The Expanded Edition: The Future of Well-Being in a Tech-Saturated World

There are scores more answers in this document about experts' views about the future of human well-being as use of digital technology spreads in the coming decade. They were selected from among the 1,150 responses to this canvassing of experts.

More answers about the many ways in which experts think people will be more helped than harmed by digital life when it comes to individuals' well-being

<u>Connection</u>: **Digital life links people to people, knowledge, education and entertainment anywhere globally at any time in an affordable, nearly frictionless manner**

David J. Krieger, director of the Institute for Communication & Leadership, Lucerne, Switzerland, observed, "With increasing connectivity, free flows of information, participation and transparency, not only social services, but many products and services will become more personalized, efficient and intelligent. Of course, this will not occur everywhere, for all, or at the same rate."

Adam Nelson, a technology developer/administrator based in North America said, "We don't know what 'good' is but we do know that technology will extend lives and make it simpler to do more. The challenge will be with governments and other powerful forces leveraging technology for their own gains. Similar to rice and wheat being controlled for gain over previous millennia, the control of information will be paramount. This is why protecting the internet is so critical to liberty."

José Estabil, CEO of a biotechnology startup, said, "Technology has greatly helped society in many areas, and not in always predictable ways. Whether in the U.S., in the Middle East, in China, in marginalized neighborhoods and even in Cuba, we are still in the early stages of this change so it is often hard to understand its immensity. I once heard something about rearing children that reminds me of the growth of technology: The days are long but the years are short! Technology fundamentally posits 'utility' as its organizing purpose and its expression is all about creating tools that can free the human spirit to pursue other endeavors with the limited amount of time we are granted. Some confuse technology with morals. Others elevate (or denigrate) people that are fluent in it: sometimes technologists create echo-chambers and exacerbate these perceptions. Would one think about the combination of concrete and transportation, or roads, as good or evil? No. Or ink and paper, or books? (Well, roads and books were huge technologies in their day.) My point is that

it takes a long time for society to see a technology for what it is; and why books, or reason, continue to be problematic for a few. I am hopeful, however, that the latency required for society to come to understand the utility of a technology is decreasing. I do worry that as we rely more and more on technology, two factors become more important: 1) Assuring resiliency in our networks and the energy that supplies them. 2) Assuring that access to technology does not become a privilege instead of a right."

Perry Hewitt, vice president of marketing and digital strategy at ITHAKA, said, "This has been a rough year for internet utopians. The technology that was supposed to break down divisions has heightened them, and we've seen everything from election tampering to the demise of Net neutrality. And the practice of using technology for citizen surveillance has not been limited to repressive governments but has become part of the tradeoff of engaging with popular platforms. My lens is education – the capacity for the internet to provide access to knowledge to the most people at the lowest possible cost. And while there are threats to this access, there remains vast potential for learning. We're far from the MOOC [massively open online courses] hype cycle peak of 2012, with many lessons learned along the way, and I am bullish about the internet as means to deliver lifelong learning to the many who need it."

L. MacDonald, CEO of Edison Innovations, wrote, "More and more applications and information will continue to inform. Freedom is a function of knowledge available. You must know what is going on to make useful judgments. Countries with less freedom will suffer under authoritarian regimes. It is hard to compete in business and technology if knowledge cannot be freely shared."

Karl Ackermann, a writer and researcher at WriteSpace, LLC., commented, "The impact will help people ONLY if society prepares for high levels of unemployment. The safety net will need to include an income for those who are not likely to find work in a highly automated world."

Ed Dodds, a digital strategist at Conmergence, listed several network advantages, writing, "1) Telepsychiatry. 2) Rural churches re-imagined as job-training and start-up accelerators. 3) Silver senility tsunami care-giver training in place via internet tutorials. 4) Folks with disabilities enabled to work remotely (less transportation hassle)."

David Wells, a CFO who lives and works in North America, said, "Digital connectedness – videoconferencing, texting, social media, etc. – allows us to stay connected to our friends and family in important ways that blunt the negative aspects of mobile markets. We move away from family more than we ever have, and these tools bring more benefit than harm. As we learn to better integrate these into our life, we can mitigate the more harmful aspects that are the worries

of today. Remote health diagnostics and monitoring will allow us to spend less time visiting doctors as we age. This is just starting but has tremendous room for growth. Our children will learn to use the internet in new collaborative ways."

Denise Brosseau, a lecturer at the Stanford Business School, commented, "As digital access continues to spread to the far corners of the planet the good will far outweigh the harm as people have access to online courses and information about their health as well as platforms for connecting with others to support their health and well-being. Telemedicine is also poised to explode, providing access to healthcare to far more people than ever before."

Jessamyn West, a respondent who shared no additional identifying background, said, "Economies of scale allow communication between and among people at a much higher rate than ever before. These allow people entry into arenas such as civics, volunteering, support services and simply enjoyment and entertainment. They allow people to interact with more sorts of people than they ever could before. They give people with disabilities a more level playing field to interact in more ways. At the same time, human decisions in this arena – particularly in the area of keeping people safe and keeping people's information private – is one of the more challenging areas where small missteps borne out of inattention, lack of caring or just bad choices, can have even larger repercussions than previously possible. I believe things are improving because I have faith that people can help improve things; I do not think these changes can come about without concerted actions and attention from people who care."

Adam Powell, manager, Internet of Things Emergency Response Initiative at the University of Southern California, wrote, "Technologies that succeed enable us to do more things more quickly and more easily, so that's a plus. The negatives – notably a decline in security and privacy – are already here in such strength that it's difficult to imagine it becoming that much worse. Of course the bad actors are really creative."

George Strawn, director of the U.S. National Academies of Science, Engineering and Medicine Board on Research Data and Information, said, "New tools and services will enable even more data, information and knowledge to be available to people. On the down side, many jobs will be automated, and it's not clear if or when new jobs will appear."

Sam Lehman-Wilzig, retired chair, School of Communication and Department of Political Studies at Bar-Ilan University, Israel, wrote, "The effects of the digital world will be complementary and complex, depending on several elements and variables: 1) Age groups: the younger cohorts will continue to overuse social media; the older cohorts will become more aware of their deleterious effects and moderate their use. We also might see the start of government

regulation, or the least, educational campaigns to limit some of the negative effects. Another, completely different online area is government services that can be offered digitally. That exists today; it will become much larger/better in the next decade. 2) Online vs offline digitality: Offline digitality will be largely positive in many critical fields: health (more Big Data from the field will lead to better service and therapeutic solutions); urban planning and transportation will benefit greatly from sensors in all public places, leading to more efficient use of public spaces and resources. One could go on, but the principle is the same in almost all areas of life. The main sticking point will be privacy concerns. However, the digital generation seems to care less about this than older folk, so that overall privacy issues will not much hinder digital progress on the public front."

<u>Commerce, government and society:</u> Digital life revolutionizes civic, business, consumer and personal logistics, opening up a world of opportunity and options

Larry Roberts, internet Hall of Fame member and CEO, CFO and CTO at FSA Technologies, wrote, "The internet and other digital tools are starting to eliminate the stressful and costly need to commute into work each day allowing several extra hours each day to most of us. This also applies to travel to meet with people as video conferencing eliminates most of the need for travel. This also greatly eliminates stress and save huge amounts of time and cost. The use of email for sending PDF files is another large speedup in getting work done. There is so much more one can accomplish each day for one's business, shopping and play that the world is speeding up. We just need to keep from letting the speedup force us to become more stressed."

Robert Touro, an associate professor at Colorado Technical University, commented, "The internet is the greatest invention and technology of the 20th century. It has changed the way people function, think, communicate, learn, collaborate and conduct business in the now. The internet will continue to stretch the boundaries of everyone in good and bad ways, but hopefully the good will outweigh the bad and add capabilities for one and all that we cannot even fathom in the present."

A **public policy expert with a major internet company** said, "We should no longer talk about the Digital Economy but rather the Economy that is Digital. As the internet and cloud are adopted by even the least tech-savvy businesses, we have the opportunity for every company – no matter how small – to deploy leading-edge tools for e-commerce, customer engagement, supply chain management, work training, sales and marketing, and almost every core function of a modern business. By lowering the barriers to starting a company and enable it to reach global markets, new products and services – and well-paying jobs – will be created (provided government policies promote rather than innovation and trade)."

Bill Woodcock, executive director at Packet Clearing House, the research organization behind global network development, said, "Over the past 25 years we have, as individuals and a society, gained immense benefits from some technologies: satellite navigation; open source software; the online indexing, searchability, and archiving of public documents; global transaction clearing; ubiquitous portable computing; overnight door-to-door delivery. All of these things have made it possible for people to engage in further role-specialization and participate in a more-efficient society. The cost of this has been increased fragility, interdependence of systems and a vast loss of privacy. I believe that the economic instability and losses in economic equality we've seen over the same period are orthogonal to the technology."

Morihiro Ogasahara, associate professor of sociology at Kansai University, said, "AIs and algorithms will help people to make choices more quickly, more beneficial and less stressful. Although such automization of choice does have risks that may erode their free will, it will be able to help them to focus more valuable decision-making on things other than trivial matters."

Mícheál Ó Foghlú, engineering director and developer, tools and signals at Google Munich, said, "All technology can be abused, but on balance internet technologies have, and will continue to, benefit us all."

Renee Dietrich, a retired professor, commented, "Information will be easier to access. Things continue to speed up. Online services for shopping for food, clothes, etc., have already changed retail. I can learn about and monitor by health more easily. Learning has/is changing. My concern is about individuals being able to interact with people of other races, values, religions, etc., in a community setting. The digital divide will grow along economic lines. Individuals with poor skills and low ability to learn will be left behind in the job market. However, there will be greater opportunities. Trust issues with accuracy of information will increase since it seems anyone can say most anything on social media without checking facts. I like that individuals can video events as they happen, both personal and public, and there is no waiting for an 'official' report and response."

Adam Montville, a vice president at the Center for Internet Security, said, "Well-being seems a broad topic with many facets. It is easy to say that an increase in screen time, sound bites and bite-sized political memes do not bode well for humanity. Technology can be used for those purposes, but it can also be used to treat disease, discover cures and increase productivity so we have more free time to spend with family and friends in leisure. The choice, it seems, is up to each of us. Do we want to stare at cat memes all day long (who doesn't love a good cat meme?) or would we prefer to engage technology in a more meaningful way? One perspective that gives me hope is watching my 8-year-old son use technology. Instead of learning touch screens after learning about

keyboards and mice, he went – along with countless other children – the other way. We bought him a Lego Boost for Christmas, because he already loves his Osmo coding. I am truly excited to see what the next generation invents."

<u>Crucial intelligence</u>: Digital life is essential to tapping into an ever-widening array of health, safety, and science resources, tools and services in real time

Charlie Firestone, executive director of the Aspen Institute Communications and Society Program, said, "There will be some amazing advances attributable to digital technologies in healthcare, transportation, energy and just about every other aspect of our lives. This is not to say there won't be negative consequences. Many problems will arise, in part because of advances in hacking identities and cyber warfare. It just comes down to whether one is a cyber-optimist or pessimist. Certainly, there will be increasingly significant impacts both ways."

Gina Neff, an associate professor and senior research fellow at the Oxford internet Institute, said, "The next decade will see extraordinary gains in how data and technology are brought to solve health problems. The main challenge for practitioners is how to integrate insights from data into the everyday decisions in healthcare. The challenge for researchers now is to help guarantee that those gains benefit the people in society who need it most."

Steve Stroh, technology journalist, said, "When I was a teenager, I had an experience with cancer in my family. In college, I volunteered at a Cancer Information Service funded by the National Cancer Institute. It was a small call center where we could answer basic questions from (mostly very scared) people about cancer, treatments, outcomes, etc. The problem was that the sources were limited to very generic information from the National Cancer Institute and the American Cancer Society (and related organizations). In short, we couldn't offer very much useful information. With the internet… the sky is the limit with being able to research your health issues, not just 'big issues' like cancer, but many health issues which affect much smaller populations, including finding fellow sufferers of particular diseases. The downside is, of course, is that people can find their way to 'quack' cures and outright frauds (not immunizing your kids comes to mind). But, at least, the GOOD information about your health can be accessed on the internet."

Ross Rader, vice president for customer experience, Tucows Inc., said, "The bad gets all the headlines, and not a day goes by where we don't hear more about the negative impact that technology has on people, but we also can't forget that we live in a world where it is conceivable that a person born with mobility challenges might never need to rely on the kindness of others to buy them groceries because they will have access to their own self-driving automobiles. My son is

in this position and the benefit he receives from technology is incalculable. Something as simple as 'Alexa, turn on the bathroom light' is a game-changer for many."

Heywood Sloane, partner and co-founder of HealthStyles.net, said, "The Internet of Things offers new tools to enable steps for monitoring and managing care, fitness and the wear on virtually any items that require maintenance. It enables gathering massive amounts of information that hold the potential of testing insights and hypothesis with a high statistical significance in a fraction of the time it once took. Applying that to our biology and the physical world around us holds huge potential. Either offsetting or perhaps helping are positive social interactions between people. Much of that will depend on how well we learn to discipline ourselves, protect facts and evidence from distortion and carry common courtesy into the virtual world. Will we learn how to effectively bridge the gap between the dramatic images that drive communication in virtual worlds and the 'body language,' empathy and respect that drive communication in the physical world?"

Walt Howe, a retired internet consultant and U.S. Army education specialist, said, "Improvements in new technologies, services deriving from artificial intelligence, ubiquitous and always-available information and, particularly, advances in medical technology will have an enormous impact. The rate of change is accelerating, and it will create many changes in lifestyles. Education and training for life will take new forms, too, as a constant need to learn new skills will be ever-present. Education will necessarily be lifelong, not completed in one's 20s. Learning how to learn is as important as the specific skills and insights one learns at any time. The concept of privacy will be changing, too. What we protect and how we protect it will not remain constant, any more than anything else. Change is in itself disturbing to many. Learning is defined as change in behavior, and those who reject or resist change will have real problems adjusting to a constantly changing world. Those who embrace change, anticipate it, create and work with it will be most successful. A serious question, which must be dealt with, is the ability of governments to function in times of rapid change. I hope new generations of leaders learn to embrace change, too."

Andrew Czernek, a former vice president of technology at a personal computer company, wrote, "Well-being will be improved by more-responsive technologies that respond to voice and not just keyboards. We're already seeing the positive impact with products like Amazon Echo being an intimate part of the household. In addition, we have the hopes of seeing more accessible medical information and care, even the possibility of reducing medical costs via direct home access to patients. However, NO security technology has proved to immune to compromise and attack. And now we're starting to see technologies in the home that can listen to private conversations and even see into personal lives. This will be the major issue holding back the benefits of new technology."

Bob Brookshire, a professor of information technology at the University of South Carolina, wrote, "Advances in telehealth will enhance quality of life. Being able to access healthcare providers at a distance, improving compliance with prescription medication, remote monitoring of symptoms and other advances will improve healthcare."

Katharina Zweig, professor of computer science at TU Kaiserslautern, said, "For those in poorer countries, access to health information on the internet will greatly benefit them – given that the internet access will rise and will be affordable for all. For those in richer countries, who are often burdened by overweight and inactivity, sensors in our surroundings ('wearable health,' personalized training software, apps alarming us to take a break or counting the caloric intake, etc.) will help us to get healthier. This bears the risk of too much control by governments, insurers and so on. So, I expect an increase in health, but it might be at the expense of privacy if we do not design better and less centralized systems."

Srinivasan Ramani, a retired research scientist and professor based in India, said, "I do believe that people are smart enough to avoid overloading themselves by abusing their communication and productivity tools. I have a developing-country point of view about what can happen. Millions of pathology lab visits are made per year in a country like India. I believe that this information should be collated and made available to all those interested over the Web. For instance, I should know if there is an unusual prevalence of Dengue or conjunctivitis in my city during a given month. My doctor should know what micro-organisms are predominant that month, so that his/her first-guess medication could be more appropriate. I should be able to use the Web to decide if I should choose to live in a given city or not [based on data]. I should be able to see on a street map on the Web a prominent icon marking every place of a death from a recent traffic accident; such transparency is essential to ensure that city traffic managers do their work well. Servers on the Web dealing with fitness trackers should guide me to suitable action – for instance, alerting me when my heart-rate monitor detects any dangerous possibility. The Web was not created merely to make billion-dollar companies become 100-billion-dollar companies. The Web should also focus on socially valuable functions and not confine itself to powering more and more expensive toys for adults. I do believe these things will eventually happen; citizens' demands might make them happen in their own lifespan."

Laura Guertin, a professor of earth sciences at Penn State-Brandywine, said, "Although there are definitely some ways I can see digital technology causing harm (rapidly changing the way people communicate with one another in an uncivil manner, used to steal online identities and access financial resources, etc.), I have to hold out hope that we as a society will be better off with digital technologies in assisting with medical breakthroughs, natural hazard warnings and disaster recovery and overall digital applications to create a sustainable planet for future generations."

Jane Gould, Ph.D., an author and futurist, commented, "We are just beginning to learn how to use our smartphones to design mental health applications that make people feel more connected and less vulnerable. There have been strides in using the phone to monitor physical health; the next frontier is mental health."

Contentment: Digital life empowers people to improve, advance or reinvent their lives, allowing them to self-actualize, meet soul mates and make a difference in the world

Many pointed out the pro's and con's as they opted to be optimistic. **Victor MacGill**, a North American futurist/consultant said, "It is certainly not a black-and-white answer. Among the good things to come will be improved health, transport, safety, communications, equal access to vast stores of information, education, community action and coordination. If we lose Net neutrality, then equal access to information is threatened. Of course there is also still a digital divide. And uses of the internet cause health problems and social-communications problems. Immediate access to information is convenient but it adds to the stressfulness of life. AI is closely linked to the internet, and that will change our lives; they will be unrecognisable when machines can do so many things better than we can. The internet directly and indirectly provides livelihoods for many millions, yet many will also lose their jobs through AI. Economics is more volatile because of the speed of transactions, and now AI getting in on the deal. Maybe I am just an optimist, but I think on balance there will be more benefits than disadvantages."

Bart Knijnenburg, assistant professor, Clemson University, said, "I had a hard time answering this question. Outside the U.S., and especially in emerging markets, I hope that internet innovations can significantly improve people's lives. I see the current advances in Internet of Things as merely superficially useful rather than truly transformative. Bringing devices online will seem enticing, but initially just be a cognitive burden. In the long run, though, these experiences may become more adaptive to our daily routines and actually relieve some of our daily burdens. As for other online services, I am afraid that the recent ruling against Net neutrality may unduly increase the power of large corporations in deciding the future of the internet. I don't think these corporations have improving our well-being as their highest priority."

Paul Rozin, a professor of psychology at the University of Pennsylvania, said, "Digital advances promise a net advantage in regard to the quality of life, but there are major risks. I hope that, as in the past with, for example, new medical treatments, we can contain or counter the risks, while profiting from the benefits. The plus side is obvious in terms of accomplishing mindless tasks (with possible negative implications for the work force), advances in diagnosis, access to information, reduction of some types of drudgery. What worries me is the increasing dangers of

world catastrophes resulting from meddling with systems that can have very wide impacts, the lack of vetting for irresponsible but attractive views, the invasion of privacy and the curtailing of what to me is a central and sacred aspect of the human condition: direct interpersonal interaction. Bad actors, like harmful bacteria, can have a much wider impact now. We have to find a way to limit this."

Ian Rumbles, a technology support specialist at North Carolina State University, commented, "Digital technology in first-world countries will improve life by making tasks easier and faster. Improvements will include improved health by monitors and signals giving early warnings of potential issues. In the third world, digital technology will improve access to information and communication. This will provide young people great opportunities to improve their lives and, potentially, the lives of their parents. Mind you, there are negatives to the direction of our technology. There will be increased accidents due to distractions; families are becoming less social, which impacts the ability to be good parents; there are new addictions. The increase in digital technology means we are all more susceptible to hacks."

Marshall Kirkpatrick, product director, Influencer Marketing, said, "I believe digital technology will provide more opportunities for understanding ourselves, others around us and the world at large. I believe many, though not all, people will continue to take those opportunities. Awareness is a prerequisite for well-being, so the internet could prove an even bigger boon for those of us who embrace it with our humanity."

Allen G. Taylor, an author and SQL teacher with Pioneer Academy, said, "People's well-being will be increased in ways that cannot be imagined at present. New capabilities and resources will be applied to the challenges that people face, enabling them to better cope with those challenges."

Shahab Khan, CEO of PLANWEL and director of strategic development and international collaboration at Sir Syed University of Engineering and Technology, Pakistan, said, "The answer can be found if we consider the advent of the internet in our life. It has really transformed it for the better, even if we call it a double-edged sword. The point is that the world cannot remain stagnant and the digital revolution – with the advent of AI, robotics, AR/VR and all of the tools of the 4th Industrial Revolution – will greatly enhance our lives for the better."

Alex Halavais, director of the MA in Social Technologies, Arizona State University, said, "Of course, some will be worse off, and some better off. But on the whole, we are moving to an era in which digital technologies can take on ever-increasing tasks, and this will challenge us to rethink how we organize the distribution of goods, how we work and how we make use of our time. The transitions will not be easy; old social structures will do a poor job of managing the rapid changes

brought on by automation. But on the whole, it will make people's lives better, removing sources of toil and creating more abundance and choice."

James Galvin, a director of strategic relationships and technical standards, said, "Long-term I believe that technology is good. It both improves the quality of life and it makes it possible to bring a better quality of life to those who more directly and necessarily need it. Unfortunately, in the short-term, it also creates a society divided according to those who have technology and those who do not. This divide increases as those who 'have' keep moving forward and those who 'have not' struggle to keep up and catch up. This is perhaps the most significant challenge we all need to consider and work together to resolve. Another short-term issue is that among those who have technology, the dynamics of personal interaction have changed dramatically. On the one hand there are greater numbers of connections between more people for more reasons than ever before. On the other hand we tend to interact more with our technology than we do with each other. I don't think we fully understand the impact of this change on ourselves or our world. We need to consider this issue more deeply and make sure this change is for our mutual good, rather than bad."

Ildeu Borges, director of regulatory affairs for SindiTelebrasil, said, "In the next decade there will be a democratization of the internet access in the poorest countries. The people affected by this democratization, who will have access to this technology for the first time, will be largely positively affected by this."

Tom Barrett, president, EnCirca Inc., wrote, "The internet will improve people's well-being by providing people the information and tools needed to improve their health, safety and financial well-being. These benefits will advance society in many ways by disrupting old, established ways and occupations. There will be some harm for the fraction of people whose livelihood is disrupted or made obsolete by new technologies, but the vast majority of society will benefit from the changes."

Scott McLeod, a professor at the University of Colorado-Denver, wrote, "On the whole, progress in targeted genetics, nanobiology, artificial intelligence, bots, the Internet of Things, mobile computing and other technological advances will help make us healthier, improve our lives and lengthen our lifespans."

Chris Morrow, a network security engineer, said, "Overall, more access to information in a free and open environment will improve people's ability to learn, interact and expand their knowledge base. Additionally, fostering innovation through access to information and markets outside the person's immediate area will expand their ability to succeed."

Cliff Zukin, a professor and survey researcher at Rutgers University, commented, "It's an optimist's view, that we hang around on Earth. Digitization speeds things up, the pace of change, the diffusion of innovations. The more available information is, the lower the cost of information, the greater the potential for equalization and growth in less-developed societies. The pessimist's view is that increasing digitization allows for colossal failures on a scale imagined only in science fiction (Azimov's 'Trilogy,' for example.) A failure of/attack on the energy grid; the homogenization of humankind and loss of individual cultures; the diversity of analogue life as something that cannot be manipulated or taken over by terrorists de jour through hacking. Digital unites everything, and there may be something to be lost in that happening."

Thomas Viall, president of Rhode Island Interactive, commented, "One only has to look at the past to see the many ways a 'digital life' has improved our lives. We can grab a ride share in minutes, see what nearby restaurants have the best reviews and stay connected to our friends and relatives across the world. In the future we will be healthier because of intelligent monitoring, our homes will be more secure and connections between smart things will make our lives easier."

Jeff Jarvis, a professor at City University of New York Graduate School of Journalism, said, "Eventually most every advance in technology yields an advance in well-being, once we are given time to figure it out."

Edward Tomchin, a retiree, wrote, "I see a future where all our needs and a lot of our desires are met by machines, freeing humanity to explore our creativity, our innovativeness, our unending quest to see what's over the next hill or past the next universe. There is a tremendous amount of hope available for humanity if fear weren't so dominant. The simple fact of our existence compared to the century past is more than ample evidence for our forward thrust. The 20th century was wall-to-wall war encompassing the two world wars and one long cold one which included coming face to face with armageddon in October 1962, and we're still here and moving toward the future. Confidence in our ability to rise above the worst problems we can throw at ourselves should be easy to achieve given our history. We're constantly on the leading edge of creating a world and then learning how to live in it, we are constantly having to make laws and regulations to stay ahead of our own failings. Those are not easy tasks, but we've succeeded at them remarkably."

Continuation toward quality: Emerging tools will continue to expand the quality and focus of digital life; the big-picture results will continue to be a plus overall for humanity

Piotr Konieczny, professor of sociology at Hanyang University, and other respondents said humans and their technologies have generally evolved in mostly positive ways over time. He wrote,

"Throughout history, technology has made us better off. While nothing is white and black, and one could find exceptions, the big picture is clear. Anyone who disagrees is welcome to live the life of 'noble savage' – watch half of his children die of starvation and disease and die himself before reaching the age of 30, uneducated, sick and likely murdered."

Eric E Poehler, associate professor of classics at University of Massachusetts-Amherst, commented, "The letter, the telegram and the telephone all had meaningful positive impacts on our lives, and it is today impossible to imagine going back to a social world without them. As individuals, we will experience greater well-being in many cases from new means of engagement with people, ideas and things. The pace of innovation will often feel exciting, but sometimes disorienting. On the other hand, our larger social structures, such as economic and political systems and normative cultural expressions, will see significant disruption due to this same pace of change. It is unknown what the impact of these more seemingly fundamental structural changes will be, thought I suspect they will appear and feel negative in the present for many. Although I believe, on average, the future of the internet will be positive in relation to our well-being, I am also sure that negative impacts will fall upon groups who have been previously marginalized. We will surely replicate our failures in this new digital landscape unless we remain vigilant to the notion that we are creating this digital world, including its implicit biases and explicit injustices."

Yvette Wohn, director of the Social Interaction Lab and expert on human-computer interaction, New Jersey Institute of Technology, commented, "Technology is both good and bad, thus well-being can as easily be improved as it can deteriorate. Technology is part of our lives now, it is here to stay, and the thing we should be discussing is not if technology/internet is good or bad but when does it have negative/positive effects, why, and to what people in what situations."

A **distinguished technologist at a major tech company** in the U.S. wrote, "We will see the emergence of AI agents to perform routine tasks and simplify workflows, which should reduce the cognitive loads that people struggle with today when they are active online. To the extent that people are willing to use them, AIs could offer significant relief from distractions that negatively impact attention. Also, the development of chatbots and conversational interfaces will enable people to interact with technology in ways that are more aligned with natural human-to-human social engagement. AI bots have the potential to dramatically change the way that people manage their mental health and well-being in a positive way."

Richard Sambrook, professor of journalism at Cardiff University, UK, wrote, "Overall, AI, automation and technology have the capacity to greatly improve our lives and our well-being if managed well. The challenge for society and politicians is to adapt rapidly enough to ensure new developments are harnessed for good and potentially damaging effects are mitigated. We see this

currently underway with the social and political response to widespread mis- and disinformation which was not adequately foreseen but which is now clearly under scrutiny and stronger management."

Maureen Cooney, head of privacy at Sprint, commented, "As we move forward with our use of digital and wireless devices our ability to more seamlessly use these devices to help us with daily life tasks and to be efficient with resources through Internet of Things products and services will expand. The possibilities for good include enhancing the lives of all ages in learning, communicating, feeling connected socially to others, and certainly can help the elderly and disabled as challenges would otherwise potentially isolate them or hinder their independence. I have confidence that as we use smart devices, we will also learn how to best use them and to be smart in our device behaviors and platform management, better mitigating risks about digital stress and phenomena such as the susceptibility to 'fake news.'"

An **account manager at a pioneering internet-based digital information service** said, "The era we live in now is an anomaly and not the norm, but we're taking a much-needed look into the role of technology in our lives with a new critical eye. All progress requires these periods of self-reflection. Technology, specifically the internet, has disrupted so much so quickly that it's worth the full review. The U.S. just went through an election where our social networks became carriers of fake news and misinformation. We took some wrong turns on the information highway that showed so much promise in its early years. The consumer Web landscape keeps consolidating to a smaller and smaller number of major companies, the new gatekeepers of the information age. Net neutrality is in jeopardy. Facebook has slowly become a place that doesn't connect us but leaves us feeling even more isolated. We're left comparing ourselves to a highlight reel of the lives of our friends, families and acquaintances. Automation in the workplace is leaving millions of people with skills no longer needed. But a correction will or is already taking place. At some point I foresee a new progressive age breaking up online media trusts like the railroad trusts of the early 1900s. How much will that change things for the better? I believe we'll all benefit from a more competitive landscape in this area. Advertising, the lifeblood of the information age, is long overdue for an overhaul. Internet service providers can only hold onto a monopoly for so long. If Netflix is the new network, there's surely room for others following their model. If automation does end up leaving millions of people without work, how much longer do we go on before we redefine the concept of work entirely? What about continuing education? If you zoom out far back enough, our fears are overblown (they almost always are) and we'll still look at the internet as a net positive for humanity."

Ted Newcomb, directing manager of AhwatukeeBuzz, wrote, "We will better-focus technology on being a tool for specific tasks that enable us to more effectively communicate and collaborate with

one another. 5G will enable mobile devices to work as effectively as PCs while offering wider public usage, making the smartphone the device of choice."

Karen Yesinkus, a respondent who shared no additional identifying background, wrote, "We are quickly approaching the end of the first era of the internet and the evolution of digital apps and services that it has brought to everyday life. The incredible proliferation of devices and apps has contributed to a higher quality of life for the majority of people using them in both personal and business settings. This era has created many winners and ultimately many losers in choices, services and ideas offered to the public –which has been and continues to be overwhelming and disruptive. I believe the next decade will usher in a new era of digital life that is more settled, secure and ever-more integrated into daily life that will impact the quality of life positively and in ways yet to be seen."

More remarks from experts illuminating their concerns and challenges of digital life

Digital deficits: People's cognitive capabilities will be challenged in multiple ways, including their capacity for analytical thinking, memory, focus, creativity, reflection and mental resilience

An **anonymous respondent** said, "The increased use of digital technologies has shortened attention spans, led to more shallow thinking and analysis, driven a dopamine-like addiction to instant digital gratification and allowed the growth of digital media where opinions are easily manipulated by unknown forces. These factors are likely to grow worse in the coming decade."

Sam Punnett, president of FAD Research, Inc., said, "Advances in monitoring, such as the ability to observe real-time brain activity, are leading to insights into the effects of media exposure upon brain function. The realization that digital media consumption is not benign will hopefully lead to greater awareness of the effects. Harm reduction in the form of distracted driving laws are a welcome measure. The effects of digital engagement are broad-ranging. They have changed the nature of interpersonal communications and social engagement. Excessive use by individuals appears to cause users to exhibit symptoms of both obsessive-compulsive disorder and substance dependence in some cases. Eventually the discussion will become a part of greater conversations related to mental health as we discover more."

Lucretia Walker, a quality improvement associate for planning and evaluation social services, said, "I'm worried that long-established social norms which allowed humans to connect with each other in a real way will be lost. I'm concerned about the real loss of and invasion of privacy and the fact that our every movement is recorded and accounted for… I see technology replacing more and

more jobs, and those who don't have technical or specialized skills being forced to try to earn a living in low-wage, service-related jobs. I'm concerned about a future when I currently see throngs of people 'engaging' alongside each other when no one even looks up from their device when talking to you. This unawareness started with everyone carrying mobile phones, and social courtesy seems to have evaporated, as people started out talking loudly and obliviously into their phones wherever they were and this has progressed to the point that people at dinner together in a restaurant are busier taking photos of their food than eating it or talking to the people they're with… Everything is ethereal now; nothing seems concrete. I do love that because of this technology I can access information instantly and anywhere, but I cannot deny that I can't seem to access my ability to focus on anything for more than an instant because of it."

A **professor at a major U.S. state university** said, "Potential benefits are mediated by how individuals use technology (e.g., controlling excessive internet use, social media use, drawing boundaries between work/home/vacation, limiting distractions that have the potential to harm well-being, etc.). I teach at the university level, and data show that students' performance in the classroom is declining while their level of stress is increasing their ability to cope in a healthy manner with stress is not, in part because real support relationships have been supplanted with the perception of digital support relations."

Claudia L'Amoreaux, digital consultant, wrote, "People are up against designers trained in persuasive technologies and brain chemistry. It takes tremendous awareness to hold a steady course and navigate an always-on, always-amazing, always-something-new-and-fascinating, always-terrifying, always-important Ocean of Information and Entertainment. Children are not getting the guidance they need that will lead to healthy self-monitoring. We don't understand or appreciate the connection between insight, creativity and reverie. When is the last time you even heard someone use the word 'reverie'? It's too easy to click or utter a voice command to the various virtual assistants awaiting. We're not helping kids enough to discover practices to help them understand what they're feeling when they're stressed, anxious or lonely, and how to address root causes in ways that will lead to sustainable well-being. With childhood anxiety increasing and kids with powerful smartphones in their hands 24/7, we're creating a destructive positive feedback loop that drives them continually to their phones, perpetuating the cycle. Experiences available are compelling and educational, therapeutic and healing. But we need to take more care with transparency about the downsides and consider how to support people, especially parents and children, in when and how technology is helpful, and when and how it can harm."

Scott Johnston, a high school teacher, commented, "Because we can rely on it having the information when we need it, we will let the internet be our repository of knowledge and memories. The effect of this is that important ideas will not be in cohabitation in the single mind,

which means that the valuable happenstance of the collision of ideas leading to new thoughts will become beyond our minds' capacity."

A **pre-law student** based in the United States said, "Though technology brings a lot of ease and comfort to our lives, in the long run it is harming our ability to process information, pay attention, find gratification within ourselves and interact with other people. Digital technologies have imposed many changes on the mental capabilities and emotional states of the people using them."

A **university student** wrote, "A major trend that can already be seen is information overload. There is so much information on the internet; too much for any user of any intelligence level to competently intake and synthesize. To many, this plethora of resources is a great thing, but many do not realize that they are drowning in this pool of information. The vast amount of advertisements and other promotional content that is forced into the faces of consumers is part of the overload. This is contributing to deficiencies in mental capabilities, for instance a decrease in attention spans. The internet impacts our cognitive abilities and emotional health, often not in a positive manner."

Anonymous respondents commented:

- "With all the information available, it is hard to know what to focus on, what is actually important and what is useless information. Because of that, we don't focus on anything, or we focus on the wrong things. Either way, it negatively affects our brains, losing focus in the real world, or causing stress."
- "Online material is much more quickly accepted and posted/shared/believed without critical evaluation."
- "The more research I do on this area, the more I learn that the thinkers who created the internet did not foresee where users would go with their demand. We are faced with unforeseen biological changes related to our new technology."
- "People are disengaging from personal interactions and are losing the ability to concentrate."
- "The combination of fake news, the echo chamber and weak critical-thinking skills will continue to polarize the population, increase fraud and lead to bad national decisions."
- "Digital communication will continue to erode people's contact and ability to interact with persons who hold different views than themselves. Cyberspace will result in a bigger gulf between people of different viewpoints."

<u>Digital addiction:</u> Internet businesses are organized around dopamine-dosing tools designed to hook the public

A **college student** wrote, "Many people have gotten to the point where they can't survive without their phone or other smart technology. This addiction and dependence is unhealthy and causes poor mental and physical health outcomes. I fully believe that this behavior will continue to escalate. People will become more shut off from the physical world, and only interact with others through some digital platform. This lack of real human contact will be extremely detrimental to social skills and overall well-being of individuals and society. These addictions, dependence, and withdrawal from society are things that we have already begun to see happen in extreme cases. I predict that they will both intensify and become more commonplace."

A **blog editor** based in North America wrote, "The goal of information technology's design is just to capture and keep our attention. It's predominantly not on our side. It's not even equipped to know what our goals are a lot of the time. But that kind of information would be necessary for it to move us in the right direction. One standard I use is GPS. If a GPS distracted us in physical space in the ways that other technologies distract us in informational space, no one would keep using that GPS. Democracy assumes a set of capacities: the capacity for deliberation, understanding different ideas, reasoned discourse. This grounds government authority, the will of the people. So one way to talk about the effects of these technologies is that they are a kind of a denial-of-service (DoS) attack on the human will. Our phones are the operating system for our life. They keep us looking and clicking. This wears down certain capacities, like willpower, by having us make more decisions. A study showed that repeated distractions lower people's effective IQ by up to 10 points. It was over twice the IQ drop that you get from long-term marijuana usage. There are certainly epistemic issues as well. Fake news is part of this, but it's more about people having a totally different sense of reality, even within the same society or on the same street. It really makes it hard to achieve that common sense of what's at stake that is necessary for an effective democracy. The role of the newspaper now is to filter, and help you pay attention to, the things that matter. But if the business model is 'like' advertising, and a good article is an article that gets the most clicks, you get things like click bait because those are the metrics that are aligned with the business model. When information becomes abundant, attention becomes scarce. Advertising has dragged everybody down – even the wealthiest organizations with noble missions – to competing on the terms of click bait. Every week there are outrage cascades online. Outrage is rewarding to humans because it fulfills psychological needs. It could be used to help us move forward, but often, it is used to keep us clicking and scrolling and typing. One of the first books about Web usability was actually called 'Don't Make Me Think.' It's this idea of appealing to our impulsive selves, the automatic part of us, and not the considerate, rational part."

Scott McQuire, professor of media and communications at the University of Melbourne, Australia, said, "My concern is the dominant models that have developed around hyperconnectivity. Dominant internet business models that depend upon amassing user attention

promote negative feedback loops based on competitive self-evaluation. They tend to commidify personal interactions. New models of data governance and new social protocols need to evolve, but I'm not confident they will."

An **anonymous respondent** said, "Market incentives are not aligned with mental health requirements. In addition, neither our understanding of digital addictions nor, most importantly, the governments' ability and willingness to regulate will be able to ensure a healthy transition into the new social norm. Perhaps a social backlash and the rejection of current digital behaviors by specific communities will moderate the high negative impact digital technology is having today on the psychological health of most of us. At least that is the hope."

Anita Salem, a human systems researcher based in North America, commented, "As we become more virtual in our relationships and activities, we will see decreasing physicality and our physical resilience will continue to deteriorate. We're already seeing youth with weaker bones and health deficiencies tied to this reduced physicality and poor diet. Reduced physicality, the physiological effects of using electronic media, the defocusing caused by multi-tasking and the pressure of keeping up with the flow of information will create widespread anxiety and alienation. This will cause increasing depression, suicide and addiction. Add to this the increasing power of corporations and you end up with populations 'chasing the dragon' who are easily manipulated and controlled for the benefit of the elite."

John Dorrer, a consultant based in North America, wrote, "Once again, we are taking taxpayer-funded, government-generated innovation and turning it over to corporations who will run the market and exploit the public. We are already suffering from such an indignity with prescription drugs. Our publically funded research and development should be also able to secure public returns. However, our bankrupt political institutions and emaciated regulatory apparatus will not serve the public."

An **anonymous respondent** wrote, "In the early years the internet was a life-changing phenomenon because only a few people had the skills to publish online and those people were using it with good judgment; truth and honesty was the norm. Now everyone publishes anytime they want. Our sources of truth in journalism have crumbled – mostly because of the internet – and there is no oversight over all the poor judgment, non-truths and manipulative tactics used by corporations, governments and individuals on social media and on the internet in general. There is no middle ground, no centrist views nor compromise. And the government is trying to do less and less to take care if its citizens, so people our really on their own now. They have lots of communication but no truth or justice."

Janet Salmons, Ph.D., principal at Vision2Lead, commented, "I am concerned about corporate takeover of internet access and online content. The loss of U.S. Net neutrality regulations will spur this trend. I am concerned about the issues of digital privacy and protections for data such as banking, credit cards, etc. With more corporate ownership and power over the internet, risks for misuse of data or hacking due to lack of proper protections are exacerbated. I am concerned about the vulnerability of users who lack basic digital literacy, are unconcerned about posting personal information online, and are unable to discern fact from propaganda. When these issues start to impact elections and policy-making, citizens are more vulnerable to authoritarianism. Similarly, I am concerned about the domination of the Web by social media companies. Many users do not venture outside the familiar platforms such as Facebook, giving them too much power. (See my blog post: 'Social Media or Social Web?' on Discover Society http://bit.ly/2ziYiQr.)

Flynn Ross, associate professor of teacher education at the University of Southern Maine, wrote, "Social media is a tool that has great potential for connecting, networking and empowering, and it is a tool that has great potential for dividing, isolating and oppressing. Similar to other tools throughout history, the collective 'we' must choose how to use these tools in our individual lives as well as designing policies for how the massive data harvested from these tools may be used."

Mike Caprio, innovation consultant for Brainewave Consulting, said, "I believe that commercial enterprise and governments corrupted by corporations have adversely affected digital life in many major ways. There are not enough government-funded public-service and utility aspects of digital life; only a few forward-thinking municipal and civic entities have managed to make services that help people fully available to everyone. Mobile devices and the majority of digital services are walled gardens designed to maximize profit by trapping people inside and fostering compulsive addictive behaviors, just like casinos. There are not enough open-access mobile *computer* alternatives to the non-programmable, mobile passive consumption-focused devices. The majority of people on the low end of income, class and racial disparities are completely at the whim of the 'cloud-based' providers of digital services, who ultimately censor their communications and filter their digital realities to serve them advertisements. These digital services are also designed to empower the most nefarious and malicious people to target people by race, gender, sexual orientation or political affiliation for discrimination and harassment and propagandizing. All of these factors trend towards growing oppression of groups of people who have been historically downtrodden."

David Golumbia, an associate professor of digital studies at Virginia Commonwealth University, said, "Of course digital technology has many positive and negative effects on well-being. Evaluating the net impact of either of these, let alone both together, is nearly impossible. I answered that it would have more negative effects presuming that our attitudes and policies

toward digital technology, and the practices of digital technology companies and advocates, remain largely the same over the next 10 years. Today, there is overwhelming evidence that digital technology companies take advantage of legal loopholes they themselves designed (especially Section 230 of the Communications Decency Act in the U.S., a regulation the major technology companies have turned on its head so that it shields them almost completely from responsibility for many of the worst effects of their technologies). Many of the wishes of the executives in these companies that are framed as making beneficial changes to the world need to be examined much more critically. Some of them are just naive (for example, Mark Zuckerberg's belief that 'community' is an inherently positive value), but others are more directly pernicious (examples are too numerous to mention). There is a strong desire among many in Silicon Valley, whether for their own monetary gain, or deeply-ingrained hateful attitudes, or both, to tear apart much of the most important social fabric. There are signs, today, that some people are starting to raise questions about these basic assumptions. Until we understand how fundamental they are, and how much they need to be brought under democratic oversight in a way that so far only the European Union seems to have much ability even to consider, the harms digital technologies cause will continue to outweigh their benefits."

An **anonymous respondent** wrote, "Access to the internet is a symptom of the wider economic polarisation which looks like it will continue to get worse because the logical construct of capitalism – especially as it is currently being deployed – is to accrue wealth to wealth and to progressively marginalise the population, making the economy less of a social phenomenon and something which only 'works' for fewer and fewer more and more wealthy individuals or entities… There is a tension between the democratic power of nation-states in service of the people and the interests of big money. This results in governments serving money instead of people or national interests. In this context, it is in the interests of money/power for everyone to be divided/angry/unable to organise constructively in a democratic sense because that seems to be something that they see as a cost rather than as a strength of a nation… When the internet distributes memes it is often for shock value and for short to instant content. This increases the volatility of communication and the probability that responses are reflexive and not negotiated ways of talking through issues, which makes us more divided."

A **professor at a major university on the West Coast of the U.S.** wrote, "One problem is increasing mindless dependency (some would call it addiction) to the smartphone and social media. The ongoing and often desperate need to check and monitor and respond and invade public physical and aural space is becoming a real social plague. Individuals are becoming more distracting and distracted, dependent, demeaning and disrespectful. This has negative implications for one's own well-being (as well as academic achievement, productivity and self-concept), but also for the well-being of those around that person. More use can foster greater

access to resources and support, but also to more depression and other forms of decreased well-being. Then, too, there is the explosion and exposure to very bad human behavior through ubiquitous social media, not good for anyone or for our political and social environment."

A **university student** commented, "The internet impacts our cognitive abilities and emotional health, often not in a positive manner. The technology industry is mainly focused today on playing into user trends in instant gratification. This trend of tapping into taking advantage of people's dopamine-inducing click addiction has leaked into almost all areas of society. It has large impacts on the ways businesses are building platforms and the ways that new technological advancements are being programmed and developed and it contributes to many threats on human capabilities."

An **anonymous respondent** commented, "People learn what types of emotions are more or less acceptable in various social settings and calibrate appropriately. Most users know that different social networks have different tones and types of content. However, all of the major digital communities we have right now are part of for-profit businesses. Since they make money by getting regular users to spend as much time on the site as possible, they have strong incentives to promote content that gets people riled up. Many people rely on social media for news, but users disproportionately engage with outrage over cultural and identity grievances. Promoting the most popular posts may seem content agnostic, but it encourages an us-versus-them mindset as the lowest common denominator of digital life. It's easy to put all the blame on the big corporate boogeyman, but I wouldn't let users off the hook that easily. Look at what's happened in the United States since Donald Trump announced his candidacy for president. Every time he says something outrageous, people who use social media to discuss politics drop everything else to respond to him. Trump provokes, and most users can't help but being provoked. They can't focus on their own political agenda. I can't help but wonder if most of us have little training in how to focus our attention, and digital connectivity is just exposing this weakness. Then again, many of my friends and family don't seem to want to learn how to focus better online."

A **research scientist** said, "It is clear that providing alternate realities not based on any ground truth to manipulate the masses is relatively easy to do in the digital realm. Homophily [the human tendency to bond with others who are similar to oneself] is a strong enough urge in humans even without the digital manipulation of the sort we have seen in Facebook, Twitter and other similar social digital portals. These social media outlets exponentially amplify homophily at the risk of nuanced discussion on a topic. I am afraid I don't see these media outlets policing themselves; insofar as they make money from advertisements, they will not question the source of the finances. They have shown this to be true in the past, and I see no reason to suspect that they will deviate from this in the future."

Anonymous respondents commented:

- "People's well-being will be harmed because addiction to digital technologies may lead to their inability to socialize with the world in an appropriate manner."
- "The industry's appetite for users and their data is bigger than their concern for people. Tech firms, with Facebook and Snapchat at the helm, use any psychological tricks, including gamification, to attain users and glue them to the screen."
- "The internet and technology as a whole are likely to disrupt and polarize our politics and economics in ways that may well be seriously detrimental."
- "The increase in sitting and viewing time and lack of human interaction a greater negative effect than the great benefit of increased access to more information."
- "Artificial intelligence undirected by equalizing policies increases inequality. Corporate surveillance policies underlie business models and governments benefit from the 'invisible handshake.' Competition policies at a national level are weak tools to control practices of search, social media and broadband companies."
- "Parents need to keep kids from getting addicted, lead by example. However I don't see this happening. Adults are almost as bad as kids. I used to teach and except for while the students were taking exams, there was no way to, keep them off their devices. Also don't see how to get people to, put down their phones in public. Even where there are laws about using devices in a car, people still use them. Maybe society will just adjust eventually."
- "Many people think these affects are nothing to worry about, but they can pose serious threats to our physical and mental health and to the ways human systems are evolving in the next decade and more."
- "Another potential scenario at this point is the continued medication of large percentages of the population and additional focus on symptoms rather than causes." [Record numbers of people are taking medication for attention-deficit, anxiety and depression.]

Digital distrust/divisiveness: Personal agency will be reduced and emotions such as shock, fear, indignation and outrage will be further weaponized online, driving divisions and doubts

Douglas Massey, a professor of sociology and public affairs at Princeton University, wrote, "With the advent and dominance of social media, the internet has evolved in undemocratic ways that were unforeseen at its inception, when it was generally seen as a democratizing force. Wealthy ideological interests, well-funded government actors and shadowy non-governmental organizations have established alternative sources of news and information that systematically pump disinformation into the public sphere in an effort to boost authoritarian ideologies, undermine democratic institutions, influence the outcome of elections or simply make money by playing on people's darkest fears and prejudices. These efforts have been enhanced by the

systematic manipulation of internet tools such as Google, Facebook and Twitter by bots and trolls propagated by many of these same non-democratic actors and interests, sowing distrust of democracy and democratic institutions and pushing public opinion toward authoritarian stances that reinforce the power and control of elites at the expense of the masses, leading to ever greater concentrations of wealth and income."

Adrian Colyer, a business leader/entrepreneur based in Europe, said, "The reasons I tipped in favour of an overall decline in well-being are: **1)** The increasingly detailed monitoring and tracking of every aspect of individuals' lives, leading to increased opportunities to exploit/manipulate an individual's psychological state for commercial gain (history teaches us that not much seems to be able to stand in the way of a potential profit!). **2)** The rapid arrival of a post-reality era where trust erodes even further because no image, video or audio source can be trusted anymore (photorealistic faking becoming a readily accessible technology). I think this will have a destabilising effect on society."

Clifford Lynch, executive director of the Coalition for Networked Information, commented, "'Our digital lives are conducted in a largely uncontrolled environment of ever-increasing surveillance and ever-more-pervasive deceit (propaganda and advertising)."

Mario Morino, chairman at Morino Ventures, LLC, wrote, "The reason I am more pessimistic than optimistic about the impact of the internet on well-being is the pervasive damage that is being caused by the promulgation of untruths, misinformation and the targeted damaging or destruction of digital information and its application. The concern is exacerbated by the lack of counter-efforts and what appears to be a public either not grasping or simply overwhelmed by the universal threat this poses."

A **retired public opinion researcher** wrote, "We are a species that evolved by utilizing social contacts for the maintenance of the individual as well as the group. Speech is a social contract as is stabilization of food and shelter resources. If technology limits social contracts, we must evolve experimentally. There is no assurance of survival without successful contracts."

Jonathan Irvin, a retail manager based in North America, said, "The intrusion of digital and on-line into more aspects of daily life has already begun to erode the cohesion society needs to function. Future developments in digital distractions will exacerbate the current trends in which people are increasingly isolated from one another except for narrow interests, attitudes or political stances. Our ability to see each other valuable members of society is being eroded and we see those who have different backgrounds, nationalities, religious convictions, political affiliations, etc., as 'others' who are not to be trusted, much less embraced as fellow human beings."

Gabriel Kahn, professor of journalism, University of Southern California, said, "This past year, two issues became crystal clear: **1)** The internet is an oligopoly, and competition is an illusion. **2)** These large tech companies operate with no sense of ethics. They have tremendous power and they operate in a largely unregulated environment."

Erika McGinty, a research scientist based in North America, wrote, "The smartphone already reduced the need for everyday interactions with people face-to-face; having the time and the Web in one's pocket made what used to be normal exchanges among citizens – asking for the time, for directions, for a particular store or restaurant – unnecessary and even unwelcome or suspicious. With social media and games and WiFi-connected public spaces, including urban transportation like the New York subway, the random, often life-affirming conversations with strangers have all but disappeared, making strangers just that much more strange. This has led to less empathy among city dwellers for the people physically around them. Then there are the issues of privacy, which affect some now and may affect many more in the future. Location tracking and digital-data seizure are concerns. The Internet of Things strikes me as enormously ominous in its potential for malicious hacking but more so even for yet more data collection and lack of privacy from corporations/providers and the government. The increasing ability to monitor and control remotely, be it one's oven temperature, home-surveillance cameras, kitchen lights, I feel is leading to a hands-off mentality where ultimate control is in the hands of third-party providers and one's personal human agency is reduced. I find this trend to be very troubling in a society of individuals that must rely on one another, not suspect or divide one another. 'Security' has become an excuse for much of digital control, in an age when people are safer than they've ever been. Loneliness is also a big problem shown in research to be an outgrowth of the shift toward remote relationships with 'friends' and workplace and even one's own home. When Facebook recently launched Messenger for Kids, I laughed at the line to the effect of 'for parents to interact with their young children' as though it were a spoof. Of course, it's not a spoof."

Gail Brown, an instructional designer based in Australia, wrote, "Anyone can be anything or write anything on the internet. Many people, especially younger people, believe what they see or read. An online relationship is not a 'real' one - yet many teenagers believe that it is. *Not* everything online is trustworthy, yet many of us, adults as well as teenagers, are easily duped. This 'fake reality' is more ever-present over time, and takes away from real relationships, true information and communication, especially with those people most important in our lives. Sometimes, the internet can be helpful, and sometimes it's not - and people need to learn the difference. In today's world, this education and learning is not happening, nor effective."

Izumi Aizu, a senior research fellow at Tama University's Institute for InfoSocionomics, wrote, "There may be a greater divide in social life and less solidarity and social bonds than ones we have

today may be generated, perhaps subconsciously and in the gradual long-term effect. People may become less tolerant, not as willing to understand and accept others who have different values, and seek instead more power and money within their own groups. This may happen – globally and locally – I'm afraid."

Katie Paine, CEO of Paine Publishing, said, "I believe things will change for the worse as more and more bad actors figure out how to better manipulate individuals, especially those without education. The Russians have been doing it for years, corporations like Amazon and Google have as well, what is to stop other nefarious characters from using digital screens to sow further chaos among civil societies?"

Craig J. Mathias, principal for the Farpoint Group, wrote, "The internet and the Web were intended to be tools, not the core of a lifestyle. And yet, for many, the internet today is just that – an essential element of their lives. This is not to say that the communications capabilities of the internet are not of value, but many of the 'services' enabled by the internet, particularly social media, have become substitutes for thoughtful interaction and intelligent discourse. Social media has become so filled with vile, hateful and poorly-formed (and worded) 'speech' that I will no longer participate. Consider also the personal productivity lost as so many consider participation in social media to be a right and an essential element of their lives. Twitter interruptions, unsubstantiated comments (there is clearly an insufficient editorial or fact-checkering function at work on the internet today), way too much advertising and just plain rubbish lead me to conclude that that more people will indeed be harmed than helped by many of the services available on the internet today. The answer? Self-discipline and good manners. Both are in increasingly short supply on the internet today."

James Scofield O'Rourke, IV, professor of management at the University of Notre Dame, said, "Increasing dependence on digital life, the internet in particular, has removed an important level of person-to-person, human interaction from daily life. The internet, of course, is enormously valuable in facilitating commerce, education, social development, medicine and so much more. The young among us, however, do not see it in that way and do not use it in that way. The 'anonymity' provided by the internet offers an opportunity for the cruelest among us to criticize, terrorize and intimidate those who have no way to protect themselves. For every opportunity to connect with a friend or share a photo with an old classmate, there are a dozen opportunities to badger, intimidate and threaten others, all at [seemingly] no cost to oneself. Many things important to each of us – from our privacy to our personal security – are jeopardized by flaws in data gathering, storage and transmission. No one among us is secure. If our banking, educational, medical and personal records are subject to hacking, theft and demands for ransom, how are we now better off? If our postal service is now threatened by the existence of a digital service that

seeks to eliminate it, how are we better as a society? If internet-enabled devices are built into every aspect of our lives – our telephones, our home entry systems, our security systems, our communication and photographic systems – how are we better off? If we are unable to prevent hackers, thieves and blaggards unwilling to work at an honest profession from cracking into our lives and taking whatever they wish, how has this technology improved our lives? I cannot protect anything I value, not because I am unwilling or unable to secure it, but because I've given it to others: my doctor, my banker, my university and the people I must trust; what measures can I take? What shall I do to protect what belongs to my family? The most valuable asset I have in an age of mass data accumulation and transmission, ironically, is my own anonymity. If I commit as little as possible to a digital database, if I install as few cameras and as few devices as I am able, then perhaps others will see me to be of little value and pass by. We must come to recognize these threats and balance them against the value provided by digital technology and the few, massive organizations that provide the devices, services and opportunities we all seem to value most."

Estee Beck, an assistant professor of technical and professional writing and digital humanities at The University of Texas-Arlington, said, "While people increasingly rely upon digital technologies for connection, tracking and easing the burdens of daily life, the surveillance state of the internet – led by corporations and governments – means increased intrusion into the private lives of millions of people in the United States. Rather than allowing people methods to opt out of data tracking or access to their data files each website collects on people to review, delete or challenge, companies like Google, Facebook and others that will emerge over the next 10 years (including Internet of Things companies and artificial intelligence companies) seek to harvest as much data about users for billions in profit with little compunction over invading the minute-by-minute lives of people. Under this framework, internet companies will continue to write the rules of collecting data online, with a lack of U.S. government oversight or regulation. This will lead to a worsening of people's well-being, as consumers will not have any recourse for adverse actions taken against them in financial, legal, health, educational and social sectors."

Thad Hall, a senior political scientist and co-author of the forthcoming book "Politics for a Connected American Public," wrote, "The internet has many positive attributes, including helping individuals organize, communicate to broad audiences, and facilitating conversations about politics and social issues. These positives are important. However, over the next decade, the social ills associated with the internet are likely to grow. One reason is that the wealth of data collected about individuals will continue to increase and these data will be used to influence and shape people's attitudes and behaviors. The big social media companies – i.e., Google, Facebook, Twitter, Snapchat – will continue to be platforms where personalized content will be delivered to selected segments in an effort to shape their behaviors. Some of these efforts will be a part of traditional advertising and persuasion (who Toyota or Nintendo target) but much of this will be political in

nature, designed to manipulate voting preferences and social attitudes. The growth in data and data analytic techniques will be accompanied by the growth in new technologies to manipulate audio and visual media. It is already possible to take a small amount of audio from an individual and create totally new, unique audio from it. Video can also be altered as well. It is easy to imagine, in the 2024 elections, candidates being confronted with either audio tapes or video of them saying offensive things, where the audio and video is seen as 100% authentic but is actually manufactured. Social media will allow these seemingly authentic hoaxes to go viral before they can be disproven (if, in fact, they can be disproven). This type of event will bring into question what is actually true or real and further undermine public confidence in the media and in facts."

David R. Brake, an independent scholar and journalist based in North America, said, "As surveillance of self and others becomes ever more ubiquitous, both corporations and governments will be using algorithms to sort people in ways that (on past form) will be unaccountable, either because corporations keep algorithms private for commercial reasons or because the algorithms are themselves too complex to fully understand and explain. One new danger is that a 'meritocracy' will arise of people whose behaviour has been deemed to show moral worth or simply credit-worthiness, and if you are on the wrong side of this you will have little or no opportunity to appeal against algorithmic judgments. Worse, you may even be unaware that these judgments are happening. Interpersonally as well, once people's moral lapses and errors of judgment are increasingly uncovered (and everyone has them) it may become difficult to get people to serve in political office for example and bullying will become easier."

A**ndy Williamson**, CEO of Democratise, said, "The internet and digital tools are tremendous forces for good, for the individual, our communities and societies as a whole. However, this will only be the case if we learn to integrate the positive aspects and to be more discriminating (and challenging) of the negative. The misuse of media for political gain or profit is nothing new but highlights the magnified effect of digital media and its immediacy. Today, we are living with future-pushing technology. If we can't develop a broad new set of skills, become information-savvy and manage the damaging effects of digital life, then the overall outcome 10 years from now is going to be poor."

Miguel Alcaine, an ITU area representative based in Central America, said, "In general, people will suffer more stress out of their inability to manage in a balanced manner their hyperconnectedness. If we as a society discover how to teach the new abilities required, especially to children and youngsters, we will be on the right track."

Digital duress: Information overload + declines in trust and face-to-face skills + poor interface design = rises in stress, anxiety, depression, inactivity and sleeplessness

Lev Grossman, Time technology writer and one of the first reviewers to get to test an iPhone, told an interviewer in 2018 that a decade after its arrival, "We still haven't understood or accepted how completely smartphones have distorted our daily lives and our social lives, our relationships with ourselves and with the reality around us." Also in 2018, Jana Partners LLC and the California State Teachers' Retirement System, which control about $2 billion of Apple shares, sent a letter to the smartphone maker urging it to develop tools to help parents control and limit phone use and to study the impact of overuse on mental health. The New York Times carried an essay in its business section titled "It's Time for Apple to Build a Less Addictive iPhone."

Many of the most commonly occurring responses to the question on individuals' well-being fell into the category of digital duress – stress, anxiety, information overload and so on, and many of these were the respondents' personal observations about themselves, families, friends and others they have observed.

A **futurist based in North America**, said, "We'll see new psychological 'diseases of civilization,' parallel to the diabetes and obesity that have accompanied abundant manufactured food. These 'diseases of digital civilization' could include depression, social alienation, attention disorders, learning deficits, gaming addiction – phenomena we're already noting either anecdotally or statistically among the young. That doesn't mean the digital world is inherently evil. In another decade our species will almost certainly spend far more of our time in the virtual world than today. But this transformation has occurred so quickly compared to previous information innovations (moveable type, the telephone, broadcasting) that we haven't yet adapted our social and educational systems to support ourselves and our offspring in this new environment."

An **anonymous respondent** wrote, "Psychological concerns – for instance, depression and anxiety – are increasing at the same time that use of digital technology is, so it seems highly correlational. This seems to be an early point in an ongoing trend that isn't likely to reverse course anytime soon."

Concerns about stress among young people were echoed in the response of a **college senior and social media professional** who wrote, "There seems to be a growth in anxiety and depression among young people in the United States that is at least partially due to their internet habits. Spending too much time in front of screens, absorbing sometimes-stressful information and interactions can be damaging. Just spending hours and hours every day taking in thousands of different short messages can be exhausting. It also seems to be doing more harm than good in the realm of physical activity. While I see friends benefiting from sharing their 5K runs and gym workouts, I see more of them sitting passively using screens most of their waking hours, which have been extended far too much for their own good by screen time that stretches far into the

night. Via social media you are always connected to your friends' and acquaintances' highlight reels online. They can create the false perception that everyone is living perfect lives and make you feel that yours is a disappointment. For instance, Instagram has a feed of good-looking people doing amazing things. This can breed insecurity in viewers. This insecurity can have negative long-term effects for some people. Another aspect of digital life is the impact on memory. Being digital, today if you forget or you don't know something, you can instantly look it up. No need to remember anything anymore – just use your phone, your external memory. The need for instant gratification seems to be increasing all the time as well. If a Web page doesn't load in under a second or two, or a video is longer than a minute or so people move on. Few people read anything longer than a paragraph or even one line – it's a TL:DR [too long – didn't read] world. If a person doesn't answer a text message within seconds, you may become worried and stare at your phone, hoping for an answer. Notifications via audio noises or numbered logos continually interrupt people's lives, and they pay them more attention than they pay to the real life going on around them. We scroll through Facebook and other social media all the time, mindlessly taking in hundreds of messages and images in minutes and we consume tons of other information in big doses daily."

Tom Massingham, a business owner based in North America, wrote, "The expansion of digital technology will diminish the traditional human interaction people need to thrive, and the volume of false or misleading information available will grow and lead to misunderstandings, conflict and divisiveness."

A **professor** from North America said, "Among the negatives: There is a loss of interpersonal skills and the ability to connect with others face-to-face. There is increased anxiety and depression, as people view others' seemingly perfect lives online. There is a disconnection from violence. And people believe in self-selected fake news."

Richard Lachmann, professor of sociology, State University of New York-Albany, said, "The internet is a convenience and provides access to information while undercutting social ties and creating anxiety among younger users. The benefits already have been achieved but the costs in sociability and psychological well-being will continue to accumulate."

Jenny L. Davis, a lecturer at the Australian National University's School of Sociology, said, "it is important to address the relationship between technological advancements and mental well-being. This must be addressed primarily as an issue of design rather than user practice. That is, we should ask how technological infrastructures and interfaces evoke particular emotional trends, and for whom. Social media, which has been my area of research, has the potential to provide both comfort and provoke stress."

A **college student** commented, "We are constantly presented with notifications by our digital devices to the point that any absence of signals from them for more than a few minutes makes us feel anxious. It is difficult to concentrate on work when you know your digital devices give you access to Facebook. Instagram, Netflix, games and more. These are dangerously addictive media platforms. A major issue is that young people seem to be much more insecure today than ever before. People have the fear of missing out (FOMO) when friends post that they are at an event without their friend, they worry they are not well enough liked, basing their self worth minute-by-minute on how many responses they get to their posts, and they have unrealistic expectations for how they should look based on photos they see. Some people are creating and then trying to live up to fake worlds they build with their phones. We have to make sure people's mental health and well-being come as a first priority."

Anthony Nadler, assistant professor of media and communication studies at Ursinus College, said, "Technologies' impacts will be influenced by political choices and the contest among different social groups fighting for clashing priorities with technological development, use and regulation."

Diana L. Ascher, co-founder of the Information Ethics & Equity Institute, wrote, "The repercussions of a(n inevitable) genetic data breach will have serious – and inequitable – consequences for millions of people. Imagine being denied insurance because your cousin sent his blood to 23&Me to trace his ancestral roots. Researchers like me are concerned with ensuring that digital technology innovators are equipped to make design decisions that promote ethical and equitable information practices – finding balance between the potentially terrific gains and portentous losses."

A **student at a U.S. private university** wrote, "As the internet gradually becomes so much a part of us that it is literally a component of our brains, people will begin to process life like the platforms they use online. The internet and humans' brains will become one. This makes me quite nervous as to how it will affect our overall well-being. A problem at this point is humans' habit of comparing their lives to the lives of others. With applications like Instagram, YouTube and Twitter, people are seeing millions upon millions of images of seemingly 'perfect' people and finding their own lives to be 'less than.' Sadly, the public's levels of confidence and hope may plummet in future years due to this and to the constant attempts by many online messengers (politicians, companies, others) to generate fears or misunderstanding as outright tactics to influence buying, voting and other acts."

Mark Glaser, founder and executive director of MediaShift.org, said, "Many studies have shown that the more time people spend on social media, the less happy they are. This problem is even

more severe among teenagers who prefer to spend time alone on their phones rather than in person with friends."

Lori Laurent Smith, an entrepreneur based in North America, commented, "If sitting is the new smoking, the internet is the chief enabler. There is a laundry list of diseases that are directly linked to inactivity, with the majority having a fatal outcome over time. Jobs in the digital economy are increasingly more intellectually-intensive (than manual labor) meaning more of us are sitting in front of screens for hours at a stretch for work. Then we come home and check our social media for a few minutes (or hours), slump in front of a screen to Netflix, YouTube, Hulu, Amazon or thousands of other video streaming services or maybe play video games with (virtual) friends. The internet lets us remain inactive while we click and buy … It's also not great for our collective psychology (as research continues to prove). Those in the rising generation (born after 1996) have grown up with the internet and spent their teenage years with smartphones and tablets, meaning they've had to construct their identities and discover their interests in a completely new way – in front of an audience of friends, family, teachers, neighbors and trolls. The American Academy of Pediatrics has warned about cyber-bullying and 'Facebook Depression' (referring to an adolescent spending too much time on social media, including texting). According to the Centers for Disease Control, suicide became the leading cause of death among people ages 15-34 in 2016. Ongoing studies among adults are increasingly showing that internet use, particularly social media, is related to an increase in mental health disorders including: anxiety, depression, panic attacks, ADHD and addiction. The last point is perhaps the most controversial; however, it appears to be present in people who spend excessive amounts of time using social media: neglect of personal life, mental preoccupation, escapism, mood-modifying experiences and tolerance and concealing the addictive behavior. On the flip side, there is increasing research evidence that people who are overly dependent on digital devices undergo 'withdrawal' when they take a break from the internet. Many studies have focused on social networks, particularly Facebook, with its promise of instant social connections and groups of like-minded individuals, have found that instead of enhancing well-being (as has been proven with people socializing offline and joining support groups in real life), they appear to actually undermine well-being and increase a sense of social isolation. And the more social sites a person visits each day, the greater they *feel* their feeling of social isolation tends to be. According to psychiatrists, perceived social isolation (loneliness) is one of the very worst things for our physical and mental well-being. That's not to say there aren't great benefits to our well-being from the Internet. Fitbits and sleep monitors help us achieve fitness goals. Apps help us meditate, keep up on our commitments and be on time for meetings. But such a small percentage of the population use these tools consistently, the longer-term effect is overwhelmed by the negative effects from the 1-2 punch of inactivity and poor mental health. While the promise of self-driving vehicles to lower injury and deaths from traffic accidents is important to consider; artificial intelligence/machine learning brings with it more automation

including drones to deliver things/run errands, the rise of robots to help look after our homes and family and the permanent rise of unemployment over the longer term. I can't help but think that the additional time freed up by these miraculous changes will cause us to spend even more time being inactive while we mindlessly scroll through social media-type sites, figure out what to watch (or otherwise be entertained), order everything for home delivery (including every meal) and slowly become aware that our well-being has been compromised by poor mental and physical health."

Daureen Nesdill, research data management expert based at the University of Utah, said, "People will be both positively and negatively impacted by the increase in technology. The negative is in a reduced knowledge and experience with social interactions offline leading to isolation, depression and an increased number of broken relationships within families, couples and groups. To a certain extant it is already happening. A second negative will be the increase in cybercrime we will be dealing with – financial and identity theft, ransom for access, manipulation of autos, robots, etc."

Mark Maben, a general manager at Seton Hall University, commented, "I have increasingly observed in my students the negative impact their digital lives are having on their well-being. This is especially true when it comes to work and social relationships. As interactions become primarily digital and non-verbal, misunderstandings of tone, intention and meaning are occurring with growing frequency. This in turns creates more tension and conflict between individuals that likely would not have occurred if the communication had been face-to-face. In addition, I am seeing use of digital technologies give rise to more anxiety, stress and depression in students and colleagues, especially those who are heavy users of social media. While some digital tools are making us more productive, the growing levels of connectivity within our culture are harming the happiness and health of those who have a difficult time managing their digital intake."

An **anonymous respondent** said, "Yes, I can shop online easily, I can search for information much faster than in the old days, and I can connect with out-of-town friends and family more readily. But I'm not sure the tradeoff is worth it. I worry that the enormous amount of time people spend on the internet and social media – often as more than a habit or boredom than any true need – outweighs the many benefits of technology. You go to a restaurant and see an entire family of four sitting with their phones, not speaking or looking at each other during a meal together. Parents at playgrounds or waiting for a bus are not talking or interacting with their kids, instead they are just looking at their phones.

A **Ph.D. in biostatistics** commented, "It is common for people to browse on phones or watch shows before bed. Studies have shown these habits are disruptive to sleep (the light emitted

interrupts our bodies' natural wake-sleep rhythms), which negatively affects our mental and physical well-being. I do not see this problem improving. Studies are also beginning to show the longer-term effects of looking at screens all day."

Serge Marelli, an IT security analyst, "People will be more stressed. Digital life, and 'digital everything' leads to a permanent state of mental, emotional 'excitation.' Our minds and attention are constantly requested (by smartphones, social nets, etc.). There are less and less periods of mental inactivity that allow for mind relaxation. Some will learn to switch off, at the possible cost of partial social exclusion (I see it in my life, many do not understand that one is not permanently available), while others will place social pressure above their life, and pay the price. I would expect we will see more burnout syndrome or effects."

Kathleen Harper, an editor for HollywoodLife.com, said, "While technological advances improve the logistics of our lives, they severely limit human interaction, which is arguably more important than having Google at your fingertips. Before smartphones, people lived perfectly happy and content lives, so it's very possible to be fulfilled without the internet in your back pocket. But without essential social skills and human interaction, which we're essentially trading technology in for, I don't believe we'll be as successful on an emotional level. For example, I have cousins who are Gen Z, and they're constantly on their phones – even during family gatherings when everyone else is talking face-to-face. On some level, technology has a way of giving us social anxiety when it comes to interacting with others in real life. As a result, I don't think we'll be as successful as we could be as a species... Like so many other things, technology helps and hurts. I'm not personally sure yet if the benefits will outweigh the negatives – I don't think *anyone* is."

A young **multimedia journalist** based in the U.S. said, "More people will be negatively impacted by technological digital advances and would be more harmed than helped mentally because people are thinking less. When folks use their brain power less or rely on technology more the movement of mankind plateaus. In order for generations to keep improving in years to come, folks need to remember basics that cause human nature to thrive. For example, happiness, love, laughter and – most importantly – relating to other humans allows us to feel and emote, resulting in a more positive mental and physical state. While technology can supplement some of these things, it's no perfect replica to what all humans can do."

A **digital strategy director** for a major U.S. professional association wrote, "It will be more harmful than not over the next decade because device use will lead to more social alienation, increased depression and less-fit people. Because it's still relatively new, its dangers are not well understood yet."

Mary Ellen Bates, president and founder of Bates Information Services Inc., commented, "We have seen plenty of studies on the negative impacts of social media on users' feelings of happiness and satisfaction, exacerbated by social media companies (whose revenue is dependent on advertising) developing more and more ways to keep users engaged on their sites. Virtual- and enhanced-reality devices will become commonplace, which further engages people in a low level of interactions with others. I foresee people becoming accustomed to the low-bandwidth virtual interactions rather than the face-to-face meatspace interactions that we humans instinctively crave."

A **professor/teacher** based in North America commented, "With respect to psychological well-being, the performance of identity in a public and surveilled forum leads to a brittle sense of self that imperils an individual's psychosocial development and ability to build resiliency. Recent research in teenage depression increasingly makes this relationship clear."

A **North American entrepreneur** wrote, "Several negatives: An idealized or false sense of reality is often portrayed by individuals online. This creates an unachievable standard for others to try to live up to or at best it creates a comparison that's unfair and unrealistic but can result an individual feeling as though their lives are not as meaningful or happy as those being portrayed. Time spent online is another factor has an impact on people's lives. Time spent using technology takes away from time available in the real world with live people in one's immediate family and life. People will continue to be harmed by misinformation. In general, exploitation of the vulnerability of others overall has great potential for harm."

Daniel Schultz, senior creative technologist at the Internet Archive, commented, "Digital literacy and best practices are not innate, it all needs to be taught. Risks and protections are also not fully understood around use of technology; what is a healthy balance of utility and risk? How do social feeds impact world views, et cetera? As we learn more, people with the resources and general network of support will be more likely to benefit from those lessons in the short term, while the average technology user will be at the mercy of where best practices can fit into capitalistic forces. Over the next decade I hope that we will identify better practices. I believe that it will require advocacy by organizations who want to make healthy technology use a mission, and to hold creators accountable for building those best practices into their tools. I do not expect that effort to be large enough to protect most users. For a case in point, look at the negative impacts of blue light. There were open source tools on the market to lower blue light on machines as early as 2009 but it took almost a decade for that technology to get built into iOS. Only the most educated and most technical, who also happened to be brought aware of the negative health impacts of blue light, were protected from the health hazards – and even today I would imagine the vast majority of technology users are still unaware. Extrapolate that to every single known and unknown health

risk posed by technology and we see the potential for a serious technology-driven casual health gap."

Beth Kanter, an author, trainer, blogger and speaker based in North America, wrote, "I spent the year before this publishing a book on the topic of self-care leaders of nonprofit organizations and creating a culture of well-being in the nonprofit workplace, interviewing and surveying nonprofit professionals. I am now also teaching workshops for nonprofits on the topic of Technology Wellness. Because nonprofits are under-resourced and often their programs are under attack, these people are spending endless hours online, with news alerts going off, sleep interruptions, no boundaries regarding after-work emails and requests. I interviewed countless nonprofit leaders who made themselves sick, ended up in ERs and hospitals due to stress, with use of technology and social media as a contributor... As a social-change activist and someone who has strongly believed in the power of networks and social media to create good, the last year has been really disheartening. I have had more conversations about a wish to quit social media, especially Facebook, but realizing that it has become a roach motel in a way."

Jason Abbott, professor of political science at the University of Louisville, said, "Increased use of digital media has resulted in people being less present and mindful, more distracted and restless. resulting in more stress. As the number of digital platforms and social media applications increase this trend will only continue."

Erin Valentine, a writer based in North America, wrote, "From personal experience, I have noticed that when technology is not as prevalent in my life, I have a greater sense of well-being. Technology brings a larger amount of anxiety to my life, as there is a sense to constantly be connected and working. However, I do acknowledge that technology has been incredibly helpful in my life and has become an essential part of my day-to-day routine."

Philip J. Salem, a respondent who shared no additional personal information, wrote, "**1)** Chatter is increasing, and conversation is decreasing. People are losing their abilities to sustain human communication. What happens on social media is most often a sequence of messages authored by different sources. In many instances, people will author a message and leave. Expression has replaced communication. 2) People are losing their ability to process with any depth. That is, we scan a lot, and we do not probe much. 3) The latest generations are risk-averse, especially with social relationships – friendships, romantic relationships. The slightest hint of hurt leads to leaving, no response, etc. Again, less depth, but broad, shallow relationships. 4) There has been a loss of community. The formation of sustainable civic groups has decreased with an increase of ephemeral activist networks. 5) None of this is irreversible, but it requires greater mindfulness to improve. 6) Some who are already skilled at a behavior have improved and will continue to

improve those skills through Internet use. The internet, like all technology, acts as a catalyst to amplify already existing differences. The skilled will increase skills as the unskilled fall further behind."

A **professor of information studies and digital design** based at a major university in Europe said, "I anticipate continuation of the negative health impact because of ergonomics-sitting, immersion and the convenience of access to goods and services without leaving one's chair. Before this is properly addressed, the problem will continue to worsen for a few years... Anticipate greater stress because of the ability to be connected to innumerable outlets for news of crises around the world. The impact is already felt, but this will likely worsen if trends from the past 60 years are any measure."

Charles Ess, professor, department of media and communication, University of Oslo, said, "It is no longer dismissed as just a 'moral panic' or Ludditism to express concerns about loss of social skills (specifically, the virtues of patience, perseverance, empathy) that increased dependency on ICTs for communication seem to bring in their train (ala Sherry Turkle, 2011, but many more since). The recent spate of former social media designers and inventors who regret their contributions – e.g., as stealing attention, as fostering politically toxic filter bubbles and fragmentation, etc. – is also telling; as is the now open secret that the top executives in Silicon Valley, at least two of whom are Montessori products, send their own children to non-digital school environments (while happily continuing to sell devices to any every educational institution around). Surveillance and privacy issues are paramount here as well, as more and more of us seem to realize that good lives – as including friendship, intimate relationships, familial and other ties – require private spaces in which to flourish, whereas such privacy is increasingly scarce, as the Internet of Things diffuses ever more completely in our homes and cities. The dystopian vision (here I think Neil Postman's 'Amusing Ourselves to Death' remains trenchant and prophetic) is one of a kind of digital-neoliberal feudalism, as most of us may become more and more inextricably enmeshed in a technologically determined lifeworld, the designs of which aim at efficiencies for the sake of maximizing profit (primarily for the benefit of the few) at the cost of human autonomy, creativity and sociality. I think the forces pushing in this direction are enormous and very difficult to resist, much less redirect or restrict. But it may be that as all of this pushes more and more of us into ever greater unhappiness – i.e., a lack of a sense of autonomy in our lives, of well-being and flourishing in both individual and shared ways, an increasingly obvious oligarchy only thinly disguised as democracy – there will be sufficient push back to make at least significant changes for the better. None of this will happen by itself, of course. We will need vision and direction – in the rising importance of virtue ethics broadly and specifically in design.

A **senior at a major private university in the United States** commented, "Hyperconnected life has dangers that are going to multiply and impact more people in the next decade, so we should be aware. When young children grow up spending most of their lives hyperconnected they are risking the development of important social and communication skills. It will be interesting to see how society is changed when those all-digital children become adults. Many people of all ages are experiencing at least some harm to their mental well-being already today. Marketers and others are learning to use newly emerging tools to manipulate people and their emotions – an example is how political players are twisting social media into a confusing setting that makes people too overwhelmed to even care to go out and vote. Things seem bound to get worse. Constant self-promotion by most individuals (can't show anything other than a good side and perfect life) has also become a huge part of the social media experience. Yet in the coming decades, if we can find a way to ride it all out, there are positive possibilities. Maybe the mental capabilities of humans will increase exponentially thanks to robotics and artificial intelligence. Humans are innovating and inventing new ideas and their uses on a regular basis. In the future, there will be even more advanced technologies created, and maybe even integrated into humans themselves."

Anonymous respondents commented:

- "There is a measure of anxiety, whether from being harassed by anonymous parties, from feeling a need to 'keep up with the Joneses,' or from the usual social issues that go along with having any connection with people."
- "The time spent and the many interruptions are a negative impact for many people. Studies show that a lot of activities online are detrimental to self-image and mood."
- "The digital world has become all-encompassing. I rarely call people spontaneously or at all. My life feels highly surveilled. It's difficult to describe. I worry much more about losing my phone than losing my wallet. That was not true 20 years ago."
- "While digital technologies provide capabilities, expectations for productivity are up; the information deluge and threats on privacy and security increase stress."
- "We perceive those with resources and control of the technologies will be able to increasingly manipulate the populace for their own economic and political gains."
- "It is common knowledge that the internet has, for the most part, led people to increasingly live in 'echo chambers' where their own viewpoints are reinforced rather than challenged.
- The internet has become a means of circulating ideas and so-called facts that are misleading and often dangerous.
- Society's ever-increasing reliance on networked information systems and the Internet of Things has made us very vulnerable to cyberattacks, hacking and other forms of disruption that can prove individually and collectively harmful."

<u>Digital dangers</u>: The structure of the internet and pace of digital change invite ever-evolving threats to human interaction, security, democracy, jobs, privacy and more

An **anonymous respondent** wrote, "People's well-being could benefit or be harmed from connectedness; it all depends on the social and cultural frameworks within which we live our digital lives. Given that, and current trends towards the privatisation and market-oriented nature of digital connectedness, these will continue to affect well-being more adversely than beneficially. Even the survey question appeared loaded with cultural artefacts – 'enhance their lives,' 'improve their productivity' – these terms reflect a social structure that is predicated on capital markets, individualism and the unequal distribution of social wealth. Yet we know that individual health is most affected by the social determinants of health, and despite some being better off (such as those most adapted to connectedness, and those most adept at using digital tools), where inequality exists, poorer health outcomes for society overall and individuals follow. If digital tools are used to focus on individual health and well-being in a market framework in which inequality is a central feature then digital connectedness will invariably result in poorer health and well-being outcomes across the board. The trajectory we are currently on (with state-to-state variations) premises a continued privatisation of digital connectedness which will also function to further establish and strengthen existing trends of inequality. As individuals employ digital connectedness within this framework they will contribute to its strengthening, further eroding well-being for society and individuals alike."

An **executive for a major internet business** wrote, "Social media and hyperconnectivity may have improved well-being up to some point, but the marginal returns are decreasing and may be negative. More 'stuff' on the internet, at higher speed, does not yield greater understanding. It's like the difference between data and information: more data does not yield more useful information in all cases."

An **anonymous respondent** wrote, "I worry about the impact on jobs that AI will have and the resulting exacerbation of polarisation in society. I do not discount the efficiency gains, but they have not filtered down throughout the economy."

The **owner of a tech company** based in North America said, "Indications are that the impacts of social media, hackers, cybercrime and misinformation are impacting people's behavior in ways that have not been anticipated and that we are slow to respond to. Indeed, outside of academic pursuits and the occasional media headline, there appears to be little will to address the impacts of social media and misinformation in particular. Overall, we are seeing a very rapid change in our social structures, from how where we get our information to how we shop, access services and socialize. This pace of change is accelerating, perhaps beyond the ability of humans to adapt.

Transition to the Internet of Things has begun, and we have little, if any, idea how it will impact individuals or society."

Mike Liebhold, senior researcher and distinguished fellow at the Institute for the Future, wrote, "The lack of large-scale system interoperability between tech systems and services trying to gain business or strategic advantage by gaming or controlling connections, APIs and formats, the disparate access to resources among excluded communities and pervasive cyber vulnerabilities across all layers and nodes of our digital networks, are inhibiting the value of digital systems to improve public well-being."

An **anonymous respondent** commented, "With the current trajectory of digital technology development we are all being encouraged to rely on technology at a rate that is exhausting. This is making it harder to focus and the world feels more disjointed. Also, the persistent targeting and erasure of personal space and privacy is a major concern – and these concerns are not good for overall well-being. There is too much stress associated with being plugged in all the time or with fear of missing something when not tuned in. There are also huge ethical concerns with the sale of private information for the purpose of increasingly individualized marketing, which itself is another stressor. The bombardment of information and the pressure to keep up and engage, coupled with the decrease in access to commonly shared information and erosion of social skills that can follow are creating massive stress levels that are very damaging."

A **futurist based in Europe** commented, "In addition to the increasing digital divide there will be a complete loss of privacy, increasing cybersecurity risks and vulnerabilities as consequence of cyber-dependency (e.g., critical infrastructure, bio/chemical (t)error events, etc.)."

A **professor/teacher** based in North America commented, "There is a preponderance of evidence that economic well-being of individuals in developed economies is worse off than it was a decade or two ago. Technology has driven many of the changes, linked to public policies that have led to an increasing wealth gap. There is no intrinsic reason technology must have this kind of effect. However, there is a lack of will to change this trajectory. It seems extremely clear that economic well-being will be harmed by technology more than helped."

An **executive director of a tech innovation firm** said, "We may be seeing the last gasps of unregulated capitalism, and it won't be pretty. In the long term I'm an optimist, but I think we'll see some short-term hiccups."

A **chief of staff for a nonprofit organization** wrote, "In the long-run digital will improve people's lives, but in the next 10 years, it will be an overall negative. We are facing too many

algorithms that have not accounted for humanity and are purely profit-oriented. In addition, digital life is on a trend to have a greater negative impact on learning, abuse, bullying, etc., overall than positive. I think this will be corrected, but not in the next decade to the extent that the overall result is a benefit."

A **CTO and attorney** based in North America wrote, "Privacy will be further reduced and digital crimes will become more prevalent. The erosion of inter-human conversation will continue, along with further reduction in trust in information and tribalization. Advertising will be injected into every nook and cranny. In the longer term the internet will fracture into a world of insulated islands interconnected by well-guarded information bridges. Those 'islands' will be things like Facebook, China, Verizon. The internet will lose much of the so called 'end-to-end' principle that once allowed innovation to occur without permission at the edges."

Stephen McDowell, professor and associate dean at Florida State University's College of Communication and Information, commented, "Some major social and public policy issues associated with digital services and environments will need to be addressed to enhance well-being – challenges for speech, privacy, intellectual property and security. Since many areas of social, economic and political life are increasingly mediated in digital environments, some settled expectations will need to be renegotiated."

Giacomo Mazzone, head of institutional relations at the EBU/WBU Broadcasting Union, said, "My predictions are for a negative impact in the next 10 years for three main reasons. **1)** Most technological changes occurring today and those that will happen tomorrow are in answer to immediate needs and requests (for example, an app aiming to provide the solution for a given problem). Nobody knows what their impact will be on human behaviours and skills in the long run. Because of rapid change, long-lasting effects could be seen only later. **2)** Developments based on disruptive processes are very difficult to regulate because the changes happen too fast; this is potentially very dangerous – especially understanding the impacts on society. There is nothing more dangerous than to create the prospect of a new world where the large majority of people have no idea of their future situation and social status. The last time this happened was during the first industrial revolution. A century of social turmoil and the end of absolute monarchy were the result. Could the digital world bring as consequence the end of democracy? **3)** The industrial revolution saw the birth of monopolies and the rise of corporations stronger than the state. Antitrust legislation and the break-up of some of these monopolies were the national solutions. It could be that the appetite of internet companies and of the telecommunications companies will bring the end of the open internet. Could the antitrust solutions of the past be replicable in a global world where national jurisdictions cannot tackle global problems and multilateral tools are ignored or rejected by the stronger states? Not necessarily. After the industrial revolution a new

balance of powers was established in modern societies: democracies and a new 'social contract' were signed. But it took more than a decade."

Riel Miller, team leader of futures literacy at UNESCO, said, "We are in a transition from the frontier status of Wild West to something else. Think cybercitizenship and recourse in cyberspace. Take for example the fact that P2P currencies, easily implemented with Public Key Infrastructure and the trust infrastructure of fiat currencies in 2000 but blocked by central banks, now are back on the agenda as crypto-currencies begin to undermine a number of justifications for advances in transaction systems. Same goes for verifiable identity and ownership of identity on the Net. Cyberscitizenship was mooted in OECD papers I wrote in the late 1990s, now the harm to credibility and verifiability and responsibility are becoming clearer through antics like those of Trump and bots, trolls, etc. So, well-being will be harmed because people need the Net for many reasons and it won't be able to meet those needs properly without an appropriate global infrastructure that nation -tates inherently oppose and multi-national organisations won't address. So the Net will be dysfunctional and inadequate for some time."

A **professor at New York University** wrote, "Like any human invention the internet can be used for good or bad of mankind. Alas, the last years have shown rampant abuse and misuse of this platform. As much as we praised global culture, democratization of tools + access to media my optimism has all but vanished. This misuse has also placed people outside of most countries' legislation, and I do not see a unified willingness of all countries on Earth to address this problem. Media literacy may help, but only partially. At the same time, I could rather do without a fridge than the internet. Maybe the tools will mature to prevent most misuse. That would require legislation that forces the quasi-monopolies in social networking to heavily invest in R+D."

Laurie L. Putnam, an educator, librarian and communications consultant, wrote, "If current trends go unchecked, individuals' overall well-being will be more harmed than helped by digital life… Connected technologies that can be manipulated, attacked or misused will do more harm than good unless we recognize the vulnerabilities and do a better job of managing the risks. Stress levels rise when we lose control over our environment, and if we lose power over our digital lives, our well-being will be compromised. We are caught in a wave of rapidly changing technology, and many people are struggling, unsettled in the present and uncertain about the future. This is not about information overload; it's about a digital undertow that can pull away our time, agency, and even economic stability. When we live online, our credit card numbers are stolen, our private data is harvested and commodified, our sense of the truth and reality is called into question. Job security – and with it a family's ability to meet its basic needs – becomes a real concern when plans for automation don't include plans for workers. It becomes harder and harder to unplug our lives, and with the expanding Internet of Things, opting out will become virtually impossible. We

need to find ways to adapt or tensions will grow and our well-being will be further compromised. It's important to note that the well-being of the individual is connected to the well-being of the community. If the weaknesses of digital technology damage our collective institutions and democratic systems, however unintentionally, the individual will suffer. I expect things will get worse before they get better. But they can get better, if enough of us are willing to put our collective well-being ahead of business interests."

John Sniadowski, CEO of Riverside Internet, Wales, commented, "Where you live and your social status will determine whether you are harmed or helped. The great masses are being milked by multinational companies such as Facebook and Google and others queuing up behind to exploit. Huge numbers of people are being excluded because of poor access, or bad or no education and wrongly influenced by fake news, social media pressure and thought-control by governments through surveillance and access control, e.g., the great firewall of China. Individuals will be helped by access to connected technology such as telemedicine, etc."

A **professor** from North America said, "I'm concerned that people will be even more trapped by always working – with constant connectivity how do you not work wherever and whenever? I'm also concerned about privacy. Even if I personally am not on social media my face and information are because of other people I know. Companies like Google and Facebook know more about me than the government or my family, and I do not control that information. The flip side is that improvements to health probably will occur, especially related to chronic conditions."

An **anonymous head of research and instruction at a major U.S. university** wrote, "Despite the incredible usefulness of new communication, workflow, aggregation and other technologies, I worry that the accompanying downside is only growing. Specifically, I see the lack of privacy and control over information collected, the sociology of algorithms that are virtually invisible to users and the commercialization of personal data as having short- and long-term effects that are already radically changing norms. In addition, the conveniences of tools and applications in our hands are a tradeoff for remapping attention spans and information-literacy fluencies that seem – at this point, at least – to prompt anxiety and discontentedness over the longer term."

A **senior at a major U.S. university** said, "In the next decade, many individuals' personal well-being will be harmed by the pace, content and influences of hyperconnected life. We are already overwhelmed with information, advertisements and content. Teenagers and young adults are heavily influenced by social media... We are constantly connected, and our smartphones are basically another body part. In the next decade, our ability to stay connected and the technology available to us are only going to increase. We are on the edge of what Maurice Conti calls 'the

augmented age.' Within the next decade, fast-paced developments in virtual and augmented reality and possibilities such as neural lace and robots put as at risk of losing our sense of reality and losing our jobs. People will begin to feel insignificant because they can simply be replaced by computers. AR [artificial reality] and VR [virtual reality] will make it easy for them to immerse themselves in online worlds, leading to the loss of social skills, loss of reality and the loss of 'alone time.' Nicholas Carr and Tim Leberecht have warned about dangers of people not spending significant time on quiet introspection, the 'loss of alone time' and taking time for oneself. Contemplative time spent alone, disconnected is vital for personal well-being. But in the coming decade in our hyperconnected world, alone time is not going to be seen by many as an option any more. I am expecting to see changes in the way we are able to socialize and the ways in which our children develop. Attention-deficit disorder won't be something that a few people have and take medicine for. It will be the norm... If we are so immersed in this technology that we use it to avoid other people or ignore problems in the 'real world,' this could have harmful effects on people's emotional states of mind. If we neglect our own inner peace and interactions with others that do not involve digital appendages, we lose those significant relationships and experiences."

An **anonymous respondent** said, "Thinking through the benefits of digital technologies that have emerged in the past 10 years or so, I see evidence that the benefits to well-being that have accrued from the widespread adoption of those technologies have been counterbalanced by harms. For example, Facebook and other social media allow us to maintain meaningful connection with more people we care about more easily, and to form lightweight communities of interest that can cut across geographical and (to a lesser extent) demographic and cultural barriers. But this connectivity comes at the cost of filter bubbles, an erosion of tacit cultural consensuses that kept us civil to one anther, trust in the authority of institutions and subject-matter experts (especially scientific), and of course, in the unprecedented voluntary release of personal data to platform providers and third-party data brokers. Similarly, the internet itself provides unprecedented immediate access to information and has democratized the publication of information to a broad audience. These features can be huge boons for personal decision-making and social equity, respectively. But they also degrade trust in institutions and make it more difficult for people to assess the veracity of the information they read. Even more significantly, being on the internet – as a 'passive' consumer or an active participant/provider – exposes people to increased risks of personal physical, psychological and financial harm (through targeting by both state and non-state actors): doxxing, harassment, identity theft, malware and data collection for profit. A lot of the novel technology platforms and services we've adopted widely in U.S. society over the past decade or so increase convenience and immediate gratification of non-essential desires. This feels good, and makes solving some life problems ('how do I get from A to B without driving a car?') much easier. But it always comes at a cost in terms of privacy and attention. There are components of human well-being that are not easily translated into a profitable platform or service. For example,

an app that helps you be a better father to your children; increases the quality of the time you spend with your romantic partner; provides practical support for an ailing parent who lives across the country; decides whether it makes sense for you to apply for a mortgage given your life goals and financial stability; identifies and addresses sources of anxiety or distraction. These don't get made or are designed deceptively to nudge people towards a particular outcome that is advantageous to the provider or are provided at the expense of other facets of well-being (especially privacy and attention). Given our current regulatory environment, I don't see the problems with the current digital landscape getting addressed any time soon. And we're just now seeing the beginning of the full destructive potential of the digital technologies we're already embedded in. We might be hitting diminishing returns in terms of benefits accrued from these technologies."

An **anonymous professor** based in North America said, "The changes connected with the internet work in conjunction with other political, economic and geographic changes. Over the last 50 years, we have seen a major increase in inequality, with 40% of wealth flowing to the top 1% pf humanity. This has been coupled with geographic inequality that isolates segments of the population into like-minded clusters. At the same time, the revenue sources of advertising and subscription that supported centrist journalism have eroded. Individuals at the median income see their quality of life eroded. And the information available to them to frame their situation is increasingly polarized, reinforcing long-standing cultural attitudes. That is a recipe for deep social tensions."

An **anonymous research scientist** based in Europe said, "An environment is being created that we are not 'designed' to live in. The health of humans (and organisms of all kinds) is thereby damaged. Due to digitialization products are made in a way that make them more complicated to mend and very often not possible to mend at all. Even if they could be mended by an expert there is no service available. Therefore, lots of energy and material is used for things that are thrown away before they should be, and new products are purchased in their place. This increased speed of circulation increases the request for raw materials the processing of which leaks unwanted substances into the environment that circulate in both local and global ecological, aqua and atmospheric systems."

Ebenezer Baldwin Bowles, author, editor and journalist, said, "'Speak! I charge you!' Can I choose to be silent to the demands of digital technology? Not really. Is it good for me? Does this strange intelligence enfold and hold me, or does it drive me to distraction, delusion and despair? Should I remain an isolated and dogged individual, retired in the rural heartland, content in seclusion, or should I dare to speak to the universal? Should I even care? [This] survey, asking us to imagine the future of the internet in terms of personal well-being and general happiness,

reaches me on the edge of an existential chasm of seemingly disastrous portent. I'm probably not alone at the edge. I'm thinking we are doomed. I may be reaching an end, but am I so self-consumed by the digital universe I've crafted that I can no more see the good in the ones and zeroes? Proposition: We have become so connected on the shimmering surface of things that we no longer have time to think beyond the fragments, most of us. We struggle to tear our attention away from the endless avenue of screens to slow down, look one another in the eye, and share a genuine moment or two of humanity. Have you tried to carry a conversation lately? The smallholder's individual website, the dream that propelled the World Wide Web just before and after the turn of the century, has fallen into digital deafness and self-imposed silence. Why? The mega-scroll of a few big players – why bother to name them? – under the banner of 'social media' breaks down the ability to focus beyond the moment or look deeper than a page or two. No amount of so-called original content or innovative creations can break free of the stranglehold on expression imposed by the major players. Choose one or two of their handful of platforms or choose absolute obscurity. The middle ground is disappearing. Search engines no longer honor original content but tout the latest deal, the purchased top ranking, the most manipulative keyword. OK. I've already waxed TLTR. The Web contracts and constricts, offering candy and symbol instead of meat and potatoes, pushing distraction and deflection upon We the Masses to exert greater and greater control over thought and emotion through digital life and, ultimately, over individual freedom. Can you honestly claim our lives as a community and as a nation are happier and less stressful because of the smartphone, the digital subscription, the algorithm and the voice-activated assistant? So, if you're content to scroll your fellowship on the run, activate in a rush the monthly digital draft from your account to theirs, catch your news in cynically filtered fragments, and sink into the oblivion of binge media and increasingly fantastic cyber-realities, then yes, digital life will get better and better for you. You can even go rogue, be anonymous, and troll those sumofabitches to kingdom come. Here in the rural heartland, retired and withdrawn and licking wounds, we stand on the ledge and look into the darkness and prepare for the end."

Lynn Schofield Clark, an associate professor at the University of Denver whose work includes the Teens & The New Media @ Home Project, commented, "For more than a decade, I have been involved in research that has focused on young people and parents who experience some form of marginalization, whether that is from racial/ethnic or gender discrimination, socioeconomic disadvantage, dislocation and disruption, experiences with incarceration or differently abled lived experience. It has been an amazing privilege to observe and work with people as they have harnessed internet-related technologies to address collective problems, and I have witnessed the ways that such work contributes immensely to well-being. However, I believe that much of the advances in well-being I have observed have occurred in spite of rather than because of societal changes related to the internet. We are experiencing a tremendous widening of inequalities due to the U.S.'s collective inability to utilize its democratic institutions in a way that reinforces the

common good. We face difficult challenges ahead, particularly with the demise of Net neutrality, the continued concentration of ownership in the internet-related media industries, and the current mode of distraction that obscures the realities of climate change and other forces of globalization that contribute to inequities worldwide. Still, I think that improvement in life circumstances is possible. I believe that the resources for positive change and for increased well-being are available to us, but they lie in the human spirit rather than in the systems we have created. To secure well-being for the greatest possible number of people, we must work together to align our systems with a vision that underscores everyone's right to live with dignity and respect. This will take a strength of collective will that is sometimes hard to see. But I know it exists, because even among communities that are hardest hit by today's injustices, there is evidence of resilience, strength and the determination to survive and thrive."

A **professor** wrote, "Issues related to data surveillance, data privacy and algorithmic justice are not being adequately tackled in law, policy, technology design and education. So while access to technology increases, positive usage of it will not. The agency and autonomy of people will disintegrate if they are not given control and a say in the design of their socio-technical world. Note that this response relates specifically to the U.S. context. Elsewhere, some positive steps are being taken. Europe and the UK have moved ahead with a strong set of data rights for their citizens while U.S. citizens continue to have few rights with regard to their personal data (including metadata). Canada and other countries maintain Net neutrality, while the U.S. shuts down the pipeline to equitable access to information via the Web. In my own research, I am particularly interested in children and youth and their well-being in relation to technology so I highlight here a few broad issues related to young people. 1) Incredibly, as access to digital technologies grows and becomes more embedded in our everyday lives, media and digital literacy continue to play second fiddle to the traditional disciplines in K-12. School libraries, the natural venue for teaching young people the critical information/digital literacy fluencies needed in the 21st century, are closing down across the country due to funding cuts to public schools. This is certainly a counter-intuitive move in this age of digital mediation and data. 2) There is an emerging, rights-based discussion about children's well-being in relation to digital technology. The conversation has gone global and is framed by the UN Convention of the Rights of the Child (as witnessed by reports issued by the United Nations, UNICEF and scholarly writing in respected journals like Media and Society). Unfortunately, the U.S. has not ratified the Convention. Given that technology crosses borders, it is really a shame that the U.S. can't play a central, credible role in this global conversation; a missed opportunity. 3) Algorithms live in a black box and data gathering is happening from birth onward. The lack of transparency in technology development and data gathering, with seemingly little concern for the long-term effects on children's development, is breath-taking. Someone has to think of children's well-being. I do foresee a

growing awareness of this situation, and some parents pushing back. But we need a proper movement for data privacy, initiated through public education."

Marc Brenman, managing partner at IDARE LLC, wrote, "Privacy is already disappearing. Public discourse is already coarsening. Hateful individuals find each other and form groups more easily. Cybersecurity threats continue to grow. Artificial intelligence and robotics are putting people out of jobs. At some point, AI entities may decide they don't need people on earth. Autonomous weapons can make misjudgments."

Llewellyn Kriel, CEO of TopEditor International, said, "Digital life is a reality and will increase throughout all facets of human life and across the world. Human beings need time to 'evolve' into 'digital beings' at ease with 'digitality,' able to interact with it as well integrate it into their lives. These processes will take time. Some groups, especially younger generations will find this easier, but will also need guidance when they feel uncommon sense of alienation, disjointedness and emptiness. It will take at least two decades for 'digiality' to become part of human existence – just as it has taken two decades for humanity to become comfortable with cellphones. The ever-present danger of course is the constant growth of the digital divide – primarily between rural and urban dwellers (and not rich and poor as commonly thought of)."

Mamie Anthoine Ney, an information science professional and director, wrote, "We are still in an era of significant technological change that is so rapid that people are just not able to keep up with the pace of change or know how to fully adapt to change. It is just a part of our human nature. I do not think that another decade will allow us to solve the issues of civility, proper use of time and understanding the content of all that technology brings us. We are in a time of political discomfort that is drawing attention to much of what is bad about technology, rather than the good that it can do for us. Just think about how much we currently hear about uncivil tweeting, sexting, scamming and more compared with how technology can alleviate medical problems (3D printing of prostheses), connect rural areas to the rest of the world (cell service drones over Africa), and bring friends and families closer. If we were better able to concentrate on the good, rather than the 'evil,' the current state of upheaval could be conquered in less than the next 10 or so years."

A **technology developer/administrator** based in North America said, "I don't think we realize the impact of the increased amount of media we consume on a daily basis. Plus, all of our interactions online are being harvested for corporations to know more about our habits and patterns. While being online can help us solve some issues and maybe save time, we don't fully understand the impact of that big data."

Andie Diemer, journalist and activist user, wrote, "It's difficult to point out the negative aspects of digital in such congruent and specific terms as the positives. We know some things – like looking at blue light before going to bed is unhealthy – but we don't exactly know how the wavelengths of a cell phone affect our mental or physical state. It will take decades and dozens of studies to confirm specific impacts before we can even determine a solution. The persistent use of technology in our lives has not yet been studied over the full duration of an average human lifespan. We don't have the data to help us understand how to make the healthiest decisions for us, as individuals and as populations. As a society, it is best to be aware that there are drawbacks that can't be physically seen or touched, and our judgments with tech need to be constantly evolving. It seems as though self-driving cars will be here shortly, saving time and traffic and lives, but also allowing the government or another entity to track your every movement, and creating the potential for hacking and mass devastation that plugging into a grid system could provide. And we have only started to scratch the surface with AI, which is a prime example of something that could have an immediate positive payoff (increased automation/production/profits) *and* long-term devastating consequences (does a society where robots outperform humans makes humans almost obsolete?) It is crucially important for our families, communities and governing bodies to come together to set perimeters before we evolve to a point where we won't be able to return. It just takes one company, one person, to unleash something that can never be stuffed back into the box that will alter the lives of most people on the planet. If we aren't able to physically see how dangerous technology could quickly unfold, it could be almost impossible to get any large groups of the population to act beforehand to install regulation."

A **professor** based in North America wrote, "Technological advances will challenge well-being over the next decade because our governance mechanisms will not be effective for the digital age and public accountability will suffer."

Eric Allman, research engineer at the University of California-Berkeley, commented, "In the early days of the internet we imagined a world where people would be able to communicate more easily and hence deepen their understanding of others. Unfortunately that's not how it worked: it allowed extreme views to find havens that were essentially echo chambers, making interpersonal understandings go down, not up. In the next decade I believe progress will be made, but not before it gets even worse than it already is. Similarly, the rise of AI is going to put a lot more people out of jobs, including many people who think they are immune right now. At least in the U.S., I don't believe the social safety net will be able to cope with the rising demands. Also, the rise of the 'surveillance state' is going to seriously challenge our freedoms… I believe that if we try hard enough we can fix or ameliorate part of the problem and gain the benefits. But I'm not sure that we have the will to do so, since it will require some of the rich people to get less rich."

Su Sonia Herring, an editor and project coordinator based in Europe wrote, "The thing we need to worry about may not be so much digitization but the data gathered for commercial or political interests. The way billions of people's data is mined, packaged and sold, whether with or without consent, will shape the future. Algorithms that directly or indirectly influence our lives and make crucial decisions shaping it are mostly protected as 'trade secrets,' while the endless volumes of data we create as we are living our digital lives is monetized. Surveillance capitalism is growing in undiscovered territories, and we as digital individuals and societies need to be informed and vigilant about how we (via our data) are being traded as products while we have minimal say about the terms and conditions. People will adapt well to digital life but I am not so sure what will come of surveillance capitalism."

David E. Drew, Platt Chair in management of technology, Claremont Graduate University, wrote, "I am in the middle of writing a book about this subject. Computing technology is both an aid to us and a growing threat. In the next decade, the balance will shift so that the damage that is done by computing outweighs the benefits. The threats include the damage to human verbal and emotional interactions, especially among the young."

An **anonymous research scientist** based in North America commented, "If I had to guess, I would expect that new technologies would further contribute to 'hyperconnectedness' and make it even more difficult for people to disengage from technology during leisure/relaxation time and also detract from productivity at work because of so many distractions/competing demands on attention from technology. In addition, new smart technologies and the 'internet of things' introduce privacy concerns that have not been adequately addressed. It seems like these technologies emerge and develop at a faster pace than the government/regulatory agencies are able to keep up with, and if companies prioritize innovation and profits over consumer protections it seems likely that consumers will be harmed, likely through lack of privacy protections. Finally, a related concern has to do with cybersecurity and ensuring that new technologies do not make individuals and nations more vulnerable to cyberattack."

A **technology consultant and expert on attention and workflow** wrote, "Technology is moving faster than wisdom. Computer science is being studied to the exclusion of social science, ethics and philosophy. The current U.S. administration is compromising universities' basic research funding. Moneyed interests are 'trumping' and compromising civil society. There are bright spots – the work of Saul Perlmutter, danah Boyd, Joi Ito, Reid Hoffman and others – but it'll take a lot to turn this 'ship.'"

Martin Shelton, a user research scientist for a top global technology company, commented, "In the Western world, we're more productive than ever before. Our lives are longer than ever before.

But so are our working years. This is kind of a unique place in history. By taking advantage of these newly discovered years, we have the capability radically improve our lives by pursuing more fulfilling work and interests. But mostly, we work until we can't any longer, often on problems of questionable value. If you want an example of a place where we're not best applying our collective resources, look no further than the technology industry. Our most brilliant technologists are being put to work on encouraging you to click advertisements."

A **North American businessman** wrote, "In the short term, the current designs of the internet attempt to put people in boxes convenient for advertisers, marketers and influencers such as politicians to target demographics and micro-target personalities. As Jaron Lanier has written, this trend, in combination with the transient anonymity provided by platforms like Twitter, seriously dehumanizes users, leading to the prominence of troll activity and the dominance of extremist ideologies such as Nazism online. These trends in internet design are, and will continue to be, detrimental to human interaction. That said, should we survive this current phase and return to a more human- and individual-centric internet design, the overall democratization and dissemination of information will ultimately prove beneficial to people. The availability of information provides the raw material for innovation to more and more people. The propagation of diverse perspectives expands the worldviews of those without the means to change their physical environments. Overall, the closing of information gaps and asymmetries will, I still believe, prove beneficial for people in the long term, providing we return to a more human- and individual-centric design focus on the Web."

More expert views on potential interventions to overcome challenges to individuals' well-being

Most among the respondents who said digital life will stay the same noted that every technology has always had its positive and negative effects and that, on balance, things will probably stay about the same. A representative comment came from **William J. Ward**, president of DR4WARD, who said, "Overall there will be no change. Many people will become more immersed in their digital lives and suffer the negative health and psychological consequences of a sedentary life disconnected from a physical reality. At the same time, an equal number of people will wake up and recognize they have been wasting too much of their time on an imagined digital life. They will reinvest their time and efforts into positive physical activities and face-to-face human relationships and interactions, finding a balance or equilibrium where digital use declines to a more healthy and helpful level."

Every respondent noted that digital life has its downsides. Respondents were asked to share their thoughts regarding ways in which digital life could be improved. **Peter and Trudy Johnson-Lenz**, principals of Pathfinding Smarter Futures, wrote a comprehensive response: "Humankind has organized to create civilization to exploit self-preservation instincts that shut down our thinking in favor of quick, automatic fight/flight/freeze reactions. Those reactions come from the deeper, older parts of our brains that kept our ancestors from death and destruction so they could survive. Now, increasing hyperconnectivity and constantly accelerating change are confronting us with threats that trigger fear and anxiety all the time. Our civilization is not smart enough to survive the mess we've created because it's making us stupid with uncertainty, fear and helplessness. To foster personal and societal well-being, we need to learn and practice how to be present to what is, with each other, without fear. It's a tall order, but what else is there to do? This will take patience, love and practice, practice practice! There are three classes of actions that can be taken to mitigate potential harms of digital life: **1)** Highlight the positive potentials and negative and sometimes unintended consequences of digital technologies as they evolve in order to provide and foster society conversations about how to orient their development… toward personal and social well-being rather than being shaped by market forces and profit… **2)** Develop new apps and digital technologies for the express purpose of enhancing… career, social, financial, physical and community well-being… **3)** Encourage and support education, training and practices of critical-thinking, respectful engagement, mutual trust, collaboration, conflict resolution and transformation and the like. Digital life is increasingly fragmented and polarized, further eroding trust, cheapening relationships and shattering community. At the same time, there are more programs, courses, examples and practices that point the way to a better future. Learning to skillfully manage our scarce attention and our thinking for our own well-being and that of our circles of influence is key."

Rich Salz, principal engineer at Akamai Technologies, said, 'Intervention requires rigorous filtering of 'facts' and taking time away to make human connections. It is difficult."

Reimagine systems: **Societies can revise both tech arrangements and the structure of human institutions – including their composition, design, goals and processes**

Many respondents to this canvassing pointed out a need to remake institutions or legacy systems. They also said technology design processes should be reconsidered and improved and that the composition of the technology teams in charge of creating and enhancing products and platforms should be more diverse and reflective of all members of society in order to better address the well-being of all.

An **anonymous respondent** wrote, "Technology is being allowed to develop and advance without adequate regard for its impacts on people, society, the culture of work, interpersonal communication, family relationships, child development and so on. Much as we have medical ethicists in our society, I believe we should have technology ethicists so that financial gain is not the sole determinant of the trajectory of technological development."

Gus Hosein, executive director of Privacy International, a London-based nonprofit, wrote, "We can't continue down this path because we can't continue to be this stupid. I'm mostly speaking at a security and privacy level but I also hope it applies at a competition level too. We are building a very unresilient socio-technical infrastructure that we are coming to rely upon ever more. This is insanity by definition as we've seen all these problems before and somehow we still invest with the thought that what happened before won't happen again: breaches due to inattention and lack of care of systems, domination by few companies who have vast access to insights into our lives and markets, governments intervening only to advance their own interests to gather intelligence."

A **CPA based in the U.S.** predicted, "As the technology gets better and better... will content providers build in automatic shutoffs? Will an underground market develop for content that won't shut off? In the next decade, there will be unexpected actions that will reduce certain risky aspects of digital life and there will also be unexpected actions that will be extremely harmful and society won't be prepared. Virtual reality immediately comes to mind."

A **director of a technology graduate program** commented, "Technological change cannot be disembodied from the values of the people who design and use technologies. Technological change will be a force for social good if values that foster positive social change are embedded in the technologies."

Sasha Costanza-Chock, associate professor of civic media at MIT, said, "We absolutely need to take actions to mitigate digital harms. Actions are possible at every level, from the personal (adopting better digital security practices), to the interpersonal, to organizational shifts, as well as for entire communities, municipalities, governments and so on. Harm mitigation can be accomplished through shifts in practice, regulation, policy, litigation, code and design and norms. For example, there is the growth of the #designjustice approach: Design justice explores how the design of technological objects and systems influences the distribution of risks, harms, and benefits among various groups of people, or in other words how design both reproduces and is reproduced by the matrix of domination (white supremacy, heteropatriarchy, capitalism and settler colonialism). Design justice is also a growing social movement that focuses on the fair distribution of design's benefits and burdens; fair and meaningful participation in design decisions; and recognition of community based design traditions, knowledge and practices."

James Galvin, a director of strategic relationships and technical standards, said, "I worry that as technology 'replaces' people, it will in fact 'replace' people. Technology is a tool and should be used as such. In all places where it is deployed it should be the case that life is improved for people. It should never be the case that people are displaced. Business in particular needs to embrace the use of technology, but they need to continue to support their employees in the process. This is not an easy problem. It's not as simple as retraining employees for another job, nor is it as simply forcing employees to find another employer. It is a society problem, not just the problem of any individual business that wants to improve its efficiency. Every business has a role but so does every person in the development of a long-term, mutually satisfying solution."

A **deputy director at a nonprofit** based in the United States wrote, "To date, 'digital life' has literally been built by human activity, across academic, government and commercial entities. That human agency means we can choose to make different apps, services, devices and approaches to applying technology in different sectors of society. None of this is foreordained or fate. The technology giants of today and tomorrow can and should recalibrate to encourage conscious consumption and intentional use that leads to meaningful, positive experiences and offline connections instead of incentivizing passive consumption of the curated feeds of others and demanding attention. Employers, schools and families will need to develop and encourage healthier social norms that integrate the use of phones and wearable computers into modern life in ways that bring people in from the cold."

Beth Kanter, author and speaker based in North America, wrote, "We can't just put this on the backs of individuals. The tech companies have to take responsibility, too – they are the tobacco industry of today. Tristan Harris has been a leading voice on the ways that technologies are being

designed to create behavior addiction, and the motive is so they can sell our attention to the advertising buyer."

If companies develop technologies that are certain to be used to upend society shouldn't there be industry and public processes to assess them during design and prior to launch? **Andie Diemer**, journalist and activist user, wrote, "There are small but realistic steps we can take as a society to mitigate potential harms of digital life. There is research available to form an outline and guidelines for technology consumption by age. We can teach children healthy boundaries with devices. We can recommend tactics to change behavior and specific accessories to preserve our physical senses. However, as a society we are also at the whim of private businesses that can deliver various forms of technology without studying how it impacts consumers." **Vincent Alcazar**, director at Vincent Alcazar LLC, wrote, "We must absolutely remain vigilant for the unintended consequences wrought by technology. An example is Adobe's VoCo technology, which if commercially developed – as it most assuredly will be – will fully, perhaps violently, upend all that this society and civilization holds as truthful with regard to human voice and motion veracity."

A **blog editor based in North America** wrote, "A lot of things need to happen at the level of business model, regulation, corporate company organizational design and operation, prioritization. One of the most important things we can do in the near term is come up with good ways of talking about the nature of the problem, because it's harder to advocate for change without the right language. Sometimes it's talked about in terms of distraction or attention, but we tend to associate that with more immediate types of attention, not longer-term life effects. I don't think it will happen overnight, because a lot of it involves changing the way we talk about human nature and interaction. So much of the way we talk about it, especially in the U.S., is rooted in discussions of freedom of choice. My intuition, and this is just intuition, is the more we can get away from talking about it in terms of choice and start talking about it in terms of chance – which outcome was preferable and which actually happened – the better. Choice is such a messy thing to dive deep into, because then you realize that nobody knows what it means to choose. In terms of individuals working at these companies, I'm still heartened and optimistic, because everybody who's a designer or engineer is also a user at the end of the day. Nobody goes into design because they want to make life worse. The challenges, generally, are structural, whether it's about the existing business models of companies or the way in which certain forms of corporate legal structures don't give people the space to balance some of these more petty, immediate goals with more noble kinds of things. It's hard to say, in terms of the longer-term of tech evolution, whether we can be optimistic or not. I'm hoping that there will be a point where, if we don't restrain things or turn the battleship around, we realize the unsustainability of it, from a business point of view but also in our own lives."

A **research scientist and internet pioneer** commented, "There are many things that could be done, the question is whether they can be achieved… More attention to reducing complexity and other barriers to use should be a high priority, but I don't see the private-sector creators of the internet experience motivated make this a priority; the addition of new features (which adds complexity) seems more important to them than ease of use. Disciplining online misbehavior will call for thoughtful reconsideration of how applications modulate the internet experience – a careful balance of accountability and freedom of action is required. Again, I do not yet see a motivation for the private sector to give this priority, although this may change. Overall, I do not see the private-sector battle for market share aligned with the steps that might address some of the negative impacts on well-being."

David S. H. Rosenthal, retired chief scientist of the LOCKSS Program at Stanford University, said, "The only possibly effective intervention would be the aggressive use of anti-trust action to break up the oligopolies that dominate internet service and the applications that run on it. But, given the power of increasing returns to scale and network effects, even if undertaken it would likely have only temporary success (see AT&T). Given the lobbying power of the incumbents it is extremely unlikely to be undertaken."

Mike Caprio, innovation consultant for Brainewave Consulting, said, "Internet access is a human right and steps must be taken to give every person everywhere unfettered access to networks. Democracy and social mobility will increase everywhere that digital life is allowed to flourish away from the negative influences of vast commercial monopolies and overreaching governments corrupted by corporations. Public funding must be applied to create infrastructure that is not owned and manipulated by corporations, and net neutrality must be the principle applied to all networks. Publicly funded alternatives to walled-garden digital services must also be implemented, with data freedom and portability for all users – people must control their own data at all times."

Fay Niker, postdoctoral fellow at Stanford's Center for Ethics in Society, wrote, "As a political theorist, I think that there are grounds for the public regulation of our digital environments, based on the harm principle and/or on asserting and defending a freedom of attention. Governmental regulation is required, because we cannot trust the self-regulating efforts of the firms themselves and we should not be responsibilizing individuals when it comes to dealing with the harmful effects on their lives and society of systemic issues. That's not to say that individuals have no role and responsibility in the management of their digital lives, but that the main burden should not be held by individuals within the current system."

Marcus Foth, professor of urban informatics at Queensland University of Technology, wrote, "Whether the design of blockchain and distributed-ledger technology – and robotics, and AI and

other digital technologies – advances us toward dystopian or utopian futures will have a tremendous impact on people's well-being. Continuing to work just in our little square and not seeing the bigger picture, can do harm. The bigger-picture disciplines such as humanities and especially axiology are called on to guide the way. I believe actions can be taken to mitigate potential harms of digital life. However, this depends on a number of factors, including political and ethical direction and framework. 'Ethics can't be a side hustle' – https://deardesignstudent.com/ethics-cant-be-a-side-hustle-b9e78c090aee. Take blockchain and distributed-ledger technology as an example: There are many downsides and challenges that if they are not overcome can be detrimental to people's well-being. The exponential energy use can accelerate fossil fuel use, depletion of rare earth metals, e-waste production, etc. The technology can produce dystopian futures (see 'Black Mirror'). Money could become programmable, so the issuer of your salary or welfare cheque could determine how you can and cannot spend your income. On the other hand, the technology has the potential to do good, kill off the neoliberal nastiness of our current capitalist system through disintermediation, and bring about radical changes to society – universal basic income, direct/representationless governance and democracy, e.g., http://www.mivote.org.au)."

Devin Fidler, a futurist and consultant based in the U.S. commented, "Network technologies are destabilizing forces, no question, and they are not impacting everyone in the same way. At a fundamental level there must be more cultural, entrepreneurial and policy focus on actively 'humanizing' these new tools. Beyond this, while it is fashionable (and often even useful) to point out all the ways that technology is negatively impacting people, it is worth remembering that at this very moment many, many, more people around the world are being given new opportunities in the wake of internet growth than are having them taken away. Expect continued ambivalence from the global 'winners' of the original Industrial Revolution, just like the ambivalence of the noble gentry 'winners' of feudalism before them. They will continue to see their traditions broken and their status challenged."

A **post-doctoral fellow** based in North America wrote, "Actions that can be taken to minimize harms start with those in charge of distributing the technology. For example, Facebook has supposedly good intentions by wanting to connect the world to each other, but they are taking advantage of basic human psychology and using attention metrics to determine how successful they are as a company. In the future we'll need to ensure that companies are not capitalizing on the flaws of the human mind to get people engaged and instead have those in charge focus on improving humankind. If all of those seeking to change digital life started with a positive, humanitarian goal (rather than a capitalistic one), there could be widespread benefits. Educating the public and ensuring that the drivers of digital life are abiding by code of ethics that the

majority of users can agree upon, we could definitely minimize the harms associated with digital life."

Richard DeVries, a respondent who shared no additional identifying background, said, "New ethical dilemmas may result regarding the definition of quality of life and well-being issues, however clear thinking and consensus beyond academic and strictly profit-motivated voices need to be taken into account to resolve such disagreements. If this is the approach taken, technological advances will find a balance between the various constituencies providing market-driven incentives for innovation and agreed-upon ethical standards by which new technologies may be broadly implemented for the greater good."

Philip Gillingham, Australian Research Council Future Fellow, said, "Human need needs to take the lead in technology development. We need to think through what the unintended consequences of particular technologies might be."

Adrian Schofield, program consultant at the Institute of Information Technology Professionals-South Africa, said, "Vulnerable people of all ages should be protected from harm perpetrated through digital systems. All people should be educated about how to protect themselves from such harm. Policing the digital world should be the same as policing the physical world – protecting the innocent, catching and punishing the criminals. The key is ethical and professional practice in the creation, construction and application of digital systems."

Tiziana Dearing, a professor at the Boston College School of Social Work, said, "Interventions might include increasing our understanding of social empathy and including it in design. Working extremely hard to mitigate inherent bias in design. Setting out to develop our norms as carefully, thoroughly and rapidly as we develop the digital technologies that change them."

Jan Schaffer, executive director at J-Lab, wrote, "I've judged enough SXSW Accelerator competitions to believe that engineers live to solve problems, especially is there is a financial reward at the end of the rainbow. It would be my hope that the tech giants will be moved to embrace problems that preserve civil society and democratic values."

Laurie Orlov, principal analyst at Aging in Place Technology Watch, said, "Boost investment by tech firms in protecting identity more effectively. Begin charging for access to technologies that are useful – and reduce dependency on advertising."

Diana L. Ascher, co-founder of the Information Ethics & Equity Institute, wrote, "Actions certainly can be taken to mitigate the potential harms of digital life, but to do so will require

moving beyond partisanship and (re)defining the values by which we wish to live. Legislative moves that make it possible for powerful entities to limit the capabilities and opportunities of the powerless, such as repealing the common-carrier classification of internet service providers, have disproportionately negative effects on under-represented populations."

Ross Rader, vice president for customer experience, Tucows Inc, said, "We will see more and more social pressure employed on companies as to the secondary costs of their innovation, and companies – the good ones – will embrace this as a social responsibility and work to absorb those costs to the extent feasible. We – society on Earth – are developing an awareness of what secondary costs look like, why they can be negative and why they can't be left untended. As we are learning how to mitigate these costs in legacy markets like agriculture, energy and finance, I believe that we will apply those lessons in other sectors and avoid the huge sunk-costs problem that we've let develop over the last few hundred years as our population has ballooned."

Darlene Erhardt, senior information analyst at the University of Rochester, commented, "As with anything, if the driving force behind the latest/greatest developments in technology is based on creating things for the betterment of society, taking time to consider the implications, establishing/refining 'Good Practices' to go with them, than I think the outcomes may be more positive."

Theodora Sutton, a Ph.D. candidate at the Oxford Internet Institute, wrote, "We do need guidelines for technology design to prevent companies from exploiting users in the realm of personal information and the attention economy. Implementation of guidelines like this is possible and likely to happen."

John Skrentny, a professor of sociology at University of California, San Diego, wrote, "There are two key problems with digital life today. 1) Digital media. 2) Digital platforms for services. First, social media and search engines harvest data about users and monetize that data for advertising, insidiously destroying privacy. Even if we are aware of this, we forget about it in our daily lives. Social media and search engines (Facebook and Google) should have paid models where, for a subscription, users can have access to these sites but *not* have their data collected and monetized. I know many who would pay to use these services and protect their privacy. Second, platforms like Uber, Lyft and Taskrabbit should be public utilities that extract the minimum amount necessary to maintain themselves. These companies are exploiting people and I believe it is beneficial for all to make these public and non-profit. Bonus suggestion: Net neutrality is a non-negotiable. It is appalling that we have lost this. Second bonus: Internet access should be a public good, like water, and we should not be at the mercy of monopolies to provide the internet."

Jennifer deWinter, associate professor of rhetoric and director of interactive media and game development at Worcester Polytechnic Institute, said, "This is one massive open box. Companies can create reasonable technology policies about communication technologies. Germany has just passed a law that requires platforms to remove hate speech from their sites. This is good. We need to seriously interrogate what we mean by digital democracy and create policies that support and nourish online democratic engagement – one that cannot be policed if that is what we think is valuable. We need to think through policies of hate and online harassment. These things have real health effects on people, yet our justice system doesn't really have a way to intervene, research and prosecute others for offenses. We need to think through privacy and data and be explicit when talking with people and educating them about what their rights are. They should have rights. We need to think through geographical power and access to these technologies so that power is not concentrated in certain areas but is dispersed. We need to give people input and control over the algorithms that overdetermine content. [We need to address] the issue of Net neutrality."

Some people don't expect technology companies to focus the public good. **Ebenezer Baldwin Bowles**, author, editor and journalist, said, "A citizenry already trained to accept limits on freedom in the name of safety and security will eventually enter motor vehicles designed to block microwave signals and shut down their personal digital assistants. We are moving inexorably toward absolute control of digital life by global corporate entities, abetted by bought-and-paid-for public servants and government leaders co-opted by business. These controllers will define by decree the harms of digital life and then mitigate these harms through the extreme threat of blocking access to data-delivery systems."

Laurie L. Putnam, an educator, librarian, and communications consultant, wrote, "Tech companies, universities, governments and other influencers can broaden the scope of their thinking when it comes to digital technologies. Tech companies – the digital creators – need to think more broadly about the use and impact of their products. For the next phase of digital development, we need to understand not just the user, but the user in context. Digital tools don't exist in isolation, especially if we're talking about social media or the internet of things, and the impact of these tools can go far beyond individual users and user communities to permeate the very fabric of our society. We can't fully understand the effects of our digital tools and toys just by looking at the technology. We need to think outside the technology. While companies like Facebook and Twitter and Google can pack a meeting room with high-powered engineering talent, they need to balance the table with social scientists and anthropologists and futurists who can look around and behind and beyond the technology. There will always be unintended consequences, and we need more people watching for them. Digital creators need to pay more attention to the broader circles of impact their products have on society and the information ecosystem. Where hardware is involved, especially as the internet of things is embedded in our infrastructures,

manufacturers need to think more about product lifecycles, including reliability, serviceability, and recyclability – all of which, ultimately, affect our daily life and well-being. At the same time, universities need to incorporate information issues more deeply into technology and business programs so that future creators will have more nuanced perspectives on the purpose and impact of their work. Policymakers, too, need to make space at the table for futurists and others who see the world from different angles. An effective democracy needs people who can think broadly, study potential scenarios, and inform policymakers before the big decisions are made – especially big decisions about technology, which is probably not their area of expertise."

An **anonymous respondent** said, "Many of the harms are a subset of wider economic harms… Stupidity as a distracting entertainment is masking serious issues the United Kingdom, U.S., Australia and probably elsewhere. We need a different economics. If we can use the internet to generate an inclusive ecologically-grounded and humane economics, it would underpin a shift in the mentality of the internet and the wider media as an information space… There are challenges around identity, people pretending to be other real people in order to use a spoof account to defraud or otherwise con people… Tensions between freedom of speech and hate, racism, bullying and false information are hard to curate effectively and fairly. This is a mirror of wider issues in society. **1)** Youth – the freedom to express themselves and also be safe with each other as well as with the wider community. **2)** Gender – the freedom to express themselves and also be safe with each other as well as the wider community. **3)** Faith communities – the balance between rights to believe and tolerance of others… Governments have been defunding objective expert scientific opinion because the opinions they are responding to are donors, sponsors, multinational money and not in the public interest or ecological interest. Funding becomes more directly commercial for science, which causes tensions for objective science… Negotiating a shift from capitalism into something with a real planetary equilibrium is the task for our generation. Perhaps the internet can help with that. Some governments have been co-opted and cannot deliver. It is probable that the internet as a tool for change is the reason why they are blocking Net neutrality despite the fact that this would be bad for business."

Stephen Abram, CEO of the Federation of Ontario Public Libraries, wrote, "The digital industry needs to invest in:

- Tools to label potential propaganda, fake news.
- Tools to address hate speech/distribution against any group.
- Tools to address 'fake' actors and accounts on social media.
- Better tools for addressing hacking, attacks, viruses, ad purchases (such as by the Kremlin, etc.) that disrupt life the real world.

"All of this needs to be done in a way that allows the content to exist and remain findable and addressable. However this content should not be search-engine-optimized to the top page or pushed, boosted or promoted over higher-quality information. Governments (in concert internationally through the UN or WIPO etc.) need to invest in:

▪ A statement of principles and policies that are agreed to internationally with consequences – for example, words should not be banned to disrupt search. Content should not be locked down – especially content that doesn't align with the governments' in power political views (e.g., climate change, abortion, civil rights, etc.)
▪ Laws and treaties in all countries protecting the right of access as a human right."

Dana Klisanin, futurist and psychologist at Evolutionary Guidance Media R&D, wrote, "The science of the impact of digital life on our physical, emotional, mental, spiritual and communal lives is in its infancy. This is an area requiring interdisciplinary and transdisciplinary scholarship, and we need more of it. We will use what we learn to mitigate the harm and enhance the benefits."

Reinvent tech: Things can change by reconfiguring hardware and software to improve their human-centered performance and by exploiting tools like artificial intelligence (AI), virtual reality (VR), augmented reality (AR) and mixed reality (MR)

Many respondents to the canvassing expressed the hope that technologies can be implemented to solve current and future issues tied to concerns over digital life and individuals' well-being.

Daniel Schultz, senior creative technologist at the Internet Archive, commented, "Technology is built by humans, and in the best cases it is designed for humans. There are some areas where unintended consequences of certain design decisions have become so dramatic that the fabric of our society feels like it might unravel (e.g., social media/Twitter/bots and vitriolic interactions/etc.) but I feel confident that it is possible to correct these problems through changes to the technologies themselves to account for newly discovered needs as well as a newly recognized need for a more informed/trained user base. I imagine that people weren't driving 70 miles per hour when the Model T came out; society had time to adapt and evolve. We haven't had this luxury with the internet, but that doesn't mean it's too late for us to catch up with the pace of innovation."

Ellen Detlefsen, associate professor emerita at the University of Pittsburgh School of Information Sciences, commented, "I look forward to the use of machine learning and artificial intelligence tools that have the potential to screen and remove destructive or harmful Internet activities."

An **executive director of a tech innovation firm** said, "There could be more awareness and removal of the filter bubble, even proactive connections to alternate viewpoints. There could be rigorous prosecution of information warfare and more transparency."

James Scofield O'Rourke IV, professor of management at the University of Notre Dame, said, "If technology has placed us in danger it can remediate, obviate or eliminate that danger. I have great faith in technology, but somewhat less faith in the nature of the humans who employ it. I remain ever hopeful, though, that we can invent our way out of the dangers we have created."

Katharina Zweig, professor of computer science at TU Kaiserslautern, said, "We need to develop devices that learn from local information in a truly anonymized way. We also need regulation on how insurers can and cannot incentivize the use of health sensors. Of course, this is only one tiny aspect of the wide field of digital life and health. Other aspects will have to be analyzed in detail as well, e.g., benefits and potential risks of VR [virtual reality] and other topics will be of great interest in the future. In general, I am a strong believer in the scientific method to firstly identify chances and risks and to secondly find meaningful ways to steer towards the chances and away from the risks. For me, this is the most promising approach to mitigate the potential harms of any kind of technology."

Dewayne Hendricks, CEO of Tetherless Access, said, "Most folks forget that the Internet is a 'network of networks.' Autonomous networks choose to peer with other such networks. I believe that it's time to do a reset on the global internet and move to a model where trust between peers can be achieved. That is NOT the case now. I personally am spending more time in much smaller peering networks, where you can choose to peer only with those whom you trust. The TCP/IP protocol suite makes it possible to create a multiverse of internets. There need be only one. Time to explore just what a trust-based internet would look like. I don't believe that the current global Internet is sustainable."

Internet Hall of Famer **Bob Metcalfe**, a professor of innovation at the University of Texas-Austin, wrote, "'Interventions' are not what's needed, but a competitive evolution of the tools, now ongoing, with Facebook and Twitter [for instance] defending their flaws."

Mario Morino, chairman at Morino Ventures, LLC, wrote, "There is promise in developing algorithmic and human-based countermeasures to detect, escalate awareness and even blunt or directly attack data pollution/polluters."

Gary L. Kreps, distinguished professor and director of the Center for Health and Risk Communication at George Mason University, wrote, "Efforts are underway to improve digital

health information tools to make them easier to use and more informative, adaptive, interactive, personalized, relationally sensitive, interesting, private and mobile. New digital health information systems are being built into societal infrastructure to provide automatic access to needed information and support in homes, cars, schools, stores, businesses, clinics, public transportation, clothing, roads, the human body and other parts of everyday life to provide easy access, automated delivery of information/support and specialized functions."

Doug Breitbart, co-founder and co-director of The Values Foundation, said, "Technology developed in service to human beings' experiential generativity and collaboration holds the potential to materially enhance the quality and depth of human connection and mitigate the current isolation and antisocial behavioral imprinting currently reflected in our culture by its use today."

Marc Brenman, managing partner at IDARE LLC, wrote, "Ethical constructs can be introduced into artificial intelligence devices. But this is not likely to work well, since there is no unanimity on what 'ethical constructs' are. A 'veracity application' could be used as a filter to judge the truth of an internet posting. Prosecutors could charge those who threaten on the internet. Internet service providers and others could be required to provide much better service. The U.S. could introduce a 'right to be forgotten,' as Europe has. Net neutrality could be required."

Lisa Padilla, CEO, NewPath VR, wrote, "Technological advances with help wellness by far outweighing the negative effects. Although, for example, there will be cases of video game addiction, there will be exponentially more people helped by way of wellness applications being created today by developers who will create games that decrease anxiety, remap understandings, resolve relationships, condition for pro-social behavior and empower users with self-compassion, to name just a few."

Ethan Zuckerman, director of the Center for Civic Media at MIT, wrote, "The platforms we use are often actively hostile towards attempts to make them kinder and less harmful for users. A new category of innovators is starting to build complementary systems that allow users of these systems to improve how they use them. I see great promise in users taking responsibility for their health within the systems we use."

A **doctoral researcher in communication** based in North America commented, "There is no such thing as technological determinism. If we can get designers, entrepreneurs, ethicists and humanists to work together, we might be able to produce technological advancements that avoid the worst harms and provide the most benefits. But it will take critical thought before, during and after the design and launch of new products and systems, as well as critical analysis of the

infrastructures, regulatory regimes and educational contexts within which they are developed and implemented."

A **professor** from North America said, "At the moment messages come into my (mobile/cell/handy) phone unmoderated and this can be stressful. In the future, messages will be moderated by a system. The system will use environmental factors such as am I driving or being driven, what is my mood like, how fast I've been handling previous messages and the content and metadata of the message stream to determine when a message should be delivered. The content will be analysed using Reputation, Attention and Trust (RAT). What is the reputation of the sender in my circle of colleagues or industry or society? If Elon Musk sends me a personal message I'll want to see it straight away. My attention is valuable. Will the delivery of this message serve my current goals? Trust analysis is applied to the message and the sender. Sometimes my close friends play pranks."

John Sniadowski, CEO of Riverside Internet, Wales, commented, "It should be possible using machine learning neural networks to provide personal digital assistants (PDA) to individuals to help them cope with online interactions. Machine learning can help prevent the distribution of fake news and warn people of poor content. However, personal digital assistants themselves will need a large number of built in safeguards to prevent personal information being disclosed to unauthorised third parties. How PDA's can be implemented is something of a challenge. They should probably be provided by not-for-profit companies that are either paid for by the individual or subsidised by ISPs or government support. There should be a global registry of companies providing such services and they must under no circumstances provide free services based on the individual concerned giving up any control of their personal information."

Jordan LaBouff, associate professor of psychology at the University of Maine, commented, "In short, the idea that we can't shape our behavior to be more helpful and less harmful is just wrong. We can always investigate a situation, recognize harms and work to reduce those – and we should."

Kevin J. Payne, founder of Chronic Cow LLC, said, "One of the surest ways to influence behavior is simply to alter the environment to one that rewards 'positive' behaviors and punishes 'negative' behaviors (although, of course, there's an endless debate surrounding which behaviors to label as positive or negative). There's also quite a bit of research yet to do to understand which factors we can manipulate and how in order to optimize success. Not to mention the ethical dilemmas that arise. However, with big data and intelligent, adaptive, prescriptive algorithms, we should technically be able to achieve the required, targeted nuance. The question remains as to whether we should. And, if so, how far we should go and who would oversee."

Eelco Herder, an assistant professor of computer science whose focus is on personalization and privacy, Radboud Universiteit Nijmegen, the Netherlands, wrote, "The main intervention needed to be taken to mitigate potential harms of digital life is to prevent or limit current interventions that partially lock us in a filter bubble… I believe that users need to be more in control regarding content that is currently largely automatically selected from them. We do need information filtering, but each user needs to be able to influence how this is done."

Jenny L. Davis, a lecturer at the Australian National University's School of Sociology, said, "Critical attention to design and evidence-based assessments of how technical design decisions affect diverse populations will be key to generating socially responsible technologies that attend to the potential benefits and harms of digitality."

Rich Ling, professor of media technology at Nanyang Technological University, said, "It is my hope that tools like AI will be able to address some of the abuses that we have seen in, for example, the Russian involvement in the U.S. elections."

Michael Roberts, an internet pioneer and Internet Hall of Fame member, commented "Politics is a lagging indicator, and politicians are just beginning to grapple with the threats posed to democracy and quality of life by the misuse of powerful digital technology and globe-spanning networks. Most politicians are not well-equipped to deal with the task of translating rules and laws developed for an analog world to the emerging digital reality. Many jurisdictions are already well launched into defining behavioral norms for cyberspace and considering appropriate penalties for criminal acts. The social media giants have discovered their original 'hands off' approach doesn't fly when individual users have no ability to deal with the bad guys on their own. Bottom line – steps are already being taken."

Avery Holton, an associate professor of communication at the University of Utah, commented, "We're already seeing a push toward regulating and vanquishing mis- and disinformation and those who spread such discourse. That can greatly decrease levels of stress, confusion and anger that build around such information. We're also seeing a sort of overlap in available app technology, meaning that we'll likely be faced with fewer, not more, apps in the coming years. As Facebook and Instagram adopt the technology of Snapchat, and in some cases of themselves, there are less apps competing for our attention. They are also searching for new ways to enhance individual and collective engagement, moving ahead of the experimental curve we've all had to deal with. Sure, this might create a sort of monopolistic view of apps, but it also helps to streamline user experiences."

Garland McCoy, president of the Technology Education Institute, said, "New private-sector tools continue to enter the market that help people manage their online experience and their interactions with smart devices to provide a better/safer 'digital' environment. I don't think government intervention will help. Additionally, with government interaction there is always the risk of unexpected collateral damage and the inevitable regulatory creep."

Regulate: Governments and/or industries should create reforms through agreement on standards, guidelines, codes of conduct, and passage of laws and rules

Charlie Firestone, executive director of the Aspen Institute Communications and Society Program, said, "As tech companies get bigger and bigger it is really only government that can form an effective counterforce. At every level, government programs, ideally in partnership with business and civil society, have a role. 1) In cyberwarfare, government is our first level of protection against state-level (or equivalent) attacks. Hacking of the Internet of Things could shut cities down and have other disastrous consequences. In cybercrime (including identity theft), we need government to protect and enforce laws aimed at protecting citizens and businesses. We also need antitrust and regulatory enforcement against abuses in business such as anti-competitive behaviors, fraud, misrepresentation and discrimination. 2) Another major area to think about is advances in artificial intelligence, genetics and robotics. We need vigilance on how these technologies are advancing, but the point of governmental intervention is very difficult. We don't want to stifle innovation or investment, but can't wait too long to avoid a disastrous outcome. We need more attention to that issue. 3) The question of data ownership is extremely significant to both business models and individual autonomy. I am hopeful that blockchain technology or other means will enable a move towards more personal ownership of our own information, recognizing at the same time that we can't and perhaps even shouldn't control all public information about ourselves."

A **research scientist working on tech innovation** commented, "Policymakers need to be at the forefront of these innovations. Some of new technology that is being created is existing in loopholes and acting in areas where there is little policy oversight. There should be. Policy should work towards constructing the frame on which technology sits, rather than being reactive, after the harm has been done."

A **data analyst** said, "To reach the point of policymaking requires society to have discussions within itself about how these new technologies are to be received and used even if it is just teaching people (adults and children) how to behave. It's the human element that needs to be considered as we continue into the digital life. As life becomes more digital, a lot of potential harms can be mitigated or removed by having conversations about what the existing technology

means and creating actions and policies from those conversations. One of the looming issues that will need to be dealt with is the sheer amount of WiFi-connected devices that have no built-in security. All it takes is one device to be hacked on a network to give someone access to everything. This is something that can be addressed BEFORE a device is put to market and can be reinforced by policies creating a standard level of security the product must meet."

A **research scientist** based in North America commented, "Increased collaboration between technology firms, regulators and public-interest groups could help us better understand the pros and cons of new technologies and develop regulatory frameworks that support innovation while at the same time ensuring appropriate consumer protections."

Sheizaf Rafaeli, a professor at the University of Haifa in Israel, wrote, "Digital is powerful. In the hands of ill-meaning people, corporations, governments or groups, it can be used to leverage crime, violence, oppression. Everything that can be done, including regulatory acts, citizen and social action, scientific and technical effort, should be put into reducing these ill effects. I do not believe that the market, left to its own devices, will suffice. So governments, NGOs, the public, have to take responsibility and intervene. On the other hand, I do think that progress is being made."

Andrew Czernek, a former vice president of technology at a personal computer company, wrote, "Absolutely critical is the implementation of a digital key that can be tied to each individual to eliminate the shoddy security that email/password 'soft' security provides. In addition, Congress and our state legislatures need to pay much closer attention to protection of personal privacy. Indeed, at some point we may need a Bill of Rights for digital privacy."

Su Sonia Herring, an editor and project coordinator based in Europe, wrote, "Making business practices of technology companies more transparent and accountable is a must. The same transparency must apply to government's use of technology, especially when related to privacy, access and security of big data. Cooperation and dialogue between all stakeholders is key as the technology and the internet are virtually borderless. This practice of information exchange on good practices and diverse experiences would help create useful and flexible policies. Dated laws, non-transparent decision-making and over-regulation are not the best way forward."

Hanane Boujemi, a senior technology policy expert based in Europe, commented, "In order to benefit from the internet in the future, safeguards to consumers' rights must be guaranteed by existing legal mechanisms and possibly a code of ethics based on which the internet industry ought to adhere to. Users are to be made aware of the implications using their personal data and they should also respect the rights of the others while interacting in the virtual space."

Simeon Yates, professor of digital culture at the University of Liverpool, wrote, "I would have once argued vehemently against this, but we need to start looking at how we regulate the internet. It is not just the horrors of hate online, nor 'fake news,' but more importantly how we chose to solve social problems with (in part) technology. As I have argued repeatedly in my recent secondment and joint research with UK government and local government agencies – technologies are never the solution. Technologies embedded and developed with appropriate regulation are the key to delivering good outcomes. For example, how will we regulate aspects of automation. What will be our goal in regulating it or not (profit? well-being? risk?). Again context is for kings – we need to know from a strong evidence base specific potential impacts and the contextual limitation of regulation and policy."

Erika McGinty, a research scientist based in North America, wrote, "More regulation is required to safeguard against privacy and security breaches, constitutional violations – venders could include consumer-advocacy information with their products. And government applications should be evidence-based before implemented."

Richard Sambrook, professor of journalism at Cardiff University, UK, wrote, "It is hubris for technology companies or their evangelists to think they are beyond regulation. They have acquired huge market and social power – it is the place of politics and society to ensure that is managed for the collective good. I believe there will be regulation and other measures introduced to ensure the market power of these huge companies is not abused or misused (and currently it seems to me there are many examples of current misuse which are coming under scrutiny)."

David Golumbia, an associate professor of digital studies at Virginia Commonwealth University, said, "Serious government regulation is needed at both the national and international level. It is possible, despite the many tools Silicon Valley – building on other industries like oil and gas and tobacco and finance – have developed to prevent it."

Bradford Hesse, chief of health communication and informatics research at The National Cancer Institute, NIH, said, "The National Academy of Sciences maintains a Board on Human System Integration, whose responsibility it is to leverage the capabilities of human factors specialists in monitoring the unanticipated consequences of complex technological systems. The Board also reviews and curates the methods that can embedded within complex to promote safety and system improvements. In Silicon Valley, these methods are often referred to as 'User-Centered Design' or more colloquially 'Design Thinking.' Unfortunately, resources are not always allocated within the most vital sectors of the economy to self-correct when negative consequences are detected, or more importantly to embed the data-based signal processing systems needed to prevent negative consequences early in their life cycle. My hope is that resources will become more

available as the negative consequences of not engaging in cybernetic, sociotechnical monitoring becomes apparent."

A **professor at a major university on the East Coast of the U.S.** wrote, "**1)** Strict liability needs to be placed on the sources of cyber risk, not simply shifting responsibility for risk remediation to consumers. **2)** Basic technologies should be developed to remediate software development processes that preserve vulnerabilities at the level of language primitives (e.g., require type safe languages be used to develop applications used in critical infrastructures), and create new oversight mechanisms allowing non-specialists to make more informed risk decisions. **3)** Government must ensure that market incentives do not propagate vulnerability because of externalities and other misaligned incentives of both IP owners and computer equipment manufacturers (speed to market and features vs. security). **4)** Governments need to ensure the security of critical infrastructures from deliberate cyber disruption. This means that they need to be informed and proactive in identifying risks, measurably mitigating them (or requiring that industry do so), and proactive in assigning intelligence assets to tracking state and non-state actors that seek to exploit cyber vulnerabilities. **5)** USCYBERCOM and the Department of Homeland Security need to undertake better coordination for the cyber defense of the United States. The U.S. should seek collaboration with like-minded countries to internationalize these measures, defending an open internet from authoritarian states seeking to impose 'sovereign control' over data, IP and transport."

Bill Woodcock, executive director at Packet Clearing House, the research organization behind global network development, said, "The European General Data Protection Regulation [GDPR] is the first sign of regulators waking up to the need to protect the public interest in cyberspace. Privacy and control over personal information have been the worst victims of our rush to move everything into the cloud. I believe that the current conflict between state currencies and 'cryptocurrencies' will need to be resolved by regulators soon, and the role of privately mediated transactions will need to be clarified. I believe that one of the most insidious threats we face is the monetized exploitation of our own psychological weaknesses: the creation of AI and deep learning devoted to extracting money from people's needs for social acceptance, addictive behaviors, or insecurities is, essentially, the breeding of predators for whom we are the prey. Five years ago, this basically didn't exist. Now, such systems extract money from the very young, the very old, and the very credulous; but they're learning quickly, and five years from now, all of us will be within their reach, unable to determine whether we're talking to a real person or being scammed by an AI. This is an area that looks to me to be completely unregulated right now, and the area which most needs regulatory attention."

A **research leader** at one of the top five global technology companies said, "Although we can't restore the world for which we were designed by evolution, we can certainly mitigate our painful transition to the new world and cushion the shocks that we have begun to experience. Restoring Net neutrality could be an example. The EU's GDPR initiative is an experiment in pushing toothpaste back into the tube and bleeding the large tech companies that are rocketing us into the future; we will see how it plays out."

Thomas Streeter, a professor of sociology at the University of Vermont, said, "The protection of an individual's data should be defined strongly as a right, alongside the right to life, liberty, etc. Clearly voluntary 'opt in' to personal data sharing should be the only allowable way for commercial enterprises to gather data, and it should be required by law to be for limited times only (e.g., after three months, the permission to share automatically disappears and the data must be erased). This would change business models, and might cause some businesses (e.g., Facebook) to implode. That would be fine. And yes this would require an enormous amount of aggressive political intervention in the economy that might seem unlikely and would be completely politically unprecedented. The same was said about the likelihood of the election of Donald Trump."

A **postdoctoral fellow at Stanford University** commented, "Create multiple, robust Webs so that we are not reliant on a Net that isn't neutral. Regulate surveillance of content and gathering of metadata beyond simply asking for consent. Encourage the development of communication tools by and for demographics that are generally not served to benefited by them – this needs to be a not-for-profit project and it needs to involve women, minorities, activists and the Global South (these projects exist and they need more funding). Support labor-organizing and rights for workers in the factories making the devices. There should be transparency and audits of hardware and software."

A **technology developer/administrator** said, "More regulation and best practices can help reduce the impacts of cybersecurity events. Creating some set of liquidated damages regulations for industrial equipment and power grid operations should cause insurance companies for these entities to force them to more-secure systems."

A **leader who works at one of the leading global internet administrative organizations** wrote, "Security and authentication measures (e.g., fingerprint or facial recognition) will improve and be more-user friendly thus allowing stronger measures to be used without unduly burdening the user. Privacy protections should benefit from improved data-protection measures at the software and hardware levels. Legal privacy protection measures will add to a trend toward protecting users' rights."

A **business leader based in North America** wrote, "Adherence to privacy laws, firewalls, role and context authentication, dual authentication and continuously updated encryption and data protection."

Kelly Quinn, a clinical assistant professor at the University of Illinois at Chicago, wrote, "Many digital tools are provided in exchange for personal data – both about the individual and about the individual's activities. More action can be taken to protect the privacy and integrity of this information, both in its collection and in how this data is used. Unfortunately, the proprietary nature of technology development and internet provision has shrouded the ways in which personal data is collected and used. The argument to 'just don't use' digital tools (or the internet) is not an effective means of regulating the power imbalance between providers and users."

Matthew Tsilimigras, a research scientist at the University of North Carolina-Charlotte, said, "We are now beginning to appreciate the potential for harm and possible solutions to address the harms brought about by the increasing presence of digital life. The next decade will see a net improvement in people's well-being when it comes to digital life as this knowledge becomes widely disseminated and actions are taken by cultural, commercial and legislative forces… However, the digital divide is still present and we run the risks now more than ever of alienating and subjugating those without to a bleaker, and bleaker second-class citizen status if access to high-speed, reliable internet is considered a luxury rather than a right."

Guy Levi, director of innovation at the Center for Educational Technolgy-Tel Aviv, said, "Privacy issues should be changed to adjust to the new reality. Behemoths like Google, Facebook and others should be limited and regulated. Education must change for more personalization, etc."

Seth Finkelstein, consulting programmer at Finkelstein Consulting, wrote, "We desperately need legal protections to redress the imbalance of power between large corporations and ordinary people. We're at a stage for 'connectivity' now comparable to the early days of 'industrialization.' Back then, there was the idea of 'If you accept the job, you accept the risk.' That meant if you were maimed or killed by factory machinery, too bad. It wasn't the problem of the 'platform owner,' err, company. And a corresponding type of establishment apologist would similarly offer tips and exhortations to always be watchful in dangerous areas, but eventually just wring their hands that nothing could be done about carelessness or bad luck, and anyway to even try would kill precious start-ups, err, industrial spirit. An illuminating example of not believing in technological determinism is the issue of copyright. Just as an observation, without taking a position myself on whether the ultimate result is true or not, big media company owners of copyrights believe very many things can be done to migrate the effects of digital life on their business model. They are not simply throwing up their hands and saying nothing can be done, and we shouldn't even try for fear

of consequences. Only the little people get that line. The fact that the United States has an extremely weak labor movement, and a press where there's little besides corporate interests, means that this discussion takes place in the U.S. in a very skewed way. It becomes a very financially oriented framework, such as proposing property rights for individuals in their data, or viewing the harms as a market opportunity for other companies. Privacy and data protection laws run into the problem that fundamentally they restrict the ability of a large corporation to profit somehow, which is difficult when politics is dominated by money. But on the other hand, there are frequent calls now for monopoly media companies to use their immense power to directly marginalize fringe ideas. After years of hearing hucksters touting the Internet as letting everyone have a voice, I find it darkly amusing that it's become a moral panic the instant such hucksters weren't the ones shouting loudest. There's not enough space to do a full analysis here. But briefly, I think that conflict is a symptom of a dysfunction in what's supported overall by the social system. If there's only an economy of attention-seeking outrage, that's the problem itself, not having someone pick the correct winner among all the outrage-mongers."

José Estabil, CEO of a biotechnology startup, said, "It depends on what is meant my an 'intervention.' Society has decided – almost everywhere really – that the construction, maintenance and improvement of roads and bridges should be delegated to a government or a public trust. We have not (yet) achieved a similar kind of mechanism for technology. But I hope we do. And soon."

Joe Raimondo, digital CRM leader at Comcast and former CEO, said, "Eventually the need for fair and intelligent propagation of rule sets will take over – slowly and not in an organized fashion. But eventually."

Perry Hewitt, vice president of marketing and digital strategy at ITHAKA, said, "We're now living with a structural lag between the rapidly advancing technology and the means to regulate it – as a society and as individuals. As the risks become more quantifiable, both governments and individuals will take action."

Steve Stroh, technology journalist, said, "Organizations that choose to acquire personal information that is not voluntarily disclosed, should be held liable if that information is leaked / stolen. I'm thinking of the many recent hacks of retailers, and especially the recent credit bureau debacle. I did not agree to have a retailer retain my (bank) credit card information. I did not individually disclose to a credit bureau my personal information (for them to retain). In most of the cases that I've heard of, the disclosure of personal information was due to negligence on the part of the organization – they were lazy, or cheap, or incompetent. If they were held liable – by regulatory agencies, or sued in a class action lawsuit, *then* they would start caring."

Jamila Michener, an assistant professor of government at Cornell University, wrote, "As far as mitigating potential harms the most important steps are as follows: 1) Rigorous research (qualitative and quantitative) to identify harms. We cannot assume they exist or speculate about what they are. 2) Rigorous research to test the effectiveness of various interventions in reducing said harms. 3) Once we have identified real harms and useful interventions, educational institutions, government and others in positions of power need to disseminate information and resources to parents, educators and ordinary people so that they can implement those interventions to the extent possible."

Joseph A. Konstan, distinguished professor of computer science and engineering at the University of Minnesota, expert in human-computer interaction, commented, "We need to restore a commitment to Net neutrality. We also need to think about re-architecting the internet to remove anonymity from public postings – let's consider what the internet would be like if all messaging were publicly traceable – how well would that help beat back bullying and hate groups? We need tools that allow individuals to see the variety of 'possible digital spaces' they might be in, recognizing the different products, news, commentary, etc., that are out there and prominent to others. We also need tools to help individuals and families set rules around availability and interruption – rules with the flexibility to support emergencies yet the automation to restore levels of human interaction."

Michael R. Nelson, public policy expert with Cloudflare, said, "The most important government intervention is to avoid regulations or lawsuits that would lead to less competition in the IT and telecommunications sectors. Competition drives innovation and leads to more solutions to meet the varied needs of consumers. Too often governments try to pre-select a favored solution, when finding ways to encourage competitive markets that deliver competing solutions is a much better goal."

Adrian Colyer, a business leader/entrepreneur based in Europe, said, "There are actions we can take, but they won't be popular and I think they will need to come in the form of laws and regulations – nothing else will be strong enough to stand in the way of commerce. I'm thinking of privacy and security regulations for example (such as the forthcoming GDPR, and its successors) as well things like requiring clear labelling or disclosure when media has been digitally manipulated."

<u>**Redesign media literacy:**</u> **Formally educate people of all ages about the impacts of digital life on well-being and the way tech systems function, as well as encourage appropriate, healthy uses**

Adriana Labardini Inzunza, commissioner of Mexico's Federal Institute of Telecommunications, said, "The real challenge is reinventing education, learning and teaching programs, reinventing pre-scholars first encounters with IT, educating for the benefits of digital life but also for the risks and perils of an ill use of digital products, combining physical, artistic, athletic, manual skills and training millennials' senses and sensitivity to keep their body, mind and spirit alert, active, receptive and skeptical, to balance online and offline lives and activities, to learn to produce and create works of art, science, technology rather than being consumers only. To innovate, to solve social or collective problems to use digital products as tools not as ends. New education programs, new skills and guidance for parents, employers, entrepreneurs, government officials, should be designed and put in use in order to help humans bring the best of humanity with the aid of technology, with ethics and empathy, with new golden rules of the digital era, to encourage critical analysis, time management, creativity and empathy serious lectures on privacy and data protection and new laws and regulations that may efficiently, if at all possible, create incentives for a healthy lawful use of digital tools and deter harmful, unlawful and abusive use of it to the detriment of society. Education may prove more effective than law enforcement but insufficient, to persuade people in their own best interest to make a responsible use of IoT, AI, digital transactions among others. But a 180-degree change in the law (torts, criminal, labor, copyrights, procedures, class actions, antitrust law) and culture should be implemented to address the challenges and risks of an automated society and economy if humankind intends to remain human, free and civilized."

A **head of research and instruction** at a major U.S. university wrote, "Understanding the strengths, drawbacks and underlying structures of technologies and their applications is crucial – especially for younger people, who might not have alternative mental models, and those less-familiar with tech. But attentiveness to changing habits and what kinds of spaces aren't being created is integral to interventions that will lessen their effects or help recapture kinds of attentiveness that might be otherwise lost."

David Ellis, course director of the Department of Communication Studies at York University-Toronto, said, "There certainly are actions that can be taken to mitigate harms in our digital lives. The challenge is takeup. The first and most important of these actions is: educate thyself. The less people know about the technologies they use, the more likely they are to be victimized in some fashion or constantly confused and frustrated trying to get what they want. The items needing some helpful explanation range from misguided beliefs about privacy, like 'I've got nothing to

hide,' to why VPNs are useful and how they work, along with perspective adjustments about which actors pose a real threat to online welfare. Should hackers top everyone's threat-modeling list or should we leave room up there for Facebook and your ISP? Learning about any technology is tough. Digital technologies are especially so not only because they're mostly hidden from sight, but also because of the industry's big value proposition; ignorance is bliss, whether it be about privacy policies or the details of how services actually function. Consumers have become so accustomed to hearing that their digital life, indeed all of life, must be effortless in every way that little incentive is left to dig for details, even if doing so might improve their welfare."

Brenda M. Michelson, an executive-level technology architect said, "We need (desperately) to build information literacy and critical-thinking skills across the population and improve curation tools without impinging on free speech. Broad education on information literacy and critical thinking can help people discern the validity of information, view multiple sides/perspectives of an issue and consider the motivations of content creators/providers. There should be a developing/refining of our individual habits. Turning off notifications. Giving ourselves digital breaks with other people, doing outdoor activity and so on. Essentially, regaining our attention. As well, we can choose devices and interfaces that augment our everyday experiences while being a present participant in social/work/family situations."

Beth Kanter, an author, trainer, blogger and speaker based in North America, wrote, "We can do a lot more education on the harm that uses of Facebook and our mobile phones can do to our mental and physical health. Folks like former Google design ethicist Tristan Harris and others from the tech industry have brought a lot of this to light. There are also scientists who are studying this, like Gary Small, an author of 'iBrain: Surviving the Technological Alteration of the Modern Mind' and his lab. In addition to educating people about the dangers of improper use of online tech, we need to understand when we're getting addicted and how it is impacting us and learn techniques in how to practice technology wellness. We also need to educate in the workplace as well as in homes and schools. More workplaces in America need to set better limits on employees' after-hours communications. Maybe we should follow France's lead and make after-hours emails and messaging illegal. Schools also need to teach tech wellness to kids, especially today's screenagers."

Silvia Majó-Vazquez, a research fellow at the Reuters Institute for the Study of Journalism, said, "Digital literacy should be a priority in education systems all over the world to enhance people' skills to cope with potential threads of the digital domain but most of all to make the most out of the digital sphere."

Bouziane Zaid, an associate professor at Al Akhawayn University in Ifrane, Morocco, wrote, "We can educate people more on privacy issues, on how to protect their information and be aware of what they sign off on when they click 'agree' to terms and conditions. We can also pressure governments to be more judicious in their surveillance activity and pressure them to establish mechanisms of oversight to limit any potential abuse of power."

A **professor based in Oceania** wrote, "Technology education must be upgraded and people need to learn the tricks of scammers; hackers; fakers; call-center, email and advertising, scams. All people must have equal access to the same education in hardware, software, skills, knowledge and teachers. All people must have equal access to ISPs, computers, hardware, software, etc. Information technologies must become a human right, just like a living wage must become a human right. [It could be managed by a] worldwide, honest, unbribeable group who will be paid very well – a forensic-audit financial group not controlled by countries or vested interests (not a FIFA or UN) but with equal and diverse numbers of male and female members from across various disciplines. They each must have high level of proven, honest knowledge in their specific area. They might effect recovery of unpaid taxes and stop scams, money laundering and all illegal/dishonest/unethical wealth creation and storage."

Daniel Pimienta, an internet advocate and activist from the Dominican Republic, commented, "The answer is simple: education! The answer is not only simple, but heavily urgent. Without comprehensive information literacy programs people are going to be more and more confused by information technologies."

Erika McGinty, a research scientist, wrote, "Revolutions like the Internet of Things should be better explained, and by neutral or consumer-friendly parties, not just by vendors who dream up stuff to make a profit, whether it's useful or not. There needs to be more education from journalists, nonprofits and government as well as consumer watchdogs about the implications for social interaction, privacy, self-censorship, fear, isolation, safety, empathy, personal control, citizenship, etc., from installing things like Google Voice or Amazon Echo or surveillance cameras or smartphone apps that allow one to control one's heating, radio and so on."

Eileen Rudden, co-founder of LearnLaunch, wrote, "Just as 'digital literacy' is now taught (for example, how to recognize biases in media), so can digital citizenship and digital friendship."

Ginger Paque, a lecturer and researcher with DiploFoundation, wrote, "We, the users, are learning that we have to manage our online lives, and take responsibility for this part of our life. We are learning to teach our children, to evaluate needs and priorities instead of automatically accepting new technologies that are thrust upon us. We might not read every word of the fine print

– and too many of us click 'I agree' too easily – but we will demand terms of service and privacy policies in plain, comprehensible, transparent user language and we must begin to make appropriate choices. We are learning that 'free' services are not free – we make sacrifices in return – so we must consider the options before we decide. We will take control of our data, and start making better choices, even though sometimes we really don't have control (e.g., in the U.S., ISPs can sell our browsing data not only without our permission, but without our knowledge). We must learn the power that the consumer wields, and we are learning we cannot trust our lawmakers to make wise decisions for users. As consumers/users wield the power of choice, providers will have to pay attention or lose customers. This may be an optimistic outlook, but it's the only path we have. We haven't always made wise choices in the past, and we won't always make the right decisions in the future. But if we don't learn to protect ourselves and our children we don't have a future. Logically then, we must and we will become better consumers. Another main area of concern revolves around the sociological implications of online presence, both in how that ecosystem itself works, and how it affects our offline sociology. It's coming to a 'do or die' point, the same way offline sexual harassment has. I believe that we are learning to get our priorities straight and learn to blend our online and offline lives in a positive way to our own advantage."

Barry Chudakov, founder and principal of Sertain Research and Streamfuzion Corp., commented, "We are in a new reality with new dimensions and new rules. So our first intervention should be education starting at the primary level and going through all further levels of education and instruction… We must begin to establish some distance of awareness, i.e., enough space between us and our tools to see what we are doing. Time outs and breaks are necessary but are not sufficient. We must become self-aware enough to look around the corners of our tools to see how they are affecting us and influencing us to change our behaviors… The more intelligence we build into digital tools – things that think – the more it is incumbent upon us, especially as parents and educators, to prepare for (understand, outline, delineate) how these tools 'use' their users. We must face the 'us-ness' of our new tools. Increasingly they feel, think and look like us (often using our own image to stand for us). This affects, and will continue to affect our well-being, especially if external algorithms begin to 'hack humanity' and monitor us to get to know us, perhaps better than we know ourselves. Having a Metalife, as I have said before, is a full-time job."

The **director of a psychology research center** said, "We are, as a society, woefully negligent in preparing people, especially young people, to manage technology. This is the equivalent of letting people drive without training or having them jump into the deep end of the pool without a swimming or lifesaving lesson in sight. Media and technological literacy and digital citizenship training need to be integrated across all grade levels. Media literacy is not just evaluating media content and digital citizenship is not just about cyberbullying. This training needs to be based on: 1) the psychology of human behavior, such as understanding how the brain reacts to virtual

behaviors, the cognitive biases that interfere with critical thinking, and an emphasis on self-regulation and self-efficacy, and 2) understanding how technology works at practical and theoretical levels, from privacy settings to algorithms."

Stuart Umpleby, a professor and director of the research program in social and organizational learning at George Washington University, commented, "Algorithms in social media show articles and ads similar to what readers have looked at before. In politics this means people live in different information universes. Algorithms could be used that would present other points of view, but will the 'platforms' find this to be in their interests? Some regulation will likely be necessary. Alt news sites do not present news. Also, some 'science reporting' is by corporations with an interest is a particular point of view. The sources of articles and ads should be clearly stated. How to do this in an environment of free speech and press will require experimentation and clever design. Lessons in understanding media should be offered at all levels of education to help people understand what they are reading and the intent behind it."

John David Smith, coordinator at Shambhala Online, said, "We need new ways to educate people so that they understand the impact of their actions online. A lot of what's going on in the online world is hidden; people need to be able to see it and they need to be educated so that they can see it."

Andy Williamson, CEO of Democratise, said, "We need better education in information literacy; our school curriculum isn't keeping pace with technology and that's to the detriment of all of us. Information is now constantly permeating so many aspects of our lives that it's too important to leave this to chance – we have to know how to qualify, filter, process and accept or dismiss what we're told. It might also be useful to remind people that it's possible to slow down and that a reply a day late is fine because sometimes it's the quality of the response, rather than the speed, that matters."

Craig J. Mathias, principal for the Farpoint Group, wrote, "Apart from education regarding personal responsibility (to use internet-based services in a responsible manner), nothing can be done. We cannot compromise freedom under any circumstances."

Laurie L. Putnam, an educator, librarian, and communications consultant, wrote, "Educators and policymakers can make information literacy a core subject. Information literacy is taught in many schools and libraries already, but it is rarely given the financial and political support it deserves. As citizens and consumers, we are responsible for knowing how to use digital technology critically and responsibly. This is not just about spotting misinformation or 'fake news'; it's about learning to maintain our well-being when digital technologies are embedded in every aspect of life.

We need to understand how to manage our personal data, to protect our privacy, to assess the information we encounter, to communicate effectively. When living offline is not an option, information literacy becomes a basic skill, and we need to build it into our education system. We need programs for adults, too, and public libraries are a natural fit for this task. It's time to take digital information literacy seriously."

Jason Hong, professor at the Human Computer Interaction Institute, Carnegie Mellon University, wrote, "There are three big things people can do to take back control of their time and their attention, and improve well-being. The first is to turn off notifications from apps and services. When I sign up for a new service or install a new app, the first thing I do is figure out how to minimize the number of notifications it sends. The default for most apps is to buzz and make loud sounds when it receives a notification. It turns out that you can often block these notifications or make it so that they silently send notifications, making it so that you don't get interrupted all the time. The second is to decrease use of apps and services that try to monopolize your attention, in particular social media. Learn about the psychological strategies that they use to capture your attention. Put your smartphones away when dining with friends. Also, try reducing your usage of these apps too. You'll find that you're not really missing that much if you reduce your use of Facebook or Snapchat to once a week or less. Focus on the here and now, on the people around you right now, rather than the virtual you. The third is to change how you use these apps. Social media is a lot like TV: you can watch it by yourself, or you can use it as an excuse to get friends to watch things together. In one case, TV is isolating, and in the other case, it is bonding. Instead of mindlessly browsing information about acquaintances, use social media to build or maintain strong relationships. Check in directly with close friends to see how they are doing, or use these social media platforms to coordinate meetups with friends."

Kat Song, communications and digital strategy director at the American Association for the Advancement of Science, wrote, "I suspect that the spiral into digital dependence can be curbed through education and practice. Tell people about the potential harms. Give them ways to prevent or reduce their overuse of devices. Those methods can range from things like apps that shut down your device at certain times, to setting a 'digital sabbath' (times when you and your family are not permitted to use devices), or even asking other parents to bar or limit device use when kids get together."

Jacob Dankasa, a North American researcher, said, "Educate people to use technology in a way that adds value to their lives. This entails knowing how much time one can spend on technology and knowing when to drop your piece of technology and engage in everyday face-to-face human relationship."

Deborah Coe, a coordinator of research services based in the U.S., said, "This is one of those instances of cultural lag in which social change takes a few years (or maybe a generation) to catch up with technological change and make some necessary adaptations. When the automobile was first invented, people didn't cope well. This too shall pass, but only if we help it along with some interventions. Society must teach itself and its newer generations how to do this. We've already seen some good experiments in which people (and especially children) have voluntarily relinquished their cell phones, tablets and computers for a few days. Although they were very distressed at first, after a few days most participants said they were surprised at how much more relaxed and focused they felt."

Yoram Kalman, an associate professor at the Open University of Israel, wrote, "Awareness, training and education are critical for people to understand the benefits and risks of digital life. In particular, I believe that understanding the forces that power digital innovation and adoption of innovations (commercial, economic, psychological, social, etc.) are key to empowering people. Furthermore, carefully considered regulation should be used to protect individuals and organizations from powerful players when market and/or social forces fail to do so."

Recalibrate expectations: Human-technology coevolution comes at a price; digital life in the 2000s is no different. People must gradually evolve and adjust to these changes

Uwe Hasebrink, a research scientist based in Europe, commented, "Digital life does not follow a law of nature. It follows 'laws' of economy, sociology, politics, psychology and other disciplines that share the basic assumption that reality is socially constructed. Thus digital life can be shaped along basic values and specific principles and objectives. We cannot not shape digital life."

A **professor of humanities** commented, "Like all radical cultural changes, this one requires new patterns of living and changed social expectations. Experience will teach us most, closely followed by more formal forms of learning."

Eric E Poehler, associate professor of classics at University of Massachusetts-Amherst, commented, "Digital life is part of life. Since the development of the pointed stick, we have been able to surround our technologies with an envelope of social acceptability. We protect ourselves from physical traffic by rules, signaling devices and dedicated spaces for different means of travel – cars on highways, bikes in bike lanes, pedestrians on sidewalks. All these came after a difficult learning experience of the dangers of automobiles. We created physical buffers, laws and norms of behavior (e.g., around drunk driving). We will in time learn to do the same with internet traffic. We can learn (both as individuals and as a society) to more fully control the speed and volume of

information, divert its content onto particular paths, authorize and deauthorize some forms of access and establish sanctions for malpractice."

David Myers, a professor of psychology at Hope College, wrote, "Much as humans flourish when living with an optimal work/life balance, so we will flourish when technology serves us without making us its slave. Thus we need creative minds that can help us intentionally manage our time and priorities accordingly."

An **anonymous respondent** wrote, "1) Don't cut taxes. We need more oversight not less in this era. 2) Social media companies need to hire editors, fact checkers and journalists to invest in truth that has been lost by newspapers/magazines that have gone out of business, just leaving a few media monopolies. 3) Find ways to financially support truth, journalism and verified information online. Sure everyone can blog on Wordpress, but that isn't the information to view as verified truth. It is opinion. Advertising isn't enough to support sites that require a large staff of people (not bots) to make decisions about what information is legit enough to publish. 4) Teach kids that digital is a partnership between humans and technology. *Not* a replacement of humans with technology. I know many people believe AI will save us. I've seen early models and they suck. AI will do what it is taught by humans or it teaches itself. AI poses all the same the risks as humans with poor judgment (or possibly more risks) because there are no rules, morals or values to guide decisions with the software platform. 5) We need more laws about what happens on the internet; Net neutrality-type laws to protect individuals."

Michael Knowles, an entertainer and entrepreneur, said, "The actions that will be taken will be social in nature. Parents and peers will rediscover in-person connections and augment those in-person connections using social media rather than the other way around."

Robert Bell, co-founder of Intelligent Community Forum, wrote, "The interventions will not, for the most part, be technological but social and cultural. The plague of 'phone zombies' crossing streets without looking for traffic and bumping into us on the sidewalk is a marker I watch; I expect that over a matter of years, this behavior will decline because it is socially inept. Equally, we will slowly develop habits and ways of thinking that make us less susceptible to hackers."

David Weinberger, a senior researcher at Harvard's Berkman Klein Center for Internet & Society, said, "In addition to the technical affordances and 'nudges,' we need to teach our children to be kinder. We also learn to be more 'meta,' making explicit norms that geographically local communities can take for granted are shared."

Larry Rosen, a professor emeritus of psychology at California State University-Dominguez Hills known as an international expert on the psychology of technology, wrote, "I have written seven books, each with strategies for healthy technology use. They are being used by many people who have heard me talk either at schools, to parent groups or to general audiences. Key is moderation plus frequent breaks to calm your brain."

David Klann, a technology consultant for the broadcast industry, said, "People need to be reminded to leave their devices on the desk or table, and simply go outside. Not necessarily to interact with other people in person, but to simply be in the elements and step away from the digital world. Here's an exercise I learned at a spiritual retreat many years ago: go outside and focus on a one-square-foot plot of land for 15 minutes. Note all the things you feel, see, hear, smell, or taste in that single square foot. Then spend the next 15 minutes staring up at the sky above the square-foot plot and make a note of all the things you observe in the sky above. This action of leaving the digital world behind for even half an hour can mitigate and relieve some of the stresses imposed by our hyperconnected lives."

An **executive for a major internet business** wrote, "Greater education about information literacy would be helpful. But I do believe that there will soon come a time when people realize that the return on their investment in time and money into being constantly plugged into 'information' is flat or negative and people may become more discerning about the sorts of services they consume."

Frank Odasz, president of Lone Eagle Consulting, commented, "If no one raises the flag on how good people can truly learn to specifically take action to counter all the current negatives online, then the world will continue in a downward spiral… Who will lead the deep research of techno-social psychological impacts, both positive and negative, given Google, Facebook, Apple, Amazon and others have over one-half trillion dollars each? Low-cost, short-term pilot projects can quickly demonstrate what does and doesn't work for incentivizing individual and group *positive* outcomes. Herein lies the rub: Most adults – particularly those in leadership positions – subconsciously avoid 'learning anything they know nothing about,' from Native elders up the ladder to legislators and Congress persons. So, while it might be unlikely that solutions to help, not harm, will come from the top down, it is highly likely they will come from the bottom up. It is just a matter of who and when. I've posted online many grant templates for youth-led local pilot projects. I'm pitching a 'Rogue Scholar' online program based on my 33 years of continuous online teaching and innovation – short e-learning lessons to teach others how to teach online for positive short-term measurable outcomes. For example, Native-American youth suicides are often due to individual's perceived lack of a meaningful role in society and support system for self-esteem. US West funded my Big Sky Telegraph for 10 years; $1.5 million, connecting over 100 one-room schools from 1988-

1998, mainly for research and development on whether online markets were going to emerge or not."

Valerie Bock, principal consultant at VCB Consulting, wrote, "I like to remember the power of the off switch. Digital things are electrical things, and we can choose to power them down. Consumers can and should educate themselves about what information they are giving away, and also, on how they can choose to configure their devices to share more or less information. They should make purchases mindfully and refuse to buy products that do not offer them options to configure for more privacy. Of course, there isn't any grabbing back the private data one has mindfully or unwittingly shared, so we need regulations about what can be used in aggregate and what can be used individually. I think it's going to probably take some pretty egregious abuses of personal data before that regulation comes into being, and even then, digital technology often features secret backdoors through which people/organizations may avail themselves of our information illegally."

A **data-quality analyst** from North America said, "Issues with our technology and interactions thereof have been revealed. With the problems out in the open, both the consumers and producers should be shifting the new technologies on the supply-and-demand side to address these issues. New issues will be revealed, adjustments will be made, and (thanks be to the dynamics of the marketplace) technology's continual improvement will keep on going."

A **professor** based in Europe wrote, "Companies and organisations have to take the lead here. Trade Unions (such as they are today) should also take a stand. The erosion of leisure time and the bleeding of work into any and all aspects of life can only be halted by those who are in charge. We need programmes of well-being and self-care that teach us to unplug and walk away. We need workplace policies that define when we are NOT expected (or indeed allowed) to respond to digital communications (and other forms of communication)."

A **principal research technologist** who works for the U.S. government commented, "Mindful assessment of new technology and how we allow it into our lives will help us mitigate negative effects. It is easier to do this when thinking of someone else (e.g., deciding how much 'screen time' your child should have). We could apply the same judgment to our own consumption of media and technology. I recently read an article in which a mother wrote, 'In honesty, my children have to compete with my phone for my attention.' That kind of self-awareness could lead to developing new habits that help us achieve the relationships we want to have, rather than the ones we default to."

Stephen Downes, a senior research officer at the National Research Council Canada, commented, "We have to recognize that people can be harmed through technology and in particular through the exercise of what some call 'free speech' using technology. Just today there was a story of an innocent man being killed in a SWAT raid that resulted from a dispute between two people playing online games. One of them gave a fake address to another, and the other reported the address to police, which resulted in the raid, and the death. This is a tangible harm caused by 'free speech.' It was a deliberate act, and the speaker will be held accountable for the consequences. We know that speech harms. We know that spreading false beliefs will lead people to act on those beliefs, often to the point of harming themselves and others. We know that spreading hatred and incitement to violence result in hatred and violence. The right to a peaceful life and enjoyment of society are not superseded by the desire to engage in irresponsible use of free speech. There is a clear case for limits to expression online, and people violating those limits ought to be sanctioned. By the same token, though, people need to become more resilient to the effect of online speech and actions. Many of the calls to violence and racism fall on willing ears, and people who are unable to grow and develop through other more peaceful means bond together in hatred to enjoy community, to advance their position in society, and punish people for their imagined misdeeds. We need to give people more to hope for and, frankly, more to lose. If they have an investment in society they won't be so quick to destroy it. Inequality breeds racism and intolerance, and in turn, feeds on it. We need to reverse this."

Avery Holton, an associate professor of communication at the University of Utah, commented, "As with many previous technological evolutions, we are in the midst of the good and the bad of digital and social media. What connects us also divides us, and a large part of the division seems to be mis- and disinformation. These are not new forms of discourse, but the ways in which they spread and infect are new. So while we wrangle with what they are, where they come from and how they affect us, we are simultaneously experimenting with ways to vanquish them. Beginning in 2015, we saw many advances in identifying types and sources of such information. At the tail of 2017, we witnessed Facebook's effort not only to identify mis- and disinformation, but to also provide more factual alternatives. So, in the next year or two, we will likely see the tide turn against this type of content as well as those who spread it. Taking away the power of mis- and disinformation, or at least lessening that its impact, will relieve some levels of stress and reinvigorate to an extent the empowering feeling of digital and social media."

Richard Bennett, a creator of the Wi-Fi MAC protocol and modern Ethernet, commented, "We're still very early in the adoption of digital tools in politics, news gathering and social interaction. An initial bubble of optimism has given way to pessimism as we realize that these technologies were oversold. I suspect that fake news and ideological insularity have always been with us, but weren't as easy to spot as they are now. We will ultimately develop the critical-

thinking skills necessary to enjoy the benefits of information abundance, but it's probably going to take another generation. We really have no choice as we're not going back to print media and three TV networks anytime soon. Digital tools have made major impacts in medicine and food production. These developments will continue to improve as long as the fear-mongers don't succeed in killing them, too."

David Cole, a respondent who shared no additional personal details, wrote, "The rise of computational engagement, for all its risks, brings with it the awareness of the need for – if not, for the moment, the experience of – deep transparency. People in the field know we should be using two-factor authentication, but how many of us do so on all our accounts? We know we should be reading our user agreements more closely but how many of us do? As bureaucratic and administrative as these examples may sound, ultimately they are about connecting and managing relationships with people and with services. Mindful application of technology in our lives continues to deliver remarkable efficiencies and experiences. I have deep faith in our ability to redesign an internet that is not based on clicks and impressions and the bundling and resale of profile information."

Serge Marelli, an IT security analyst, wrote, "People need to learn how to use the tools. Some are willing (or equipped) to learn, some are not willing, or possibly ill-equipped to learn. It is a bit like reining in uses of television, or tobacco, some won't try, some will try and give it up, some will become addicted and some will use 'tobacco-addiction' as an excuse. With television, some watch it a few moments a day, some watch it all the time, some select high-value programs, some watch trash (of course, we all define differently what 'trash' means). The same will happen with digital tech, just as television."

Steven Polunsky, a research scientist at Texas A&M University, wrote, "As a society, we must make a concerted effort to increase dialogue, to have people meet other people who are not like them and share their personal stories. As individuals, we must become more open to hear from people with experiences outside of our own, and at the same time apply a greater measure of skepticism to new or unconfirmed information."

David Ellis, Ph.D., course director of the Department of Communication Studies at York University-Toronto, said, "What will it take to make mitigating harms more appealing? For individual consumers, it's going to take more than blaming our digital woes on the Silicon Valley crowd, however culpable they may be. It's time to look in the mirror and decide for ourselves what we want from the digital life, now that escape is well-nigh impossible. Some may stumble on the incentives they need to conduct their lives differently. But most people will need to be influenced by the trickle-down effects of broad social changes, some planned, others unplanned. In the

planned category, one area ripe for change is higher education. On thousands of North American campuses, classroom learning has been radically disrupted by the unfettered use of smartphones and laptops to transport students away from the instructor and the course material. The campus takeover by digital and the ensuing plague of inattention has reached crisis proportions. One factor that may shine a cold, clear light on this problem is the discovery by parents of the extent to which their money and family resources are being wasted by their college-age kids. Any potentially reformist ideas will, however, have to face the entrenched assumption by administrators, vendors, students and many educators that more tech in the classroom is always good for business. In the unplanned category, a misguided regulatory decision taken in December 2017 shows how unintended consequences and lots of bad publicity can promote progressive change. That would be the Ajit Pai-led FCC's repeal of the Open Internet Order, and with it the rejection of Network neutrality as part of the US policy framework for broadband. With the ink barely dry, a storm of protest and threatened legal actions has erupted - suggesting the FCC order was politically shortsighted and likely to backfire on its intended beneficiaries. This war over internet gatekeeping, which promises to rage through 2018 and beyond, has had the desirable outcome of making millions of consumers aware of the harms that can be visited on them by their ISP and what's at stake in their digital lives when the regulator sees the public interest exclusively through the eyes of the telecom industry. We can reasonably hope that what began as an arcane policy process will prompt lots of skeptical questioning about digital harms and mitigation, whether through advocacy efforts, political action or casual introspection about our digital future. Not an ideal way to promote public education, but definitely the silver lining in Pai's perverse gesture to 'internet freedom.'"

Jim Rutt, a respondent who shared no additional identifying background, wrote, "I am cautiously optimistic that as the S-curves top out on adoption of social media and smartphones we'll start to develop social norms to minimize the harm and maximize the benefit."

Robert Stratton, cybersecurity entrepreneur, coach and investor, wrote, "There is a loss of online civility even on the part of otherwise decorous people. There are sound arguments for discussing and promulgating social norms of civility and due care in the consumption of online media. This is not to suggest that regulation is the right idea. To the extent that we request online service providers or the government to protect us from unpleasant speech, we are planting the seeds of our own repression and chilling effects. We need to explain just how important it is to verify information against known valid sources. Reputation systems, even when pseudonymous, can help. If ever there was a time to point out that the speech most deserving of our protection may well be the most unpleasant it is now."

Ian O'Byrne, an assistant professor of education at the College of Charleston, wrote, "For me this answer is both a yes and a no. I never thought I'd say this, but I think it might be based on the age of the individual. I think you're seeing a growing contingent of people who are actively examining or problematizing their use of technology. Possible interventions may include a growing focus on meditation and mindfulness practices. This may also include designating off time, 'screen-free Saturdays,' or making your displays grayscale. This may also include more reading of texts, including philosophy and Stoic-based texts. For some people there is a desire to find balance in these relationships with technology. In many ways it is like the discussions addicts have about their relationships with vices. I also believe that we (if I can lump adults into one box) don't entirely know what the best uses of these tools and platforms may entail. We also don't entirely know what is best for the children and future generations. As we've learned from work by danah boyd and the [HOMAGO](#) [Hanging Out, Messing Around and Geeking Out] group, and, as recent anecdotal research suggests, we do not know exactly what the future generations will want or need from these spaces. There is already anecdotal evidence that they do not see much value in the social media that monopolizes the lives of adults. We need to see what impact there is for the individuals that full grow up in the soup that is this digitally connected space."

Vicki Davis, an IT director, teacher and podcaster based in North America, said, "If smartphone companies care about the health and wellness of humans, they will make these things easier. But until then humans must use the greatest software ever invented – their brain – to set healthy boundaries… Businesses that don't respect boundaries will find the best talent goes places where those boundaries are more respected. Rest and sleep are vital needs, as is personal time. Human hamsters on an incessantly-turning wheel don't make great employees. Setting reasonable expectations for email response time and delayed email delivery are things that can help mitigate the incessant barrage of work life on one's personal life. People are used to getting instant answers now, but we must all have healthy boundaries. I will be an excellent employee, however, my family is even more important. Like Gandalf in 'Lord of the Rings,' I will turn things off so that messages 'do not pass' and I can have healthy time off work. Take a digital sabbath: Once a week I put up my phone for a day. I schedule social media updates ahead of time. I do have a worry about when smartphones move into our glasses and contacts. This is why doing these things has to be easier. If we want healthy human beings we need to establish boundaries."

A **retired Web developer** wrote, "The biggest/easiest action that can be taken is to require cell phones be turned off in all public places or have designated cell phone areas. If I can't have a cigarette, why should they be able to share their phone conversation with me? It would allow people to talk to each other in restaurants. To look up instead of down in parks. To be disconnected for just a short amount of time to enjoy the other things around them."

Fabian Szulanski, a professor at Instituto Tecnológico de Buenos Aires, said, "AI is a matter of balance. Programmed digital detox with personalized prompts of digital personal assistants will avoid or dampen side effects such as isolation, nature-deficit disorder, eyesight issues, attention-deficit, anxiety and depression."

Rich Miller, a practice leader and consultant for digital transformation at Telematica, Inc., wrote, "Thoughtful and pragmatic incorporation of legal mechanisms offers a number of opportunities to improve the situation. **1)** Establishment of legal liability for software (particularly embedded software) that 'misbehaves' and cannot be updated in the field. This includes punitive measures for faulty software/systems that endanger life (e.g., medical instruments, healthcare systems). **2)** Establishment of effective data privacy legislation, appropriate penalties for non-compliance and effective enforcement."

An **anonymous respondent** wrote, "There _are_ things that can be put in place, but – outside of the internet stopping – people will find ways around anything others put in place for them. It's like seatbelts in cars. Once, there were no seatbelts and people got hurt a lot. Then there WERE seat belts, but only a few people used them and they were still a lot hurt. Then the industry had the car warn you when you didn't wear your seat belts, and people got around that too by buckling it before they sat down. Then states made it a law and more people used them, but some still didn't. Now kids are growing up who have never NOT used a seat belt and they think it's stupid not to. That's pretty much the steps we have to go through with the internet, but we are still in the 'no seat belts' phase of the story. It's going to take generations to have internet 'seat belts' become a common and accepted thing, and there are going to be millions injured in the meantime."

Edward Tomchin, a retiree, wrote, "Humankind has a quirk. When we discover something new, it seems the first thing we do is abuse ourselves with it. There's a long history of this behavior, so I expect it will be no different with AI or anything else we discover or create. But we always manage to rise above it. I don't see that changing much. In fact, right now we are in the midst of political chaos, but the picture we see around us at this moment is not a foretelling of the future. It is a portrait of what we are leaving behind. We are in the midst of one of the greatest changes in human life we've ever encountered and it's happening at an amazingly fast rate. Yes, there will be some losses because change is a fearsome thing, but we will survive it and like the Phoenix, rise."