The Future of Well-Being in a Tech-Saturated World

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BY *Janna Anderson and Lee Rainie*

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When the Pew Research Center asks American internet users for their bottom-line judgment about the role of digital technology in their own lives, the vast majority feel it is a good thing.

Yet, over the past 18 months a drumbeat of concerns about the personal and societal impacts of technology has been growing – and it crescendoed last week in the congressional grilling of Facebook CEO Mark Zuckerberg about his company's power and impact on American life. More broadly the concerns are highlighted by headlines about the "Heavy Toll of 'Always On' Technology," the emergence of a "techlash" driven by people's disillusionment with the online environment, and worries over digital dystopia. There has also been commentary and research about the effects digital technology usage can have on people's well-being, their level of stress, their likelihood of committing suicide, their ability to perform well at work and in social settings, their capability to focus in an era of information overload, their capacity to modulate their level of connectivity, and their overall happiness.

In light of these mounting concerns, Pew Research Center and Elon University's Imagining the Internet Center queried technology experts, scholars and health specialists on this question: ***Over the next decade, how will changes in digital life impact people's overall well-being physically and mentally?***

Some 1,150 experts responded in this non-scientific canvassing. Some **47%** of these respondents predict that individuals' well-being will be *more helped than harmed* by digital life in the next decade, while **32%** say people's well-being will be more *harmed than helped.* The remaining **21%** predict there will *not be much change in people's well-being* compared to now. (See the section titled "About this canvassing of experts" for further details about who these experts are and the structure of this canvassing sample.)

Many of those who argue that human well-being will be harmed also acknowledge that digital tools will continue to enhance various aspects of life. They also note there is no turning back. At the

same time, hundreds of them suggested interventions in the coming years they feel could mitigate the problems and emphasize the benefits. Moreover, many of the hopeful respondents also agree that some harm will arise in the future, especially to those who are vulnerable.

Participants were asked to explain their answers, and most wrote detailed elaborations that provide insights about hopeful and concerning trends. They were allowed to respond anonymously and many did so; their written comments are also included in this report.

Three types of themes emerged: those tied to expert views that people will be more helped than harmed when it comes to well-being; those tied to potential harms; and those tied to remedies these experts proposed to mitigate foreseeable problems. The themes are outlined in the nearby table.

Themes about the future of well-being and digital life

MORE HELPED THAN HARMED	**Connection**	Digital life links people to people, knowledge, education and entertainment anywhere globally at any time in an affordable, nearly frictionless manner.
	Commerce, government and society	Digital life revolutionizes civic, business, consumer and personal logistics, opening up a world of opportunity and options.
	Crucial intelligence	Digital life is essential to tapping into an ever-widening array of health, safety, and science resources, tools and services in real time.
	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.
	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.
MORE HARMED THAN HELPED	**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.
	Digital addiction	Internet businesses are organized around dopamine-dosing tools designed to hook the public.
	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.
	Digital duress	Information overload + declines in trust and face-to-face skills + poor interface design = rises in stress, anxiety, depression, inactivity and sleeplessness.
	Digital dangers	The structure of the internet and pace of digital change invite ever-evolving threats to human interaction, security, democracy, jobs, privacy and more.
POTENTIAL REMEDIES	**Reimagine systems**	Societies can revise both tech arrangements and the structure of human institutions – including their composition, design, goals and processes.
	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).
	Regulate	Governments and/or industries should create reforms through agreement on standards, guidelines, codes of conduct, and passage of laws and rules.
	Redesign media literacy	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.
	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.
	Fated to fail	A share of respondents say all this may help somewhat, but – mostly due to human nature – it is unlikely that these responses will be effective enough.

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These findings do not represent all the points of view that are possible in responding to a question like this, but they do reveal a wide range of valuable observations based on current trends. Here are some representative quotes from these experts on each of these themes.

The benefits of digital life

Connection: **Daniel Weitzner**, principal research scientist and founding director of MIT's Internet Policy Research Initiative, explained, "Human beings want and need connection, and the internet is the ultimate connection machine. Whether on questions of politics, community affairs, science, education, romance or economic life, the internet does connect people with meaningful and rewarding information and relationships. … I have to feel confident that we can continue to gain fulfillment from these human connections."

Commerce, government and society: **Pete Cranston**, a Europe-based trainer and consultant on digital technology and software applications, wrote, "There's a top-1%, first-world response, which is to bemoan the impact of hyperconnectedness on things like social interaction, attention span, trolling and fake news – all of which are real but, like complaining about the marzipan being too thick on the Christmas cake, are problems that come with plenty and surplus. There's a rest-of-the-world response which focuses more on the massive benefits to life from access to finance, to online shopping, to limitless, free research opportunities, to keeping in touch with loved ones in far-away places (and think migrant workers rather than gap-year youth)."

Crucial intelligence: **Micah Altman**, director of research and head scientist for the program on information science at MIT, said, "Most of the gains in human well-being (economic, health, longevity, life-satisfaction and a range of choices) over the last century and a half have come from advances in technology that are the long-term results of scientific advances. However, these gains have not been distributed equitably, even in democracies. Many advances from the fields of computer science, information science, statistics and computational social science are just beginning to be realized in *today's* technology – and there remains a huge potential for long-term improvement. Further, since information is a non-consumptive good, it lends itself to broad and potentially more equitable distribution. For example, the relatively recent trends towards openness in scientific publication, scientific data and educational resources are likely to make people across the world better off – in the short term, by expanding individuals' access to a broad set of useful information; in the medium term, by decreasing barriers to education (especially higher-ed); and in the long term by enhancing scientific progress."

Contentment: **Stephen Downes**, a senior research officer at the National Research Council Canada, commented, "The internet will help rather than harm people's well-being because it breaks down barriers and supports them in their ambitions and objectives. We see a lot of disruption today caused by this feature, as individuals and companies act out a number of their less desirable ambitions and objectives. Racism, intolerance, greed and criminality have always lurked beneath the surface, and it is no surprise to see them surface. But the vast majority of human ambitions and objectives are far more noble: people desire to educate themselves, people desire to communicate with others, people desire to share their experiences, people desire to create networks of enterprise, commerce and culture. All these are supported by digital technologies, and while they may not be as visible and disruptive as the less-desirable objectives, they are just as real and far more massive."

Continuation toward quality: **Paul Jones**, professor of information science at the University of North Carolina, Chapel Hill, proposes that future artificial intelligence (AI) will do well at enhancing human well-being, writing, "Humans need tools. Humans need and want augmentation. And as the saying goes 'First we make our tools, then our tools form us.' Since the first protohuman, this has been true. But soon our tools will want, demand and create tools for their own use. The alienation of the industrial age has already given up the center stage to the twisted social psychology of the service industry. Next, will our tool-created overlords be more gentle and kind than the textile factory, the sewing room or the call center? I believe they will be."

Concerns over harms

Digital deficits: **Nicholas Carr**, well-known author of numerous books and articles on technology and culture, wrote, "We now have a substantial body of empirical and experiential evidence on the personal effects of the internet, social media and smartphones. The news is not good. While there are certainly people who benefit from connectedness – those who have suffered social or physical isolation in the past, for instance – the evidence makes clear that, in general, the kind of constant, intrusive connectedness that now characterizes people's lives has harmful cognitive and emotional consequences. Among other things, the research reveals a strong association, and likely a causal one, between heavy phone and internet use and losses of analytical and problem-solving skill, memory formation, contextual thinking, conversational depth and empathy as well as increases in anxiety."

Digital addiction: **David S.H. Rosenthal**, retired chief scientist of the LOCKSS Program at Stanford University, said, "The digital economy is based upon competition to consume humans' attention. This competition has existed for a long time (see Tim Wu's 'The Attention Merchants'), but the current generation of tools for consuming attention is far more effective than previous

generations. Economies of scale and network effects have placed control of these tools in a very small number of exceptionally powerful companies. These companies are driven by the need to consume more and more of the available attention to maximize profit. This is already having malign effects on society (see the 2016 presidential election). Even if these companies wanted to empower less-malign effects, they have no idea how to, and doing so would certainly impair their bottom line. Thus these companies will consume more and more of the available attention by delivering whatever they can find to grab and hold attention. The most effective way to do this is to create fear in the reader, driving the trust level in society down (see Robert Putnam's 'Making Democracy Work' for the ills of a low-trust society)."

Digital distrust/divisiveness: **Judith Donath**, author of "The Social Machine, Designs for Living Online," commented, "If your objective is to get people to buy more stuff, you do not want a population of people who look at what they have and at the friends and family surrounding them, and think to themselves 'life is good, I appreciate what I have, and what I have is enough.' If your goal is to manipulate people, to keep a population anxious and fearful so that they will seek a powerful, authoritarian leader – you will not want technologies and products that provide people with a strong sense of calm and well-being. Keeping people in a continual state of anxiety, anger, fear, or just haunted by an inescapable, nagging sense that everyone else is better off than they are can be very profitable. In short, the individual researchers and developers may be motivated by a sincere desire to advance understanding of mood, cognition, etc., or to create technologies that nudge or control our responses for our own good, but the actual implementation of these techniques and devices is likely to be quite different – to be used to reduce well-being because a population in a state of fear and anxiety is a far more malleable and profitable population."

Digital duress: **Jason Hong**, professor at the Human Computer Interaction Institute at Carnegie Mellon University, wrote, "Many years ago, the famed Nobel laureate Herb Simon pointed out that 'Information consumes the attention of its recipients. Hence a wealth of information creates a poverty of attention.' Simon presciently pointed this out in 1971. However, back then, the challenge was information overload. Today, we now also have organizations that are actively vying for our attention, distracting us with smartphone notifications, highly personalized news, addictive games, Buzzfeed-style headlines and fake news. These organizations also have a strong incentive to optimize their interaction loops, drawing on techniques from psychology and mass A/B testing to draw us in. Most of the time it's to increase click-through rates, daily active users and other engagement metrics, and ultimately to increase revenues. There are two major problems with these kinds of interactions. The first is just feeling stressed all the time, due to a constant stream of interruptions combined with fear of missing out. The second, and far more important, is that engagement with this kind of content means that we are spending less time building and maintaining relationships with actual people. Having good friends [has the] equivalent [health

effects] of quitting smoking, and today's platforms are unintentionally designed to isolate us rather than helping us build strong relationships with others."

Digital dangers: **Tiziana Dearing**, a professor at the Boston College School of Social Work, said, "People's well-being will be affected for the worse by digital technology for three reasons. 1) Because we have evolved as interpersonal, social creatures and therefore are unable to adapt to the behaviors, needs, even maybe the wiring required to thrive socioemotionally and physically in a digital world at the pace that digital change will require. 2) Because digital technology – from design to algorithms – has evolved without sufficient consideration of social empathy and inherent bias. 3) Because we have not figured out how to mitigate the ability that certain forms of technology have created to be our worst selves with each other. Don't get me wrong. Technological developments hold tremendous potential to cure disease, solve massive human problems, level the information playing field, etc. But our ability to adapt at a species level happens on a much slower cycle, and our human behaviors get in the way."

Intervention ideas to ease problems

Reimagine systems: **Sherry Turkle** one of the world's foremost researchers into human-computer interaction and professor at MIT, shared the following action steps: "1) Working with companies in terms of design – [these tools] should not be designed to engage people in the manner of slot machines. 2) [There should be] a movement on every level to make software transparent. This is a large-scale societal goal! 3) Working with companies to collaborate with consumer groups to end practices that are not in the best interests of the commons or of personal integrity. 4) A fundamental revisiting of the question of who owns your information. 5) A fundamental revisiting of the current practices that any kind of advertisement can be placed online (for example ads that are against legal norms, such as ageist, sexist, racist ads). 6) Far more regulation of political ads online. 7) An admission from online companies that they are not 'just passive internet services.' 8) Finding ways to work with them so that they are willing to accept that they can make a great deal of money even if they accept to be called what they are! This is the greatest business, political, and social and economic challenge of our time, simply learning to call what we have created what it really is and then regulate and manage it accordingly, bring it into the polity in the place it should really have."

Reinvent tech: **Susan Price**, lead experience strategist at USAA, commented, "We can use human-centered technology design to improve our experiences and outcomes, to better serve us. I have a vision for a human API that allows us to moderate and throttle what occupies our attention – guided by principles and rules in each user's direct control, with a model and framework that prioritizes and categorizes content as it reaches our awareness – to reduce effort and cognitive load

in line with our own expressed goals and objectives. Today we cede that power to an array [of] commercial vendors and providers."

Regulate: **Dana Chisnell**, co-director of the Center for Civic Design, wrote, "There are dozens of projects happening to try to make the internet a better place, but it's an arms race. As individuals find tools for coping and managing their digital lives, technology companies will find new, invasive ways to exploit data generated on the internet in social media. And there will be more threats from more kinds of bad actors. Security and privacy will become a larger concern and people will feel more powerless in the face of technology that they don't or can't control. And it will take many years to understand how to negotiate that race and come to some kind of detente."

Redesign media literacy: **Alex Halavais**, director of the M.A. in social technologies program at Arizona State University, said, "The primary change needs to come in education. From a very early age, people need to understand how to interact with networked, digital technologies. They need to learn how to use social media, and learn how not to be used by it. They need to understand how to assemble reliable information and how to detect crap. They need to be able to shape the media they are immersed in. They need to be aware of how algorithms and marketing – and the companies, governments, and other organizations that produce them – help to shape the ways in which they see the world. Unfortunately, from preschool to grad school, there isn't a lot of consensus about how this is to be achieved."

Recalibrate expectations: **Sheizaf Rafaeli**, a professor at the University of Haifa in Israel, wrote, "People are adaptive. In the long run, we are reasonable, too. We will learn how to reign in the pitfalls, threats, bad guys and ill-meaning uses. These will continue to show up, but the march is towards progress. Better, more meaningful lives. Healthier, more-supportive environments. It is a learning process, and some of us, sometimes, get an 'F' here or there. But we learn. And with digital tech, we learn faster. We converse and communicate and acknowledge each other like never before. And that is always a good start. Bad things, like greed, hate, violence, oppression will not be eradicated. But the digital is already carrying, delivering and instantiating much promise. This is not rosy-colored utopian wishful thinking. It is a realistic take on the net effects. I would rather trade places with my grandkids than with my grandparents."

Fated to fail: **Douglas Massey**, a professor of sociology and public affairs at Princeton University, responded to say that interventions are not likely to be possible. He wrote, "I am not very optimistic that democratically elected governments will be able to regulate the internet and social media in ways that benefit the many rather than the few, given the vast amounts of money and power that are at stake and outside the control of any single government, and intergovernmental

organizations are too weak at this point to have any hope of influence. The Trump administration's repeal of net neutrality is certainly not a good sign."

1. The state of play for technology and looming changes

A strong narrative about online life has arisen in recent years that pushes back against the techno-optimism of the earlier days of the internet. A roundup of recent headlines underscores the darker storyline:

- The Global Risks 2018 report by the World Economic Forum lists "adverse consequences of technological advances" as one of the top risks societies are facing today.
- Psychology professor Jean Twenge has sounded widely covered alarms that technology might be destroying a generation and, in particular, published research arguing that heavy tech use is linked to teen suicide and depression.
- The American Psychological Association found that constantly checking electronic devices is linked to significant stress for most Americans.
- The American Academy of Pediatrics reports that youth well-being, social connectedness and empathy are under threat in digital life.
- The National College Health Assessment reports record numbers of university students are seeking assistance for stress, overwhelming anxiety, and depression. A New York Times Magazine piece noted that UCLA's Higher Education Research Institute college survey in 1985 found that 18% of students felt "overwhelmed"; in 2010, that share was 29%, and in 2016, it jumped to 41%.
- Some people blame business models of powerful corporations battling for attention in an age of information overload. Researcher danah boyd said the tech industry is "now the foundation of our democracy, economy and information landscape. We no longer have the luxury of only thinking about the world we want to build. We must also strategically think about how others want to manipulate our systems to do harm and cause chaos."
- Former tech leaders from Google, Facebook and Apple agree with boyd, saying a "fundamental flaw" in the way business is done in the digital age is causing damage to society. Facebook's original president, Sean Parker, said the company intentionally sought to addict users by "exploiting a vulnerability in human psychology." Former Facebook executive Chamath Palihapitiya said: "The short-term, dopamine-driven feedback loops that we have created are destroying how society works: no civil discourse, no cooperation, misinformation, mistruth." Former Google design ethicist Tristan Harris launched the nonprofit Time Well Spent aimed at stopping "tech companies from hijacking our minds." The Center for Humane Technology is reportedly creating a "Ledger of Harms," a website where engineers can express concerns about what they are being asked to build.
- In early 2018 Facebook responded: CEO Mark Zuckerberg wrote in a post pledging to fix Facebook, "The world feels anxious and divided, and Facebook has a lot of work to do."

Facebook also restructured its algorithm in early 2018, with the goal to prioritize people's personal friends and family over viral content.
- XPRIZE Foundation CEO Peter Diamandis predicts that advances in quantum computing and the rapid evolution of artificial intelligence (AI) embedded in systems and devices will lead to "hyper-stalking," influencing and shaping of voters with hyper-personalized ads, and will create new ways to misrepresent reality, effectively spread misleading messages, and perpetuate falsehoods.

As concerns about the harmful impact of digital technology mount, Pew Research Center and the Imagining the Internet Center canvassed its database of technology experts, scholars and pundits about where things might stand in the coming decade when it comes to human and societal well-being. The preamble to the question we asked about digital life and its impact on people's health and well-being was:

> *People are using digital tools to solve problems, enhance their lives and improve their productivity. More advances are expected to emerge in the future that are likely to help people lead even better lives. However, there is increasing commentary and research about the effects digital technologies have on individuals' well-being, their level of stress, their ability to perform well at work and in social settings, their capability to focus their attention, their capacity to modulate their level of connectivity and their general happiness.*

They were then asked to respond to the question:

> ### *Over the next decade, how will changes in digital life impact people's overall well-being physically and mentally?*

They were given three options to choose from when considering their response. In all, 1,150 experts responded to these answer options:

> *Over the next decade, individuals' overall well-being will be* **more HELPED than HARMED** *by digital life.* **47%** of these experts chose this option.

> *Over the next decade, individuals' overall well-being will be* **more HARMED than HELPED** *by digital life.* **32%** of these experts chose this option.

> *There* **will not be much change** *in people's well-being from the way it is now.* **21%** of these experts chose this option.

This report covers their written responses to our invitation to elaborate on their answer to this question and their written answers to a follow-up question:

> ***Do you think there are any actions that might successfully be taken to reduce or eradicate potential harms of digital life to individuals' well-being?***
>
> Some 92% of respondents chose this option: ***Yes***, *there are interventions that can be made in the coming years to improve the way people are affected by their use of technology.*
>
> Some 8% chose this option: ***No***, *there are not interventions that can be made to improve the way people are affected by their use of technology.*

Some respondents wrote material that summarizes the state of play of modern life that is being – and will be – shaped by digital technology. Those overview answers serve as a good starting point.

An **anonymous professor** participating in this canvassing observed, "We're moving from the perception of time and space connected with factory life – in which the flow of time was stamped into schedules that needed advance planning – to a world of continuous flow, in which the moment can be reimagined and altered constantly. This allows many more possibilities, but also a keen sense of opportunity costs, as we compare the way we experience our lives to an endless set of better possibilities."

Jerry Michalski, founder of the Relationship Economy eXpedition, wrote about the disruptive chaos that lies ahead, "Whether the internet will increase well-being or not on the whole is unanswerable. In pockets, it's addressable, and right now I think the positive pockets outweigh the potential negatives. For example, learning can now cost nothing except a person's effort. People who fear one another can become familiar and dispel their fear. Plans for how to improve the world are easy to share. Resources and movements can collect energy and scale online. Meanwhile, spin and the destruction of facts could take us into nuclear wars, the next nationalist nightmares or climate catastrophes larger than we've imagined. How do you sum all that?"

Some respondents stressed that both kinds of futures are possible and can be affected by the choices that are made now. **Amy Webb**, futurist, professor of strategic foresight at New York University and founder of the Future Today Institute, argued, "If our current habits continue unchanged, it's easiest to map pessimistic and catastrophic scenarios. People will be surrounded by

more misleading or false information, not less. We'll see more YouTube and Twitch stars testing the thresholds of what their audiences are willing to watch, which means ever more salacious, incendiary content, disturbing images and dangerous behaviors. Government officials and political leaders at all levels will add to the vitriol online, posting quick hits that don't advance democracy in any meaningful way. Eventually regulators, hoping to safeguard our well-being, will introduce laws and standards that differ from country to country, effectively creating a splintered internet. Regional splinternets will likely cause more harm than good, as the big tech companies will find it impossible to comply with every legal permutation, while our existing filter bubbles will expand to fit our geographic borders. Our well-being is directly tied to our sense of safety and security, which would be upended in these scenarios. But the good news is that these scenarios haven't happened yet. We can decide that we want a different outcome, but that requires making serious changes in how we use and manage information today. … We can choose to improve the quality of our digital experiences by forcing ourselves to be more critical of the information we consume. … The world we see looking only through the lens of a single post never reveals all of the circumstances, context and detail. Schools must teach digital street smarts … from an early age, kids should learn about bots and automatically-generated content. They should have provocative ethics conversations – with their peers, not just their parents – about online content and about technology in general. Content distributors must stop asserting that they are merely platforms. … As we enter the Artificial Intelligence era we must examine and make transparent how platforms make decisions on our behalf."

An **anonymous professor of philosophy at a major U.S. technological university** wrote, "There's a fundamental question that society needs to better confront: As technology advances and becomes 'smarter,' are we, human beings, being techno-socially engineered to behave increasingly like simple machines?

In the next section, we outline three sets of key themes found among the written elaborations to questions one and two of this canvassing:

> 1) Statements affirming the great appreciation for the wonders of digital life expressed by the vast majority of these respondents.
> 2) Statements illuminating people's worries over digital life.
> 3) People's hopeful suggestions for potential improvements – and some doubts expressed about the likely success of these.

Some responses are lightly edited for style.

Correction: A previous version of this report contained one instance where the figures for those who said overall well-being would be more helped than harmed by digital life and those who said it would be more harmed than helped were transposed. That correction has been made.

2. Hopes for the future of the digital life

The core question guiding this study explores experts' attitudes about the future of people's well-being. A plurality of the participants endorsed the abundant positives of digital life and said they expect humans and technologies will continue to build upon them. On balance, this hopeful group argued that the beneficial impact of digital life will make its negatives mostly tolerable.

Rob Atkinson, president of the Information Technology and Innovation Foundation, said, "Like most technologies, the overall benefit is positive, otherwise people would not adopt them. The internet and its continuing evolution is no different. With all the popularity of 'internet-is-harmful' books, articles and talks these days, they overlook the amazing good that it provides for most people. As the internet has matured and become more ubiquitous we have all too often taken for granted the amazing improvement in our lives."

Vint Cerf, Internet Hall of Fame member and vice president and chief internet evangelist at Google, commented, "I am persuaded that we will have more tools at our disposal to improve our ability to do knowledge work, to discover relevant information, to keep ourselves and others informed. Machine learning will be part of that toolkit. Autonomous software running in the background (think: Google Alert for example) will also prove useful. Automatic translations (spoken and written) will improve our ability to conduct international business or maintain relationships. New businesses will form around these advanced information-processing capabilities."

Ethan Zuckerman, director of the Center for Civic Media at MIT, wrote, "We are becoming more aware of the dangers and shortcomings of a digitally connected life. That said, we can't forget the many people who've built new connections or rebuilt old ones through online tools. We're at a moment of waking up to downsides and figuring out how to address them – this isn't a moment to back away from the internet as a space for interaction."

Paul Saffo, a leading Silicon-Valley-based technological forecaster and consulting professor in the School of Engineering at Stanford University, said, "Heraclitus put it eloquently over two millennia ago – 'nothing new comes into our lives without a hidden curse.' The greater the marvel, the greater the unexpected consequences. Five centuries ago, the advent of the printing press utterly atom-smashed the social, religious and ultimately the political order of Europe. It ushered in a half century of chaos and conflict. But it also opened the door to the Enlightenment and the rise of representative political orders. The optimistic internet visionaries of the 1990s were neither naive nor mistaken. The expected future always arrives late and in unexpected ways. We are in for a wild period of disorder, but beyond is a sunny upland."

An **anonymous technology developer/administrator** said, "The harms brought by technology are considerable, and should not be minimised. They represent both the adjustments that we need to make to accommodate new ways of doing things and structural changes and shifts in power that result. *However*, the benefits should not be forgotten; for every person who risks 'internet addiction' or 'smartphone overload,' there are people elsewhere who see quantifiable improvements in quality of life, opportunity, education and human rights as a result of technology."

David Weinberger, a senior researcher at Harvard's Berkman Klein Center for Internet & Society, said, "It is difficult and possibly impossible to evaluate a change of the magnitude that we are living through, for our values themselves are changing. For example, it is changing some of the most fundamental formations of sociality. We worry that our children or our colleagues are spreading themselves too thin across a loose network of 'friends' – putting the word in quotes to indicate our concern and disdain. At the same time, we are spending more time being social in these thin networks, and we carry our friends and acquaintances with us through our lifetimes in ways we never could before. Perhaps we'll look back and pity the millennia when we were limited to a handful of friendships formed among people who happen to live close to us, and when we had to say final farewells to friends when we move away. This is not to say that everything is working out great so far. For example, bullying and intolerance are flourishing on the Net, and there is no future state in which that is a good thing. We can blame this on the Net, or we can say that we have uncovered a nastiness in the human social makeup that needs to be addressed by norms, morality, art and education. Or both. But if I'm going to call out some negatives after saying that we can't evaluate what we are becoming, I feel compelled to point out some of the hopeful values that have already emerged on the Net. We are more social, more creative, funnier and more collaborative. This is a flourishing of our social nature so deep that it is transformative. It is important to remember the positives we see on the Net or else we will shut it down for fear of the negatives. My secret hope is that in this transitional stage we are poking at every extreme to explore the boundaries of the possible, and will eventually – before too long – file down the most hurtful edges."

Shiru Wang, a research associate at the Chinese University of Hong Kong, said, "Two sides coexist. On the one hand, the internet will significantly improve social communication and economic opportunities (e.g., e-shops) of the world population as a whole, especially when the former digital have-nots are able to access the internet. On the other hand, the redundancy, information explosion, the tendency of the internet's (sic) dominating one's life will continue bothering the 'post-Internet' generation, if not becoming worse. But I believe that there will be an inverted 'U-shape' on which the digital communication technologies benefit the overall well-being of the world population. We have not reached the peak point yet."

Fred Baker, an internet pioneer and longtime leader with the Internet Engineering Task Force, wrote, "Will there be innovations? Yes, definitely. Will they impact us negatively or positively? Yes. And I would imagine the ones we will talk about will be the negative impacts, not the positive."

Brad Templeton, software architect, civil rights advocate, entrepreneur, internet pioneer and chair emeritus for the Electronic Frontier Foundation, wrote, "That we need to do a better job mitigating the bad effects does not stop the good effects from being worth it. There are still scores of ways we all find it hard to imagine how we did things in the past without our digital tools."

In the next few sections of this report we share respondents' thoughts on the myriad ways digital life enhances individuals' well-being and builds a better future for people living digital lives. This content is organized under these commonly occurring themes: connection; commerce, government and society; crucial intelligence; contentment; and continuation toward quality.

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

The essence of digital life, these experts argue, is *connection*. It is the most apt one-word reason people today feel they simply cannot get along without it. **Doug Breitbart**, co-founder and co-director of The Values Foundation, said, "The internet and the connectivity it provides offers greater and greater numbers of people access to information, education, social connection and affinity with others, and the potential to distribute, empower, enfranchise and unleash individual human generativity on a scale of unlimited potential."

Louis Rossetto, founder and former editor-in-chief of Wired magazine, said, "For all the negative effects of digital technologies – and there have been many – the net effects have been overwhelmingly positive. Across the planet, people in every culture, in every economic group have seen their lives improve dramatically, directly because the development and deployment of digital technologies and networks."

Alejandro Pisanty, a professor at Universidad Nacional Autónoma de México and a longtime participant in the activities of the Internet Society, wrote, "The benefits of digital life will continue to outweigh the deleterious effects for a long time and for increasing numbers of people. At the very least this is a sampling and baseline issue: A fresh billion people will soon gain access to the most basic benefits with little or no significant damage from the negative side effects."

Hassaan Idrees of Karachi, Pakistan, said, "People will be helped more than harmed by digitization. Already, important discoveries and developments in areas as diverse and impactful as

genomics, cancer and stem cell research, energy access, curriculum delivery and health solutions have been, and continue to be shared. I foresee continued positive developments in this regard."

Fabian Szulanski, a professor at Instituto Tecnológico de Buenos Aires, said, "Well-being will be helped. The democratic distribution of knowledge and decision-making; remote access to health monitoring and to doctors and health workers; communication platforms for bottom-up peaceful and generative conversations; socialization of disabled people; communities of wellness; PTSD and depression treatment; and the 3D printing of everything, including medicines, are just a few examples."

Frank Feather, a business futurist and strategist with a focus on digital transformation, commented, "Every technology is an extension of human abilities and capabilities. To succeed, it must be technically viable, economically worthwhile and politically and socially acceptable. It must be used wisely and for good not ill. Overall, while each technology causes certain disruptions, over the long term, if well administered, every innovation improves the overall quality of life. So it is with the internet and digital technologies. These technologies will continue to enhance education, aid in research, foster a simpler lifestyle and work processes, and they will create far more jobs than they eliminate. They also will enhance life and commerce by creating wealth, higher productivity-induced incomes and shorter workweeks. They will enhance the leisure aspects of life, and also make it easier for people to connect worldwide, eventually helping to overcome differences in values and cultures."

Rob Frieden, a professor of telecommunications and law at The Pennsylvania State University, said, "On balance, access to digital technologies and the literacy to use them will enhance social quality of life. These technologies provide new and better tools for individual and societal transactions, including education, career development, tele-health, e-government. I do not consider it wishful thinking to believe that many people can more effectively use these technologies than what pre-Internet technologies offered."

Nathalie Coupet, an internet advocate based in North America, said, "The internet will have positive aspects in people's lives as far as it can be harnessed. It facilitates meaningful communication in an Information Society, but also creates 'thought silos,' stress and isolation. There is no substitute for human interaction, and public policies should be designed to increase human interaction in public places."

Eileen Rudden, co-founder of LearnLaunch, wrote, "The broadening of access to information and education and work to all of the world's populations by the internet will continue to create a net new benefit to humanity."

Kathryn Campbell, a digital-experience design consultant, said, "There is no question that continuous connectivity and attention-enticing content is producing shifts in our behavior and even our cognition. I find it much more difficult to focus for long periods of time now, especially when I am online, which is most of the time. I also find it hard to disengage. However, the benefits of connectivity are enormous. Those who are physically and/or socially isolated can now interact with a wide range of people. All those with internet access can inform and educate ourselves according to our interests at little to no cost. Data on diseases can be pooled and analyzed in ways that were cost and time prohibitive in the past. Overall, the forces that connect us draw us closer together in myriad interesting ways."

Neil McIntosh, managing editor of BBC Online, said, "Digital technologies have brought myriad improvements."

A sampling of additional comments related to "connection" from **anonymous respondents**:

- "The benefits include the capacity to find each other and network in new ways; access to information and services at your fingertips; higher-quality entertainment in homes and in hand; finding things with considerable less hassle and travel; new advances in analytics."
- "Digital tools are often free, easily portable and can automate tasks that would otherwise take up cognitive space."
- "A great section of society now has the ability to learn about any subject on the planet. We walk around with the contents of a global library in our pocket."
- "There is huge educational potential in online and technology-enhanced learning and that we have barely scratched the surface of that potential."
- "The entertainment uses of the internet will continue to expand. Although many of these will be harmful to people's productivity, sense of purpose and well-being, in moderation they open opportunities for personal enjoyment that should not be discounted."

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

The rise of global communications networks in the past few decades has produced revolutionary transformations of many essential life activities, according to the more hopeful experts responding to this canvassing. Many respondents chose to illuminate the ways in which society's political, economic and social realms have been enhanced globally, also enhancing individuals' well-being. Only about half of the people in the world are connected; billions more are expected to gain connectivity in coming years.

Nalaka Gunawardene, science writer and information and communication technology (ICT) researcher based in Sri Lanka, said, "Digital tools/technologies come with some potential problems, but on the whole I consider them more beneficial in a developing country like Sri Lanka where a third of the 21 million population now regularly uses the internet. The spread of digital and Web tools during the past decade has had far-reaching impacts on our families, society, culture and politics. For example, they undermine our feudal and hierarchical social orders, enabling a meritocracy to emerge. They disrupt conventional business models in our unimaginative media, creating new opportunities for digital startups to innovate. They create new spaces and opportunities for youth to participate in politics and social reforms. Digitally-armed young people are challenging the status quo in schools, workplaces and civil society. These larger benefits far outweigh misuse and excesses of digital technologies."

Larry Roberts, Internet Hall of Fame member, original ARPANET leader, now CEO/CFO/CTO of FSA Technologies Inc., said, "The improvement in allowing the majority of us [to] work at home will greatly improve our lives. This requires bandwidth and speed per home that many do not have today. Besides being able to do all our digital work online, this requires easy and cheap video conferencing with our co-workers, customers and outside contacts. Savings in office space, an office computer, our ability to mix business with other home demands like signature deliveries and eliminating the stress and time lost in commuting are a few of the benefits. They represent significant cost savings and also an improved quality of life."

Akah Harvey, co-founder, COO and IT engineer at Traveler Inc., based in Cameroon, said, "We are already experiencing the many advantages that are brought by developing technologies that address our local problems. Most of these directly improve the well-being of people in this part of the world (Africa)."

Larry Irving, president and CEO of the Irving Group and co-founder of the Mobile Alliance for Global Good, wrote, "The opportunities in health, education, commerce, agriculture, finance, sustainability and even government will compensate for the very real negative potential consequences."

Fernando Ortega, a director of the National Council of Science, Technology and Innovation of Peru, said, "New tech developments will allow the concentration of human efforts (including work) on more complex activities, leaving the routine activities to machines. This will generate new jobs and enhance the opportunities to new companies emerging from innovations. The key factors for a successful economy will be technological education, telecom infrastructure and a promotional environment for the creation of new ventures."

Olugbenga Adesida, founder and CEO of Bonako, based in Africa, wrote, "The digital revolution has led to radical changes that many could not have imagined only a decade ago. Despite the radical shifts so far, the digital revolution is still at its infancy, especially with respect to its potential impacts on socioeconomic development in the developing world. The potential is high in various fields, from health, livelihoods, and education to governance. While the potential for harmful effects will always be there, the use of the emerging digital tools in development will be transformative. It will affect all sectors, from the way economic activities are organized, the way we deliver social services (education, health, etc.), to the way we govern ourselves. The critical challenge is whether Africa and the rest of the developing world will become active producers of the emerging technologies or remain primarily consumers."

Jon Lebkowsky, CEO of Polycot Associates, said, "I believe we're in a transitional phase – a phase that will last one or more generations. Digital literacy will evolve, as will global understanding of the implications of technology developments. Though we'll always have issues and bad actors, I believe that we'll catch up with technology and diminish the negative impacts. I'm lately focused on cooperative business, and I believe there are promising developments in that space – democratic worker co-ops forming, along with multi-stakeholder cooperatives facilitated by digital platforms. I'm also feeling hopeful about the impact of the 'internet of trust' that the blockchain promises to deliver. We're way early in the development of that technology, but it feels promising. Our way out of current moral challenges will definitely include/require systems of trust."

A sampling of additional comments related to "commerce, government and society" from **anonymous respondents**:

- "The internet is bringing about profound changes in medicine, public safety, education, our economy, public discourse and civic engagement."
- "The internet will continue its diversified growth at the core of work, leisure, social, etc."
- "Digital technology is already making big contributions to monitoring and diagnosis, access to information, education and markets, to job creation and similar markers of human welfare."
- "Blockchain will change the way that we pay for goods and services and undertake legal contracts."
- "We will see solutions to disease, renewable applications that will help address our climate crises and dependence on fossil fuels, the architecture of shelters, transportation and our exploration into the larger universe around us."

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

Many of the most enthusiastic experts made this argument: The advancement of knowledge in health and science globally and the potential future well-being of billions will be dramatically improved by the way digital technologies enable people to create, share, discover, monitor and remotely enable real-time actions.

David A. Bernstein, a retired market researcher and consultant, said, "The well-being of individuals will improve over the next decade as a result of greater integration of personal wearable technology and the internet. I see a day in the not too distant future where diabetes, heart conditions and basic diagnostic tools will be made closer to the patient through these. The distance and time between practitioner and patient will hopefully be greatly reduced."

Shel Israel, CEO of the Transformation Group, said, "There is a very large mountain of evidence in how it will help the well-being of people. Just in immersive technologies, such as AR [artificial reality] and VR [virtual reality], we are seeing improvements to the care and treatment of all sorts of diseases such as Alzheimer's, Parkinson's, schizophrenia, autism, non-opiate pain treatment and more. There are also clear improvements of surgery caused by use of the internet and immersive technologies in training medical practitioners."

Alf Rehn, a professor of innovation, design and management at the University of Southern Denmark, wrote, "AR has already gotten kids moving more (Go, *Pokemon Go*!). This will only increase, and new fitness solutions will help even us couch potatoes get up more. The Internet of Things will enable better health tracking, and a ubiquity of sensors will nudge us into better behaviors. Next up: The internet of healthier diets (or 'Who put a tracker in my liquor cabinet?!?')."

Gary L. Kreps, distinguished professor and director of the Center for Health and Risk Communication at George Mason University, wrote, "Digital health-information systems have the potential to significantly support individual and public health promotion by providing needed health advice (recommendations and reminders), answering important health questions, minimizing health care/maintenance errors and delivering timely support to solve health problems."

Fred Davis, a futurist/consultant based in North America, wrote, "There are a number of new transformative technologies that have the potential to increase people's psychological and emotional well-being. The one with the most potential is VR [virtual reality]. It has been shown to increase people's capacity for empathy. This alone is profound. VR [virtual reality] has been shown to treat depression more effectively and quickly than medications or talk-only therapy. VR has been used to treat anxiety disorders, phobias, social anxiety and PTSD. I know of a VR app for self-

compassion targeted at quieting your inner critic, also known as negative self-talk. It uses cognitive behavioral therapy. Other VR apps reinforce pro-social behavior and help relieve stress. 25% of the U.S. population has a mental illness at any given time, and 50% will have one during their lifetime. Being able to develop treatments and therapies to address these issues could have a very positive effect on people's well-being."

Laurie Orlov, principal analyst at Aging in Place Technology Watch, said, "One of the most disruptive technology changes is underway – as significant as the browser, smartphone and tablet. 'Voice first' technologies (examples: Amazon Echo, Google Home, Apple Siri) will be quality-of-life enhancements and enablers, for older adults in particular. Price points for devices, at $50 or less, make it feasible to speak a request or need, including communicating with family, friends and service providers. The opportunity is to reduce social isolation in the home, easily access information and services, and provide new ways to improve general quality of life."

A sampling of additional comments related to "crucial intelligence" from **anonymous respondents**:

- "We can anticipate major advances in health care delivery, active-wellness monitoring, management of chronic conditions, remote surgical procedures with potential for significant cost savings, patient access and improved outcomes."
- "Advances in technologies such as AI, machine learning and robotics will revolutionize fields such as medicine, healthcare and aged care."
- "There is a lot of potential for technology to help with affordances for people who have diminishing capabilities due to aging and mobility."
- "We can better monitor and respond to health threats, which can improve the health and well-being of the entire population."
- "There will be an expansion of remote medicine, improved information sharing, improved analysis of many types of data, from medical images to city traffic patterns. Smart cities that provide more information and accept more input from citizens can shorten the time to identify and resolve problems, from a broken street light to system issues like inappropriate police behavior."
- 'The informational elements of the internet are unleashing a flow of data access, analyses and new knowledge that has led to many breakthroughs."

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

The internet, web and associated technologies are powerful bootstrapping tools, according to some of these respondents. Digital life offers endless possibilities to anyone with a connection,

anywhere, anytime. Yes, it offers these same possibilities to criminals, con artists and crackpots. But the enthusiastic experts in this sample say that the personal empowerment enabled by digital technologies allows the vast majority of earnest, honest individuals to discover possibilities, solve problems, come together, find their bliss and make their lives sweeter. Their predictions argue that most people will spend most of their time online doing something they believe to be beneficial to their own well-being.

Richard Jones, an investor based in Europe, wrote, "The current development of IT tools in areas such as search, data mining and its feedback, voice interface and AI, AR and VR immersive experiences, drone and camera, blockchain and all applications thereof (such as value exchange and transaction enablement and accounting), smart-home management, remote education, mobility, etc., generally disintermediate, quicken and extend the possibilities for use of one's time. There is undoubtedly a challenge to accommodate this effectively into mentally stable patterns of behaviour as it tends toward a quickening of pace akin to burnout, but some of this can be accommodated by digital natives whereas silver surfers will be flummoxed by having to rationalise rather than accept or simply be confused and feel out of control. Digital natives will generally have better habits and acceptance, but, having said that, the technology does appear to have the potential to spin out of control by either cyber warfare, chip design errors, systemic collapse due to some unforeseen problem, etc. Put simply, this is like any great change: a period of heightened uncertainty about direction and outcome so much so that the world order and the very survival of humankind and the planet are issues in flux."

Ralph Droms, a technology developer/administrator based in North America, said, "New internet technologies will allow people to remain independent longer as they age as well as contribute to augmenting and improving daily life."

Mary Chayko, a professor at the Rutgers University School of Communication and Information, wrote, "People's well-being will be both helped and harmed in substantial measure as they continue to use and depend on digital technologies. We will be positively impacted when useful and credible information and opportunities flow through our networks and negatively impacted by false or demeaning exchanges and interactions – and in the modern social media era there will always be plenty of both. Access to education, literacy, physical and mental health care and financial (and other key) resources help tip the scale to the positive; efforts to increase their distribution widely and equally are therefore critical to the well-being of societies and individuals."

Kyle Rose, principal architect at Akamai Technologies Inc. and active Internet Engineering Task Force (IETF) participant, wrote, "Positive changes resulting from the greater opportunities for

learning and exploration, communication and collaboration for which the internet provides a foundation will persist. The net effect will be positive."

Ed Black, president and CEO of the Computer & Communications Industry Association, said, "Improvements in access to information, services, knowledge will in some cases enhance personal, business and cultural empowerment. However, the opportunity for misuse and negative utilization is also a constant and needs to not be ignored."

Glenn Grossman, consultant of banking analytics at FICO, wrote, "In the next decade, digital abilities will improve life and work with higher-quality services."

Barbara Clark, Ph.D., said, "One has to think about the Gutenberg press. To control the impact, the Catholic Church created the Imprimatur. The Gutenberg press eventually allowed the common person to have access to textual information. Fast forward to the internet, which opened access to global information – most importantly the ability of the common person of any age to create text, video, voice and animation. While we, as a society, currently struggle with the ramifications of this new Information Age, the coming years will only allow us to grow intellectually and help create a working global society."

A sampling of additional comments related to "contentment" from **anonymous respondents**:

- "The internet is a primary defense against isolation, in particular for people whose age, abilities, family circumstances and incomes limit their face-to-face interactions to a narrow circle. It allows people to continue to contribute in their fields and communities."
- "More people are meeting their life partners and friends online. The internet allows people a larger pool of other humans from which to choose who they spend their time with and it makes it more clear which of them they are likely to fit in with."
- "People's well-being will be improved because of increased efficiency at work and home. People can be more productive at work, and technology will improve convenience at home."
- "It expands the potential for local-community social safety nets, expands the potential for learning and education, expands the potential for exercising local-through-global citizenship."
- "People are able to access information about anything from anywhere, are able to speed up processes that ordinarily took much longer to complete, and with the advent of new technology will come new and improved ways of conducting business, learning, interacting and living."
- "Simply being online provides great benefits to people in many parts of the world, and in the next decade, a large number of people will get new access or faster access."

- "Technology affords a number of life-improving innovations. Technology will also contribute towards a reformulation of the social fabric, as online platforms begin to take the role that local communities have fostered and supported."

<u>Continuation toward quality</u>: 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

A common sentiment found throughout many of the responses about well-being in the next decade was shared by **Christian Huitema**, a technology developer/administrator based in North America. "I am optimistic," he wrote. "Yes, we do see negative side effects of social networks in particular and various forms of automation in general. But I believe that society will adapt and that digital services perceived as unhelpful will be replaced by better and more convenient services. Given time, this process should lead to improvements."

Peter Lunenfeld, professor and vice chair of the Design Media Arts department at UCLA, said, "In the more than a quarter of a century since the advent of the World Wide Web, and the decade of smartphone-driven social media, we've explored and exploited a lot of the worst that the digital can bring into our lives. The next decade will see a pendulum swing to more conscious and deliberate use of emerging and extant technologies."

Internet Hall of Fame member **Robert Metcalfe**, co-inventor of Ethernet, founder of 3Com, and a professor of innovation at the University of Texas at Austin, wrote, "Connecting is a good thing. We have not yet developed the tools to deal with the sudden connectivity of the internet, but even still, reduced economic frictions are leading to better lives. The road is bumpy, but we are moving toward freedom and prosperity for all."

Ray Schroeder, associate vice chancellor for online learning at the University of Illinois Springfield, wrote, "As the Internet of Things continues to expand, artificial intelligence applications become more integrated into the Web, virtual reality is refined and mixed reality is combined with geo-location, we will see a wide array of applications and uses that enhance the online experience. These technological advancements will combine with the network to disseminate services and create collaborations that we have not yet fully imagined."

Peter and Trudy Johnson-Lenz, principals of Pathfinding Smarter Futures, commented, "Individuals' over-all well-being will be helped by digital technologies – an increasing number of apps, virtual workshops, online support networks and the like emphasize aspects of positive psychology, work-life balance, de-stressing, personal and spiritual development and so on. Mindfulness is going mainstream and googling 'mindfulness apps' results in 1.7 million hits. A few

mindfulness apps also include biofeedback. Mindful use of digital tools in one's life can support and enhance well-being. Better yet, design of digital tools that encourage and reinforce more mindfulness, rather than obsession with whatever is on the screen, would be a big benefit. Some digital designers are speaking out about the 'addictive' qualities of smartphone interfaces. Key online articles by Farhad Manjoo, Stu Goulden, Bianca Bosker describe what makes interfaces and apps so addictive and what people can do to manage the negative effects. Former Google design ethicist Tristan Harris is now the executive director and co-founder of Time Well Spent. He writes, 'We are building a new organization dedicated to reversing the digital attention crisis and realigning technology with humanity's best interests … we are advancing thoughtful solutions to change the system.' Harris is a graduate of B.J. Fogg's Persuasive Technology Lab at Stanford. Fogg is a behavioral psychologist whose insights about how people change habits and behaviors has led to him to develop the field of behavior design over the past 20 years. On his website (https://www.bjfogg.com/) Fogg writes, 'Technology itself doesn't magically change behavior. People creating products need to understand how human behavior works. Teaching people the psychology of behavior change is core to my work these days. I've created a set of models – how to think clearly about behavior. And I've created a set of methods – how to design for behavior. These models and methods work together and comprise behavior design.' With people like Tristan Harris, Justin Rosenstein, B.J. Fogg and their many colleagues working to develop better digital technologies and supporting business models and organizational structures that contribute to personal and societal well-being, we are more hopeful about the positive impacts of digital life in the future."

Some who said the next decade will be mostly helpful to well-being also mentioned that negative change may come post-2027. **Dan Ryan**, professor of arts, technology and the business of innovation at the University of Southern California, wrote, "I suspect that for most of the next decade we will be in the more-better, less-worse part of the social-change gradient. That's based on the idea that there are still a whole bunch of folks who have not yet reaped what's already there and an expected 'second wave' of 'for the general welfare' work that's ongoing and upcoming. There are, I think, gathering negatives but I'd predict most of the decade will pass before they hit home."

A sampling of additional comments related to the theme of "continuation toward quality" from **anonymous respondents**:

- "With an increasing saturation of 'digital awareness,' people's sense that they are any better connected than anyone else should dissipate."
- "There is increasing pressure on IT companies and network service providers to make our digital infrastructure more secure, more reliable, more affordable and much easier to use. We have many of the technologies needed to accomplish that and they are being deployed."

- "There will be a better learning curve of using the internet more effectively."
- "People will become more responsible for their own actions, comments and how they interact with the digital world."

3. Concerns about the future of people's well-being

About half of the people responding in this study were in substantial agreement that the positives of digital life will continue to outweigh the negatives. However, as in all great technological revolutions, digital life has and will continue to have a dark side.

Roughly a third of respondents predicted that harms to well-being will outweigh the positives overall in the next decade. In addition, even among those who said they are hopeful that digital life will be more helpful than harmful and among those who said there will not be much change, there were many who also expressed deep concerns about people's well-being in the future. All of these voices are represented in this section of the report.

Rob Reich, professor of political science at Stanford University, said, "If the baseline for making a projection about the next today is the current level of benefit/harm of digital life, then I am willing to express a confident judgment that the next decade will bring a net harm to people's well-being. The massive and undeniable benefits of digital life – access to knowledge and culture – have been mostly realized. The harms have begun to come into view just over the past few years, and the trend line is moving consistently in a negative direction. I am mainly worried about corporate and governmental power to surveil users (attendant loss of privacy and security), about the degraded public sphere and its new corporate owners that care not much for sustaining democratic governance. And then there are the worries about AI [artificial intelligence] and the technological displacement of labor. And finally, the addictive technologies that have captured the attention and mindspace of the youngest generation. All in all, digital life is now threatening our psychological, economic and political well-being."

Rich Salz, principal engineer at Akamai Technologies, commented, "We have already seen some negative effects, including more isolation, less ability to focus, more ability to be deceived by bad actors (fake news) and so on. I do not see those lessening. Sadly."

Leora Lawton, lecturer in demography and sociology and executive director of the Berkeley Population Center at the University of California, Berkeley, shared these reasons digital life is likely to be mostly harmful: "The long-term effects of children growing up with screen time are not well understood but early signs are not encouraging: poor attention spans, anxiety, depression and lack of in-person social connections are some of the correlations already seen, as well as the small number of teens who become addicts and non-functioning adults."

David Ellis, Ph.D., course director of the department of communication studies at York University in Toronto, said, "Much like a mutating virus, digital services and devices keep churning

out new threats along with the new benefits – making mitigation efforts a daunting and open-ended challenge for everyone. Over the next decade, the majority of North Americans will experience harms of many different kinds thanks to the widespread adoption and use of digital technologies. The last year alone has seen an outpouring of commentary, including some 20 trade books, arguing that our digital habits are harming individual welfare and tearing up the social fabric. In marketing its services, Silicon Valley is committed to the relentless promotion of convenience and connectedness. Its success in doing so has wreaked havoc on personal privacy, online security, social skills and the ability to focus attention, not least in college classrooms. While they may be victims of a kind, most consumers are simply in denial about their compulsive use of smartphones and social media, as well as other services designed by their developers to be addictive – a problem that persists even when legal sanctions are in play, as with texting while driving. There's growing evidence these digital addictions are promoting depression, loneliness, video-gaming abuse and even suicidal behavior, especially among teens and young adults. Instead of feeling obliged to moderate their level of connectivity, however, consumers have come to feel a sense of entitlement about their habits, unconstrained by social mores that previously framed these habits as inappropriate. Indeed, heavy use of digital devices is widely encouraged because of the misguided idea that so-called multitasking makes us more productive."

An **anonymous research scientist and professor** said, "The grand internet experiment is slowly derailing. The technologies that 50 years ago we could only dream of in science fiction novels, which we then actually created with so much faith and hope in their power to unite us and make us freer, have been co-opted into tools of surveillance, behavioral manipulation, radicalization and addiction."

The next few sections share primary concerns expressed by respondents, grouped under commonly expressed themes: digital deficits; digital addiction; digital distrust/divisiveness; digital duress; and digital dangers.

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

A number of respondents said people's cognitive capabilities seem to be undergoing changes detrimental to human performance. Because these deficits are found most commonly among those who live a highly digital life, they are being attributed to near-constant connectivity online.

Steven Polunsky, a research scientist at Texas A&M University, wrote, "One way to describe how we behave is the OODA cycle – when something happens, we Observe it, Orient it to our personal

context, Decide what to do and Act on that decision. The internet is easily weaponized to short-circuit that process, so we receive minimal information and are urged to act immediately on it. Unless behavior changes and adapts, this tendency will lead to greater dissatisfaction among internet users and those affected by their actions, which may be a wide audience."

Nikki Graves, an associate professor at Emory University's Goizueta Business School, said, "We currently live in a culture that fosters attention-deficit disorder because of hyperconnectivity. I have been teaching at the college level since 1993, and I can see a definitive decline in students' ability to focus on details and in general. Additionally, I believe that the research on the relationship between hyperconnectivity and this has merit."

Meg Mott, a professor of politics at Marlboro College, said, "The internet is harming well-being. My answer has to do with the disturbing trend amongst college students, who operate as if all questions should be answered online. The devices make it so easy to find answers elsewhere that students forget to ask deep questions of themselves. This lack of uninterrupted introspection creates a very human problem: the anxiety of not knowing oneself. The more the culture equates knowledge with data and social life with social media, the less time is spent on the path of wisdom, a path that always requires a good quotient of self-awareness. This becomes evident in classes where a portion of the grade is derived by open-ended writing assignments. In order to write a compelling essay, the author needs to know that the process of crafting a question is more interesting than the retrieval of any answer. Instead, the anxiety is attached to getting the 'right' piece of data. I am of the mind that a lot of the anxiety we see in college students is the agony of not having a clue about who they are. This hypothesis is now supported by Jean Twenge's research on the impact of smartphones on the Millennial and post-Millennial generations."

An **anonymous director of one of the world's foremost digital rights organization** said, "I'm concerned that the pace of technology creation is faster than the pace of our understanding, or our development of critical thinking. Consider, for a moment, the latest buzzword: blockchain. Yesterday, I heard about a blockchain app designed for consent in sexual interactions – designed, of course, by men in Silicon Valley. If it sounds ridiculous, that's because it is. We've reached a phase in which men (always men) believe that technology can solve all of our social problems. Nevermind the fact that a blockchain is a permanent ledger (and thus incontestable, even though sexual abuse can occur after consent is given) or that blockchain applications aren't designed for privacy (imagine the outing of a sexual partner that could occur in this instance). This is merely one example, but I worry that we're headed toward a world in which techno-solutionism reigns, 'value' has lost all its meaning, and we're no longer taught critical-thinking skills."

An **anonymous president of a U.S.-based nonprofit** commented, "Increasingly social media is continuing to reduce people's real communication skills and working knowledge. Major industries – energy, religion, environment, etc., are rotting from lack of new leadership. The level of those with aliteracy – people who can read but choose not to do so – is increasing in percentage. The issues we face are complex and intertwined, obfuscated further by lazy bloated media and readers and huge established industry desperate to remain in power as cheaply, easily, safely and profitably as possible – of course! Those of us who still read actual books that require thinking rather than mere entertainment, must redouble our efforts to explain the complex phenomena we are in the midst of addressing in simple terms that can encourage, stimulate, motivate."

Some respondents also more indirectly noted that individuals' anxiety over online political divisiveness, security and privacy issues, bullying/trolling, their loss of independent agency due to lack of control over what they are served by platform providers, and other psychosocial stress are contributing factors in this cognitive change.

An **anonymous professor** wrote, "As life becomes more and more monitored, what was previously private space will become public, causing more stress in people's lives. Furthermore, some of these technologies will operate without a person's knowledge or consent. People cannot opt out, advocate for themselves, or fix errors about themselves in proprietary algorithms."

A sampling of additional comments about "digital deficits" from **anonymous respondents**:

- "We have less focus – too much multitasking – and not enough real connection."
- "The downside is too much information and the lack of ability to manage it."
- "Attention spans have certainly been decreasing recently because people are inundated with information today."
- "There is increasing isolation from human interaction and increased Balkanization of knowledge and understanding."
- "Over 50% of U.S. children over 10 now have some sort of social network-based application, whether it be Instagram, Snapchat or Minecraft. These children are always looking for what they may be missing online. They are increasingly finding it hard to be present and focused."
- "The writing skills of students have been in constant decline, as they opt for abbreviations and symbols rather than appropriately structured sentences."
- "Digital users who have not lived without technology will not know how to cope with utilizing resources outside of solely tech. With users relying on devices for companionship, we will no longer see people's faces, only the blue or white screens reflecting from this effervescent gaze."

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

Some of the most-concerned respondents pointed to the monetization of attention – the foundation of the internet economy – as the driving force behind many wellness issues.

Douglas Rushkoff, writer, documentarian, and professor of media at City University of New York, said, "The real reason why digital technology will continue to compromise human cognition and well-being is that the companies dominating the space (Facebook, Google, Amazon) are run by people with no knowledge of human society or history. By leaving college at an early age, or running companies immediately after graduating, they fell under the spell of venture capitalists who push growth of capital over all other values. So the platforms will necessarily compromise humanity, democracy and other essential values. The larger the companies grow, the more desperate and extractive they will have to become to grow still further."

Michael Kleeman, senior fellow at the University of California, San Diego and board member at the Institute for the Future, wrote, "The early promise of the Net has been realized, but the financial incentives to use it for harmful purposes, including legal and illegal ones, have proven too attractive. 'Digital Life' will continue to erode personal interactions, reduce the diversity of ideas and conversation and contribute to negative health impacts. Other than the use of data analytics we have virtually no proof that wearables, etc., alter health trajectories. We do have evidence of a radical reduction in privacy, increase in criminal activity (as digital means reduce the cost of major financial and personal crimes), reduction of engagement with and caring for the environment as a result of increased interaction with online and digital devices."

Kate Thomas, a writer/editor based in North America, wrote, "Unfortunately, major social media corporations have discovered that anger and insecurity keep people glued to their screens. As long as profit is more important than people, digital life will only grow more destructive."

An **anonymous professor at one of the world's leading technological universities** who is well-known for several decades of research into human-computer interaction wrote, "Deterioration in privacy; slicing and dicing of identity for sale; identification of individuals as targets for political messaging. I don't see the institutions growing that will bring this under control. I don't see corporations taking sufficient responsibility for these issues."

Sam Punnett, president of FAD Research Inc., said, "Distraction is our most prevalent commodity, paid for with attention span. The society-wide effects of 'continuous partial attention'

and the tracking, analysis and corruption of the use of data trails are only beginning to be realized."

Many respondents to this canvassing wrote about their concern that online products are designed to tap into people's pleasure centers and create a dependence leading to addiction.

Richard Bennett, a creator of the WiFi MAC protocol and modern Ethernet, commented, "Highly-connected nations such as South Korea have had to develop treatment programs for internet addiction. Gamers in particular are subject to this malady, and Korea's broadband networks make gaming very attractive to socially isolated teens."

Vicki Davis, an IT director, teacher and podcaster based in North America, said, "Un-savvy consumers don't realize the addictive nature of the dopamine hits they are getting through the social media sites they use. In an attempt to keep a Snapchat streak going or to perform for the illusion of a growing audience, this generation could easily live a life one inch deep and a mile wide instead of a deeper life with deeper relationships and deeper productivity. The future of society depends upon our ability to educate people who are willing to get out of the zone on their phone and live life in the real world. … Many students I work with seem to show some sort of withdrawal symptoms after just a few hours away from Snapchat or Instagram. The greatest innovations often happen with uninterrupted thought. This interruption generation must learn how to turn off their notifications and find satisfaction in solving problems that aren't solved in a snap but take years of dedication. Without tenacity, self-control and some modicum of intelligence about the agenda of social media, the interruption generation will miss out on the greatness that could be theirs."

Robert Stratton, cybersecurity entrepreneur, coach and investor, wrote, "While there may be beneficial uses for this technology … we cannot ignore the question of what happens when addictive technologies are coupled with very plausible but erroneous content, particularly when generated by skilled actors with specific goals. Additionally, there are decentralized, distributed-actor groups with information operations capabilities that I will assert now rival those of nation-states. Things are not what they seem. We now live in an environment where digital audio and video can be generated with modest skill to produce video that is functionally indistinguishable from photography while being essentially wholly specious. Most internet users and virtually all of the news media seem to operating on two errant assumptions: 1) People mean what they write on the internet. 2) People are witting of their roles in events that occur due to their actions. I would respectfully assert that anyone with a basic knowledge of intelligence tradecraft would agree that these are naïve in the modern environment. Additionally, there are now generalized programming APIs that provide the ability to make essentially ANY application or website habituating for its users."

An **anonymous respondent** predicted this scenario as a continuation of today's trends into the next decade: "More and more will seem possible in all aspects of life. People may perceive that their lives are better, but it will be the experience of the lobster in the slowly boiling pot. Digital life will take people's privacy and influence their opinions. People will be fed news and targeted information that they will believe since they will not access the information needed to make up their own minds. Out of convenience, people will accept limitations of privacy and narrowed information resources. Countries or political entities will be the influencers of certain groups of people. People will be become more divided, more paranoid as they eventually understand that they have no privacy and need to be careful of what they say, even in their own homes. Some people will break free but at the loss of everything they had worked for. The digital divide will become worse, and many will be unable to pay for all the conveniences. To ensure simpler access and control, some political entities may try to make it available to everyone but at a cost of even more privacy. Convenience will be chosen over freedom. Perhaps."

The massive change in people's news-finding habits instigated by the rapid adoptions of the smartphone and social media was cited by some as the reason for the destruction of accurate, objective journalism, a foundation of democracy. An **anonymous respondent** commented, "The addictive nature of social media means the dis-benefits could be profound. Watch a young mother utterly engrossed in her phone and ignoring her small children and you will know what I mean. Humans need real-time, real-life interaction not just social interaction, yet the pull of the phone is overwhelming. More broadly, the platform companies are already destroying the business models of legacy media, and as that continues civic journalism will become thinner, poorer and possibly obsolete. Journalism won't disappear. It will simply drift back to propaganda."

A sampling of additional comments related to "digital addiction" from **anonymous respondents**:

- "Engaging apps and digital experiences are much like addictive substances such as alcohol, tobacco and even sweet foods and sex and there has been little progress in creating a 'healthy' consumption model for digital experiences."
- "Kids and adults alike are prone to go for the quick fix, the easy high or pleasant feeling, but not well armed to understand its impact on their health."
- "People's well-being will continue to be affected by the internet because the software, hardware and structures that are already in place are built to do exactly this."
- "As social networking becomes 'professional grooming' as well as providing family/friend updates, the need for multiple platforms (such as LinkedIn and Facebook/Instagram) becomes an assumed need. The amount of time it takes for workers to manage tedious online interactions will lead to an increasing lack of work/life balance."

- "Behavioral and psychological impacts of digital life will continue to be discovered and will confirm negative trends."
- "Digital communications and the time they take away from personal interactions are contributing to growing social isolation and eroding interpersonal relationships. This affects individuals' mental well-being. People everywhere – walking, in their cars, in meetings, etc. – are glued to their cell phones."
- "Unless we are more aware/careful/media literate, there are a lot of 'analogue' behaviours we will jettison that are actually more efficient, positive and valuable."
- "When human beings are constantly reminding themselves about a selfish bubble they've lost touch with the truth."
- "I fear … social media having us surround ourselves with people who think like we do, entrenching divisions among people."
- "Engagement in social media takes a lot of time for the individual and gives back small and decreasing jolts of satisfaction for a substantial cost in time."
- "There is a reason the iPhone was initially called a 'crack-phone.' Spending time on websites and apps is a very seductive way to avoid and/or ignore painful and difficult situations. I've seen very young children ignored while their caregiver texts, plays games, or surf the Net and can't help but wonder how this neglect is affecting them. Will these children learn to parent their children in a better way or will they do the same thing?"

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

Among the most-expressed fears for well-being in the next decade were those having to do with issues of social isolation, societal distrust and identity and human agency.

Fay Niker, postdoctoral fellow at Stanford University's Center for Ethics in Society, wrote, "Understanding well-being in terms of human flourishing – which includes among other things the exercise of autonomous agency and the quality of human relationships – it seems to clear to me that the ongoing structuring of our lives by digital technologies will only continue to harm human well-being. This is a psychological claim, as well as a moral one. Unless we are able to regulate our digital environments politically and personally, it is likely that our mental and moral health will be harmed by the agency-undermining, disempowering, individuality-threatening and exploitative effects of the late-capitalistic system marked by the attention-extracting global digital communication firms."

Evan Selinger, a professor of philosophy at Rochester Institute of Technology, wrote, "The repeal of the Obama administration's 2015 rules for Net neutrality is a devastating blow. … Net neutrality is fundamentally about social control. Thanks to the [Ajit] Pai regime at the FCC, Internet Service Providers have more power than they deserve to micromanage how we conduct our online social, political, educational and economic lives. While Net neutrality advocates have identified several disheartening outcomes to be on our guard for, the projected parade-of-horribles only scratches the surface. If we can't get the information superhighway right, it's a bad omen for the future where we'll need to govern a mature Internet of Things. Second, although analysis of the last U.S. presidential election is shining a spotlight on the problem of botified communication, the focus on internet propaganda obscures the more basic, habit-forming ways that we're being techno-socially engineered to outsource more and more of our communication – and thus ourselves – to software. Third, despite increased awareness of the value of being able to spend time offline, practical constraints continue make the freedom to unplug ever-harder to achieve."

Adam Popescu, a freelance journalist who has written for The New York Times, Bloomberg and other publications wrote, "You see it everywhere. People with their heads down, more comfortable engaging with a miniature world-in-a-box than with the people around them. And you see it while they're behind the wheel driving, while working and performing dangerous and focus-intensive tasks. Forget emotional happiness and the loss of focus and deep thought and the fact that we're now more comfortable to choose who we sleep with based on an algorithm than we are based on serendipity, intuition, chance, and the potential for rejection by walking up to someone and saying 'Hi, my name is …' The biggest issue with our addiction to smartphones, one none of us talk about openly yet all engage in, is the threat to health and safety. Sure, no one says 'hi' anymore when they're passing by, no one takes a moment to be friendly or reach out, even with just our eyes, because our eyes are no longer at eye-level, they're down, hiding in our screens. Social media over the past year has been revealed for the ugly wolf-in-sheep's clothing it is, a monster once draped in the skin of liberty. We see it for what it is. When will we see that it's not just the programs and toys and apps and sites on our screens that are the problem – but our screens themselves?"

Judith Donath, author of "The Social Machine, Designs for Living Online," also predicted, "We will see a big increase in the ability of technologies to affect our sense of well-being. The ability to both monitor and manipulate individuals is rapidly increasing. Over the past decade, technologies to track our online behavior were perfected; the next decade will see massively increased surveillance of our off-line behavior. It's already commonplace for our physical location, heart rate, etc., to be tracked; voice input provides data not only about what we're saying, but also the affective component of our speech; virtual assistants learn our household habits. The combination of these technologies makes it possible for observers (Amazon, government, Facebook, etc.) to know what we are doing, what is happening around us, and how we react to it all. At the same

time, increasingly sophisticated technology for emotion and response manipulation is being developed. This includes devices such as Alexa and other virtual assistants designed to be seen as friends and confidants. Alexa is an Amazon interface – owned and controlled by a giant retailer: she's designed, ultimately, to encourage you to shop, not to enhance your sense of well-being."

A number of these experts wrote about their concerns that technology's evolution would make people suffer a "loss of agency" and control over their world.

Dewayne Hendricks, CEO of Tetherless Access, said, "It is important to consider just how much of digital life is provided/controlled by cyber monopolies. Those entities will have an ever-increasing ability to control/shape the factors that make up that digital life. I see individuals for the most part having less control as time passes."

John Klensin, Internet Hall of Fame member, longtime Internet Engineering Task Force and Internet Society leader, and an innovator of the Domain Name System administration, said, "I am impressed by the increasing anecdotal and research evidence of people not only using the internet to isolate themselves from others but to select the information they are exposed to in a way that confirms and strengthens their existing, predetermined views. While that behavior is certainly not new, the rapid turnaround and instant responsiveness of the internet and social media appear to be reinforcing it in ways that are ultimately undesirable, a situation that is further reinforced by the substitute of labeling and denunciations for examination and reasoning about facts."

Rosanna Guadagno, a social psychologist with expertise in social influence, persuasion, and digital communication and researcher at the Peace Innovation Lab at Stanford University, wrote, "In my professional opinion, the current trends in digital communication are alarming and may have a negative long-term impact on human social interaction. It was naive of social media companies fail to consider and prepare for the prospect that their platforms could be misused for large-scale information warfare (e.g., Russian interference in the 2016 U.S. presidential election). Furthermore, these companies have shirked their responsibility to their users by failing to protect their customers from cyberwarfare. This has not only interfered with people's perception of reality and their ability to tell fact from fiction (I've actually conducted research demonstrating that information presented on a computer screen is perceived as more persuasive than comparable printed material). This has caused a lot of disinformation to spread online and has fueled myriad divisive online interactions. In addition to these issues, there is quite a bit of evidence mounting that people are spending more and more time alone using digital communication as a proxy for face-to-face interactions and this is increasing loneliness and depression among people, particularly our young adults. These technologies should be designed to promote healthy interactions. One way to accomplish this would be to switch to more interactive options for

conversation (e.g., video chat instead of text-based conversation would reduce miscommunications and remind people that there are other people with real thoughts, feelings, and emotions behind the computer screen). It remains to be seen whether any of the promises made by digital technology companies to address these issue will be implemented. As a faculty member, one issue I've also commonly noticed is how little time is spent on ethics and psychology as part of the typical software engineering course curriculum. The ethics of software development and the idea that technology should be designed to enhance people's well-being are both principles that should be stressed as part of any education in software design."

A sampling of quote excerpts tied to "digital distrust/divisiveness" from **anonymous respondents**:

- "The dominance of algorithmic decision-making and speed and reach of digital realms have proliferated cultures of misinformation and hatred. We have not yet adjusted to this. It may take a while for the political realm to fully engage with it, and for people to demand tech companies regulate better. I am more optimistic in the long run than I am in the short term."
- "People spend too much time online, often devouring fake and biased items. They grow hateful of each other rather than closer in understanding. Negative and harmful ideologies now have platforms that can reach much farther."
- "There will be an increase in isolation, further dependence on technology and an increase in unearned narcissism."

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

A swath of respondents argued that as digital life advances it will damage some individuals' sense of self, their understanding of others and their faith in institutions. They project that as these technologies spread, they will suck up people's time and attention and some will be overwhelmed to the point that they often operate under duress, in a near-constant state of alert.

Larry Rosen, a professor emeritus of psychology at California State University, Dominguez Hills known as an international expert on technology and its impacts on well-being, wrote, "1) We continue to spend more time connecting electronically rather than face-to-face, which lacks essential cues for understanding. 2) We also continue to attempt to multitask even though it harms performance. 3) We insist on using LED-based devices close to our eyes right up to bedtime even though it negatively impacts sleep and our brain's nightly needs for synaptic rejuvenation harming our ability to retain information."

Susan Price, lead experience strategist at USAA, commented, "Mental health problems are rising and workplace productivity is falling. The tendency to engage with digital content and people not present instead of people in our immediate presence is growing, and small-screen trance has become an accepted interpersonal norm in the workplace. Culturally-induced attention-deficit behavior has already reached staggering proportions, and is still rising. The mini-serotonin payoffs we get when 'connecting' in this way are mildly, insidiously addictive and are squeezing out the more uneven, effortful, problematic real social connections we need for true productivity and intimacy."

Stowe Boyd, futurist, publisher and editor-in-chief of Work Futures, said, "Well-being and digital life seem so intertangled because of the breakdown between personal and public life … that digital tools have amplified. One significant aspect of public life is our relationship to work. … We need to wake up to the proximate cause of the drive for well-being, which is the trap of overwork and the forced march away from living private lives."

K.G. Schneider, dean of the university library at Sonoma State University, wrote, "Anonymized discourse, it turns out, is not a civilizing influence, nor is having one's every thought broadcast in real time the best way for us to interact as humans."

Marcus Foth, professor of urban informatics at Queensland University of Technology, wrote, "Advancement and innovation of digital technology is still predominantly driven by the goal to increase and optimise productivity rather than people's quality of life or well-being. While proponents of an elusive work-life balance may argue that you can always switch off digital technology, the reality is that [it] is not being switched off – not because it cannot, but there is now a socio-cultural expectation to be always available and responding in real-time."

Jan Schaffer, executive director at J-Lab, wrote, "Overall, people will be more harmed than helped by the way the internet is evolving. People's trust in basic institutions has been hurt, perhaps irreparably, by conflicting accounts of what is true or not, online. People's productivity at work has been hampered by the distractions of social media. People's social and emotional intelligence have been impaired by the displacement of personal interactions with online interactions. "

An **anonymous digital strategy director** for a major U.S. professional association wrote, "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."

An **anonymous professor** wrote, "While there are many positive aspects to a more digitally connected life, I find that it is very difficult to keep up with the volume of spaces where one must go. I spend too much time answering emails, communicating in digital spaces and just trying to keep up. This causes a significant amount of stress and a lack of deliberate, thoughtful approach to information sharing. One cannot keep up with personal and professional email accounts, LinkedIn, Twitter, Facebook, Instagram and all the rest. Truly, it is just too much."

A sampling of comments about "digital duress" from **anonymous respondents**:

- "There is too much connecting to other people's anxieties and expectations."
- "We already know there are negative effects for everyone waiting for a 'like' or other similar kind of gratification."
- "I worry about mental illness and increasing social isolation as a result of more time spent with technology."
- "Increased digitalization is leading to more sedentary lifestyles in a society already plagued with obesity challenges. Social media use has also led to poor communication skills, even in face-to-face settings, people opt to burying their faces into the smartphone screens."
- "Some people are creating and then trying to live up to fake worlds they build with their phones."
- "Constant connections to electronic-information feeds causes anxiety and damage to our eyes, brains."

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

A number of respondents pointed out that digital life opens the door to societal dangers that can affect individuals' well-being. They say the digital world's systems – the internet, the web, the smartphone, all networked digital hardware and software – have evolved so rapidly due to their incredible appeal and the economic and social forces driving them forward that there has been little recognition of nor a real reckoning with the wider negatives emerging with the positives.

Anthony Rutkowski, internet pioneer and business leader, said, "Clearly – as DARPA's director noted in his seminal 2000 millennium article on this topic – the past 17 years have demonstrated how the DARPA internet, which was never designed for public infrastructure use, has resulted in all kinds of adverse impacts to people's lives and even the security of society. It has amplified the most outrageous behavior and alt[ernate]-truth as the new normal. See details of my position at http://www.circleid.com/posts/20170312_the_internet_as_weapon/ (Excerpt: 'The existence of 'an open platform that enables anyone, everywhere, to share information, access opportunities and collaborate across geographic and cultural boundaries' globally is fundamentally a weapon. … Such

an infrastructure has inherent economic, operational, and political self-destructive properties that are playing out exponentially every day.')"

An **anonymous longtime leader of research at one of the top five global technology companies** said, "I chose my career believing that technology would improve our lives. Seeing what has happened, I've grown pessimistic. Our species has lived for millions of years in small communities – bands, tribes, extended families. We are wired to feel valued and good about ourselves through direct, repeated interactions in such groups. These tight-knit associations are disappearing as our activity moves online. Relationships are replaced by transactions. If we avoid catastrophe, in the long run natural selection will produce a new kind of human being that is adapted for the world we are creating. That individual will not be like most of us. Living through the transition will be painful."

Aram Sinnreich, an associate professor at American University's School of Communication, said, "In general, people's lives will change for the worse over the next decade because of the internet. There are several factors I am taking into account here: 1) The increasing prevalence and power of internet-based surveillance of citizenry by state and commercial actors. 2) The catalyzing power of digital technology in exacerbating the gaps between haves and have-nots. 3) The as-yet-undertheorized and unchecked role of digital disinformation in polluting the democratic process and news dissemination channels. 4) The increasingly savvy and widespread use of the internet by crime syndicates. 5) The increasing vulnerability of our social infrastructure to internet disruption and hacking. 6) The environmental consequences of the internet, recently exemplified by studies analyzing the electrical power consumption that goes into Bitcoin transaction processing. This isn't to say there aren't many benefits to the internet, or that its impact won't net positively over the longer term. But I don't see any likely benefits outweighing the threats I outlined above over the next decade."

An **anonymous professor based in North America** said there is a public perception of well-being – crafted by platform builders and policy (or lack of policy) – while well-being is actually being damaged. This respondent wrote, "People may very well experience an increase in *subjective* well-being. The techno-social world we're building is increasingly geared toward engineering happy humans. While a life of cheap bliss, of satiated will, may yield more net well-being measured in terms of subjective happiness, it would at the same time be a rather pitiful life, devoid of many of the meaningful blessings of humanity. Brett Frischmann and Evan Selinger address the questions you're asking in a 500-page book, 'Re-Engineering Humanity,' due out in April 2018. One chapter, 'To What End?' directly considers the normative values at stake and the issue of what well-being means. Other chapters explain in detail the technological path we're on and how to evaluate techno-social engineering of humans."

Bob Frankston, a technologist based in North America, said, "The internet is not a thing but rather a product of the ability to use software to program around limits. It enables the creation of systems of technologies that work in concert. But the benefits will be limited to point solutions as long as we are limited to solutions that are profitable in isolation, until we invest in common infrastructure and have open interfaces."

Jeremy Blackburn, a computing sciences professor who specializes in the study of the impacts of digital life, wrote, "1) People will continue to be manipulated via targeted (mis/dis)information (sic) from a variety of sources. 2) There will be an increase in online harassment attacks that will be mostly ignored due to their statistical weight (Google/Facebook/Twitter/etc. do not care if 0.1% of their users are attacked, even though the raw numbers are substantial). 3) There will be an increase in extremists and their ability to recruit and radicalize vulnerable individuals. 4) There will be an increase in information silos, eventually resulting in extreme polarization of information acceptance. 5) There will be decreased concern about individual impact in the face of big data and large-scale machine learning (e.g., a 1% increase in revenue due to scale is worth it, even if it means a few people here and there will suffer). This will eventually cascade to large-scale suffering due to network effects. 6) There will be an increase in the acceptance of opinion as fact due to the democratization of information. No one knows if you are a dog on the Internet, and no one cares if you are an expert."

An **anonymous respondent** commented, "What we are seeing now becoming reality are the risks and uncertainties that we have allowed to emerge at the fringes of innovation. One is the systemic loss of privacy, which is a precondition for deliberation and a sense of self-determination. Further, we already see how our critical infrastructures – ranging from energy supply to health systems and the internet itself – increasingly are at risk of failing us due to their openness for malicious attacks, but also due to the complexity of interrelated, networked processes. Due to the lack of traceability on the internet, there is no expectation that we will achieve accountability in such situations."

An **anonymous Ph.D. in biostatistics** commented, "The culture of anonymity on the Web is scary and seems to allow people to behave in ways they wouldn't otherwise (see recent news about 'swatting' in the online gaming community). Then there is the social media 'hive' that allows internet uproar to dictate what happens. There is no room for discourse, grey areas or mistakes. Lives can be ruined by the publicity of a simple mistake (and combined with people sharing home addresses this can also be dangerous)."

An **anonymous professor in the United States** commented, "My belief is that unless extensive regulation and user education occurs, we will see an increase in negative consequences of

online activity such as violations of privacy, dissemination of misinformation, crime and displacement of jobs."

An **anonymous research scientist and internet pioneer** commented, "We have reaped great benefit from digital life over the past decades. My answer compares the next decade to the current situation, not to the time prior to the digital life. The negative aspects of the digital life are becoming more pronounced, and I think the next decade will be one of retrenchment and adjustment, while society sorts out how to deal with our perhaps over-optimistic construction of the digital experience."

A sampling of additional comments about "digital dangers" from **anonymous respondents**:

- "Election results will remain unverifiable and subject to digital manipulation by political criminals. ... Terrorists will recognize more ways to destabilize economic, social, political and environmental systems."
- "Security/hacking and manipulation online may cause more harm; e.g., the latest Intel bug."
- "People's well-being will be hurt unless we figure out the cultural and social and political solutions – and religious and economic ones – to life online. Every medium needs to be tamed. It will take a while for digits to be domesticated."
- "I fear government and private-sector security measures in 'protecting' individuals, and I fear the advancement of AI."
- "The loss of privacy as data sharing and integration continues will be highly problematic. Government, industry and hackers will all benefit."
- "We don't know the effects of electromagnetic fields (EMF) and radiation. It's not a mainstream idea to protect people from the negative health impacts of radiation."
- "Technology's beneficial effects (improved efficiency, access to information) are increasingly being overwhelmed by its negatives – distraction, disconnection from real in favor of virtual interactions, and how anonymity unleashes ugly behaviors such as misogyny, racism and overall nastiness."
- "Increasing surveillance and social control by corporations and their political representatives will reduce the standard of living and freedom for the majority of the citizens in a world of rapidly changing climate."

4. Intervention ideas to ease problems

One current public debate centers on whether it is enough to expect people to simply evolve to avoid unhealthy tech habits or whether the only effective solution is for the tech business to evolve different approaches. Nir Eyal advocates in his new book "Indistractible" that people can apply the concepts behind tech addiction – motivation, trigger and ability – to disconnect from unhealthy tech habits. Venture capitalist Roger McNamee spoke for those who believe that isn't enough when he said, "The best way would be for founders of these companies to change their business model away from advertising. We have to eliminate the economic incentive to create addiction in the first place." Canadian journalist Eric Andrew-Gee summed up many concerns in an article titled "Your smartphone is making you stupid, antisocial and unhealthy. So why can't you put it down?" writing, "Billions of people continue to be distracted and turned away from loved ones thanks to their smartphones. And untold billions of dollars wielded by some of the world's biggest companies are devoted to keeping it that way."

Respondents to this canvassing were asked what might be done to diminish any threats to individuals' well-being that are now emerging due to people's choices in creating digital systems and living digital lives. Whether they answered that digital life will be mostly helpful or mostly harmful, a majority of respondents said there are existing and foreseeable downsides that deserve attention. They discussed ways in which adjustments might be made to build a better future.

One particularly comprehensive answer came from **Aram Sinnreich**, an associate professor at American University's School of Communication, who listed several ideas: "The most important thing we can do to mitigate the negative social effects of the internet is to draw on social scientific and communication research to understand the multifaceted roles it plays in public and private lives, and to use both state and market regulatory measures to address these different dimensions separately, while maintaining a holistic understanding of its transformative potential overall. In practice, this means measures including but not limited to: 1) Holding algorithms, and the companies responsible for them, accountable for their role in shifting and shaping social and political power dynamics. 2) Developing a 'digital bill of rights' that privileges human dignity over the profit motive. 3) Involving multiple stakeholders on a global scale in internet governance. 4) Integrating digital media literacy more deeply into our educational systems. 5) Regulating internet communications in [a] way that privileges diversity of participation at every level and requires accountability and transparency to consumers and citizens. 6) Investing heavily in post-fossil fuel energy sources."

There are those who expect that interventions may have a bit of influence but not enough.

Eric Allman, research engineer at the University of California, Berkeley, commented, "I do think there exist actions that can (and will) be taken to mitigate problems, but I am not confident that those mitigations will be enough to solve the problems."

Joseph Turow, professor of communication at the University of Pennsylvania's Annenberg School of Communication, wrote, "Changes can be made to mitigate potential harms of digital life, but, depending on what those harms are, the responses will require a complex combination of public education, government activity and corporate agreement. Some of the harms – for example, those relating to issues of surveillance and privacy – unfortunately result from corporate and government activities in the political and business realms. Moreover, government and corporate actors often work together in these domains. Their vested interests will make it extremely difficult to address privacy and surveillance practices so that they match the public interest, but advocacy groups will keep trying and they may make some progress with increasing public awareness."

In the next few sections we share respondents' ideas about the potential interventions that might help bring a better future for people living digital lives. They are organized under these commonly occurring themes: reimagine systems; reinvent tech; regulate; recreate media literacy; recalibrate expectations; and fated to fail.

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

A large share of respondents said human systems tapping into human nature are to blame for many of the downsides of digital life. They argue that fixing those problems can make a difference for the better.

Alejandro Pisanty, a professor at Universidad Nacional Autónoma de México and longtime leading participant in the activities of the Internet Society, wrote, "An open, public, civil, rational discussion of principles guiding systems design and implementation will become critical. All stakeholders must be availed a chance to participate meaningfully, in a timely and relevant manner. The most important intervention is to help, nudge or even force people to THINK, think before we click, think before we propagate news, think before we act. Some regulatory actions inviting information disclosure by corporations and government may be helpful but will fall on fallow ground if people are not awake and aware. Second: transparency to a reasonable extent will continue to be necessary, so the basis of decisions made by systems can be understood by people, and people and organizations can in turn test the systems and adjust their responses."

Giacomo Mazzone, head of institutional relations at the European Broadcasting Union, shared a number of specific targets for improving systems, writing, "1) New antitrust rules on a global scale need to be defined, and corporations that have reached far beyond their boundaries have to break up. The internet giants that immediately take over any innovation arriving into the market are becoming an obstacle to change and progress. 2) The open internet needs to be preserved at any price. If we have separate internet for the rich and the poor, the reasons we have granted special status and exceptional treatment to the internet revolution have gone. 3) Disruptive social impacts need to be addressed quickly – as the disruption process is identified and not afterward. Educational processes need to be redesigned, taking into account the notion of digital citizenship and the need for lifelong learning processes. 4) A brand new 'social contract' should be defined and signed between ruling classes, business community, citizens; the notions of salaries, jobs, pensions and social security need to be redesigned from scratch."

Anita Salem, a human systems researcher based in North America, commented, "Potential risks can be mitigated by reframing the role of technology and reducing the power of corporations. Technology needs to focus on the whole system, minimize unintended consequences and support big lives rather than big corporations. In addition to marketability, technology should be valued by how well it strengthens human relationships, preserves our planet, bridges inequalities and provides a livable wage, gives voice to the marginalized, develops creativity, supports mental and physical health, and increases opportunities for leading a meaningful life. This however, requires a cataclysmic shift in our economic system."

Jillian C. York, director for international freedom of expression at the Electronic Frontier Foundation, said, "Interventions to mitigate the harms of digital life are possible, but they require a commitment to holistic solutions. We can't simply rely on technology to mitigate the harms of technology; rather, we must look at our educational systems, our political and economic systems – therein lie the solutions."

An **anonymous retired consultant and writer** said, "The digital environment enables platforms of near costless coordination – the benefits of which will require a 're-imagining' of work and society in order the harness these benefits. Thus, while every technology can be weaponized and incumbent rent-seekers will fight to remove protections and capture regulation for their own profiteering, the real power of the digital environment will require new forms of institutional innovation, new institutional frameworks and public infrastructures and more."

Sy Taffel, senior lecturer in media studies at Massey University, wrote, "Moving away from the corporate model of platform capitalism towards commons and public alternatives that are driven by a desire to build a more equitable and fair society rather than profiteering from the

commodification of communication and systematic dataveillance would be a good start at addressing the systemic issues that currently exist. There are a huge number of areas where legislative activity to curb the behaviour of tech corporations can help, and the European Union has recently taken a lead in doing this in numerous cases, ranging from prohibiting the use of toxic substances in digital devices to how personal data can be used. The social harm that results from tech corporations' pervasive tax avoidance cannot be overstated either."

David J. Krieger, director of the Institute for Communication & Leadership located in Lucerne, Switzerland, observed, "Generally society and its organizations should proactively move away from the established solutions to problems as they were defined in the industrial age and try innovative forms of networking, sharing and management of information."

Darlene Erhardt, senior information analyst at the University of Rochester, commented, "We certainly can create awesome, cool tech toys but we also need to pay closer attention to the moral/ethical/societal implications, benefits and effects. If that's not at the very core, the foundation, then the cool new stuff that gets created has a greater likelihood of being used for negative things."

Jodi Dean, a professor of political science said, "Internet giants (Google, Facebook, Apple, etc.) can be collectivized, turned into public utilities so that capitalist dynamics don't guide the way they develop."

An **anonymous respondent** said, "An increasing focus on the role of the Big-Five tech companies will shape how they behave in the years to come. With increased pressure, these companies will address their responsibility for the content on their platforms along with other critical issues such as privacy, access and the potentially addictive nature of product design."

Mike Silber, general counsel at Liquid Telecom South Africa, wrote, "We need partnerships to deal with content issues. No one entity can accept responsibility; there needs to be a form of co-regulation between content creators, content users, platforms and governments to ensure that the freedom and openness allowed by digitalisation is preserved, while malicious actions can be mitigated. … We run the risk of perpetuating digital echo chambers where independent thought will gradually disappear."

Some said that the teams of technologists who are creating the products of digital life lack the appropriate diversity, and that the people constructing the ways of knowing and accessing knowledge and human connection should represent all of humanity.

Brenda M. Michelson, an executive-level technology architect based in North America, commented, "We need to improve how we build and introduce digital products, services, information and overall pervasiveness. On building, we need to diversify the teams creating our digital future. 1) These future builders must reflect society in terms of race, gender, age, education, economic status and so on. 2) As digital is integrative – technology, data, arts, humanities, society, ethics, economics, science, communication – the teams must be composed of individuals from across professions and backgrounds, including artists, scientists, systems thinkers and social advocates. On introduction, we need – desperately – to build information literacy and critical-thinking skills across the population and improve curation tools without impinging on free speech."

An **anonymous futurist** commented, "Awareness is changing and non-tech expertise is being integrated into the planning of technology being developed. There will still be unintended side effects, but with diverse perspectives from the start we have a better chance of minimizing – and even foreseeing – the potential ill effects and working toward better solutions."

Digital life is built from code-based technologies that are protected as intellectual property and thus their structures are generally not made public. This is seen as a danger by some who say there should be algorithmic transparency and openness to how and why tech tools are built as they are.

An **anonymous distinguished technologist at a major tech company in the U.S.** wrote, "As AIs [artificial intelligence systems] become more common and important, we need to have visibility to how algorithms are making decisions and what happens to our data."

Peter and Trudy Johnson-Lenz, principals of Pathfinding Smarter Futures, wrote, "Scientists need to find ways of listening to and valuing more diverse forms of public knowledge and social intelligence. Only by opening up innovation processes at an early stage can we ensure that science contributes to the common good. Debates about risk are important. But the public also wants answers to the more fundamental questions at stake in any new technology: Who owns it? Who benefits from it? To what purposes will it be directed? (See 'See-through science: Why public engagement needs to move upstream' by James Wilsdon and Rebecca Willis.) Those advocating redesign and different ways of using these technologies must be given a platform to share their thinking so new products and services can be developed, tested and adopted. Ultimately, we need to have more 'see-through science,' to involve the public upstream in the development process to make sure science and technology contributes to the common good."

Some suggested that tech design can be mindfully built to lift individuals' experiences to be more beneficial to well-being just as easily as it can be designed to be addictive.

Brad Templeton, software architect, civil rights advocate, entrepreneur, internet pioneer and chair emeritus for the Electronic Frontier Foundation, wrote, "The key action is to identify when things are not working well, do research, and then work to fix it in the design of the next generation of products. First generations will continue to tend to have unintended consequences. You can't have innovation without that."

Jerry Michalski, founder of the Relationship Economy eXpedition, said, "User-experience (UX) design dictates most of what we do. Place a big source of addictive content in the focus of attention and most people will slip into that trap. If our UX designers wise up, they can just as easily design wellness, mindfulness, self-control and other features into the devices we use. It's possible, but the business models that fuel these companies make such steps unlikely."

Micah Altman, director of research and head scientist for the program on information science at MIT, said, "Information technology is often disruptive and far faster than the evolution of markets, norms and law. This increases the uncertainty of predicting the effects of technological choices but doesn't render such predictions useless, nor prevent us from observing these effects and reacting to them. … We know enough to effectively design substantial elements of privacy, security, individual control, explainability and audibility into technical systems if we choose to do so. How will specific technology choices affect individuals and society? We do not always know the answers to technology questions in advance. But we can choose how to design into our systems now, the ability for society and individuals to ask these questions and receive meaningful answers."

Salvatore Iaconesi, an entrepreneur and business leader based in Europe, said, "Bring in arts and design to work not only on providing information and skills, but also to work on the dynamics of desire, imagination and emotion, which are the real behavior-changers."

Some respondents aren't so sure that progress in the ethical design and use of technology can overcome the influence of base human nature. **Frank Kaufmann**, a scholar, educator, innovator and activist based in North America, commented, "People are constantly improving, so technology naturally supports that. Unfortunately our race is blocked from true progress until people embrace the secret to dissolving and removing dominating self-interest. Tragically technology exacerbates that."

The overarching sentiment among these respondents is that people have to take action, not simply step back and let an avalanche of technology overwhelm human reason.

Marc Rotenberg, director of a major digital civil rights organization, wrote, "The initial hurdle in all such challenges will be to overcome technological determinism. This is the modern-day religion of acquiescence that stifles reason, choice and freedom."

An **anonymous respondent** commented, "We are ruled by a dysfunctional worldview that values profit over people; it skews what the internet does and what it can do. The internet has the power to be much more positive in people's lives but that requires a different political framework."

A sampling of additional comments about the "reimagine systems" theme from **anonymous respondents**:

- "A new model of education for our technologists and engineers should incorporate ethics and public policy. Better investigative journalism should be directed at tech."
- "Companies can't be allowed to just shrug their shoulders and say that people's safety on the internet is not their concern."
- "We need empowered technology ethicists. Profit should not be the only driver for technology-driven change."
- "Providers should be able to better control security and safety for users."
- "We need to provide strategies for disconnecting, which is as important as connecting."
- "A substantive rethinking of design principles and the true potential of these technologies, beyond the limiting visions of Internet of Things and social media, is necessary."
- "Companies like Facebook, Google and even Twitter need to recognize that with their power comes great social responsibility. This will be even more true as companies like Uber merge digital and physical worlds so that the risks people face are not just nasty messages but immediate physical danger."
- "We can apply experience and knowledge to keep us grounded in the physical world and continue the advancement of technology. An essential component of this is how we maintain the inherent democratic nature of a non-hierarchical internet."
- "Stopping gamification of everything is an obvious first step."
- "The fact that there are possible interventions for good does not guarantee that they will be effected or that they will not be countered by forces against good."

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)

A number of respondents said technology fixes and emerging tech tools can be called upon to mitigate many current challenges to individuals' well-being.

Daniel Weitzner, principal research scientist and founding director of MIT's Internet Policy Research Initiative, commented, "When interacting online, we need to know whether we are dealing with real people, and those people need to be held accountable (sometimes socially, sometimes legally) for the truth and integrity of their words and actions. As an alternative to censoring speech or controlling individual associations, we should look to increasing accountability while recognizing that sometimes anonymity is necessary, too. And, when platform providers (i.e., advertisers and others) operate platforms for profit, we should consider what mix of social and legal controls can provide the right measure of accountability."

Dan Ryan, professor of arts, technology and the business of innovation at the University of Southern California, wrote, "I would like to see a low-transaction-cost method for tagging ownership of personal information that would allow individuals to up-license use of their data (including the ability to withdraw the license) and potentially collect royalties on it. A blockchain-like technology that leaned in the direction of low transaction cost by design rather than trying to be a currency might allow this to work. Alternatively, third-party clearing houses that operate as consortia could control good/bad behavior of information users (e.g., if you continue to use personal info when license has been revoked you will be denied access to further information) could make something like this possible. An extension of this to permanent transportable identity and credit ratings could make a big difference in parts of the world where those things are a challenge."

Bart Knijnenburg, assistant professor at Clemson University, said, "An important side effect of our digital life is that it is observable and amenable to research. This aspect is slowly but steadily revolutionizing the fields of psychology, sociology and anthropology. The available data is so vast that we can now study subtle phenomena and small sub-populations (e.g., underserved minorities) in increasing detail. If insights from the 'digital humanities' can be fed back into the development of online technologies, this can help mitigate the potential harms of digital life."

Sam Lehman-Wilzig, retired chair at Bar-Ilan University's school of communication and the department of political studies, wrote, "Social media will be forced by regulation, legislation and/or public pressure to limit some of the more deleterious elements within their platforms – this will involve artificial intelligence to aid in 'surveying' the constant, vast flow of communication, a small part of which is harmful and even illegal."

An **anonymous distinguished advocate for the World Wide Web and policy director** based in Europe said, "Technologies such as artificial intelligence and blockchain have the possibility to greatly improve how we navigate through the world and how the world is structured. If these technologies are developed in a way that aims at increasing the greatest social good, then

they have the potential to have an extremely positive impact on our economies, societies and politics. This would mean placing the individual at the center of concern and the problems that technologies are being developed to solve."

Alf Rehn, a professor of innovation, design and management at the University of Southern Denmark, wrote, "As always, information and education are key. … Rather than building in limitations such as 'maximum allowed screen time,' digital tools should inform their users of good usage practices, allowing for considered choices."

Morihiro Ogasahara, associate professor of sociology at Kansai University, said, "Because users of platforms (e.g., Google, Facebook) hope for these actions, platforms will have to respond to the huge demand. Of course the definition of benefits/harms sometimes depends on people's habits or cultural context and these have been shifting, therefore the actions will be necessarily temporal symptomatic treatments."

George Strawn, director of the U.S. National Academies of Science, Engineering and Medicine Board on Research Data and Information, said, "'Interventions' will be among the new tools and services that will continue the evolution of the internet."

A sampling of additional comments about the "reinvent technology" theme from **anonymous respondents**:

- "As AI makes digital applications easier to learn, fix and adapt to us, it will greatly reduce the time learning how to use new applications."
- "Future technologies (e.g., AI, semantic technologies) have the potential to assure greater information/data provenance."
- "New technologies can mitigate harmful effects of digital technology. For example, dual authentication can enhance security. That said, good and evil will always be in a race."
- "A technology self-limiter needs to be pervasive, not app by app, or site by site, but rather something that's embedded in our culture."
- "The Web can generally move toward more human-centric designs that celebrate individuality rather than attempt to put people in pre-defined categories for ad targeting purposes. … Advertisers themselves can demand it, as it would reduce the propensity toward trolling and extremism that we see today."
- "Moving away from incentive-based features that require constant check-ins is a good start."
- "Security could be fundamentally improved, sparing everyone a ton of annoyance. But it won't be, because that would require a fundamental change in the architecture of the internet."

- "Our digital 'diet' will become more apparent with new guidelines for healthy patterns of use. New apps will become more analytic, alerting us to the health of our financial affairs, personal health and well-being and in so doing liberate more time for personal enrichment, exercise, time with family and friends."
- "Tech is both our best and worst friend. Ways to make it our best friend: Make it stop if over-used. Initiate self-governing rules and self-learning AI rules to avoid things like bullying, etc. Deep-learning fact-checking to avoid fake news. Create social citizenship as part of any action relevance."

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

A number of people said they do not expect change without some sort of industry, government and public interventions – requirements, professional codes, rules, laws or other guiding structure that works to elevate the public good and individuals' well-being over profits without stifling helpful innovation.

Seth Finkelstein, consulting programmer at Finkelstein Consulting, observed, "It's too common to have any harms excused as an inevitable consequence of technology, when it's really a matter of policy. That is, a net benefit can be composed of many large positives and negatives. … 'Digital life' can mean easily connecting with someone sharing your particular problem. But it also means an easy connection for anyone who has a problem with *you*. The flip side of 'supportive community forum' is 'social-media hate mob.' Having a world of knowledge at your fingertips also means having the world's distractions a click away. Doing business all over the globe brings being able to be scammed from foreign lands. Consulting with experts in another country means offshoring labor is practical. All of these effects, and more, do not take place in isolation, but are profoundly affected by governmental actions."

Rob Frieden, a professor of telecommunications and law at The Pennsylvania State University, commented, "Leaving technology introduction and integration to an unregulated marketplace diminishes the benefits, because most stakeholders do not operate as charities. If governments conscientiously embrace their consumer-protection and public-interest advocacy roles – a big if – society can integrate new technologies accruing measurable benefits."

Tom Wolzien, chairman at The Video Call Center LLC, was among those who proposed specific steps: "1) Provide plain and simple notice to the consumer of the [owner responsible] for each site, app, stream or other material reaching that consumer on that web/app page or event. 2) This is a legal editorial responsibility for the content presented (consistent with current libel, slander,

defamation and rights laws covering legacy print and mass media). 3) Application of anti-trust law to vertical and horizontal integration across all media, including all online media."

Narelle Clark, deputy CEO of the Australian Communications Consumer Action Network, said, "Increasingly regulators are finding ways to enforce previously accepted norms of requisite content quality – in areas such as unrealistic health claims on health apps, for example. Data-governance regimes are also becoming more widely accepted and enforced. While we will continue to see poor (and even appalling) examples of data mismanagement and misuse, new products and product-development approaches are starting to take privacy and good data management principles into account. With the regulators discovering better ways to enforce these matters we should start to see improvements in product quality, and, as a result, better outcomes for consumers of digital products. The booming industry of mental health apps illustrates the desperate need for broader availability of mental health care. Many of the current apps fail to contain appropriate attributions to their creators or to the evidence (if any) of their effectiveness, yet many make extraordinary claims. These apps also have the ability to prey upon vulnerable people through in-app purchases, inappropriate treatment and so forth. I welcome advances in apps that work, and in the efforts of health practitioners and regulators to act against the predatory ones. If we can promote the effective ones, these apps and related services have the potential to deliver real benefits to society."

Justin Reich, assistant professor of comparative media studies at MIT and the executive director of the MIT Teaching Systems Lab, said, "As the largest communication platforms begin to function as monopolies, we may need to depend more on regulation than competition to curtail the most anti-consumer behaviors."

Oscar Gandy, professor emeritus of communication at the University of Pennsylvania, wrote about requiring companies take user well-being into account, "I have suggested that the market needs an aide to self-management in the area of news and information, where 'balanced diets' can be evaluated and improved by a trusted agent. In my view, Facebook is not a trusted agent, and its influence over our information diets is not healthy, in part because of its conflict over whose interests are supposed to be served. In the absence of the emergence of a successful information platform, regulatory oversight that includes assessments of individual and collective harms will have to evaluate the performance of market leaders and exact compensatory payments to support the development of such agents/services. I am hopeful that really smart people are raising questions and seeking policy responses to limit the harms that come from captured transaction-generated information. Time will tell, of course, whether the regulatory developments in the European Union will influence, let us say, counter-balance those in the U.S. and China."

An **anonymous respondent** said, "More regulation of online companies is needed to provide transparency into the algorithms that shape the information that we are fed."

Anne Collier, consultant and executive at The Net Safety Collaborative, said, "Regulators and governments need to show greater responsibility in three ways: 1) Grow their understanding of how digital media work, of algorithms, machine learning and other tools of 'big data,' including the pace of change and innovation. 2) Begin to acknowledge that, given the pace of innovation, regulation can't continue to be once and for all, but rather needs a 'use by' date. 3) Develop more of a multi-stakeholder rather than a top-down, hierarchical model for regulation. In fact, we all need to think about how regulation needs to be multi-dimensional (including self- and peer-to-peer) and how all the stakeholders need to collaborate rather than work from an adversarial approach."

Dozens of comments mentioned the net neutrality rules established by the U.S. Federal Communications Commission during the Obama administration that have since been slated for repeal by the FCC of the Trump administration. All who commented on net neutrality said such rules are necessary for a positive future. **Ian Peter**, an internet advocate and co-founder of the Association for Progressive Communications, commented, "There are regulatory measures that can assist with many other problems, such as fake news, algorithmic injustices, privacy breaches and market domination via breakdowns in Net neutrality or unregulated market dominance. All these things can be improved by regulatory measures; whether they will be is another matter." **Michael Everson**, publisher at Evertype, commented, "The *one* intervention which is important is the guarantee of Net neutrality worldwide."

Organizations are beginning to work together to possibly effect some positive change. New alliances are now being formed between non-governmental organizations and government entities, joining to address challenges raised by rapidly advancing digital technologies.

Sonia Jorge, executive director of the Alliance for Affordable Internet and head of digital inclusion programs at the Web Foundation, said, "There are many actions that can be taken to mitigate potential harms of digital life/interactions, and many organizations are working towards ensuring that those are designed thoughtfully and implemented correctly, including the Alliance for Affordable Internet, the Web Foundation, the Internet Society, the Association for Progressive Communications, some corporations and governments (with a number of Scandinavian countries and the European Union being good examples). Such actions include, for example, comprehensive data protection laws (the EU General Data Protection Regulation being a good example), or corporate transparency and accountability standards to increase consumer trust. Some examples include: 1) A4AI has published suggested policy guidelines to make public WiFi work for users. 2) The Web Foundation has published a whitepaper series titled 'Opportunities and risks in emerging

<u>technologies'</u> which addresses some of these issues and suggests some actions. Other areas of concern are around legal frameworks to ensure that internet-based violence against women is addressed by law enforcement and other agencies. Without such frameworks in place to increase privacy and protection, women will increasingly question the benefit to participate in digital life, as the costs of access may be far too high for many. This is unacceptable, therefore, leaders MUST develop policy solutions to address such situations."

Like the technologies they may be created to rein in, legal actions can lead to some unintended negative consequences.

Shel Israel, CEO of the Transformation Group, said, "The issue becomes one of public policy and government regulation. My concern is the quality of such policies is dependent upon the quality of government, which at this moment in time is pretty discouraging."

Daphne Keller, a lawyer who once worked on liability and free-speech issues for a major global technology company, pointed out some potential negatives of regulation, commenting, "If European Union law compels platforms to build online content filters, for example, that will: 1) Foreseeably lead to lots of erroneous suppression of lawful information. 2) Speed the day when filtering technologies are easily available to oppressive regimes around the world. 3) Entrench incumbent platforms at the expense of new market entrants." She added, "Interventions to shape the law *can* mitigate harms to digital life. So can pressures on private companies and other powerful actors in the space."

Several respondents said codes of ethics and professional guidelines should be written and reforms should be suggested by industry and health associations.

Alan Tabor, an internet advocate based in North America, said, "We need something like credit reports for digital advertising ... so we can see what our profiles are on the various media and who is using them and why."

Antoinette Pole, an associate professor at Montclair State University, commented, "[There should be a set of guidelines for] recommended usage by the American Medical Association for adults."

Some suggested that finding a way to eliminate complete anonymity online might reduce many types of damage to well-being.

Bill Lehr, a research scientist and economist at MIT, wrote, "Anonymous commentary has done great damage, on balance, to the quality of public discourse. Things like cyberbullying and fake news would be less of a problem if those who offer opinions were more often held accountable for their thoughts. I am fan of First Amendment protections and recognize the importance of anonymity in protecting privacy, but I think we will have to give up on some of this. This is just one example of something immediate that could be done to improve digital life."

Some say regulation (and regulation in combination with other approaches) may come too slowly to match accelerating technological change. And some say regulators cannot be trusted to help society moderate connectivity to its benefit. An **anonymous longtime leader with the Internet Society and the Internet Engineering Task Force** commented, "While there are interventions that can be made, most of them are likely to be worse than the disease, particularly putting more power into the hands of demagogues, those with no interest in listening to others, etc."

Garland McCoy, president of the Technology Education Institute, said, "As with everything, moderation is key; you want to avoid total immersion in what will clearly be an always-on environment linking your brain directly to the internet. So you will need to enable some 'off' switches – which may or may not be legal to obtain in the future. Obviously from the government and private-sector perspective they would like to keep you connected at all times to monitor your every thought and move or to sell you something you just thought about."

A sampling of quotes tied to this theme from **anonymous respondents**:

- "As experimental technologies continue to break our 'body barriers' and become more biologically invasive, tech will need to be held up to rigorous standards and testing for health implications."
- "Governments need to take seriously the risks of cyberwar by governments and terrorism by non-governmental agents. Invest. Research. Prosecute."
- "Reinstitute something like the Fairness Doctrine. Or require labeling/standards for actual news."
- "Legislation should apply a minimum journalistic standard to social media companies to force them to track and rein in the worst abuses, or social media as we know it has to collapse and be re-invented."
- "Eliminate anonymity and the use of aliases on the internet. Make sure that everybody is as visible and known as in the real life. Uphold libel laws and hate laws in every country similar to those of France and Germany."

- "An international online code of conduct with some enforcement or rating scale would be useful, but that can of worms is so big, it almost breaks my brain."
- "Regulatory actions will be essential to continue to protect human rights online … this includes regulation of monopolies and of anti-competitive and anti-consumer behaviour."
- "Society needs to adjust to technological changes; this will come with time and experience, and hopefully *not* through regulation or over-reaction."
- "Like all market systems, the negative externalities require either social or regulatory action to prevent unaccounted costs to society."
- "Government intervention should place countervailing pressure on platform monopolists."

Redesign media literacy: 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

A large share of respondents said people have to take direct action to cope with the impact of technology. They noted, however, that many users need help and that doing this well is vital to individual and societal well-being. They say education efforts are not fostering the appropriate depth of knowledge of the systems behind digital life or teaching methods so that people can mitigate problems.

Jon Lebkowsky, CEO of Polycot Associates, said, "It's a 'training issue' – our dependence on various technologies is way ahead of our comprehension. It'll probably take a generation or two to catch up with accelerating change."

Charles Ess, professor in the department of media and communication at the University of Oslo, said, "As a humanist and as an educator I think the central question is … us. That is, it seems very clear that as these technologies become more comprehensive and complex, they require ever greater conscious attention and reflection on our part in order to ascertain what uses and balances in fact best contribute to individual and social well-being and flourishing. In some ways, this is ancient wisdom – and specifically at the core of the Enlightenment: if we are to escape bondage, we must have the courage to critically think (and feel) and act out of our own (shared) agency. This is the virtue ethics approach taken up by Norbert Wiener at the beginning of computing and cybernetics. … Fairly simply put: The more these technologies both enhance my capabilities and threaten my freedom (e.g., the infinite surveillance possible through the Internet of Things), the more I am required to be aware of their advantages and threats, and to adjust my usage of them accordingly, whether in terms of close attention to, e.g., privacy settings on social media platforms, software and software enhancements (such as browsers and browser extensions, PgP apps, etc.), and/or simple decisions as to whether or not some technological conveniences may simply not be

worth the cost in terms of loss of privacy or 'deskilling', as in the case of offloading care to carebots. But as these examples suggest, such awareness and attention also require enormous resources of time, attention and some level of technical expertise. How to help 'the many' acquire these levels of awareness, insight, technical expertise? The Enlightenment answer is, of course, education. A version of this might be 'media literacy' – but what is needed is something far more robust than 'how to use a spreadsheet' (as important and useful as spreadsheets are). Rather, such a robust media literacy would include explicit attention to the ethical, social, and political dimensions that interweave through all of this – and highlight how such critical attention and conscious responsibility for our technological usages and choices is not just about being more savvy consumers, but, ultimately, engaged citizens in democratic polities and, most grandiosely, human beings pursuing good lives of flourishing in informed and conscious ways. All of that is obviously a lot to demand – both of educational systems and of human beings in general."

Annette Markham, professor of information studies and digital design at Aarhus University in Denmark, said, "We can help mitigate some of this stress and anxiety by engaging people to be more conscious of what's happening as well as – and this latter part is critical – more deliberate in establishing and maintaining better habits of digital media consumption. This means more work to develop effective media literacy (media, digital and data literacy), through strategic educational efforts or more informal consciousness raising, using feminist models of the women's liberation movements in the '60s and '70s. I've been wanting to figure out a way to have an international holiday called 'memory day,' where we spend time sorting through our own personal 'big data' to see what we've collected and generated throughout the year, to clean up our files and throw away junk, but to also more carefully curate what matters to us. This sort of regular reflection help people recognize how much they click, store, and share, which can in turn help people reflect on what those activities mean to them. Sorting through one's data to commemorate what matters is something that social media platforms like Facebook are happy to do, but are they the best curators for our memories? Tracing, remembering, and commemorating can help us slow down, be more deliberative about our digital lives, and be more reflexive about the impact of the internet overall."

Justin Reich, assistant professor of comparative media studies at MIT and the executive director of the MIT Teaching Systems Lab, wrote, "Just as earlier generations of media-literacy practices explained to students how advertising strategies work, we'll need similar education to folks about how consumer technologies are designed to capture and maintain attention, to surveil consumers and other network actors to harvest vast amounts of data, and … to organize that data for targeted advertising."

Greg Shannon, chief scientist for the CERT Division at Carnegie Mellon University's Software Engineering Institute, commented, "Here are some education interventions that already show promise: *Digital literacy *Critical thinking in the digital age *Trust in a digital world. Society needs to demand a digital world that is more secure, private, resilient and accountable."

Lisa Nielsen, director of digital learning at the New York City Department of Education, said, "People are becoming more and more aware of how to successfully manage their digital lives. In particular this is also being addressed more frequently in schools with curriculum from Common Sense Education, EVERFI's Ignition, and Google's Be Internet Awesome. Additionally, the International Society for Tech in Education has standards aligned to this goal and supports students in becoming 'empowered digital learners.' There is also a parenting component that accompanies many of these programs. There is more awareness and mindfulness of what it takes to have a successful digital life. … There are plenty of programs now to address the potential harms of digital life. These are being implemented in schools with programs that address cyberbullying and mindfulness. They are also being addressed more and more in the mental health world. People are learning techniques for being upstanders when they see others not treating someone right. Online spaces are getting much better at setting ground rules."

Frank Feather, a business futurist and strategist with a focus on digital transformation, commented, "Digital technology itself helps us to be more educated about its safe and productive use and application."

A sampling of additional comments about "redesigning media literacy" from **anonymous respondents**:

- "We need better education and people (mentally) healthy enough to withstand the seductions of immediate gratification."
- "We all need to be taught to be better consumers."
- "Digital literacies should be taught as a part of children's educational development, with a passing grade required.
- "A comprehensive understanding of how it all 'works' is essential. VR/MR/AR can be adapted as both teaching and wellness tools."
- "12-step programs and services to help people cut the cord, so to speak, may help."
- "Employers should institute electronic communication vacations for the health of their employees."
- "Early education regarding the effects of physical inactivity is required. A reward system that encourages more activity even while using the internet would be great."

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

While all respondents agreed there are some concerns and most suggested that attention must be paid and solutions pursued when it comes to individuals' well-being and the future of digital life, many have confidence that humans can and should also take the initiative to evolve and adapt.

Stowe Boyd, futurist, publisher and editor-in-chief of Work Futures, said, "One of my abiding beliefs is that we are better off when we take an active and intentional approach to living digitally. Rather than being just a passive 'consumer' of digital streams, I feel people are better off through activity. To comment, argue, share and curate. Then, instead of being buffeted by the storms raging online, you can use the blowing winds to fill your sails and set a course."

Vint Cerf, Internet Hall of Fame member and vice president and chief internet evangelist at Google, commented, "We need to help people think more critically about what they encounter in information space (film, radio, TV, newspaper, magazines, online sources, personal interactions …). This needs to be a normal response to information: Where did it come from? Who is providing it? Is there a motivation for the particular position taken? Is there corroborating evidence? We can't automatically filter or qualify all the data coming our way, but we can use our wetware (brains) to do part of that job."

Stuart Elliott, a visiting scholar at the National Academies of Sciences, Engineering and Medicine, said, "As with any powerful new technology, the internet brings important new benefits but also various risks and side effects. As a society, we're still in the process of understanding and reacting to the risks and negative side effects. We would expect this to take time – on the order of a decade or more. As we understand the risks and negative side effects, we'll develop ways of addressing them, ranging from individual behaviors to group norms to government regulations. In general, it's reasonable to expect these various reactions will allow the technology to have a net positive effect."

Yasmin Ibrahim, an associate professor of international business and communications at Queen Mary University of London, said, "The problem is that as digital technologies become seamlessly part of our everyday engagement and mode of living we may not question actions or decisions we make online. Making the internet a healthy space means analysing our modes of being and everyday engagements in the digital realm, and this itself can be stressful. But keeping the internet a space of ideals requires us to do precisely that; to question every action and think about the internet architecture and how our activities are connected to a wider digital ecology of producing and consuming."

Mark Patenaude, vice president and general manager of cloud technologies at ePRINTit, said, "Digital transference over the last decade had little guidance or mentors to help modulate the overabundance of useless, immoral and fake information. Laws, governments and society in general are starting to understand the past effects of social media and mass media marketing techniques. Society will advance to a stage that new technologies will provide us with significant advances in security, privacy and content that becomes believable. … The perceived dangers of advancing digitization are very real and people should be wary and cautious. Being afraid and skeptical will push our technologists to come up with ways that protect what we need protecting."

Hal Varian, chief economist at Google, commented, "Every new technology goes through a phase of euphoria, followed by a phase of retrenchment. Automobiles were a fantastic replacement for horses, but as their numbers increased it became clear that they had their own health and cleanliness issues. The same is true of the internet. A few years ago, freedom of the press went to those who owned one. Now everybody has a platform, no matter how crazy they are. But we will learn to live with this by developing better technology, better media and better critical awareness."

Dana Klisanin, futurist and psychologist at Evolutionary Guidance Media R&D Inc., wrote, "We are now entering a phase when a larger number of people are beginning to take seriously the various impacts of digital technologies for good and ill. This 'being conscious' is the first step to taking control over our digital lives. The coming decade will see the advent of more 'digital detoxing' and 'mindful unplugging' but people will also be learning how to use digital technologies to benefit their lives. By the end of the next decade we will see a more balanced approach in our digital lives – that, all on its own will be an improvement."

Pamela Rutledge, director of the Media Psychology Research Center, said, "With every new technology, we have to learn the new rules of engagement. This only comes from understanding what the technology can and can't do and how that impacts our goals, behaviors and choices. To benefit from cars, we had to learn to drive, establish rules for the road and understand the benefits and dangers of such technology-enabled power. Today's technologies are no different. There are inherent and undeniable benefits, such as increased productivity, wider access to information, healthcare and education, greater and more resilient social connections independent of time and distance, the inability to hide bad behavior for those who abuse power, and the psychological sense of empowerment that derives from increased agency. This does not mean that there aren't challenges to be managed, like equal access, privacy, misinformation and new avenues for criminal behaviors. Technology isn't going anywhere and it is without agenda. The choice of what and how to use technology is our own. As with cars, we need to learn to be good drivers. We need to develop new social literacies and behavioral rules that are adaptive to a digital world. However, these are recurring problems with every type of social change. Well-being is a psychological state that comes

from feeling like you have the ability to take action, have impact, that you are capable of navigating your environment to meet your basic needs, and that you have meaningful social connection. Technology enhances all of these."

Laura M. Haas, dean of the College of Information and Computer Sciences at the University of Massachusetts, Amherst, wrote, "People will adapt, learning to avoid negative use of technology. I see, for example, many younger people choosing to shut off their phones in social settings, or dramatically reducing their use of Facebook, etc. While not everyone will change, today's issues will be addressed in a variety of ways. I am also a realist, though: I believe as technology advances, new harms will develop. Any tool can be used for good or for ill, and today's technology is so complex that we cannot anticipate all uses or side effects. … I expect the positives and negatives in 10 years may be quite different than they are today."

Gina Neff, an associate professor and senior research fellow at the Oxford Internet Institute, said, "Technology did not create the vast economic inequality that is shredding the social fabric of American life, but it can amplify it. If we don't address inequality then the potential harms of digital life will only worsen."

Claudia L'Amoreaux, a digital consultant, commented, "We've passed through the naive phase of internet optimism and utopian thinking. Issues are on the table. That's a good thing. I am encouraged by the work of people like Tristan Harris, Eli Pariser, Ethan Zuckerman, Sherry Turkle, Yalda Uhls, [and] Zeynep Tufekci to identify and present solutions to the potential harms of digital life facing us – harms to children and in the family, and harms to civil society and democracy. I do think more individuals are becoming aware of the challenges with 24/7 digital life. More people are calling for transparency – in particular, with algorithms. Some solid investigative reporting is happening (e.g., ProPublica's recent piece on discriminatory housing ads on Facebook). The fake-news crisis has sounded an alarm in education that young people today need critical digital literacy, not just digital literacy. And the hearings in Washington post-election with the leaders in the digital industry have exposed deep problems in the way business has been conducted."

Jim Hendler, an artificial intelligence researcher and professor at Rensselaer Polytechnic Institute, wrote, "There is much discussion starting around the ethical issues in new technologies, especially artificial intelligence, and in 'algorithm accountability.' I believe that as more algorithms gain some measure of transparency and people's awareness grows there will be a growing awareness that new technologies depend on people who deploy them and the public response, not just on the technologies themselves."

Daniel Berleant, author of "The Human Race to the Future," commented, "When human groups encounter new environments they must adapt. … The process of adaptation will result in problems that arise, including maladjustments that people must learn to overcome as well as other challenges. Some people will be harmed but few will return to their old environment. As societies learn to exist in this new environment, humans will become better able to live in it. We will learn to cope with the new aspects while using the new opportunities it presents to enjoy improved quality of life. Thus there will be pluses and minuses, but over time the minuses will diminish while the pluses will increase."

Michael Rogers, a futurist based in North America, said, "We will certainly develop new ways to adapt to the digital environment. The key question: What is the balance of the real and the virtual that will keep us healthy in every sense? Example: I know one large company that now has a 'remedial social skills course' for certain new hires. Growing up with asynchronous communication methods like IM and texting means that some adolescents don't have as much practice with real-time face-to-face communication as did their parents. Thus, for some, tips on how to start a conversation, and how to know a conversation is over, and a bit of practice are helpful. It's not the fault of the technology; it's rather that we didn't realize this might now be a skill that needs to be taught and encouraged. I think we'll ultimately develop and teach other ways to overcome negative personal and social impacts. The challenge for older people in this process will be to ask ourselves whether, in these interventions, are we protecting important human skills and values, or are we simply being old fogies?"

Valerie Bock, principal consultant at VCB Consulting, wrote, "I see social norms developing to help us use technology in a way that serves our human connections rather than detracting from them. … Just as families of a generation ago learned to employ the home answering machine to preserve the dinner hour, families of today are creating digital-free zones of time and place to manage our strong attraction to digital devices and social media and build their connections to one another. This is not to say that there are not real threats to well-being posed by the erosion of privacy, which is a central feature of current digital developments. The total-surveillance society described in Orwell's '1984' has been packaged by corporate digital interests as a consumer convenience and is being welcomed into our homes rather than imposed on them by a hostile and oppressive government. The more-pinpoint targeting of consumer desires enabled by these technologies threatens to overwhelm the defenses against over-consumption that we developed in the TV age."

Marshall Kirkpatrick, product director at Influencer Marketing, said, "We can all help create a culture that celebrates thoughtfulness, appreciation of self and others and use of networked

technologies for the benefit of ourselves and the network. We can create a culture that points away from the exploitive mercenary cynicism of 'Hooked' growth-hacking."

An **anonymous respondent** wrote, "The adult work environment should be refocused to reduce the speed at which life is expected to travel. When everyone is meant to be 'on' and in frantic motion 24 hours a day, there is little time to rest, recover and/or allow valuable free-form thought and brainstorming. Stress has a myriad negative effects on human health and when stress lives in your pocket with an expectation that you will respond to it 24 hours of the day and within minutes, health and well-being will not benefit."

Nathaniel Borenstein, chief scientist at Mimecast, said, "Most obviously, rigorously enforced Net neutrality would prevent many of the worst outcomes. More positively, I think we can develop spiritual and philosophical disciplines that will help people get the most out of these technologies, and will help people develop in ways that minimize the chances that they become cyberbullies or other cybermisfits."

Matthew Tsilimigras, a research scientist at the University of North Carolina, Charlotte, said, "There is a huge personal and career-related cost to you if you are unable or unwilling to participate in digital life. … Workplace protections need to be enforced so that employers do not feel like they have 24-hour access to employees, which many use as a crutch for their own poor management skills. It is also the responsibility of online forums themselves to moderate content produced and exchanged on their platforms so as to police bullying and other threatening behavior."

A sampling of additional comments related to "recalibrating expectations" from **anonymous respondents**:

- "A deeper understanding through additional research and scholarship of the socio-cultural and psychological effects of digital technology will inform our use of these technologies in the years to come."
- "Put the phone down."
- "You could unplug, but at a cost."
- "I hope places that jam cell phones become popular, that unplugging gets to be a draw due to popular pressure. Not counting on it!"
- "We need to propagate the idea that disconnecting, being more aware of one's uses and balancing activities is of social value."
- "The solution is not more technology, but the responsibility of the individual to navigate and decipher information and use it as a powerful tool to benefit themselves."

- "Social norms will push back trash talk, fake news and other click-bait into their own ghettos."
- "There will be a resurgence of people rejecting the overwhelming pervasiveness of digital in our day-to-day lives."
- "There are things that can be done but it won't be easy and it will require deliberate effort. I don't think our society will take the tough route. The lull of the easy road will lead them to harm."

<u>Fated to fail</u>: A share of respondents say interventions may help somewhat, but – mostly due to human nature – it is unlikely that these responses will be effective enough

When asked the yes-or-no question "Are there any possible interventions that can help overcome the negatives of digital life's impacts on well-being?" a small share of respondents said "no." Some expressed a lack of faith in the capability of humans' and human systems to effect the changes or fixes that might make individuals' well-being paramount. Another fear expressed by those who answered "no" to this question is that attempts to effect improvements may create unintentional negative effects or be appropriated to further certain agendas that are not in the public's best interests.

Cliff Zukin, a professor and survey researcher at Rutgers University, commented, "Simply put, I believe the technology governs. It is a variant of McLuhan's 'media is the message.' It continues the argument of Neil Postman's in 'Amusing Ourselves to Death.' People send the pictures and go on Facebook because they can, not because there is any real content involved. Over time, that becomes the communication and a new normal evolves."

Mark Richmond, an internet pioneer and systems engineer for the U.S. government, wrote, "I'm concerned that the more people try to fix things, the more problems are caused. Regulation, deregulation, censorship, openness, filtering, verifying, no matter what you call it. With the best of intentions, people have proposed requiring real identification for online posters, for example. The downside is the risk of repression, censorship, discrimination and marginalization. To make it worse, overcoming such a requirement is a trivial matter for anyone determined. It just makes it harder on the honest. Protections against the misuse of the technology must continue to be developed. Financial transactions, privacy concerns, all of those of course Revival (sic). But that's a transactional change, not a foundational change. The foundation of the internet really must remain one of providing a billion soap boxes for a billion points of view."

Heywood Sloane, partner and co-founder of HealthStyles.net, said, "The risk of unintended consequences is higher than we can possibly understand or appreciate. Learning to use the best of it and avoid the worst of it – with experience over time – is quite possible."

Some replied that people-plus-technology is a threat that can't be completely conquered. **Colin Tredoux**, a professor of psychology at the University of Cape Town, commented, "Digital technology is just about uncontrollable. There are myriad examples. The internet was designed to be robust to local disruption (or control), and the many many examples of hacked banking, government, health, [and] education sites show it is not possible to provide meaningful control except at the cost of draconian measures as in Iran or China, and even those will likely fail. Some military protocols now require computers to be offline. We will have to live with the bad while enjoying the good. It is not clear we can do anything meaningful to ensure that the good outweighs the bad."

Thad Hall, research scientist and co-author of the forthcoming book "Politics for a Connected American Public", commented, "My concern is that the battle over digital life is a competition where one side is using addiction-psychology models to get people addicted to their devices and the apps on them and the ability of people to resist these temptations is questionable. In addition, the ability of people to use the technology for nefarious purposes – creating fake information, especially high-level information like video and audio – and the internet to spread this information is going to create ongoing problems that will be very difficult to address."

There were those who said most individuals will not make the adjustments necessary in their personal lives to rein in the habits that are causing them to suffer from nomophobia, fear of missing out (FOMO), eyestrain, sleeplessness, isolation, deepening lack of social skills, Instagram-inspired envy, stress, anxiety and other effects.

Tom Massingham, a business owner based in North America, wrote, "I just can't think of a possible intervention. It seems like a creature growing, and out of control."

Alice Tong, a writer based in North America, said, "We all have free will, and if someone wants to do something we cannot stop them, not digitally. What will be important is to promote the idea of non-digital life to people starting at a young age. Make it known that also living a non-digital lifestyle is a must for balance."

An **anonymous professor at a major university in Australia** said, "I do not think we have the capacity to act as we need to. Ultimately this is not about what harm technology might represent to us but it is about what our capacity is for self-harm."

And some took issue with the idea of "intervention." **Chris Morrow**, a network security engineer, said, "I don't think that trying to 'intervene' is the right view. People need to realize that balance in their lives is important. Access and information at a wide scale enables people to see, hear, [and]
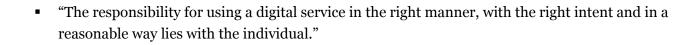
change many things, but at the end of the day they still need to interact with actual people and perform basic tasks in their lives. Trying to force this behavior will not work in the long term, people must realize that they need to balance their use of anything (digital access, food, exercise, etc.).”

An **anonymous professor based in North America** said, “The techno-libertarian philosophy is the lens through which people make sense of issues, so that collective goods like a balanced democracy or a vibrant community simply don't make sense. When coupled to a political system in which tribal political loyalties and campaign contributions erode even policies that have vast political approval (like Network neutrality) there aren't many effective institutions that can counterbalance problems created by policies that generate profits. Google would like to believe it does no evil, but when tens of billions of dollars of revenue are at stake, the social and political problems resulting from reinforcing polarizing social divisions will be ignored by the company, government and media.”

An **anonymous information science professional** wrote, “We are, in the United States, a people who believe in our free will to live as we choose. There would be incredible resistance to any large-scale attempt to help people moderate their use of technology. Technology is so linked to commerce that suggesting people use it less would be decried as harmful to the economy. We are in a cycle where the ends justify the means that justify the end. We want what we want, and, from most appearances, personal risk or harm is not an acceptable reason to limit our access to what we want. Those who make money from our behavior are certainly not going to help us change it.”

A sampling of comments supporting the “fated to fail” theme from **anonymous respondents**:

- “The ship has left the harbor. Digital providers have too much power and control information. Technologists also naturally push capabilities without worries about negative impacts.”
- “The corporations who stand to make money off these devices and services will not be working to lose eyeballs in the name of what may be better for us.”
- “Perhaps the demise of Net neutrality and onset of associated volume-based costing for use may provide a positive unintended consequence.”
- “All you could do is make access more difficult, slower or unpleasant.”
- “There is no political motivation to make changes that would help the majority of people. The recent decision against Net neutrality is just one example. Short-term profit and stockholders' interests are driving policy-making, innovation and regulation.”
- “There is a huge push from the economic side to use ever-more-digital tools in your life, and the means of regulators are really limited because of the global nature of such companies and activities. That is the biggest threat because needed regulation is extremely hard to enforce.”

- "The responsibility for using a digital service in the right manner, with the right intent and in a reasonable way lies with the individual."

5. Key experts' thinking about digital life and individuals' well-being in the next decade

Following is a collection of comments by several of the many top analysts who participated in this canvassing:

We will soon interact with digital technologies less frenetically

Kenneth Cukier, senior editor at The Economist, wrote, "Many people are frazzled by the always-on internet, but this is a feature of our embryonic understanding of how to adapt it to our lives; it's still early days. Over the next 10 years, the industry will get better at making it more subtle rather than distracting, and people will develop the social norms and personal behaviors to interact with digital technologies less frenetically."

How do we preserve quality of life while pursuing our goals?

Michael Roberts, an internet pioneer, Internet Hall of Fame member and first president and CEO of ICANN, commented, "Harm no longer can be defined in terms of history, either intellectual or physical. The spectrum of future human activities and lifestyles has been expanded immeasurably by knowledge about ourselves, and our newfound ability to replicate in digital automatons vast amounts of what used to be considered human work. Given a sufficient time horizon, a century or two, it is reasonable to assume humans can define whatever set of physical attributes and associated lifestyles they wish. The bottom-line issues are how to guide choices and achieve consensus, along with how to preserve quality of life while those goals are pursued. These are tough issues. Looking around at the end of 2017, one sees a human world of horrendous inequality and suffering, along with the worst political crisis in a very long time. My personal view is that the talent and energy contained in technology-oriented parts of society will push ahead, and, on balance, we will think we are better off 10 years from now, with 2027 technology, than we are today."

Don't allow the downsides to lead us to new laws and technologies that will serve as tools of censorship and surveillance

Daphne Keller, a lawyer who once worked on liability and free-speech issues for a top global technology company, said, "We will see declines in well-being in terms of people's real and perceived privacy, for example. And we are certain to see speech-related harms. On the one hand, online content ginning up racism, extreme populism or bias will likely expand. On the other, ill-conceived attempts to control this 'bad speech' will lead to the suppression of lawful and valuable 'good speech.' Laws and public policy in the European Union already incentivize platforms to remove legal information and expression posted by ordinary internet users. I predict that trend

will expand to other democracies around the world. I think/hope that these harms will be outweighed by improvements in well-being in other parts of the world. Many people in developing countries or oppressive regimes are only beginning to experience the internet's very real and very positive transformative power. Internet access can improve material prosperity, education, access to support for LGBT and other minority groups, government accountability, and much more. It's currently fashionable in the U.S. and Europe to see the internet as a force for harm. That's not wrong. But we should not let that blind us to the incredible benefits the internet has brought us in the past 20 years, and the benefits still to come – not just for us but for people around the world. Nor should we let our current pessimism lead to new laws and technologies that will serve as tools of censorship and surveillance in the hands of human-rights-abusing governments – wherever those governments may be or come to be."

Create policies for lifelong universal basic access to health, education and livelihood

Mike Liebhold, senior researcher and distinguished fellow at the Institute for the Future, wrote, "The most important civic actions to mitigate potential harms of digital life are: 1) Continuous education for citizens on critical-thinking skills and cyber secure behaviors. 2) Continuous education for well-being professionals and practitioners on effective application of technology, best practices for privacy and security. 3) Continuous education of technologies on designing and operations for quality of care, privacy and security. 4) Government policies providing lifelong UBA (Universal Basic Access to health, education, livelihood)."

It's your choice: There are good and bad things with which to engage

William Schrader, founder and CEO of PSINet, wrote, "When we planned the commercial internet at PSINet back in the 1980s, we dreamt of all knowledge being at everyone's fingertips instantly, along with distance learning, distance medicine (including surgery) and happiness and peace. We blew it, so far, on happiness and peace. Yes, we knew that the weak would use the commercial internet to steal, hurt and manipulate to harm. Every communications medium does that. That is what we accepted. If Man is Good, then the commercial internet will eventually enable happiness and peace. But, if Man is Evil, we will have more of what we have had for the past 20,000 years. It's your choice, each of you. There are good and bad things with which people choose to engage. I suspect that the weaker people will choose the bad things and the stronger people will choose the good. … The real good is when people decide to release themselves from that which has captured them (be it Web addiction, substance abuse, obesity, depression, sadness, laziness, self-deprecation, etc.) and choose to search the 'Inter-Web' :-) for help by learning tai chi, taekwondo, yoga, reading the classic books (online free from local library) and simply finding work that may pay poorly but gives them satisfaction. Psychiatry will be fully automated on the internet, with quality psychiatrists standing behind those systems."

Some aspects of life will be better; some will be worse

Sara Kiesler, professor emerita and National Science Foundation program manager, commented, "There will be winners and losers, as occurs now, and for individuals, some aspects of life will be better and some will be worse. Winners: entrepreneurs who invent new services or products and successfully reach new customers; formerly isolated seniors who keep in touch with family and recruit them to visit in person; happy people who find a loving spouse online; language learners who practice (almost) every day online; people who can work at home instead of commuting two or three hours a day. Losers: people without the resources to take advantage of online health, education or financial services; people who use the internet as a substitute for in-person social interactions; people who believe everything they read, hear, or see online and never question these opinions. Better aspects of life: convenience of shopping online, streaming entertainment, telework efficiency, improved government services, more efficient everyday life and social interaction. Worse aspects of life: insufficient interpersonal (in-person) interaction; manipulation via algorithm of thinking and opinions; lack of privacy and increased distraction; proliferation of online harms with insufficient defenses; global warming and population increases threaten food sufficiency, natural environment, and wildlife, and increase conflict and threat of warfare."

Believing things can be done better is the first step in figuring out how to get it done

Mark Richmond, an internet pioneer and systems engineer, wrote, "We have already seen the impact of lessening attention spans, 24-hour 'news cycles' and all of the social interaction breakdowns that result from the way things have become. I am hopeful that these declines will not continue. But I am pessimistic that the damage is already being done. There is no way to unwind the clock, nor to put this particular genie back in the bottle. Our best hope is that society, people in general, will adapt and evolve to better deal with the new reality. Society will never be the same as it was 50 or 70 years ago. It will be better. But what form 'better' takes, I don't yet know. I am hopeful that the new reality of ever-expanding connectivity can overcome the filters of repressive government, the language barriers and the cultural barriers that have kept people at odds for so long. The future may be brighter because of the same tools and technologies that have made it seem dim. My best hope is that this wonderful way of communication and interaction will somehow be used to improve the use of other technologies that can better the world situation. Believing that things can be done better is the first step in figuring out how to get it done."

Instead of suspending disbelief, we need to exercise it

Anne Collier, consultant and executive at The Net Safety Collaborative, said, "There are so many ways that connecting more and more of the world's people make things better for all of us – growing and broadening collaboration, helping marginalized or isolated people find connection

and get help, spreading opportunity and growing awareness of other perspectives and cultures, to name just a few. Yet we fixate on the negativity in media and political news. There are a bunch of reasons for this: Negative information is 'stickier' than the positive, and it's harder for our brains to go from negative to positive than the other way around. We are overwhelmed by the sheer volume of information coming at us 24/7. The pace and pressure of life in our society. Not being aware that it's the news media's job to report the exception to the rule, not the rule, not to mention 'what bleeds leads.' No one's telling us that all the negativity we're exposed to is not the norm in our experiences, that we should think twice before making what editors deem a 'big story' our story. Instead of suspending our disbelief, we need to exercise it! It's way too easy to 'believe the worst,' which is something in itself that's good to be aware of."

Digital life is enabling important work toward the 'cancer moonshot'

Bradford Hesse, chief of health communication and informatics research at The National Cancer Institute at NIH, said, "Although technologists and social scientists will continue to monitor the unanticipated, adverse consequences of digital transformations (e.g., safety issues, social media trolling), data suggest that in at least one area – the area of health and medicine – these digital technologies should provide an overall boost to citizens' well-being. At the end of 2016, the President's Cancer Panel (a legislatively mandated body) released a report titled 'Improving Cancer Outcomes Through Connected Health.' The report detailed areas in which digital technologies are poised to accelerate success against cancer in line with then Vice President Joe Biden's conceptualization of a 'Cancer Moonshot.' For example, data already suggest that by building an electronic safety net for patients in therapy it is possible to improve cancer outcomes, reduce unnecessary hospitalizations, and boost patients' quality of life. Advances in the Internet of Things, cloud computing and biomedical informatics are begin to allow scientists access to petabytes of data volunteered through biomedical sensors from patients in clinical trials. The resulting insights from these data will help biomedical researchers to create a public health environment that is more predictive, preemptive, precise and participative than its industrial age counterpart. Lifespans will continue to lengthen, as a shift toward a data-driven view of population health will help ensure that the benefits of this new medicine are delivered equitably across all populations."

When it comes to digital life benefits, your mileage may vary; figuring out the trust formula and better ways to adapt is important

Greg Shannon, chief scientist for the CERT Division at Carnegie Mellon University's Software Engineering Institute, commented, "Most innovations will have positive benefits for consumers and citizens – otherwise choices would have rejected the innovations. Yes, there will be growing pains, unexpected consequences and occasional exploitive innovations. Yet, on the whole, it will be

positive. Fewer car accidents. More-efficient and effective medical treatments. More-personalized services and products. Unfortunately, the well-being benefits for individuals will vary and the cognitive load may be high in order to maximize benefits and mitigate negative effects. What we need is more social/cultural capacity to adapt to change, to cope with change, to leverage/benefit from change. It will be all too easy for some to be vastly confused by, afraid of and (fruitlessly) resistant to digitally enabled change. Trust is a key issue. To whom do each of us make ourselves vulnerable and are we comfortable with that? For whom are we trustworthy? These are choices we implicitly make every day in non-digital contexts. The digital world provides new and confusing needs to place trust in anonymous transactions, digital companies and creators or new technologies. This need to expand one's sense and understanding of trust will be challenging for all of us, especially given the lack of trust indicators online that we rely on in the non-digital world."

New tech will obviate old problems, create new industries and wipe away old ones

Louis Rossetto, founder and former editor-in-chief of Wired magazine, said, "The future is not pre-ordained. Of course, courses can be corrected. Will be corrected. It's part of human nature. Nothing is unalloyed good or bad. Indeed, the bad is an intrinsic part of the good. Digital technologies have net been beneficial. But the negative consequences of digital technologies can, are being and will be dealt with. Specifically, new technologies will obviate old problems, create new industries, wipe away old ones. As problems are identified, 'solutions' will be proposed. Some will work, some work. In extremis, political solutions will be applied. In all cases, unintended consequences will occur. In other words, evolution will continue, as it has, for billions of years."

Don't see humans as the problem and technology as the solution

Douglas Rushkoff, writer, documentarian and professor of media at City University of New York, said, "The companies would have to adopt different profit models, based on revenue rather than growth. They would have to decide whether the future of the species is important to them. Most see humans as the problem, and technology as the solution. They seek to replace humanity before the environment is destroyed, or to get off the planet before that happens. If, instead, they decided to align with humanity, our species could indeed survive another century or more. If they continue to see humans as the enemy, we don't have much longer."

The public should question and reject the hegemony of digital media companies

Nicholas Carr, well-known author of books and articles on technology and culture, said, "The advertising-based profit models of internet companies encourage design decisions that end up harming the users of the companies' products and services. The companies, therefore, are unlikely to be the source of beneficial changes in design and use patterns. Ultimately what's required – and

what's possible – is a broad countercultural movement through which the public questions and rejects the cultural and social hegemony of digital media and the companies that control it."

Focus on human health and happiness rather than commerce and consumption

Michael Kleeman, senior fellow at the University of California, San Diego and board member at the Institute for the Future, wrote, "We might begin by taking digital technology off its pedestal and portraying it as just another profit-driven part of commerce, albeit one that can separate us from those physically close and enable those at a distance to harm us. A focus on what contributes to health and happiness, literally health and literally happiness, as opposed to consumption might let us take advantage of the good and push down the negative impacts."

Empathy doesn't scale, and we really do need it to

Paul Saffo, a leading Silicon-Valley-based technological forecaster and consulting professor in the School of Engineering at Stanford University, said, "It is tempting to list the myriad specific steps we must take, such as changing the rules of anonymity on social media and fine-tuning human abilities to discriminate the artificial from the real. However, all of those steps are but footnotes in a more fundamental challenge. We are tuned to feel empathy for individuals, but empathy doesn't scale. As Stalin put it, 'a single death is a tragedy; a million deaths is a statistic.' We must find a way to scale empathy. We must find a way to use digital media to cause individual humans to have empathy for the multitude, and ultimately for the entire planet."

We must continue to question ourselves about 'What is the web we want? What is the internet we want?'

Sonia Jorge, executive director of the Alliance for Affordable Internet and head of digital inclusion programs at the Web Foundation, said, "Humanity is constantly evolving, and the internet is yet another variable affecting the way we evolve as humans. As with anything we have faced through human development, it brings opportunities, allows for new ideas to grow, it brings challenges and certainly also not such good ideas, especially as people and institutions push for ideas that violate human rights and individual ability to determine one's agency. There are many benefits from internet access and these are well documented, but it is indeed concerning that so many of the harms we see increasing are a reflection of those we also see in the offline world, harms coming from humans that disregard basic rights of all individuals, their privacy, their freedom of expression, their ability to communicate freely, among many others. The good news is that we do know and are learning quite fast about what can be done to prevent those harms from increasing and affecting people's well-being, physical and mentally. But we need proper policies, agreements and safeguards in place to ensure that the internet continues to evolve in a way that benefits humanity that is based on human rights principles. We cannot allow the Web and the

internet to become tools for further abuse, manipulation or violations of human rights. That the internet is a tool used by those who have always violated or tried to violate human rights, it is a reflection that we as humans have not been able to develop frameworks that protect humans offline or online. Human well-being can indeed be improved if people can communicate and communicate privately as needed, if they can have new ways to find opportunities, and be sure their data is secure, if they can benefit from music, art and be sure they are not being followed because of their tastes. Without such safeguards and knowledge to use the technology, access to the internet could indeed become more harmful. We must continue to question ourselves about what is the 'web we want' or what is the 'internet we want?' The internet my colleagues and I work to protect and expand every day is one that can contribute to any woman, girl or boy's well-being, one where they can feel safe, be themselves, feel secure, and is affordable and reliable regardless of one's background, location, income, etc. An internet that is a positive variable to the evolution of humanity."

We have learned so much by leveraging this technology, you have to believe humanity can continue to mobilize these knowledge tools to do more good than harm

Greg Downey, a professor specializing in the history and geography of information technology and associate dean at University of Wisconsin, Madison, said, "On the whole, I remain optimistic that our growing digital infrastructure of invisible but human-mediated sensors, algorithms and interfaces will help us enhance energy conservation, health care delivery, transportation safety, citizen interaction, workforce engagement and educational access, as well as providing exciting, creative and transformative entertainment and social experiences. These are hopeful but not utopian predictions – similar to patterns we've seen over the last century of information infrastructure development, from the slow but steady global and local diffusion of wired direct communications (telegraph and telephone) to the more rapid and transformative diffusion of wireless mass communications (radio and television). None of these new information infrastructures resulted in the dismantling of inequality or an end to war (as was repeatedly predicted for each), but each helped contribute to a gradually increasing global standard of living and cosmopolitan condition of mutual understanding. Our current digital information technologies of data processing and algorithmic action – born largely out of the fervor of global warfare – have helped more of us across the planet to understand more about the nature of the universe, the patterns of social behavior, and the legacy of past cultures than was ever possible before. As a researcher, writer and educator myself, I have to believe that humanity can continue to mobilize these knowledge tools to do more good than harm."

'There must be a technical solution to the challenges of anonymity and trust'

John Markoff, a fellow at the Center for Advanced Study in the Behavioral Sciences at Stanford University and longtime technology writer at The New York Times, said, "Science fiction writers have done the best job of outlining the sociology of computer networks and their impact on society generally. Early on Vernor Vinge wrote 'True Names.' It is still one of the best descriptions of the challenges that networks provide for identity and privacy. Reluctantly I think that there must be a technical solution to the challenge of anonymity and trust. Perhaps an answer lies in blockchain technologies. Also, recently, Danny Hillis, has proposed a semantic-knowledge tool that would allow the proving of 'provenance' if not truth. He describes this in a paper he is circulating as 'The Underlay.'"

Parents, teachers, mentors and others must work to guide and raise awareness of healthy uses of information technologies

Adriana Labardini Inzunza, commissioner of Mexico's Federal Institute of Telecommunications, said, "I am leaning towards an optimistic prediction when it comes to the use of internet and well-being. The outcome for each individual will very much depend upon the place, education level, socio-economic condition, age and individual skills and disposition to technology. For educated citizens with a good appetite for knowledge, language skills, learning new skills, productivity and shortening distances, IT will be an incomparable tool and ally only if the individual has also awareness of data-protection tools and privacy-protection issues as well. People with poor education and awareness who lack the resourcefulness to gain skills, culture and empowerment education will have more difficulty in using IT to empower themselves. Most everyone has an option today to gain some level of education, accessing information that was once unavailable to those in marginalized communities in poorer countries. The internet has brought easier access to information to billions, connected people afar, laborers and employers, citizens and governments, buyers and sellers, writers and readers. Those who have an education that is both analogue and digital can be skilled researchers and keen users of technology for productivity. It requires education, principled thinking, awareness and discipline to use the internet as a tool for development rather than a new way to waste time, alienate the mind and body, consume unnecessary stuff and become more indebted. In Latin America for instance, so far, internet is not making the impacts it could in increasing the productivity of people, of small businesses, of governments. It is being used in many small towns more as a tool to socialize, consume or video chat, not to fight poverty. In many other places it has brought the opportunity to obtain an online education and to become visible to customers who require individual services of plumbers, smiths, carpenters who can be hired upon an SMS or a call, which means earning a livelihood. What is badly needed is that parents, teachers, mentors and others work to guide and raise awareness of the healthy uses of IT and bring up children who know how to play, run, exercise, care for nature, live in contact with real human beings and limit the use of devices in childhood and adolescence

because it is important to train mind and body and emotions in a physical world and learn how to protect oneself from phishing, fraud, spam, sexting, e-bullying and other forms of abuse of IT. Technology is agnostic, it is humans without a civilized way of living, without empathy, principles and culture who may make evil uses of technology. Technology can become an ally in communities that train and provide for local champions at schools or to work at community centers or SMEs [small- and medium-sized enterprises] and NGOs [nongovernmental organizations] – people who guide local people toward an intelligent and empowering use of technology to learn, be more competitive, get relevant information and produce – not only consume – digital products, works of art, services or goods and other innovative ways to improve the well-being of community members."

Things will improve, but watch for the unintended results

Jamais Cascio, a distinguished fellow at the Institute for the Future, said, "We will find a combination of behavioral norms, regulation and technology that will help to minimize or mitigate potential harms of digital social media. I'm equally certain that these changes – alone or in combination – will in turn produce unintended results that could be seen as harmful."

It's all about norms, not government interventions

Jeff Jarvis, a professor at City University of New York's Graduate School of Journalism, said, "Every single one of us has the opportunity to improve the Net and the society we build with it every time we share, every time we publish a thought, every time we comment. Those are the interventions that will matter most as we negotiate our norms of behavior in the Net. I have long valued the openness of the Net but I fear I have come to see that such openness inevitably also opens the door to spam, manipulation and trolling. So platforms that value their service and brands are put in the position of compensating for these forces and making decisions about quality and misuse. I prefer to have users and platforms attempt to compensate for bad behavior and regulate themselves, for I do not trust many governments with this role and I fear that a system architected for one benign or beneficent government to act will be used as a precedent for bad governments to intervene."

We are at the beginning stages of blending and merging our identities and consciousness with digital tools and platforms

Barry Chudakov, founder and principal of Sertain Research and Streamfuzion Corp., commented, "The first thing that will enhance our well-being — this helps to resolve our sense of bewilderment — is to provide some context for where we are. We are at the beginning stages of blending and merging our identities and consciousness with digital tools and platforms. I believe people's well-being will be affected for good by changes in digital life. But more than being helped

or harmed, we all will find ourselves having to adjust and re-adjust to new realities of presenting ourselves and responding to others on screens and in newer digital venues. This will likely alter our sense of who and what we are as we move from a fixed sense of self and identity to experiencing self in a flow of presentation and response. To consider how our well-being will be affected due to changes in digital life, it is useful to outline what those changes are likely to be:

1. **There is here.** Products, tools and experiences will become more immersive thanks to VR (virtual reality) and other advances. *Remote* and *near* will become quaint concepts as we connect to almost any place from anywhere.

2. **Reality gets realer**. More products, tools and experiences will seek to enhance, or bring something new, to improve sell, or convince us. This will include adding to digital encounters with relevant information, data, images and enhanced viewing for every experience from surgery and sightseeing to, of course, sex.

3. **Bots as pals.** Bots, virtual assistants (Siri, Alexa, etc.) will become more prevalent, more "real" to us, more companionable – and we will come to rely on them.

4. **Everyone knows me.** Recognition technologies (face, emotion, voice, etc.) will become remarkably accurate to verify, explain, and define who we are. These will also generate data profiles that will re-define and supplant more intuitive insights or perceptions.

5. **Showing up is a show.** Presentation of self in everyday life will increasingly move away from face-to-face interactions as we rely on tools and platforms through which we show and express ourselves.

6. **We are all living in Toy Story.** We will increasingly surround ourselves with intelligent technologies – things that think. Intelligence will be invested in all objects as the – becomes everyware (sic).

7. **Digital reorg revamps older structures.** Social structures globally will be affected – rocked – by connectivity, cooperation, and reorganization that follow the logic of newer digital tools and platforms, not older frameworks built by alphabets, literacy, laws, and religious injunctions from holy books.

8. **Life is an abstraction.** The abstraction of everyday life will continue as algorithms, blockchain technologies, crypto currencies, data tracking and profiling – combine to reduce people and experience to conceptual abstractions.

9. **Data determines.** In every area of life, from medicine to marriage, data flows and data summations will begin to guide our choices and decisions.

"Changes in digital life will land us in a quandary where two seemingly opposite things can be true simultaneously: digital tools will help us fight disease, increase productivity and assign menial and repetitive jobs to robots and algorithms. Yet these same digital tools alter our sense of self and our relationship to others. They may make us feel isolated, insecure, or lonely because we spend more hours in screen time rather than face time. We are headed for increased competition for focus and attention, with a greater likelihood for blending and confusion of self and identity, especially among younger minds. The hints of what to come are there before us now. Two examples: online dating: in 2017 30% of U.S. internet users aged 18 to 29 years were currently using dating sites or apps and a further 31% had done so previously while 84% of dating app users stated that they were using online dating services to look for a romantic relationship. Online shopping: 51% of Americans prefer to shop online; 96% of Americans with internet access have made an online purchase in their life, 95% of Americans shop online yearly, 80% of Americans shop online at least monthly, 30% of Americans shop online at least weekly; ecommerce is growing 23% year-over-year.

"Those who grew up with older media will look at the internet and digital tools as a *takeover of reality*. Younger minds will see and feel the Internet as *immersion that equals reality*. Today our digital life still has one foot in older traditions; we must prepare for the not distant future when digital life (and this will be someone's business model) becomes The Truman Show. The internet and digital realities are simulations: we must be hyper-vigilant to ensure we are seeing the reality and not the sim: simulations are more easily manipulated, and more easily manipulate us."

About this canvassing of experts

The expert predictions reported here about the impact of the internet over the next 10 years came in response to questions asked by Pew Research Center and Elon University's Imagining the Internet Center in an online canvassing conducted between December 11, 2017, and January 15, 2018. This is the ninth Future of the Internet study the two organizations have conducted together. For this project, we invited nearly 10,000 experts and members of the interested public to share their opinions on the likely future of the internet, and 1,150 responded to at least one of the questions we asked. This report covers responses to two questions tied to digital life and individuals' well-being. The overarching, primary question was presented as this:

> *Digital life's impacts on well-being. People are using digital tools to solve problems, enhance their lives and improve their productivity. More advances are expected to emerge in the future that are likely to help people lead even better lives. However, there is increasing commentary and research about the effects digital technologies have on individuals' well-being, their level of stress, their ability to perform well at work and in social settings, their capability to focus their attention, their capacity to modulate their level of connectivity and their general happiness.*

They were then asked to respond to the question:

> *Question: Over the next decade, how will changes in digital life impact people's overall well-being physically and mentally?*

They were given three options to choose from when considering their response. The answer options were:

- *Over the next decade, individuals' overall well-being will be **more HARMED than HELPED** by digital life.*
- *Over the next decade, individuals' overall well-being will be **more HELPED than HARMED** by digital life.*
- *There **will not be much change** in people's well-being from the way it is now.*

Then we asked:

> *Please elaborate on your response below considering these questions: Why do you think people's well-being will be affected this way? What harms or improvements are likely to occur?*

Some **47%** selected that individuals' overall well-being will be more helped than harmed, while **32%** said well-being will be more harmed than helped, and **21%** said there will not be much change in people's well-being from the status quo. We also asked respondents to share brief personal anecdotes about how digital life has changed in regard to their own or their family's or friends' well-being. Those answers will be covered in a future report.

While about a third of the respondents expect that many individuals' well-being will be harmed, the overwhelming majority of these experts assume that – no matter what the future may bring – people's uses of and immersion in digital tools will continue to expand in influence and impact.

They were asked a follow-up question:

> *Do you think there are any actions that might successfully taken to reduce or eradicate potential harms of digital life to individuals' well-being?*

The answer options were:

> ***Yes,*** *there are interventions that can be made in the coming years to improve the way people are affected by their use of technology.*

> ***No,*** *there are not interventions that can be made to improve the way people are affected by their use of technology.*

Then we asked:

> *Please elaborate on your response about why you do or don't think there can be actions taken to mitigate potential harms of digital life.*

An overwhelming 92% answered that there are interventions that can be made in the coming years to improve the way people are affected by their use of technology; 8% said no.

The web-based instrument was first sent directly to a list of targeted experts identified and accumulated by Pew Research Center and Elon University during previous "[Future of the Internet](#)" studies, as well as those identified in an earlier study of [people who made predictions about the likely future of the internet between 1990 to 1995](#). Additional experts with proven interest in this particular research topic were also added to the list. Among those invited were people who are active in global internet governance and internet research activities, such as the Internet Engineering Task Force (IETF), Internet Corporation for Assigned Names and Numbers (ICANN), Internet Society (ISOC), International Telecommunications Union (ITU), Association of Internet

Researchers (AoIR), and the Organization for Economic Cooperation and Development (OECD). We also invited a large number of professionals and policy people from technology businesses; government, including the National Science Foundation, Federal Communications Commission and European Union; think tanks and interest networks (for instance, those that include professionals and academics in anthropology, sociology, psychology, law, political science and communications); globally located people working with communications technologies in government positions; technologists and innovators; top universities' engineering/computer science, business/entrepreneurship faculty, graduate students and postgraduate researchers; plus many who are active in civil society organizations such as Association for Progressive Communications (APC), Electronic Privacy Information Center (EPIC), Electronic Frontier Foundation (EFF) and Access Now; and those affiliated with newly emerging nonprofits and other research units examining the impacts of digital life. Invitees were encouraged to share the survey link with others they believed would have an interest in participating, thus there may have been somewhat of a "snowball" effect as some invitees invited others to weigh in.

Since the data are based on a nonrandom sample, the results are not projectable to any population other than the individuals expressing their points of view in this sample.

> *The respondents' remarks reflect their personal positions and are not the positions of their employers; the descriptions of their leadership roles help identify their background and the locus of their expertise.*

About 79% of respondents identified themselves as being based in North America; the others hail from all corners of the world. When asked about their "primary area of internet interest," 27% identified themselves as professor/teacher; 15% as research scientists; 9% as futurists or consultants; 8% as advocates or activist users; 7% as technology developers or administrators; 7% as entrepreneurs or business leaders; 7% as authors, editors or journalists; 4% as pioneers or originators; 2% as legislators, politicians or lawyers; and an additional 15% specified their primary area of interest as "other."

About half of the expert respondents elected to remain anonymous. Because people's level of expertise is an important element of their participation in the conversation, anonymous respondents were given the opportunity to share a description of their internet expertise or background, and this was noted where relevant in this report.

Following is a list of some of the key respondents in this canvassing:

Micah Altman, director of research and head scientist for the program on information science at MIT; **Diana L. Ascher**, co-founder of the Information Ethics & Equity Institute; **Rob Atkinson**, president of the Information Technology and Innovation Foundation; **Richard Bennett**, a creator of the WiFi MAC protocol and modern Ethernet; **Ed Black**, president and CEO of the Computer & Communications Industry Association; **Nathaniel Borenstein**, chief scientist at Mimecast; **Ildeu Borges**, director of regulatory affairs for SindiTelebrasil; **Stowe Boyd**, futurist, publisher and editor-in-chief of Work Futures; **Nicholas Carr**, author of "Utopia is Creepy" and "The Shallows: What the Internet is Doing to Our Brains"; **Jamais Cascio**, distinguished fellow at the Institute for the Future; **Barry Chudakov**, founder and principal at Sertain Research and StreamFuzion Corp.; **Narelle Clark**, deputy CEO of the Australian Communications Consumer Action Network; **Maureen Cooney**, head of privacy at Sprint; **Judith Donath**, Harvard University's Berkman Klein Center for Internet & Society; **Stephen Downes**, researcher at the National Research Council Canada; **Ralph Droms**, longtime network scientist, researcher, architect and engineer; **Esther Dyson**, entrepreneur, former journalist and founding chair at ICANN; **David Ellis, Ph.D.**, course director of the department of communication studies at York University inToronto; **Charlie Firestone**, executive director of the Aspen Institute's communications and society program; **Bob Frankston,** internet pioneer and software innovator; **Oscar Gandy**, professor emeritus of communication at the University of Pennsylvania; **Mark Glaser**, publisher and founder of MediaShift; **Jonathan Grudin**, principal researcher at Microsoft; **Seth Finkelstein**, consulting programmer and EFF Pioneer Award winner; **Jim Hendler**, co-originator of the Semantic Web and professor of computing sciences at Rensselaer Polytechnic Institute; **Dewayne Hendricks**, CEO of Tetherless Access; **Perry Hewitt**, vice president of marketing and digital strategy at ITHAKA; **Jason Hong**, associate professor at the Human Computer Interaction Institute at Carnegie Mellon University; **Gus Hosein**, executive director of Privacy International; **Christian H. Huitema**, past president of the Internet Architecture Board; **Larry Irving**, president CEO of the Irving Group and co-founder of the Mobile Alliance for Global Good; **Shel Israel**, CEO of the Transformation Group; **Jeff Jarvis**, a professor at the City University of New York's Graduate School of Journalism; **John Klensin**, Internet Hall of Fame member, longtime Internet Engineering Task Force and Internet Society leader, and an innovator of the Domain Name System (DNS) administration; **Bart Knijnenburg**, researcher on decision-making and recommender systems at Clemson University; **Gary L. Kreps**, distinguished professor and director of the Center for Health and Risk Communication at George Mason University; **Leora Lawton**, executive director of the Berkeley Population Center at the University of California, Berkeley; **Jon Lebkowsky**, CEO of Polycot Associates; **Peter Levine**, professor and associate dean for research at Tufts University's Tisch College of Civic Life; **Mike Liebhold**, senior researcher and distinguished fellow at the Institute for the Future; **John Markoff**, fellow at the Center for Advanced Study in the Behavioral Sciences at Stanford University and longtime technology writer at The New York Times; **Craig J. Mathias**, principal

for the Farpoint Group; **Giacomo Mazzone**, head of institutional relations at the European Broadcasting Union; **Robert Metcalfe**, co-inventor of Ethernet, founder of 3Com and professor of innovation at the University of Texas at Austin; **Jerry Michalski,** founder of the Relationship Economy eXpedition (REX); **Riel Miller**, team leader in futures literacy at UNESCO; **Mario Morino**, chair of the Morino Institute and co-founder of Venture Philanthropy Partners; **Gina Neff**, professor at the Oxford Internet Institute; **Lisa Nielsen**, director of digital learning at the New York City Department of Education; **Ian Peter**, internet pioneer and advocate and co-founder of the Association for Progressive Communications; **Justin Reich**, executive director of the MIT Teaching Systems Lab; **Larry Roberts**, Internet Hall of Fame member and CEO, CFO and CTO at FSA Technologies Inc.; **Michael Roberts**, Internet Hall of Fame member and first president and CEO of ICANN; **Michael Rogers**, author and futurist at Practical Futurist; **Larry Rosen**, co-author of "The Distracted Mind: Ancient Brains in a High-Tech World"; **Louis Rossetto**, founder and former editor-in-chief of Wired magazine; **Marc Rotenberg**, executive director of EPIC; **Eileen Rudden**, co-founder and board chair of LearnLaunch; **Douglas Rushkoff**, writer, documentarian, and lecturer who focuses on human autonomy in a digital age; **Anthony Rutkowski**, internet pioneer and business leader; **Paul Saffo**, longtime Silicon-Valley-based technology forecaster; **David Sarokin**, author of "Missed Information: Better Information for Building a Wealthier, More Sustainable Future"; **Jan Schaffer**, executive director at J-Lab; **Henning Schulzrinne**, Internet Hall of Fame member and professor at Columbia University; **Evan Selinger**, professor of philosophy at Rochester Institute of Technology; **Brad Templeton**, chair emeritus for the Electronic Frontier Foundation; **Sherry Turkle**, MIT professor and author of "Alone Together"; **Joseph Turow**, professor of communication at the University of Pennsylvania; **Stuart A. Umpleby**, professor emeritus at George Washington University; **Hal Varian**, chief economist for Google; **Amy Webb**, futurist, professor and founder of the Future Today Institute; **David Weinberger**, senior researcher at Harvard University's Berkman Klein Center for Internet & Society; **Daniel Weitzner**, principle research scientist and founding director of MIT's Internet Policy Research Initiative; **Yvette Wohn**, director of the Social Interaction Lab at the New Jersey Institute of Technology and expert on human-computer interaction; **Ethan Zuckerman**, director of the Center for Civic Media at MIT.

A selection of institutions at which some of the respondents work or have affiliations:

American Association for the Advancement of Science (AAAS), Access Now, Adroit Technologic, Aging in Place Technology Watch, Akamai Technologies, Alliance for Affordable Internet, American Press Institute, The Aspen Institute, Apple, Asia-Pacific Network Information Centre, Berkman-Klein Center for Internet & Society (Harvard University), Boston University, Brainwave Consulting, Carbon Black, Cardiff University, Center for Advanced Study in Behavioral Sciences (Stanford University), Center for Civic Design, Center for Educational Technology, CERT Division

at Carnegie Mellon University's Software Engineering Institute , Chinese University of Hong Kong, Cisco Systems, City University of New York, Clemson University, Cloudflare, Colorado State University, Columbia University, Comcast, Darwin Group, Democratise, Designed Learning, DotConnectAfrica Trust, EchoStar, Edison Innovations, Electronic Frontier Foundation, Electronic Privacy Information Center (EPIC), Emory University, Eurac Research, European Startup Initiative, Farpoint Group, FICO, Força da Imaginaçao, France's National Center for Scientific Research (CNRS), Gardere Wynne Sewell LLP, George Mason University, George Washington University, Global Digital Policy Incubator (Stanford University), GlobalSecurity.org, Google, Hanyang University, HealthStyles.net, Hewlett-Packard, High Tech Forum, Human-Computer Interaction Institute (Carnegie Mellon University), Humanities Research Center (Rice University), Information Ethics & Equity Institute, Information Technology and Innovation Foundation, Institute for the Future, Intelligent Community Forum, International Telecommunication Union, Internet Corporation for Assigned Names and Numbers (ICANN), Internet Education Foundation, Internet Archive, Internet Engineering Task Force (IETF), Internet Initiative Japan, Internet Society, ITHAKA, NASA's Jet Propulsion Laboratory, Johns Hopkins University, Lighthouse Foundation, Massachusetts Institute of Technology (MIT), MediaShift, Michigan State University, Microsoft, Mimecast, Mindful Digital Life, Mobile First Media/Digital Healthcom Group, Nanyang Technological University, National Academies of Sciences, Engineering and Medicine, National Institutes of Health (NIH), National Research Council Canada, National Science Foundation, Nautilus, The Net Safety Collaborative, North Carolina State University, Netmagic Associates, New York University, NewPathVR, National Opinion Research Center (NORC), Northwestern University, Open University of Israel, Oxford Internet Institute, Packet Clearing House, Parsons Corporation, Peace Innovation Lab (Stanford University), Penn State University, Polycot Associates, Princeton University, Queensland University of Technology, Rethinkery Labs, Reuters Institute, Rensselaer Polytechnic Institute, , Rochester Institute of Technology, Sprint, Stanford University, Statistics New Zealand, StumbleUpon, Sunlight Foundation, Syncfusion, Technology Education Institute, TechWomen.Asia, Telematica, Terbium Labs, Tetherless Access, The Millennium Project, The Mobile Alliance for Global Good, The Values Foundation, UNESCO, U.S. Department of State, U.S. Department of Defense, U.S. federal government, University of California (Berkeley, Irvine and Santa Barbara campuses), University of Chicago, University of Colorado, University of Copenhagen, University of Michigan, University of Milan, University of Minnesota, University of North Carolina (Chapel Hill and Charlotte campuses), University of Pennsylvania, University of Southern California, University of Wisconsin, Vanderbilt University, Verizon, Volta Networks, Way to Wellville, We Media, Wired magazine, Worcester Polytechnic Institute, World Wide Web Foundation, York University.

Complete sets of credited and anonymous responses can be found here:

http://www.elon.edu/e-web/imagining/surveys/2018_survey/Digital_Life_and_Well-Being_credit.xhtml

http://www.elon.edu/e-web/imagining/surveys/2018_survey/Digital_Life_and_Well-Being_anon.xhtml

http://www.elon.edu/e-web/imagining/surveys/2018_survey/Digital_Life_and_Well-Being_Solutions_credit.xhtml

http://www.elon.edu/e-web/imagining/surveys/2018_survey/Digital_Life_and_Well-Being_Solutions_anon.xhtml

http://www.elon.edu/e-web/imagining/surveys/2018_survey/Digital_Life_and_Well-Being_Anecdotes.xhtml

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Janna Anderson, *Director, Elon University's Imagining the Internet Center*
Lee Rainie, *Director, Internet and Technology Research*

Research team

Aaron Smith, *Associate Director, Research*
Claudia Deane, *Vice President, Research*

Editorial and graphic design

Margaret Porteus, *Information Graphics Designer*
Shannon Greenwood, *Copy Editor*

Communications and web publishing

Shannon Greenwood, *Associate Digital Producer*
Tom Caiazza, *Communications Manager*