Ten Technology Trends Moving into 2021

Necessity being the mother of (re)invention, the Covid-19 crisis has dramatically accelerated corporate digital transformation. As companies hurry to develop new digital capabilities in an effort to build resilience and retool for the post-pandemic world, keeping up with fast-moving technology trends is critical.

To monitor the most important trends, Bain & Company met regularly this year with a carefully selected group of over 100 technology companies and start-ups. Hunting for today's most relevant technologies and tech applications, we hit on 10 trends that are already having an impact on a wide range of industries. From AI on the edge and 5G ushering in Industry 4.0, to automated artificial intelligence (AI) powering the financial industry, to cognitive science and gamification helping win the war for talent, these technology applications are creating big opportunities in the era of the digital enterprise.

Edge AI transplants brains to factory tools and machinery.

Considered the next wave of artificial intelligence, "edge AI" or "AI on the edge" is a network infrastructure that makes it possible for AI algorithms to run on the edge of a network, meaning closer to or even on the devices collecting the data. The sudden and dramatic changes in network traffic that have accompanied Covid-19 lockdowns and the shift to working from home are likely to accelerate the move already underway toward edge computing.

Benefits of edge computing include preserving bandwidth and increasing efficiency by processing information closer to the users and devices that require it, rather than sending that data for processing in central locations in the cloud. By embedding AI locally, manufacturers can reduce latency issues and accelerate the generation of insights while lowering cloud services usage and cost. Connectivity cost also drops, as processing part of the data locally reduces bandwidth and cellular data usage. And because intelligence is being run locally, plants located in remote areas with poor communication infrastructure are less subject to connectivity losses that can hinder mission-critical and time-sensitive decision making.

As Prometheus stole fire from the gods and brought it to men, edge AI "steals" part of the intelligence from the cloud and brings it to machinery. Octonion, a start-up that integrates artificial intelligence into low-power microcontrollers, exemplifies how intelligence can be imbued into industrial products. The technology helps companies make smart decisions in real time, locally, by using continuous learning models and machine health scores. Examples include deploying edge AI on industrial motors and pumps to improve monitoring and develop predictive maintenance capabilities.

5G factory revolutionizes manufacturing.

The World Economic Forum, citing IHS Markit research, expects the fifth-generation mobile network, 5G, to reach a global economic output of $13.2 trillion and generate 22.3 million jobs by 2035. By unlocking a new realm of technological possibilities, the global wireless standard is expected to notably accelerate the shift toward Industry 4.0, the industrial Internet of Things.

Capable of meeting the power requirements of millions of connections to data-intensive applications, 5G is expected to boost the manufacturing industry with new and more powerful digital capabilities. Up to 100 times faster than 4G, 5G offers drastically reduced latency that makes it possible to share data extremely quickly, erase processing delays and ensure factory systems can react in real time. The reliability of 5G connectivity guarantees a stable and constant network connection anywhere and at any time on factory floors, ensuring the continuous and unhindered execution of business-critical missions. 5G could even usher in an era of massive machine-type communication (communication between machines).

One interesting early application is a collaboration between IBM, Samsung Electronics, Singaporean telecommunications company M1 and Singapore's Infocomm Media Development Authority to test 5G manufacturing use cases. The concept is to improve equipment monitoring and predictive maintenance by using AI in image recognition and video analytics, facilitating automated visual inspection and acoustic insights. In addition, the group is testing augmented reality's ability to boost productivity and quality in assembly.

Smartphone data powers usage-based auto insurance while improving driver safety.

The market for usage-based insurance (UBI) is projected to reach $126 billion by 2027. Developments in telematics, defined by Gartner as "the use of wireless devices and 'black box' technologies to transmit data in real time back to an organization," have fueled one example of UBI: automotive insurance programs tailored by driving behavior.

With 3.8 billion smartphone users expected by 2021, mobile telematics takes UBI a step further, allowing insurers to use sensors and tracking technologies embedded in smartphones to collect real-time data and better understand their customers' driving habits. Ultimately, this will give insurers the opportunity to offer more competitive and innovative behavior-based insurance programs while fostering driver safety.

One mobile telematics platform, made by start-up TrueMotion, identifies good and risky drivers and adjusts premiums using driver behavior scores. Another of the company's products uses smartphone sensor signals to detect car crashes and provide context data on accidents. Customers can file a claim from their phones, streamlining the insurer's claim processes. On TrueMotion's app, users can see their driver behavior score and how many times they drove while distracted, hit the brakes too hard or found themselves in dangerous situations.

Automated and explainable AI makes financial organizations smarter.

Banks and insurance companies expect an 86% increase in AI investments by 2025, according to The Economist Intelligence Unit. For companies to exploit the full potential of AI, employees with little or no computer science background need to be able to use it to increase their operational performance. For this reason, user-friendly AI platforms that allow business employees to quickly build models, easily understand and trust their output, and confidently make decisions will be critical in the deployment of AI at a larger scale.

One example is DreamQuark's Brain, a fully automated AI platform for sales and customer engagement teams in the financial industry. Employees with no data science background can create AI models using prebuilt apps that leverage the start-up's proprietary deep-learning technologies. According to DreamQuark, one tier-1 bank used the platform to help build an application that detects more than 40% of credit fraudsters. A top French insurer is using it to assess customers' preferences for different products, such as pensions, retirement products or savings insurance, and provide the insurer's advisers insight into the rationale behind the scores.

In cybersecurity, authentication rights and network access get their due.

According to Interpol, the Covid-19 crisis has created an unprecedented opportunity for cybercriminals to increase their attacks. Yet most companies overestimate their cybersecurity performance, with only 24% actually meeting the bar, according to a 2020 Bain study. Identifying common IT security weaknesses and developing cybersecurity maturity is central to building truly resilient digital organizations.

One approach hackers take is to compromise a company's active directory (AD) infrastructure, which controls user authentication rights and company network access. Using this approach, a cybercriminal could take over a CEO's phone, usurp his or her identity, and access confidential internal information. Cybersecurity start-up Alsid advises clients to tailor security to their AD, invest in monitoring to detect attacks in real time and

investigate all AD breaches. The networks involved can be sprawling. One large pharmaceutical company Alsid works with has 360,000 AD user accounts, spread over 170 countries. A major telecommunications client has more than a million AD users worldwide.

Workforce technologies boost agility and profitability.

Globally, absenteeism costs companies hundreds of billions of dollars per year. Retail is particularly dependent on face-to-face interactions between customers and in-store employees, something Covid-19 disruptions have made especially challenging. Some 88% of global retailers would rather overschedule or add additional labor than risk being understaffed, an approach that leads to high labor costs and lower profits. Workforce management technologies, however, can help retailers substantially enhance workforce agility by quickly responding to activity peaks and employee absenteeism, ultimately improving both operational performance and profitability.

A world leader in cosmetics recently found itself struggling with temporary in-store staffing shortages and a resulting drop in customer service. In response, managers used a staffing optimization platform made by start-up Andjaro that manages temporary personnel transfers between sites within an organization. Managers can quickly post staffing needs and share information on employee availability, and Andjaro's algorithm will match managers with available employees, calculate employee travel times between their location and the sites at which they are needed, and even generate legal documents and payroll information.

Across all its clients, Andjaro handles 250,000 internal employee transfers each year, generating €20 million in labor cost savings. For the cosmetics giant, store employees' ability to share their availability on the platform in real time helped optimize staffing, leading to a measurable improvement in customer service and Net Promoter Score.®

Health data is gold.

Healthcare's big data market is expected to reach nearly $70 billion in 2025, almost six times its 2016 value of $11.5 billion. The rapid acceleration of health data collection gives the industry an unprecedented opportunity to leverage and deploy groundbreaking digital capabilities, such as AI, to improve treatment. Smart use of health data has the potential to dramatically improve patient care.

Working with Bain's product and experience innovation team, a leading European distributor of medical supplies and services has applied AI—including machine learning—to the treatment of hard-to-heal wounds by developing a mobile app for healthcare professionals. The app, which is approved as a medical device, uses image recognition to identify whether a wound is infected or inflamed. Its use has led to a substantial decrease in unnecessary antibiotics and cut the healing time of hard-to-heal wounds from years to months.

In HR, cognitive science and gamification win the war for talent.

By 2025, millennials will account for three-quarters of the global workforce. As organizations increasingly work with a digital-native pool of candidates, they must modernize recruitment. Using technology to develop an innovative recruiting process can improve HR teams' performance and enable faster identification of the most promising candidates, while meeting the expectations of a new generation of talent.

This can look quite different from traditional recruiting processes. Goshaba, for instance, offers a next-generation hiring solution that automates candidate screening without relying on résumés. Leveraging expertise in cognitive science and gamification to create mini-games for smartphones, tablets and computers, the start-up's technology evaluates experience, technical expertise, intellectual skills, soft skills, cultural fit and multiple other factors in a smooth and engaging candidate experience. The matching scores the software generates quickly identify top candidates to interview, improving HR productivity. It also fosters objectivity and diversity by limiting selection bias based on age, race or other factors.

Shifting from selling to renting becomes the green way of doing business.

By 2029, circular economies are expected to replace linear economies, according to Gartner. The move from transactional relationships based on selling products to a model of production and consumption that involves sharing, leasing, reusing, and recycling existing materials and products is gaining momentum as consumer and shareholder preferences shift toward sustainability. Organizations are under growing pressure to reduce the natural resources consumed in the production of products and services. In the words of Jim Sullivan, head of SAP's Global Sustainability Innovation Accelerator, technology has the potential to help humanity be better stewards of the biosphere and usher into existence a truly inclusive, circular economy.

This has given rise to companies like start-up Lizee, which helps retail brands build rental models by providing white-labeled software-as-a-service solutions, warehouse facilities

and logistics services. At one fashion company, Lizee's work included registering rental orders, order shipment, rented product collection, product washing, data collection and restocking.

Technology works toward zero food waste.

According to the UN's Food and Agriculture Organization, more than 30% of the world's food is lost or wasted every year. Using technology to reduce waste could put a significant dent in the food discarded by retailers and businesses, increase food security, and alleviate the suffering of the hundreds of millions of people who go to bed on an empty stomach (821 million people in 2019).

A mobile app developed by start-up Phenix helps large food retailers, local businesses, manufacturers and wholesalers sell excess food to consumers at half price and donate the rest to food charities, saving 120,000 meals each day. Through the app, consumers can discover the nearest Phenix business partners, choose a business and a type of basket—vegetarian, organic, halal, etc.—safely pay, and receive alerts with their pickup time. Collaborating with one global leader in beverages, the company has helped save 2.3 million drinks from the garbage bin during Covid-19.

Across industries, Covid-19 has catalyzed a technological shift of unprecedented magnitude. In the race to build powerful new digital capabilities and successfully retool for the world of tomorrow, corporations need innovative partners. With a select group of trusted allies, they must prepare their businesses to thrive in the future by taking advantage of the critical technology trends of today.