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COMPETITION

Digital Ubiquity: How Connections, Sensors, and Data Are Revolutionizing Business

by Marco Iansiti and Karim R. Lakhani

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For more than a century General Electric made most of its revenue by selling industrial hardware and repair services. But in recent years GE was at increasing risk of losing many of its top customers to nontraditional competitors—IBM and SAP on the one hand, and big-data start-ups on the other. Those competitors aimed to shift the customer value proposition away from acquiring reliable industrial equipment to deriving

new efficiencies and other benefits through advanced analytics and algorithms based on the data generated by that equipment. The trend threatened to turn GE into a commodity equipment provider.

In 2011 GE responded with a multibillion-dollar initiative focused on what it calls the industrial internet. The company is adding digital sensors to its machines, connecting them to a common, cloud-based software platform, investing in modern software development capabilities, building advanced analytics capabilities, and embracing crowdsourced product development. All this is transforming the company's business model. Now revenue from its jet engines, for example, is tied not to a simple sales transaction but to performance improvements: less downtime and more miles flown over the course of a year. Such digitally enabled, outcomes-based approaches helped GE generate more than $800 million in incremental income in 2013; the company expects that number to reach at least $1 billion in 2014 and again in 2015.

GE's industrial internet is based on the newfound ubiquity of digital connectivity. Most information work is already digitized through the use of connected laptops and mobile devices. Now, with the growth of the "internet of things," the pervasive deployment of digital sensors is extending digitization and connectivity to previously analog tasks, processes, and machine and service operations. Moreover, virtually limitless computing power is available at very low cost through cloud computing. The combined impact of all this is that both established and start-up players in every industry are being forced to compete in new ways. (See the sidebar "What Makes Digital Technology Transformational?")

What Makes Digital Technology Transformational?

To understand why the internet of things is transforming business models, it's helpful to understand three fundamental properties of digital technology: (1) Unlike analog signals, digital signals can be transmitted perfectly, without error. A Facebook webpage will look exactly the same when it's generated in Palo

Digital ubiquity started with the transformation of software companies. For example, Microsoft and SAP, which used to make large profits by selling software licenses, are investing heavily in infrastructure to support cloud software and analytics; switching from product to service revenue;

Alto as it does when it's shown to a consumer in Bangalore. (2) Moreover, digital signals can be replicated indefinitely—that same page can be shown to a billion Facebook users—without any degradation. (3) Once the investment in network infrastructure has been made, the page can be communicated to the incremental consumer at zero (or almost zero) marginal cost. And a digital task performed at zero marginal cost will immediately supersede any traditional analog task completed at significant marginal cost (which is why e-mail and social networks are killing "snail mail").

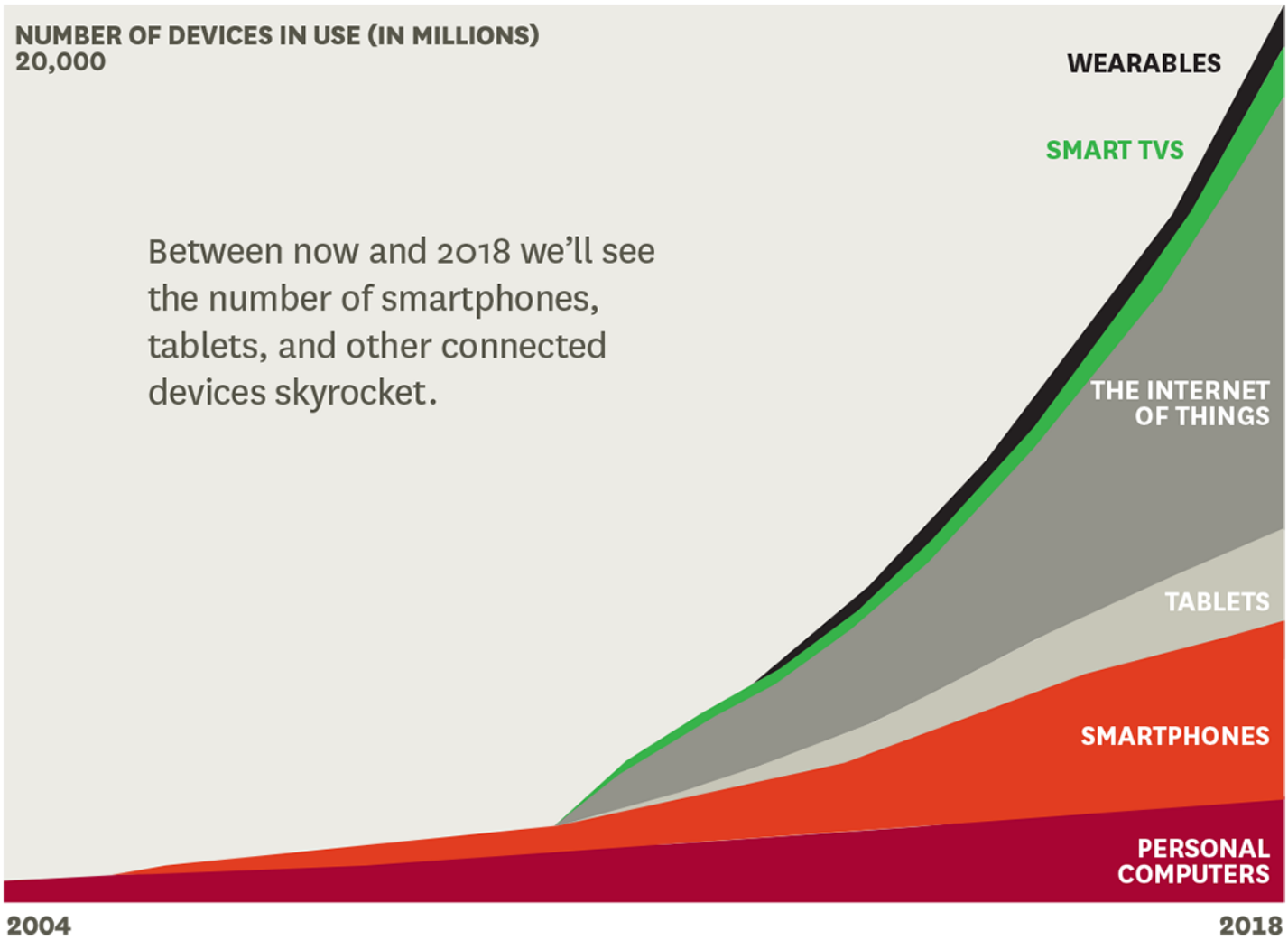
These properties (exact replication infinite times at zero marginal cost) improve the scalability of operations and make it easy to combine new and old business processes and connect industries and communities to generate novel opportunities. Facebook can connect any brand to any user community without incremental expense. A sensor on a GE jet engine can transmit useful data predicting maintenance over long distances at zero incremental cost; this data can in turn be communicated to GE's maintenance organization and third-party spare parts manufacturers. Thus these three fundamental properties drive the transformation enabled by ubiquitous digital technology.

and experimenting with outcomes-based business models in cases where revenue might be tied to the efficiencies delivered by an enterprise application. Joining them are newer players such as Salesforce, Workday, Google, and Amazon Web Services, whose cloud-native services are already transforming enterprise software. But the trend reaches well beyond software companies: The medical device maker Becton Dickinson is investing heavily in software and development capabilities that will incorporate increased connectivity, intelligence, and platform functionality in its diagnostics equipment. Companies in the investment management sector, such as Wealthfront and AltX, are assembling data platforms that optimize and automate the investing process. Even Domino's, the pizza company, is building digital capabilities, mobile technologies, and analytics to enhance innovation and meet consumer expectations regarding service, transparency, and speedy delivery.

Adapting to ubiquitous digital connectivity is now essential to competitiveness in most sectors of our economy. We have examined transformation across dozens of industries and companies—both traditional and born-digital. We have talked to hundreds of executives in our effort to understand how traditional modes of innovation and operational execution are changing. (Disclosure: We have consulted with or have interests in several of the companies mentioned in this article.) We have seen that digital transformation is no traditional disruption scenario: The paradigm is not displacement and replacement but connectivity and

recombination. Transactions are being digitized, data is being generated and analyzed in new ways, and previously discrete objects, people, and activities are being connected. Incumbents can use their existing assets, dramatically increase their value, and defend against (or partner with) entrants. Pacific Gas and Electric, for example, will be more valuable if it connects with Nest, the digital thermostat that Google recently bought for $3.2 billion. (See the sidebar "Why Nest Matters.") And Uber makes money by bringing drivers together with customers—not by replacing them.

An Explosion in Connected Devices



Rethinking Value Creation and Capture

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A business model is defined by two things: how the organization creates value for its customers (the customer value proposition) and how it captures that value (how it makes money). Digital transformation changes both.

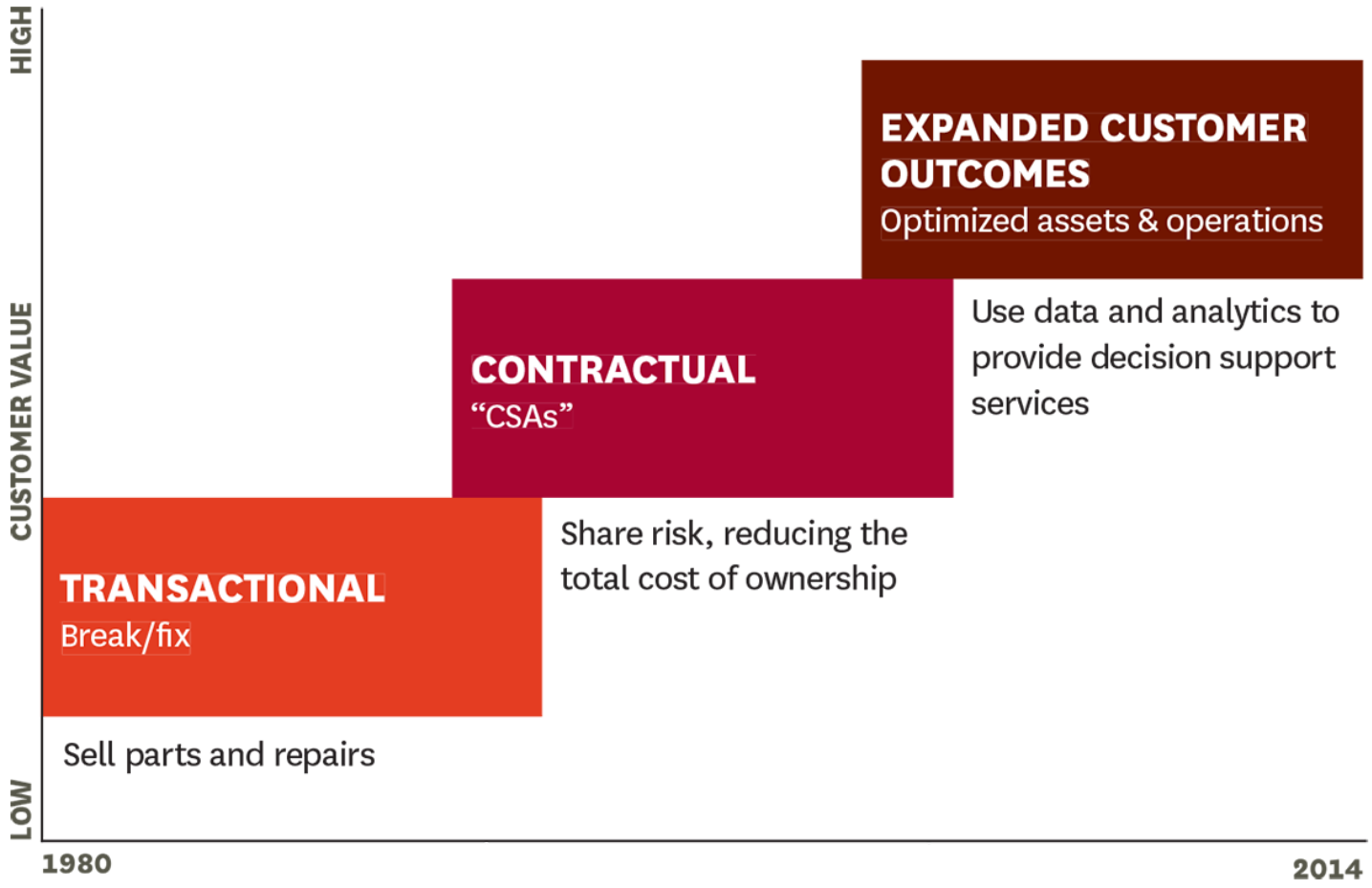
Consider GE's wind farm deal with the global energy giant E.ON. In the past, as the demand for power increased, GE would try to sell more turbines and associated equipment to power-generation companies. In its partnership with E.ON, GE used E.ON's extensive operational data to run advanced analytics and simulations and come up with a different scenario: Instead of increasing capacity by adding more wind turbine hardware, E.ON could meet demand with a relatively modest purchase of equipment to connect all the turbines through software that allows for dynamic control and real-time analytics.

GE creates value by extracting useful data from the sensors on its turbines and other wind energy equipment and using that information to optimize equipment performance, utilization, and maintenance. It captures that value by charging a percentage of the customer's incremental revenue from improved performance. So although GE sells less hardware, it has developed a mutually profitable long-term partnership.

GE's Transformation

When Jeffrey Immelt became GE's CEO, in 2001, he inherited a company that was efficient but facing intense competition and falling prices for its top-tier capital goods. Immelt accelerated the company's movement toward contract service agreements (CSAs), instituted under his predecessor, Jack Welch. CSAs guaranteed total operational management of an asset, including preventive maintenance and repairs. They generated reliable high-margin income for GE over the life of the equipment—often several decades. By 2005 CSAs accounted for more than 75% of GE's revenue backlog and contributed the same proportion to industrial earnings.

The Evolution of GE Service Models

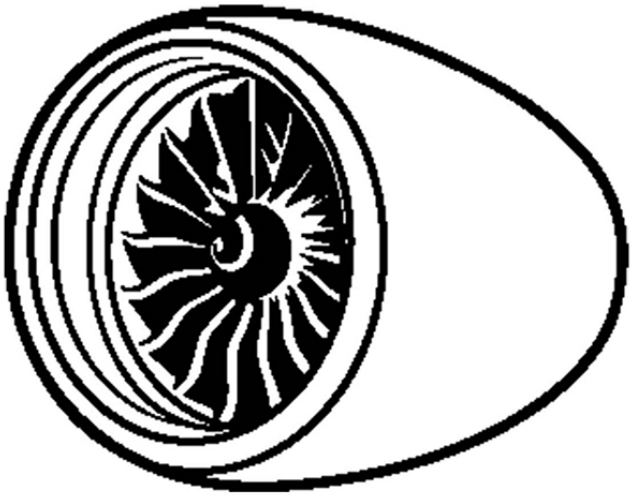


"We have globalized the company while investing massive amounts in technology, products, and services," Immelt told an industry group in 2009. "We know we must change again." That change was the industrial internet. GE's initiative proposes an open global network of machines, data, and people to generate a plethora of new business opportunities and outcomes-based business models. It focuses on providing data synthesis and analysis and designing real-time and predictive solutions to optimize the complex operations of its customers.

The industrial internet is revolutionizing value creation and capture for GE. The decision to build out the new system was more evolutionary. By 2011, along with sensors and microprocessors, GE had significant embedded software running power plants, jet engines, hospitals and medical systems, utility companies, oil rigs, rail, and other industrial infrastructure worldwide. Connecting the hundreds of thousands of GE devices to one another and arming them with increasingly sophisticated sensors seemed like a logical

extension of the maintenance-and-operations-driven business model, and one that would extend GE's strategic advantages. "I have a great deal of confidence in our core hardware," Immelt says. "We have the most stuff. It's hard to replicate. We started from a real position of relative strength."

Jet Engines



Benefits

- Lower maintenance costs
- Lower workforce costs
- Fewer canceled flights
- Better on-time performance
- Higher customer satisfaction

Building software capabilities.

As the scale and scope of the opportunity became clear, Immelt and his team recognized that the company would have to build new capabilities. It would need a global center to develop and support software applications uniformly across the businesses, and it would need new and innovative approaches to managing customer relationships—including how to sell and service the new offerings.

FURTHER READING

How Smart, Connected Products are Transforming Competition

STRATEGY FEATURE by Michael E. Porter and James E. Heppelmann

The new strategic choices every company is facing.

SAVE SHARE

GE is a world-beater in efficiency, productivity, and innovation. But it had never been known for the agility, responsiveness, and strategic coherence of its software development process. Indeed, when Immelt launched GE Software, in November 2011, the company's IT efforts were scattered. Its various business units employed more than 12,000 software professionals, who helped generate several billion dollars in revenue. But no overarching strategy guided their technical choices and commercial offerings. Each business unit—even each product

leader—made choices according to local conditions; the result was wildly uneven technical and commercial performance. “Every one of our products had a different underpinning platform, architecture, technology, and set of vendors,” says William Ruh, whom Immelt brought in from Cisco to run the new operation. Ruh and other GE senior leaders set out to get a handle on the scope of the company’s existing software operations globally; they found 136 products, of which only 17 were actually profitable. “It was taking us years to build the software, and years to get it out the door,” Ruh says. “And customers’ needs were changing too rapidly to keep up.”

Developer talent was also a concern. “Our software engineers had experience in one of two ways,” Ruh says. “They were either mechanical engineers or they were computer scientists. But most of them had experience with technologies that were last-generation. They were very reliant on outside vendors, sometimes for full development.” Furthermore, GE’s software specialists were spread across the global businesses and had no common language. Ruh started assembling his own team to bring in modern approaches. He insisted that its members all work together at GE Software headquarters, in San Ramon, California. “Co-location is everything,” he says. “New things are easier to create a team around when they are all in one place.” By January 2013 Ruh had hired 62 people; that June about 150 employees moved into the new offices. At the end of the year the team numbered 350, only 2% of whom had transferred from other parts of the company. Ruh expects to have more than 1,000 software developers and data scientists working at the San Ramon facility by the end of 2014.

Ruh set out to create a software platform that would work across the entire enterprise. It would make developing new applications more efficient and allow for rapid cross-industry innovation. It would also enable independent developers to build applications on GE’s platform. And Ruh insisted that GE own all the intellectual property his team built.

Why Nest Matters

A year ago few Honeywell executives saw Google as a competitor. That changed in January 2014, when Google bought Nest, the digital thermostat and smoke detector

The team rolled out its first set of solutions under the Predictivity brand, running on Predix, GE’s common software platform. Predix and Predictivity promise to

company, for $3.2 billion. The move is a clear indication that digital transformation and connection are reaching critical mass, spreading across even the most traditional industrial segments.

The Nest thermostat creates value by digitizing the entire home-temperature-control process—from fuel purchase to temperature setting to powering the heating, ventilation, and air-conditioning system—and connecting it to Nest's cloud data services. The thermostat aggregates its data on real-time energy consumption and shares that data with utilities, which can improve their energy consumption forecasts and thus achieve greater efficiency. And Nest can push cost data back to customers ("Current demand is high, so the price you pay is going up. We will turn down your air conditioning for the next two hours"), reducing their energy bills.

How does Nest capture the value it creates? First, its retail prices are double or triple those of conventional thermostats. Second, it can make money from electric utilities on the basis of outcomes: Google can aggregate data on energy-consumption patterns and offer the utilities a service in return for a percentage of their savings. Third, it can pass some of those savings back to consumers.

Thus Nest will not only play in the $3 billion global thermostat industry; it will help shape the $6 trillion energy sector. It can also jump into other sectors by opening up its digital cloud platform to devices and services from other providers. For example, the platform now connects with advanced Whirlpool laundry systems to schedule wash and dry cycles during nonpeak hours. It works with the wearable-technology company Jawbone

dramatically streamline monitoring and maintenance for all GE's industrial technologies. Predix combines distributed computing and big-data analytics, asset management, machine-to-machine communication, security, and mobility. Predictivity will eventually connect all GE's machines to the cloud (no small feat, given that some business units, such as health care, have thousands of products, each with its own complex software needs and legacy systems), enabling them to talk to one another, learn from historical data, and provide predictive information to help eliminate unplanned downtime and otherwise improve efficiency.

Public Service Enterprise Group (PSEG), a New York- and New Jersey-based utility, is using a Predictivity product to react to real-time changes in power demand, grid conditions, and fuel supply. In the few months that the asset-optimization solution has been in place, PSEG has increased output by 6%, reduced fuel burn by more than 1.5%, and increased operational flexibility for its gas turbine fleet. St. Luke's Medical Center, in Houston, uses another Predictivity solution to integrate bed assignments, departmental workflow, patient flow, transportation, and equipment management, reducing bed-turnaround times by 51 minutes—a critical factor in hospital

to detect when someone has awakened and then dynamically adjust the home temperature. It can connect with home security ("Someone just walked by your thermostat; I thought no one was home") and consumer electronics ("Since you're now in the bedroom, do you really want to keep the TV on in the den?"). The potential for new applications and services is astonishing.

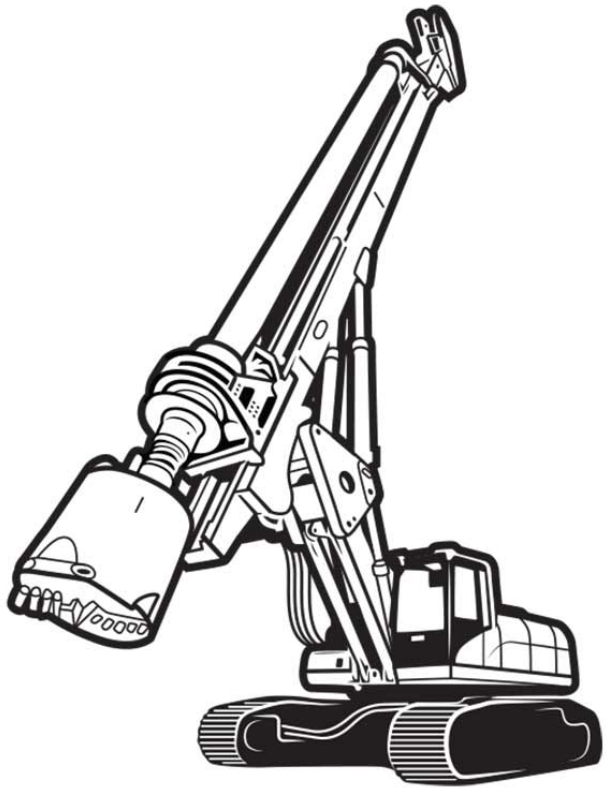
capacity planning and patient satisfaction. And a railroad customer, Norfolk Southern, uses a Predictivity network-optimization solution to move more freight faster and more intelligently, achieving a 10% increase in the overall speed of trains, a 50% reduction in losses due to "expired crews" (personnel who have to meet time-off requirements), and significant on-time performance improvements.

Getting business-unit buy-in for GE Software was often a challenge. The business units were accustomed to operating autonomously, and some were more legacy-laden than others. Ruh did not try to force anyone to comply. "I said, 'We're going to do this; who wants to be first in line?'" he recalls. "A number wanted to, so we developed them at a very fast pace and got them successful quickly. The performance gains and revenue enhancements were visible to other executives, who then asked their own businesses, 'How can we do this?'" Before long all the business units were working with the initiative.

It helped that Ruh's division was structured to encourage collaboration. Funded by the CEO's office, GE Software does not have its own P&L yet. "I don't compete with the businesses," Ruh says. "I'm tied to and care about their P&L because I'm aligned with the question 'Did we have business impact?'" In the coming months, though, Ruh may build out the platform into a product.

While Ruh and his team pushed forward on the common platform, Immelt and Beth Comstock, GE's chief marketing officer, considered the new offerings' implications for the marketing and sales teams. From the outset some managers argued that selling analytics and other software offerings was beyond GE's scope, whereas others argued that licensing the offerings was a cleaner model and therefore preferable. The challenge is that "we're trying to sell them something they don't know they need," as Comstock puts it. "And they can't see when it works."

Drilling Equipment



Benefits

- Maximized production
- Predictable delivery
- Lower maintenance costs

Learning to sell the new model.

GE had to make a dramatic shift in approach. It had to abandon its traditional "box seller" mentality in favor of solution-based sales that focused not only on pain points but also on exactly how to enhance the customer's operating performance. "The transition we have to make with our customers is going from agreements that are break/fix to agreements that guarantee outcomes," Immelt says. "Those will happen customer by customer, and the outcome guarantees are going to cannibalize the break/fix."

GE is now rethinking and redeveloping its go-to-market and commercialization strategies. To help evolve its sales organization, Immelt brought in Kate Johnson as chief commercial officer, a new position within the marketing function. Johnson had deep experience in selling and servicing enterprise software at Red Hat and Oracle; she worked to create and expand GE's outcomes-based sales capabilities. She also oversaw a new commercial center of excellence that crystallized how GE would increase service revenue and margin growth. "This change is not just about sales," Johnson says. "It's about product management, marketing, sales and commercial operations, delivery. It involves the whole life cycle, from invention to fulfillment. And that is the essence of how we're tackling the problem."

FURTHER READING

How GE Is Disrupting Itself

To be sure, GE still needs salespeople and account executives who have deep relationships with their clients. However, what they sell, how they sell, and to whom they sell is changing completely. The sales team now includes solution architects, who combine exhaustive industrial knowledge with advanced analytics to develop models for setting and achieving business outcomes. "Instead of a features list with pricing and discount caps," Johnson says, "we're shaping deals from the ground up that are based on the value derived by the customer. It's a completely different set of economics that is very disruptive in the industry."

Customer engagement has become far more complex. It requires an approach to solution development that integrates technology, connectivity, and analytics products from GE with the client's proprietary financial and operational data. "For this kind of sale, we need much more data to truly understand our customers' business and financial situation, how they make money," Johnson says. "Our sales team now has to do a whole range of new spreadsheet calculations and modeling before we even approach a potential customer."

For example, the E.ON contract started off with GE's proposing two capital-expenditure deals and one operational-expenditure deal to improve energy performance on E.ON's wind farms. Structuring the three options required extensive familiarity with the client's balance sheet, financial strategies, and approach to the market. The GE sales team had to manage E.ON's procurement and accounting officers and also had to work closely with its technologists to address concerns about measuring performance. It developed a complete methodology, shared it through white papers, and piloted the technology on selected E.ON turbines. The deal itself required layers of agreement within the client, from purchasing to asset management to finance and operations. In the end, the operational-expenditure model won out. E.ON accepted the assessments and methodology and was pleased that very little capital had to be spent to capture gains.

Building out the ecosystem.

Immelt, Ruh, and Comstock were aware that they could go only so far in developing offerings. They needed to strengthen the loose network of suppliers, distributors, and developers of related products and services that enable and enhance GE's offerings. It's an approach that technology companies such as Apple and Microsoft have benefited from for years, as have Walmart and other highly tech-dependent businesses.

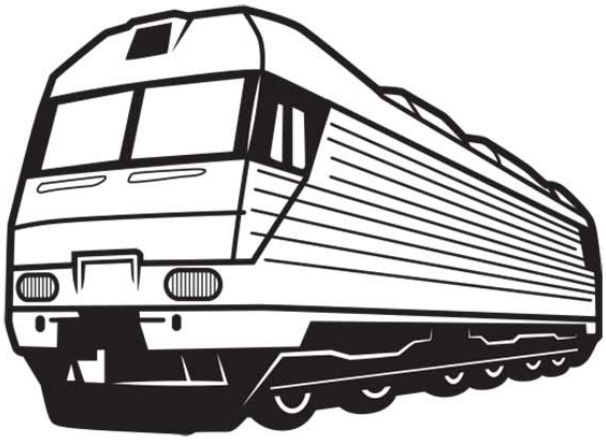
The challenge was especially tricky for GE. Each of GE's industry sectors was at a different stage of maturity, and each business unit had its own legacy software issues that constrained product innovation. "We have to face the limitations on the ecosystem," Immelt says. "We started from the idea of asset optimization and no unplanned downtime, but in the end, the maximum customer value is going to be in the ecosystem. How open do we want this to be? How far are we willing to go?"

To build out its ecosystem, GE is experimenting with different types of partnerships. Joint ventures, for example, let a smaller concern run with a discrete idea, keeping it free of GE's internal pressures. Caradigm, a 50/50 joint venture formed by GE Healthcare and Microsoft in February 2012, developed software to enable health systems and payers to drive continuous improvement in care. Taleris, a joint venture between GE Aviation and Accenture that developed software and analytics capabilities to manage airline operations, recently signed its first multibillion-dollar deal with Etihad Airways, of the United Arab Emirates, to predict maintenance issues and recommend preventive approaches.

GE is also relying more on crowdsourcing for innovation. The company has invested in Quirky, a consumer product innovation platform and manufacturer with more than 744,000 members, to propose, refine, select, fund, and build new products, and has offered its relationships with suppliers and other support for products as they launch. The investment helped get four products—a smartphone-enabled power strip, a physical dashboard that displays online information, a smart egg tray (which connects with your mobile device to tell you how many eggs you have and how fresh they are), and a multifunction sensor

(motion/sound/light/temperature/humidity) for home use—onto the shelves at Home Depot and Best Buy before the 2013 holiday season. More recently GE announced a smartphone-powered window air conditioner for the home market.

Locomotives



Benefits

- Lower maintenance costs
- Improved availability and utilization
- Improved network velocity and capacity
- Improved customer service

GE Aviation partnered with Alaska Airlines in November 2012 to present Flight Quest, making two months' worth of FlightStats data available on an open platform. Outsiders were challenged to come up with algorithms that could better predict flight arrival times, with a total of $250,000 awarded to the top five entries. The winner, a doctor in Switzerland, developed an algorithm that predicted arrival times 40% more accurately than the existing technology. More recently, Local Motors, an Arizona-based company that has crowdsourced vehicle design since 2007, partnered with GE to debut a manufacturing process and increase by an order of magnitude the number of products designed and market-tested in the appliances division.

GE has also partnered with potential competitors, including Intel for sensor technology, Cisco for network hardware, Accenture for service delivery, and Amazon Web Services for cloud delivery. As Ruh notes, "One big fear when partnering with companies like these is the competitive risks." Immelt says, "We partner with competitors. We know there's going to be tons of things we learn and share or give away. You can say on the outside, 'You are opening up Pandora's box. You're going to lose some of the control you have today.' I think that's part of the debate."

The tremendous opportunities created by GE's digital transformation don't come risk-free. As the company continues on this path, it will need to keep building software capabilities and defining software strategies that capture value without alienating participants in the ecosystem. The choices it makes about the openness of its platform will be crucial. Moreover, GE's business model will be increasingly tied to those of its customers.

Beyond GE

GE is just one of many companies being completely reshaped by the new ubiquity of digital technology. Microsoft's CEO, Satya Nadella, is trying to move his company past reliance on sales of its packaged software to remake it as a provider of cloud-enabled productivity services that operate on any platform or device. Microsoft's transformation will recombine and restructure every one of its products and businesses. And as core applications such as Outlook and Office rapidly turn toward service-based business models (Outlook.com and Office 365), Nadella and his team are looking at new monetization approaches. Revenue from packaged software is giving way to value capture based on customer usage.

Like GE, Ford is working in a variety of partnerships to create information-based offerings and is structuring new relationships with major Silicon Valley players. CEO Mark Fields is investing in the development of new business models: Ford and Zipcar have experimented with car-sharing on U.S. college campuses, and Ford is piloting a Zipcar-like program in Germany. In cooperation with other start-ups, Ford is working on services such as enabling drivers to reserve parking spaces and enforcing residential parking rules. And it is looking to create on-demand ride-sharing. Meanwhile, Daimler has established a car-sharing service, car2go, that operates in 26 cities in Europe and North America, and it recently acquired RideScout, an Uber rival that operates in 69 cities in North America.

Bank of America is investing in its relationship with the investment platform Wealthfront, bringing analytics and automation to consumer portfolio investing. The bank is now using Wealthfront's services to manage more than $1 billion in investments, rather than relying on its traditional portfolio choice and optimization processes. In the hedge fund arena, ValueAct

is working with iMatchative to create integrated data platforms—from fund performance to novel investor and fund-manager psychometrics—and more-streamlined, digitized decision processes. The list goes on.

What SmartWool Learned from Its Digital Customers

Ubiquitous connectivity can reshape marketing and product innovation. Digital networks, for example, can leverage user data and drive efficiency in advertising and lead generation. They can also connect manufacturers directly to communities of product users and "fans"—making it possible to crowdsource innovative ideas with ease.

When executives at SmartWool, a maker of high-performance athletic apparel, wanted to reach their core customers with a new ad campaign, they went to Victors & Spoils, an open digital advertising company. The V&S team quickly discovered that the last thing SmartWool's loyal customers wanted was more traditional advertising; instead these outdoorsy types were eager to participate more meaningfully with the company.

In thinking about product design and marketing, SmartWool had always looked to world-class athletes for guidance—an old-school approach based on the view that expert knowledge was scarce. V&S flipped the paradigm and, through Facebook, recruited a community to test SmartWool's products. Six months after the launch of the campaign, SmartWool had signed up 2,500 field testers—more than 10% of its Facebook following. These enthusiastic fans bought the new products and put them to rigorous use right away. But the real bonanza for SmartWool was that the testers flooded the company with novel insights about the products'

Approaching Digital Ubiquity

Over time, digital technology and the internet of things will transform virtually every sector and every business. Here's how you can embrace them, using lessons from the companies we studied:

Apply the digital lens to existing products and services.

We still live in an analog world. However, over the next five years many business components will be digitized to enable a new range of products, services, and business models. Consider how Uber has transformed transportation services by digitizing all aspects of reservations, tracking, billing, customer service, driver performance, and ratings. What cumbersome processes in your business or industry are amenable to instrumentation and connectivity? Which ones are most challenging to you or your customers?

Connect your existing assets across companies.

If you work in a traditional analog setting, examine your assets for new opportunities and look at other industries and the start-up world for new synergies. Your customer connections

performance, suggested improvements, and offered ideas for new products. For example, fans requested that SmartWool add thumbholes to its jacket sleeves so that they could function as mittens. They also wanted lighter-weight running socks in a broader selection of colors. The company's designers accommodated them.

The whole process culminated in an advertising campaign. V&S incorporated SmartWool's new embrace of its crowd in ads featuring its field testers and their innovations. The campaign has performed well online and in print, improving both brand message retention and e-commerce conversion. Executives at V&S and SmartWool say they were surprised by the customers' passion and acknowledge that they could never have tapped into it without the digital connection. Now that SmartWool has opened the channel to fans, it's finding new ways to bring them into every part of the product innovation and marketing development processes.

are especially valuable, as are your knowledge of customers' needs and the capabilities you built to meet them. Nest is connecting with public utilities to share data and optimize overall energy usage. If you work in a start-up, don't just focus on driving the obsolescence of established companies. Look at how you can connect with and enhance their value and extract some of it for yourself.

Examine new modes of value creation. What new data could you accumulate, and where could you derive value from new analytics? The industrial and consumer printing company 3D Systems is creating platform- and service-based business models that go beyond selling hardware and consumables. How would recombining the components of your business give rise to new opportunities? How could the data you generate enable old and new customers to add value?

Consider new value-capture modes.

Chances are that digitization will deflate some of your old models but will also create interesting new opportunities. SAP's cloud efforts allow it to charge customers for only the features they use, enhancing its ability to acquire new customers. Could you do a better job of tracking the actual value your business creates for others? Could you do a better job of monetizing that value, through either value-based pricing or outcomes-based models?

Use software to extend the boundaries of what you do.

Digital transformation does not mean that your company will only sell software, but it will shift the capability base so that expertise in software development becomes increasingly important. And it won't render all traditional skills obsolete. Your existing capabilities and customer relationships are the foundations for new opportunities. Invest in software-related skills that complement what you have, but make sure you retain those critical foundations. Don't jettison your mechanical engineering wizards—couple them with some bright software developers so that you can do a better job of creating and extracting value.

New Structure and New Risks

Outcomes-based business models create new dependencies and risks as well as revenue opportunities. You will depend on the ability of your customers to operate successfully, and you'll be sensitive to the same economic trends and potential shocks that affect them. GE is going to absorb a lot of business risk for its customers, but it has the financial understanding and capabilities to manage that risk. Smaller players will need to reach out to the financial sector for some carefully considered ways to cope with potential downsides.

The new ubiquity of digital technology and connectivity will have profound implications for the economy at large. The fortunes of Fairfield, Connecticut, where GE is based, will increasingly be tied to the weather at a wind farm in Germany, or to the operating efficiency of an airline headquartered in Abu Dhabi. Pressure on regulatory bodies will increase, and traditional institutions—from Fanny Mae to the U.S. Food and Drug Administration—may be unable to keep up. Inadequate regulation and a lack of transparency in financial instruments and institutions drove the global economy off a cliff in 2007-2008. In a world in which complex relationships across companies and industry segments may not always be understood, let alone transparent, something similar could occur. Booms and busts may become sharper and more violent. Furthermore, risks will be increasingly difficult to identify and manage, making busts harder to predict.

But no opportunity comes without risks, which are best handled with awareness and transparency. Individual investors, companies, and institutions should work to understand new assets, new connections, and new dependencies. Institutions should ensure that

connections are transparent and that the powerful are held accountable for the impact of their decisions. Our hope is that this wave of opportunity will couple enthusiasm with reason. If the potential downsides are managed well, the short- and long-term rewards will be dramatic.

Editor's Note: An earlier version of this article stated that St. Luke's Medical Center is in Phoenix. The facility is in Houston. This article has been updated to reflect the correct information.

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