The Only Way Manufacturers Can Survive

Digital transformation is no longer optional for industrial companies. The problem is it’s really, really hard.
Leading a corporate transformation of any kind is difficult, and it hasn’t become any easier over time. But starting and sustaining a digital transformation in a manufacturing company? That’s tougher than managing any other change initiative — from total quality management to Six Sigma to lean manufacturing — and, believe us, we’ve lived through, or seen, them all over the last three decades.

Becoming digital is a requisite for survival today. However, while waves of technology — automation, additive manufacturing, AI — are washing over the corporate world, redefining the nature of work and productivity, there are no playbooks and few best practices for manufacturers’ digital transformation. Few industrial companies even paid attention to digital technologies until recently. Just nine years ago, for instance, General Electric didn’t track them closely, never thought about how they could fit in with the machines it manufactured, and, above all, didn’t realize it could make money from them. Digitalization was far removed from GE’s industrial reality.

Even today, although most manufacturers are beginning to flirt with digital technologies, not one has successfully pulled off a digital transformation. CEOs still have to figure out its art — and science — forcing them to draw up their game plans on the fly, which inevitably leads to tension and trauma. Some business leaders have been criticized for kicking off digital transformations prematurely; others for delaying them; and still others have been sacked for not sustaining them.

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BY VIJAY GOVINDARAJAN AND JEFFREY R. IMMELT
One of us spearheaded several transformations between 2001 and 2017 — including a digital transformation — at GE, a well-established global corporation. The other has been studying innovation and change in large companies, including GE, for decades. We’re both convinced that executing a digital transformation is not only the most complex but also the most critical challenge that any manufacturer faces today. That’s why we came together to coauthor this article, which illuminates why digital transformation is so tough for manufacturers and shares some key learnings from our experience.

GE was probably the first manufacturer to internalize that digital technologies could disrupt its businesses. However, that happened only after a GE scouting team searching for megatrends serendipitously figured out through its online research that some incumbents, such as IBM, and several high-tech startups were gathering data from GE’s customers to develop novel data-based services in sectors such as aviation and power.

Despite its newfound awareness of this existential threat, GE still faced uphill battles in its efforts to start and sustain its digital transformation. GE’s experiences, as well as those of other manufacturers
Digital Opportunity and Threat

Many CEOs miss the fact that a digital transformation isn’t the same as the digitalization of an existing business. It isn’t about creating websites, mobile apps, social media campaigns, and online sales channels. It isn’t about infusing information technology into the organization — which may improve efficiency but will not fundamentally alter strategy. A digital transformation entails reimagining products and services as digitally enabled assets; generating new value from the interconnection of physical and digital assets through data; and creating ecosystems to make that possible. And it results in a fundamental change in business and organizational activities, processes, competencies, and business models, enabling greater productivity.

Most of the business leaders we talk to can sense, but don’t fully realize, just how big a threat digitalization poses for manufacturers. Worse, they don’t see the opportunity it offers. Manufacturers such as GE, Siemens, and Honeywell International already depend heavily on after-sales services for more than half their revenues and even more for profits. In 2010, for instance, service contracts made up around 75% of GE’s unfulfilled orders of more than $225 billion — amounting to over 18 months’ worth of revenues — and contributed around 80% of its industrial earnings.1

By embedding sensors and instrumentation in machines and processes, companies can now collect and analyze user data continuously rather than periodically. Analyzing those flows of data allows them to figure out ways of improving the performance and reliability of machines in real time, as well as the efficiency of the systems that link them, offering the opportunity to continually boost customers’ productivity. That can alter what a manufacturing company sells, viz outcomes rather than products. For instance, companies like GE can sell power by the hour instead of selling engines.

Despite the enormous potential for growth, machinery manufacturers weren’t the first ones who woke up to the potential of marrying “big iron” with big data. As GE’s scouts discovered, other players jumped in to create the market. That includes technology giants such as IBM, Royal Philips Electronics, Toshiba, and HP; digital natives like Amazon, Alphabet, Apple, and Microsoft; and venture capital-supported startups such as Uptake, Opower, Tendril Networks, Onzo, Aclara Technologies, and Flutura. These companies are now helping businesses such as commercial airlines, power companies, and oil and gas producers get more out of their machines by studying performance data in real time. It’s a lucrative business: Companies earn a chunk of customers’ additional revenues or savings by delivering outcomes. In 2016, a World Economic Forum study estimated that this business opportunity could amount to as much as $6.8 trillion over the next 10 years.2

That’s tempting manufacturers to launch half-hearted digital initiatives, increasing the use of information technology, outsourcing wherever possible, and bringing in digital talent without organizing it for success. However, as we’ve seen over the past decade, companies that don’t commit fully to digital transformation will be elbowed out by rivals that can offer new data-based services, potentially breaking up the incumbents’ long-standing relationships with customers. Given that the replacement value of GE’s assets was $2 trillion in 2010, when its scouts came back with news about the digital threat, anybody capturing even part of that value would become a formidable rival.

The risk of ignoring the threat of competition is immense: If a digital company can make industrial machines perform better than even the manufacturer can, it’s lights out for the latter. Not only will the manufacturer lose many of its profitable streams of service income in the not-so-long run, it will also have to be content as a commodity producer. That’s why digital transformation isn’t merely an option — it’s the oxygen that will keep industrial manufacturers alive and kicking in the digital era.

Three Forces of Inertia

Even companies that have woken up to the digital threat and opportunity find the transformation process exceedingly difficult. Our research and experiences suggest that the barriers are both structural and behavioral; they are embodied by systems and embedded in mindsets. Manufacturers must overcome three major obstacles in order to escape inertia and become digital-industrials.

THE LEADING QUESTION
What are the obstacles manufacturers must overcome to escape inertia and become digital-industrials?

FINDINGS

• They must prevent core competencies from becoming rigidities that inhibit change.
• They must figure out how to integrate digital hires with engineers to form a new set of capabilities.
• They must embrace concepts such as agility, simplicity, responsiveness, and speed.
Incumbency. Every company develops capabilities and business models with the aim of earning revenues. But those competencies, which become core to its performance and difficult for competitors to imitate, can turn, over time, into rigidities that inhibit change. Business leaders stick with existing business models because they work but don’t notice the danger from disruptive new ones. The old models are probably performing at their peak at this stage, so the incentive for change is at its lowest.

Traditional performance metrics, such as sales growth and net profit margins, compound the problem by focusing on near-term performance and preventing investments in uncertain, long-gestation innovation and transformation projects. Convincing your profitable business divisions to back investments in a digital transformation that may bear fruit in the long run (rather than financing their innovation projects, which will generate profits faster) can be a hard sell. That’s especially true if the company’s existing rewards structure favors short-term return on investments over longer-term bets.

Talent. Until recently, most manufacturers treated digital technology as a backroom function to support their existing businesses, choosing to outsource its development. They paid little attention to cultivating the skills to carry out a digital transformation. Moreover, manufacturers generally have a tough time attracting much-in-demand digital talent. Let’s face facts: Unlike Alphabet and Apple, companies such as GE and Ford Motor still aren’t considered employers of choice for software engineers.

An additional complication is that manufacturers must integrate the digital talent they do hire with their traditional mechanical, chemical, civil, and industrial engineers to form a new set of capabilities. That’s easier envisioned than executed, because engineers in the virtual sciences learn, think, and function very differently from those in the physical sciences.

Culture. An industrial company’s organizational culture often proves to be a huge obstacle. Manufacturers historically have thrived on a long product-development cycle, Six Sigma efficiency, and a long sales cycle. They tend to focus on investing large sums of money to develop, manufacture, and sell products, usually based on proprietary technologies.

By contrast, software companies work to short product development cycles, are flexible, and have quick sales cycles. They like to develop software in partnership with other companies and make money by providing software as a service in addition to selling products. Their products have a shorter shelf life than manufacturers’ products, and the cost of failure is lower. For instance, while GE releases several versions of its software products every year, its machine designs change only once in three or four years.

Manufacturers believe in continuous improvement, digital companies in constant innovation. To become more digital, industrial organizations must embrace concepts alien to them such as agility, simplicity, responsiveness, and speed. That’s a tall order for well-established enterprises geared to deliver cost-effective products at predictable intervals.

Setting up a digital function in a manufacturing company also heightens internal rivalry, creating an us-versus-them mentality between the old and the new. In the early days, GE’s IT teams, for instance, felt most threatened by GE Digital’s software and systems engineers, who were paid higher-than-standard GE salaries as an incentive to join a manufacturing company. Worse, the newly hired software engineers looked down at how the IT folks worked and told everyone in the company that. They loved GE’s mission but didn’t care for its bureaucracy. They would simply quit if they didn’t like the way projects were planned and executed. Suffice it to say that a digital transformation will affect your company’s culture in ways you have not even begun to imagine.

How Companies Talk Themselves Out of Transformation

Kicking off a digital transformation can be a long and laborious process. In our experience, executives usually take a cautious approach, asking themselves a series of questions that send them around in circles, thus stymieing the process before it’s even begun. Here’s how we suggest cutting to the chase.

Wouldn’t it be quicker and less investment-intensive to outsource the creation of digital capabilities or enter into a partnership? Our
Outsourcing the development of digital technologies or tying up with a digital partner may seem like a viable option, but, in reality, it could short-circuit the digital transformation process. There are plenty of cases where buying capabilities does make sense — cloud computing or storage, for instance — but manufacturers would do well to invest in developing the digital technologies that will differentiate them in the marketplace, particularly since they already own the machines and have the customers.

Companies should first decide what they want to own before thinking about partnerships; otherwise, they will end up picking the wrong partners. Worse, partnering from the outset or merely making investments in digital businesses will never alter a company’s core capabilities, technologies, and business models enough to bring about a transformation, or even lay the foundation of one. It will only add a thin digital layer over existing products, processes, and business models. Some next-generation technologies may look too distant, but industrial companies must realize that mastering them will be essential for survival. Moreover, manufacturers will have to share precious domain knowledge with their digital partners, losing their only bargaining chip. It’s tough to negotiate partnerships when you don’t bring much to the table. Just ask Microsoft about buying Nokia, Yahoo! about Tumblr, Google about Motorola, eBay about Skype, or News Corp about Myspace.

We believe that companies perform better by developing digital capabilities in-house. Not only will doing so permanently improve their core capabilities, it will also help reshape the company’s culture, as industrial employees work alongside digital folks to develop software-based services. If the manufacturer were to strike a partnership down the line, it would then be able to do so on an equal footing — not from a position of weakness. GE, for instance, refused to enter into alliances or strike partnerships for the first five years of its digital transformation. Instead, it hired a digital CEO from outside the company; set up a central software division in San Ramon, California; and then signed on more than 2,000 software engineers — a mammoth undertaking. As GE gained expertise, it slowly pivoted to partner with digital players such as Microsoft, Amazon, Splunk, Accenture, Tata Consultancy Services, Tech Mahindra, and AT&T. It also learned to work with startups on software applications, acquiring key companies such as Meridium, to build out its capabilities. Doing so was critical to creating and owning the digital layers around its products. By December 2018, when GE hived off GE Digital into a fully owned subsidiary, as had been planned from the outset, it had accumulated considerable expertise that strengthened its bargaining power and confidence. Spinning off GE Digital only after it had attained scale will help it raise resources at larger valuations and grow into a giant in the industrial internet of things while still being linked to GE’s businesses.

Shouldn’t we use IT people we already have rather than hiring fresh people who don’t know our businesses? And shouldn’t we place the digital initiative under the CIO rather than appointing a new chief digital officer (CDO)? No, and no. Harsh though it may sound, the IT functions in manufacturing companies aren’t staffed by digital technologists. IT engineers buy hardware, outsource software development, and excel at managing projects and customizing vendor-developed software to improve operational efficiency. Reimagining products and services with proprietary software for customers requires very different capabilities. In that sense, IT is a process; software is a product. GE learned the difference the hard way. In 2006, GE Healthcare (then headed by one of the authors) acquired IDX Systems — one of the top five health
care software companies in the U.S. — but failed to capitalize on the $1.2 billion deal. IDX’s four main products needed a software rewrite. A GE person took charge, and by the time the dust settled, the acquisition had lost many of its people.

Because most manufacturers ignored the first wave of digitalization, they have no choice but to hire heavily from the outside when they start out on their digital transformations. In doing so, they often try to save costs by combining the role of the CIO and the CDO, a relatively new position in manufacturing. The titles sound alike, and there is some commonality, but it’s almost impossible for one person to focus on both functions. The CIO, whose knowledge base is inward-focused, must concentrate on increasing productivity inside the company. The CDO, who focuses on external markets, should worry about customer productivity. Keeping those two roles separate is critical for success; combining them will ensure that one of the two roles becomes ineffective.

Unlike IT professionals, digital leaders can weave their knowledge into the context of a customer’s business, helping the customer realize the commercial value of digital technologies. For instance, after analyzing data from customers, one of GE’s digital teams figured out that every wind farm has a unique energy-generation profile based on its location, landscape, and prevailing winds. Realizing the importance of that insight, the digital team worked with turbine engineers to custom design turbines for every wind farm. That increased each turbine’s energy output by 20% a year and generated $100 million in additional revenues over its lifetime — something most IT people wouldn’t have concerned themselves with.

Shouldn’t we have each of our businesses develop digital capabilities that are specific to their customers’ needs, instead of setting up a central digital unit that caters to all the businesses? No. Conventional wisdom suggests that in a multidivisional company, digital capabilities should be distributed in each of the businesses. There is some logic to that idea. Each business is different and possesses different subject matter expertise, has to learn to work in its own way with software engineers to develop solutions for its customers, and must develop unique business models to capture value. The thinking goes that decentralization will enable each business to feel that it “owns” its digital strategy, its customers, and the costs.

In practice, though, three factors dictate that the digital function must be a central unit in order to play a truly transformative role. First, as is true of most breakthrough innovations, the old and dominant industrial business will never allow the fledgling digital function to grow beyond a certain point. The legacy mindset will constantly strive to assert its dominance; the digital unit will never gain the traction or support it needs to transform the business.

A digital function operating inside an industrial business can therefore never create a transformation mindset. Only when it is located outside the existing business will it identify ways of disrupting the business. Moreover, if the digital initiative is not centralized, every business will work at its own pace; there will be little best-practice sharing; and the digital units will wither. That’s why GE Digital was conceived of as an independent business in faraway Silicon Valley from the get-go. Headed by a CDO who reported directly to GE’s CEO, it started up with an investment of $200 million to embed sensors and instrumentation in GE machines, capture and study customer data, and develop software applications for all of GE’s businesses.

Second, a digital-industrial can gain economies of scope only by creating a digital function that cuts across businesses. Over time, GE Digital developed the first operating platform for the industrial internet of things, GE Predix, which became the cornerstone of its strategy. The platform laid down a set of technology standards for the industrial IoT and could sit
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on all the machines GE made, as well as on machines that rivals sold. Creating a platform matters commercially. Digital companies that develop the first platforms — Amazon, Google, Facebook, YouTube, eBay — usually make all the money.

Finally, to attract the best digital talent, an industrial company must create a global center of excellence with its own HR capabilities. When GE started out, the central HR function handled recruitment, which didn’t work very well. Probably 90% of the people whom GE and its headhunters reached out to in Silicon Valley didn’t know that GE wanted to develop complex software products and weren’t interested in signing up. Only after GE set up a dedicated HR function for GE Digital in San Ramon did it attract digital talent.

Colocating all the digital talent will also enable them to learn from and feed off one another to build great software. Optics matter, too. A large, state-of-the-art digital center, visible to the market, will draw partners to create an ecosystem, attract customers, and boost valuations. Small digital units located deep inside industrial businesses are unlikely to have the same impact.

Shouldn’t we be selective rather than going all in? The jury is out on this one. If they wake up early enough to the digital threat, some companies may well be able to set up a few digital pilots in one business or product line, learn from their successes and failures, and then slowly scale the digital transformation across businesses. But waking up belatedly to the digital threat usually makes it difficult to follow a staged approach.

GE had to move relatively quickly to capitalize on the digital opportunity; it had to go all in because it faced a grave threat from digital rivals. It kick-started the transformation across all the company’s businesses to underline the fact that digital transformation was a strategic priority for the entire company. That message would not have gone out if the transformation had started tepidly in one or two businesses. In hindsight, because GE began to take the threat seriously only after its digital rivals had started up, it’s fair to say that GE should have moved even earlier than it did.

Lessons in Executing Digital Transformation

Developing a strategy to harness digital technologies to transform an industrial company is a start — but that’s all it is. The stiffest challenges lie in strategy execution. In order to achieve that, CEOs must rethink virtually everything about how their companies work and create new business models, develop fresh organizational structures, and lead very differently. There’s no “add water and stir” solution to navigate digital transformation, but three ideas stand out as critical for success:

1 Business models eat technology for breakfast. A digital transformation is about changing business models — and that is harder than moving on from legacy technologies. While industrial companies’ traditional business model has been to sell hardware, give away software for free, and perform break-fix service (fix it when it breaks), the new digital-industrial business models entail selling customized, performance-enhancing, software-enabled solutions along with the hardware; delivering outcomes; and sharing in customers’ additional profits.

Manufacturers enjoy an innate advantage over digital rivals: They understand their machines better, which helps them provide the outcomes customers desire. The trick is to be prepared to change or give up an existing business model if doing so has the potential to create and capture new value.

Create fresh value. Manufacturers can create value from the industrial IoT in several ways and should deploy all of them at the same time. By analyzing all the data on how customers are using, maintaining, and repairing their machines,
manufacturers can build better-performing products that last longer and require less service. Superior products drive sales, even in flat markets, which will yield more data over time. Thus, market leaders may be able to trigger network effects in hardware sales.

In addition, developing a suite of software applications can turn data into insights, and insights into better customer outcomes. Using predictive analytics, companies can migrate to condition-based service, reducing unplanned downtime. For instance, an airline can be certain that all its engines will always be available and be serviced only according to a predetermined schedule, which will boost fleet reliability and aircraft utilization.

Capture new value. Manufacturers can capture the value created through a digital transformation in two ways.

First, they can go the software-as-a-service route and sell subscriptions and licenses for the software products they develop in order to analyze the data from and refine the performance of their machines. They can target customers, noncustomers, and even companies in industries in which they don’t operate, expanding their ecosystems. Improving one aircraft engine’s efficiency by 1% through software can result in $2 billion of annual savings, but that’s just the starting point. It provides an impetus to redesign the entire system for greater efficiency, and analyzing aggregated data from the airline’s fleet will boost company-level profits significantly.

Second, digital-industrial companies can offer “success as a service” through guaranteed customer outcomes — safety, speed, fuel efficiency, zero operator errors, no unscheduled downtime. Instead of selling locomotives, they can sell velocity; instead of power turbines, power by the hour; and instead of selling jet engines, they can sell flying times.

However, most manufacturers don’t know how to do all that — yet. They will need to retrain their existing sales force to sell data- and software-based outcomes and create a digital-products sales force to offer a portfolio of subscriptions and other ways in which deals could be monetized. In doing so, they will become more like IT services companies such as Salesforce.com, SAP, Adobe Creative Cloud, Amazon Web Services, and Slack Technologies, which have gone beyond selling software to selling services and success.

Be warned, though. A digital-industrial strategy will cannibalize traditional sales in several ways. Data and insights help improve the productivity of machines, which will eat into hardware sales. They can increase the reliability of machines, which could reduce future service revenues. Software subscriptions and licenses might enable customers to service their machines themselves. Existing customers could terminate or renegotiate their service agreements, and potential customers that might have chosen legacy offerings could decide not to enter into service agreements with manufacturers.

For all those reasons, the traditional businesses are bound to fight the digital transformation. GE used several approaches to anticipate and counteract this resistance. Its initial moves were designed to protect the businesses’ after-sales service revenues, which they greatly valued. The company collected data to show that the industrial IoT would substantially expand the market. GE also demonstrated that digital transformation could trigger network effects in hardware sales. Its aviation business, for example, used real-time, data-based analyses to simultaneously reduce its customers’ maintenance costs and increase engine availability. Not surprisingly, it was able to strengthen its market position as a result.

Finally, GE designed several structural mechanisms, which we discuss next, that addressed the concerns of the businesses, while the CEO constantly emphasized that the cost of cannibalization was lower than the cost of inaction — namely, extinction.

Digital-industrial companies can offer “success as a service” through guaranteed customer outcomes — safety, speed, fuel efficiency, zero operator errors, no unscheduled downtime. Instead of selling locomotives, they can sell velocity; instead of power turbines, power by the hour.
Digital operations should be distinct but linked. Getting the structure right for a digital transformation can be tricky. In addition to creating an independent digital operation, as we argued earlier, CEOs must find ways of linking it to the industrial businesses, which understand best how their machines work. GE Digital was a distinct business, but it was deeply connected to the company’s manufacturing businesses such as GE Power and GE Healthcare. Not only did the manufacturing businesses possess the data that the digital center needed, they also enjoyed brand power, owned the customers, and managed service contracts. It is only by integrating industrial knowledge and assets with software that manufacturing companies can create value, but that’s the hardest thing to pull off.

Friction is inevitable when the digital function connects to the mother ship, especially as digital grows in size and influence. For one thing, it will divert resources from the core businesses, which the latter will resent, especially since they are generating all the capital. For another, everyone in the machinery businesses — from the unit heads to field-level salespeople — initially may be skeptical about what software can do for a hardware company. The manufacturing businesses can get the best out of the digital center only by working closely with it, but operating hand in glove with digital employees is the last thing most industrial managers want. Sooner or later, the physical businesses will start wondering about how the digital business is going to affect their long-standing customer relationships. Who will talk to the customer: the business or the digital function? Who will decide pricing? Who is going to get credit for a sale? Who owns the customer, anyway?

CEOs must therefore find ways to make linking the vertical businesses and the horizontal digital function pay off — for both sides. GE appointed a chief digital officer of the business for each unit. A CDO-B reports both to the CEO of his or her business and to the company’s CDO and works with both to execute the digital transformation of products and business models.

The CDO-B helps create support for the digital function inside the businesses, getting them involved in the transformation process. However, all the CDO-Bs must be based in the digital center, co-located with the software development people. This facilitates coordination by making it easier for the CDO-Bs to provide feedback to the digital center about which software applications customers value, help bring software solutions to market, and play a mediating role in dealing with conflicts between the businesses and the digital center. If a CDO-B is a digital native but is also more business- and product-oriented than tech-oriented, he or she can help move the transformation process forward. Those capabilities will ensure that the CDO-B generates additional revenues from the business’s existing customers while bringing in new customers by explaining and selling digital services to them.

We discovered that B2B customers like working with CDO-Bs. That’s because the CDO-Bs understand enough about the businesses the customers are in and about the latest technologies to improve their productivity and deliver outcomes. That in turn draws grudging acceptance from the industrial businesses, especially employees in the field. Recognizing “their” customers are likely to become more loyal and sign more profitable contracts because of the CDO-Bs, the businesses start backing the digital transformation. Hiring a CDO-B is not a panacea, though. Every company must build its own mechanisms to help the industrial businesses embrace the digital transformation.

There’s much debate nowadays about whether measuring profits and losses is a smart way to hold the digital center accountable or whether that will sound its death knell. One way of making it work is to share credit by internally double-counting digital
revenues — once for the businesses, which are the legal entities where the revenues are booked, and once more for the digital center, where they can be shown notionally. Since both groups benefit if revenues rise, there won’t be squabbles over which of them clinched a deal.

Interestingly, GE set only quarterly top-line, or revenue, targets for GE Digital, not profit targets, believing profit targets would prevent risk-taking and inhibit investments in developing digital products. For instance, GE Digital’s Predix-powered revenues rose to $1.2 billion in 2018, an increase of 49% over the previous year. Around 60% of those revenues came from GE customers such as BP, BNSF Railway, Emirates Airline, E.ON, Excelon, Maersk Drilling, PSEG, Rio Tinto, Rosneft, SABIC, and Vale; 40% came from non-GE customers that used the Predix platform, such as Gerdau, Schindler Elevator, SIG, Subaru, and P&G.

CEOs must not be scared to lead. Leading a digital transformation is about being willing to challenge incumbency, ignorance, and the status quo. It requires courage. Because a digital transformation changes everything, CEOs must personally take up the cause. They must be committed to learning more about digital in order to lead effectively; this is critical to ensuring that they don’t become uncertain and paralyzed.

Only CEOs have the power to resolve the conflicts between the old industrial businesses and the new digital business. (Conflicts will arise, not because people are bad, but because people care about the work they do.) That’s why GE Digital’s head reported to the CEO — just like the heads of GE’s industrial businesses.

When the future is so uncertain, there will be pushback both internally and externally to justify investments in value-creation initiatives. But leaders know they must create the future through their investments in innovation, globalization, manufacturing productivity, and talent development, while at the same time focusing on operational excellence to improve revenues and profits. They have to manage the trade-offs between their tenures as CEOs and the tenures of the companies they lead, particularly since the returns on the long-term investments won’t be evident until after the CEO is long gone.

It’s tough to lead change when it isn’t clear why change is needed or where the organization will end up. To start, CEOs must react quickly to weak signals, but over time they should develop an overarching vision for digital transformation. After creating a burning platform by framing digital as an existential threat, they must demonstrate how digital can be an enormous opportunity. They must be firm about the strategic direction and remain committed to their point of view about the future, but they should also be prepared to experiment, learn, and pivot.

Above all, CEOs should never lose their nerve. A digital transformation is a long-run strategy. Without consistent backing, it’s hard to execute. Business cycles come and go, but the future always lies ahead. CEOs should never need to apologize for investing in it. If industrial companies don’t continue to invest in digital transformations, they will create markets that either industrial rivals or digital natives will seize without much fanfare. It’s crucial that they transform themselves today.

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