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October 2013

Opportunity Unlocked

Big Data's Five Routes to Value

IT Advantage

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Preface

Today's business landscape is witnessing a surge in technology-led innovation, propelled by ubiquitous connectivity, cloud-based infrastructure, and big-data analytics. Such innovation threatens to make many of today's business models, value chains, and cost models obsolete. For businesses, creating competitive advantage in this environment demands recognizing the new reality that every company really *is* a technology company. It also demands thinking in new boxes rather than merely thinking outside of old ones.

The October 2013 issue of *IT Advantage* features a range of perspectives and insights on how companies can approach and ultimately thrive in this environment. It kicks off with two articles on big data. The first examines the major applications of big data and discusses how to zero in on the right opportunities. The second discusses how companies that have yet to explore big data can do so.

We follow with a discussion of opportunities that today's digital capabilities present financial services companies for winning and serving customers. An accompanying interview with Peter Weill, chairman of MIT's Center for Information Systems Research, sheds further light on the topic.

Next up is a piece on 3D printing, a technology that is capturing the imagination of growing numbers of pundits. We expound on the technology's implications for business.

The next article is an interview with Cathryn Riley, COO of UK-based multinational insurer Aviva. She discusses her recent transformation of the company's IT and her efforts to turn Aviva into a "digital insurer."

Following that is a piece on a practice common to many companies across industries: IT outsourcing. We argue that, to capture full value from their efforts, companies must institute a comprehensive optimization process for an often underserved lever: contracting and contract management. The issue concludes with an article on digital ecosystems.

I hope you enjoy these articles. Please send any feedback to ITAdvantage@bcg.com.

Ralf Dreischmeier
Global Leader, Information Technology Practice

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OPPORTUNITY UNLOCKED

BIG DATA'S FIVE ROUTES TO VALUE

by Jon Brock, Ralf Dreischmeier, James Platt, and Robert Souza

IN TODAY'S WORLD, NOTHING is certain but death, taxes, and the growth of data. The quantity of information generated from the dawn of time until 2003—some 5 exabytes, according to Intel—is now created every two days. Businesses have long understood that there is value—somewhere—to be extracted from this burgeoning volume of data. And increasingly, they have been able to get at it more efficiently and cost effectively. Yet for all their enthusiasm for "big data," most companies are only scratching the surface of the opportunities that await them. They are analyzing data for insight—an important, value-generating strategy, to be sure—but have yet to exploit the truly transformative role that big data can play in how and where they do business.

The companies that get ahead will be the ones that see and seize the full range of opportunities that big data offers. We envision five major applications: generating new business insights; improving core operating processes; enabling faster, better decision making; taking advantage of changing value chains; and creating new data-centric businesses. Not all of these opportunities will be relevant to every business, but most companies can benefit on multiple fronts. For those that do, the prize won't be just a competitive advantage but, potentially, the ability to reshape the competitive landscape.

Seeing the Big Picture on Big Data

Views on big data have shifted recently for many companies. Skeptics who saw an overhyped route to riches—having been burned, perhaps, by their own costly, complex, and ultimately disappointing efforts to turn data into dollars—are increasingly becoming believers. They're no longer asking *whether* big data can generate value for them but *how* it can do so.

Why the change of tune? Data processing and storage costs have decreased by a factor of more than 1,000 over the past decade. Powerful analytical techniques have emerged. And new technologies like Hadoop and MapReduce mean that data no longer have to be stored in rigidly structured form to be processed (a costly, labor-intensive proposition). Now information can reside in whatever form it naturally takes—from Facebook posts to audio recordings of customer service calls—in geographically dispersed data centers or in the cloud.

Insights that would have stayed buried just a couple of years ago can now be uncovered routinely and often relatively easily. Businesses understand this. In 2013, big data is forecast to drive $34 billion in IT spending, according to Gartner. And the initiatives are growing more sophisticated and more widespread. At Chevron, an in-house analytics platform mines seismic data for insight into

where oil and gas deposits may be located—helping the company focus its drilling efforts and its spending. In New York City, where there are some 1 million buildings but only 200 building inspectors, analytics enable the city to pinpoint those structures most likely to be at risk—increasing the efficiency of its inspectors fivefold.

Indeed, the ability of advanced analytics to address high-priority challenges is so great that we advocate its rapid deployment. (See "How to Get Started with Big Data," on page 7.) Instead of remaining on the sidelines, brainstorming grand strategies, businesses need to get started, get experience, and get results. At the same time, however, they need to understand that what they're doing—and the payoff they're seeing—is only the beginning.

At the heart of big data lies tremendous potential to transform the way companies operate, driving not only new insights and processes but new business models. Big data can spur innovation and agility. It can lead to new revenue streams—even in areas far removed from a company's traditional line of business. In BCG's project work, we are already seeing companies benefit from this broader view of big data. For example, a telecom company is leveraging its mobile network data to offer subscribers one-time, location-based insurance policies. By inferring users' most likely activity from their location (travel, for example, if the subscriber is at an airport), the company can offer highly relevant—and thus highly attractive—products in real time. This is the sort of outside-the-box—and outside-the-sector—opportunity that can deliver huge value.

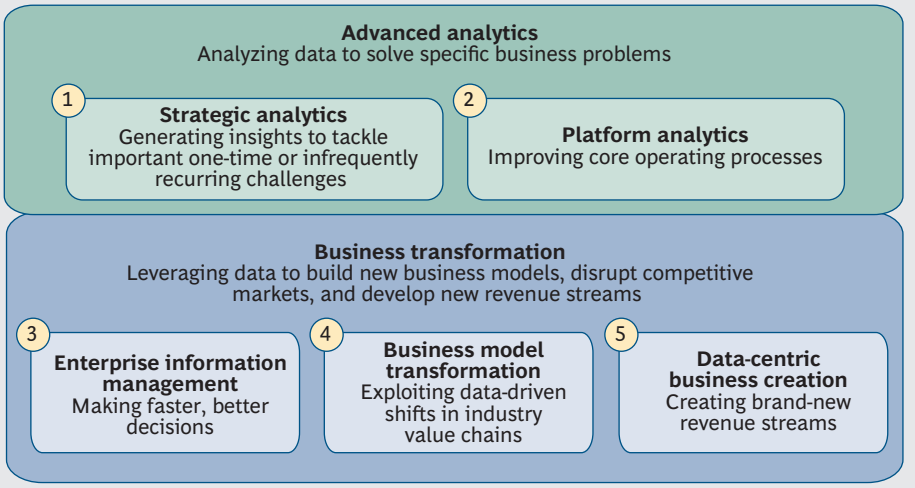
Below we look at the five key applications of big data and how some forward-looking companies are already embracing them—transforming their businesses and, in some cases, even transforming industries. (See the exhibit.)

Generating New Business Insights

Most of the advanced-analytics efforts we see have a tactical focus: leveraging data to get a few key decisions right or to solve specific problems (such as where to open a new bank branch or what coupon to send to the smartphone held by a shopper in a store).

The ability to use information in this way has been greatly enhanced by a combination of developments: more data coming from existing and new sources, greatly improved analytical techniques, and lower processing and storage costs. As a result, companies can incorporate data they hadn't previously used in decision making, such as social-media posts and unstructured data that older tools were

Five Routes to Value from Big Data



Source: BCG analysis.

unable to work with. This has resulted in better, faster, more actionable insights.

Advanced analytics can be applied to a vast array of situations. Vestas Wind Systems, for example, has been able to tackle an important challenge in the wind energy business: where to place turbines. Precise positioning helps maximize energy output over the more than 20-year operational lifetime of a wind power plant. To home in on the optimal location, Vestas analyzes information from a host of sources: wind and weather data, turbulence levels, topographic maps, and sensor data from more than 25,000 turbines that it monitors worldwide. This process gives the company a competitive edge as it helps its customers maximize their return on investment.

Platform analytics can be incorporated into processes in a wide range of industries.

In the financial sector, a client has launched an innovative project that analyzes customers' transaction data to infer the occurrence of major life events, such as marriage or a new job. These are occasions that can trigger interest in high-value financial products (such as a home mortgage or a joint savings account). If a financial institution can identify these critical moments, it can better match customers with the most appropriate promotions—and, even more significant, establish long-term relationships. Working with our client, BCG developed a targeting model that, in its initial stages of implementation, is proving 2.5 times more effective than existing approaches.

Improving Core Operating Processes

The use of advanced analytics need not be limited to one-time or infrequent tasks. In fact, integrating analytics into everyday processes, or "industrializing" them, can be particularly beneficial, as the insights gained can be applied—automatically, repeatedly, and often in real- or near-real time—in key business functions.

Such platform analytics are still relatively rare. Yet companies that have taken this step have seen some powerful results. Visa, for instance, integrated analytics into its fraud-detection processes in August 2011. By March 2013, the system had identified $2 billion in fraudulent transactions—blocking them before money was lost. In the e-commerce sector, Amazon.com uses dynamically generated recommendations—based on each customer's purchasing and browsing history—to drive an estimated 25 percent of its sales. Banks, meanwhile, are using platform analytics in risk scoring, automatically processing a variety of internal and external data to judge a loan applicant's credit-worthiness.

The beauty of platform analytics is that it can be incorporated into all manner of processes in a wide range of industries. Some of the emerging uses might seem surprising—far removed from the consumer-related applications most commonly associated with big data. In Italy, a system called *redditometro* uses advanced analytics to find tax evaders. It looks at data from a host of sources—bank records, credit card transactions, insurance payments, statistical research—to determine an individual's likely spending and whether his or her tax return matches up.

Platform analytics have also proven effective in facilitating preventive maintenance. By analyzing data—often from sensors implanted in or on critical infrastructure—companies can predict when failures are about to occur and intervene before trouble strikes. In effect, troubleshooting becomes proactive rather than reactive. Advanced analytics can look for patterns—such as in the type and frequency of alerts—that have historically presaged failures. This approach has enabled one of our clients to predict incidents an hour or two before they occur, providing time for effective intervention. As a result, critical operational downtimes have been cut by more than 50 percent.

Making Faster, Better Decisions

The availability of accurate, real-time management data is critical to decision making (about where to focus R&D efforts, for example, or how to price new products). Yet at

most companies, this information tends to be fragmented across the enterprise, with every department working with its own "version of the truth." Making matters worse, this information is often out of date by the time it gets factored into decisions—if it gets factored in at all. In many enterprises, a great volume of potentially helpful data—in both structured and unstructured form—is never used. The result: conflicting decisions, untimely decisions, wrong decisions.

Not surprisingly, one of the most promising applications for big data is in enterprise information management (EIM). The idea is not just to collect and process operational data but also to present it in a clear, consistent, readily available manner throughout the organization—improving the speed and the quality of decision making. We see the ideal EIM system as one that combines a single set of data—from sources both inside and outside the company—with intuitive graphic elements like on-screen dashboards. The result is an accessible, uniform, real- or near-real-time view of operations that allows different departments to speak a common language and base their decisions on the same facts.

Taking Advantage of Changing Industry Value Chains

Big data is upending traditional value chains, presenting risks to companies that don't respond accordingly—and presenting opportunities to those that do. Advanced analytics and new data sources are enabling companies in one sector to play a role in the products and services of other sectors—even ones far removed from their traditional line of business. This is blurring the boundaries between industries and changing competitive dynamics. (See "The Age of Digital Ecosystems: Thriving in a World of Big Data," on page 33.)

Companies that transform their business models in parallel with these shifts will find new doors opening for them. For example, in the home thermostat market—a traditionally staid sector with a small, settled list of competitors—a startup called Nest has been able to challenge the incumbents by introducing a thermostat that employs analytics to learn customers' preferences and use patterns and adjust itself accordingly. Nest's novel, data-driven business model enabled it to enter a market long closed off to outsiders.

> A promising application for big data is enterprise information management.

Yet the payoff isn't just for new players. For established companies, new data-driven business models can help keep—and even expand—share in an existing market. In the automobile insurance sector, for instance, Progressive uses driving data—collected from a small device customers plug into their car's diagnostic port—to help calculate premiums based on actual driving habits. Among the data analyzed: when and how far the customer drives and the number of hard brakes he or she makes. Good drivers are rewarded with lower premiums—on average, a savings of 10 to 15 percent. For drivers who have put their Grand Prix dreams behind them, that can be a compelling value proposition.

Creating New Data-Centric Businesses

The large volume of information that companies generate—and the insight it affords—may well have value to other organizations, both within and outside the industry. Social-media sites, for example, often capture data pertaining to users' preferences and opinions—information of interest to manufacturers that want to focus their product-development efforts and marketers that want to target their product campaigns. Mobile network operators routinely collect subscriber location data—of value to retailers that want to know where consumers are shopping. By making this information available—for a price—companies can develop new revenue streams. While the sale of personal information traceable to specific individuals can raise privacy concerns, companies can greatly reduce sensitivities by aggregating and ensuring the anonymity of data.

BCG is working with a large international bank to create new data businesses by leveraging transactional information—such as credit card activity—captured in the bank's normal course of business. The idea is to provide companies from different industries with information they can use to perform their own business intelligence. But this is just a start. We envision external sources—such as social-media information—playing a key role in the coming years, enriching the bank's internal data and further enhancing its value proposition to its data customers.

The Road Ahead

Identifying relevant applications is, of course, just the first step in deriving value from big data. New capabilities, new organizational structures (and mindsets), and significant internal change will also be required. (We will address these challenges in future publications.) But businesses should not underestimate the importance of zeroing in on the right opportunities. They will need to think outside the box, embrace new models, and even reimagine how and where they do business. A culture that encourages innovation and experimentation, and even some radical thinking, will serve this undertaking well—but so will calling in outside help when needed to assess, prioritize, and develop the different routes to value.

Big data isn't just changing the competitive environment—it is transforming it. Businesses need to change along with it. Seeing where the opportunities lie and creating strategies to seize them will help companies turn big data's promise into reality—and gain new customers, new revenue, and even new markets along the way.

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HOW TO GET STARTED WITH BIG DATA

by Robert Souza, Rob Trollinger, Cornelius Kaestner, David Potere, and Jan Jamrich

THE USE OF "BIG DATA"—vast amounts of varied, fast-moving information—has the potential to magnify and accelerate the ability of businesses to understand customers and fine-tune products. Despite the availability of new techniques to make sense of big data, many senior leaders we encounter today are having a hard time figuring out where to start.

We see three overarching ways in which business leaders can unlock the value of big data:

- Develop a big-data strategy that capitalizes on a company's most important data assets.
- Deploy more innovative advanced-analytical approaches to address the highest-priority challenges and processes involving big data.
- Determine how big-data transformation can improve existing business models and create entirely new revenue streams.

By far the quickest path to value over the short term is the second approach. By pushing the envelope in the fast-moving area of advanced analytics, companies will quickly learn what works best for them, where the value lies, and how to expand their capabilities over time. Such rapid learning can greatly inform the overall big-data strategy.

This article offers four questions to explore as you experiment with advanced-analytical approaches to big data. Answers to each one can help create immediate clarity about this seemingly vast topic.

Why Get Started Now?

For a long time, many executives thought it was difficult or dangerous to get into the big-data space. Burned by past experiments with large-scale customer-data initiatives that racked up excessive IT costs and failed to generate sufficient results, they have grown gun-shy about the topic. Bad memories of fizzled efforts have led some companies to get stuck in a state of "big-data paralysis."

But these companies are overthinking things. It's actually never been safer or easier to get started with big-data solutions. In fact, the rapid evolution of the field has made advanced analytics accessible to just about any company. Everything that a company needs in order to analyze large, complex data sets is now within arm's reach. Three improvements stand out:

- *Increasing Speed and Decreasing Costs of Infrastructure and Hardware.* The amount of data that can pass through a fiber-optic cable continues to double every nine months. In parallel, processor and storage

costs have decreased by a factor of more than 1,000 over the past decade. (See Exhibit 1.)

- *Better Approaches to Utilizing Hardware.* Emerging technologies, in-memory processing, and accessible analytics platforms are enabling the processing of large data sets on thousands of servers distributed across the cloud. In addition, applications that can process big data sets now cost only a few thousand dollars rather than the millions they cost a decade ago. Now, customers can buy only what they need, when they need it.

- *Improved Availability of Technical Talent.* Finally, data analytic skills are becoming more widespread in the workforce, with major universities producing increasing numbers of graduate-degree holders who are focused on all aspects of advanced analytics.

How to Define Big Data

By now, leaders have no doubt heard the term "big data" used repeatedly in the media in different ways. Before we explore how to use advanced analytical techniques well, we must be clear about the meaning of big data.

Big data describes the large amounts and varieties of fast-moving information that can be processed and analyzed to create significant value. We'll address three of the key characteristics first:

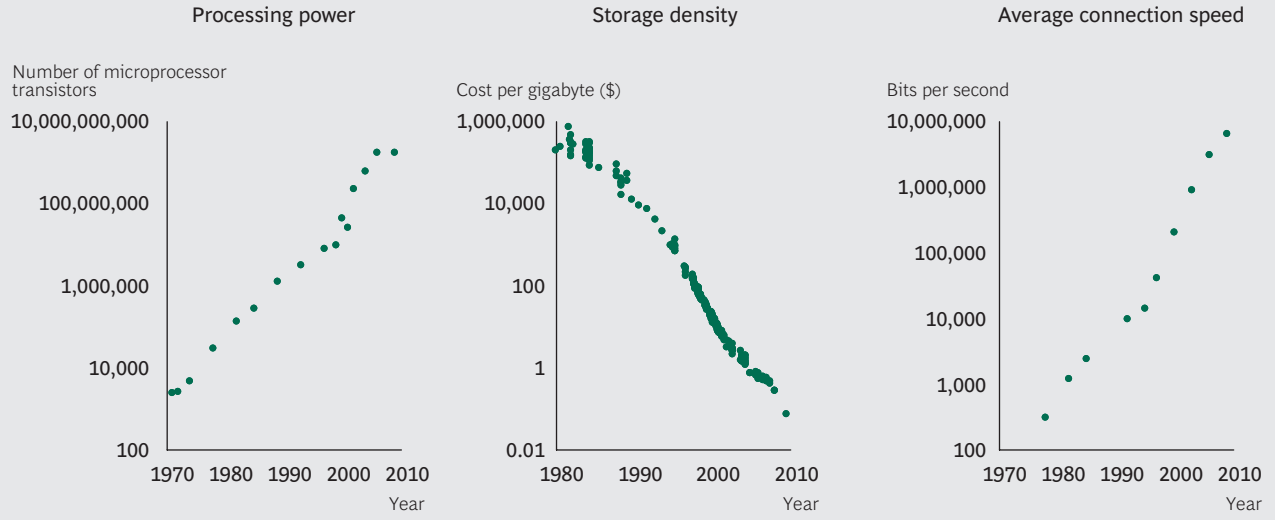
- *Volume.* Data that have grown to an immense size, prohibiting analysis with traditional tools

- *Variety.* Multiple formats of structured and unstructured data—such as social-media posts, location data from mobile devices, call center recordings, and sensor updates—that require fresh approaches to collection, storage, and management

- *Velocity.* Data that need to be processed in real or near-real time in order to be of greatest value, such as instantly providing a coupon to customers standing in the cereal aisle based on their past cereal purchases

Exhibit 2 shows the rapidly expanding nature of each of these three types of data. The three dimensions combine to create data sets that are often quite different from the traditional data a business collects about offers, purchases, and segments. The retail industry, for example, misses out on an estimated $165 billion in total sales each year because retailers do not have the right products in stock to

EXHIBIT 1 | Recent Advances Have Made Big Data Accessible to a Much Broader Audience



Sources: Intel; ADB; IBM; archive.org; http://ns1758.ca/winch/winchest.html, courtesy of Matthew Komorowski; http://www.mkomo.com/cost-per-gigabyte.
Note: Internet speed is based on the average advertised download speed purchased by consumers, according to the CSG network (before 1994), the FCC (1994–2009), and the OECD (2011).

Exhibit 2 | The Volume, Variety, and Velocity of Data Are Expanding Exponentially

Data volume	**Data volume increases every day at a rate of 2.5 exabytes, or 2.5 billion gigabytes** • The volume of Wal-Mart's hourly transaction data is 67 times that of what is contained in the Library of Congress • Smart meters in China alone will generate 13.3 trillion readings in 2020 • Twelve terabytes of tweets are created each day
Data variety	**Content comes from more-diverse sources and formats** • Data can come from smartphones, sensors, RFIDs, GPS devices, transactions, and more • Data can be in the form of databases, video, speech, social-media posts, links, tweets, text messages, and more
Data velocity	**Faster analytics unlock value and reduce risk** • Organizations are analyzing millions of trading events per day to identify securities fraud • Organizations are analyzing hundreds of video feeds in real time to identify security threats

Source: BCG analysis.

meet customer demand. Big-data analysis allows companies to more quickly understand sales trends and incorporate more accurate forecasting, ultimately increasing customer loyalty and revenue.

Where Does the Opportunity Lie?

Many companies tend to struggle with a fourth dimension: value. Amid efforts to capture larger and more-diverse data sets, incorporate real-time social-media and location data, and keep up with the evolving technology landscape, leaders often lose perspective on how they can create value from advanced analytical approaches to big data.

Opportunities for value creation vary across industries. In retail, advanced analytical approaches often match well with strategies involving promotional effectiveness, pricing, store locations, and marketing at the individual level. In the energy industry, on the other hand, the emphasis is more often on making use of smart-meter data and optimizing physical assets, such as equipment and plants. In financial services, effective areas often include risk scoring, dynamic pricing, and finding optimal ATM and branch locations, while in insurance, the areas might include claims fraud, reimbursement optimization, and the tracking of driving behavior.

To identify value for your company, look for areas that have the following characteristics.

The volume of data matters. The outcome will sometimes be different if you analyze all the data as compared with sampling just a part. To target individual customers, a retailer needs to understand the entire purchase history of a given customer and how, for example, it is different from that of other customers. Using just a sample of customers or their transactions will lead to an incomplete picture, making promotional efforts less effective.

Consider the case of Cardlytics, an Atlanta-based startup that helps retailers sell to "markets of one." Four of the top ten U.S. banks use the service to analyze hundreds of millions of customer transactions each week—a tremendous amount of data—in order to offer retailers the ability to customize promotions right on a customer's bank statement. Because the offers are based on purchase behavior and where an individual customer shops, they are highly targeted. Merchants that use the service can reach customers, or competitors' customers, in a simple, targeted way that can be tracked through actual usage. Response rates average 15 to 20 percent, as compared with the low single digits for most traditional campaigns. Consumers save money without having to print out coupons or enter promotion codes—the discounts are automatically credited to their statements. And banks earn extra revenue and offer their customers more rewards, without a heavy IT investment and without the data ever leaving the banks' servers.

The variety of data matters. In some cases, the outcome will be different if a company analyzes diverse data types, ranging from structured data that can fit in a traditional relational database to the unstructured data that come from social-media posts and elsewhere and are difficult to map. When vast quantities of data are combined with fast-moving, unstructured social-media data, for instance, it can become very difficult to analyze with old-fashioned techniques.

As an example, there's tremendous value in accurately predicting churn at a customer-by-customer level at telecom companies. If a company offers discounts to people who would have stayed anyway, it has wasted its money. A lack of appropriate targeting can also make it overlook people who might leave for a competitor.

Companies can start with advanced analytics through teams, tools, and testing.

One company tackling this challenge is Telekomunikacja Polska, part of France Telecom-Orange Group and the largest fixed-line provider for voice and broadband services in Poland. The company wanted to quickly find ways to predict and address churn among its customers more effective than the traditional methods, including analysis of declining rates of use and calculations of lifetime customer value based on how long customers stayed with the service and how much they spent.

The company decided to build a "social graph" from the call data records of millions of phone calls transiting through its network every month—looking, in particular, at patterns of who calls whom and at what frequency. The tool divides communities into roles such as "networkers," "bridges," "leaders," and "followers." For example, it detects the networkers, who link people together, and the leaders, who have a much greater impact on the network of people around them. That set of relational data gives the telecom-service provider much richer insight into who matters among those who might drop its service and, therefore, how hard to try to keep its most valuable customers. As a result of the approach, the accuracy of the company's churn-prediction model has improved 47 percent.

The velocity of data matters. In other cases, companies need the latest real-time data to feed into decision making. Lack of that knowledge can mean an increase in risk. The faster a company reacts, the more likely it is to make a sale—or to prevent a customer from defecting to a competitor.

For example, insurers such as Allstate are beginning to offer pay-as-you-drive plans that incorporate a deluge of real-time customer-driving behavior gathered through devices installed in cars. Sensors measure how fast an individual customer drives, how much he or she drives, and how safely he or she navigates the roads. Signals of someone who is a higher risk can include hard braking, accelerating, and turning, as well as the number of miles driven at night or in rush-hour traffic.

Participating customers receive a discount on their next bill once they establish a baseline for their driving behavior over 30 days. They can also go online to track their performance, which tends to increase their loyalty. Likewise, insurers can avoid putting effort into retaining riskier customers, and they can increase these customer's rates to reflect what they learn about their overall risk pool.

Which Initial Steps to Take

Companies can get started with advanced analytics through what we call the "three Ts" of big-data effectiveness: teams, tools, and testing. Each offers an opportunity to start small, deliver tangible results, and scale up what works.

Build the right team. You need a SWAT team for analytics made up of well-rounded experts in the field. A diverse group of experts on narrow topics won't produce results quickly enough. A large company should start with a team of five, for a total people cost of roughly $1.5 million. With each member of the team, companies need a combination of high-level analytical capabilities, technical familiarity with advanced-

analytics platforms, and a clear business perspective to discern which solutions are deployable and which are not. Team members don't have to be world-class on each dimension, but they do need strengths in each of the three skill sets. In many cases, the right combination of skills and experience is not available inside organizations. Partnerships often offer a shortcut to delivering value in such situations.

Deploy the right tools. You should next support these teams with the right tools to enable success. Each member should be able to leverage cloud infrastructure for his or her work. You can outfit each person with a virtual machine and massive amounts of storage for about $15,000 per year. Many industry-standard tools cost only $5,000 to $15,000 per seat. The R open-source programming environment is free.

Test and learn the most effective approaches. Finally, run two- to three-month experiments that push for rapid results and implementation. This forces you to put a timeline on your analysis. You can't wait around for the perfect infrastructure or solution—the space is moving so quickly that the longer you wait, the further behind you'll be. If you're doing things right, you'll be learning what success means, what you discovered about your capabilities, and what kinds of infrastructure you need. In the process, you'll discover how resistant the organization is to taking advantage of advanced-analytical approaches to big data, which types of problems and data work best, and what other challenges you could apply your approaches to.

The experience of Aviva, the U.K.'s largest insurer, illustrates all three best practices. Creating Aviva's new Driving Behavior Data offering involved both developing algorithms to connect driving behavior with prices and creating a smartphone app. Instead of buying expensive systems, Aviva made a minimal initial investment and used a small number of developers. This enabled the team to get the first beta app to customers within five months. Over the next six months, the team refined the app and the customer experience based on rich data from thousands of driver journeys. In the process, it delivered a number of upgrades to the app—for example, enabling customers to share their scores on Twitter and Facebook. The additional knowledge about individual customers allows more-sophisticated insurance ratings based on how people actually drive rather than how similar types of people drive. Aviva can now offer better discounts to good drivers and create a more appealing product. So far, the app has been downloaded thousands of times, and plans are under way to deploy it in markets outside the U.K.

Or consider what has taken place at one North American food and beverage retailer. Not only does the company sell 30,000 individual items, but prices vary by location and market condition. And costs can change as often as four times per year. As a result, the retailer makes up to 120,000 price changes annually. The company, therefore, saw an opportunity to centralize its highly complex, high-data-volume pricing decisions. Using inexpensive tools and a team of only 11, the retailer was able to increase pricing accuracy and responsiveness and to deliver tens of millions of dollars in incremental sales and profit.

With these kinds of small steps, results are definitely possible. Smart companies that stick a paddle into the river of fast-moving data can begin to chart a direct course to creating significant value.

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CUSTOMER-CENTRICITY IN FINANCIAL SERVICES GOES DIGITAL

by Ralf Dreischmeier and Benjamin Rehberg

In a previous article, The Boston Consulting Group argued that, for retail banks, a focus on customer-centricity—defined as a way of operating "based on trust and fairness that uses knowledge of customers to meet their needs and achieve sustainable, valuable, long-term relationships"—is becoming an increasingly important differentiator in the marketplace.[1] The same holds, we believe, for financial services companies broadly. Tomorrow's winning players, we expect, will be the sector's most customer-centric companies. They will have developed a truly deep understanding of their customers and will be able to satisfy their wants and needs in a manner that meets, if not exceeds, expectations in all critical areas, including product selection and availability, interaction experience, service quality, channel accessibility, and communications.

Rapidly evolving digital capabilities—particularly mobile, social-media, big-data, and cloud technologies—offer financial services companies entirely new opportunities for understanding, serving, and engaging customers. These capabilities will be powerful allies in the pursuit of greater customer-centricity. Many companies recognize this but—given the range of possibilities and the speed with which the technology is advancing—are uncertain about how to proceed. Yet time to think things through fully and at an unhurried pace is a luxury that many businesses might not have. Customers' expectations regarding what is possible in today's digital landscape continue to rise—as does the ease with which a customer can identify a competitor that outdelivers and move his or her business.

Whether by carrot, stick, or a combination of the two, then, most financial-services companies will be propelled further into the digital space as they strive for greater customer-centricity. Our advice: be bold and proactive—even if it means making mistakes. For those that move quickly, there is high potential for sizable early-mover advantages. Indeed, a handful of companies are already pushing the envelope aggressively on this front and reaping rewards.

The Digital Edge

Today's evolving digital capabilities can help financial services companies achieve greater customer-centricity by breaking some of the key compromises the industry has had to wrestle with historically. In the past, the form, frequency, and caliber of companies' interactions with customers have been governed to a great extent by operational limitations. Legacy systems and back-office restrictions (for example, independent computer systems and data centers that are siloed by business line) have curtailed companies' options regarding product design and delivery,

targeting, communications, and service levels in general. The notion of being able to serve customers when, where, and how they want to be served, with products that meet their specific needs, has remained more a vision than reality.

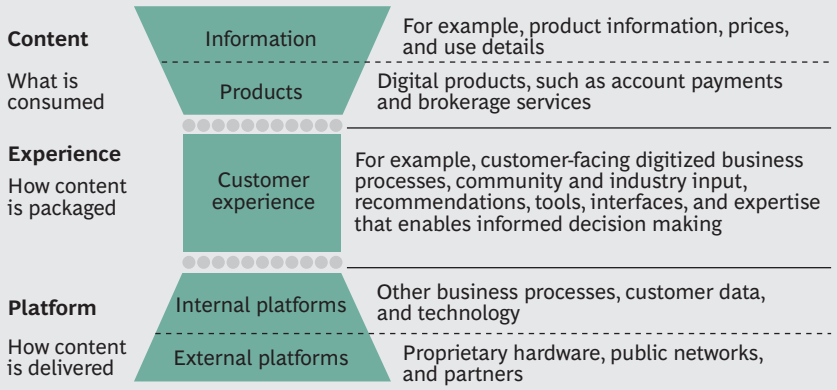
Tomorrow's champions will exploit the possibilities afforded by customer-centricity.

But available digital capabilities can change the game.[2] They can liberate financial services companies from these constraints by enabling the delinking, and subsequent loose rejoining, of content (that is, *what* is consumed), experience (*how* it is consumed), and platform (how it is *delivered*).[3] (See the exhibit below.) The resulting ability to modularize, package, and deliver content (including products, services, and information) in new ways—supported by ubiquitous mobile Internet access through, for example, smart devices, cloud technologies, and service-oriented architecture—opens up a wide range of new options for greater customer-centricity.

To get a sense of the possibilities, consider a highly popular service that many banks already offer customers: ATM locator maps that can be accessed with a mobile phone. In the not-too-distant past, getting such information (literally) into customers' hands would have been highly difficult, to say the least. Now, however, it is relatively straightforward. And, critically, the bank, by "mashing up" digitally enabled capabilities made available by others—such as mobile data access through the mobile-phone-service provider, a software delivery ecosystem through an app store, GPS technology included in the smartphone, and the digital map provided by a third-party Web service—can deliver this service without having to make its own material investment. All the bank has to do is provide its ATM-location data and create the app that serves as the conduit for the desired customer experience.

Tomorrow's champions of customer-centricity will, no doubt, actively exploit the possibilities that this new reality affords. What suite of capabilities will tomorrow's state-of-the-art, digitally enabled players possess and deploy? The following scenario is based on trends we have observed in our client work. Companies will utilize a big-data approach to understand direct and indirect communications and feedback from customers and prospects, including communications and feedback received through social media. They will use that information, coupled with hypothesis-driven analytics, to develop and tailor personalized products, services, delivery methods, and communications.

Digitization Offers New Opportunities for Linking Content, Experience, and Platform



Source: Center for Information Systems Research, MIT Sloan School of Management.

Companies will combine these with the capture and study of every transaction and touch point they share with customers through customer-relationship-management software to determine how they can improve the caliber of their interactions. They will model and test new products regularly, creatively, and efficiently—in specific regions, among specific customer cohorts, and for specific time periods—to glean new insights, employing a "fail fast, fail often" philosophy. They will present customers with a truly user-friendly and unified experience that is consistent across channels. The result will be greater customer satisfaction—coupled with a lower cost-to-income ratio.

A Current Exemplar: USAA

USAA is a leader in digitally enabled customer-centricity in the financial services sector. The Texas-based diversified financial-services player, whose products and services include banking, property and casualty insurance, credit cards, financial planning, and car-buying advice, caters to individuals (and their families) who currently serve or have served in the U.S. military. Its membership exceeds 8 million.

True customer-centricity demands significant changes at the organizational level.

The company is renowned for its focus on and deep relationships with customers. Its Net Promoter Score, for example—a widely recognized measure of customer loyalty—is consistently superior to the scores of its competitors: the company's 2012 score of 83 percent stands well above the industry average.[4] A major factor behind the company's success on this front has been its early recognition of and ongoing emphasis on the opportunities digitization affords. USAA was the first company to introduce mobile-phone check deposits using photos, for example. Coupled with the company's service-oriented IT architecture, digitization is, in fact, the critical enabler of USAA's highly successful "life events" approach, which is centered on meeting members' needs at various life events and stages (such as getting married, saving for a child's college education, and retiring).

Digitization also underpinned the creation of the company's unique member-experience initiative, which supports the strategy by integrating USAA's various lines of business into a single unified organization. (See the sidebar, "USAA's Wayne Peacock on Customer-Centricity.") And digitization, particularly the opportunities afforded by today's technologies, remains a vital part of USAA's ongoing efforts to improve and expand the customer experience. USAA customers can now, for example, use their mobile phones to pay their bills with text messaging, trade stocks with a mobile app, and change their ATM and debit-card personal-identification numbers.

The company's customer-centricity has been enabled by many other capabilities built over the years. Technology-driven efforts, including the early creation of a single file for each customer, the use of common frameworks and integrated middleware, adherence to principles of good engineering, and the integration of business and IT, have been critical. But actions on the cultural front, including strong commitment from leadership, a clear mission statement, an understanding that this would be a long-term effort, regular communication, and well-considered job training and rotation, have also been important. Organizational moves—for example, the creation of connect-the-dots functions, forums for the discussion of integration challenges, and the institution of metrics and a rewards system—have also played roles.

Getting Started

Although digital capabilities are the linchpin, they are not, by themselves, sufficient for achieving meaningful levels of customer-centricity, as USAA's example illustrates. True customer-centricity also demands significant changes at the organizational level, including changes in governance—for example, organizing around the customer rather than the product or channel. And it necessitates overhaul-

ing the company's culture to ensure that a paramount focus on the customer's interests becomes firmly embedded in the company's DNA. The company must change its orientation from How can we sell more of product X, Y, or Z? to What does the customer really want, and how can we provide it?

Actively committing to greater use of digital capabilities is an essential first step toward

USAA'S WAYNE PEACOCK ON CUSTOMER-CENTRICITY

Wayne Peacock is the executive vice president, member experience, at USAA. He oversees the company's marketing, channel management, sales, and service functions. He recently spoke with Jeanne Ross (director) and Martin Mocker (research scientist) of the Center for Information Systems Research at the MIT Sloan School of Management about USAA's focus on the customer. Below are excerpts from the discussion.

How has digitization enabled USAA's transition to a customer-centric model?

Its main contribution is that it has afforded us a single, unified view of the customer. Whether a customer is doing business with a USAA property and casualty company or the bank, or has purchased product A, B, or C, he or she has a unique identifier that transcends all of the individual operations at USAA. This has given us a huge leg up in our ability to be customer-centric.

What is USAA's ultimate aim regarding customer-centricity?

We truly aspire to become our members' trusted advisor, to be there every day and at those important times when our advice can help them achieve financial security.

Have the company's efforts toward customer-centricity been reflected in your client-based metrics?

Yes. Our efforts have paid us huge rewards, particularly in member loyalty, member retention, and member advocacy.

Has having a dedicated organization focused on the customer experience enhanced the company's efforts toward customer-centricity?

Yes. This is about serving members in a holistic way and over their entire lifetime. We recognized that to do that really well, we needed to get the company organized around members and their needs rather than around product silos or regulated lines of business. The creation of our member-experience division essentially did that. It integrated our frontline teams and call-center staff in a way that better serves members and better meets their needs by reducing the number of handoffs from one agent to the next. We then tied this into our digital channels and marketing function, because we saw that what our members were going through in life often required solutions that spanned our product silos and distribution channels. If we were organized the way we were in the past, members would be forced to jump across those silos, making for a completely different experience.

What have been the key factors that have allowed USAA to successfully execute an integrated strategy centered on members' life events?

First, we have a passion for serving members. Second, we have a leadership team that is calibrated around one "North Star," which is USAA's mission to serve the military community. Third, our leadership team's close physical proximity means that we're able to come together and talk about things face-to-face and understand both the qualitative and quantitative issues around tradeoffs. And we're getting better and better at doing that. In fact, the level of leadership alignment is probably the most powerful factor behind our success.

greater customer-centricity. It can also serve as a catalyst for broader customer-centricity efforts. If your company is just starting on the journey, begin by taking a critical look at the company's value chain and determining where digital capabilities might be deployed to support one or several of your core strategic aims. Define your precise objective: for example, We will employ digital technologies to improve our understanding of customer preferences regarding retirement-focused products, and we will use that understanding to improve our offering, customer experience, and, ultimately, our market share. Indeed, a better understanding of customers should be the primary focus for virtually any company starting down the digital path toward greater customer-centricity. Once an objective has been set, start with a pilot, leveraging your company's internal best practices.

FOR MOST FINANCIAL-SERVICES companies, achieving game-changing levels of customer-centricity through the leveraging of digital capabilities will be a multiyear journey. But there is no gain in waiting.

NOTES

1. See *Customer-Centricity in Retail Banking,* BCG Focus, March 2012.
2. See "Winning in the Digital Economy: A New Focus for the CIO," BCG article, July 2011.
3. Peter Weill and Stephanie L. Woerner, "Optimizing Your Digital Business Model," *MIT Sloan Management Review* 54, no. 3 (Spring 2013).
4. Satmetrix, Net Promoter benchmark study of U.S. consumers, 2012. The Net Promoter Score is calculated by taking the percentage of "promoters," defined as "loyal enthusiasts who will keep buying and refer others, fueling growth," and subtracting the percentage of "detractors," or "unhappy customers who can damage your brand and impede growth through negative word of mouth."

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PETER WEILL ON DIGITALLY DRIVEN CUSTOMER-CENTRICITY

AN INTERVIEW WITH THE CHAIRMAN OF MIT-CISR

Peter Weill is chairman and senior research scientist at the Center for Information Systems Research (CISR) at the MIT Sloan School of Management. He recently spoke with The Boston Consulting Group's Benjamin Rehberg about ways that financial services companies can use digital technologies to drive customer-centricity.

Peter, you and your team have been studying digitization for some time now, and you are a thought partner of companies worldwide that are seeking to utilize digitization to achieve greater customer-centricity. In your experience, what key changes must a company make to succeed on this front, and how drastic do the changes need to be for a company to achieve sustainable advantage?

To dramatically increase the quality of the customer experience using digitization usually does require fairly radical organizational surgery. USAA, for example, added a customer experience group, organized by life events, that sits between product owners—those responsible for the company's product lines (including credit cards, car loans, and mortgages)—and the customer. (See "Customer-Centricity in Financial Services Goes Digital," on page 12.) In financial services companies that use this type of arrangement, the customer experience group is responsible for ensuring a great multiproduct customer experience, measured with such metrics as the company's Net Promoter Score and cross-selling effectiveness. The product owners are typically measured by the P&Ls for their respective products and by their degree of innovation.

For most financial-services companies, this means a fairly radical reorganization. But if you believe, as I do, that financial services is no longer a product play—that today it is more a multiproduct customer-experience play—packaging products organized by life events, for example, makes great sense. This, however, typically requires product consolidation.

PETER WEILL

Peter Weill is chairman and senior research scientist at the Center for Information Systems Research (CISR) at the MIT Sloan School of Management. His work centers on the role, value, and governance of digitization in enterprises and their ecosystems. In 2008, Ziff Davis recognized Weill as number 24 of "The Top 100 Most Influential People in IT" and the highest-ranked academic. He has written award-winning books, journal articles, and case studies. His work has appeared in *Harvard Business Review, MIT Sloan Management Review,* and the *Wall Street Journal.*

Prior to joining MIT Sloan in 2000, Weill was foundation professor and chair of management (information systems) at Melbourne Business School, as well as a member of its board of directors. He continues his association as an MBS professorial fellow.

What is the role of the CIO in this change journey? Can he or she take the lead?

The CIO needs to ensure—using compelling data and case studies—that the conversation about how digitization threatens or provides opportunities for the company's business model occurs at the right level. In most cases, this conversation should take place at the executive-committee level in which the CEO, working with the heads of the business units, must balance enterprise performance with the performance of the individual businesses. Simultaneously, the CIO can help prepare for the transformation by consolidating—typically starting with infrastructure and then progressing to applications—business processes (such as customer acquisition) and products, from the bottom up.

Our experience has been that financial services companies are relatively new to process optimization excellence, so this can entail significant cultural change. Many financial-services firms are industrializing their core banking environments, specifically, borrowing process optimization approaches from successful manufacturing companies such as Toyota. The product consolidation conversation is particularly challenging: there are often local winners and losers, so this needs to be managed by the COO or CEO, who is positioned to see across the entire organization. But these consolidation efforts have sizable potential benefits, particularly for reducing cost-to-income ratios and ensuring a better customer experience.

Do financial services companies require new skills to make this transformation?

Yes, especially in the areas of process optimization, mobile-app development, big-data analysis, and social media. Partners can provide a fast-entry point for getting access to these skills, but in the end, the skills have to be absorbed into the company's DNA. Case studies of other companies making the transformation can be very helpful and motivating for the company's executives when they encounter the inevitable challenges.

To be successful in this transformation, most companies also need to enrich a number of their existing skills. It helps to have benchmarked performance against competitors, particularly relating to the customer experience, product complexity, time to market, and the number of products per customer—that is, the success of cross-selling efforts.

How important is the role of digitized platforms?

They play a critical role. At MIT CISR, we think of these platforms as shared digitized business processes and data that help companies flawlessly execute their core activities while maintaining world-class service levels and unit costs. The creation of the digitized platform requires the senior company leaders to agree on what is core and should be reused across the company (for example, the customer acquisition process and the credit-scoring process). The CIO and his or her team then lead the creation of these platforms.

Commonwealth Bank of Australia, for example, over a ten-year period, implemented a series of platforms that have helped make the company one of the ten top-performing banks worldwide. One of its platforms enables the bank to operate as an omnichannel company that gives the customer a seamless experience across all channels. CBA has also recently implemented a new core banking platform that has significantly consolidated, streamlined, and industrialized the back office, with the goal of increasing CBA's flexibility in offering new products, services, and bundles at lower costs.

Peter, you have been traveling the world for many years and have talked with many organizations, CEOs, and CIOs. Are there companies that stand out in your mind as having been particularly successful in transforming themselves through digitization and a sharp focus on the customer? And are there commonalities among those companies?

I feel fortunate to have had opportunities to work with great companies across the globe on leveraging digitization to achieve breakthrough performance. Among the companies that have inspired me the most are two I've mentioned already: USAA and CBA. Another is Banco Bilbao Vizcaya Argentaria.

Beyond traditional financial services, a company that has particularly impressed me is Seven-Eleven Japan. It empowers its sales clerks—who manage product categories and are, in many cases, part-time employees—to make hypotheses about which items will sell, on the basis of weather forecasts, school holidays, and their own understanding of their customer base. These hypotheses become orders, and the goods arrive, typically the next day, at 7-Eleven stores in downtown Tokyo. A logistics feat in itself. In the following days, the clerks receive feedback on handheld computers that reflects the accuracy of their hypotheses. By providing local empowerment and fast feedback that lets its sales clerks make better decisions over time, and by digitizing and automating its ordering process, Seven-Eleven Japan has become a true learning organization. In addition, the company has added financial services (including highly functional ATMs), bill payment, and payment-

by-mobile-phone capabilities to each store, building on its already great customer experience. Such spanning of industry boundaries to enhance a company's offering is both a major opportunity afforded by digitization and, for some companies, a major threat.

I think that what has helped these companies become successful is their understanding that digitization offers opportunities for dramatically improving the customer experience and replicating that improvement across the whole company while reducing costs and decreasing time to market. But achieving this takes major organizational surgery. It's illustrative that, in these companies, it's much more difficult to tell who works in the IT unit and who works in the lines of business. This is evidence of the team approach required to blend the customer, process, data, and financial focus to achieve breakthrough performance.

Peter, many thanks for your time and insights.

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PREPARE FOR IMPACT

3D PRINTING WILL CHANGE THE GAME

by Stefan A. Deutscher, Marc Schuuring, and David Ritter

3D PRINTING, KNOWN MORE formally as additive manufacturing, is capturing growing interest from both industry and consumers. Opinions on the technology and its ultimate significance run the gamut. Some pundits consider it the spark that will launch the next industrial revolution; others deem it a fringe technology that is destined to remain the domain of geeks and hobbyists. What is the reality?

We believe that 3D printing will, in fact, prove a game changer for large swaths of industry—and, critically, that its impact will be felt far sooner than many people expect. The technology is already well developed and continues to advance; costs and prices are falling; investment in the industry, while still quite small relative to that in mobile technologies and wireless infrastructure services, is accelerating; and remaining hurdles to adoption are being surmounted. In short, 3D printing is on a fast track to mainstream adoption—and the time for companies to weigh the ramifications for their business is now.

The Potential to Reshape Industries

3D printing has been on the scene since the mid-1980s. It was conceived as a means of enabling prototyping, and prototyping remains its primary use. Its evolving strengths in this realm continue to win new users to the technology, particularly in manufacturing, where a robust 3D-printing capability in the design lab is quickly becoming table stakes.

> As the technology continues to develop, the rapidly shrinking list of things that 3D printers *can't* produce will only shrink further.

But 3D printing has expanded beyond prototyping to the delivery of finished goods, where it stands to have an equally transformative impact. By providing a first-ever flexible, economical means of low-volume, customized or complex manufacture, 3D printing could radically change the business calculus of many companies. Indeed, it is already doing so. As we speak, companies (and consumers) are routinely "printing" items ranging from shoes to airplane parts—and doing so at a fraction of the cost associated with traditional manufacturing.

And these are early days. As the technology continues to develop, the rapidly shrinking list of things that 3D printers *can't* produce will only shrink further. And critically, 3D printing also raises the specter of remote manufacturing. A product can be printed miles from the factory floor, be it at a local repair shop or in someone's basement. Tesco is exploring the potential utility of having 3D printers in its stores; spare parts for previously purchased items could be printed on demand, for example.[1]

What's more, 3D printers are spawning products that only they could create. Many of these are truly remarkable. Consider two recent applications in the medical realm. Researchers at the U.S. Department of

Energy's Oak Ridge National Laboratory used a 3D printer to produce a prosthetic hand with miniature hydraulics that move the fingers. The hydraulics rely on a network of ducts integrated into the structure of the prosthesis—no drilling of holes was necessary.[2] Equally remarkable, researchers at the University of Michigan printed a customized tracheal stent made of biopolymers for a baby whose windpipe was collapsing during regular breathing. The child's trachea is now growing normally around the device, which will be fully absorbed into his body after two to three years.[3]

There remain hurdles that must be overcome before 3D printing reaches a critical threshold of adoption.

The landscape that these changes usher in will present a range of opportunities—for innovative new products, cost savings, convenience, and business launches or expansion—to a wide range of businesses, including smaller companies. Indeed, says Eduard Neufeld, managing director of the Fogra Graphic Technology Research Association, the world's leading research association for the printing industry, "3D printing stands to have its strongest strategic impact in cases where it helps to drastically lower risk and other entrance barriers for entrepreneurs who otherwise might not have the funds or the skills to push new ideas or start competing with established players." But for many others, 3D printing will bring substantial risks. Industrial-goods companies, for example, will see falling barriers to entry in many industries and will wrestle with the disruptive effects of remote-manufacturing capabilities on their business model. Consumer goods companies will see rising pressure on sales as consumers gain the ability to print products, legally or illegally, on their own. Transportation and logistics providers could face reduced demand for their time-critical, higher-margin services as fewer finished products, including spare parts, are shipped. While this may be offset initially by new volume from service providers such as Shapeways, which offers on-demand printing (and shipping) of digital designs, related demand for shippers' more profitable long-distance services could fall as printing inevitably becomes more local. (The negative effects of these forces on shippers will be mitigated, to a degree, by increased demand for transport of the raw materials used in 3D printing.)

To be sure, 3D printing will not replace traditional manufacturing. Molding, casting, stamping, milling, and other time-tested techniques will remain vital, especially in high-volume production. "I wouldn't expect this to steamroll traditional production methods," says Neufeld. Rather, 3D printing will complement these methods—although it has the potential to substitute for them in a growing number of instances and applications. Panasonic, for example, which already uses 3D printing in the production of some OLED (organic light-emitting diode) panels for its high-end large-screen TV sets, now plans to use 3D printers to produce resin and metal parts to facilitate mass production of its consumer-electronics and household appliances. NASA is exploring the use of 3D printers in the production of parts for rocket engines that will power human space travel.

Approaching the Inflection Point

Companies at risk still have time to prepare. There remain hurdles that must be overcome before 3D printing reaches a critical threshold of adoption. For now, it remains limited to small production volumes, for example. Its production costs are still high compared with those of conventional mass production owing to its slow production speed and the high cost of raw materials. The number of raw materials that can be used in 3D printing is growing but still relatively small, and the range of properties they can deliver (for example, heat resistance) is relatively limited. (An owner of a small, custom heating- and air-conditioning-equipment business is watching this closely, however, as he ultimately expects 3D printing to be an economical alternative to injection molding. "I'm totally following this trend. Once the technology can handle 1-by-1-meter artifacts with heat-resistant materials, I'll pounce on it.") And combining different types of material in a single product remains difficult.

There are other challenges as well. Certain product designs, especially objects with bridges or overhangs, can be difficult for 3D printers to execute. The quality of 3D printing's output can be lacking or inconsistent—cooling can cause shrinkage that compromises the accuracy of product dimensions, for example, and surfaces can be rough. The current price of 3D printers, both commercial and consumer grade, also poses a hurdle for many buyers, and there is a learning curve when it comes to using the devices.

But these hurdles—like the minimum thickness of layers that can be produced, which has shrunk from 0.25 millimeter to 0.1 millimeter in the past five years—will continue to be overcome, and most should disap-

pear within the next five years. This will pave the way for a surge in adoption and, potentially, mainstream status. (See Exhibit 1.)

Consider some of the trends already in place. Following a trajectory similar to that of digital cameras, photo-finishing equipment, and conventional laser and inkjet printers, prices of 3D printers, for both industrial and consumer use, continue to fall. Soon price will no longer pose a hurdle for first-time buyers. (See Exhibit 2.) Some industry watchers believe that prices for entry-level machines, in fact, could fall below the psychologically crucial $100 level within the next two or three years.[4]

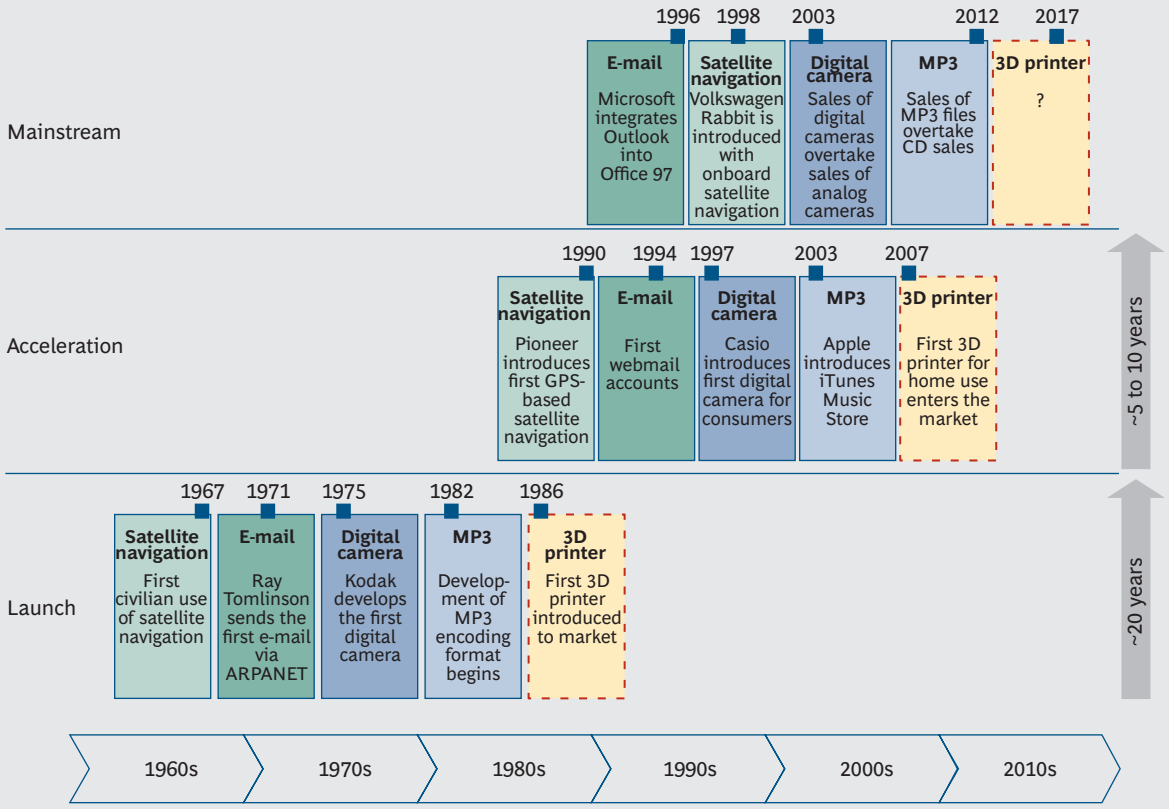
Technological hurdles are also gradually being surmounted. 3D printers are producing output of increasing strength, for example; indeed, manufacturers of jet engines are starting to use 3D printers to produce parts. The size of printable objects is also increasing, as is the range of usable materials. The world's largest 3D printer, developed by China's Dalian University of Technology, uses industrial-grade sand.[5]

Simultaneously, the industry is broadening. Two competitors—Stratasys and 3D Systems—currently account for roughly three-fourths of the installed base of 3D printers. (Market leader Stratasys recently strengthened its position by acquiring MakerBot, a producer of 3D printer kits for the consumer and desktop market segments.) But many new competitors are emerging. Interest is particularly strong in the personal-printer segment, where global sales are growing quickly: 2013 sales are on track to reach roughly 42,000 units, compared with approximately 23,000 units in 2011.[6] For consumers, this means both falling prices and a widening array of choices. There are already more than 100 models of personal 3D printers available from the more than 60 companies competing in this space. Offerings range from streamlined, build-it-yourself kits selling for several hundred dollars to high-end machines that sell for several thousand.

In concert, outside elements that will underpin the technology's adoption are emerging or already exist. Software that marries 3D scanning, modeling, and printing capabilities, for example—allowing for the easy copying and reproduction of existing objects, whether by consent or illegally—is becoming increasingly affordable. This

EXHIBIT 1 | 3D Printing Could See Mainstream Adoption Within Five Years

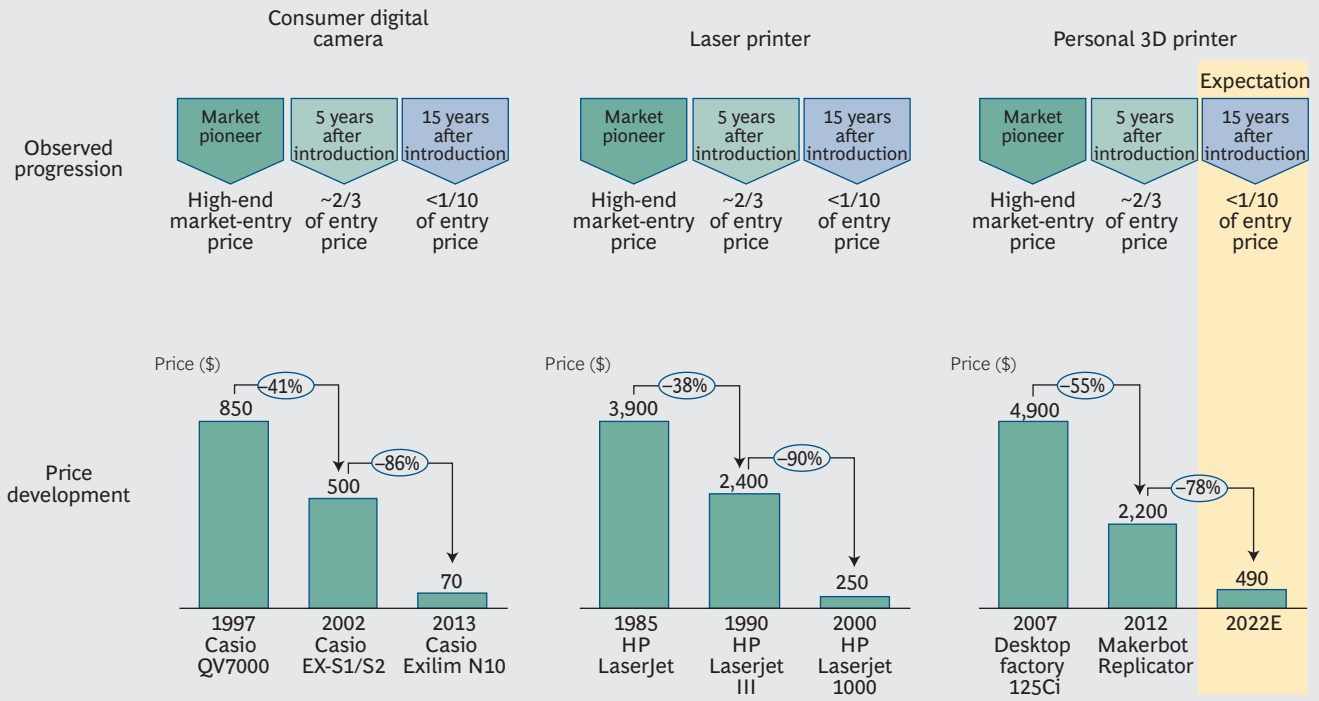
3D printing's potential evolution compared with that of other game-changing technologies



Source: BCG analysis.

Exhibit 2 | The Price of 3D Printers Is Falling and Soon Will No Longer Be a Barrier to Adoption

Price development of 3D printers compared with that of analogous technologies



Source: BCG analysis.
Note: Based on real prices (unadjusted for inflation).

stands to have major implications for 3D printing's speed of adoption, just as it raises concerns and questions about product piracy and intellectual-property rights. There are also enabling communities that have formed in a spirit similar to that of the open-source community. An example is Thingiverse, a site that allows users to share digital designs that can serve as the basis for 3D-printed products.

In sum, 3D printing has a tailwind at its back. How quickly this leads to mainstream adoption remains to be seen—our current guess of five years or less might ultimately prove conservative.

A Digital Wonderland—for Companies That Are Prepared

The approach of ubiquitous 3D printing, coupled with the ongoing development of the technology itself, will force many companies to rethink their businesses and business models. Mold makers, for example, could see their model disrupted, or perhaps strengthened, by one of the many evolving subniches of 3D printing, namely printers capable of making very large molds from layers of paper laminated together—molds that can be used for large castings (such as engine blocks).[7]

Companies will also have to rethink the individual capabilities necessary for success. Product development strategies, organization structures, legal capabilities and strategies, operational logistics and capabilities, and workforce and outsourcing strategies might all need to be adjusted if not overhauled.

The potential ramifications for companies' IT could be particularly profound. IT departments will need to ensure that the necessary platforms, network capabilities, and storage and archiving structures and capabilities are in place, for example. The IT function will also need to support the development of whatever new strategic or tactical capabilities the company determines it needs to put in place, such as capabilities related to billing or intellectual-property management.

For companies, all of this is obviously a tall order. Where should you begin? Start—today—to think through the high-level implications for your industry. Engage in scenario planning. Monitor technological and regulatory trends. If you haven't yet done so, experiment with the technology yourself. Try to determine whether and where your business is vulnerable and where there might be opportunity.

3D PRINTING IS likely to leave a profound mark on many industries, just as digitization has, and to do so sooner rather than later. Forewarned is forearmed.

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BECOMING A "DIGITAL INSURER"

AN INTERVIEW WITH CATHRYN RILEY, AVIVA'S COO

Cathryn Riley, chief operations officer of UK-based international insurer Aviva, is responsible for IT, business change, and shared services. She recently spoke with BCG's Ralf Dreischmeier about her transformation of the company's IT and her goal of making Aviva a "digital insurer."

Can you briefly describe Aviva's activities?

Aviva is an international insurance company that provides life, general, and health insurance as well as asset management services. Our overarching goal is to help people save for the future and manage the risks of everyday life. We currently serve 34 million customers across 16 countries.

You've occupied the COO role for roughly two years now. During that span, you led a major transformation of the company's IT organization. What was your primary objective?

The main objective was to unlock the value of information and technology to the business by radically improving IT's performance and transforming the company into what I refer to as a "digital insurer." This was a sizable undertaking, since I had inherited a fragmented, underperforming, high-cost, highly complex IT organization that operated largely in silos. In fact, the role of global CIO had not existed prior to my appointment.

So the challenge was to create a global IT function and make much greater use of shared services. To get there, we established four key priorities. The first was to sort out the past—meaning tackle the considerable legacy issues that were hindering us—and simplify IT through a 50 percent reduction in applications. The second was to manage the present differently, with a particular focus on deriving greater consistency and value from IT investments, radically improving the level of IT service, and transforming our cost base.

The third priority was to modernize and digitize the IT estate and initiate the process of creating a digital insurer. The last priority was to ensure that we had access, both internally and externally, to the right capabilities. Those were really the four pillars of the transformation.

The transformation has certainly changed your IT organization. Has it also simplified the IT environment?

Yes, necessarily so. As we've pursued our objectives, we have been forced to simplify on multiple fronts. To im-

CATHRYN RILEY

Cathryn was appointed Aviva's chief operations officer in 2012. Before that, she served as Aviva's chief information officer from 2011 to 2012; she has held a number of other executive roles since joining the company in 1996. Before joining Aviva, Cathryn worked for British Coal, British Airways, Coopers & Lybrand, and Bupa in a variety of positions spanning human resources, customer services, operations, and general management.

prove our cost structure, for example, we have had to simplify the organization considerably through such levers as delayering, increasing spans of control, raising our deployment of shared services across both infrastructure and applications, and simplifying and clarifying accountabilities. Similarly, to meet our quality objectives, we have streamlined our applications landscape through greater use of agile tools and methodologies, systems thinking, and modern software engineering. We have also instituted more robust portfolio governance and made more disciplined business decisions. In short, we have tried to eliminate nonvalue-added activity, and get things right the first time, by simplifying our processes.

Simplification also figures prominently in our efforts to improve IT service levels. We are using a range of means and approaches, including digital capabilities and shared services, to eliminate unnecessary complexity and give the business what it needs faster, at lower cost, and at higher quality. In concert, we have designed a clearer target state for applications and architecture and are placing much greater emphasis on reusing, decommissioning, and buying rather than building, where possible. Encouragingly, as a result of these various efforts, our service quality is now higher than it has been in three years. So the short answer is, yes, we are a more simplified IT organization—and a more effective one.

Digitization and big data are overriding themes in IT today. How have they changed your role as CIO?

They have changed it in several ways. I think their emergence helped convince the company's board that IT needed a stronger voice in strategic debates. The advent of the two forces has also allowed me to become much more of a thought leader rather than solely a service provider. And I've been able to evolve the role even further by virtue of my experience in this business. Digitization and big data are ultimately about driving business value, not about IT. I see my role as bridging the two—and my experience in the business realm has proved a key asset.

You've set a goal of transforming Aviva into a digital insurer. How did you start on that journey?

We set out on a campaign to demonstrate the business value of digital to the company. We knew it would be a challenge. It's easy to cite the rise in the use of social media, the number of smartphones sold per year, and so forth, and extrapolate; it is far less easy to demonstrate how these things might actually create opportunity for a 300-year-old insurance company. But we managed to do so. A significant milestone for us was the successful delivery of a number of digital pilots: these ultimately had a 10:1 return on investment, and we delivered them in record time. The wins created a buzz across the company and a belief in the opportunity.

How were you able to capture the imagination of Aviva's business leaders and board, specifically, and inspire them to play their role?

We made a series of presentations at senior-management and board meetings, talking about the vision and illustrating it with real-life examples. But what really seemed to bring the concept to life was our showcasing of the pilots in what was essentially an internal trade fair. We set up a dedicated area in our head office, replete with lots of screens and so forth, that provided a real digital experience in a real digital environment. People could see, feel, and touch the vision and get a concrete sense of what digital could do for Aviva's business. And we contrasted that vision with some of their current experiences.

Who attended the trade fair, and what was the reaction?

Our chairman, most members of the group executive committee, and senior management across a variety of functions and markets all came, as did a number of our partners who stood to benefit from some of the effects of digitization. And I have to say that the reaction was fantastic. In fact, perhaps our one mistake, in hindsight, was that we didn't set up the display as a permanent feature or something we could take to other offices. Regardless, the demonstration, which was now launched 18 months ago, did the trick, winning us the necessary buy-in. All 11 of the pilots got the green light and are now in business-as-usual mode, and we have continued to build on their success and have increased adoption across our markets globally.

As part of the digital initiative, you set up a "digital center of excellence." What is that unit's role, and how does it work with the business units?

Its purpose is to bring together, in one place, our digital thinking and assets. More importantly, it operates as a unit that will both provide strategic thought leadership—you know, what's going on and how is it relevant to us?—and act as a practical center of excellence for driving and reusing digital initiatives. The goal is to build once, reskin to the particular market or markets we're targeting, and then reuse many times.

Where has the value been most visible so far in your push to make Aviva a digital insurer?

There are several places. One is in the area of data and analytics. Being an insurer is about managing risk, and data is our lifeblood, so we were already very good at this. But our digital initiatives have given us an even

deeper, richer understanding of the data, particularly in such areas as fraud and the pricing and selection of risks.

A second area in which we have seen visible benefit is in our efforts to drive growth at lower cost. It's clear that digitization can drive value at the front end in many ways, and we continue to pursue those opportunities. But I think the real value of digitization materializes when you can achieve it end to end across the business. So far, relatively few companies seem to have managed this. But I always point to Amazon as an example of what's possible. Amazon didn't start by tweaking a bookshop—it reimagined the customer experience, using technology to create a wholly different value proposition. I think we have a similar opportunity in our business.

What high-level advice would you give a CIO facing similar challenges in embracing new technologies?

I'd offer four tips, based on my experience. First, continue to focus on value creation, not the technology. That's critical. Second, strive to minimize risk by undertaking proofs of concept, piloting, and testing, and validate projects quickly through that process. If something doesn't work, kill it dead and move on. Third, once you've committed to something, bring it to life. The showcases we staged made a huge difference for us by allowing people to really see and feel the vision in practice. And finally, don't be afraid to lead the business on this. Very often, and quite rightly, technology is there to support the business. But I think that digitization is an area where there's an opportunity for us to demonstrate real leadership and create real value.

What's next for you and Aviva's IT?

We have several things in the works. Among the most noteworthy, we are in the early stages of creating a digital platform that will enable quicker development of our digital ideas, reduce complexity and cost, and allow us to strengthen our capabilities in such areas as advanced customer-data management and analytics. The platform brings together a range of capabilities, including mobile, big data, customer relationship management, content management, and single view of customer, and lays the foundation for a wider ecosystem of digital partnerships and solutions. We are also extending our digital hub into both London and Singapore to allow us to deliver consistent digital capability across our key markets.

More generally, our focus remains on enhancing the customer experience and building digitally enabled products and services, and on delivering excellence consistently. We are also working to develop a more inspiring vision for both Aviva and its customers of precisely what it is we are trying to create with our vision of a digital insurer.

Thanks, Cathryn.

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SMART CONTRACTING IN IT OUTSOURCING

by Heiner Himmelreich, Peter Burggraaff, and Wim De Bruyne

INFORMATION TECHNOLOGY OUTSOURCING is a popular lever for companies seeking to drive down IT costs and improve agility and service quality. Yet, in many cases, it fails to deliver the sought-after gains.[1] The numerous reasons for this result range from vendor underperformance to a company's lack of the requisite internal capabilities.

Many companies, however, forfeit considerable value—30 percent or more of the initial targeted value—as a result of problems related to contracting and contract management.[2] Companies focus heavily on securing the best deal they can, in terms of unit prices for example, without confirming that the contract is sufficiently robust to fully protect their interests. They fail to carefully manage the handover to the operational team after the deal has been inked. They pay insufficient attention to factors that are critical to ensuring successful implementation. The bottom line: some—in many cases, much—of the expected value from companies' outsourcing initiatives fails to materialize, and managers are left wringing their hands. (See Exhibit 1.)

To ensure that they avoid the potential pitfalls, companies should institute a comprehensive optimization process for contracting and contract management—a process that spans the entire life cycle of the outsourcing contract. That life cycle can be divided into two phases: first, negotiation and contracting and then, contract execution up to the point of exit or renewal.

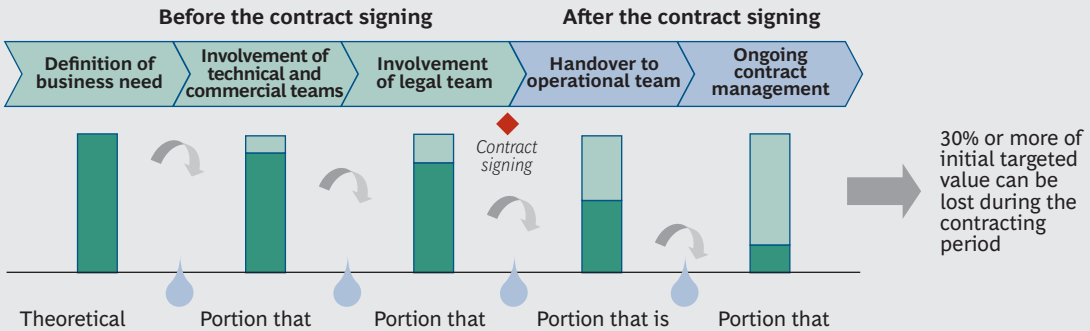
Negotiation and Contracting: Laying the Foundation for Maximum Value

The negotiation and contracting phase is focused on identifying the potential value available through outsourcing and then securing that value with a contract. It encompasses the tasks described below.

Defining an Outsourcing Model. This starts with a determination of what to outsource. Which of the company's IT services can be better or more efficiently serviced by external providers? To make this determination, a company should define its outsourcing strategy and target operating model and divide its IT landscape into logical bundles. Each bundle will merit its own sourcing strategy. Once the scope of the outsourcing effort has been determined, the company must specify its targeted service levels.

Managing Negotiation Activities. This involves making sure that the interactions during negotiations are sequenced logically. It also entails ensuring that the right parties are involved in the discussion and that they play the right roles. The negotiation team should be structured to optimize the business value

EXHIBIT 1 | "Value Leakage" Can Occur Both Before and After the Contract Signing



Value over time	Theoretical value of outsourcing (potential improvements in cost, quality, and agility)	Portion that is captured by the technical and commercial teams	Portion that is negotiated by the legal teams	Portion that is captured by people working with the vendor on a daily basis	Portion that remains after contract changes, settlements, and renegotiations
Sources of leakage	• Inexplicit baseline • Poorly defined bundles	• Unclear tradeoffs • Lack of detail	• "Giveaway" clauses • Inexplicit detail of terms	• No handover of contract knowledge • Lack of ownership	• Overly complex contract • Changes in key personnel
How to prevent	• Solid baseline analysis and scenario planning	• Involvement of key business personnel • Better communication	• Earlier engagement of the legal team • Term sheet	• Extensive contract knowledge • Involvement of IT operations in deal team	• Contract stress-testing • Strong governance and operational procedures • Simple contracts and a code of conduct

Source: BCG analysis.

of the negotiation from the company's perspective and to ensure that there is no loss of value during the transition to the vendor and beyond. Negotiation team members should thus come from both business and IT backgrounds. Furthermore, it's important that the team include people who will run and manage the program on a daily basis. The company should also ensure that the vendor's negotiation team mimics these dynamics and includes key contract managers, delivery representatives, and people who will be intimately involved in day-to-day value delivery.

The contract must allow the company to capture the benefits and protect its interests.

The company ought to take steps to ensure that value is not lost during transitions between its various teams—technical, commercial, and legal—during negotiations. The risk can be reduced significantly by maintaining a stable core team throughout the process, having clear and complete documentation, and holding team member meetings focused on discussing the implications of handoffs and changes in personnel when they occur.

Ensuring That the Contract Accurately Reflects the Predefined Scope, Objectives, and Conditions. In addition to including the agreed-upon targets, the contract must also allow the company to capture the intended benefits and protect its interests under a range of conditions. A central element here is a risk assessment of the contract conducted through a "stress test"—a modeling of the evolving contract against multiple business scenarios, both relatively high- and low-probability ones.

A proper stress test comprises four steps: understanding the contract's structure; defining

scenarios, or changes in business conditions, that the company could face; modeling the contract under those scenarios to see how the company would be affected; and identifying the key risks—related to business outcomes, pricing, quality and accountability, and agility—to which the company might be exposed. (See Exhibit 2.)

The risk assessment should span the contract's life cycle, from inception to completion.

The risk assessment should span the entire life cycle of the contract—from inception to completion, including the possibility of a contract extension or an unforeseen exit by the company before the contract's end. The stress test's ultimate goals are the confirmation of the contract's clauses, enhancements where they are needed, and the fine-tuning of service-level agreements to be included in the contract. (See the sidebar, "Stress-Testing the Contract: A Vital Step.")

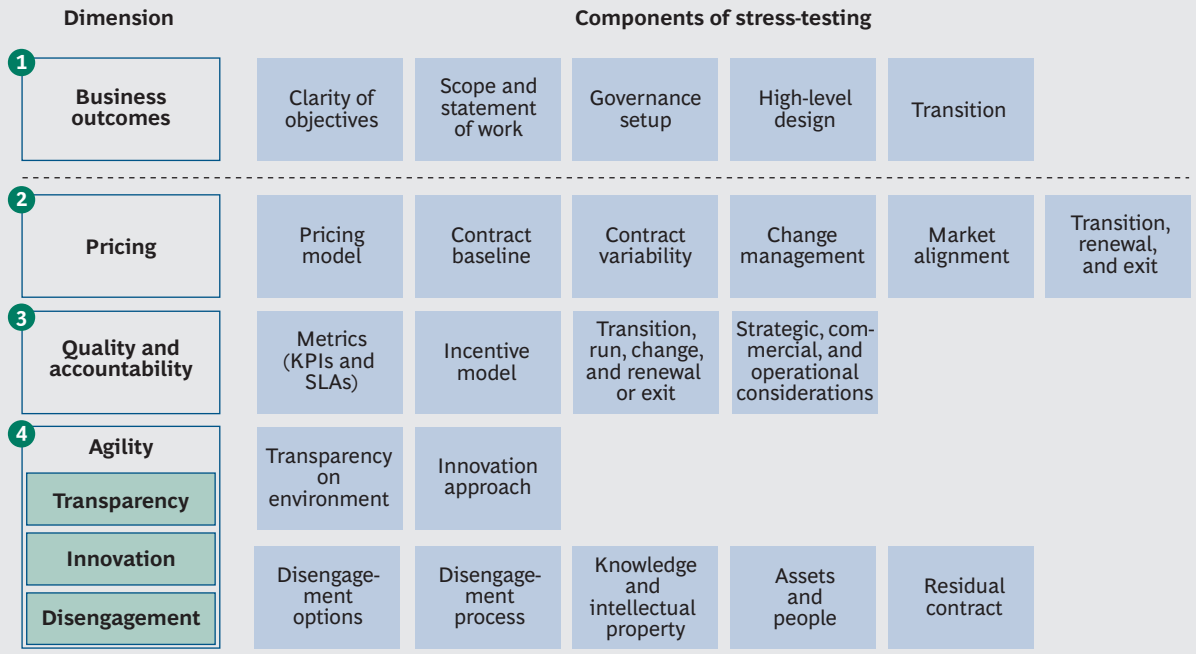
Contract Execution: Realizing the Targeted Value

The goal of this phase is to ensure that the contracted value materializes. The company's efforts ought to include three distinct thrusts: operationalizing the contract, managing the transition of activities to the vendor, and managing the contract on an ongoing basis.

Operationalizing the Contract. It is important to determine which operational levers will be necessary for ensuring that the agreed-upon value is captured on a day-to-day basis over the life of the contract. This effort includes the translation of contract terms into operational procedures. (Findings from the stress test should be used to help define these.)

Furthermore, it includes the creation of a "code of conduct" that will govern the company-vendor relationship and provide clear definitions of roles, responsibilities, and the consequences of underperformance. It should also describe the development and execution of a communication plan that identifies key stakeholders and their specific information requirements and establishes a process for regular communication.

EXHIBIT 2 | A Contract "Stress Test" Identifies Potential Risks to Which the Company Might Be Exposed



Source: BCG analysis.
Note: KPI = key performance indicator; SLA = service-level agreement.

STRESS-TESTING THE CONTRACT
A Vital Step

Stress-testing can provide an effective means of revealing and mitigating the potential risks of a contract—before the deal is signed. Consider the example of an Australian government agency. Poised to outsource part of its information, communications, and technology services, the agency was concerned about the prospect of "value leakage" vis-à-vis its strategic objectives and performance targets.

To better recognize and limit its risk, during the negotiations, the agency modeled and stress-tested the proposed contract against a number of different business scenarios, including fluctuating government budgets, policy changes, and changes in demand for government services. The exercise proved invaluable: it helped the agency identify a number of key risks to which it was exposed and allowed it to take steps to mitigate those risks before the contract was finalized. These actions included negotiating a more flexible pricing model to better accommodate normal business changes and selected extraordinary scenarios; adjusting the vendor's performance and accountability incentives to give the agency greater leverage for ensuring high-quality service at all levels (strategic, commercial, and operational) of the relationship; and dramatically reducing the agency's risk exposure to larger changes or unforeseen events—by, for example, negotiating less stringent rules regarding asset levels and inflexible commitments to specific technologies.

A major consumer company found out the hard way that there is a serious downside to *not* stress-testing before committing to a major IT-outsourcing contract. The architects of the deal did not anticipate that the company would undergo a large-scale divestiture. And after the divestiture, the company was no longer in a position to meet the volume targets it had promised the service provider. Convincing the vendor to honor its original commitment under these new circumstances proved very difficult for the company.

Managing the Transition of Activities to the Vendor. This process will encompass a host of efforts, including, at the outset, the creation of a transition team, the definition of timelines and reporting tools, and the engagement of critical support functions, especially HR. It also entails addressing a wide range of nuts-and-bolts concerns such as the following:

- Establishment of connectivity infrastructure between the company and the vendor
- Resolution of potential issues associated with access rights and licensing
- Determination of how in-progress projects will be handled
- Management of the transfer of necessary personnel and knowledge
- Establishment of lines of communication with the vendor
- Ensuring that the necessary capabilities are present in the company's retained IT organization

The final must-have for a successful transition to the vendor is the institution of governance. This demands not just the formulation of a plan but also a thorough, well-organized effort aimed at ensuring that the changes are understood and that they will stick. Absent this follow-through, problems could arise and linger, leading to a loss of value or greater-than-necessary efforts at resolution.

Managing the Contract on an Ongoing Basis. The company must ensure that the contract's principles, terms, and conditions are understood, reviewed regularly, and adhered to by

both the company and the vendor. The establishment of the code of conduct and governance procedures, including the use of incentives that steer the performance of both the vendor and the company, are key elements of this, as is timely communication.

Failure to skillfully manage the contract execution phase can result in a material loss of value. The experience of a financial services company that had outsourced the coordination of key IT processes, such as incident and configuration management, is a case in point. The company had failed to secure adequate control of such key elements as governance during the transition stage and ongoing execution. This led to critical losses of clarity and accountability. For example, few of the people involved in the day-to-day execution of the 8,000-page contract thoroughly understood it or were familiar with its many specific clauses and agreements. This and related issues led to frequent and lengthy discussions about contract interpretation and adherence, ultimately prompting the company to take much of the outsourced work back in-house.

Companies that fail to pay sufficient heed to contracting in their IT-outsourcing initiatives often take a significant hit to their return on investment. The approach outlined above—which stresses thorough preparation and attention to detail both before and after contract signing—can do much to ensure that IT outsourcing delivers fully on its promise.

Notes

1. See "IT Outsourcing: Expectations Versus Facts," BCG article, March 2013.
2. We have observed this in IT-outsourcing support cases over the past three years.

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THE AGE OF DIGITAL ECOSYSTEMS

THRIVING IN A WORLD OF BIG DATA

by Tamim Saleh, Jon Brock, Nadjia Yousif, and Andrew Luers

THE EVERYDAY CONSUMER WORLD of 2020 will look radically different from today's. Many ordinary products and devices—heating systems, televisions, cars, watches, toys, light bulbs, sporting goods, home appliances—will have gone digital. They will no longer be islands unto themselves: they will be connected to the Internet and to each other in altogether new ways.

Consumers will increasingly access, monitor, and control their connected digital products and services remotely over the Internet, using smartphones, tablets, laptops, desktop PCs, and other devices. Massive streams of complex, fast-moving "big data" from these digital devices will be stored as personal profiles in the cloud, along with related customer data.

Digital ecosystems are playing a key role in this transformation. An ecosystem is a network of companies, individual contributors, institutions, and customers that interact to create mutual value. In consumer-oriented digital markets, ecosystems are being enabled by standard technical platforms that allow devices, applications, data, products, and services to work together in new ways. For example, insurance companies can collaborate with telecommunications providers to create new pay-per-use insurance products based on shared data.

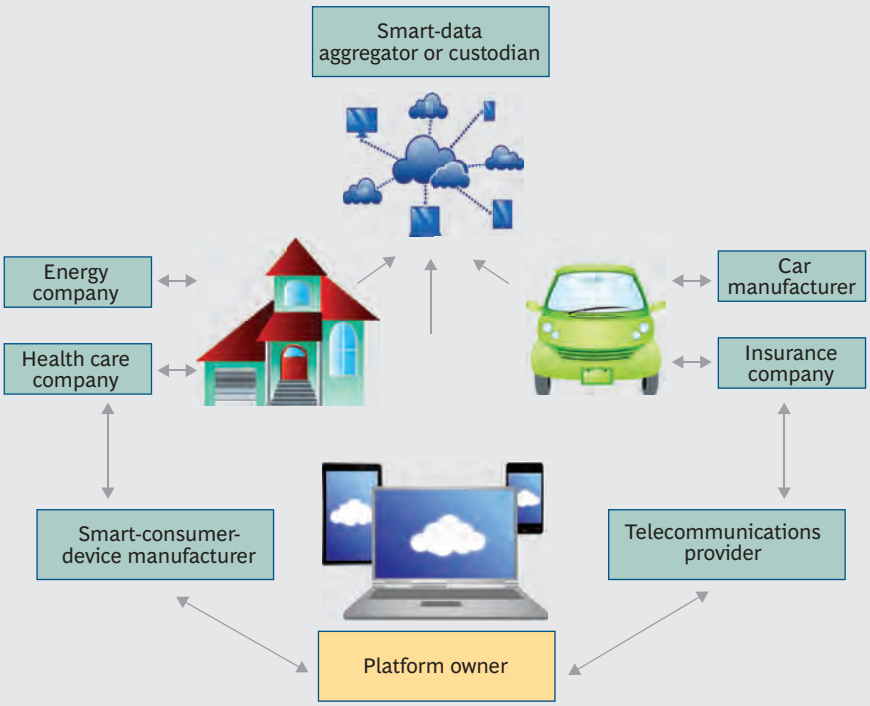
We see three types of organizations collaborating in a digital ecosystem. At the center of interconnected devices and services are ecosystem platform owners—in many cases, Apple or Google. Platform owners create the standards-based technical foundation—comprising, for example, operating systems, devices, an app store—that allows the components of the ecosystem to collaborate and interconnect much more easily than if the individual products operated alone. In addition, providers of products and services from different industries collaborate and compete to create value for customers through applications, data, and new digital devices. And in many industries, data aggregators and custodians are emerging to manage the data created by devices and customers and to find new ways of adding value. (See Exhibit 1.)

We believe that digital ecosystems will profoundly disrupt businesses in nearly every consumer-centric industry, including less obvious candidates such as energy. On the positive side, these ecosystems will tap into better connectivity and customer data to create major new products and services and, eventually, profitable markets that do not yet exist. As a result, competing successfully in the future will require a host of new and different capabilities.

The Connected Home Goes Mobile

This stage in the evolution of consumer products and services isn't a far-fetched dream. It's already a reality. New devices and services—ranging from energy thermostats that can adjust the temperature in your home on the basis of your smartphone's location to intelligent devices in cars that monitor performance and location—appear every day, and they operate together well beyond the confines of the home. (See the sidebar, "Feathering the Digital Nest.") These ever more mobile devices are encouraging diverse industry players to work together and move into new markets. For instance, energy companies have the potential to partner with health care companies to offer a full spectrum of remote home-based monitoring services through smart devices.

Exhibit 1 | Standard Platforms Allow Digital Ecosystems to Form



Source: BCG analysis.

FEATHERING THE DIGITAL NEST

The future has already arrived in the form of products such as the sleek Nest Learning thermostat. The Nest learns your household's energy-use patterns, turning down the heat when you go to work, warming things up when you get out of bed late on weekends, and turning the system off when you're on vacation. It works much better than the previous generation of programmable thermostats, which few homeowners have the time or patience to set up and adjust regularly.

An app lets you use a mobile device to adjust your home's thermostat from anywhere. It also helps you learn how to save energy. One estimate claims that the Nest can reduce household energy consumption by 20 to 30 percent. The device connects through Wi-Fi to a range of Apple devices and is sold in Apple stores along with other products in the Apple digital ecosystem.

Platform owners such as Apple and Google are fueling an intense acceleration of this trend. For an ecosystem to operate efficiently, platform owners and operators must work with a host of others in the platform "stack." Standardization provides the glue that binds the ecosystem. Exhibit 2 shows the components and degree of standardization in the business-to-consumer platform stack.

It will prove unlikely that a company in the business-to-consumer space will succeed at becoming a platform owner. The costs of building a sustainable platform and competing against the dominant owners are prohibitive. Still, some companies might be able to carve out a niche in which they can add value. However, in the business-to-business market, although a small number of platforms will likely become dominant, it remains far from clear that these platforms will be universal across industries. More opportunities exist to become a platform owner.

The Evolution of Digital Ecosystems

We see five consequences of the rise of digital ecosystems. Companies that master their complexities will thrive.

A Surge of Big Data. Devices and ecosystem apps generate huge amounts of fast-moving data in a variety of forms. Customers will expect to receive value from the use of their data. A company that is skilled in analytics and can convince customers that it will use the data well will outcompete those that don't. (See "How to Get Started with Big Data," on page 7, and *Rethinking Personal Data: Strengthening Trust*, a World Economic Forum report produced in collaboration with BCG, May 2012.) Organizations that control and drive the most benefit from the data will win.

Blurred Boundaries. The lines separating industries such as automobiles, retail energy, consumer goods, insurance, digital media, and telecommunications will continue to dissolve as new entrants move into the adjacencies and niches created by digital ecosystems.

Connected Products and Services. Consumers will evaluate products on the basis of their ease of use anywhere and at any time. Products and services will no longer be judged only on their ability to function independently; they will also be judged on how they function as part of a digital ecosystem of other products and services.

Exhibit 2 | A Broad Range of Components Compose a Platform "Stack"

Component	Role	Degree of standardization
Content and services	Offer content or a physical service to consumers, from, for example, a book publisher or bank	
Digital devices	Connect to the platform and stream data; devices include, for example, tablets and smart thermostats	
Data integration	Makes it easy to share data among systems and companies, particularly in markets where platform standards have yet to emerge	
Applications	Add functionality to devices or create value from the data they generate	
Platform	Provides technologies and standards that ensure compatibility and fuel the ecosystem	
Cloud or data warehouse	Stores data generated by applications and devices	
Network	Ensures that digital products are accessible from anywhere at any time	

Source: BCG analysis.

The Emergence of New Industry Roles. Data custodians, such as organizations that offer customer loyalty cards that work across companies, manage data on behalf of an industry. Meanwhile, digital-data aggregators insert themselves between the customer and the traditional product or service provider to add value—for example, services that allow customers to compare and apply for products from a range of competing financial companies. Companies that are slow to react to the latest digital disruptions may find themselves replaced by an ecosystem provider or may discover that an aggregator is standing between them and the customer.

The Rise of Ecosystem-Platform-Endorsed Products. Ecosystem platform providers aim to generate additional revenues from their network. So they will increasingly give an advantage to "preferred" digital devices, such as those that feature proprietary embedded chips or are sold through their own networks of stores.

As products in the home, office, stores, and streets become more connected, companies in a range of industries will find that they are no longer in the business they once thought they were. For example, this is playing out today in the auto insurance industry, which is about to be dramatically restructured as telemetric and sensor data from devices in cars record driving behaviors and integrate the data with insurance pricing, product design, and claims management. (See "Big Data: The Next Big Thing for Insurers?" BCG article, March 2013.) But who will dominate the emerging space? Will it be insurance companies, car manufacturers, network providers, or new entrants that specialize in devices and analytics? Companies that stand still in the face of such change will not be deft enough to adapt.

New Challenges Require New Capabilities

We believe that in order to succeed in the future, companies must develop new capabilities.

The first capability involves partnering. Many traditional companies might choose to collaborate with "digital native" organizations rather than risk trying to build an ecosystem product or service themselves. But many of them will not be accustomed to the level of third-party integration necessary or the need for a collaboration model that is fast, responsive, and outcome oriented. At a basic level, these companies may not understand the ways digital-ecosystem players form partnerships and the common terms for their deals.

In the digital domain, product development and improvement cycles are also significantly more accelerated than in traditional businesses. Rapidly moving companies strive to fail fast and move on. However, many traditional organizations are not used to operating in this faster lane of product and business model change: in many cases, product development processes, technology organizations, and company cultures lack the agility and responsiveness required.

Successful companies avoid making huge investments by taking small, quick steps.

For example, one leading European energy company that moved into the smart-home market found it difficult to make rapid progress within its existing structure, even though it had established separate teams to manage its new offering. The teams were hampered by their limited technology capabilities, the lack of speed in decision making, and the need to train field forces and telephone agents in how to use new products.

Finally, customers will demand new levels of experience and service. Customer expectations concerning interface design, functionality, 24-7 customer service, and always-on availability will be high. Organizations must, therefore, dramatically improve their ability to analyze customer needs and behavior if they hope to compete for customers more effectively, especially as business is conducted over a wider range of channels and devices. Having the right technology, analytical skills, and data integrity in place will be critical.

Facing the Future

We believe that in the face of such dramatic change, CEOs must take five key actions in order to prepare themselves to compete in the world of digital ecosystems.

Understand the economic opportunity. First, CEOs will need to understand how their existing products and services can add value in the ecosystem and how they can create new sources of value. Furthermore, they must understand the potential for new revenues and profits, as well as the second-order effects that can come from better cross-selling and up-selling of existing offerings. Market leaders should also assess the value at risk: What could happen in terms of customer churn or reduced market share as events unfold in this rapidly evolving space?

Let company strengths help prioritize offerings. Although some companies will succeed with totally new digital products and services, success will come most readily when companies can connect their offerings with what they are already good at doing and where they can add real value to the ecosystem. For example, an energy company would more likely succeed in the smart-home market with energy-related products that improve on the gas, electricity, and energy management services it already provides.

Build the right organization. Companies should decide whether their current organization structure will support change at the pace required or whether a dedicated greenfield organizational unit is required.

Partner strategically. No company has the end-to-end capabilities internally to succeed in a digital ecosystem. Companies can save themselves an enormous amount of effort and considerable resources if they choose the right partners. Some partners excel at providing digital technologies, data analysis, or customer service. Others might provide complementary data, products, or services, perhaps from another industry. Forward-thinking companies intentionally select the criteria by which they will work with others, and they ensure that those partners will still be delivering value five years from now.

Start small and scale up quickly. Many companies build a product and simply hope that customers will somehow find it. In many cases, they spend hundreds of millions of dollars over many months and manage to sell only a few thousand units. Successful companies avoid making huge investments by taking small, quick steps and using test-and-learn approaches until they find demand. Only then do they rapidly scale up what works.

STANDING still represents a high-risk option for any company whose products and services are capable of being connected to the shifting world of digital ecosystems. The business environment is changing, and organizations must be prepared to make the most agile moves on the chessboard.

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NOTE TO THE READER

Acknowledgments

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