



# Accelerating digital transformations: A playbook for utilities

Adrian Booth, Eelco de Jong, and Peter Peters

Utilities trying to reinvent themselves as digital enterprises have found it hard to scale up from digital pilots. Adopting digital ways of working, adding talent, and modernizing IT will hasten transformation.

**For utility companies,** transforming operations and systems with digital technologies can create substantial value: a reduction in operating expenses of up to 25 percent, which can translate into lower revenue requirements or higher profits. Performance gains of 20 to 40 percent in such areas as safety, reliability, customer satisfaction, and regulatory compliance are also achievable. These prospects have led utilities to launch all sorts of efforts to use digital technologies: reimagining customer journeys, adding digital leak detectors to gas grids, using predictive models to schedule maintenance and other asset-management activities, and equipping field workers with mobile devices that let them access technical instructions while in the field, to name a few (see sidebar, “Digital opportunities in the utility sector”).<sup>1</sup>

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<sup>1</sup> For more, see Adrian Booth, Niko Mohr, and Peter Peters, “The digital utility: New opportunities and challenges,” May 2016, McKinsey.com.

Many utilities initiate these efforts with larger ambitions, like establishing a new way of operating based on agile management methods and other practices, and incorporating digital technologies across the enterprise, including interactions with customers, employees, suppliers, regulators, and partners.<sup>2</sup> Yet few of the digital pilot projects we've seen at utilities have created momentum for comprehensive digital transformations. Research by the McKinsey Global Institute bears this out: a study of US companies showed that utilities have achieved only a moderate level of digitization—well below that of other industries. Significant potential to digitize the assets of utilities further and to deepen their digital engagement with customers remains.<sup>3</sup>

That's understandable. In our experience working with utilities and speaking with their executives, we have learned that three issues appear to inhibit their digital transformation. First, the working methods of the typical utility company are built around safeguarding large, long-lived assets and minimizing operational risks. Because of this mind-set, utilities are typically cautious about embracing digital ways of working that involve constant experimentation and could have unintended consequences. Second, the popular perception of utilities as analog-era companies makes it hard for them to attract people to fill digital-economy roles, such as data scientists. Third, utilities typically have complex legacy operations and IT environments that inhibit rapid innovation.

None of these conditions is easy to remove, but some utilities are showing that this can be done. Here, we offer a closer look at the issues, along with insights into how leading companies have resolved them (exhibit).

### **Adopting digital ways of working**

The conventional wisdom in the sector is that utilities need to be stable, reliable, and secure above all. We agree that these are important virtues. However, utilities face fresh competitive threats and heightened customer expectations because advances in digital technology have enabled companies in all sectors to operate in a more agile, innovative manner. Digital-native and digitally transformed businesses take risks with their innovations because fast-moving processes and flexible systems let them correct mistakes before serious harm occurs. These companies use design thinking to understand customer needs, conceive suitable products and services quickly, launch them as soon as they are viable, and make improvements in short cycles of testing and collecting feedback.

To thrive in the digital economy, utilities need to increase their agility—their capacity for sensing challenges and opportunities and for quickly mobilizing the organization in response. Agility need not destabilize a utility's assets or operations. Indeed, greater agility can actually make assets safer and more reliable by enabling utilities to anticipate, detect, and resolve problems faster than they can today. Making that happen, though, requires support from senior leaders and, ultimately, from the entire company.




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<sup>2</sup> For more on digital transformation, see Peter Dahlström, Driek Desmet, and Marc Singer, "The seven decisions that matter in a digital transformation: A CEO's guide to reinvention," February 2017, McKinsey.com, as well as "ING's agile transformation," *McKinsey Quarterly*, January 2017, McKinsey.com.

<sup>3</sup> For more, see James Manyika, Sree Ramaswamy, Somesh Khanna, Hugo Sarrazin, Gary Pinkus, Guru Sethupathy, and Andrew Yaffe, "Digital America: A tale of the haves and have-mores," McKinsey Global Institute, December 2015, McKinsey.com.

## Exhibit

Utilities can accelerate digital transformation by focusing on changes in three main areas.

Focus area	Adopting digital ways of working 	Attracting and retaining digital talent 	Modernizing the IT architecture and environment 
Key tasks	<ul style="list-style-type: none"><li>● Gain the support of senior leaders so a digital transformation has high priority</li><li>● Build a digital factory to produce new applications and insights using digital-native methods</li></ul>	<ul style="list-style-type: none"><li>● Highlight the intellectual challenge and social value of the utility's work</li><li>● Tap into a broad pool of digital specialists who value the balance and stability that a utility offers</li></ul>	<ul style="list-style-type: none"><li>● Simplify the utility's product portfolio and business processes</li><li>● Shift from all-in-one, monolithic IT systems to modular IT architectures</li></ul>

McKinsey&Company | Source: McKinsey analysis

### Getting senior leaders on board

One challenge for many utilities will be persuading senior leaders, many of whom have spent almost all of their careers in the sector's more predictable former environment, to adopt digital ways of working. Another challenge is prioritizing a digital transformation over other important endeavors. Digital opportunities are evolving quickly: McKinsey research suggests that digital first movers and fast followers capture more value within their industries than slower-moving companies. In our experience, utilities that take the lead on digital technologies generally got a fast start after concluding that the potential downside of investing too little was greater than the downside of investing significantly and gaining little in return.

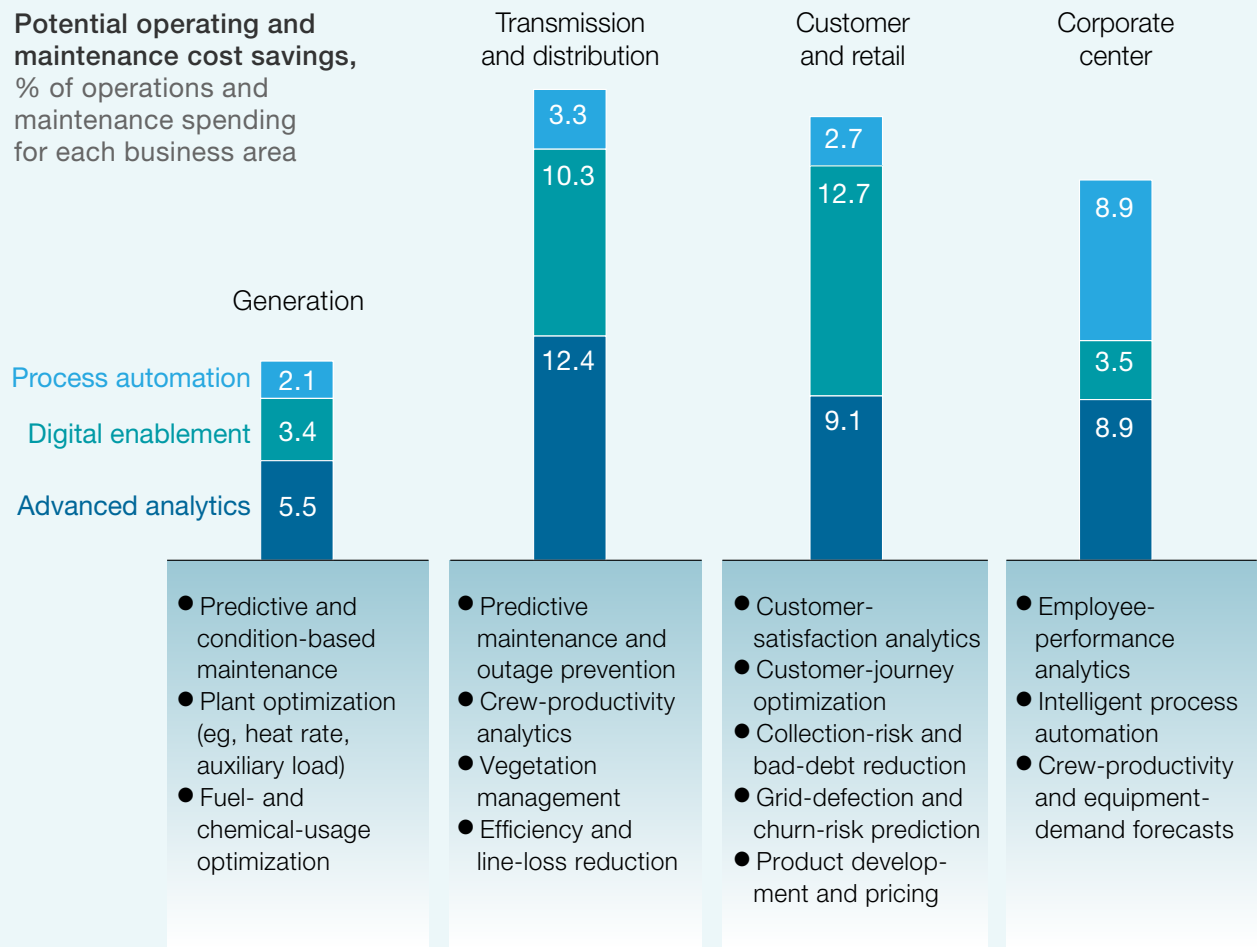
Executives who are unsure about the need to digitize would do well to spend time at digital-native companies and digitally transformed incumbents—not just in the utility sector but in others as well. Seeing digital technologies and ways of working, and hearing firsthand about digital transformations, can assuage the concerns of utility executives that digitization will throw off their companies' fine-tuned processes and systems. And learning from fellow executives about the pressure they face from digital competitors should remove any doubts about whether utilities ought to go digital.

## Digital opportunities in the utility sector

Digital-transformation programs in the utility sector must meet requirements that don't always apply to others. A significant proportion of utility assets and operations have zero tolerance for safety and performance deviations beyond a specific range. Plant-control and grid-management systems, for example, need to be risk proof and predictable. For these reasons, utilities should pay special attention to safety and performance expectations when they digitize, particularly in their high-sensitivity business functions. With those expectations in mind, utilities can benefit greatly from implementing digital technologies and adopting digital ways of working all along their value chains (exhibit).

### Exhibit

Digitization can create value across the utility value chain.



McKinsey&Company | Source: McKinsey analysis

Opportunities will vary for different types of utilities; for example, fully integrated ones in regulated markets tend to seek operational-expense savings, as well as higher productivity and network reliability. Many utility operations, such as asset management, can be streamlined through automation. Utility executives and managers can make better decisions when they get insights from artificial-intelligence (AI) applications that crunch large data sets. Safety and regulatory-compliance programs can be reinforced with advanced systems for directing employees and collecting their observations.

Additional opportunities can be found in customer operations. Digital-native companies and digitally transformed incumbents outside the utility sector have taught their residential and commercial customers to expect more seamless, flexible, and personalized customer service. Utilities that fall short of those expectations stand to lose business—which is already happening in Europe, where deregulation has pushed customer-churn rates as high as 25 percent. And digital-native companies have begun to disrupt the utility sector by offering lower-cost, higher-value services, as they have in the telecom and cable industries.

To counter these pressures, some utilities are replicating the sophisticated customer-service practices of digital-native companies. The most ambitious are looking at how to use virtual agents, AI, and “one-click” mobile experiences to help customers resolve their concerns quickly and easily.

Even in the best situations, with executives who fully support the digital-transformation agenda, it can take years for an entire utility—with thousands of employees, a vast asset base, and extensive regulatory requirements—to embrace the methods of digital-native businesses. One utility executive we know lamented that it took his company several years just to establish an in-house digital start-up. So how can a utility start to transform its working style?

### **Building a digital factory**

Some utilities have acquired or partnered with smaller digital businesses to develop new products and services. Several large European utilities have opened Silicon Valley offices that participate in the start-up scene and invest in relevant digital enterprises. Such arrangements do help utility companies to augment their capabilities, but we have rarely seen them exert much influence on the utilities’ own ways of working.

A more effective approach is to set up an in-house digital factory devoted to producing digital applications and advanced analytic insights by using the latest technologies and ways of working, such as agile and DevOps. While such a digital factory can be modest in size at the outset—20 to 50 people—it should have a strong, well-positioned leader who can marshal resources and ensure its direct visibility to the CEO and executive team. The factory’s staff should include business leaders who can act as product owners, along with designers and a range of technical specialists, including software architects, scrum masters, data scientists, and developers. Some can be internal transfers, while others will need to be new hires or outside contractors (as we discuss in the following section).

Within the company, a digital factory can occupy any number of positions—at the corporate level, within a business unit, inside the IT department, or adjacent to it. Some utilities might choose to set up more than one digital factory, each serving a different part of the company. To help a digital factory forge a distinct identity, it can be physically located in a space that reflects its ways of working, away from the utility's main office.

The offsite location of a digital factory speaks to a critical feature: it needs to be as autonomous and self-contained as possible so it can operate at a faster speed. Achieving a high level of autonomy might mean liberating a digital factory from dependencies on some enterprise-level processes, like hiring, planning, and budgeting. (In this respect, too, a strong digital-factory leader can help a great deal by taking responsibility for decisions that would otherwise be made in other parts of the company.) Most digital factories will conduct those activities on their own—for instance, by using recruiters who specialize in hiring for digital roles. In other cases, a utility might need to establish separate processes, like quarterly planning-and-budgeting cycles and performance reviews that let executives track the contributions of digital factories more closely.

The exceptions that a utility makes to accommodate a digital factory should come with the expectation that it will have a transformative impact. Leading utilities hold their digital factories accountable for staggering performance gains, like reducing inbound-call volumes by 30 percent within a year or reducing maintenance costs by \$50 million within 18 months. When utilities call for big changes, their digital factories think big and discover more opportunities as their efforts progress. One utility began by digitizing a paper-based compliance process and ended up identifying a much greater opportunity to improve overall asset utilization.

### **Attracting and retaining digital talent**

As a digital factory proves that it can successfully deliver new products, it should continue to add staff and tackle more assignments, with the aim of working on all the value pools the utility wishes to address. Tripling the group's headcount within a year (or adding more factories) while gradually replacing external contractors with internally trained or newly hired colleagues is the norm rather than the exception because most utilities have a major digital-talent gap to close. For a full digital transformation, many utilities will need to hire hundreds of product owners, experience designers, front-end/full-stack developers, DevOps engineers, analytics and machine-learning engineers, and other digital specialists—few of whom work at utilities today.

This type of scale-up requires utilities to enter the competitive market for digital talent with a sense of urgency, especially because they are seldom seen as innovative, cutting-edge businesses. We've seen several tactics help utilities vie successfully for digital hires. One is to play up the intellectual challenge and reward of the utility's digital agenda. Utilities can appeal to the hearts of digital specialists, as well, in ways that many other enterprises can't. For one thing, they can highlight their socially valuable mission of providing a community

with reliable energy. They can also show that their digital jobs have more meaning for the people who hold them than jobs at a lot of other companies.

For instance, one European utility presents its approach to digital technology as an important part of its efforts to lower its environmental impact—and it has success stories and a generation portfolio to back up its claims. Another utility, PG&E, set up a digital center of excellence, which it called Digital Catalyst. This group, for example, sent digital specialists to shadow electricity and gas field workers for hundreds of hours to uncover ways of aiding their work. That method, based on design thinking, led the Digital Catalyst team to create a mobile app to help field crews complete asset inspections more efficiently and safely by furnishing them with real-time information. The solution was so innovative that the company won a cross-industry award from *InformationWeek*.<sup>4</sup> Showcasing achievements like these can demonstrate to prospective digital hires that utilities provide genuine opportunities to improve the lives of customers and colleagues.

Another digital-recruiting tactic that utilities have used successfully is to go after a broad, diverse pool of digital professionals. While there's some truth to the stereotype of the young, single-minded software developer who thrives on energy drinks, 16-hour workdays, and a high-pressure start-up environment, that stereotype tends to limit the imagination of incumbent-company recruiters seeking digital talent. Plenty of digital specialists value a reasonable work-life balance and the stability of a large, established company. Utilities can typically provide both. PG&E's Digital Catalyst, for example, has a mission to deploy innovative digital solutions “for our people, by our people,” in the words of CIO Karen Austin.<sup>5</sup> That has required PG&E to hire digital specialists in California's San Francisco Bay Area, perhaps the world's hottest market for digital talent. Utilities with headquarters outside pricey metropolitan areas, where many digital-native companies are based, can also offer prospective hires the chance to live in places where their salaries go further than they might in high-cost cities.

Finally, some utilities have chosen to form partnerships with nearby universities as a way of sourcing digital talent as well as fresh ideas. To attract graduates in digital fields, one European utility has taken practical measures such as sponsoring sector-relevant courses and research, providing students with internships, and allowing managers to take sabbaticals from their utility jobs to teach.

### **Modernizing the IT architecture and environment**

Most utilities have managed their IT architectures and environments much as they have their physical assets. Utilities were early adopters of large-scale software packages such as customer-information systems, distribution-management systems, asset-management systems,

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<sup>4</sup> Sara Castellanos, “How PG&E's CIO sped up mobile app deployment,” *Wall Street Journal*, April 11, 2017, [wsj.com](http://wsj.com), and “Innovative app for PG&E field crews earns *InformationWeek* IT Excellence Award,” PG&E, May 22, 2017, [pge.com](http://pge.com).

<sup>5</sup> “Innovative app for PG&E field crews earns *InformationWeek* IT Excellence Award,” PG&E, May 22, 2017, [pge.com](http://pge.com).

and outage-management systems. They invested in solutions that offer maximum stability and performance and then customized them as their requirements outgrew the systems' standard features.

Many of those large-scale software systems have now been in place for decades. Some utilities are running several systems of the same type side by side, after merging with or acquiring companies that had their own legacy systems. As a result, the IT architectures of utilities have become steadily bigger, more cumbersome, and harder to maintain, with millions of lines of custom code written in obsolescent programming languages, such as COBOL, by developers who have long since retired or moved on to other jobs.

This state of affairs severely limits the ability of utilities to adopt the modern technologies and flexible IT-management practices of digital businesses. Digital-native companies base their decisions on real-time data from many sources. They deploy new software functions every few weeks and make updates even more frequently, sometimes daily. Their processes are easy to reconfigure when they identify new customer or employee needs. Complex, monolithic IT systems are poorly suited to these operational demands, but replacing such systems can take five years or more and cost hundreds of millions of dollars. Instead, utilities should modernize their IT architectures and environments progressively.

A necessary first step is to simplify the utility's product portfolio and business processes. Many utilities have seen their offerings, and the corresponding operational requirements, proliferate in response to changing customer needs and regulations. One European utility's portfolio comprises thousands of products and services, ranging from traditional energy products with different rate structures to new offerings for energy efficiency and distributed generation. Each product or service puts unique demands on the utility's IT architecture. After the company decided to allow only offerings that can be supported by one of four variants of standard back-office processes, it reduced its portfolio to 150 offerings that still met 95 percent of its customers' needs. By reducing the number of functions software must undertake, winnowing down a bloated portfolio obviously makes it easier for a utility to modernize its IT architecture. Simplifying lineups of offerings also allows utilities to streamline their operations, which shrinks their demand for new technology solutions.

A core tenet of efforts to modernize IT is the need to shift from all-in-one, monolithic systems to a modular IT architecture. In such an architecture, currently used or off-the-shelf software packages provide a stable backbone for business functions with standardized requirements, such as billing, customer-relationship management, or work and asset management. Companies should select standard software packages that meet their essential needs rather than opting for best-of-breed solutions that cost extra and have superfluous features.



With a stable backbone in place, utilities can develop custom applications for functions such as customer service, product development, analytics, or mobile-enabled field operations, where unique capabilities can provide competitive advantages that software from outside vendors often lacks. This way, companies can benefit from the economy and reliability of standard software packages, as well as the sophisticated, leading-edge features that add a great deal of value.

Economy and rich features aren't the only advantages of modular IT architectures. Ease of managing the entire IT environment is another. A modular architecture helps a utility's IT department deliver more services more quickly because smaller teams can focus on specific software packages or end-to-end processes, without having to master huge systems. It also allows a utility to draw on a diverse ecosystem of partners: traditional vendors offering standard applications, start-ups and crowd-sourcing forums that help develop homegrown applications, and system integrators to make all the pieces work together.

### **How utilities can jump-start their digital transformations**

According to McKinsey research, the opportunity for incumbents to get ahead of the pack on digitization can be narrow: by the time industries near the 40 percent digitization mark, digital leaders have already secured large market shares. For utilities, these dynamics make it imperative to get digital transformation under way as soon as possible. Three steps can help utilities set a fast pace.

#### **Build an executive-led digital mind-set**

When utility executives adopt digitally savvy behavior, that has a constructive influence on the rest of the organization. Some utility executives we know hold regular meetings with technology executives, venture capitalists, and entrepreneurs so they can keep up with developments in the digital economy and collect ideas to share with their teams. Other key moves are to put a single executive, with a direct reporting line to the CEO, in charge of technology and to encourage the board to devote some of its agenda to technology and the strategic implications of digitization.

#### **Start small, but with big ambitions in mind**

Since a digital transformation should ultimately cover the entire organization, utility executives sometimes find it hard to decide where to begin. In our experience, it helps to identify a single business domain (such as customer experience, asset operations, or the execution of large projects) where a digital transformation could provide ample value and to begin the transformation there. The choice of domain should thus determine where the digital unit is placed in the organization and what it does first. Most utilities have 15 to 20 customer journeys and business processes that will be strong candidates for digital transformation, including maximizing the efficiency of plants, conducting predictive maintenance, assisting field crews, and onboarding customers. Within the starting domain, utilities should prioritize one or two high-value, highly feasible digital applications and gradually move toward the end-to-end transformation of journeys and business processes.

Ideally, the initial digitization effort will generate enough cost savings to offset any necessary spending in the first year. Subsequent cost savings can be reinvested in later waves of digitization. In addition, the initial effort should produce other impressive outcomes, such as enthusiastic employee feedback, higher customer satisfaction, or notable performance gains. (These early successes can also help convince naysayers that the digital transformation is worth the effort and doesn't compromise safety, reliability, or the customer experience.) Once the transformation of the initial domain is well under way, executives can lay out a long-term road map for transforming other business domains and for building the capabilities to do so.

### **Make anchor hires to attract digital talent**

Digital specialists want to work with and learn from people who have a track record of leading teams that envision, develop, and deliver innovative solutions to major business problems. When a utility hires high-caliber digital leaders, this sends a signal to prospective employees that the company recognizes the value of digital technology and appreciates the need for quality people. Anchor hires can also provide digital recruits with compelling reasons to come and work on the utility's digital transformation. The senior head of design at one utility, for example, has helped attract new hires by sharing the story of how her team developed a mobile app that made it easier for thousands of line workers to do their jobs well.



Even in the most optimistic scenario, it takes years to transform a utility so that it can take full advantage of digital technologies and methods. We believe the ultimate outcome is worthwhile: an organization that can deliver greater value in the near term, as well as the infrastructure to identify and pursue growth opportunities while adapting to economic and regulatory developments in the long term. To achieve that end state, a utility first needs to adopt digital ways of working, build up its digital workforce, and modernize its IT environment. Companies that can make these enabling changes quickly will stand a better chance of securing market share against digital attackers and transformed incumbents.

[Adrian Booth](#) is a senior partner in McKinsey's San Francisco office, [Eelco de Jong](#) is a partner in the Charlotte office, and [Peter Peters](#) is a partner in the Düsseldorf office.

