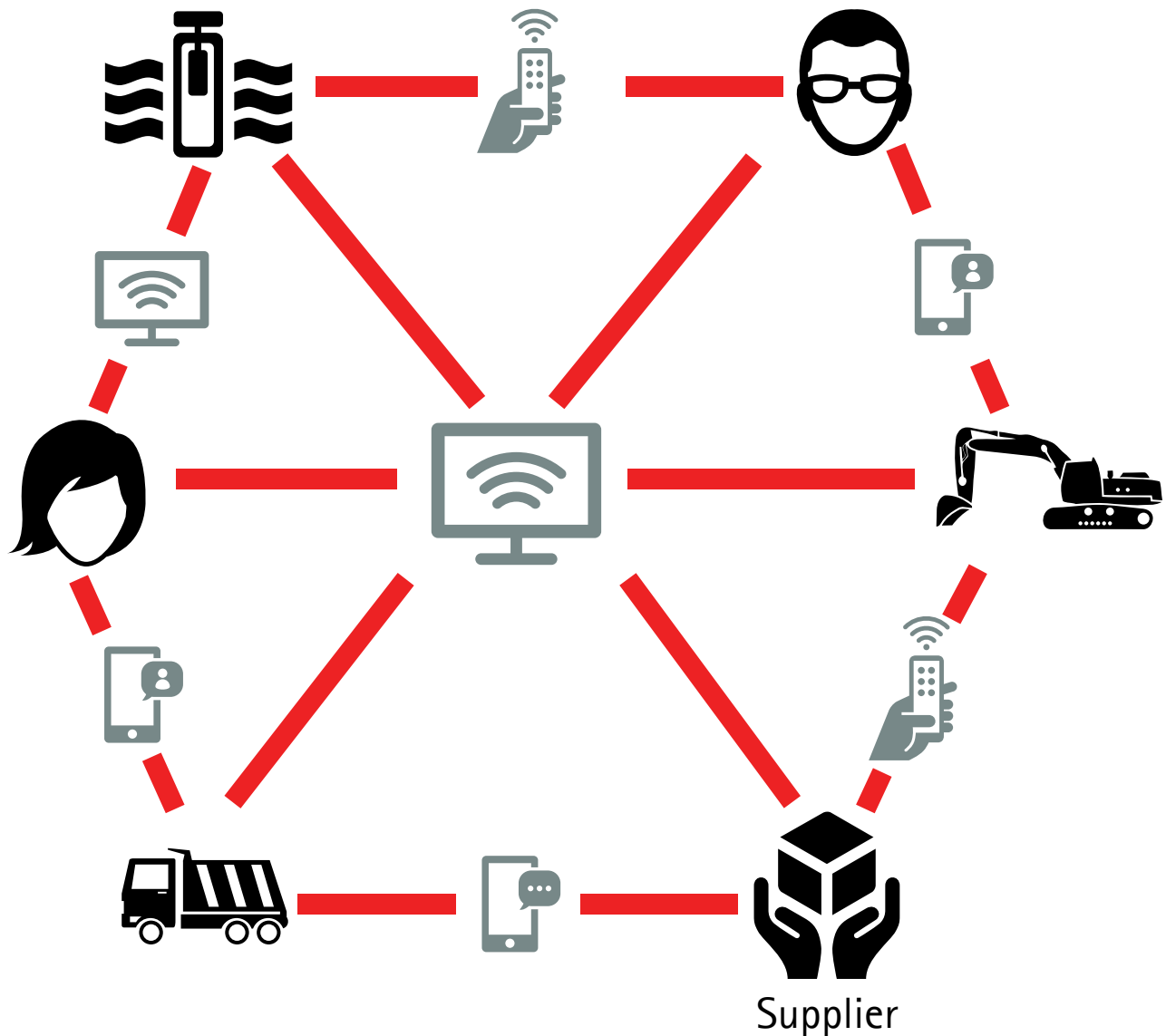
From a procurement standpoint, vast opportunities exist to use traditional mobile devices as well as the emerging Industrial Internet of Things to transform the procurement function—although the true potential is not recognized equally by all procurement executives. Most procurement executives we interviewed as part of our research are well aware of the growing use of mobile devices in their companies and understand mobile's potential to enable the transactional element of procurement processes. These executives clearly see that mobile technology can help professionals gain quicker and more flexible access to sourcing data, track orders, request a contract, view invoices, and approve requests.

But a smaller group of executives has a more expansive view of mobile technology. They understand mobile technology as the beginning of a continuum and the foundation for future use of the Industrial Internet of Things—which combines sensor-driven computing, industrial analytics and intelligent machine applications into a single universe of connected intelligent industrial products, processes and services. In the next five to 10 years, mobile technologies will mature beyond the devices (i.e., smartphones and tablets) that currently fuel the majority of interactions across the channel to eventually connect into the Industrial Internet of Things. We can already see the beginning of this movement

in the rising adoption rate of Industrial Internet of Things solutions. According to one survey of global IT and business decision makers, 25 percent of companies globally had an Industrial Internet of Things solution in place in 2014 (up from 15 percent in 2012) and 65 percent were in the process of implementing one.²⁰

As more “things” become connected to the internet and to one another, they will fundamentally transform key aspects of a company's business.

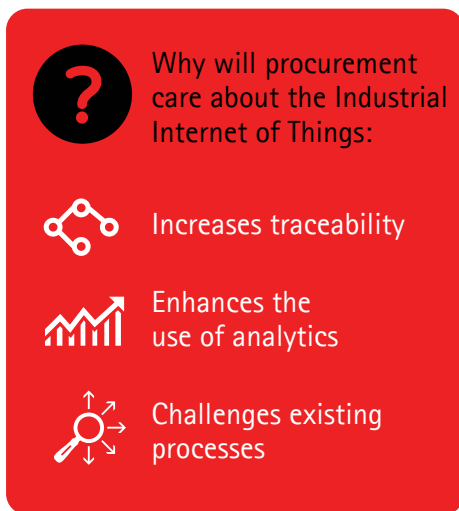
Figure 13. Today's mobile device-driven market will shift to an interconnected Industrial Internet of Things



Industrial Internet of Things in Procurement: 2020

Forward-thinking companies see the promise of the Industrial Internet of Things to reshape procurement in the next five to 10 years in three fundamental ways: through its ability to substantially increase traceability of products and materials across the entire supply chain; to enhance a company's use of analytics to improve decision-making; and to enable a company to challenge the status quo for key processes (both procurement processes and those specific to the company's industry).

Figure 14. Forward-thinking companies see the promise of the Industrial Internet of Things



Increasing traceability

For many companies, knowing what goes into a product, where a product is and where it has been is increasingly critical to the success of the business. Depending on the industry, it also could be core to meeting relevant regulatory requirements. With its eventual pervasive penetration in products and parts, the Industrial Internet of Things makes that job eminently easier.

"Transparent supply chains [are] something that you cannot stop. They're going to happen, and they're going to happen all the way down to source-level control," says Tom Linton of Flextronics.

The Industrial Internet of Things can enable companies to trace products and materials as they travel throughout the supply chain—from the supplier of raw materials through production and shipping and ultimately to use by customers. Such comprehensive traceability is vital to enhancing supply chain transparency: It can give companies better insights into how long a product or component has been sitting in stock (which can help them avoid using outdated or obsolete goods), as well as knowledge of the precise source of all the materials comprising a product (a critical concern, for example, in the case of organic foods

or potentially hazardous materials). "All you have to do is walk into any Whole Foods supermarket and you understand the issue of transparency," said Tom Linton at Flextronics. "[You see] a picture of the farmer and the cow that produced the cheese, right? Transparent supply chains [are] something that you cannot stop. They're going to happen, and they're going to happen all the way down to source-level control."

Such traceability could have significant implications for procurement, not the least of which would be insight into an organization's commitments to corporate social responsibility. With so much information about suppliers at the product level available via the internet, procurement could much more easily know if suppliers are, for example, truly engaged in claimed sustainability efforts. Likewise, transparency of information will highlight any corporate social responsibility abuses among suppliers, enabling buyers to adjust their relationships accordingly.

Enhancing the use of analytics

As we will discuss in Chapter 5, analytics is increasingly being used by leading procurement organizations to generate insights that lead to much better business decisions. Key to analytics is rich data, and that's where the Industrial Internet of Things really shines. It gives companies access to a whole new world of data that can feed the analytics engine, enabling companies to paint a much more comprehensive and accurate picture of the state of their operations.

Figure 15. Transparent supply chains are happening down to source-level control



Dirk Van De Putte of BHP Billiton is working with suppliers to develop sensors to monitor the health of its trucks to predict failures and boost utilization. Data in scenarios such as this can help fine-tune category strategies, as well as reduce part and vendor proliferation.

One of the best examples is the way in which sensors combined with analytics can give companies greater knowledge of how their assets are performing, and what is needed by when to keep them functioning at peak capacity. Doing so can enable a company to avoid a crisis situation where it's left scrambling to find the parts and people to fix vital equipment that has broken down. That's what Dirk Van De Putte, group chief procurement officer at BHP Billiton, envisions when he thinks of his company's fleet of trucks transporting material. "These pieces of equipment cost a lot of money, they consume a lot of fuel, and they cost a lot of money to maintain," he explained. "So there is a lot of focus on keeping that machinery's utilization as high as possible and using it as efficiently as possible."

According to Van De Putte, BHP Billiton is working with suppliers to develop and deploy sensors and tracking devices that monitor the health of its trucks. Doing so enables the company to predict failure before it happens and, with the help of analytics, boost truck utilization (by, for instance, creating more efficient routes and optimizing each truck's loads).

Predicting failure rates based on key data can also feed the sourcing decision process and, in fact, help fine-tune category strategies to reduce part and vendor proliferation. Consider, for example, a company that buys two pumps from two different vendors. The pumps are almost identical in specifications, but Pump B costs 10 percent more than Pump A. The question is, does the company need both pumps, and if not, which one should it continue to buy? By adding sensors to the pumps in the field, the company can see that Pump A actually fails 10 percent more often than Pump B in certain weather conditions. Procurement can use this data to decide to source only Pump

B, despite its higher initial cost, to increase reliability, reduce warranty claims and reduce part complexity. In this way, Industrial Internet of Things (IIOT) is an important step toward real-time, fact-based data analytics in procurement.

Similarly, Abu Dhabi-based Etihad Airlines is leveraging the Industrial Internet of Things to monitor its fleet of 80 aircraft to predict future faults and take proactive measures to reduce unscheduled disruption to the company's operations. Supporting the airline's efforts is the Intelligent Operations service provided by Taleris, a joint venture of GE and Accenture. It combines sensors, analytics and other technologies to help airlines and cargo carriers predict, prevent and recover from operational disruptions.²¹

At a minimum, the sheer volume of information available at the part, product and supplier level due to the Industrial Internet of Things will drive procurement and business stakeholders to make better decisions. On a broader level, more information with insights will reduce ad hoc processes and tactical activities, as well as allow procurement to begin to question more fundamental processes. Projecting Etihad Airlines' experiences on a much larger scale, one can begin to see how the Industrial Internet of Things is poised to transform procurement in the next five to seven years.

Challenging existing processes

While improved traceability and enhanced use of analytics are major benefits, the true transformative power of the Industrial Internet of Things lies in its ability to help companies completely rethink how their procurement organization processes operate. In fact, analyzing how to reshape the process is paramount to achieving the significant productivity, efficiency and cost benefits the Industrial Internet of Things can render.

This concept is eloquently described in *The Second Machine Age*, which stressed the need for "complementary innovations," most often in process and organization, to make the greatest use of new technologies.²² This doesn't mean just streamlining existing processes, which many organizations already do as part of their technology implementations. Rather, it involves a complete reevaluation of the process or organization and how it operates.

A well-known example, cited in the book, was the need to completely redesign the manufacturing floor layout after the move from steam engine power to electricity in the early 1900s. An efficient steam engine layout relied on a large central steam engine powering machines crowded around it. When electricity was introduced, manufacturers simply replaced the steam engine with a large electric motor in the same configuration—which had little impact on productivity. It took 30 years (enough time for the original managers to retire) for companies to give each machine its own power source, a small electric motor, which enabled the machines to be placed anywhere in the factory. This breakthrough spurred new, more efficient layouts that made possible a more natural and efficient flow of materials to make the end product. After that, productivity benefits boomed.²³

Of course, in hindsight, this all makes perfect sense. But "in the moment," the need for complementary innovations is often overlooked. That's certainly been the case with procurement. Despite a century of data showing that maximizing productivity gains from technology requires a complete reevaluation of the way things are done, procurement processes have hardly changed in the past two decades. Companies have largely ignored complementary innovations when implementing new technologies such as ERP, the internet and eProcurement applications to support procurement processes. Instead, they predominantly focused

Figure 16. With the Industrial Internet of Things, procurement needs to ask, "Do we even need the PO?"



on incremental efficiencies achieved through industrializing and automating transaction processing, grouping procurement processes into shared services, and implementing some process modifications to complement new technologies (among others).

This must change in the future. Accenture experts and procurement executives we interviewed agreed that companies need to challenge themselves to consider how to use the Industrial Internet of Things not to simply do the same things better. They also have to think about opportunities to replace previously necessary components of procurement processes to dramatically improve the value those processes deliver.

If the procurement organization is a series of process dots on a piece of paper, Tom Linton advises to focus not on eliminating the white space between the dots, but on the very need for the dots themselves.

"A good way to think about it is, if you pretend a supply chain or a procurement organization is a series of dots on a white piece of paper, we've tended to focus on the white space between the dots," explained Tom Linton. "In other words, [we ask] how do you lean out, how do you eliminate waste, how do you eliminate all that white space between the dots? I think we need to focus on the dots. We need to focus on why those dots exist and challenge the very fundamentals of why we can't reconstruct the dots, not the white space."

As an example, Linton called into question the need for POs. But it's not just the PO process "dot" that should be examined. Taking this further, one could ask if invoice documents are always necessary?

Or if the company should instead make regularly scheduled payments and rely on an audit function for accuracy after the fact. And, with the advent of digital currencies in concert with the IIOT, could the payment of ad hoc purchases be tied to a digital contract and fully automated?

Consider the following futuristic but achievable scenario: When an item arrives on-site, the embedded IIOT sensor "auto-receipts" it and notifies the system that delivery was either on time or late. The system consults the digital contract the company has with the supplier to determine the price to be paid (e.g., a certain price for on-time delivery or a discounted price for late delivery). It authorizes the transfer of the appropriate funds directly from the company to the supplier using digital currencies.

In this scenario, IIOT eliminates substantial transactional steps that cost money, time, resources and effort. When these lower costs are paired with digital compliance controls and lower prices naturally available in the Virtual Company Mall (Introduction), and with access to uncharted suppliers via the Virtual Supplier Room (Chapter 1), there's little need for the company to measure and control the number of suppliers.

Chris Toomey at BASF Corporation, relates another potential example of how the Industrial Internet of Things could transform not only procurement but the entire supply chain if the essential elements of both industry and procurement processes were questioned. He imagines a scenario in which a truck carrying potentially hazardous chemicals from one plant to another overturns on a highway. Sensors in the truck alert the company of the problem as soon as the truck begins tipping over, triggering alarms in the company's command center. Crisis-management professionals are mobilized and the police and local community are notified to minimize potential harm to the environment and people.

Because the shipment involved an internal supply, the company also has to deal with a supply disruption. Both the manufacturing facility awaiting the material and the plant that originally produced it are automatically notified—so the former can adjust its schedule and the latter knows to send a new shipment out to minimize the disruption. At the same time, an electronic notice is sent to the carrier that employs the driver of the truck, so the two companies can begin the process of analyzing the data recorded by the truck's on-board computer to determine the cause of the accident.

An even more futuristic application of the Industrial Internet of Things is the "self-directed part." Tom Linton related the story of how elephant seals as young as six months migrating in the Pacific Ocean find their way from California to Alaska and back by following the sounds of nature around them, which help guide them to their destination. Why couldn't parts, when they are created, also be told where they are supposed to end up, he asked? Embedded programming in parts could indicate the plant where they are ultimately needed, and sensors along the supply chain could guide the parts throughout the journey—all without human intervention. In this scenario, the virtually integrated enterprise (which we describe in detail in Chapter 1) could use the Industrial Internet of Things to track parts and, if required by some unforeseen development, reallocate them while they're in transit. It's quite a stretch from today's operations, to be sure. But it's eminently realistic given the current state and anticipated trajectory of mobile technology and the Industrial Internet of Things.

Questioning the fundamentals is the only way to determine if there is further value in process changes as a result of implemented technologies. Certainly there are legal and commercial concerns, along with a host of others, that must be considered in asking these fundamental questions. But the disruptive technologies, especially those founded in the Industrial Internet of Things, make the moment ripe for change.

Conclusion

The preceding discussion illustrates the inexorable march of mobile technologies—from the smart devices in growing use today, to the Industrial Internet of Things that will knit together products, people and processes around the world. At the same time, it's extremely difficult to predict how and when the technologies will evolve because they are emerging so rapidly and frequently that guessing what comes next becomes a challenge.

"It's gotten to the point now where technology is evolving faster than my mind is conceptually able to digest [it]...I have to bring the fence of when they're going to occur in closer."

"It's gotten to the point now where technology is evolving faster than my mind is conceptually able to digest [it]," said one chief procurement officer. "That's why I've got to understand [that] things that I used to think are a little pie in the sky aren't anymore. I have to bring the fence of when they're going to occur in closer."

Scope and timing issues notwithstanding, there's little doubt that advances in mobile technology will fundamentally change and shape how procurement processes are executed in the future. In fact, the Industrial Internet of Things will likely render such dramatic change that procurement professionals should question their entire function's operations. Procurement professionals need to see the Industrial Internet of Things for what it truly is: an opportunity to challenge the status quo. Such questioning could lead to disruptive innovations that will dramatically boost the performance of the procurement organization, as well as the overall value it generates for the larger enterprise.

Chapter 5:

Procurement Is Poised to Ride the Analytics Wave

Procurement organizations will create new capabilities that will drive more widespread use of advanced analytics and, in the process, help transform five key procurement areas.

The use of analytics to improve business decision-making has grown exponentially in the past decade. An Accenture survey has found that one-third of companies are aggressively using analytics across the entire enterprise, and that the use of predictive analytics has nearly tripled since 2009 (from 12 percent to 33 percent).²⁴ Fewer than 10 percent of companies surveyed reported that their companies are not making any use of analytics.

This expansion in the use of analytics thus far has left procurement on the outside looking in, as efforts have been concentrated in other operational and customer-facing functions. In fact, according to the same Accenture survey, companies today are least likely to use advanced analytics in procurement (beyond reporting) compared with six other corporate functions (finance, customer service, production/operations, sales, IT/telecoms and human resources, see figure 17).²⁵

Figure 17. Procurement is the least likely corporate function to use advanced analytics



Our interviews with procurement executives back up those findings: Analytics—particularly predictive analytics—applied to procurement is in its infancy. Typical of most companies' experience is what one chief procurement officer highlighted.

"We're mostly applying analytics to inbound logistics to forecast consumption patterns," he noted. "In terms of pure procurement, I think the analytics we're doing is pretty much based on internal data and historical data."

There are, of course, hotspots of more mature activity centered in specific industries and certain categories (largely those that are core to the business). For example, process and product companies, which operate on very thin margins, owe their very survival to predicting raw material costs and managing commodity price risk. It makes sense that such companies tend to have fairly mature commodity pricing algorithms and processes that enable them to know at what prices they should buy and how much of which materials they should keep in inventory.

In the future, the analytics landscape in procurement will change dramatically. More procurement organizations will increasingly take advantage of analytics in very significant ways—largely because of the chief procurement officer's ascent in the executive ranks and increasing responsibility for managing the bottom line. While procurement heads a decade ago were primarily focused on purchasing, savings, and securing supply, today they have a much more strategic role. That role demands generating deeper insights about the state of the business and using a more data-driven process for effective decision making.

The Greater Value Analytics Can Help Procurement Deliver

Because it sits at the intersection of business and technology, analytics is critical to delivering the kinds of insights strategically focused procurement executives now need. That's why many procurement executives anticipate building more robust analytics capabilities that go beyond illustrating what has happened in the past (descriptive analytics) to helping them anticipate and respond to future developments that could have a significant impact on their businesses (predictive analytics). Our research suggests that in the next five to seven years, analytics will be at the center of a more sophisticated decision-making and business intelligence engine in procurement that's connected to all levels of the supply chain. This will help procurement manage, predict and change pricing, materials, resources and other operational levers that drive overall business performance.

Category managers in particular will be at the receiving end of these benefits: Analytics will allow for the next wave of value creation for category management, which will emphasize more effective collaboration on categories. Analytics and new powerful tools will manage today's and the future's dynamic data, bolstering the insights category managers will use to drive their actions on a daily basis, in addition to their category strategies over the long term.

Five procurement areas, in particular, look set to benefit the most from the expanded use of advanced procurement analytics (see figure 18). Some of these types of analytics have been common for quite a while. What will be different is that these five areas will enjoy more control of Big Data in real time, far more advanced technology (including machine learning and recommendation systems), and a focused corporate strategy that pulls the right resources together to push each area further than ever before.

Commodity Pricing and Risk Management

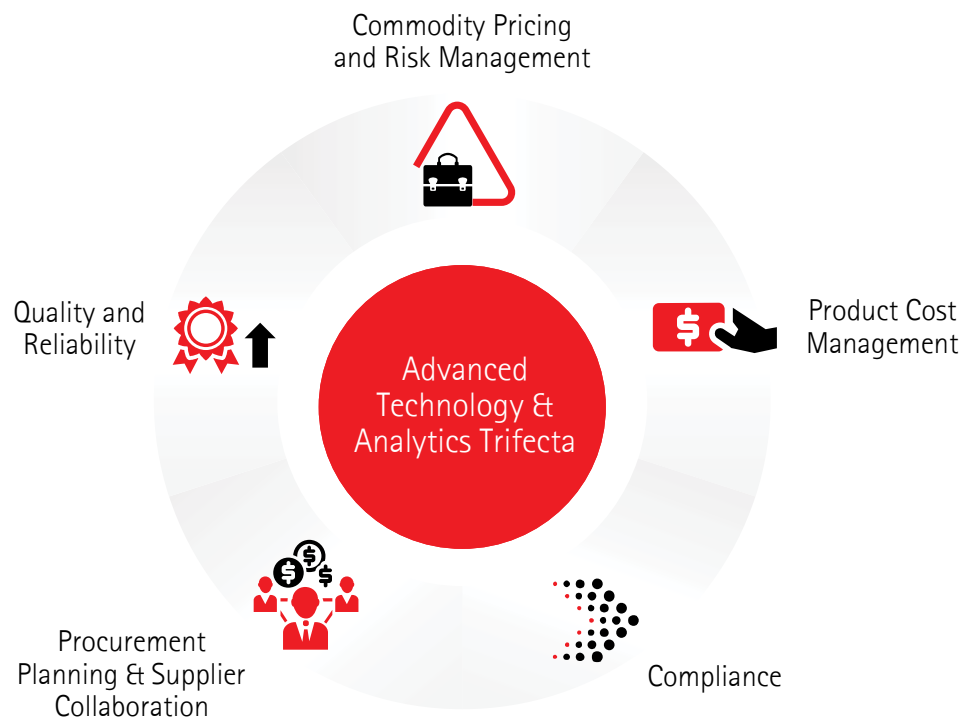
Companies can use analytics to help them incorporate commodity price insights into the structuring of contracts. They can link advanced commodity pricing algorithms with broader procurement analytics to help them understand the percentage of the cost contribution to a specific finished product that's represented by a certain commodity; determine the price and availability risks of that commodity; and forecast the resulting impact of those risks on the business. And they can use analytics to help them understand what drives suppliers' behavior and to what risks the company is exposed by its dependency on a particular supplier, or on that supplier's suppliers. Finally, companies can use analytics to build dynamic pricing models (versus index-driven pricing models) to radically alter terms and negotiation frequency.

Some of the executives we spoke with are already thinking about analytics in these broad terms, whereas others are already using them in this manner. "I see value in a number of areas," noted Dirk Van de Putte. "For example, financial analysis of our suppliers to reduce risk, and modeling demand and future growth of our industry and linking that to supply markets so we can see potential bottlenecks and risks. Also, because many of our contracts are indexed to certain raw materials, we'd like to use predictions on raw materials prices to help make decisions on contracting or diversifying our supply base."

Product Cost Management

Within the next few years, we anticipate companies using more advanced analytics will be able to determine the detailed cost of specific SKUs, not broadly by commodity as they do today. They will also be able to predict demand for indirect resources that are core to the business—such as certain types of contract labor—and subsequently ensure sufficient quality, price and supply.

Figure 18. The 5 great analytics impacts to procurement in 5 – 7 years



Looking further ahead, it's not a stretch to imagine predictive analytics giving rise to intelligent virtual software agents—basically, programs—doing their own purchasing of commodities. By incorporating business rules that enable the programs to learn, these agents will apply analytics to evaluate a decision, determine if it was right or wrong and adjust as necessary.

Compliance

Companies will also apply analytics to help vastly improve contract compliance. Today, most procurement executives don't know for sure how well the organization adheres to established contracts—largely because such analysis is currently a manual, time-consuming process. This situation is changing, however, with the emergence of innovative cost management techniques like closed-loop indirect spend management (with its unique brand of zero-based budgeting embedded), which is providing a strong basis for compliance control throughout multiple industries. In indirect spend management, procurement uncovers and reports on causes of non-compliance on a monthly basis—explaining to senior category owners the difference between actual spending and planned spending, by business unit, region, geographic unit, department and by person. In the future, this brand of cost management will become far more pervasive beyond today's industry stronghold in consumer goods and services.

Emerging now, and growing stronger in the future, a platform that combines descriptive and predictive analytics will start to blend with the human component to take on many of the responsibilities of compliance control. Such a platform could compare each transaction and other purchasing behavior with the appropriate contract to determine individual and overall compliance, and the cost of non-compliance. This system, combined with other relevant data, could help procurement executives understand current and projected compliance, as well as pinpoint where responsibility for non-compliance rests (with the procurement organization, suppliers, or broadly throughout the company's employee base). It could also help them forecast the impact of compliance management techniques in their organization.

The meaning that a procurement user or business stakeholder puts on such data could lead to significant interventions in behavior. For example, when considering compliance, a decision maker could quickly identify all individuals who are non-compliant with a specific policy in real time and take action to prevent further non-compliance. Another set of analyses could include real-time supplier performance monitoring. Still other analyses could lead to the identification of and intervention in fraud detection.

Procurement Planning and Supplier Collaboration

In the future, technology will enable procurement to link more tightly with downstream processes in the company, helping to break down organizational silos in the process. As a result, a company will be able to more quickly and precisely translate an operations-based demand plan into a procurement plan. For example, when marketing announces plans for a new promotion, the analytics engine could quickly identify the impacts on sourcing and the supplier network.

Quality and Reliability

One of the areas in which more sophisticated procurement analytics likely will have the greatest impact is equipment and parts. By integrating its analytics engine with other departments across the enterprise, procurement will be able to understand the reliability of components it buys. Consequently, it could negotiate better warranty terms with suppliers and more closely align the equipment it is buying with actual demand in order to free up working capital. It also could gain greater visibility into the type and number of spare parts that are actually needed, and where they are needed, to ensure availability.

Building a Robust Analytics Capability

While the significant benefits of advanced analytics are evident, the executives we spoke with acknowledged they have a lot of work to do to capitalize on the technology. According to our research, most companies will focus their efforts on two critical areas: data and technology infrastructure, and the corporate structure.

Analytics, Data and Technology Infrastructure

To use analytics in a predictive way, a company needs four essential elements: historical data, a set of algorithms, a set of company or business rules, and an external event or data (e.g., a "trigger"). In the coming years, companies will make great headway in strengthening all of these elements—especially the most basic of them, historical data—so they can take greater advantage of descriptive analytics.

"We're data rich in some areas but we're really data poor in other areas, and I don't think you can do analytics well unless you have good data coming in," said one procurement executive.

"We're really data rich when it comes to anything related to [our] operations. We're data poor in the supply department itself—we don't have

supplier quality or delivery metrics on most of our suppliers, and we don't have a way to track the reliability of [our] parts. We're putting in place an enterprise asset management system, but it's going to take a while."

While having good historical data is one component of success, maintaining clean master data is equally important—and frequently hard to do. Even organizations that do have insight into their historical transactions often find that this data is misclassified, assigned to the wrong general ledger account, and thereby difficult to tag to the right procurement category. Without clean master data, decision-making is compromised.

In five to seven years, procurement organizations will develop the capability to not only use and maintain clean internal data, but also to reach beyond their walls to incorporate Big Data—vast amounts of structured and unstructured data from a variety of sources—in procurement analytics. When a company relies primarily on its own internal systems for data, its ability to conduct supply analytics is severely limited. However, when technology can pull in data from external sources and is no longer bound by the constraints of the company's internal IT systems, the opportunities for supply, price, risk and other analyses expand dramatically. In the future, these external sources of data will include the Industrial Internet of Things (as we discussed in Chapter 4), cloud-based supplier networks (as described in Chapter 3), social media and current events, to name a few. Bundling these analyses into a dashboard and making it easy for business stakeholders and procurement to understand, interpret and make decisions will become a key competitive differentiator.

Analyzing Big Data in this way could help procurement more effectively address geopolitical risk and supplier risk—frequently discussed concepts of procurement analytics, although not widely deployed across organizations today. For instance, analysis of trending hot spots identified in social media throughout the globe could lead to focused interventions when supply is located in those specific at-risk geographies. Furthermore, information immediately available via social media, such as corporate social responsibility infractions by a key supplier, could allow a company to proactively evaluate potential interventions or alternatives before such incidents affect the company's brand.

In addition to good data, analytics requires the right tools. To conduct more mature, sophisticated analytics, companies will implement more powerful technology than Excel—which is often

the default tool for analytics at many companies today. That need is certainly recognized by David Annett at the National Bank of Canada. "A lot of...institutions haven't invested in the necessary technology," he said. "Many procurement organizations are still somewhat legacy—practically the whole procurement organization is driven by an Excel spreadsheet. Just to do what we're doing now is taking a lot of time. Investment in appropriate tools or partnering with a supplier with this specific expertise is what is required to take it to the next level."

Especially useful tools include supply analytics apps, which Accenture has identified as one of five principal areas that will form the core technology infrastructure of the procurement organization of the future. Supply analytics apps will bring together a wide variety of data and, through a standard dashboard, enable both procurement and business users to interpret analytics to solve specific problems or answer questions. These apps also will provide recommendations to users as well as enable them to do forecasting and conduct "what if" analyses.

An area that will significantly benefit from more robust analytics, data and supporting tools is spend visibility. Currently, solutions exist to help companies understand where and how they spend their money. However, almost all solutions available today cater only to basics such as negotiated savings, spend trends, summary dashboards and scorecards, and focus mainly on automating the reporting process. In the near future, we expect to see much more sophisticated analytics applied in this area as tools emerge that can, for example, do comparative analytics between supplier prices, determine buyer effectiveness on prices for the same material across plant locations in the same country, and identify buying channel effectiveness. This will illuminate otherwise non-evident, actionable opportunities for procurement to pursue, thus unlocking far greater value.

From a technology perspective, the future trend is clearly toward ever-greater automation to support more robust analytics. For descriptive analytics targeting largely transactional data, that means allowing programs to effectively handle (and optimize) the processing of routine analysis. For more complex, predictive analysis, that involves the emergence of "cognitive engines" that can make better decisions on their own—and learn from their experiences. We discuss such engines in more detail in Chapter 6.

"Everybody knows that [analytics is] a cool thing and thinks that they should understand it," said Lynn Kelley of Union Pacific Railroad. "But unless they've been involved in statistical analysis or forecasting, they probably don't know where to start."

Analytics and the Corporate Structure

Yet even with the right data and technology, companies still need the human element to generate value from analytics. Without the right people—people who bring business intelligence to the table and know which questions to ask—all a company has is data massaged by a tool. That's a scenario Lynn Kelley, vice president of supply and continuous improvement at Union Pacific Railroad, has seen throughout her career. "Everybody knows that [analytics is] a cool thing and thinks that they should understand it," she related. "But unless they've been involved in statistical analysis or forecasting, they probably don't know where to start."

Even worse, she said, is that those same people may end up being enticed to buy an analytics software package and simply not know what to do with it, resulting in little to no return on that investment. "They won't be able to deliver the results because they didn't know how to frame up their problem," she said.

Accordingly, procurement organizations will work within the corporate analytics structure in the future to focus on bringing together the right combination of skills in two distinct dimensions. The first is the "mechanical" dimension, which is concerned with ensuring that the output of the analytics is right (see figure 19).

Figure 19. Dimension 1: The Analytics Trifecta in a robust Center of Excellence

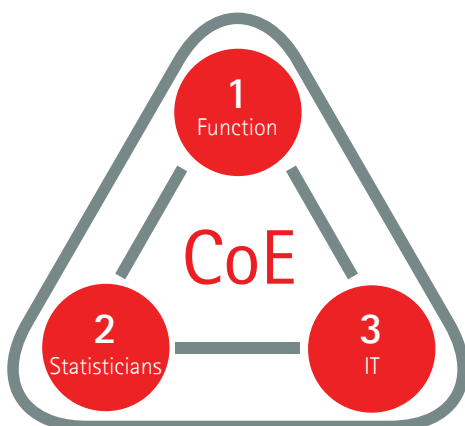
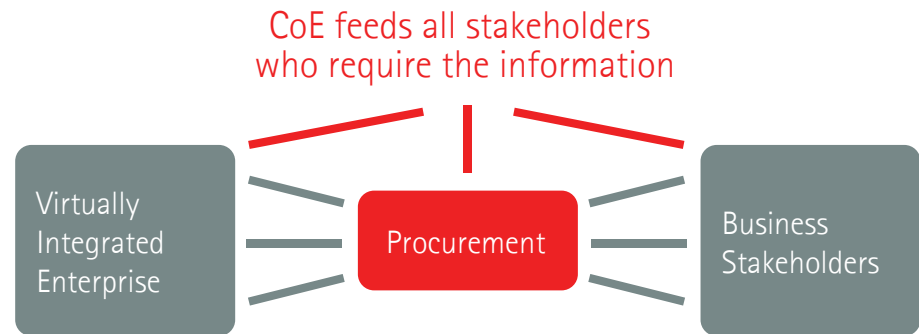


Figure 20. Dimension 2: Putting key insights in the hands of the right people



This requires what Kelley referred to as the "analytics trifecta":

- 1 Functional Experts (e.g., procurement or finance experts with the right knowledge to define the problems they want to solve);
- 2 Statisticians to create the right analytic models and algorithms to uncover the answers to those problems; and
- 3 IT people to ensure the analytics technology is integrated with the right enterprise systems and other data sources, and provided to the right person at the right time.

The second dimension is the "interpretation" dimension, which requires people with deep market and industry knowledge (both those within procurement and stakeholders in the business) to translate and apply the output of analytics to improve business performance (see figure 20).

In the next five to seven years, the analytics trifecta likely will reside in a formal Center of Excellence (CoE) dedicated to developing and deploying advanced, comprehensive analytics capabilities. In companies that are starting with no analytics capabilities, this CoE will likely be built to support all areas of the company (such as sales, marketing, finance and supply chain, as well as procurement). As the analytics capabilities mature over time, individuals in the CoE will become embedded in their respective functional areas to get closer to the business.

To staff their CoEs, companies will adjust their recruiting practices to include a focus on finding the increasingly scarce data scientists and other analytics experts who are vital to the CoE's

effectiveness. They will also develop the right supporting structure and formal career paths for these individuals so analytics professionals feel as if they "have a home" in the company and understand what they need to learn and do to progress in their chosen roles.

Conclusion

There's little doubt that procurement analytics can generate significant value for a company. The bigger question is how and how quickly procurement organizations (and particularly category managers) will collaborate with IT colleagues and statisticians to develop the capabilities necessary to capture that value and join the analytics wave that's sweeping the rest of the enterprise. Our research indicates that as procurement organizations are asked to address more strategic business issues, they will aggressively adopt more advanced analytics to help them not only improve their existing activities, but identify and exploit opportunities to deliver much greater value for the larger enterprise.

By deploying emerging technology tools (including highly sophisticated cognitive engines) and teams of experts embodying key procurement, analytical and technological skills, companies will be able to generate much deeper insights from their data and, consequently, make far better business decisions.

The Advent of the Real-Time Should-Cost Model

When a company's procurement organization has all the analytics pieces in place, the company can generate useful insights that deliver value to the enterprise. The following example involving a should-cost model shows what the future will bring when a company combines the necessary data, technology infrastructure and organization to support real-time decision-making in a powerful new way.

A should-cost model breaks down the total cost of a component into its constituent costs, including those related to raw materials, processing, manufacturing (such as tooling, energy and maintenance) and labor. On average, a model identifies 15 to 20 cost drivers and the percentages associated with each.

The problem with most current should-cost models is that they are not updated with real data on a regular basis, which means the information they use gets outdated quickly. As a result:

- When costs of commodities, labor or processing rise or fall, a company has no fact-based way to negotiate with suppliers.
- When the price of a commodity increases, a company can't quickly understand the magnitude of the impact on different commodities and which items are affected.

- A company has no predictive capabilities to help it make a decision on increasing or decreasing inventories, or even the prices on finished goods, based on price movements.

Adding to these challenges is the fact that, currently, should-cost models are commonly maintained by commodity managers on Excel spreadsheets. This prevents a company from gaining a full picture of a product's cost drivers or effectively sharing best practices among the procurement community.

In the future, companies will have access to a more effective approach based on a consolidated platform of real-time cost models. This platform will be created by first aggregating the Excel-based cost models into a common technology platform and creating new models where they don't yet exist. Next, these models will be linked to predictive

models of commodities (such as steel, copper and seeds, depending on the industry), as well as to manufacturing cost elements such as energy, labor, inflation and interest rates. With these linkages in place, the procurement organization will be able to get a view of material costs on a real-time basis and intervene as needed to mitigate risk. It will also know when to take an inventory burn or forward-buy position if prices go up or down, have more informed cost reviews with the business, and help sales and finance with accurate costing, forecasting, planning and budgeting.

Chapter 6:

From Augmentation to Automation— Cognitive Help Desk Agents Are Only the Beginning

Intelligent and self-learning computers will become trusted “expert advisors” to procurement professionals, augmenting complex decisions and, in some cases, operating autonomously under human supervision.

What used to be the stuff of science fiction is now very much a reality. A new breed of emerging cognitive computing tools is reigniting the debate over the limits of technology's potential to replace humans. Such tools go far beyond simply automating manual, routine activities, doing them more efficiently and consistently while freeing up people to focus on more strategic and value-adding activities. They now hold massive potential to help with more complex, knowledge-based or manual activities (for example, precision surgery) that involve unstructured commands, intuition and judgment.

According to Gartner Maverick Research, "through 2023, one-third of all highly skilled work done by doctors, lawyers, traders and professors will be replaced by smart machines or by less-skilled (non-specialist) humans assisted by cognitive computing technology."²⁶ Gartner Maverick Research further predicts that "by 2030, 90 percent of jobs as we know them today will be replaced by smart machines."²⁷

What exactly is cognitive computing? As Accenture defines it,²⁸ cognitive computing is focused on making computers operate as humans would, thus creating smarter IT solutions that can sense, comprehend and act. It consists of multiple technologies that enable computers to perceive the world (e.g., computer vision, audio processing or sensor processing), analyze and understand the information collected (e.g., natural language processing or knowledge representation), and make informed decisions and take action (e.g., inference engines, machine learning or expert systems).

When properly combined with business expertise, these technologies can lead to a variety of capabilities. They include intelligent virtual agents (interactive characters that exhibit human-like qualities and communicate naturally with humans to assist with and perform business processes); natural language question-answering systems (providing a new type of interface to a large body of knowledge); and machine learning applications (for system optimization, automatic trend detection, anomaly detection or recommendation systems).

Our research paints a scenario that's likely to unfold over the next five to seven years as procurement organizations begin to embrace cognitive computing. Currently, the technology is processing data and information incredibly fast, making existing processes more efficient and less costly, and giving decision makers the information necessary to make better decisions. In the future, cognitive tools will play an augmentation role, interacting naturally with humans by, for example, using natural language and existing data without a need for people to reformat data or questions into machine language. Such a tool will process data and information to recommend to a decision maker a particular course of action—one the tool deems "best" based on all available information. The decision maker can choose to accept the recommendation or ignore it. Over time, as the system learns what constitutes a good decision, it could reach the point where it is no longer just making recommendations, but is actually making the decision for a person—i.e., fully automating the activity or process.

The Maturation of Cognitive Technology

How far cognitive computing's influence and involvement will go in actual decision-making, and how quickly it will get there, is a matter of considerable debate. However, the technology is maturing rapidly and will have a significant impact on many aspects of businesses, including procurement, in the very near future.

Consider, for instance, a cognitive-based system that supports self-service passport-control gates. It uses facial recognition technology to compare passengers with their passport photos, computer vision to check for counterfeit passports and face recognition to detect people on watch lists. The system has been deployed at major airports around the world.²⁹ Google's driverless car also incorporates an intelligent system, which in this case continuously monitors a wide variety of

parameters to "decide" where and how fast the car should go. In tests thus far, Google driverless cars have driven 700,000 miles with only two accidents—both of which were the fault of humans.³⁰

Deep Knowledge Ventures appointed to its board of directors a machine learning program capable of making investment recommendations.

An illustration of how far the technology has come: Deep Knowledge Ventures appointed to its board of directors a machine learning program capable of making investment recommendations in the life sciences sector. Dmitry Kaminskiy, senior partner of the Hong Kong-based life sciences venture capital fund, explained the rationale behind the decision. "The variables involved in the long-term success of a biotechnology company are many and complex," he noted. "We were attracted to a software tool that could in large part automate due diligence and use historical data sets to uncover trends that are not immediately obvious to humans surveying top-line data. We plan to incorporate new information from prospective investments into the databases to compare the outcomes against our selected investments."³¹

One of the biggest benefits of cognitive computing is its ability to put the right information at decision makers' fingertips, enabling professionals to make faster, more fact-based decisions. For example, it can quickly sort through a massive internal corporate knowledge base to help a manager find an answer to his question, thus eliminating the time and potential errors involved in manual searches. And because it uses natural language

According to Gartner Maverick Research, "through 2023, one-third of all highly skilled work done by doctors, lawyers, traders and professors will be replaced by smart machines or by less-skilled (non-specialist) humans assisted by cognitive computing technology."²⁶

processing, cognitive computing enables managers to ask questions in their natural language instead of requiring a technology specialist to write complex queries. As a cognitive system continues to learn, it can become adept at recommending the optimal choice, based on relevant variables, from the range of possible options. In doing so, it can help improve the quality and accuracy of humans' decisions.

The potential benefits of cognitive computing are intuitive. However, people are understandably wary about (or even unaware of) the technology and unsure of how, and how much, it will be used in business settings. That's certainly the case among the procurement executives we interviewed. While most saw great potential to automate the procurement function's transactional and manual activities, many expressed skepticism that cognitive systems could eventually replace a large percentage of knowledge work. Of course, no one yet knows how much, or how fast activities will be assumed by cognitive systems. But one thing is certain: Cognitive computing is likely to progress far further than many people are comfortable with today, and its impact on procurement will hinge more on procurement teams' willingness to accept it than on limitations in the technology itself.

Use of Cognitive Computing in Procurement

In our interviews, procurement executives were confident their organization's routine, manual work will become increasingly handled by more intelligent systems in the next five to seven years, including the transactional processes of the requisition-to-pay cycle. They cited a wide range of potential targets, including:

- Setting up and conducting requests for proposals
- Finding relevant suppliers
- Evaluating suppliers' performance

- Creating cost models and industry cost curves
- Analytics and advanced modeling
- Compliance
- Order fulfillment, report generation, reporting and catalog maintenance
- Logistics, picking and packing

A powerful example of how cognitive computing is already improving one aspect of procurement is a pilot implementation of an intelligent agent at a major oil and gas company. This company, which works with a large number of suppliers, is testing the use of the intelligent virtual agent to largely automate the help desk it operates for suppliers to contact when they have questions.

The intelligent virtual agent is the initial contact for suppliers when they query the help desk portal, mimicking the actions of a live person and communicating with suppliers through a chat interface that enables suppliers to ask and get answers in natural language. It continually learns from a body of knowledge it is fed—including manuals, books, wiki pages, process diagrams and other information—and will digest and be able to draw on that information to find the answers to suppliers' questions. The agent is also given all the appropriate instructions, local work orders and procedures that live operators in the help desk have and use as a reference. For instance, if a supplier is looking for a status on an overdue invoice, the intelligent agent likely will first respond with a series of questions (What's your invoice number? When was it submitted? What was the amount of the invoice?). Based on the answers to those, it will be able to search the transactional system and provide a response.

The beauty of this particular virtual agent is that, through natural language processing, it understands and analyzes unstructured text and does essentially the same kind of mental calculations that humans would do to answer questions given the same type of content. It understands synonyms, the meaning behind

sentences, different types of expressions and context. It also can ask clarifying questions when it doesn't understand what a supplier is asking.

According to Gartner, "by 2017 managed services offerings leveraging autonomies and cognitive platforms will permanently remove head count to drive a 60 percent reduction in the cost of services."³² We believe it's that kind of potential that's making enterprises such as the oil and gas company take notice.

A more futuristic example, and one that will take some time to develop, involves a "category advisory cognitive agent" that could help provide guidance on the right category strategy. In doing so, it would assess a variety of dimensions: an organization's progress against savings, compliance and other targets; cumulative experiences; benchmarks; and should-cost models. It could then ask a series of unstructured questions to elicit precise requirements for a given category. Similarly, a "supply risk cognitive agent" could stratify suppliers into their respective risk quadrants. Having done so, it could then continually poll internal and external data sources (including social media, financial industry bodies, requestor feedback and geopolitical exposure) to provide a dashboard of potential risks and propose appropriate mitigation strategies.

Chris Toomey from BASF Corporation predicted, "The whole traditional procurement process is going to be dead... all will be dramatically different if not wholly automated in 10 years."

The picture is less clear, however, when it comes to how technology will affect knowledge work that requires much more judgment and soft skills. Procurement executives in our study were generally adamant that in some procurement activities,

According to Gartner, "by 2017 managed services offerings leveraging autonomies and cognitive platforms will permanently remove head count to drive a 60 percent reduction in the cost of services."³²

humans simply can't be replaced by technology. These include face-to-face negotiations, business requirements gathering, contract reviews, strategic sourcing and generally any decisions that are core and strategic to the business.

"To me, business is about people," said Michael Whitby, chief procurement officer for Lloyds Banking Group. "I need to make it efficient, but actually the real value, and I think the real relationships that you have with suppliers, you'll get through human interaction."

Chris Toomey at BASF Corporation took a more aggressive position. "The whole traditional procurement process is going to be dead," he predicted. "Internal demand development, developing RFxs, conducting bidding events, evaluation of bids, vendor/product master data, order process—all will be dramatically different if not wholly automated in 10 years."

Whether or not technology can and even should, indeed, fully replace human involvement in these areas in the future remains to be seen. But there is no doubt that cognitive computing—today—can dramatically augment activities that require people and may, at some point, fully automate them—much as cruise control, park assist and lane assist in automobiles today will eventually be fully replaced by self-driving cars.

Benefits of Cognitive Computing for Procurement

What often first comes to mind when thinking about cognitive computing is using the technology to gain cost savings through automation. However, automation can generate additional benefits such as quality, consistency and compliance, and even greater benefits where augmentation is enabling better decisions to be made faster, with potentially large impact.

For instance, cognitive systems such as intelligent virtual agents reliably and consistently deliver high-quality service and execute processes in a standardized way that are fully compliant with relevant rules and regulations. They don't get sick or distracted, have "bad" days, need refresher training, or quit and have to be replaced, and they never have to take a break. They are generally much more efficient than humans—in one recent case, an intelligent virtual agent handled 25,000 concurrent chat interactions—so they can significantly reduce the time it takes to complete a task. And if implemented and "trained" well, they can approach or even exceed the quality of service delivered by humans.

Figure 21. One intelligent virtual agent handled 25,000 simultaneous chat interactions



A good example, again, is the help desk. If a company only operates its human-based help desk during regular office hours, but there's considerable customer demand for 24/7 access, the company faces the prospect of incurring huge additional costs to expand its staff to three shifts. But a cognitive system that can handle front-line queries from customers could enable that expansion with minimal cost—mostly, the cost associated with adding a few well-trained human agents who can act as escalation points to the system if needed. Better yet, when an issue is escalated to the human agent, the cognitive system can "listen in" on that exchange and learn from it so the next time it encounters a similar issue, it can handle the call on its own.

Such a system also can make it much easier for a company to serve customers in multiple languages (one virtual agent Accenture works with speaks and understands 20 different languages). And it can make it more cost-effective for a company to comply with government regulations that require data to remain in a particular country: Instead of having to create help desks and staff them with humans in such countries, a company can deploy far less-expensive virtual agents to deal with inquiries in those areas.

"While the power of [a cognitive system] is great, at the end of the day there still need to be proper checks and controls on it," said Chris Toomey of BASF Corporation.

Conclusion

The mere mention of cognitive computing and intelligent agents can conjure up images of computers taking over the world. But while such thoughts make great fodder for movies, reality is much less dramatic. To be most effective, cognitive systems still require appropriate human oversight.

"While the power of [a cognitive system] is great, at the end of the day, there still need to be proper checks and controls on it," said Chris Toomey of BASF Corporation. "It can't become a self-operating entity, any more than somebody sitting at a desk here is. It has to have latitude for decision-making, [but] can't be completely independent."

There's no doubt that cognitive computing is one of the most exciting areas of the technology world. The advancements made thus far in such systems, and those that are yet to come, have the power to transform many aspects of business (not to mention our day-to-day lives).³³ In fact, the increasing use of cognitive computing has a number of significant implications for the organization structure and talent of procurement in the future. As we discussed in Chapter 2, if cognitive computing progresses and is adopted as fully as it could be, companies could expect to end up with a dramatically different procurement workforce in the next five to seven years—one that will require less pure procurement acumen and more business expertise, and that will focus on more strategic pursuits to unlock far greater enterprise value at a far lower cost.

One-to-one Interview Participants

Accenture would like to thank the chief procurement officers, chief supply chain officers, chief financial officers, chief executive officer, chief strategy officer, and senior-level executives in procurement, supply chain and technology whom we interviewed for their insights in shaping this study. While the views expressed do not necessarily represent the totality of opinions received from all contributors, their participation and guidance have been critical.

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About the Research

The research was designed to understand the business and procurement trends that would substantially affect procurement organizations globally in the next five to seven years. We conducted a total of 52 one-hour, one-to-one interviews during which we tested several research hypotheses. Interviews were conducted with executives across a variety of industries and geographies. The majority of executives represent large global multinational organizations with revenues of up to \$130 billion.

Research insights represent the views of current chief procurement officers, chief supply chain officers, chief financial officers, chief technology officers, a chief executive officer and a chief strategy officer, as well as other senior-level executives in procurement and supply chain. We also spoke with senior executive-level digital and technology experts.

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