



Disrupting the utility

Tech Trends 2017 and the utility industry

The latest entry in the flagship series from Deloitte, Tech Trends 2017 continues to identify the key trends that will likely revolutionize enterprise technology in the next 18-24 months. This year's theme is the kinetic enterprise— companies that are developing the agility and vision to overcome operational inertia and thrive in an environment where the only constant is change.

Today, no industry is exempt from this change, and that includes utilities. Machine intelligence is streamlining and automating back-office operations. Sensors and cloud are providing data that can take customer relations and services to a whole new level. Predictive analytics can identify potential problems before they occur. Geospatial technology can keep workers safe in dangerous environments and make training more immersive via virtual reality.

The question is, which technologies really have the potential to disrupt utilities? To separate the hype from the technologies that can deliver true value, this report offers a snapshot of how the trends presented in Tech Trends 2017 are likely to impact the power and utility industry.

In the first section of this report, we dive into the trends that are most likely to yield a competitive advantage and offer some practical first steps to capitalize on them. Some of these deal

with the core functioning of the business. IT unbounded and inevitable architecture are trends that will require some deep thinking about the enterprise's structure and culture. Others, machine learning and blockchain, are trends that spring directly from the rise of disruptive new technologies and could very well change the face of the industry.

In the second section, we touch on the trends that may not require immediate action, but should not be ignored. A mix of new technologies and new approaches, these include dark analytics, mixed reality, everything-as-a -service and an exponentials watch list. All are trends we hear a lot about, but may not merit a complete upending of the business model—yet.

Cutting through the hyperbole to identify those most critical and disruptive innovations is particularly important for utilities. With entire communities, sometimes nations, dependent on reliable and consistent service delivery for their essential day-to-day functions, experimenting with new trends is a high-stakes endeavor. However, transformation will be needed to drive the competitive advantage new technologies can bring, with many leading organizations already seeking out these opportunities. There's no sitting on the sidelines when it comes to some of these trends and it will have to be all hands on deck in order to truly capitalize on them.

Part I: No sitting on the sidelines: Trends you cant ignore

IT unbounded

The trend: As organizations modernize their information technology (IT) operating and delivery models, some are creating multifunctional teams and breaking down silos across IT. They are also looking beyond organizational boundaries to explore the open talent market and to form new types of relationships with vendors, incubators and academics. With technology dominating strategic business priorities, some companies are educating executives and employees to increase awareness and understanding of both core and emerging technologies. For many, embracing this multifaceted approach may require adjustments to organizational models, IT processes and supporting systems. The good news is that irrespective of an organization's legacy footprint, there are systematic approaches that can make the task more manageable. The outcome may justify the effort as services become unbounded and more efficient, transforming the IT organization.

Utilities, like every other industry, can stand to benefit from the innovation now being unleashed by new technologies. For both front and back office functions, the potential for new technologies to optimize operational efficiencies, enhance the user experience and delivery of services in the field is tremendous. Just as with other industries, creating an unbounded IT organization enhances IT's ability to collaborate effectively within the enterprise and beyond its traditional boundaries to help drive business innovation.

The challenge however, is getting executives to think of IT as unbounded, that is, getting them to think about technology as something to be leveraged outside of just the IT department and thinking about what it can do to solve day-to-day challenges. This requires collaboration across the organization. IT must work with business units to identify applications for new technologies, both internally and externally.

This might not be as easy as it sounds. When running critical national infrastructure with a high level of regulation, risking a change of this nature can be hard to undertake. However, embracing risk is critical in this era of agility, speed and innovation. Siloed legacy structures are no longer a viable way to do business if companies want to take advantage of the opportunities presented by new technologies.

Take the range of applications to be derived from sensors, Internet of Things (IoT) and artificial intelligence (AI). With the data collected from smart meters through IoT, utilities are offering not only enhanced customer service but are providing entirely new services like energy efficiency advising. Using sensors, customers are monitoring home temperatures and energy use. Predictive analytics enabled by AI is helping leading enterprises optimize operational efficiency in fixed assets, such as grid operations and improving the overall performance of the utility. The possibilities for innovation using these technologies throughout the entirety of the utility are limitless once organizations have reimagined IT development, delivery, and operating models, and enhanced IT's ability to collaborate effectively within the enterprise and beyond its traditional boundaries.

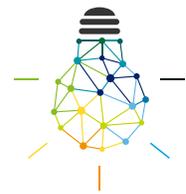
Technology also opens up a range of new revenue streams, especially if you are willing to shift your business models to become more customer centric. With the majority of products that utilities run being pure commodities, improved services is fast becoming a way to differentiate in the marketplace. If customers opt to give outside players access to their data, utilities could be missing out.

Getting started

- **Develop innovative solutions alongside traditional approaches:** A utility can't just sit out the market while developing a new product, this means new approaches should be tested and rolled out incrementally. New technologies such as cloud and sensors can be used to enhance and improve the efficiency of traditional assets and eventually enable the flexibility needed to boost innovation and technology uptake.
- **Develop an immersive, co-creative environment:** Employees are the organization's best resources when it comes to figuring out how to apply technologies in new ways. However, getting them to share and co-create is challenging if the organizational culture is not set up that way. One way to jump-start a co-creative culture is by holding a mash-up day. This brings employees together from across departments, giving them a business problem that needs solving, and seeing what they come up with. This is a first step in reshaping organizational culture and potentially achieving a scalable solution. One event however, does not change culture, this is only effective when there is real follow-up action within an ongoing program of cultural change.
- **Changing up roles:** An important way to break down siloes is to promote the integration of information technology with operational technology (IT/OT), as well as changing the way teams are structured. This means technology would give up control of some IT system's capabilities to business, for example, the use of cloud-based solutions, with business running their own reports and configuring (within limits) certain applications. Business, in turn, would need to develop the technical ability to use this technology. IT's role then changes to one of governance rather than complete control of all things technological.
- **Partner with outside organizations:** Partnering with members of your ecosystem can promote responsiveness and agility within the organization. What are the organizations, academic institutions, professional services companies, start-ups, digital giants, etc., that can complement your skills set and help you drive innovation? Seeking out these types of partnerships can model a more flexible, collaborative way of working. Many utilities already sponsor start-up accelerator programs or are working with government research organizations. Some are selecting an innovation partner—focusing on one or two key partners, such as an established software company, to help build capabilities and push change within the organization.
- **Set up a digital factory:** Change isn't easy but a unit inside the company made up of analysts can help facilitate digital transformation and collaboration among business units. Working across the organization will be critical to developing new products and services. An internal digital factory can focus on bringing together various players to innovate new products, discover ways to embed new technologies into processes and identify novel uses and applications of data.

Trend in action

A utility was looking to change the focus of their business model to one that was more customer-centric but couldn't find the right software to help them make some key changes. Developing products and services within this organization had been a long and sometimes cumbersome process—one that they were working to change. Instead of rushing to transform the culture overnight, the company decided that working with a software start-up would not only help them build the customized product they needed, it would also help jumpstart the more responsive culture they were trying to build. The product developed with the start-up not only addresses the internal problem, but the company is now looking to sell it to other utilities in markets outside of where they currently operate.



Relevance



Readiness



Machine intelligence

The trend: AI's rapid evolution has given rise to a myriad of distinct—yet often misunderstood—AI capabilities such as machine learning, deep learning, cognitive analytics, robotics process automation (RPA) and bots, among others. Collectively, these and other tools constitute machine intelligence (MI): algorithmic capabilities that can augment employee performance, automate increasingly complex workloads, and develop cognitive agents that simulate both human thinking and engagement. Machine intelligence represents the next chapter in the advanced analytics journey.

MI can have an impact on both your customer and asset bases. Let's take business-to-customer (B2C) first. MI's role here is to take the customer experience to the next level by streamlining, automating and eliminating processes in customer interactions. Does your customer have to fill out forms with multiple entries? Do your operators need to talk to customers for several minutes? By replacing these actions with some form of virtual assistance the customer can interact with an intelligent machine versus a tedious form and the operator can be freed up to address only the most complex problems. Customer-related manual processes are being automated, such as invoicing and correcting addresses, allowing organizations to in-source some functions rather than use an outside provider.

MI is also enabling even more sophisticated customer engagement. The ability to compute your consumer's every touch point and the data gathered via smart metering is enabling MI to develop insights on consumption habits—enabling targeted campaigns, enhancing the ability to detect fraud, managing billing expectations and, eventually, predicting energy load and the micromanaging of power delivery. Virtual assistants, like Google Home and Amazon's Alexa, are playing a role in automating customer flows, especially as the connected home becomes more ubiquitous. While still in an early stage, machine learning will start enabling the use of unstructured data, such as social media, to gauge customer sentiment.

The MI potential on the asset side is just as vast. With asset management being such a critical part of the industry, anything you can gain in terms of availability, cost of maintenance and total cost of ownership can add up quickly. The abundance of information generated from assets, when filtered through MI, can provide a range of cost-savings and operational efficiencies. Take automated and predictive maintenance. Knowing when an asset will fail and knowing how to act so it doesn't, can set off a chain reaction of reduced operational costs, from sending technicians into the field to time saved on ordering parts. Further to this, if you are without a back-office system that integrates everything from revenue cycle to asset management, robotic process automation (RPA) is a smart and cheaper way to ease the effort involved in manually moving data around the company. It can also establish new IT environments, such as automating the testing and piloting of new applications.

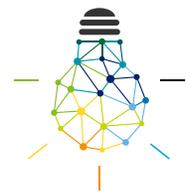
Although many leading enterprises have been looking at ways to use MI to maximize operational efficiency for a while now, it is still very much in a nascent state for much of the industry. Many are still working on ways of capturing data from assets and customers and then trying to effectively manage the sheer volume of data. Others are dealing with the challenge of favoring robots instead of employees and with smart metering starting to reach critical mass, more nimble start-ups are taking notice of this massive MI opportunity.

Getting started

- **Start small:** The challenge with MI is how to start. Rather than boiling the ocean trying to deliver MI for the entire organization, look for the opportunities to start small and generate momentum and buy-in. There are many of these, for example, kick off an RPA pilot in specific process areas such as in back-office finance operations or a process where data is being moved manually from one system to another, or look for existing frustrations or pain points and apply to MI try to scale-up.
- **Differentiating or operational efficiency?** Is stripping costs out of asset management your goal? Or are you trying to make sure your customer offerings aren't usurped by a start-up? Before embarking on MI, it's best to determine which it is you are looking for—to differentiate or maximize operational efficiency. While they are not mutually exclusive, the payoff from operational efficiency is more immediate and clear—whereas differentiating is more of a dark science. Generally, companies move from operational efficiency to differentiation.
- **Prototype your differentiation:** If you've already achieved some good results with MI and operational efficiency, try prototyping a differentiating project so that stakeholders can see it in action and understand its value. This may require a greater investment of time and resources across several departments, making differentiation challenging. However, with the industry rapidly becoming more customer-centric, operational efficiencies can only take you so far.

Trend in action

Streamlining back-office systems typically managed manually—from verifying bank records to processing contracts—is a key application of RPA. One utility found itself spending significant time supporting the handling of incorrectly estimated and read meter data, with each correction requiring it to be manually calculated. Using automation, the wrong meter reading is now picked up from an excel extract and compared against the actual meter reading contained in a database where calculation checks are performed. The reading is released for settlement if criteria are met, with all data processed and logged in automatically. On average, the time for handling one case decreased from 10 to two minutes. With 500 new cases a day on average, this is not an insignificant amount of time saved.



Relevance



Readiness



Inevitable architecture

The trend: Organizations are overhauling their landscapes by combining open source, open standards, virtualization and containerization. Moreover, they are leveraging automation aggressively, taking steps to couple existing and new platforms more loosely and often embracing a cloud first mind-set. These steps, taken individually or as part of larger transformation initiatives, are part of an emerging trend that is sometimes seen as inevitable: the standardization of a flexible architecture model that drives efficiency, reduces hardware and labor costs and foundationally supports speed, flexibility and rapid outcomes.

When it comes to cloud, many businesses have already grasped the low-hanging fruit. Now the focus should be on truly transforming core and legacy systems into a more flexible, responsive and open architecture.

With the fast-pace of innovation and technology yielding rapid disruption, this move is often referred to as inevitable. This means rethinking systems to make them more malleable, open sourced and automated will have to happen at some point. However, managing and optimizing the transition sooner rather than later can be a point of competitive advantage—especially with start-ups unencumbered by legacy systems.

A cloud-first approach is critical to this new architecture. Cloud can enable the openness and flexibility needed to support the development and deployment of solutions and the innovation it can yield. Utilities also need to think more broadly about how to build architectures that are loosely-coupled. Though many have invested in large scale ERPs, which are tedious to update, exploring the potential of breaking the systems into containers is an option. The containers would be less tightly connected and hence more flexible, allowing them to be updated individually and yield more speed and responsiveness.

Another factor to consider is access. Software vendors that enable the organization to build a more customer-centric business model increasingly only work via cloud. Open source architecture can enable valuable outside input. Cloud-based solutions are increasingly becoming the way to handle the ever-growing need to process data and build analytics functions while also enabling projects to scale. Key data from social media can only be found in cloud. With significant disruption on the horizon, flexible architecture is critical as utilities face pressure to rethink business models.

A move to inevitable architecture won't be easy, as operational systems may not be designed for openness and agility. There are inherent risks to having all systems under one host in terms of security and safety, with no physical separation that comes with physical assets, not to mention open source systems. Cloud can also eat into the return regulated utilities get on their capital expenditures once physical assets like servers are no longer needed.

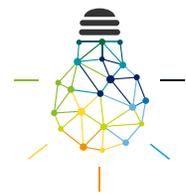
The thinking that enables inevitable architecture also requires a cultural shift. The virtualization and automation that this can bring means giving up some control. Employees would have to answer to regulators if something goes wrong with a virtual system they don't truly operate. With cloud, employees will be expected to be agile and work on an increased number of smaller projects versus the long-term cycle they're used to. As a result a different kind of expertise and skill set may be required.

Getting started

- **Don't believe the hype:** Just as with any other trend, inevitable architecture must be judged as a strategic differentiator and undergo a cost-benefit analysis. Using the cloud is not always cheaper, especially with declining cost of infrastructure. Keep in mind that you will still have network and storage costs and still need people to manage cloud solutions.
- **Educate regulators:** Many regulators are pressuring utilities into cost-efficiency and performance improvement—and cloud is one avenue through which to pursue this. However, regulators need to rethink the incentives around capital expenditure versus operating expenditures so that a shift to a cost-saving measure such as cloud is not disincentivized.
- **Look to success:** Leading organizations in all industries are aggressively exploiting cloud technologies and are looking to start-up challenger brands that are unencumbered by legacy systems for inspiration. In fact, some leading banks and telecommunications companies are creating digital twins of their old businesses that are leaner and more cost-effective to attract new customers. Therefore, new customers would come into this twin environment, current customers could eventually shift to it and, ultimately shrink reliance on the legacy structures. Many leading utilities have started looking at these new business models.

Trend in action

A major energy company decided that moving their IT structure onto an external cloud service was about more than saving money. They saw it as an opportunity to explore new applications in renewable energy and to expand its storage capacity to serve growing markets. The move is also anticipating the proliferation of electric vehicles. All of these applications are and will, require additional computing capabilities and shifting to cloud enables the productivity gain needed to support them. Reinvesting the savings that comes from closing data centers is an added benefit.



Relevance



Readiness



Blockchain

The trend: Blockchain is outgrowing its adolescent cryptocurrency identity, with distributed consensus ledgers becoming smart contract facilitators. Beyond creating efficiencies by removing the legal and financial intermediary in a contractual agreement, blockchain is assuming the role of trusted gatekeeper and purveyor of transparency. In the emerging trust economy in which a company's assets or an individual's online identity and reputation are becoming both increasingly valuable and vulnerable, this latest use case may potentially be blockchain's most valuable to date.

Blockchain is a technology that always seems to be just around the corner in terms of impact. While the application within the power and utilities industry is currently limited, it doesn't mean that the potential of this technology should be ignored. In fact, blockchain may prove to be the most important factor in the disruption of utilities.

Blockchain is transparent, permanent and because it's digital, easy to work with. All of this makes it a natural repository for a range of information that needs to be secure—from contracts to identities to financial transactions. What does this mean to a utility? There are the more prosaic uses: contracts and transactions can be easily recorded and stored in blockchain, which are then transparent and searchable. With the amount of customer paperwork involved in utilities, this could yield significant operational efficiencies, including ease of locating records, clarifying billing disputes and detecting fraud.

Then there are the service applications. With utilities trying to move to a more customer-centric business model, blockchain can capture data from smart meters, creating a secure digital identity for each customer. This identity can reveal a customer's preferences and habits, enabling tailored services and product offerings. One would be able to access customer information that indicates their status, such as indigent customers, who may need interventions. With the security of blockchain immutable, it can also engender trust and affirm the integrity of information.

Cryptocurrency is the other key application of blockchain and the one we're probably most familiar with. Some players like Solar Coin, are awarding cryptocurrency for spare energy produced from an individual's solar cells. These digital wallets can also enable prepaid meters, eliminating the need for banks or credit cards in the billing process, this is especially important in developing regions. Even customer loyalty programs can be based on cryptocurrency.

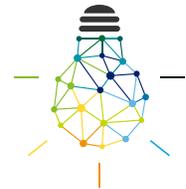
The most disruptive application of blockchain however, relates to renewable energy and prosumers. With the storage capacity of solar cell batteries improving exponentially, the reality of peer-to-peer trading is just over the horizon. Communities and industrial facilities are already increasingly seeking to become their own power source via solar and other renewable energies. With blockchain, any excess energy can be traded via a secure registry and transaction, creating an energy market independent of utilities. Some theorize that if these markets catch on, it could transform utilities as we know them. The fewer the participants in traditional energy markets, the fewer paying customers there are to support large capital investments.

Getting started

- **Brush up:** Blockchain is still greeted with a fair bit of skepticism today—and not just in the utilities world. Educating colleagues about the potential of blockchain is critical. The more you understand how blockchain works, where it can make a difference in business models, and how it can bring operational improvements, the quicker you can get ahead of the blockchain curve.
- **Look for bottlenecks:** One of the best ways to gain immediate value from blockchain is by finding those points in the organization that have no standard channel of communication but also focus on sensitive information. With blockchain's ability to scale, engaging in smaller projects conducted in parallel with other IT transformation projects is a good way to start experimenting, especially if spearheaded by an in-house innovation team whose job it is to pilot new technologies.
- **Plan for prosumers:** While peer-to-peer trading is an industry-specific issue, the potential impact to those utilities that supply energy could be significant and prosumers should be anticipated and planned for. These customers value innovation and green solutions and services tailored to them can offset any exits from the traditional market (practices that can be leveraged by any utility). Keep in mind that these prosumers still need the grid to transfer energy. A new business model, supported by blockchain that charges for grid use versus energy use is one way to ensure critical infrastructure is still supported. Secured registries of prosumers can also enable utilities to use excess energy to offset peak periods.

Trend in action

Blockchain is already seeing a range of uses across utilities, including the sharing of electricity among prosumers, the real-time use of smart metering and the securing of transactions using cryptocurrency. One utility launched a platform that allows them to send energy trade orders through a trading screen without a marketplace operated by a third party. Another developed a blockchain smart metering solution to leverage the international donor market to deliver cryptocurrency payments directly to meters, while another is piloting a gas trading scheme to demonstrate how a blockchain platform can significantly drive down costs associated with energy trading.



Relevance



Readiness



Part II: Keeping an eye out: trends on the cusp

Dark analytics

The trend: Across enterprises, ever-expanding stores of data remain unstructured and unanalyzed. Few organizations have been able to explore nontraditional data sources such as image, audio and video files; the torrent of machine and sensor information generated by the IoT; and the enormous troves of raw data found in the unexplored recesses of the deep web. However, recent advances in computer vision, pattern recognition and cognitive analytics are making it possible for companies to shine a light on these untapped sources and derive insights that lead to better experiences and decision making across the business.

Companies are starting to look past structured data and are seeking to generate competitive advantage via what is known as dark analytics and the deep web (those parts of the web not captured by search engines). What can analyzing a vast sea of unstructured assets such as texts, emails, photos, videos, audio files and still images mean to a utility? Can this exercise help build a more customer-centric business model? Or perhaps improve safety?

It could and, in some instances, it already is. However, the key to mining unstructured data is to have some very specific goals in mind and some out-of-the-box thinking. If you are now using other technologies to enhance customer service, stretching this a little further can enable dark analytics to yield some useful insights. However, utilities would do well to make use of structured data first, before wading into the deep web.



Mixed reality

The trend: The enterprise potential of augmented reality and virtual reality continues to grow as companies explore use cases and move beyond pilot applications. Increasingly, these efforts intersect with opportunities made possible by IoT technology—sensors and connected devices that help build a more integrated and extended digital and physical landscape. Yet amid this flurry of activity, many overlook the larger implications of augmented reality (AR) and virtual reality's (VR) emergence. Design patterns are evolving dramatically, with 2D screens giving way to tools that use sensors, gestures, voice, context and digital content to help humans interact more naturally with the increasingly intelligent world around us. Though it may be several years before mixed reality's ultimate end game materializes, the time to begin exploring this dynamic new world, and the digital assets it comprises of, is now.

Mixed reality may seem like science fiction—so within utilities, are there really practical applications? In some cases, yes. Geospatial apps or Google Glass type devices could allow field workers to use graphic overlays to see potential underground hazards or work more safely in risky environments. Workers can train via virtual and augmented reality as well as conduct simulated testing.

There's no telling the range of applications this technology can bring. However, before jumping on this trend, you need to ask yourself, do you have the resources to develop the complex data needed for these models? Would you be able to stand up to the rigorous testing needed to meet the high standards of a utility? Absent of the correct data and talent, mixed reality can become more of a gimmick—though it never hurts to think about some useful applications should the technology suddenly advance.



Everything-as-a-service

The trend: Many organizations are orientating their business capabilities and approaching business products, offerings and processes as a collection of services that can be used both inside and outside organizational boundaries. Doing so means IT may need to revitalize legacy core assets by upgrading to the latest ERP platforms or refactoring aging custom code. Though sometimes daunting undertakings, these and other legacy remediation efforts can help achieve short-term efficiency gains and cost savings, while laying the foundation for broader strategic shifts.

Every industry is contending with legacy systems and utilities are no different. Perhaps the everything-as-a-service (XaaS) approach can transform the task of modernizing systems into an opportunity. Could the ability to generate greater efficiencies enable utilities to engage customers, employees and business partners in new ways?

Looking at the organization's ecosystem, reorienting core systems can yield a service valuable to all stakeholders and encourage employees to think differently and creatively about their processes by looking for business opportunities is key. As they work to enhance their efficiency, they could very well uncover processes that can be packaged as products or services and offered externally. This includes data, cloud applications, networks and even cyber intelligence.

Exponential watch list

The trend: Though business applications for nanotechnologies, energy systems, biotechnology and quantum technologies may seem light-years away, in reality they are approaching rapidly. In the next three to five years, expect to see business use cases emerge and pioneering deployments accelerate around these once-futuristic technologies. With this in mind, increasing numbers of CIOs, CTOs and business strategists are already taking exploratory steps with these and other exponential technologies. They are sensing and scanning disruptive forces and putting in place deliberate, disciplined innovation responses. These leaders understand that waiting for exponentials to manifest as mature technology trends before taking action may be waiting too long.

The exponential technology that holds the most disruptive potential for utilities is no doubt high-capacity electric battery storage. When this technology becomes truly commercialized and affordable, there won't be much to stand between the prosumer and private energy generation. Could this and other exponentials radically change the utility business model?

Maybe not just yet but that doesn't mean utilities shouldn't be working on how to future-proof themselves. Creating alliances that help utilities see around the corner will be critical when it comes to energy storage and leveraging other exponential technologies. This includes corporate ventures, academic institutions and other innovation partners within the energy ecosystem.

Conclusion

Right now, many leading enterprises are starting to successfully integrate disruptive technologies and many have already begun to reap the benefits from the value these innovations bring. However, true disruption in the industry is still over the horizon. Where will it come from? Some point to prosumers and high-capacity electric batteries that can reshape the grid as we know it. Others say new entrants who will develop novel and disruptive business models based on new technologies and a lack of legacy infrastructure. However, one thing everyone can agree on is that disruption will come and utilities must take action.

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