Technology Trends to Monitor

Across industries, digital technologies are shattering established business paradigms and advancing rapidly as businesses, governments, and nonprofit organizations find more and more ways to leverage them. The following is a small sample of digital technologies that are either already developed or on the threshold of viability.

**Augmented-Reality and Virtual-Reality Applications.** Augmented-reality applications integrate digital information—including images, sound, video, graphics, and GPS data— with the real-world environment. Virtual-reality applications deliver a complete virtual experience and are transforming a wide range of products, services, and processes across industries. For example, Lowe’s has created a home-improvement simulator, called the Holoroom, that allows the company’s customers to virtually construct, view, and plan home improvements before making a purchase.

**Blockchain.** This cryptographically secure distributed-ledger protocol, perhaps best known as the technology that underpins Bitcoin, has attracted significant attention from venture capital firms and investors. Established financial-industry players are also showing considerable interest: more than 40 investment banks have joined the innovation firm R3, which leads an industry-wide consortium that focuses on the technology. These companies believe that blockchain technology could change the financial-market paradigm by accelerating banking processes at relatively low cost.

**Cloud-Based ERP Systems.** These systems offer companies far greater speed and flexibility than legacy ERP systems. They are often based on in-memory technology that enables fast transactions and a real-time experience, and they look and feel like apps. They are provided on-premises or via the cloud through usage-based license models. SAP’s cloud-based ERP package, SAP S/4HANA, for example, offers both data-analytics capabilities that are a thousand times faster than those of its predecessor and a variety of new features and capabilities.

**Cobots.** Collaborative robots are capable of learning and can work side-by-side with humans. Robots made by Denmark-based Universal Robots, for example, can perform a variety of jobs, from sorting eggs to sorting blood samples. Programming these robots requires no coding skills, only the ability to use a touchscreen user interface. By connecting cobots with machine learning, it might be possible to develop increasingly powerful robots in the future—for example, robots that can train themselves.

**Continuous Delivery and DevOps.** These approaches close the gap between development and operations, enabling companies to release software reliably at any time, independent of fixed-release schedules. Continuous delivery also fosters a zero-defect mentality while fully automating the delivery pipeline. Best-in-class practitioners of continuous delivery become capable of continuous deployment: some companies release software more than 100 times per day.

**Data Lakes.** These repositories can store both structured and unstructured data. Their underlying technology—Hadoop, for example—supports a
high degree of physical distribution of data, ensuring scalability, stability, and availability. Data lakes, which store copies of the source data, allow analysts to explore the data using any type of analytics—such as real-time or complex algorithms—that they choose. This is an improvement over traditional data warehouses, which can support only the type of analytics that is based on the warehouse’s data model.

Drones. Unmanned aerial vehicles equipped with high-resolution cameras allow utilities and oil and gas companies to inspect onshore and offshore facilities, such as power grids and oil rigs, in all types of weather and without shutting down a facility to ensure the safety of human inspectors. Eventually, drones may be capable of performing repairs and routine tasks throughout these companies’ maintenance cycles as well.

Hybrid Integration Services and iPaaS. These services greatly simplify the challenge of connecting applications to a cloud environment and reduce the cost of doing so. Encapsulated services, or wrappers, connect any application or resource, ensuring that the benefits of the cloud, such as load balancing, can be assessed anytime, anywhere. Hybrid cloud environments preserve investments in legacy systems through their ability to access existing mission-critical data and work flow processes. New cloud services can speed the time to market for new products and help companies seize new market opportunities.

The Internet of Things. Applications based on the Internet of Things are not new, but they continue to evolve and can be used in many diverse situations. These applications, which allow connected devices to gather and share data, also facilitate dynamic responses to product demand, real-time optimization of maintenance in manufacturing, and remote monitoring of individuals’ health, including the related notification of the appropriate parties in the event of an emergency. Amazon’s Dash Replenishment Service, for example, enables connected devices to order consumer goods, such as toner for printers, when supplies are running low.

Multidimensional Master-Data-Management Tools. Once these devices are fully developed, they will allow companies to better respond to the increasingly complex data-management demands that digitization is generating. The benefits will include an enhanced ability to manage data holistically among business functions and across industries, data domains, and organizational structures.

Robotic-Process Automation. Robots have been able to replicate muscle-power-driven tasks for years. With the advent of robotic-process automation, the technology now extends into knowledge-related and back-office work, such as tasks traditionally performed by call center employees, doctors, and lawyers. The next step of robotics’ evolution could produce a code-free virtual workforce that replicates human actions and can automate any software-based process.

Self-Learning Machines. The algorithms that these machines employ provide more precise results than those that can be achieved with traditional big data. They also reveal correlations that are hidden from traditional big-data
applications and can explore data even with very limited knowledge of the context. This technology has already become available to a broad audience through services such as Amazon Machine Learning, which is capable of delivering billions of forecasts per day.

3-D Printing. The potential applications of this technology continue to expand exponentially, and demand for printers is soaring: Gartner expects more than 490,000 units to be shipped in 2016. This technology helps companies reduce downtime and cost considerably by allowing them to print parts at their various facilities on an as-needed basis instead of storing available component parts in centralized locations. Amazon, for example, recently filed a patent for mobile 3-D-printing delivery trucks, in which products would be printed upon order in locations close to customers, speeding time to delivery and sparing the company storage and inventory costs. As the variety of printing materials continues to expand—printers can now handle glass, carbon, textile fibers, and biological material—3-D printing’s possibilities will continue to grow.