



TODAY IN TECHNOLOGY: THE TOP 10 TECH ISSUES FOR 2018

By Brad Smith & Carol Ann Browne

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Over the past six months we've written in our *Today in Technology* series about historical tech developments and the insights they provide for our current day. As the calendar flips to 2018, we are looking back at the top tech issues of the last year, offering our perspectives for the coming 12 months, recapping what we've learned, and sharing how Microsoft is helping to address these issues. The following are our top 10.

1. CYBERSECURITY

From WannaCry and electoral attacks to a Digital Geneva Convention



Cybersecurity emerged as one of the biggest tech issues of 2017 as a few specific events with far-reaching and even historic implications defined much of the year. And it looks like we'll need to keep our seatbelts buckled as we continue to grapple with these issues in 2018. While the Equifax incident underscored the potential vulnerability of any business from a wide variety of possible attacks, as well as the harm these attacks can inflict on millions of consumers, 2017 was a year when nation-state attacks reached a new zenith.

One of the defining days in these ongoing cyber events came on May 12, the day North Korea unleashed the WannaCry cyberstrike, impacting more than 300,000 computers in 150 countries. No attack in human history has inflicted damage on so many locations around the world simultaneously. A little more than a month later, on June 27, the Not-Petya attack struck computers across Ukraine, before spreading internationally. It appears to have been connected to a continuing military-sponsored assault from the east aimed at crippling Ukrainian infrastructure, turning increasingly to a

new generation of unconventional arms and tactics. Both attacks inflicted substantial collateral damage and garnered considerable international attention. And while companies like Microsoft made clear that we retain the first responsibility to keep customers secure, these new threats also necessitate a shared responsibility and collective action with customers and governments around the world.

The second half of 2017 focused increasingly on electoral issues. On Nov. 1, social media companies testified before two congressional committees about the impact of Russian-sponsored advertising on the 2016 elections. The hearings were the result of months of deepening scrutiny and growing self-awareness about the breadth of these efforts. We haven't seen this much controversy about foreign intervention in American politics since the Red Scares of the 20th century and, perhaps even more pertinent, when John Adams, the second president of the United States, was dealing with Napoleon Bonaparte and the impact of an Anglo-French war on the United States.

These electoral issues were not unique to the U.S. either, having spread throughout the year to France and other countries. But the international response to them has been challenged because the nation to which many countries would ordinarily look for leadership – the United States – is absorbed in looking back at the cyber activities of the 2016 elections. Political finger pointing over foreign meddling in the campaign has shifted the nation's focus from protecting the future to almost entirely investigating the past. And to some degree, the roots of America's current political disagreement stretch back even further. Following the end of World War II, some of the U.S. government's intelligence agencies intermittently intervened in political developments elsewhere. This history makes it more difficult to build consensus among all the parts of the government, including the important role that the intelligence community can play in protecting our democracy. Perhaps most significantly, 2017 was a year when we started to realize that the ability of state-sponsored hackers to unleash out-sized damage has created a new and perhaps asymmetric international vulnerability for democracy itself.

Many of the new nation-state tactics reach beyond the intelligence community. Attacks like WannaCry and Not-Petya used digital code as weapons and were akin to military assaults. They call for a new generation of international arms control discussions to address them. Unfortunately, the governmental and academic experts who played important roles in addressing prior arms control issues, like the nuclear arms buildup of the 1980s, have virtually all retired or passed from the scene. For the first time since the 19th century, we'll need to learn how to manage a new generation of arms control challenges without the wisdom of the last generation of arms control experts.

If 2017 was a turning point in understanding these threats, there's hope that we've also recently reached a turning point in taking more effective action to address them. As the year approached its close, on Dec. 19 the U.S. officially joined the United Kingdom, Australia, Canada, New Zealand and Japan in attributing WannaCry to North Korea. Standing at the same White House podium where former President Barack Obama talked about the attack on Sony exactly three years before, Tom Bossert, the White House Homeland Security Advisor, also announced that [Microsoft](#) and [Facebook](#), acting separately from the governments, had worked together and with others in the security community to disrupt the malware capabilities of ZINC, the group the FBI has connected with North Korea. It was a step in the right direction towards addressing growing nation-state cyberattacks.

In 2018 the world must build on this collaboration. A first key step will need to come from the tech sector itself. The first half of the year should provide the opportunity for global technology leaders to come together and adopt a cyber-security tech sector accord. This would create a stronger basis for tech companies to act effectively as internet first responders in protecting customers from the full range of cybersecurity threats. Microsoft is committed to helping to advance this effort. Look for progress over the next six months.

New governmental steps in 2018 will be vital as well. We need governments to recognize where international law applies to cyberattacks and fill in the gaps where it does not. That's why we've supported short-term steps to clarify existing law and have called for the pursuit of a Digital Geneva Convention to protect civilians on the internet. To achieve this goal we must build on the international community's experience with the Red Cross, which as we've written, spurred governments since the 19th century to recognize [the need for medics and volunteers to act in a neutral capacity to protect the wounded on the battlefield](#). In 2018 we need governments to recognize that tech companies in effect need to act as medics in cyberspace and should protect people everywhere, regardless of nationality. We're hopeful that discussions at the Munich Security Conference in February will focus attention on this principle. We also hope that the Swiss and Dutch governments, which traditionally have played influential roles on international humanitarian issues, will contribute toward advancing these principles.

Finally, 2018 will be a year when democratic governments can either work together to safeguard electoral processes or face a future where democracy is more fragile. In the year ahead, this needs to include work to protect campaigns from hacking, address social media issues, ensure the integrity of voting results, and protect vital census processes. While technology companies have a high responsibility to help, there is no substitute for the effective and unified voices of democratic governments themselves. We can look in part to leadership from Canada, where Karina Gould is the only national minister in the world responsible solely for protecting democratic institutions. As she and her ministry work to safeguard Canada's electoral future, political and tech leaders from around the world will need to follow suit. Look for new steps over the next 12 months, including from Microsoft.

2. IMMIGRATION

From the travel ban to DACA to the green card backlog



By the end of January, a fervent debate on the Trump Administration’s proposed travel ban was underway in the United States. It set a pattern for the year that continued Sept. 5 when the White House announced its plans to rescind Deferred Action for Childhood Arrivals (DACA), with six months of notice.

While few years match 2017’s intensity on immigration issues, the controversy was far from unprecedented. The Senate’s 2013 landmark bipartisan immigration bill had stalled in the House of Representatives the following year. A few years prior, former President George W. Bush’s own ambitious plan for immigration reform had foundered on Capitol Hill in his second term. As we wrote, even [Albert Einstein’s visa to enter the United States had encountered vocal opposition in 1932](#). In the United States, controversy around immigration is almost as old as immigration itself.

Yet one would be hard-pressed to find an industry that mobilized on immigration issues the way the tech sector did in 2017. When the year began, the big question was whether companies would be comfortable using their voice on controversial issues, including immigration. The travel ban quickly put that question to rest, especially as [more than 100 tech companies](#) – led in part by Google, Apple, Facebook and Microsoft – joined the amicus brief to fight the first travel ban. [The group built on early leadership by Amazon and Expedia, which had provided legal declarations supporting a lawsuit filed by Bob Ferguson, the Washington State Attorney General.](#)

In America today, immigration and the tech sector are deeply connected, a reality that underpins the recent political debates on this issue. Perhaps in more than any other part of the economy, immigration has played a vital role not just in the success of individual tech companies, but in the

global leadership position of the entire American tech sector. As we wrote during the year, [immigration and cross-border collaboration has long been appreciated and championed by business leaders and technology visionaries in the past](#). But the IT sector has taken this to a new level.

As we look to the new year, a few key dates and issues are obvious. Already we can mark our calendars for March 5. By that date one of four things will happen. Either Congress will have acted on DACA, the president will have postponed his six-month deadline, the courts will have intervened, or 800,000 people will wake up that day dreading deportation. Many of these individuals have no memory of living in a country other than the United States. A significant number work at tech companies, including 45 at Microsoft. There's hope that a congressional compromise may emerge in January as part of an omnibus budget bill. If not, March 5 could well become one of the loudest days of the year. If that happens, it seems a safe bet that tech companies will make their voices heard.

But DACA is unlikely to be the only prominent technology immigration issue in 2018. In recent years frustration has grown across the tech sector about the so-called "green card backlog." [It results from an arcane rule adopted in 1990 that sets the same maximum limit on green cards from every country](#). This means that immigrants from India and China have access to the same number of green card allotments as Liechtenstein, a country of 38,000 people. The result is that talented individuals from these large nations wait a decade while green cards for other countries literally go unused. It's eating at the morale of some of the most talented individuals who live and work in the United States. Expect this issue to join the ranks of other more visible immigration matters in 2018.

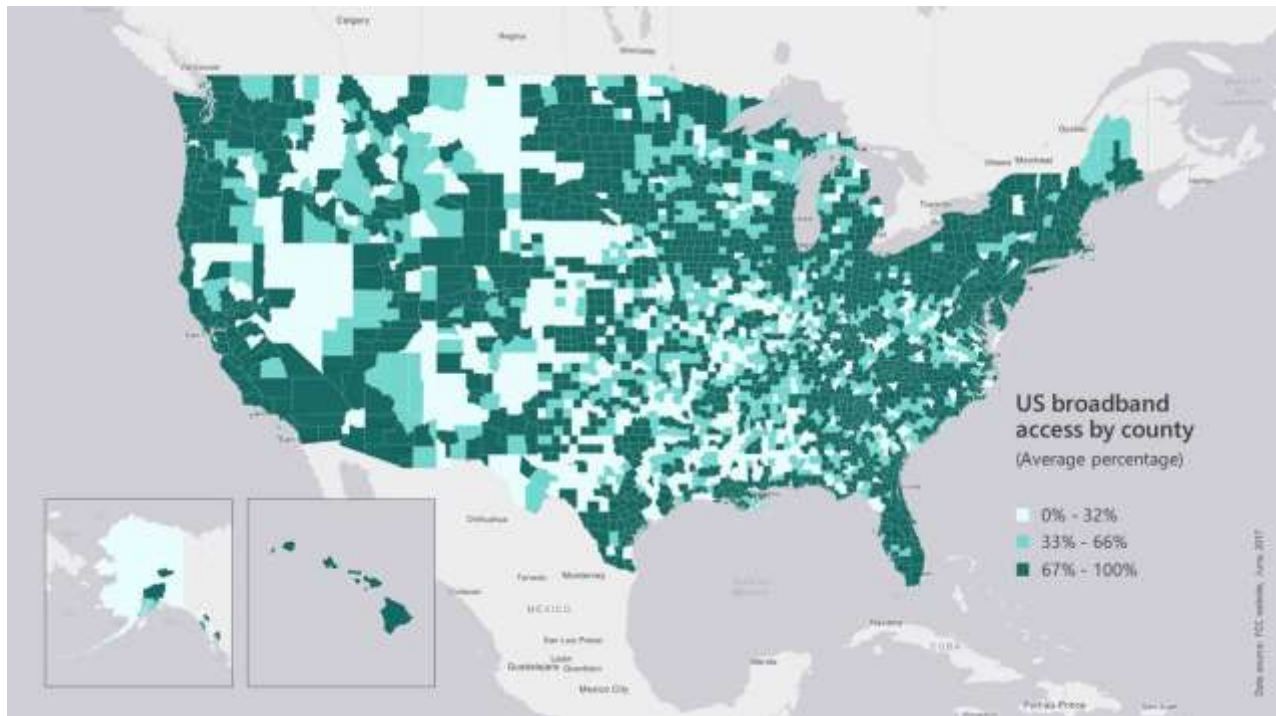
Two other serious collateral issues are emanating from the green card backlog, and both may attract more attention and controversy in the New Year. First, a growing concern for employees stuck in the backlog is the increasing possibility that their children who moved with them to the U.S. will "age out," becoming ineligible to receive a green card as a dependent beneficiary once they become 21 years old. Second, the Administration appears poised to announce the rescission of the H-4 spousal work authorization rule, which allows qualifying spouses of H-1B employees to work. As we and many other tech companies are finding, the extended green card backlog creates additional stress for those undergoing the green card process when family members are adversely impacted.

There's also concern that in 2018 the White House will announce a rollback of the extended period of Optional Practical Training for STEM graduates, which would reduce the number of chances at the H-1B lottery for recent STEM graduates from three to one. This would dramatically decrease an individual's odds of eventually securing an H-1B visa to continue employment in the U.S., as well as require U.S. companies to consider placement of this talent abroad as they struggle to meet their hiring needs in a very competitive STEM talent market.

Finally, immigration continues to be hugely important and sometimes controversial in many other countries, with important connections to the tech sector. In June the [UN High Commissioner for Refugees announced there were 65.6 million displaced people worldwide](#), the highest in history. Tech companies including Microsoft increasingly are pursuing initiatives to use technology to help provide digital identities to people who are often forced to migrate without a scrap of paper or anything else to identify who they are, what education and certificates they have, or the health assistance they may need. This is yet another way that immigration and technology issues are becoming intertwined.

3. TECHNOLOGY FOR RURAL COMMUNITIES

Ensuring a fair shot for everyone



If immigration is one side of the coin, ensuring equal access to opportunity for all Americans is the other. The 2016 election forced many people across the tech sector to look in 2017 at the role of technology in rural America – and they often found the issue glaring. Many of us began to appreciate that while the industry depends on contributions from skilled immigrants, it also needs to do more to create better opportunities for people who are American citizens.

While recent political conversation has often focused on the impact of trade on the American economy, it makes equal sense to consider the impact of technology. In part this is because of its huge impact on jobs and the economy itself. It's also worth recalling that historically American inventions often took root in smaller towns faster than in big cities. [Hydroelectric power is a good example, having lit homes along the Fox River in northeastern Wisconsin in 1882, nine years before electricity reached the White House.](#) But while many early technology innovations flourished quickly in rural America, today there are 23.4 million Americans in rural counties who lack broadband access at a time when broadband has become a necessity of life. Whether they are parents helping their children with homework, veterans seeking telemedicine services, farmers pursuing advances in precision agriculture or small business owners wanting to create jobs, people in rural communities are at a disadvantage to those living in cities with high-speed connectivity.

With companies like Microsoft accelerating the development of new digital transformation tools, broadband access will become even more important in 2018. There's hope, however, that the coming months may bring some needed assistance, in part because the White House's upcoming

infrastructure initiative may provide real investment in this area. In a sense, the country can take a page from Congress' action in 1933 to establish the Tennessee Valley Authority to bring electricity to rural areas. The nation concluded that the problem was not the advance of electricity, but the fact that it wasn't reaching every part of the country. While there are days when the internet creates challenges as well as opportunities, the impact on economic development has become increasingly clear. The issue here is not the invention of new information technologies, but their unequal penetration in part due to uneven broadband access.

While this is a problem begging for stronger government leadership, it's unlikely to be a problem that the public sector can or should solve by itself. That's why in 2017 we at Microsoft launched our [Airband initiative](#), partnering with telecommunications companies to bring new technology and broadband access to 2 million Americans over the next five years. It's also why we called for a more effective national strategy aimed at eliminating the rural broadband gap during this same period.

Our work outside the country's largest cities also led us to Fargo, North Dakota where we launched our national [TechSpark initiative](#) to partner with and invest more broadly in six less urban communities across the country. It's an opportunity to innovate and learn how technology can better serve these areas, with the hope that we can then help spread best practices more broadly. The initial efforts included our [first signature investment in Green Bay, Wisconsin](#), as well as programs in all six communities promoting digital skills for youth, new career pathways for adults, digital transformation help for small businesses, and expanded support for the non-profit community.

Microsoft was hardly alone in engaging with communities outside the coastal tech hubs this past year. In August, [Apple's Tim Cook visited a supplier in Ohio](#) and unveiled a new datacenter investment in Iowa, underscoring the industry's efforts to spur growth between the two coasts. [Google announced a broad initiative](#) that will include training programs at 156 Goodwill locations across the country. And [Facebook announced that its Community Boost program](#) will visit 30 U.S. cities in 2018, including Des Moines and Greenville, South Carolina, to help small businesses better use digital technology to create jobs. All this builds on years of work by [AOL founder Steve Case and his Rise of the Rest](#) initiative to draw attention to tech innovation opportunities in smaller cities and towns. [During 2017 Case announced that J.D. Vance, author of the Hillbilly Elegy, would assume day-to-day management of his new \\$150 million seed fund for startups in these areas.](#)

All this activity points to an important – and recent – learning. It's hard to believe the United States can rebuild a broader foundation for economic growth or any long-term political cohesion unless it can make technology and digital skills more accessible to rural communities. It will require continuing focus and innovation. Look for Microsoft and others across the tech sector to take new steps in 2018.

Finally, it would be a mistake to think about rural technology issues as being unique to the United States. Similar gaps in technology coverage exist in countries across Europe, Asia and the rest of the world. Not surprisingly, you find political issues and trends that mirror those in the United States in these places. It's a powerful reminder that despite the ongoing advance of PCs and smartphones, people need broadband access to make the most of these devices. Without it, the gap in the effective use of technology will continue to widen, with substantial economic, social and political ramifications. Viewed globally, closing this gap may well represent one of the farthest-reaching challenges and opportunities not just for 2018, but for the next decade.

4. DIVERSITY AND TECH

A watershed year



Diversity was a huge and evolving issue in 2017, and its impact on the tech sector was immense. In the United States, the issues included continuing national discussion about race, ranging from the conversation sparked by Black Lives Matter to events in Charlottesville to the national anthem at NFL games. Tech companies lent their voice, as they did on LGBTQ issues, in support of diversity and tolerance.

But increasingly the question became less about what the tech sector was saying about diversity and inclusion and more about what it was doing to advance these causes within its own ranks. The industry has continued to be challenged by its shortage of racial minorities, as well as women. As we wrote in August, women have long made contributions to invention that have been noted if not fully appreciated. Ironically, [in 1883 it took a woman to show the world how to drive](#); but in 2017 the male leaders at Uber apparently forgot how to incorporate respect for women into a company that literally drives passengers around the world. This past year also saw Google fire a male employee for a controversial internal memo about diversity, and the Uber board hired a new CEO from Expedia in Seattle with a longstanding local reputation not only for successful business leadership, but basic human decency. The news stories nonetheless shined a light on tech company practices that had focused more on innovation than encouraging maturity and respect.

Yet as people returned from summer holidays at the end of August, no one could have predicted how the national discussion on sexual harassment would explode. By year end, the #MeToo movement touched every part of American society and led to what accurately was called a new national reckoning.

A reckoning is never easy, forcing people to confront difficult images and realities too long ignored. A vital element involves an assessment of the past and addressing people and circumstances with open eyes and accountability. But a brighter future requires more than looking at the past, as essential as that is. New steps are needed to build a stronger foundation for diversity, including in the tech sector.

Considered from this perspective, 2017 brought challenges, opportunities, and perhaps some glimmers of hope. It was a year when the tech sector finally started to apply to diversity the same principle that it has applied to innovation, namely paying for performance. For example, a year after CEO Satya Nadella and Microsoft's board of directors began basing senior-level compensation decisions in part on progress in diversity and inclusion, the needle started to move. [In November Kathleen Hogan, Microsoft's chief human resources officer, reported publicly that, after controlling for mergers and acquisitions, over the preceding 12 months the percentage of women in technical roles at the company increased from 17.5 to 19 percent, and in leadership positions it increased from 17.9 to 19.1 percent.](#) The representation of African-Americans and members of the Latino community similarly started to inch up. It was a start. There is far more progress ahead of the industry than behind it. [Yet Facebook, where Sheryl Sandberg has long been an outspoken leader, also reported progress during the year,](#) as did [Apple](#) and some others. As every tech company has become more transparent with annual diversity reports, there will be continued pressure to generate and sustain momentum.

As the calendar turns to 2018, one of the biggest diversity questions concerns the future of the #MeToo conversation. How can we ensure that it's not a temporary moment but the foundation for enduring and positive change? How can we make #MeToo a moment of lasting historical importance? Clearly this will require creativity and new innovations – to improve HR practices, advance legislative proposals and bring people together in ways that advance genuine cultural change. At Microsoft we were moved on [Dec. 19 to endorse new legislation and change contractual clauses requiring pre-dispute arbitration for harassment claims, ensuring that the victims of sexual harassment can turn to court if needed to have their voices heard.](#) This too was a start. But the year ahead will require the tech sector to do much more.

5. PRIVACY AND SURVEILLANCE

More milestones in an eventful decade



The past 12 months brought another important year in a decade filled with milestones relating to privacy and surveillance. And there is every reason to believe that 2018 will offer more of the same.

Two specific topics rose to the top in 2017. The first involves a sea change in privacy regulation, marked by the European Union's General Data Protection Regulation. It moves beyond the European Data Protection Directive adopted in 1995, enough so that "GDPR" has become a well-known word across the tech sector. The new EU regulation takes effect on May 25, imposing added requirements on companies that have the personal information of European consumers, regardless of where the company is located. While many regulations tell companies what they cannot do, GDPR also tells firms what they must do. Among the changes, the regulation requires that companies ensure that European consumers can learn what information businesses have about them, change the information if it's inaccurate, move the information to another provider if desired, and delete it if they "wish to be forgotten." In effect it prescribes new business processes and even product features.

While the regulation applies to companies of every sort, much of the practical burden falls on the tech sector. This is due in part to the large amount of information held by online firms, but it's also because, with digital transformation trends, every company is relying more on cloud services. For Microsoft and other tech companies that provide these services, architectural and engineering changes that support GDPR's new requirements are foundational not only for ourselves, but for all our customers who use our services to store or process consumer information. With European regulators continuing deliberations on how to interpret the detailed regulations, May 25 will be both a key milestone and part of an ongoing journey that will extend through 2018 and beyond.

The months ahead will also be critical for a second privacy topic, namely, government surveillance, with worldwide attention focused on the U.S. Supreme Court. While the results remain to be seen, two potential blockbuster cases may have lasting impact. In the first, *Carpenter v. United States*, the Court will decide whether the government needs a warrant from an independent magistrate to access an individual's cell site location records. At the oral argument in November, some justices expressed concern about the degree to which the executive branch is taking advantage of new technology to stretch old laws beyond their intent and in a manner that is undermining individual privacy rights.

That same tension is at issue in the Supreme Court's other big privacy case, *United States v. Microsoft*, a case on which we strive to be objective but certainly not independent in our views. On Feb. 27, the court will hear oral argument regarding the Justice Department's attempt to apply a search warrant to reach a customer's email stored in Microsoft's datacenter in Ireland. The DOJ's assertions of unilateral powers to access email content globally have been controversial since 2013 when Edward Snowden took four laptops, traveled to Hong Kong, and started to share information about U.S. surveillance practices around the world. Rather than rely on or improve existing treaties to obtain information located in other countries, the DOJ prefers to exercise jurisdiction over cloud service providers and compel them unilaterally to fetch emails located in other countries and bring them to the U.S. and disclose them to the government.

Like the *Carpenter* case, the *Microsoft* case involves a statute passed in 1986, well before cloud computing was even contemplated. Congress approved this law four years before the creation of the World Wide Web and three years before someone at AOL coined the phrase "you've got mail." Mark Zuckerberg was only 2 years old, making it fair to surmise that Facebook wasn't even a glimmer in his eye. In 2016 the 2nd U.S. Circuit Court of Appeals ruled in Microsoft's favor, concluding as the DOJ now concedes that Congress didn't express an intent at the time to apply the law outside the United States. In February, we'll start to learn how the justices think about the DOJ's efforts to stretch the statute in ways that Congress didn't anticipate.

As cloud computing has gone global and companies like Microsoft increasingly store data overseas so it's closer to customers, the case has important international ramifications. Europe's privacy regulators have called the DOJ's unilateral reach into Ireland "an interference with the territorial sovereignty of an EU member state." That type of concern prompted the EU to include a provision in the GDPR to require governments to respect each other's borders and work under international agreements rather than act unilaterally. The Irish government last month filed an amicus brief with the Supreme Court explaining that it remains ready to work with the United States under its existing international agreement and stating that in the absence of any obvious error of interpretation by the 2nd Circuit, it "would propose that the judgment be affirmed." The European Commission, United Kingdom, and even New Zealand weighed in with their own briefs, making the case a focal point for international policy as well as American jurisprudence.

It remains possible that a late compromise could emerge between the DOJ and the tech sector for new legislation in Congress, which would bring agreement on a more modern and international approach. But unless one emerges and Congress acts on it, the Supreme Court will need to decide by June on the basis of a law that everyone agrees was not written with the 21st century in mind.

6. AI AND ITS ROLE IN SOCIETY

The future of technology



Looking back, 2017 was also a watershed for its discussion on artificial intelligence. And in the coming year, these issues will likely become even more prominent. Suddenly every tech company wants to be considered an AI company, as artificial intelligence in conjunction with cloud computing starts to transform businesses, governments and every other part of society.

Two early and broad AI issues are emerging. The first involves the societal principles that companies should follow in creating AI technologies. Over time we're likely to see the emergence of a new generation of governmental policies, regulations and laws that will govern the development and use of artificial intelligence. But these are early days. Before that can happen, there needs to be some consensus about the values and principles that should govern AI, followed by best practices to implement them. Only then will it become clearer what types of regulations or laws make sense.

At Microsoft and among other tech companies, some early principles are emerging. These would ensure that AI systems are fair, reliable and safe, private and secure, inclusive, transparent and accountable. Working together, a group that included Amazon, Apple, Facebook, Google, IBM, and Microsoft announced the [Partnership on AI](#) to work with academic and other leaders to advance these and similar concepts more quickly. The ultimate impact will extend well beyond the tech sector itself. As Microsoft works to "[democratize AI](#)" by making AI building blocks available for customers to incorporate into their own services, these will become important questions for businesses and governments worldwide.

A second issue is likely to get even more attention in 2018. This is the potential impact of AI on jobs. In 2017, this issue emerged as a leading topic in government circles in almost every national and state

capital. It has become apparent that over the next decade and beyond, AI will create new jobs, eliminate other jobs, and change the tasks and content of the jobs for almost everyone else. If one studies the [transition from horses to the automobile in the early 1900s, about which we wrote two weeks ago](#), or the adoption of PCs in offices beginning in the 1980s, one can readily discern the historic dimensions of the coming impact of AI on jobs and work. The past year saw an unprecedented number of news reports speculating that robots are coming to take away our jobs.

All of this puts us on the cusp of a whole new set of tech issues that will increasingly capture headlines in 2018, and then occupy more of our attention during the coming decade. They will involve the need for changes in education and training to provide people with the skills that will be in demand in an AI era. They'll also include the need for the future labor market to adapt so that both employers and employees can flex with demands created by this new technology. At their broadest reach, AI, the cloud, and other technologies will continue to upend traditional employer-employee relationships with new gig economy positions, and all this will put added stress on employment laws and labor policies crafted mostly in the early 20th century. Ultimately these coming changes will call for a new era of labor reforms to meet the needs of workers and employers alike.

7. SUSTAINABILITY & THE PARIS ACCORD

The U.S. government pulled out, but the tech sector stayed in



On June 1, the White House announced its intent to withdraw the United States from the Paris agreement on climate change. [Microsoft, virtually every tech company, and much of the U.S. business community quickly announced their continued support for voluntary efforts to advance sustainability, carbon and energy goals that were part of the Paris Agreement's formula for success.](#) So did many state and local governments across the country. It made for one of the more eventful days of an eventful year.

At Microsoft we expanded our commitment the week of Dec. 11 as we joined French President Emmanuel Macron and a wide variety of other government, civic and business leaders in Paris to discuss new sustainability initiatives on the two-year anniversary of the Paris climate accord. [While there, we announced a \\$50 million expansion of our AI for Earth initiative, which partners with individuals and organizations to use AI technology to address four critical climate-related issues: energy, water, biodiversity and agriculture.](#) The effort will include work within Microsoft by a unique multidisciplinary team of AI and sustainability experts.

The coming year will test tech companies' global partnerships and the sector's ability to use technology, like AI, to solve climate-related challenges worldwide. Society is looking toward the tech sector to help solve climate related issues, and the environment will be a recurring issue for many years to come.

8. NET NEUTRALITY

A single vote sometimes doesn't last forever



The year we just completed marked an apparent end to the Federal Communications Commission's net neutrality rules in the United States. But it was hardly the end of the debate about the regulation of underlying telecommunications services and access to so-called OTT or "Over the Top" services like Netflix, YouTube, Spotify or next-generation consumer and business services delivered from Microsoft and other companies operating datacenters.

In the U.S., this debate has raged in one form or another since the 1990s. In 2010 the FCC struck a compromise with limited net neutrality rules. After Verizon successfully challenged this compromise in court in 2014, the FCC in 2015 built a stronger legal edifice to support more sweeping net neutrality rules under Title II of the Communications Act of 1934. The result was a set of rules that treated internet service providers, or ISPs, as common carriers and prohibited them from blocking access to web services provided over the top of their networks or otherwise discriminating in the pricing or speed of these services. All this ended on Dec. 14, when a new FCC voted to repeal these rules.

No debate that has lasted this long will end with a single vote. Already the work for 2018 has begun with a new round of legal challenges, state legislation, and deliberations in Congress. The ISPs themselves are pledging that they will avoid the discrimination that consumer groups and tech companies fear. It's a wise course. An issue that began when Bill Clinton was president will undoubtedly last beyond this administration and its FCC – and perhaps the two or three after them as well. One of the arguments of net neutrality opponents is that regulation isn't needed. If the ISPs act otherwise and prove that it is, the result could well be the lasting and bipartisan net neutrality rules that so far have proved elusive.

9. CODING IN SCHOOLS

A decisive year in a decade-long movement



Recent years have witnessed the rise of a genuine and broad movement to support access to coding and computer science in schools. In 2017 we saw this movement reach a critical milestone in the United States and broaden its reach globally. The year ahead provides key tests in the tech sector's collective ability to build on this momentum.

Sept. 25 witnessed an event at the White House that had long eluded the tech sector. On that day President Donald Trump, following extensive work and support by his daughter and Assistant to the President Ivanka Trump, signed a \$1 billion, five-year presidential order to ensure that federal funding from the Department of Education helps advance computer science, as well as other science and math subjects, in the nation's public schools. The next day Ivanka traveled to Detroit, where she announced a partnership with the tech sector that included [\\$50 million commitments each from Amazon, Facebook, Google, Microsoft and Salesforce](#) . (Over the course of the decade, [Microsoft Philanthropies](#) has been the [largest corporate contributor to the coding movement](#).) [The next day, we joined Ivanka and code.org founder Hadi Partovi at a school in Virginia](#) where fifth graders had been practicing their coding skills using Microsoft's Minecraft, one of the most popular tools for helping kids master some of the basics in this field that is so fundamental to the future.

The events in September built on the strong support provided by former President Barack Obama during his tenure, including the submission of a budgetary request to Congress. As we [wrote in October](#), the past two years in some ways harkened back to the important bipartisan support that had come together in 1957 in the wake of the Sputnik launch. Then, as now, Republicans and Democrats worked together despite other intense political controversies to ensure that the next generation of

Americans would develop the know-how needed for a new generation of technology. In that decade, the consensus issue was the teaching of math and physics. This decade it's about coding and computer science, which not only rank among the most in-demand skills in the workplace but help students strengthen their ability for critical thinking. Over the past two years, the bipartisan spirit and support were as welcome as they were unusual.

It will be critical that we build on this momentum in the coming year. The presidential order was issued by the White House, but it will be implemented by the Department of Education. It's a safe bet that the eyes of the tech sector, students, and parents across the country will all be watching to make sure the department's administrators live up to the president's strong promises.

10. GLOBALIZATION OF THE IT SECTOR

It's a new world



While some issues culminate in decisions on specific dates, others march inexorably without these singular milestones. That's the case with this final entry on our Top 10 list, the continuing globalization of the IT sector. Whether measured by IT adoption by customers, the emergence of new technology leaders, or the rise of startups, 2017 was a year that made clear that information technology has become more global than ever.

When it comes to customer adoption, cloud computing has clearly gone global. While Microsoft has built more datacenter regions than any other tech leader, companies like Amazon and Google are also investing heavily in providing businesses with connections to cloud services from local datacenters around the world. Cloud computing has become an indispensable part of the future, and customers on six continents increasingly want the speed, reliability, security, and legal certainty that comes from the local storage and processing of their data.

We saw globalization in action in Virginia on Sept. 22, when [Microsoft joined with Facebook and Telxius, a subsidiary of Telefonica, to commemorate the most advanced submarine cable in the world.](#) All three companies invested in a cable that can transmit eight times the volume of the U.S. Library of Congress, in one second. Unlike other submarine internet cables that run farther north, this new cable connects North America and Europe by running from Virginia to Spain, where it can transmit data more quickly to southern Europe, north Africa, and the Middle East. The event in Virginia brought together business and political leaders from Spain and the United States, including both U.S. senators

and the Governor of Virginia. It underscored both the global nature and local importance of what the internet so quickly has become.

In 2017 the world also took notice of how the sector itself has gone global. By any fair reckoning, the world's IT leaders now form a "Club of Seven," with not only the five biggest American IT leaders – Amazon, Apple, Facebook, Google, and Microsoft – but two top Chinese companies as well, Alibaba and Tencent. [Alibaba has built on its e-commerce success in China by taking on Amazon in India and other markets](#). And as Forbes headlined on Dec. 19, "[China's Tencent has quietly built an entertainment empire that Western tech giants can only envy.](#)"

Notably, for the first time since Fujitsu challenged IBM in mainframe competition in the 1980s, the world's biggest IT leaders are no longer headquartered only in the United States. While the Club of Seven today includes two companies from China, the number of global IT leaders and its Chinese representation within the group both seem destined to grow. By an increasing number of measures, China has become the world's largest IT market, and except for Apple, it's a market where its own companies tend to fare better than their American counterparts. The Chinese IT leaders increasingly are going global, and this is a trend that will continue in 2018 and beyond.

But IT globalization is about more than current IT leaders. The future will also be shaped by IT startups which are increasingly taking root in up-and-coming tech centers around the world. We saw this at [Web Summit](#) which brought together more than 60,000 members of the startup community across Europe in Lisbon the week of Nov. 6. And we saw it again on Dec. 4 when we visited [Station F](#) in Paris, the biggest "startup campus" in the world. It was just a few years ago that Americans would travel to Europe and say that entrepreneurs there could start a business, too, albeit perhaps with more hope than confidence in their voices. While Europe's startup scene still lacks some of the financial vitality seen in Silicon Valley, that too is changing. It no longer seems radical to predict that we may see a declining number of startups in Silicon Valley itself because more talented individuals in the rest of the world will found IT companies at home rather than trek to America's West Coast.

As we look forward into 2018, it is a new world for information technology. And as this list reflects, the top issues for technology increasingly rank among the top issues for the world.

SOME KEY DATES IN 2018

Jan. 19	Deadline for U.S. Congress to pass an omnibus spending bill, which could include a compromise package on DACA and some other immigration issues
Feb. 16-18	Munich Security Conference will bring together government officials and others to address cybersecurity challenges, among other issues
Feb. 27	Oral argument before the Supreme Court in U.S. v. Microsoft
March 5	Deadline for Congress to act on DACA before its rescission takes effect
April 16-20	RSA Conference in San Francisco will bring together tech leaders for one of the leading discussions about cybersecurity
May 25	EU General Data Protection Regulation takes effect
June 30	End of Supreme Court term, by which time the Court will issue decisions in the Carpenter and Microsoft cases

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