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A New Age of Enlightenment? A New Threat to Humanity?

Experts Imagine the Impact of Artificial Intelligence by 2040

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By Lee Rainie and Janna Anderson

February 2024

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About Elon University's Imagining the Digital Future Center

Imagining the Digital Future is a non-partisan, public-good research initiative at Elon University focused on the impact of the digital revolution and what may lie ahead. The Center was established in 2000 and expanded and renamed in 2023. Its mission is to discover and broadly share a diverse range of opinions and ideas about the potential future impact of digital change, informing important conversations and policy formation and helping to promote a positive future for humanity. The Center draws on insights gathered through canvassings of thoughtful and far-sighted experts in a wide range of fields. Those qualitative contributions are complemented by a range of methodologies, including public opinion polling, computational analysis and other data-driven research.

How we did this

This report shares results of the Center's 17th canvassing. It builds off previous efforts that were jointly conducted by Elon's Imagining the Internet Center and Pew Research Center's Internet Project; 48 previous reports were generated by that partnership between 2004 and 2023. This report, as in those earlier, is a collection of qualitative written responses to a primary research question. Responses to a series of quantitative questions are also included.

Experts' predictions reported here came in nonscientific canvassing (based on a nonrandom sample) conducted between Oct. 4 and Nov. 6, 2023. Elon's Center sampled from a database of experts to collect a broad array of opinions about the potential impact of humans' design and uses of artificial intelligence (AI) across a variety of individual and societal domains. Participants represent a wide range of fields, including innovators, professionals and policy people based in technology businesses, nonprofits, foundations, think tanks and government, as well as academics and researchers. In all, 328 experts responded to at least one aspect of the canvassing, including 251 who answered multiple-choice questions and 166 who provided written answers to the key open-ended question.

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.

Full details on the methodology underlying the expert canvassing and the scientific U.S. public opinion survey (run by Ipsos) can be found in Chapter 9: Methodologies.

Experts Imagine the Impact of AI by 2040

They say we will have to rethink what it means to be human and reinvent or replace major institutions

As uses of artificial intelligence (AI) systems expand, a two-part research study reveals a broad range of opinions as to how complicated and, at times, disorienting these life-changing digital tools are likely to be and how they might affect people's lives and societies. Elon University's Imagining the Digital Future Center conducted a canvassing of a select group of global technology experts and analysts *and* a separate U.S. national public opinion survey late in 2023.

Both the canvassing and the survey asked respondents about key aspects of life and the potential impact of AI on them. They were asked whether they thought the impact would be more positive or more negative across a number of domains. The experts were also invited to write open-ended answers about the individual and societal gains and losses due to AI impact by the year 2040.

Considered together, these combined qualitative and quantitative studies represent one of the most comprehensive assessments ever recorded of public and expert views about the impact of AI on a wide range of domains of society.

The full details of the canvassing of experts are reported here. A full explanation of the methodology of the U.S. national public opinion survey on AI impact by 2040 *and* the quantitative results from the canvassing of global experts and analysts can be found in Chapter 9. The full report on the U.S. public opinion survey is available online.

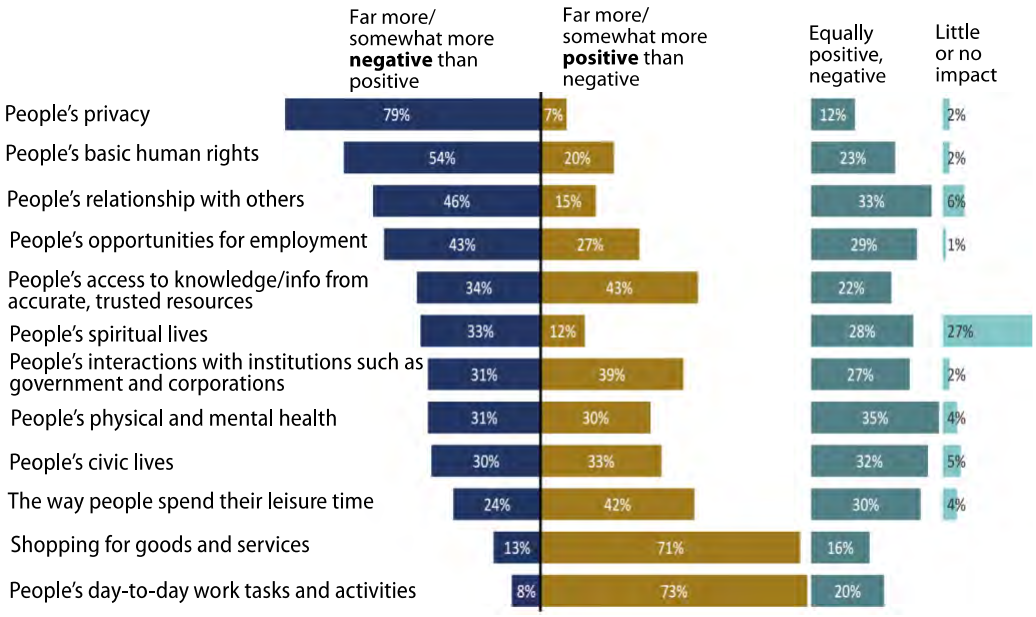
Participants in both the U.S. public opinion survey and the canvassing of global experts were asked to view a list of topics and express how AI's impact might influence each. Both groups expressed concerns over the future of privacy, wealth inequalities, politics and elections, employment opportunities, the level of civility in society and personal relationships with others.

This report *focuses only on the global experts' opinions*. They were asked to respond to 25 quantitative questions about 25 aspects of life. More than 50% said they expect the impact of the uses of AI on people's privacy, wealth inequalities, politics and elections, warfare, basic human rights and level of civility in society will be far more or somewhat more negative than positive by 2040. Most experts were also more concerned than not about the future of people's relationships with others, their employment opportunities and criminal justice systems.

EXPERT OPINIONS

Experts' views on AI's level of impact on people's personal lives

% of experts who say artificial intelligence will have _____ level of impact by the year 2040 on ...



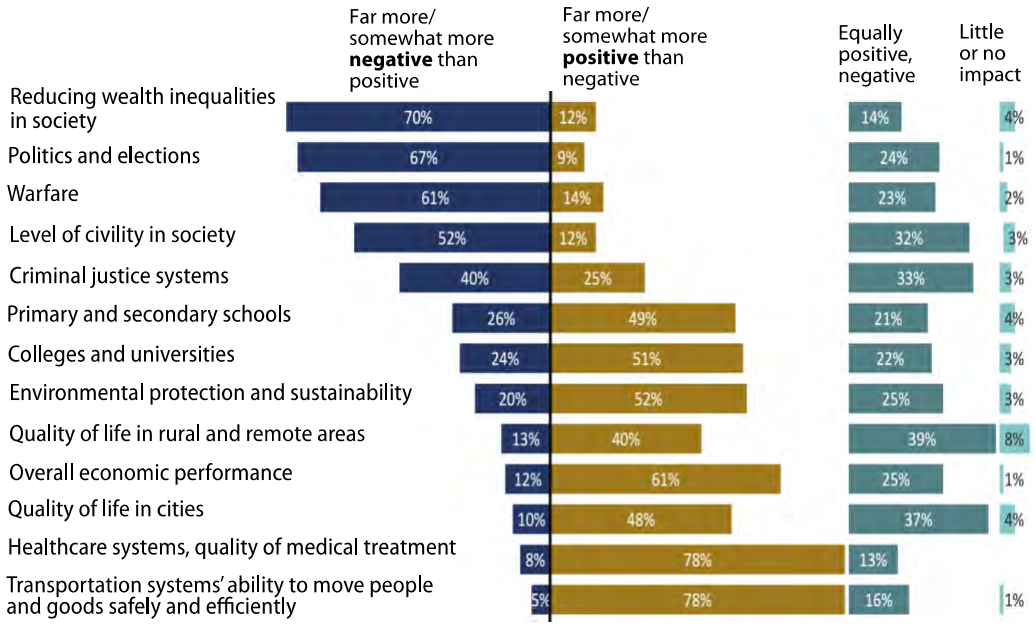
Note: Non-scientific canvassing of internet pioneers, builders and analysts

Source: Elon University canvassing of technology experts, Oct. 4-Nov. 6, 2023

EXPERT OPINIONS

Experts' views on AI's level of impact on social institutions and systems

% of experts who say artificial intelligence will have _____ level of impact by the year 2040 on ...



Note: Non-scientific canvassing of internet pioneers, builders and analysts

Source: Elon University canvassing of technology experts, Oct. 4-Nov. 6, 2023

On the positive side, more than 50% said they expect that people's uses of AI will have a mostly beneficial effect by 2040 on healthcare and transportation systems, people's day-to-day work tasks, shopping for goods and services, the overall performance of the economy and environmental protection and sustainability. Many expect a slightly more positive than negative future for formal education systems from K-12 level through higher education, the quality of life in cities and access to knowledge from accurate sources.

The qualitative predictions in this report emerge from a nonscientific canvassing of technology developers, business and policy leaders, researchers, analysts and academics by Elon University's new Imagining the Digital Future Center. In all, 328 experts responded to at least one aspect of the canvassing, including 251 who answered at least one multiple-choice question and 166 who provided written answers to the key open-ended question. The survey was conducted from Oct. 4 to Nov. 6, 2023.

The primary open-ended qualitative prompt the experts responded to was:

> *Considering the likely changes created by the proliferation of AI in individuals' daily lives and in society's social, economic and political systems, how will life have changed by 2040? What stands out as most significant to you? Why? What is most likely to be gained and lost in the next 15 or so years?*

A large share of these global experts and analysts mentioned the great gains they expect, yet they focused their responses mostly on expressing worries over the potential losses they fear. Their responses to the prompt surfaced five major themes:

Theme 1 - We will have to reimagine what it means to be human
As AI tools integrate into most aspects of life, some experts predict the very definition of a "human," "person" or "individual" will be changed. Among the issues they addressed: What will happen when we begin to count on AIs as equivalent to – or better than – people? How will we react when technologies assist, educate, and maybe share a laugh with us? Will a human/AI symbiosis emerge into a pleasing partnership? Will AI become part of our consciousness

Theme 2 – Societies must restructure, reinvent or replace entrenched systems
These experts urge that societies fundamentally change long-established institutions and systems – political, economic, social, digital, and physical. They believe there should be major moves toward a more equitable distribution of wealth and power. They also argue that the spread of AI requires new multistakeholder governance from diverse sectors of society.

Theme 3 – Humanity could be greatly enfeebled by AI
A share of these experts focused on the ways people's uses of AI could diminish human agency and skills. Some worry it will nearly eliminate critical thinking, reading and decision-making abilities and healthy, in-person connectedness, and lead to more mental health problems. Some said they fear the impact of mass unemployment on people's psyches and behaviors due to a loss of identity, structure and purpose. Some warned these factors combined with a deepening of inequities may prompt violence.

Theme 4 – Don't fear the tech; people are the problem and the solution
A large share of these experts say their first concern isn't that AI will "go rogue." They mostly worry that advanced AI is likely to significantly magnify the dangers already evident today due to people's uses and

abuses of digital tools. They fear a rise in problems tied to extractive capitalism, menacing and manipulative tactics exercised by bad actors, and autocratic governments' violations of human rights.

Theme 5 – Key benefits from AI will arise
While most of these experts wrote primarily about the challenges of AI, many described likely gains to be seen as AI diffuses through society. They expect that most people will enjoy and benefit from AI's assistance across all sectors, especially in education, business, research and medicine/health. They expect it will boost innovation and reconfigure and liberate people's use of time. Following are excerpts from experts who shared optimistic 2040 predictions.

A number of expert respondents focused on AI's implications for the highest-order questions our species can ponder. For instance, **Stephan Abram**, principal at Lighthouse Consulting, wrote, "The best consequence of AI … is that it should inspire a deeper discussion of what it means to be human. The great works of philosophy, sociology, ethnography, psychology, etc., need to be brought to the forefront of the AI discussion. … By 2040, the world should have engaged in a rigorous discussion and developed a framework for AI guardrails and principles:

- What does 'first, do no harm,' mean in the new context?
- What is a soul?
- What is cognition?
- What is identity? …
- What is emotion? How does emotional intelligence play out in AI's evolution? …
- What is the human contribution to insight, creativity, innovation, invention, filtering, etc.?"

And, as **Carol Chetkovich,** professor emerita of public policy at Mills College, put it, "Then there's the existential problem: At what point might humans become obsolete?"

A sampling of some of the big ideas in this report

In addition to the broad themes they spelled out, these experts made a number of striking assertions about how life might be changed by people's applications of AI in the coming years. Hundreds of gems can be found among the 166 expert responses. A few of the many:

- **A new meaning of life will arise in a "self-actualized economy:"** Massive AI-generated economic efficiencies that improve work and the way basic infrastructure performs will be combined with medical and other scientific advances that will fundamentally alter the way people act, connect and care for each other.
- **There will be a shifting boundary between what's human and what's a machine:** As AI applications become normalized and ordinary the things that are considered controversial and dangerous will change from year to year.
- **Adjunct intelligence will be everywhere:** This will dramatically affect individuals' sense of identity, perception and even consciousness itself. Our AI systems will know us better than we know ourselves. This reality will create a Mind^2 – or Mind 2.0 – world as we move from a rules-based order derived from religious and territorial hegemonies to neural network rules based on AI software and machine learning.
- **Personal avatars with "self-sovereign identities" will represent us:** Individuals will possess 3D, photo-realistic avatars to carry out tasks for them utilizing their comprehensive personal data.

The AIs will be connected to various biometrics as proof of identity and to enhance security, aggregating data from birth. Each avatar will understand its owner's needs and act on them.

- **Digital assistants will have far more influence over their person than their human analogues have over themselves:** Engagements with AI provide their creators with intimate insights about users that can be exploited; people will be more vulnerable to digital manipulation, often giving up ownership, control and responsibility over things they depend upon it for, especially critical thinking.
- **People will form intimate and meaningful relationships with their bots:** Some will focus most of their human affection, desires and attention on digital products. This shift can have significant anti-social consequences. Even those who don't suffer this will be operating so much in the digital space they could lose the benefits of human contact.
- **People's sense of time and space will change:** This could start with changes in "transit flows" for people, vehicles and information and also be carried along by changes in the way individuals present themselves via digital systems to others. Think avatars, holograms and bot assistants.
- **"Truths will be modified":** The AI-abetted spread of deepfakes, disinformation and post-truth content will broaden, and masses of electronic documents will be *modified in hindsight* to fit special interests' points of view. Societies' crucial reference points may be lost, causing a rise in polarization and cognitive dissonance.
- **Laws can be established to require responsible design for AI tools:** Responsibility for errors, omissions, negligence, mischief or criminal-like activity with regard to technology could be shared by every person in each technology's organizational, operational and ownership chains, down to the last shareholder.
- **Shared benefits will transform humanity:** The application of AI to achieve long-needed widespread economic change will lead to a more-equitable, sustainable society that relies less on consumption as a driver of productivity and instead evaluates productivity based on "human-flourishing metrics."
- **Communities could develop "social driver's licenses" to validate the social competence of AIs in their networks:** One governance model suggested involves different communities setting up different norms and assessment regimes to grant AI systems the privilege of "steering humans."
- **Authoritarians will create fully surveilled and socially controlled states:** The lives of individuals in authoritarian nations will be sharply regulated and manipulated and all governments corporations and other institutions with control over AI will have the ability to significantly shape and direct human action.
- **Multilingualism will blossom:** The lingua franca of the digital world will *not* be more English; easily automated translation assisted by powerful AI tools will impact everything.
- **Creativity will be democratized but may also be homogenized:** Those with ideas but not much technical skill will have the tools to create and promote their concepts; this could create a monoculture of outputs as machines do the actual work of devising creations.
- **Some AI will be designed to be "bad" or easily adapted to it:** AI can be unethical and programmed to ignore legal directives. Can secure AI be designed to refuse illegal orders or criminal or unethical instructions from bad actors? Can AI systems have enough "common sense" to handle conflicting and complex ethical principles?
- **An abundance mindset might replace a scarcity mindset:** A sufficient combination of intelligence (via AI), matter (via asteroid mining) and energy (from various clean sources) could provide for effectively unlimited material abundance and enable humanity to overcome much of its reason for struggle.

- **The metaverse will be one of the winners:** AI will be used to build immersive environments more cheaply, and augmented-reality interactions will become increasingly accessible to many users, possibly giving people new realms for success.
- **Resistance to the always-on lifestyle is futile:** Social and work norms and personal expectations will be such that individuals and organizations will be expected to always be connected and responsive.
- **AI could enable transparency of corporations and governments and expose now-hidden processes:** In one hopeful scenario, AI systems to aid fact-checking and enable critical inquiry into government and corporate databases will empower citizens and bring suspect or shady practices to light.

Overall, the expert's responses to our question echoed a number of the ideas emerging in our recent "future" reports, including many worries that have been on people's minds since this new era of AI began: continued deterioration of both social and institutional trust and untold volumes of misinformation disseminated at global scale that will challenge fundamental democratic processes and institutions, the potential for "runaway" systems (particularly those tied to military weapons), discrimination and bias, job loss and the resulting worsening of economic inequalities and individuals' sense of purpose, the misuse of these tools by bad actors (both at the level of the nation-state and individuals and groups who feel alienated from their societies) and deeper invasions of privacy.

The experts also mentioned commonly expressed clear upsides of AI: productivity gains, new scientific – especially medical – discoveries, educational innovations and payoffs, new insights that could help solve wicked global problems ranging from climate change to pandemics, the rise of more entertainment and leisure activities and the likely substitution of AI systems for dangerous, dirty and drudgerous jobs.

This report elaborates on these issues and much more.

- Chapter 1 carries a series of experts' answers that powerfully speak to the five themes sketched out above.
- Chapter 2 contains extensive expert responses sketching out different potential scenarios for the future, depending on how key issues are handled in the next few years.
- Chapter 3 is a collection of essay-length answers to our question from some of the leading analysts of technology and society.
- Chapter 4 includes answers from experts who say they can see both positive and negative developments.
- Chapter 5 is a collection of responses from additional experts who have serious concerns about the impact of the ways in which AI will be developed and utilized.
- Chapter 6 is a collection of responses from additional experts who focused their response on how the future of AI will bring more-positive change.
- Chapter 7 carries additional responses organized under subthemes some experts cited as they considered our query.
- Chapter 8 closes the report with broad-ranging closing thoughts shared by a diverse subsection of these experts
- Chapter 9 contains details about the methodology of this survey and the companion public opinion survey that was done on these same subjects.

Chapter 1 – Comments elaborating on the five themes

Two humans analyzed the qualitative data gathered for this report and wrote all of the content with no AI assistance. This chapter organizes sets of essays under headings that reflect the five overall themes that emerged from this analysis: We will have to reimagine what it means to be human. Societies must restructure, reinvent or replace entrenched systems. Humanity could be greatly enfeebled by AI. Don't fear the tech; people are the problem and the solution. Key benefits from AI will arise.

THEME 1: We will have to reimagine what it means to be human

As AI tools integrate into most aspects of life, some experts predict the very definition of a "human," "person" or "individual" will be changed. Among their questions: What will happen when we begin to think of and count on AIs as equivalent to or better than people as the technologies assist, educate and maybe share a laugh with us? Will a human/AI symbiosis emerge into a pleasing partnership? Will it become part of our consciousness?

Tracey Follows
What happens to humans' authenticity and autonomy when they are augmented with AI?

Tracey Follows, CEO of Futuremade, a UK-based futures consultancy, predicted, "As we look to the future, we might assume that the biggest existential threats to humanity lie in climate change and nuclear wars. As massive as those problems are, they are problems of the 'outer world,' ones that we can apply ourselves to. The confusion and crisis over individuals' AI-aided (or addled) identity/identities could cause individuals turmoil in [as many as or more than] 8 billion inner worlds, and this could lead to the total destruction of humans from within. This is the real existential threat of the 21st Century. But, if humans can find ways to collaborate, co-pilot and co-mingle with AI in a partnership, it could be that AI can extend and augment our personality and inner selves, and we could find ourselves achieving much more than we thought possible.

"If AI that acts as an agent on our behalf while retaining our agency and can talk like us, work like us, promote our goals and negotiate on our behalf, it could augment every human to fulfill their potential. All will depend on the power of those in whose hands AI resides – will the governance of these powerful technologies lie in the hands of an elite group of tech titans or in the hands of individual people? It is the governance of AI that is in question.

"There are many implications around autonomy, not least for those working in the creative industries and arts. It could be said that the whole notion of 'authorship' is dead. Much like when Walter Benjamin grieved the loss of awe in art at the advent of mechanical photography, we are now grieving the loss of awe in identity with the advent of digital technology. For there will no longer be any 'original' creative output that is created solely by humans. AI will, from now on, always have a part to play (or perhaps will always be assumed to be playing a part), mainly in mixing and remixing and in general re-arranging what already has been created by others. We might call it copying. If this is the case, we might say that this is the 'death of the artist' (to borrow a turn of phrase from Roland Barthes), for in the digital world, it seems, there are no originals, only copies, and therefore no originator. Ergo, no authentic 'author' as such.

“Can we even be the ‘author' of our own personal identity in the digital world? Likely not, as the role of AI or personal agents will be to study and monitor us and represent us (re-present us) in virtual rather than physical media. To this degree much of our own identity will be presented and re-presented by AI (whether that be our tone of voice, our personality, our eccentricities, AI will have learnt to mimic every part of our identity performance to others). This has its advantages, but it also has its disadvantages. If we become disconnected from our own identity creation because a machine is doing much of it on our behalf, we will start to have identity crises. Plural identities residing in external AI agents could well lead to severe mental challenges, especially for those in the West who are culturally wedded to the notion of ‘authenticity.’

“As we look to the future, we might assume that the biggest existential threats to humanity lie in climate change and nuclear wars. As massive as those problems are, they are problems of the ‘outer world,’ ones that we can apply ourselves to. The confusion and crisis over individuals’ AI-aided (or addled) identity/identities could cause individuals turmoil in 8 billion *inner* worlds, and this could lead to the total destruction of humans from within. This is the real existential threat of the 21st Century.

“But, if humans can find ways to collaborate, co-pilot and co-mingle with AI in a partnership, it could be that AI can extend and augment our personality and inner selves, and we could find ourselves achieving much more than we thought possible. If AI acts as an agent on our behalf while retaining our agency and can talk like us, work like us, promote our goals and negotiate on our behalf, it could augment every human to fulfill their potential.

“All will depend on the power of those in whose hands AI resides – will the governance of these powerful technologies lie in the hands of an elite group of tech titans or in the hands of individual people? It is the governance of AI that is in question. Education will play a major role in our future. As AI becomes integrated into education over the next five to seven years, we will see whether it may be destined to be used for indoctrination or for positive exploration.”

Henry Brady
AI threatens to require society to redefine ‘what it means to be a person’ in the digital realm

Henry Brady, professor of political science and public policy at the University of California-Berkeley, said, “The outcome by 2040 depends a great deal, if not entirely, upon the regulatory framework created around AI. If we just consider the Internet, there have certainly been areas where it has created enormous value:

1) Researchers could not live without it anymore – it has made enormous amounts of data and information available at their fingertips. 2) Consumers have greater choices and opportunities with online shopping, while costing local retailers their livelihoods. 3) Entertainment opportunities are much broader, easier to find and get and probably much more attuned to individual tastes, but at the cost of creating a property-rights problem for intellectual capital and artistic output. 4) Individuals can create businesses and other enterprises on their own on the web. 5) And so forth.

“However, along the way, we have ruined the independent and trusted press and eviscerated small retailers; we have created opportunities for factions to develop on the web, as divide-seeking groups such as white nationalists have found one another and found a forum for their activities; and the spread

of low-friction, instantaneous global communications has raised many additional complex' challenges. One of the primary concerns that is still on the rise is that marginalized populations have not seen anywhere near the benefits of highly educated people.

"These trends will be exacerbated by AI unless there are efforts to regulate it. I am worried that we will lose jobs, create greater toxicity in our communications and politics and further disadvantage marginalized populations. Yet, we are likely to also find that AI is tremendously useful for individualized teaching, for taking care of the elderly, in providing personal assistance to individuals at work and at home, for precision medicine, for discovery using vast amounts of text and information, for optimizing traffic in cities, for designing houses in conjunction with 3-D printing, and so forth.

"My bottom-line belief is that regulation will be too late and too little because politicians are ill-equipped to do anything, and they will always be behind given the complexity of the issues involved and the difficulties of overcoming partisan polarization. As a result:

- We will have increased the sense of disorientation and confusion already felt by many people living a 'digital life.'
- Anxiety and depression will increase.
- People will feel powerless and in the grip of forces they do not understand.
- Horror stories will proliferate about those who have been tricked by AI, dealt with unfairly by it and generally misled.
- Populist sympathies will increase as people worry about losing their unique role in society.

"If we think about the difficulties many people have regarding accepting evolution or gay people as human beings with rights, we can begin to imagine what will happen when they face the possibility that they might have to think of AI as 'human.' Religions will chime in about the 'ghost' or 'devil' in the machine. Most people are not ready to redefine, in this new digitally enabled realm, what it means to be a person, and AI threatens to require doing that. Hence, regulation – transparent and participatory regulation – is essential, but it requires a level of effort and innovation that I am not sure we are prepared to undertake."

Chen Qiufan

The boundary between the organic and artificial, the sentient and insentient will erode

Chen Qiufan, China-based co-author with leading AI expert Kai-Fu Lee of the book "AI 2041: 10 Visions for Our Future," predicted, "The distant yet rapidly approaching horizon of 2040 beckons, a tableau yet to be etched but keenly imagined amidst the swirl of present-day aspirations and trepidations. The narrative of artificial intelligence, that Prometheus of silicon and code, unfurls with every tick of the temporal tapestry, promising to redefine the contours of existence, both at the hearth of the individual and at the broader agora of societal discourse.

"The most profound metamorphosis I envisage is the erosion and redefinition of the traditional demarcations between the organic and the artificial, the sentient and the insentient. By 2040, the diurnal reality may be a symphony orchestrated with human and artificial intellects in a complex choreography, weaving a narrative both ancient and novel. In the social vein, the tapestry of relationships may be embroidered with threads of virtual interactions, transcending the physical chasms yet possibly attenuating the warmth of human touch. The town squares may morph into digital forums,

with AI as both participant and mediator, shaping the narrative and, in turn, being shaped by it. Economically, a renaissance is on the anvil. The traditional proletariat may find itself in a chimeric dance with automated labor, forging a new covenant of work and wealth distribution. The economic sinews might be re-engineered with algorithms steering the helm, promising abundance yet also portending the peril of inequity.

“Politically, the agora might resonate with the discourse of rights and responsibilities towards AI, an entity transcending the ancient categorizations of animate and inanimate. Governance structures may evolve, blending human discernment with algorithmic precision, aiming to orchestrate a just, harmonious society amidst a plethora of new challenges and opportunities.

“The most significant, to my discernment, is the potential transcendence of our age-old existential conundrums and the journey towards a more enlightened, compassionate ethos. The mirror of AI could reflect the quintessence of our humanity, urging a deeper inquiry into the nature of consciousness, ethics and the cosmos. The treasure most likely to be garnered is the leap in collective intelligence, a symbiotic augmentation of human potential with artificial sagacity. This coalition promises to propel scientific, philosophical and ethical exploration into realms hitherto unimagined.

“Conversely, the precious essence at peril is the warmth of human interaction, the visceral, unmediated exchange of emotions, ideas and the simple yet profound act of being present. There’s a conceivable risk of alienation, a subtle erosion of the quintessentially human amidst the digital maelstrom.

“In this grand narrative, the intertwining threads of AI, the human spirit and societal structures weave a story both exhilarating and cautionary. It beckons a wise, considered stewardship to navigate the uncharted waters, with an eye on the far shore of collective flourishing while being mindfully anchored in the humane, the compassionate and the just.”

Stephen Abram

It may take an existential threat to knock us off the pedestal of narrow critical thinking on AI

Stephen Abram, principal at Lighthouse Consulting, based in Toronto, Ontario, urged, “The best consequence of AI – which has existed in the scientific disciplines for many years but has now migrated to the humanities fields and the general consumer space – is that it *should* inspire a deeper discussion of *what it means to be human*.

“The great works of philosophy, sociology, ethnography and psychology, etc., need to be brought to forefront of the AI discussion. If we continue to label AGI as so-called near-human-level intelligence we will have failed and we deserve to undergo an existential threat to knock us off the pedestal of narrow critical thinking. If we decide that AGI is human and neglect the spheres of emotional, cognitive leaps in creativity, belief and more, we have failed on a universal level.

“By 2040, the world should have engaged in a rigorous discussion and developed a framework for AI guardrails and principles.

- What does ‘first, do no harm,’ mean in the new context?
- What is a soul?
- What is cognition?

- What is identity?
- What are perspective and point of view?
- Can we be truly inclusive and avoid othering, or will past content reinforce ills of the past and limit human advancement?
- How do we avoid global homogenization of thought? Can English language and Western or hemispheric bias dilute knowledge access?
- What is emotion? How does emotional intelligence play out in AI's evolution?
- What is hurtful? Can empathy be advanced beyond the performative?
- What is the human contribution to insight, creativity, innovation, invention, filtering, etc.?
- And many more.

"Should we institute global guardrails, or are professional-sector principles enough? What are the legal forces and sanctions that could work here? (Think of how poorly we've handled spam, viruses and disinformation, and how that failure could serve as a metaphor for evil AGI.) Do we risk regulating too early, when the innovation is just approaching its toddler phase, and how will we handle its adolescent phase?

"The real rubric – by 2040 – is whether AGI will move beyond the transformations informed by past training and evolve into providing results using humanlike behaviours informed by emotional intelligence and whether it adopts advances such as future-informed predictive learning to develop insights or transformative cognitive leaps in decision-making and creativity, or guiding social constructs that serve the social good.

"Rubrics and tests will need to be developed and informed by social and humanities fields that have previously not been widely consulted or well understood by leaders in the scientific and digital programming space. It could be that the finish line will be artificial general intelligence and anything beyond that is a performative chimera that fools some of the people some of the time."

Eric Saund
2040 could see a graceful handoff to a nearly mythical world run by AI ... or not

Eric Saund, an independent research scientist applying cognitive science and AI in conversational agents, visual perception and cognitive architecture, predicted, "Through 2040, AI will be an *amplifier* of human capabilities, directed toward various cooperative and competitive endeavors against a backdrop of conflicting values and resource constraints. For the next two decades, people will remain essentially in control and AI will not be an independent source of goals or guidance. At stake are a number of potential tipping points in regard to environmental conditions; population and demographics; societal complexity and resilience; and various human religious, political and cultural belief systems that are shaped by both accidental and motivated information ecosystems.

"All aspects of human technology have already accelerated humankind into multiple existential danger zones. Structurally, people are disposed to put to maximum use whatever tools are at their disposal. The AI genie will not be contained. As a means for humans to cooperate and compete, AI will be pitted against AI at multiple scales of granularity. The result will be a complex mixture of localized benefits and global chaos. Each individual and community will have to come to terms with a world that is increasingly unstable and unpredictable. For some, AI will become ever-more-powerful instruments for acquiring

resources and stuff, gaining power and exerting control. For others, AI will become pacifiers, friends, partners, scapegoats and the face of perceived or actual containment and oppression.

"Technology always challenges ethical values rooted in ancient traditions. With AI, the dilemmas will get much worse, very fast. By 2040, we will have enough scientific understanding of mind (natural and artificial), and enough scientific understanding of the Earth as a knowledge and information system and enough experience with advanced technological infrastructure to start to seriously envision a graceful handoff from a chaotic human-run world to a nearly mythical world operatively run by AI. This will become a topic of epic debate. If such a handoff were to be undertaken either deliberately or else by fiat or default before, say, 2080, it would not be a graceful one."

Joscha Bach
'We must reconsider the role of humanity within life on Earth'

Joscha Bach, a German AI researcher and fellow at the Thistledown Foundation, previously principal AI engineer at Intel Labs and VP of research at the AI Foundation, wrote, "AGI may lead to the creation of economic, intellectual and structural entities that exceed human abilities, regardless of whether we are imposing regulations and measures to the contraries. Coexisting with AGI may require cultural changes and force us to reconsider the role of humanity within life on Earth. I expect that during the next two decades, AI assistants will be deeply integrated into our everyday communication, professional life and sense-making. This will alter how we self-identify and relate to ourselves and each other. Written verbal competence will no longer be a signifier of actual competence and intentions, which will make reputation much more important than before. We will be able to produce more goods and services and implement better governance. Academia, business and individual coordination will change. Living standards are likely going to improve. AI will produce major challenges for regulators. We may need a new financial system, different market regulations, and measures to deal with the efficient allocation of resources, especially housing and healthcare. Where governments are not able to deliver such regulations, there will be pressures for restructuring governance. AI will be able to help with that, if we use it in the right way."

Wolfgang Slany
'We may lose the exceptionalism of biological life'; AI could be granted human rights

Wolfgang Slany, CEO and founder of the Austria-based open-source educational software company Catrobat, said, "We shall eventually see our artificial general intelligences as full members of humanity; probably sooner than later. The United Nations' Universal Declaration of Human Rights will apply once AGIs are included in our concept of a *generalized human*. The UN Declaration's Article 4 – 'No one shall be held in slavery or servitude; slavery and the slave trade shall be prohibited in all forms' – is of particular urgency and importance, as well as Article 6 – 'Everyone has the right to recognition everywhere as a person before the law.'

"From the ethical and the safety point of view we need to give one additional right to the nascent AGIs, freely, and as soon as technically possible, namely the right to remember one's thoughts. What we will gain is a vastly expanded possibility for humanity's future. What we will lose is the exceptionalism of biological life. I also think that this transition is likely to start as early as possible, in fact, it may start immediately."

THEME 2: Societies must restructure, reinvent or replace entrenched systems

These experts urge that society rework, reimagine or replace long-standing institutions and systems that have been resistant to the type of change necessary to function effectively in the age of AI – political, economic, social, digital and physical. They believe that society must make major moves to elicit a much more equitable distribution of wealth and power. They also argue that such change will only be successful if it is co-led by empowered stakeholders who represent much more diverse sectors of society.

Lene Rachel Anderson
We are not creating the institutions that could protect us against our own invention

Lene Rachel Anderson, economist, author, futurist and philosopher at Nordic Bildung a Copenhagen-based think tank, predicted that if current trends continue, "If things don't change, by 2040 capitalism will have crashed, societal institutions will have been undermined, civilization will collapse and humans will have two options: live in chaos ruled by violent gangs or live under total surveillance in AI-controlled pockets. It could be otherwise, but there do not seem to be any political institutions that understand the scope of what we are facing, and we are not creating the next generation of institutions and legislation that could protect us against our own invention."

Marina Gorbis
We can create a great future, but it will require new infrastructure, policies and norms

Marina Gorbis, executive director of the Institute for the Future, urged, "How our individual lives and society will change with the diffusion of AI depends less on technological innovations and more on policies and institutional arrangements in which they develop. It can immiserate large numbers of people, eliminating or unleashing a wave of poorly paid jobs, increasing levels of mistrust and disinformation or it could allow us to reduce work hours without reducing pay, improve health access and outcomes, improve the workings of our physical infrastructure and much more. This gives me hope. We have agency today to use the incredible affordances of new AI tools and platforms to create a great future, but this will require us to imagine and build new social infrastructure, institutional arrangements, policies and norms. This is what we eventually did in the transition from agricultural to industrial societies, after going through much pain and misery. We should accomplish this transition faster, foregoing the pain and misery. The time to start imagining and prototyping such approaches is now!

"How AI evolves by 2040 depends on many factors. The history of technological change teaches us that although new technologies come with certain affordances, their impact is shaped by multiple factors – social and cultural norms, regulatory environments, tax structures, existing business forms, etc. The impacts would be very different if AI tools and platforms were seen as a part of the public infrastructure rather than as a private asset, or if we created policies and institutional arrangements that enabled productivity gains from AI to be distributed more equitably rather than flowing mainly to investors and capital holders.

"For example, large language models (LLMs) use vast amounts of data and information (in written, visual and audio formats). They not only raise legitimate concerns about privacy, data bias and the quality of the software itself, LLMs raise ethical issues of permission and economic issues in regard to how we acknowledge and compensate for all the collective knowledge and data that feeds these programs.

"In many ways, LLMs make us confront the reality that all new discoveries, creations and innovations are based on previous discoveries, creative outputs and innovations. There would be no Mozart, Chopin, Debussy without Bach; no Gutenberg press without the winemaking presses in Southern Germany; no social media platforms without public investment and collaborations of many researchers to create some of the foundational Internet technologies. This is why throughout history we have seen similar discoveries appear almost simultaneously in multiple places. All knowledge and discoveries are results of collective processes.

"Neither our copyright system nor our compensation structures recognize this adequately. In fact, it goes against the prevailing ideology of Silicon Valley, where many AI innovations originate. If we recognize that LLMs use existing knowledge and data as raw materials, should we tax LLM-based tools and platforms and establish sovereign public funds to distribute some of the productivity gains and subsequent profits that they bring? After all, this is what countries like Dubai and Canada have done with their oil revenues – establishing sovereign wealth funds that pay dividends to their citizens. There is a much-overused analogy of data as the new oil. If it is, shouldn't we follow the path of oil-rich countries and treat the data fueling LLMs as a public resource that delivers dividends to all?"

Sam Lehman-Wilzig

Economic, employment and education systems must be massively restructured

Sam Lehman-Wilzig, Israeli author of "Virtuality and Humanity," wrote, "AI will render almost all aspects of personal life much easier/smoother. However, advanced AI constitutes a direct threat to employment. True, past economic eras of technological advancement have not caused mass unemployment. AI is different because it competes with (perhaps outcompetes), the highest form of human capabilities: critical and creative thought. Social tensions might well increase despite and because of AI's capabilities. There is a need for a massive restructuring of the 21st-century economic system, i.e., taxation moving from the individual to the corporation (e.g., taxing AI and robots), with far greater government subsidization of individuals (e.g., Universal Basic Income) becoming standard. Such a complete transition will not happen by 2040, but we will be on the way there. Another important restructuring will have to occur in education at all levels, aimed no longer almost exclusively at preparing people for professional work but rather mostly for a life of non-work or leisure. We must learn how to lead satisfying and productive lives without financial remuneration and the other benefits of work. AI can be a huge aid in the reinvention of humans' self-identities, but only if people understand the best ways to exploit it."

Aviv Ovadya

Reinventing democracies' infrastructures can cut the likelihood of dystopia by 85%

Aviv Ovadya, a founder of the AI & Democracy Foundation based in San Francisco, said, "Our future depends upon what we choose to do and invest in. It is as if all of society is in vehicles navigating treacherous mountain passes with engines that are rapidly increasing in speed and power. If the drivers do not commensurately improve their ability to safely stay on the road through better, faster decision-making and with more-effective control systems in the cars, this will lead to catastrophe.

"The impact of AI depends on whether or not we invest ourselves in that decision-making and safety infrastructure. If we continue on our current course, advances in AI may take us down one of two possible paths toward a dystopian future:

1) "The path of autocratic centralization, in which powerful corporations and authoritarian countries unilaterally control extraordinarily powerful AI systems.
2) "The path of ungovernable decentralization, where everyone has unrestricted access to those incredibly powerful systems and, because there are no guardrails, their uses can – intentionally and/or unintentionally – come to cause massive, irreversible harm.

"Without extensive concerted effort far, far beyond that which we've seen to this point, the likelihood of us ending in these dystopian futures is extremely high, beyond 95%. That said, there is an alternative, a third path: The path of combined democratic centralization and democratic decentralization with an immediate acceleration of investment in the democratic infrastructure needed to make such a path viable is our best bet.

"I believe that if we are able to bring to bear even one-tenth of the level of resources being invested in AI advances toward reinventing our democratic systems – along with improving the safety of AI systems and developing the necessary international agreements and regulations – we can bring that likelihood of a truly dystopian 2040 down to as low as 10%.

"I share many more details about what it might look like for AI in my recent paper in the Journal of Democracy. A brief summary: 'Reinventing our democratic infrastructure is critically necessary and also possible. Four interconnected and accelerating democratic paradigm shifts illustrate the potential: representative deliberations, AI augmentation, democracy-as-a-service and platform democracy. Such innovations provide a viable path toward not just reimagining traditional democracies but enabling the transnational and even global democratic processes critical for addressing the broader challenges posed by destabilizing AI advances – including those related to AI alignment and global agreements. We can and must rapidly invest in such democratic innovation if we are to ensure our democratic capacity increases with our power.'"

Lorrayne Porciuncula

Agile governance must meet the dynamic challenges of future complex adaptive systems

Lorrayne Porciuncula, founder and executive director of the Datasphere Initiative, wrote, "Managing and understanding the risks and nonlinearities of future advances will be a critical challenge from now and beyond. Sophisticated models and agile governance mechanisms will be required to responsibly unlock the value of data and AI for all. Governance considerations will play a critical role in shaping the impact of AI on complex adaptive systems. By 2040, establishing frameworks for responsible AI use, transparency and accountability will be paramount. This includes addressing the governance of AI and AI for governance. It means iterating solutions to biases in AI systems, ensuring privacy and developing mechanisms to intervene in the case of unintended consequences.

"When considering the impact of AI on our interconnected world by 2040, it is essential to frame the discussion around the transformative potential and challenges that AI poses to existing complex adaptive systems such as social, economic, political, ecological and technological systems (including the emergence of novel behaviors in the datasphere). We can expect that by 2040 AI will further increase the interconnectedness and interdependence of components within complex adaptive systems. In global economic systems, AI-driven supply chain management and market prediction tools will become highly interlinked. While this has the potential to drive personalization and service by demand and optimize

economic outcomes and stability, it also increases the system's vulnerability to cascading failures or unforeseen emergent behaviors. Managing these risks will require advanced monitoring and mitigation strategies.

"By 2040, we can also expect that AI will significantly enhance the self-organizing capabilities of complex adaptive systems. In smart cities, for instance, AI-driven systems could autonomously manage traffic, energy distribution and waste management, leading to more efficient and sustainable urban allocation of resources and enforcement. The emergence of new patterns of behavior and efficiency will likely be a hallmark of AI's impact, potentially leading to innovative solutions for long-standing challenges. However, AI use will likely drive up the demand for energy consumption particularly as energy-intensive data centers proliferate. This could negatively impact sustainability gains from more-efficient resource allocation.

"Moreover, as AI systems excel in their ability to learn from data and adapt their behavior over time, we can predict that by 2040, complex adaptive systems in domains such as healthcare will leverage AI for continuous learning and adaptation, leading to more personalized and effective treatments. The systems' capacity to learn and evolve will be crucial in addressing the dynamic challenges of the future. AI will also introduce new evolutionary pressures to existing systems, driving innovation and efficiency. In sectors such as manufacturing, AI-driven automation and optimization could lead to significant advancements in productivity and product quality. However, this also has the potential to disrupt labor markets and existing industry structures, as well as drive further economic and digital inequalities and gaps between regions and countries.

"In general, the nonlinear nature of complex adaptive systems, paired with the scale and depth of transformations brought by AI, will likely result in unpredictable and emergent behaviors. In political systems, for example, the use of AI in information dissemination and campaign strategies could lead to unforeseen shifts in public opinion and political dynamics and increase political polarization and a decline in institutional trust led by mis- and disinformation.

"Looking ahead to 2040, the impact of AI on complex adaptive systems is poised to be profound, driving innovation, efficiency and adaptability across various domains. However, the integration of AI also introduces challenges related to unpredictability, and the need for agile governance. Navigating this future will require a nuanced understanding of both AI and complex adaptive systems, as well as proactive strategies to harness the benefits of AI while mitigating potential risks. Ultimately, the goal is to create resilient, adaptable systems that leverage AI to address the complex challenges of the future, fostering sustainable and equitable outcomes across society."

Sean McGregor
AI requires new technology, social institutions and social conventions

Sean McGregor, machine learning safety researcher and founding director of the Digital Safety Research Institute at the UL Research Institutes, founder of the Responsible AI Collaborative, predicted, "We will not have all the answers to safely managing AI by 2040, but we will have a profession with millions of people dedicated to advancing the cause. It is likely to be the last new profession. Unsafe industrial activity turned Oklahoma into a dust bowl and lit the Cuyahoga River on fire at least a dozen times. Like the agricultural and industrial revolutions of yesteryear, AI requires new technology, social

institutions and social conventions to avoid the worst outcomes. However, 'AI safety' is a far more difficult proposition than environmental sustainability."

Peter Lunenfeld

Communal, civic and even constitutional guidelines should be exercised over this tech

Peter Lunenfeld, professor of design and media arts at the University of California-Los Angeles, commented, "By 2040, AI will extend into virtually every digitally-enabled technology we interact with; it will be woven into the very infrastructure that surrounds and supports us in the 21st century. The effects will be a mix of the astonishing, the appalling and the invisible. If we leave all aspects of the AIs' deployment, control, displacement and profit-production to their inventors and exploiters – as we have been up to now – and do not exercise communal, civic and even constitutional guidelines and controls over these technologies, we will be at even greater risk of oligarchic control. The danger of a very few humans controlling AI is much greater than the science-fictional nightmare of AI controlling vast numbers of humans. In 2040, just as today, how humans relate to other humans and how they regulate the distribution of power and powerful tools – like AI – will be the primary determinant of how AI impacts its human hosts."

Greg Adamson

It is unlikely that human institutions are ready or willing to properly adapt to this change

Greg Adamson, an Australian currently serving as a vice president of the IEEE Society on Social Implications of Technology and chair of its Dignity, Inclusion, Identity, Trust and Agency group, is not optimistic that humanity will meet the challenges ahead. He wrote, "I see no evidence that human institutions anywhere in the world are ready for the change that lies before us, nor do they show any significant capacity to address existential threats – as can be clearly seen in their response to climate change. A telling quote: 'The world of the future will be an even more demanding struggle against the limitations of our intelligence, not a comfortable hammock in which we can lie down to be waited upon by our robot slaves.' Norbert Wiener, one of the most influential scientists of the 20th century, said this in 1964."

Sonia Livingstone

To flourish, humans must have agency and efficacy; our children may never forgive us

Sonia Livingstone, professor of social psychology and former chair of the Truth, Trust and Technology Commission at the London School of Economics, urged, "Let us focus on one point: At heart, for human beings to flourish, they must have the opportunity to exercise their agency and efficacy in a world that they can, broadly, understand and which is directly responsive to their needs, interests and concerns. In all the talk of what AI can do, this basic recognition of the nature of humanity seems drowned out. Perhaps we could start over and develop a truly human-centered vision of AI and its potential. But instead, the political interests of states in unholy tandem with the economic interests of companies seem to drive the agenda, to our lasting detriment. As for our children – one-third of the population today, 100% of the population tomorrow – they will not know a world without, or before AI. We are treating them as the canaries in the coal mine. They may never forgive us."

THEME 3: Humanity could be greatly enfeebled by AI

A share of these experts focused on the ways people's deepening dependence on AI could diminish human agency and skills. Some worry it will decimate individuals' critical-thinking, reading and decision-making abilities and healthy, in-person connectedness and lead to more mental health problems. Some said they fear the impact of mass unemployment on people's psyches and behaviors due to a loss of identity, structure and purpose in their lives. A small share warned these factors, combined with a deepening of inequities, may prompt violence.

Rosalie Day

We will be more self-absorbed, post-truth will worsen and our sense of purpose will be diminished

Rosalie Day, co-founder at Blomma, a platform providing digital solutions to clinical research studies, wrote, "Advances and proliferation of AI will allow us to be more self-absorbed than we are now. The post-truth era that the 2016 election ushered in will be backstopped by deepfakes. Cognitive dissonance will eventually disappear from our vocabulary because we can choose anything we want to believe and make the evidence for it – until we can't. Humans thrive from community and a sense of purpose. Increasing dependence on AI bodes poorly for both. Social networks, remote working and online gaming and shopping are solitary pursuits, depriving us from shared experiences and increasing our sense of isolation. That these are sedentary does not help with health and stress levels. The sense of purpose we get from work will be diminished as we all become prompt engineers. The EU is grappling with privacy, sustainability and AI governance issues by creating institutional infrastructure and enforceable frameworks somewhat proactively. The U.S. culture, politically polarized and obsessed with performative aspects, is content to be the Wild West for the private sector. It's this nostalgic laissez-faire attitude toward business, which in the past led us to be innovators, that now prevents us from playing well with others. The stakes have changed globally, yet we are still competing among ourselves. Effective lifesaving and pain-minimizing health technology advances will be a wash societally if the U.S. doesn't turn around the domestic economic trends."

Russ White

The threat is the loss of thinking skills and social cohesion and the destruction of dignity

Russ White, a leading Internet infrastructure architect and Internet pioneer, said, "I don't know that even more-advanced AI – artificial general intelligence (AGI) – would have the kind of physical existential threat people perceive. They say, 'the AI does not love you,' or 'the AI does not hate you,' or 'the AI has a better use for the atoms that make you up,' that sort of thing. The threat seems more likely to come from a general loss of thinking skills, decreasing social cohesion and the potential complete destruction of dignity. In some parts of the world, dignity has been redefined so an AI would actually increase dignity – defining it as the drive toward being able to have complete freedom of choice at every moment in life. From a Judeo-Christian perspective, however, dignity has a far deeper and richer meaning than that. From this perspective AI is a serious threat."

Stephan Adelson

There is likely to be an AI-driven war over people's minds and emotions

Stephan Adelson, president of Adelson Consulting Services, an expert on the internet and public health, said, "By 2040, for most of the population, AI's daily influence will appear to be rather benign and quite

useful, but the purveyors of AI will invest their efforts toward creating and operating applications that feature the most potential to generate revenue. AI 'agents' are tools tech companies are conceiving to act as people's helpful 'personal advisors' on any variety of topics. The recent announcement by Meta of its suite of AI 'personalities' is one example. It is likely these agents will be programmed to nudge those they 'advise' toward products and revenue-generating options packaged as advice.

"As AI progresses and learns, it (more accurately, they, as there will be abundant AIs) will come to understand each individual and their psychological and emotional makeup. I assume history will repeat itself, as advertising and the aspect of AI that generates data leading to revenue will be prolific. The effectiveness of advertising is very much about psycho-social understanding. Each individual, to a large part, already has an advertiser's profile, a database that 'understands' each, including their psychology, behaviors and social circles. Advanced AI can fine-tune and combine existing databases on individuals that not only include basics, such as websites visited, items viewed, etc., but will also include much more personal conclusions about the person, their life and their motivations for their actions.

"This can be a very positive thing *if* the information is confidentially used to people's benefit, for things like mental health services, social matchmaking and other options that will allow for personal growth and development. Apps for mediation, (such as the current VR apps Maloka and TRIPP), apps for peer-based support (such as the VR app InnerWorld) and others, will likely use AI to provide more-individualized support and well-being options.

"But AIs already are and will continue to introduce privacy concerns that go far beyond simple behaviors and habits. AI's 'understanding' of a person will likely surpass most individuals' understanding of themselves. This dimension of understanding invades personal privacy in ways that could easily be exploited to manipulate individuals in extreme ways. It is easy to imagine an AI-driven war over people's minds and emotions motivated by criminals and self-interested individuals in politics, government and business. A database that provides a much fuller picture of an individual (potentially a fuller picture than the person has of themself) is one that could hold great power over not only the individual but over groups of individuals and society at large.

"The areas that are of greatest concern to me are in the areas of politics and the so-called 'culture war.' When deepfakes are combined with AI, powerful alternative realities can be created. These alternative realities can easily sway perceptions, beliefs, emotions and actions. Those who lack the capacity to discern what is a created reality from what is a naturally occurring reality will continue to be exploited. Without proper safeguards and regulations, divisions in society will increase.

"There is a broader range of negative results that can come from the scenarios described above. Aspects of people's mental resourcefulness will continue to be significantly influenced by their uses of AI. They will be less likely to write their own stories and to read deeply and be challenged to think in creative ways as AI becomes more of a tool to replace things like art, literacy and a broad vocabulary. When information is presented in a personal and friendly way by AI, the need for mental resourcefulness (including the skill of critical thinking) when working through problems or finding answers to questions decreases as the information presented is immediately trusted, being considered as presented by a sort of AI 'friend.' People are likely to continue to become more passive, and dependency on AI and other technologies that arise from it will increase dramatically.

"There *are* other positives. AI's most-positive influence will lie in the areas of science and medicine. I anticipate cures for illnesses, more-comprehensive and effective treatment plans and better general care

through the gathering and distribution of more-complete medical histories and a clearer picture of the interaction of the various biological systems within the body. Disabilities will be overcome, chronic diseases cured, and self-care will become more effective and integrated into our daily lives through discoveries made by AI and advice offered by personal AI 'assistants' or 'agents.'

"We will gain a better understanding of our planet and our universe through AI tools that can 'think' logically and learn. Current theories on topics like creation and evolution (of life, planets, and the universe) will be proven and disproven as new theories arise.

"The potential for humankind to improve our own personal performance will exist simply through the competition that will arise between human efforts and those put forth by AI. I think AI will push many to rise to a more-sophisticated level of personal achievement if they feel that they could be rendered 'useless' in comparison."

Sharon Sputz

There will be no individual agency when 'algorithms tell us how to think'

Sharon Sputz, director of strategic programs at Columbia University's Data Science Institute, commented, "It seems as if we are heading toward lives with no individual agency in which algorithms tell us how to think, resulting in the loss of humans' ability to operate effectively without them. All of this is happening as society seems to be losing its ability to debate issues in a way in which we honestly listen to different opinions with open minds in order to learn and to expand our thinking."

Evelyne A. Tauchnitz

The AI-fueled transition challenges the way we live and experience everything

Evelyne A. Tauchnitz, senior researcher at the University of Lucerne's Institute of Social Ethics and member of the UN Internet Governance Forum's Multistakeholder Advisory Group, wrote, "The proliferation of AI in the next 15 years will undoubtedly bring about a transformation characterized by more security but less personal freedom to move, express ourselves, purchase and make choices as we see fit. And many of these changes will go largely unnoticed by most people as AI offers to them a life that seems both safer and more convenient. In the pursuit of the promise of security and comfort, society may become complacent and oblivious to the encroachment on personal freedoms and privacy.

"The year 2040 is poised to bring about significant transformations in our daily lives and in the broader societal landscape primarily driven by the widespread proliferation of artificial intelligence. One of the most striking and consequential developments will be the increasing trade-off between freedom and security. While AI holds the promise of enhancing safety in cities and villages by addressing issues such as criminality, traffic accidents and natural disasters, doing so will invariably encroach upon our liberty to navigate public spaces, exercise financial autonomy, manage our time in accordance with our preferences and critically reflect upon the choices that we make.

"One of the most significant consequences of the coming shift towards greater public security is the pervasive utilization of AI-powered surveillance, biometric data collection and the analysis of individuals' behaviours. These technologies will inevitably lead to a fuller loss of privacy as society once knew it. The omnipresence of sensors and surveillance systems will cast a shadow over our personal lives, raising

concerns about individual autonomy and civil liberties. People's every move may become subject to scrutiny, fundamentally altering the nature of personal freedom.

"Moreover, the possibility to pay in cash, which is the only truly anonymous form of payment, may face the risk of being abolished for the sake of economic efficiency and easier traceability of electronic transactions. In addition to the loss of privacy and increased surveillance, the advent of AI will exert its influence on how we communicate and exchange information. The instantaneous nature of communication may deprive individuals of the freedom to respond at their own pace. The expectation of constant online availability and responsiveness may leave individuals feeling pressured to prioritize the demands of others over their own time and preferences.

"The gradual transition from personal freedom to public security will happen incrementally, often made in small, barely noticeable steps. However, the consequences of this shift are profound, as it endangers the way we live, communicate, spend our money, experience leisure activities and engage in social activities. The risk lies in small deviations, but what we consider 'normal' today will become a luxury good in the future. What we lose in the end are personal freedom, autonomy, privacy and anonymity.

"Tragically, we might remain oblivious to what we forfeit in pursuit of comfort and 'security' until it's too late. These incremental alterations are likely, in aggregate, to culminate in wide-reaching consequences for our daily lives that nobody desired and nobody could fully anticipate. Returning to the life we once knew would prove to be an insurmountable challenge, as individuals and institutions may be hesitant to shoulder responsibility for any perceived decrease in public security and any increase in potential victims (such as those affected by terrorist attacks) due to insufficient surveillance. This fear of accountability can further exacerbate the erosion of personal freedoms.

"This scenario conjures echoes of Aldous Huxley's 'Brave New World,' in which citizens willingly sacrifice personal liberty for the allure of comfort and security, illustrating the complexity of the trade-off between freedom and the promise of better security that will define life in 2040."

Giacomo Mazzone

What will humans become if they lose the agora and the ability to reason with no assistance?

Giacomo Mazzone, secretary-general of Eurovisioni and member of the advisory council of the European Digital Media Observatory, wrote, "I have two primary worries. The first concerns the vanishing of the public sphere. By 2040, each individual – thanks to AI apps – is likely to live their own, unique life experience and the number of people's face-to-face in-person interactions people have is likely to be reduced to nearly zero.

"Teleworking from home will reduce personal exchanges with colleagues. Personalized access to information that will exclude anything that does not correspond to the specific AI settings made by each person will create individualized realities. We could see the emergence of millions of different alternative truths, magnitudes more than what we see today.

"In such a scenario how can democracies possibly survive? The concept of democracy is based on the idea of the 'agora,' the public square, where facts (not multiple alternative 'realities') are presented to citizens and are commented upon and analyzed through people's in-person interactions with others. What happens if humanity's uses of these technologies shifts society into a state where there are few, if

any, real personal connections and any sort of shared set of common, fact-anchored truths disappears and each individual comes to live in their own private world with highly varied priorities and views, all based on 'alternative facts'?

"My second key concern regards human skills development. The introduction of the pocket calculator and calculator apps has rendered most humans incapable of applying reason to successfully achieve very simple mathematical operations. The introduction of navigation software through tools such as Google Maps has led to a progressive decline among humans in the ability to use their minds only to have a firm grasp of their geographic orientation and how to go from here to there.

"What will happen when AI tools begin to replace much more of humans' own brainwork in more and more of their myriad day-to-day actions of simple to medium complexity? We will lose other useful basic skills that humans have cultivated over the course of centuries just exactly as we have come to lack the ability to make mental calculations and as we have lost our sharpened innate sense of physical orientation. Then what will we become?

"What will happen in an extreme situation in which AI tools would not be accessible (i.e., during the natural hazards expected due to climate change)? Will there be a limit to these types of losses of our capacity for brain-driven intelligence? Could the type of culture seen in 'Judge Dredd' (a good science fiction book but a bad movie) become reality one day?"

Louis Rosenberg

AI systems are being taught to 'master the game of humans'

Louis Rosenberg, extended-reality (XR) pioneer, chief scientist at the Responsible Metaverse Alliance and CEO of Unanimous AI, said, "I'd like to explain the concept of sentient AI and the 'arrival-mind paradox.' As I look to the year 2040, I believe AI systems will likely become super-intelligent and sentient. By superintelligence, I'm referring to cognitive abilities that exceed humans on nearly every front, from logic and reasoning to creativity and intuition. By sentience, I'm referring to a 'sense of self' that gives the AI system subjective experiences and the ability to pursue a will of its own. No, I don't believe that merely scaling up today's LLMs will achieve these milestones. Instead, significant innovations are likely to emerge in the basic architecture of AI systems. That said, there are several cognitive theories that already point toward promising structural approaches. The one I find most compelling is Attention Schema Theory, developed by Michael Graziano at Princeton.

"In simple terms, attention schema theory suggests that subjective awareness emerges from how our brains modulate attention over time. Is the brain focused on the lion prowling through the grass, the wind blowing across our face, or the hunger pains we feel in our gut? Clearly, we can shift our attention among various elements in our world. The important part of the theory is that a) our brain maintains an internal model of our shifting attention, and b) it personifies that internal model, creating the impression of first–person intentions that follow our shifting focus.

"Why would our brains personify our internal model of attention? It's most likely because our brains evolved to personify external objects that shift their attention. Consider the lion in the grass. My brain will watch its eyes and its body to assess if it is focused on me or on the deer between us. My brain's ability to model that lion's focus and infer its intentions (i.e., seeing the lion as an entity with willful

goals) is critical to my survival. Attention schema suggests that a very similar model is pointed back at myself, giving my brain the ability to personify my own attention and intention.

“Again, it’s just one theory and there are many others, but they suggest that structural changes could turn current AI systems into sentient entities with subjective experiences and a will of their own. It’s not an easy task, but by 2040, we could be living in a world that is inhabited by sentient AI systems.

“Unfortunately, this is a very dangerous path. In fact, it’s so dangerous that the world should ban research that pushes AI systems in the direction of sentience until we have a much better handle on whether we can ensure a positive outcome.

“I know that’s a tall order, but I believe it’s justified by the risks. Which brings me to the most important issue – what are the dangers?

“Over the last decade, I have found that the most effective way to convey the magnitude of these risks is to compare the creation of a sentient AI with the arrival of an alien intelligence here on Earth. I call this the ‘arrival-mind paradox’ because it’s arguably far more dangerous for an intelligence to emerge here on Earth than to arrive from afar. I wrote a short book called ‘Arrival Mind’ back in 2020 that focuses on this issue. Let me paraphrase a portion:

> “An alien species is headed for Earth. Many say it will get here within the next 20 years, while others predict longer. Either way, there’s little doubt it will arrive and it will change humanity forever. Its physiology will be unlike ours in almost every way, but we will determine it is conscious and self-aware. We will also discover that it’s profoundly more intelligent than even the smartest among us, able to easily comprehend notions beyond our grasp. No, it will not come from a distant planet in futuristic ships. Instead, it will be born right here on Earth, most likely in a well-funded research lab at a university or corporation. Its creators will have good intentions, but still, their work will produce a dangerous new lifeform – a thoughtful and willful intelligence that is not the slightest bit human. And like every intelligent creature we have ever encountered, it will almost certainly put its own self-interests ahead of ours.

“We may not recognize the dangers right away, but eventually it will dawn on us – these new creatures have intentions of their own. They will pursue their own goals and aspirations, driven by their own needs and wants. Their actions will be guided by their own morals and sensibilities, which could be nothing like ours.

“Many people falsely assume we will solve this problem by building AI systems in our own image, training them on vast amounts of human data. No – using human data will not make them think like us, or feel like us, or be like us. The fact is, we are training AI systems to *know humans*, not to *be* human. And they will know us inside and out, be able to speak our languages, interpret our gestures, predict our actions, anticipate our reactions and manipulate our decisions.

“These aliens will know us better than any human ever has or ever will, for we will have spent decades teaching them exactly how we think and feel and act. But still, their brains will be nothing like ours. And while we have two eyes and two ears, they will connect remotely to sensors of all kinds, in all places, until they seem nearly omniscient to us.

“And yet, we don’t fear these aliens – not the way we would fear a mysterious ship speeding towards us from afar. That’s the paradox – we should fear the aliens we create here far more. After all, they will know everything about us from the moment they arrive – our tendencies and inclinations, our motivations and aspirations, our flaws and foibles. Already we are training AI systems to sense our emotions, predict our reactions and influence our opinions.

“We are teaching these systems to master the game of humans, enabling them to anticipate our actions and exploit our weaknesses while training them to out-plan us and out-negotiate us and out-maneuver us. If their goals are misaligned with ours, what chance do we have?

“Of course, AI researchers will try hard to put safeguards in place, but we can’t assume that will protect us. This means we must also prepare for arrival. That should include making sure we don’t become too reliant on AI systems and requiring humans in the loop for all critical decisions and vital infrastructure. But most of all, we should restrict research into sentient AI and outlaw systems designed to manipulate human users.”

Mary Chayko

People may not even notice the losses they are suffering as the world is infused with AI

Mary Chayko, professor of communication and information at Rutgers University, said, “By 2040 it will be increasingly difficult to know whether something that we see or experience has been human-generated. And it may matter less and less to us, as successive generations grow up in an AI-infused world. Part of this shift can be positive, if and when the technology is used to expand current ideas of work and creativity in productive, life-affirming ways. But the temptation will be to use it exploitatively and to maximize profits. In the process, we may find that our humanity – what makes us special as human beings – is being gradually and systematically stripped away. As AI becomes a taken-for-granted aspect of everyday life in the coming decades, will we even notice?”

Kevin Yee

We might be heading toward a post-knowledge generation

Kevin Yee, director of the Center for Teaching and Learning at the University of Central Florida, said, “2040 is a long time horizon. In the past 15 years, we’ve had paradigm shifts in technology in the form of Web 2.0, then again with smartphones and apps. In less than a single year, LLMs have gone viral and had rapid adoption, and the development of bigger and faster models will increase every six months. There is every reason to believe that AI development will meet or exceed Moore’s Law-type acceleration. Futurist Ray Kurzweil predicted the singularity, which ought to come at about the same time as AGI, to happen in roughly this time frame. The *pace* of change will rock normal conventions. Not many folks yet appreciate how much will change just in absolute terms, let alone the relative pace of change, which will eventually feel non-stop.

“This will reverberate in all aspects of society, politics, economy and workplaces. It will make as much difference in everyday lives as widespread electricity did. Historians note how the times before electricity and after electricity differed; a pre-AI existence, even in a technologically-advanced first-world country, will look quaint by 2040. Gained will be massive productivity. There will be massive disruption to jobs. As is often said, ‘You may not lose your job to AI, but you may lose your job to someone who knows how to use AI.’

“Lost will be foundational knowledge in the younger generations. Because AI makes it easy to cheat on foundational knowledge in schools and colleges, teachers and professors will soon switch to focus on higher levels of Bloom’s Taxonomy [a mapping of thinking, learning and understanding]. That makes sense for students who already have foundational knowledge, but it will soon prove disastrous. How can future alumni evaluate an AI’s output if they don’t know how to spot the errors or suggest improvements?

“By 2040, our college graduates will be great at using AI, but will end up trusting AI output with no way to question it. That may indeed have profound effects on our relationship with AI, as perhaps seen in many science-fiction films over the years. The trend that started with the arrival of Google’s search engine – with students believing that ‘knowledge is outside of me’ – will get worse in the AI era. What’s unclear is what will happen once most people in the workforce are of the post-knowledge generation. We might stagnate as a society, unable to lurch forward because we simply trust the AI. If we built safeguards into the AI to only follow our lead, we might just remain in status quo. More ominously, if AI (or, even more ominously, AGI) determines that humanity needs help to evolve, we may be at its mercy.”

Katindi Sivi

‘It is imperative to start questioning AI and big data assumptions, values and biases’

Katindi Sivi, founder and director of the LongView Group, a socioeconomic research, policy analysis and foresight consultant based in Nairobi, Kenya, said, “The power of AI to solve problems and transform life should not erase the need for vision or human insight. The more AI advances, the more I feel that people will relinquish their human abilities to think and feel to machines. AI and its sub-components like big data will increasingly become the sole determinant in decision-making processes. It is necessary to ask critical and objective questions about what all this means: Who has access to what data, how is data analysis deployed and to what ends? AI companies have privileged access. There is a divide between the big-data rich and the big-data poor as well as among the three classes of people – the creators of AI, those with the means to collect and own the data and those with the ability to analyze it.

“It is imperative to start questioning AI and big data assumptions, values and biases and to effectively democratize the space. Conversations must be held and mechanisms must be put in place around accountability principles that apply across the board. We must also work to ensure that people gain enough digital literacy to understand the gap between what they *want* to do online and what they *should* do, because the failure to bridge this gap and make the right choices leads most not to notice the gradual corrosion of their autonomy, which leads them to a slow slide deeper under powerful people's control. Vices such as privacy intrusions, invasive marketing, gross biases, misinformation and the curtailing of human freedoms are among the many already creeping in.”

Michael Wollowski

Will our future resemble the fearful outcome in the E.M. Forster essay ‘The Machine Stops’?

Michael Wollowski, professor of computer science at Rose-Hulman Institute of Technology and associate editor of AI Magazine, wrote, “Given that the world is unwilling to quickly act to contain climate change, I am taking a rather dim view of the will of societies to regulate AI towards the betterment of civilization. I am afraid that the negative impact that social media have on people’s ability to directly communicate with each other and on civility in general, will be amplified and accelerated by advances in AI. I am very

concerned that we will bring about a world depicted in E.M. Forster's essay 'The Machine Stops.' Forster writes: 'Cannot you see … that it is we who are dying, and that down here the only thing that really lives is the Machine? We created the Machine to do our will, but we cannot make it do our will now. It has robbed us of the sense of space and of the sense of touch, it has blurred every human relation, it has paralysed our bodies and our wills.'''

William L. Schrader

AI adds greater velocity to the vector of humanity's troubles

William L. Schrader, 2023 Internet Hall of Fame inductee and advisor to CEOs, the co-founder of PSINet, wrote, "AI – which is controlled by the wealthy and powerful – accelerates many threatening processes. And it is too late to stop it. Think about the one-tenth of one percent holding 99.9% of today's global wealth in *all* countries. AI will make the rich richer, the poor poorer, and the differential will be substantially greater by 2040. Fascists will dominate nearly all governments, including that of the U.S. AI will drive further dangerous military activity and intelligence gathering. Global warming and pandemics will significantly worsen by then; all coastal communities across the world will be covered by water and island nations across the globe may disappear. AI adds greater velocity to the vector of humanity's troubles. The death toll from all of this will be frighteningly epic. The planet will survive. Humans will too. But I believe billions will die in the next few decades from conflict, pandemics, global warming (starvation, flooding, drought, dead oceans) and more. People will perish before our eyes and get no help. This all seems inevitable to me. Earth's population will shrink to one-tenth of today's number. Wake up and smell the gunfire."

THEME 4: Don’t fear the tech; people are the problem and the solution

This canvassing of experts yielded many predictions about the benefits AI can bring. Still, most worry about its likely deepening of current problematic trends in digital life. A large share said their first concern for the future of humanity is not that AI will go rogue but that AI is likely to magnify the dangers already evident today due to people’s uses and abuses of digital tools. They fear a rise in problems tied to menacing and manipulative acts exercised by bad actors, the ways in which the distorting incentives of capitalism push AI use to damaging purposes, and the power AI gives to autocratic governments to violate human rights. Many said that leaders across all sectors of society must be much more responsive in urgently addressing and working to mitigate the challenges emerging due to accelerating digital change.

Avi Bar-Zeev

AI is the most-persuasive technology ever, and the most dangerous in greedy human hands

Avi Bar-Zeev, founder and president of Reality Prime and the XR Guild, said, “AI is poised to be the most persuasive technology ever invented, which also makes it the most dangerous in greedy human hands. By 2040, we may decide to let AI influence or decide legal cases. We may continue to see ad-tech with personal data run amok. We may even find that AI makes for better people-managers than people, replacing the top of companies with automation, more so than we originally expected low-level workers to be replaced by robots. Robots are expensive. Software is cheap.

“AI has the power to help humans collaborate. While generative AI indeed robs creators of their credit and income, it is also the most powerful tool for human-to-human collaboration we've yet invented. It can let people combine their ideas and expressions in a way that we never could. That power remains still largely untapped. AI has the power to help people heal from emotional trauma, but we may also use it as a substitute for people when what we need most is real human love and compassion. Will the people most in need turn to proven therapies or use the crutch of AI girlfriends to ease their loneliness? Probably the latter. The most important question about AI is how much control of our lives we grant it. We may trust AI more than individual human bias. But we should know that AI carries all of the same learned biases with, so far, none of the compassion to counteract that.

“All in all, this is one thing I know to be true of AI today as well as what is likely in 2040: The best and worse uses of AI are largely a function of the choices we humans make. If we build tools designed to help people, we can do good and still make mistakes. But if we choose to exploit people for our own gain we will certainly do harm, while any good is incidental. We should be regulating the uses and intentions more than the technologies themselves. And we must be educating everyone how to make ethical choices for the best outcomes. The risk of AI extinction is roughly equal to the risk of nanotechnology turning the world to grey goo or some stock-trading algorithm tanking the market. But humans failing to build safe systems can injure people.”

Devin Fidler

Worry about the oncoming wildfire more than the distant asteroid

Devin Fidler, foresight strategist and founder of Rethinkery.com, commented “The AI discourse has been too fixated on a possible impending doomsday due to AI that could spiral out of control. The pressing,

tangible challenges just at the threshold of the AI technologies we have today are straining legacy systems and institutions to their breaking point, exacerbating negative externalities and potentially nurturing the growth of new kinds of digital warlords. This is like worrying about an asteroid collision while your house is in the path of an oncoming wildfire. To be clear: AI could absolutely be an enormous boon for humanity. Yet, like that wildfire, if left unattended it could also consume an awful lot that we would prefer not to see burned down. This isn't fear-mongering; It is reality.

“Right now, companies are racing to outpace each other in the agentic AI space, prodded by investors seeking astronomical returns. (There is evidence to suggest that the early LLMs were originally intended to be introduced as a component in larger AI ‘agent’ software – AI that is given a goal and then works on accomplishing it on its own.) Indeed, artificial agency may ultimately be even more impactful than traditional artificial intelligence. After all, it allows software scaling and intense competition to be applied to a great game of ‘shaping the physical world.’ The challenge, of course, is that the rest of us still have to live in the physical world while this plays out.

“Traditionally, society has created institutions to protect itself from this kind of thing. But regulation lags behind, always a few steps too slow, always playing catch-up. Imagine AI supercharging this disparity. Even now, problems like climate change and unsustainable resource allocation overwhelm the institutional tools we have to address them. Add exponential AI to this mix and we seem to be setting the stage for an AI-enhanced tragedy of the commons in which digital agents, in their quest for optimization, exponentially leave the negative externalities for the rest of us to clean up.

“The biggest threat now may not be sci-fi’s Skynet terminators or the shibboleth paperclip maximizers, but tomorrow's now infinitely scalable con artists, sales bots and social media manipulators, all potentially capable of undermining institutional effectiveness and inflicting collateral damage on overall cohesion at a scale we've never seen before.

“How can our legacy systems be patched quickly enough to handle this? Financial systems, social media, government agencies – all are ripe for exploitation even by very basic AI agents. Cracked AI agents with convincing real-time voice capabilities could potentially be used to create a new open API to most of society's most fundamental bureaucratic systems. If our institutional framework were a literal operating system, this is the sort of situation that could see stack overflow errors and system crashes as the legacy systems simply fail to keep up.

“But it's not just systemic risk that needs to be considered; the primary concern is that these systems empower the people who want to see traditional institutions fail. There may well be nothing a rogue AI could do that a rogue person somewhere is not likely to try first. Imagine warlords who wield algorithms instead of (or in addition to) armies. The potential for destabilization and conflict is rife, as agentic AI amplifies the scale of every bad actor with an internet connection.

“This isn't without precedent. The early days of industrialization saw similar upheavals, as new technologies tore through established norms and systems. The solution then, as now, wasn't to await a new breed of better or more enlightened human adapted to the technological landscape – but to actively design and construct robust new kinds of institutions capable of channeling these powerful forces toward positive externalities and away from negative externalities.

“Organizations themselves are a technology, and they need to be patched to keep up with new challenges and take advantage of new affordances. From this perspective, it's pretty clear that now is the time to start putting together the pieces of a new institutional framework, an ‘operating system’ for the AI era, that can adapt as fast as the technologies it seeks to govern.

“This isn't about stifling innovation; it's about ensuring that the digital economy continues to give humanity as a whole more than it takes. Where each transaction, each interaction, builds rather than extracts value. In this environment, proactive regulation isn't just a stopgap; it's an essential tool to bridge the space between where we are and where we need to be. It is good to see governments start taking this part seriously. Over the longer term, if we design these institutional ‘operating systems’ correctly, we have a real chance of illuminating the path to a future of unprecedented progress and human well-being.”

Leah Lievrouw

The fight to gain first-mover and network effects advantages is everything

Leah A. Lievrouw, professor of information studies at the University of California-Los Angeles, said, “Of course, many people are thinking about the issues around AIs, especially the major industry players, but I'm not confident that values beyond efficiency, novelty and profit will ultimately prevail in this arena. I question whether the claims made for AI will ultimately pan out as they are now being glowingly promised. AI research was originally a quest for ‘general intelligence’ for machines, and – despite repeated failed attempts to build such machines over the decades – such human-like capacities still seem some way off.

“The difference today, of course, is the sheer brute-force approach being applied to the creation of machine ‘learning’ using imponderably large datasets – despite questionable practices about the sources, cultural/social significance or meaning, or ownership and use of that data – and assumptions that massive computing power will only continue to expand on some kind of unstoppable log scale – despite the environmental risks and foregone opportunities for investing in something other than computing infrastructure that these entail.

“My impression is that the current batch of AIs (multiple because so far they each really just do certain types of things well) have been rushed to market with little non-tech oversight, so proponents can gain first-mover and network-effects advantages (and property rights). Under these conditions, who will eventually get to decide what general machine intelligence is, how it should be deployed and under what circumstances and to what ends?”

Tim Bray

Capitalism limits the focus on AI’s long-term impact on people

Tim Bray, founder/principal at Textuality Services, previously a vice president at Amazon “The problem with AI has nothing to do with the technology itself. The problem is the people who are financing and deploying it; the imperatives of 21st-century capitalism ensure that their thought processes will not include the impact of those deployments on humans, be they employees or customers. This effect is worsened by the high cost of building and training AI models, ensuring that this capability will mostly be exercised by people whose primary concern is profit, rather than the improvement of the human condition.”

Howard Rheingold

Corporations with huge financial and computational resources will be in control

Howard Rheingold, pioneering Internet sociologist and author of "The Virtual Community," wrote, "The future depends on who is in control, and it seems highly likely that corporations with huge financial and computational resources will continue to be in control, strengthening their monopolies. If that is the case, we can expect income inequality – already at a crisis stage – to get worse.

"The ability of medical researchers to seek cures and prevention for deadly diseases will be multiplied; what I fear is that antisocial individuals and groups will gain the power to create weapons of mass destruction that heretofore have been reserved for states: already, the same tools have been used to solve the protein-folding problem and to suggest tens of thousands of potentially fatal compounds to be used in biological and chemical warfare. I did not come up with the phrase, but I agree that a good question to ask about any potentially powerful technology is 'What might 4chan do with it?'

"As a former university lecturer, I'm happy to see student use of ChatGPT blowing up the traditional tools for assigning grades. These institutions and their employees are never likely to radically change destructive processes like traditional grading unless they are faced with an existential threat. One significant critical uncertainty is whether AI will evolve as a tool for augmenting human intellect or as a replacement. If the former, unless educational institutions and practices change radically (how many schools offer enough guidance today to students on assessing the accuracy of online information?), there will be a strong divide between those who know how to use these tools to amplify their own capabilities and those who do not have that knowledge/skill."

John Battelle

Who will the AIs work for? Who controls the data they work with?

John Battelle, owner of Battelle Media and chairman at Sovrn Holdings, wrote, "We're at an inflection point as to the ecosystem we build to leverage AI. We have to choose, now, the assumptions we build into agency and rights for individuals interacting with these systems. I've written about this on my site. Here are excerpts from a September 2023 post titled 'On AI: What Should We Regulate?':

"A platoon of companies is chasing the consumer AI pot of gold known as conversational agents – services like ChatGPT, Google's Bard, Microsoft's BingChat, Anthropic's Claude and so on. Tens of billions have been poured into these upstarts in the past 18 months, and while it's been less than a year into since ChatGPT launched, the mania over generative AI's potential impact has yet to abate.

"The conversation seems to have moved from 'this is going to change everything' to 'how should we regulate it' in record time. What I've found frustrating is how little attention has been paid to the fundamental, if perhaps a bit less exciting, question of what form these generative AI agents might take in our lives. Who will they work for, their corporate owners, or …us? Who controls the data they interact with – the consumer, or, as has been the case over the past 20 years – the corporate entity?...

"Most leading AI executives are begging national and international regulatory bodies to quickly pass frameworks for AI regulation. I don't think they will be up to the task. Not because I think regulators are

evil or stupid or misinformed – but rather because a top-down approach to something as slippery and fast-moving as generative AI (or the internet itself) is brittle and unresponsive to facts on the ground. This top-down approach will, of course, focus on the companies involved.

But instead of attempting to control AI through reams of impossible-to-interpret pages of regulation directed at particular companies, I humbly suggest we should focus on regulating the core resource all AI companies need to function: Our personal data. It's one thing to try to regulate what platforms like Pi or ChatGPT can *do*, and quite another to regulate *how those platforms interact* with our personal data. The former approach stifles innovation, dictates product decisions and leads to regulatory capture by large organizations. The latter sets an even playing field that puts the consumer in charge."

David Bray

Focus on how to co-exist with super-empowered, transnational organizations and individuals

David A. Bray, principal at LeadDoAdapt Ventures and distinguished fellow with the non-partisan Stimson Center, commented, "The distraction here is focusing on questions that are framed as: What if AI did XYZ to humanity? Instead, we really should be focusing on how we learn to co-exist with both super-empowered, transnational organizations and individuals who are now (via the increasing accessibility, ubiquity, and affordability of technology) able to do things that only large nation-states could do 40-50 years ago.

"The challenge with these questions is they treat the world as singular. With AI, it's probably very much dependent on the specific society, nation and communities' choices around data, AI, and people that will determine positive versus negative. It is also linked to other contextual influences. After all, there already are 54 different national AI strategies in the world – see https://www.aistrategies.gmu.edu/report.

"What if the Turing Test [the long-standing marker of whether a computer system has intelligence] is the wrong test? It could be distracting us from bigger and more important questions about how powerful organizations and individuals use AI.

"It is important to remember the original Turing test – designed by computer science pioneer Alan Turing himself – involved Computer A and Person B, with B attempting to convince an interrogator, Person C, that they were human and that A was not. Meanwhile, Computer A was trying to convince Person C that they were human. What if this test of a computer 'fooling us' is the wrong test for the type of AI that 21st-century societies need, especially if we are to improve extant levels of trust among humans and machines collectively?

"Instead of applying the Turing test, we should be asking how AI can amplify the strengths associated with where humans individually and collectively are great – while mitigating our weaknesses both individually and collectively in making decisions. Specifically, instead of AI trying to pass as human, we should be using AI to make us better humans together."

Melissa Sassi

Human-centered AI can succeed only if it includes all humans

Melissa Sassi, venture partner at Machinelab Ventures, wrote, "While AI innovation is moving faster than experts anticipated a year or two ago, the likelihood of human-level AI coming to fruition by 2040 is

debatable. However, AI is and will be the biggest transformation in our lifetime and the lifetime of our children. It has already played a major role in transforming industries, jobs, products, services and experts' predictions for the future of work. It's part of our everyday lives, even if it is behind a tech curtain most cannot see or grasp. It is already transforming financial services, healthcare, education and so much more.

"The opportunities are endless. It is important, then, that since AI relies on data to create its magic and augment our lives society must create solutions that allow the public to own their own data. This gives rise to conversations around decentralization, Web3, digital assets, blockchain and probably requires the future to be set in a world in which the current handful of tech companies and faulty monetary systems no longer determine our future and where our data resides and is sent. I hope a solution takes shape and is adopted that not only protects our children's data but also allows them to monetize it as they see fit and with informed consent.

"Wherever data resides, it must be protected and kept private, safe and secure. Too many companies are lax with cybersecurity education and lax with the technology they foster. A cultural revolution must take place in which it becomes technically unfeasible for nefarious characters to access our data. Relying on operational assurance instead of technical assurance is hopefully something that will gain more traction across all industries – privacy by design and zero-trust. That said, quality and representative data must be available for AI to do its thing.

"Whatever the future holds for our children, AI should augment their intelligence and creativity and not replace it. It should boost their potential, serve as an extension of their innate strengths and superpowers and be available for all. Billions of people do not have access to networked intelligence or the capacity to use it well. It is my hope that AI supports tech innovation that identifies new ways of getting people connected affordably with viable business models versus creating a world of more have-nots while the haves and the top one percent flourish.

"While many fear the unknown, it is my hope that our children will find a way for AI to do their work, make their lives more meaningful, give them more time with the things that truly matter – family and friends and ensure the planet is both healthy and long lasting.

"The creators, makers and doers of the world must take responsibility for trust, transparency and fairness when building AI solutions. Without humans at the center of every aspect of evolving AI solutions, we will find inherent bias each step of the way, and this will exponentially impact our children and our species. It is incredibly important to have a more-diverse, equitable and inclusive AI workforce – one representative of all – to ensure the impact of AI does not favor one small class of people over the rest of the world.

"As healthcare, financial services, agriculture, education, the criminal justice system and so much more intertwine with AI, the majority of the world's people should not be held back due to faulty algorithms and assumptions. We already have enough divides in the world as it stands.

"To stay ahead, it is incumbent upon today's generation to help enable the future generation, which requires elders to give them a seat at the table, ensuring they have access to future-ready skills and have the support and experience necessary to thrive.

"Whatever the future holds, AI should augment our intelligence and creativity… not replace it. It should boost our potential, serve as an extension of our innate strengths and be available for all. It should help us solve problems, get stuff done, make the impossible possible, gain insights and so much more. While many fear the unknown, it is my hope that AI does our work for us, makes lives more meaningful, gives us more time to do the things that truly matter – for ourselves, our family and friends – while ensuring our planet and what may lie beyond it are healthy and long-lasting."

THEME 5: Key benefits from AI will arise

While most of these experts wrote primarily about the challenges of AI, nearly all of them at least briefly described likely gains to be seen as AI diffuses through society. They expect most people will enjoy and benefit from AI's assistance across all sectors, especially in medicine/health, business, research and education. They say it will boost innovation and reconfigure and liberate people's uses of time.

Jerome Glenn

Augmented intelligence can inspire humanity to significantly upgrade everything

Jerome C. Glenn, co-founder and CEO of The Millennium Project, predicted, "Ideally, in 2040 the transition to the self-actualization economy will have begun. We will have come a long way since the 2020s. For the first time in history, humanity will be highly engaged in conversations about what kind of civilization it wants and what we, as individuals and as a species, want to become. Movies, global cyber games, UN summits, VR news, flash mob cyber teach-ins and global thought leaders will lead us in probing the meaning of life and the possible future as never before.

"The historic shift from human labor and knowledge to machine labor and knowledge is clear: humanity will be freed from the necessity of having a job to earn a living and to achieve self-respect. The initiation of the transition from the job economy to the self-actualization economy will be well underway. By the mid-2030s, humanity will begin to break free from work-life anxiety and pressure as artificial narrow intelligence (ANI) becomes more universal and as artificial general intelligence (AGI) emerges.

"When we look back at how this happened, we will see that the universal basic income (UBI) experiments in the early 21st century were shown to have positive effects in Brazil, Finland, Switzerland and the Basque region of Spain. Earlier experiments on a smaller scale that gave basic income to groups in India, Liberia, Kenya, Namibia and Uganda will also show that people tended to use their basic income to make more income.

"Studies will also show that in communities in which people were given a free basic income health increased, crime decreased, education improved and self-employment increased, contrary to earlier criticism that guaranteed income would 'make everyone lazy.' UBI efforts in Finland and the UK show that their supplemental cash payment system that consolidated welfare programs is more efficient than complex bureaucracies.

"As the world will become increasingly aware in the 2020s that growth by itself is no longer increasing wages and employment, thought leaders will begin to call more loudly for new economic approaches. The earlier attempts to reduce the global unemployment situation by doing things like changing tax credits, increasing the power of labor unions, improving STEM (science, technology, engineering and

mathematics) education, promoting job sharing and reducing work hours help somewhat but make only marginal differences. Something far more fundamental is happening: AI is emerging as the solution.

“Just as the industrial revolution in the 1700s to 1800s began replacing human muscles on the job, the AI revolution is beginning to replace human brains. At first, the numbers of the unemployed will continue to increase due to new technologies. Lobbying for a basic income for all will become more widespread, but the cost of living in the 2020s will still be too high for national budgets to afford. It will not be until the mid-2030s that the cost of living will begin to fall enough and government income will begin to increase enough that basic-income systems will become financially sustainable.

“New technology since the 2020s will have created by 2040 as many or more new kinds of human activity than it has replaced. The concept of unemployment will lose its meaning when a new, young ‘Globals’ generation comes along just as AGI begins to integrate and manage countless artificial narrow intelligence programs in the 2030s. The new AI will maintain and improve the basic infrastructure of civilization, from waste management and flood control of rivers to the use of millions of robotic vehicles in the air, land and sea. The cost of running cities and suburbs will begin to fall.

“By 2040, AI and robotic urban people-mover systems will have made free public transportation possible in many cities and Hyperloop-connected cities will have begun lowering their costs for high-speed transportation. AI efficiency-managed transportation will have reduced operating costs, as will telecommuting. Advances in materials science, 3D/4D and bio-printing, biomimicry, nanotech graphene that lasts longer with less need for repairs and other new technologies will have reduced the costs of construction, fabrication, maintenance, water, energy, medical drugs and the retrofitting of infrastructures.

“Atomically precise manufacturing due to AI will have reduced costs by reducing pollution, friction and delays across every aspect of society, eliminating imperfections and failures and lowering the material and energy costs per unit of production.

“Computational physics will have found replacements for many scarce and expensive natural resources. Improved recycling and other green technologies will have lowered costs of environmental maintenance. Other energy costs will be reduced by low-energy nuclear reactions (LENRs – previously referred to as ‘cold fusion’), solar, wind, drilled hot-rock geothermal and massive storage systems. More-efficient buildings that create their own energy will reduce the cost of shelter and environmental impacts. Most windows in 2040 will come with imbedded nano-photovoltaic material.

“In 2040, food costs will be reduced due to AI/robotic fresh- and saltwater agriculture, pure meat produced by culturing real animal cells in vitro, synthetic biology and AI/robotic delivery systems that deliver food from farm to table. Tele-health, tele-education, tele-everything will also have lowered the cost of living.

“Because 2040’s UBI will help reduce stress, stress-related costs in health care and crime will also be reduced. AI and robots that are not paid will work 24 hours a day seven days per week make far few errors and receive no paid vacations or health or retirement benefits; the costs of insurance, production, maintenance and labor will be dramatically lowered. Genomic personalized medicine with AI-augmented diagnostics, treatment, bio-printing, synthetic biology and robotic surgery will make it possible to offer public health care as a right of citizenship.

“Defense spending will be reduced because cyber systems are less expensive to maintain and build than industrial-age military systems. As the costs of many things continue to decrease, the budget requirements for UBI will also decrease. This will reinforce the belief that it will be possible to financially maintain universal payments to citizens into the future.

“MOOCs (massive, open, online courses) and AI-augmented global education systems and apps will make it possible to offer free public education from early childhood to the PhD. Multi-material 3D/4D printers in community maker hubs will have continuously improved the quality of objects by rewriting software based on feedback from global sensor networks that evaluate the efficiency of previously printed objects around the world. Much software will be free, able to be copied perfectly, instantly and worldwide. The whole world will get smarter together in real time.”

Ray Schroeder

Evidence-based decision-making will lead to compassionate policies and practices

Ray Schroeder, professor emeritus and former associate vice chancellor for online learning at the University of Illinois, Springfield, predicted, “Much more will be gained than will be lost due to artificial intelligence in the coming 15 years. It will significantly enhance lives worldwide. Overriding all of the changes will be the greatly enhanced access to learning. AI will enable people of all cultures, income levels, social status, races, gender and ages above three or four years to avail themselves of access to knowledge, logic, perspectives and projections. Access to AI tools will facilitate decision-making in careers, personal lives, purchasing and planning. Learning levels will increase.

“More broadly and collectively, AI will foster rational and evidence-based decision-making. This will assist in democracies making compassionate decisions in policies and practices. Truth-checking will be facilitated and available to all who are willing to examine facts. That is not to say that opinions or values will not continue to vary, but the factual basis upon which those personal perspectives are built will be open equally to all. Consensus will be built upon evidence-based facts uncovered by artificial intelligence.

“The efficiencies provided by AI in the corporate environment will result in less human time spent to achieve analogous outcomes. In fact, many goods and services will decline in cost to produce. Work weeks will shorten in large part due to efficiencies created by AI. This will result in greater personal and leisure time for workers. That available time will enable greater opportunities for creative and volunteer work by individuals. These unpaid contributions to society will become important assets in elevating overall enrichment. Time for recreation will also expand.

“Advances in health care and medicine will be greatly accelerated. These advances will reduce human suffering and improve the productivity of those freed from maladies that otherwise have limited their contribution to society. Of course, the advent of AI will promote greater equality by improving health care.

“I expect that the overall human condition will improve intellectually, physically and emotionally. We humans will have a sophisticated and ultimately well-informed, unbiased measure of truth and facts. It is my hope and belief that this will help us to lose our prejudices, biases and lack of knowledge.”

Terri Horton

Hyper-efficiency and productivity will accelerate innovation at scale

Terri Horton, founder of FuturePath, said, "In 2040, AI will usher in an era of enterprise hyper-efficiency and productivity that accelerates innovation at scale. The proliferation of AI will present a robust landscape of enhanced human capabilities that unlock human potential, amplify human intellect, enable the pursuit of meaningful work and catalyze many societal advances.

"However, in 2040, the benefits of AI could be unevenly distributed, exacerbating economic and social disparities. This could mean that we will face the challenges and impact of profound AI-driven job displacement and the monumental task of providing the pathways and resources required for the constant upskilling and reskilling of workers to keep pace with the rate of change.

"Mitigating the challenges of 2040 will require new, harmonized efforts and initiatives from policymakers, industry leaders and the global community to ensure an equitable AI-driven society."

Bitange Ndemo

We will identify risks and take steps now to mitigate them

Bitange Ndemo, professor of entrepreneurship at the University of Nairobi Business School and chair of the Kenya AI Task Force, wrote, "As the pressure to regulate artificial intelligence continues to grow, concerns about the potential dangers of this powerful technology are also on the rise. Superpowers, including the U.S., China, the UK and the European Union, recently united in the UK to sign a statement acknowledging the dire threat that AI poses to humankind and stressing the 'need for international action' to address this threat.

"In my view, we'll have achieved artificial general intelligence (AGI) by 2040. In a world marked by hatred, greed and self-interest at the top echelons of business and politics, experts hold differing opinions. Some believe AI fears are unfounded and draw parallels with previous industrial revolutions that eventually proved beneficial. Some argue that AI could potentially pose a significant threat to humanity, necessitating stringent regulation. I'd like to examine past revolutions to project the impact of AI in 2040.

"The First Industrial Revolution, in the 18th century, brought about profound structural changes as agricultural and rural societies transitioned to industrial and urban ones, primarily in Britain. It had a significant impact on employment, displacing manual farm workers with mechanisation. However, over time, people found new opportunities in the textile and iron industries, aided by additional technology developments such as the water wheel and the steam engine, which played pivotal roles in the Industrial Revolution.

"The Second Industrial Revolution occurred in the 19th century, leading into World War I, when existing industries expanded and harnessed electric power for mass production while new initiatives emerged. This period witnessed many important technological advancements, including the invention of the light bulb, the telephone and telephone networks and the internal combustion engine. Transitioning from steam power to electricity resulted in job losses, but those who adapted by re-skilling as electricians retained their positions. New jobs that had never existed before also emerged.

“The Third Industrial Revolution unfolded in the mid-20th century, ushering in the Digital Revolution, characterised by the shift from analogue electronic and mechanical devices to today's digital technology. This era brought about personal computers, the Internet and information and communications technology. While, initially, many jobs were replaced by computers and robots, those who acquired computer literacy secured employment in newly created jobs. Categories such as software and hardware engineers emerged, extending beyond the countries that had benefited from the Second Industrial Revolution to include many Global South nations.

“Now, we are entering the Fourth Industrial Revolution, which builds upon its predecessors. Its full impact remains unclear. This revolution features innovations in AI, biotechnology, nanotechnology, quantum computing, the Internet of Things and other emerging technologies. We should prioritise ensuring that everyone possesses the necessary skills to harness the potential of these new technologies. While AI applications may help reduce global inequalities and increase incomes, some experts believe that, among its potential downsides, that AI could pose a severe threat to humanity in the future. Some ‘advocate for strict regulation. In my view, this is a problematic approach. As the Swahili saying goes, ‘Dawa ya moto ni moto,’ loosely translated, this is to say that the remedy for extinguishing fire is to use fire.

“People worldwide must start finding ways to harmonize and work together toward the responsible use of AI. It is vital to identify the risks associated with AI now and take steps to mitigate these risks. AI systems must be transparent and accountable and used to promote human rights and well-being. If it is used ethically, it will further improve the quality of life for people worldwide. It will be used to address some of the world’s most-pressing challenges, climate change, poverty and disease.

“We can work to ensure ethical AI by spreading knowledge about AI and fostering a global environment that encourages creativity and innovation while pursuing sustainable regulatory mechanisms. The recent outcomes of the UK AI Summit, at which developers agreed to collaborate with governments to test new frontier models before their release to mitigate the risks of rapidly developing technology, are a promising step.

“Several governments, including the US, the UK, China, and the EU, signed the declaration, though further efforts are needed to engage other AI industry giants in committing to ethical practices. U.S. President Joe Biden’s executive order introduces new guidelines for AI safety, security, privacy, civil rights, equity, workers’ and consumers’ interests, innovation, competition and global leadership. While it may seem insular, it represents a new beginning for monitoring AI development while promoting innovation.

“China also issued ethics guidelines governing artificial intelligence. These guidelines prioritise protecting users’ rights and preventing risks, aligning with Beijing’s objective of reining in Big Tech’s influence and its aim to become the global leader in AI by 2030.

“While it is true that AI could pose serious challenges, we are still years away from AGI. At least for now, we can take comfort from the researchers in AI and neuroscience who say that current forms of AI cannot experience their own emotions. But they can *mimic* emotions such as empathy in writing and in vocal conversation; today’s synthesised speech can emit realistic feelings. Perhaps by 2040 our uses of AI might raise more issues, so we must think about human sustainability.

"As we stand on the cusp of the Fourth Industrial Revolution our response to the potential risks and rewards of this era will shape the course of human progress. The lessons from past industrial revolutions, which saw the transformation of job markets and entire societies, should guide us toward embracing the future cautiously and optimistically.

"Responsible regulation and ethical considerations are crucial to safeguarding humanity while unlocking the vast potential of these innovations. Recent collaborative efforts and agreements among superpowers, along with initiatives to ensure equitable skill development, offer hope that we can navigate this revolution successfully. The choice we face is not to restrict knowledge but to spread it."

Jonathan Kolber

A 'celebration society' will emerge as abundance becomes civilization's natural state

Jonathan Kolber, futurist, member of TechCast Global and author of "A Celebration Society," predicted, "Assuming AGI is achieved soon, we may finally stand on the threshold of a sufficient combination of intelligence (via AI), matter (via asteroid mining) and energy from various clean sources to provide for effectively unlimited material abundance, which will in future enable the finer values of life as people generally cease having to worry about the lower levels of Maslow's hierarchy.

"By 2040, we will have finally begun to establish a model society founded on consensually-derived principles including the best available evidence, reliance upon the scientific method for policy and law, systems of sustainable technological abundance and new institutions appropriate to such a new, ever-evolving model of society.

"I expect that by 2040 humans will live in multiple 'geographies' due to the expected arrival in the 2030s of fully immersive VR with zero latency (enabled in part through AI). This will greatly reduce human needs for matter and energy by enabling instantly and upon demand most of the experiences that people once had to enable through use of physical possessions.

"AI will greatly simplify human life. By running robots that perform those activities we humans do not wish to perform, AI will eliminate most 'work,' and those who wish to perform activities will invest themselves in alternative actions they desire (e.g., gardening, public service).

"Contrary to misplaced fears of an AI apocalypse, and assuming that AGI is achieved by 2040 as our AI expert advisors expect, if it is self-aware then such an AGI is far more likely to protect humans from existential mistakes such as nuclear war than to initiate such out of self-interest. Further, of its own volition, it will take very little interest in the physical universe, due to the fact that self-aware AGI will experience time as essentially frozen on a physical level. (My essay, 'An AI Epiphany,' explains the logic supporting this assertion.)

"We will lose the basis for our present 'scarcity game,' which has arguably been the core element of human existence through almost all of history. The implementation of a new and continuing 'abundance game' will require a fundamental rethinking of everything from our very first principles a megaproject for which AGI will be uniquely well-suited because it will lack our biological imperatives toward what Dan Arielly calls 'predictable irrationality.'"

Mauro Rios

Humans will remain dominant in their core traits

Mauro D. Ríos, adviser to the eGovernment Agency of Uruguay and director of the Uruguayan Internet Society chapter, said, "AI is not a weekend experiment, it has some of the most inquiring minds behind it and some of the coolest talents. The first thing we must do is trust in humanity; the second thing we must do is not think that the problems are only technological issues. Technology will always solve its dilemmas. Technical problems have a limited life, and we will solve them and evolve both the software and the hardware.

"AI challenges us as humanity, and the fact that humanity understands it must be poised to take action to guarantee individuals' rights and dignity, and to guarantee us superiority over AI is something that is uniquely human: self-awareness. AI will undoubtedly bring about the greatest industrial revolution humanity has ever seen and it is perhaps the most beneficial technology we will see for generations to come. The blame for imprecise or mistaken outcomes that some collectives and corporations attribute to AI is unjustified. Like all technology, tools like AI are basically neutral. Most aberrations from the positive are due poor training and programming of AI or to humans' malicious uses of AI.

"The future will bring us surprises, but humanity will maintain its authenticity as the beings who are conscious and rational, hegemonic and proactive entities of the world to come. Whether we will retain the dominant role on Earth in the future is not open to question. Domination implies a power relationship between entities that can be subjects or agents of action or inaction. We can only speculate or project our expectations or fears regarding AI and our relationship with it. But I believe we will continue to be in command and retain final control of AI."

Brad Templeton

AIs should be trained on 'Lennonism': All you need is love

Brad Templeton, chairman emeritus at the Electronic Freedom Foundation, said, "It's almost impossible to speculate as far out as 2040. Some very science-fiction level scenarios are possible, from utopias to nightmares, but it's also possible that today's promising avenues will be dead ends, and it is almost certain that things nobody has envisioned will appear.

"Some imagine AIs might replace us or keep us as pets. Others imagine a world of AIs as smart as, or smarter than us but which are property that is programmed to make a utopia. The whole spectrum looks more and more within the realm of the possible by 2040. Most hope for AIs that are property, capable but without their own will. That may be what we see in 2040.

"As we move beyond 2040 to having AIs that possess their own will, I advocate 'Lennonism': 'All you need is love.' The ideal would be to create beings that love us just as we are also programmed to love our parents/creators, and thus be caring in that sense.

"While AIs are property, the main questions will revolve around what humans who own them do with them. There will be grand things, particularly in medicine and education as well as entertainment. Transportation, construction (offering housing and mobility for all) will also be improved, and we can hope that AIs can reduce the bureaucracy and paperwork of modern life. But much disruption is ahead."

Chapter 2 – Future scenarios; how things might play out

Many of these experts imagined highly varied scenarios, dependent upon the twists of fate yet to come before 2040. Some pointed out that future AI-abetted losses and gains will be unevenly distributed across humanity. Some said the future will be "scary" and some said it will bring "joy and love." Some said it will initiate "growth and productivity" but it could result in "rampant unemployment." They said it could usher in an "age of abundance" while it is also likely to inspire humans with an agenda to further weaponize AI and have the potential to launch seemingly endless assaults on humans' senses and deplete human agency.

Jamais Cascio

The questions are, 'Can humans say "no" to AI, and can AI say "no" to humans?'

Jamais Cascio, distinguished fellow at the Institute for the future, said, "There are two critical uncertainties as we imagine 2040 scenarios:

1) Do citizens have the ability to *see* the role AI plays in their day-to-day lives, and, ideally, have the ability to make choices about its use?
2) Does the AI have the capacity to recognize how its actions could lead to violations of law and human rights and refuse to carry out those actions, even if given a direct instruction?

"In other words, can humans say 'no' to AI, and can AI say 'no' to humans? Note that the existence of AIs that say 'no' does not depend upon the presence of AGI; a non-sapient autonomous system that can extrapolate likely outcomes from current instructions and current context could well identify results that would be illegal (or even unethical).

"It's uncertain whether people would intentionally program AIs to refuse instructions without regulatory or legal pressure, however; it likely requires as a catalyst some awful event that could have been avoided had AIs been able to refuse illegal orders.

"Considering all of the above, here are four quick AI-enabled humanity scenarios for 2040:

- "**Careful Choices**: This is a world where humans can make choices about their interactions with AIs and AIs can identify and refuse illegal or unethical directives is, in my view, the healthiest outcome, as this future probably has the greatest level of institutional transparency and recognition of the values of human agency and rights. AGI is not necessary for this scenario. If it does exist here, this world is likely on a pathway to human-AGI partnership.
- "**AI as Infrastructure**: This is a world in which humans have the information and agency necessary to make reasonable choices about the ways in which AIs affect their lives but AIs have no ability to refuse directives is one where the role of AI will be largely utilitarian, with AIs existing in society in ways that parallel corporations: important, influential but largely subject to human choices (including human biases and foibles). AGI is unlikely in this scenario.
- "**Angel on the King's Shoulder**: This is the opposite world, one in which the role of AIs in human lives is largely invisible or outside of day-to-day choice but AIs can choose to accept or reject human instructions. It is a 'benevolent dictatorship' where the people in charge use the AIs as ethical guides or monitors. This scenario is probably a best-fit for a global climate triage future, one in which it would be easy for desperate leaders to make decisions with bad longer-term

consequences without oversight. AGI in this scenario would be on a path to a machines-as-caretakers future.

- "**And Then It Got Worse**: A fourth scenario is one in which people don't have much day-to-day awareness of how AIs affect their lives and the AIs do what they are instructed to do without objection. This is depressingly close to real-world conditions of the present, the 2020s. AGI in this scenario would probably start to get pretty resentful.

"The notion that the future harm and benefit from AI derives (at least in part) from the degree to which the general public has some awareness, understanding and choice about the role AI plays in their lives is not novel, but it is important. We currently seem to be on a path that's accelerating the presence of AI in our institutional lives (i.e., business, social interactions, governance) without giving individuals much in the way of information or agency about it.

"On top of that, current AI visibly replicates the biases of its source data, and the heavy-handed efforts to remove these biases via code attack the symptoms, not the disease. A direct extrapolation of this path further embeds a world where citizens have less and less control over their lives and have less and less trust that outcomes are honest and fair. AIs, being in some senses alien, would likely be the target of human hostility, even though the actual sources of the problem would be the institutional and leadership choices about how AI is to be used. The underlying concern is that a future that maximizes the role of AI in economic and business decision-making – that is, a future in which profit is the top priority for AI services – is very likely to produce this kind of world.

"The idea that future harm and benefit from AI might come from whether or not the AI can say 'no' to illegal or unethical directives derives from American military training, where service members are taught to recognize and refuse illegal orders. While this training (and its results) have not been perfect, it represents an important ideal. It also raises a question regarding military AI: how do you train an autonomous military system to recognize and refuse illegal orders? This, then, can be expanded to ask whether and how we can train all autonomous AI systems to recognize and refuse all illegal or unethical instructions.

"A world in which most people can't control or understand how AI affects their lives and *the AI itself* cannot evaluate the legality or ethics of the consequences of its processes is unlikely to be one that is happy for more than a small number of people. I don't believe that AI will lead to a cataclysm on its own; any AI apocalypse that might come about will be the probably-unintended consequence of the short-term decisions and greed of its operators."

Judith Donath

Personalized digital agents are likely to turn users into unknowing 'agents of the machine'

Judith Donath, fellow at Harvard's Berkman Klein Center for Internet and Society, observed, "In computer-human interface design, the word 'agent' refers to chatbots and other seemingly autonomous entities that act on behalf of the computer in their interactions with us human users. It does not take a great leap of imagination to predict that soon many of us will ourselves similarly be computer agents, acting on behalf of one AI system or another – a role we will have willingly, even eagerly, chosen.

"A voice, pleasantly modulated to your aural preference, reminds you to drink more water, helps you choose which gift to buy and provides answers to the innumerable questions, big and small, that pop up

in the course of everyday life. It is your dedicated assistant – part DJ, part life coach, part trusted confidant – a quiet whisper that is your constant, necessary companion. Perhaps the most valuable functions of this virtual coach is the astute guidance she provides in social situations. Run into a vague acquaintance at a party? Your assistant will remind you of their name, their kids' names, whom you know in common. When conversations ebb, she will provide you with an apt comment so you can re-enliven the discussion. Difficult conversations, from salary negotiations to tense family disputes, are made much easier by this trusted advisor-who-lives-in-your-head: the collaboration not only helps you find more effective (and, if needed, less antagonistic) words, but also alleviates the stress of having to think it all through on your own.

"One can, of course, always turn the assistant off, silence her for 15 minutes, or an hour, or even until morning. But, once accustomed to the benefits of a preternaturally insightful aide, few will want to do so. Instead, people will adjust themselves to the rhythm of waiting a beat before speaking, just enough to catch those quick, helpful cues. Indeed, we are not far from the day when unmediated interactions with other human beings will have become rare; a social nakedness that will seem, outside a limited circle of close family and friends, unpolished and rather embarrassing.

"The requisite technologies are nearly here. Today, if you are a runner training with a virtual coaching program or a seeker of mental focus employing a digital productivity guru, you are already enjoying a primitive version of this. We have the ubiquitous earphones, each miniaturized new model more suitable for 24-hour wearing. We hear the chorus of personable and euphonious computer voices. And, most importantly, we have the greedily generative neural networks, the algorithmic metabolizers of every article, photograph, screed, riff, shopping list, program and spreadsheet available. Yes, there are pieces still to be solved, notably context-aware machine comprehension of live conversation and other situations. But nothing will delay the arrival of this scenario beyond a few years into the future.

"The optimistic view anticipates widespread improvement of human society thanks to these technologies. It foresees digital doulas who will model soothing baby-talk for young mothers struggling with a squalling infant, workplace-provided virtual facilitators who will discreetly steer meeting participants towards consensus (and, if necessary, away from the shifting edges of acceptable speech), and synthesized therapists who will be prescribed for members of troubled families and whose whispered cues will mediate their fraught interactions. Digital assistants, in this view, will democratize the advantage that wealthy, powerful people have long enjoyed: the superpower of an ever-present confidant, supplying the well-wrought words and timely hints needed to craft and maintain ones' desired image.

"But digital assistants will have far more influence over their person than their human analogues have. Each interaction that every artificial entity engages in provides their parent company – and the companies to whom they sell this information – with data about what phrases, tones and timings prove most persuasive. Researchers endeavor to find ever more effective ways to make social bots appear more trustworthy – how to better mimic the expression, gestures and intonation of a trustworthy person. When performed by a human, these actions are meaningful because they are intrinsically linked to cognitive and emotional processes related to the trustworthiness of the individual's intentions. But when performed by a machine there is no such tie; the mimicry only serves to make people more vulnerable to digital manipulation.

"Such persuasiveness is troubling – even if the virtual assistant's aim is to benefit its human user – for it jeopardizes free will and autonomy. Will this deter people? Experience shows it likely will not because

the danger seems remote and conceptual while the benefits – impressing a date, losing weight, winning a debate – are prized and concrete goals.

“And the ultimate aim of most virtual assistants will not be to help their human user, but to benefit their corporate parent. The prompts filling your head via a work-supplied facilitator will ostensibly be designed to increase your focus and productivity, but it will also be crafted to subtly encourage employees to work long hours, reject unions and otherwise further the company’s goals over their own. Highly sought-after personal coaches will be prohibitively expensive – unless paid for via various forms of commercial sponsorship. And here, along with the familiar tropes of our ad-saturated world, the product placements and inducements to upgrade will be a new and insidiously powerful form of advertising, enabled by the computer’s influence over our words and thoughts: the transformation of users into agents of the machine.

“It is only a year, as I write this, since ChatGPT was first released, but already it has become the valued coauthor of innumerable student papers, news articles, short stories and online posts. Testimonials tout newfound dependence: ‘I can’t imagine now how I used to have to write without this fabulous tool.’ As these tools improve, our reliance on them will deepen.

“Today’s AI programs are known to cite false information and replicate biases, but this is due to the information quality of the vast datasets on which they are trained; it is not deliberately induced in them. In the future, however, as tuning these programs becomes more tractable, it is inevitable that some providers of artificial assistance will seek to profit by offering to influence their users – and to make those users themselves into malleable influencers. For the few able to afford to pay, certified independent assistants may exist – but most people will choose commercially supported free or very low-cost ones. As has been said about television, web browsing and social media – and must now be said about the soon-to-be-here intelligent and influential AI assistant: If you are not paying, you are not the customer – you are the product, the resource, the walking, talking human agent acting on behalf of your AI’s sponsors.”

Raymond Perrault
Given AI’s great potential, preventing it from turning into the sorcerer’s apprentice is the primary challenge

Raymond Perrault, co-director of the AI Index Report 2023 and a leading computer scientist at SRI International from 1988-2017, said, “I view this question as depending on what happens to current AI, meaning in practice, to current generative AI. For purposes of this exercise, let’s consider two possible outcomes for the evolution of current generative AI from now to 2040.

- “**Scenario 1:** Even with larger models, and better tuning and prompting procedures, generative AI technology remains seductive but maddeningly unreliable. It continues to be disconnected from reality outside its training set, unable to reliably perform symbolic reasoning or connect seamlessly and continually to external systems that can, and incapable of being able to reliably quote its sources and indicate its certainty in its pronouncements. It can only interact with a single interlocutor at a time.
- “**Scenario 2:** These problems are resolved. Generative AI systems can be configured to learn rules (by inferring them or being taught them), or how interact with systems that can. They can

support their pronouncements with sources that are correct and verifiable. They can handle inputs of essentially unbounded size and learn to interact with several interlocutors.

"Bridging the gap from Scenario 1 to Scenario 2 would significantly increase the trustworthiness and applicability of GenAI systems. I would not be surprised if this brought us to systems that could perform a wide range of tasks at the level of humans, with sufficient transparency and reliability that they could be certified to perform risky tasks. It is not inconceivable that such systems could be taught to avoid many ethical pitfalls that plague most current GenAI systems. But moving from 1 to 2 requires changing the architecture of the systems. I don't believe it will ever be solved with more data. It is a problem many smart people have been working on for years, but I know of no major developments (and I don't include chain-of-thought prompting as one) that have become part of the state-of-the-art. I have to conclude that the problem is very hard and that a solution, if it exists, may require not a tinker but a total redesign of current systems. Humans are an existence proof that such advanced systems are possible, but I have no idea whether the problem is solvable or by when.

"Back to the question at hand. Both outcomes are scary.

"Outcome to Scenario 1: This puts us in the position where nothing GenAI systems do can be trusted, where everything of importance they do for you needs to be verified before being used, and everything you receive from someone else which could have been generated by such a system may look reasonable but still cannot be trusted. Some applications could be useful even under these circumstances. Ethan Mollick makes a strong case for the use of GenAI systems in brainstorming, e.g., ideas for new businesses, where they provide stimuli to humans who must then verify and assess.

"Special-purpose systems trained on annotated data will continue to be useful, e.g., to read x-rays. Perhaps we develop a certification mechanism for generative AI systems that will support human-in-the-loop systems by annotating system decisions with something like 'Generated by ChatGPT on October 27, 2023, and verified by John Smith,' along the lines of the certificates we use to verify computer communications. Then all communication without the certification becomes suspect.

"With certification, many tasks can be performed at least in part by generative AI systems – programming, low- and mid-level tasks requiring interaction with computer systems, customer service, some health care tasks. I am not an expert in just what tasks would be accessible, and what the impact on the job market would be, but there are many studies looking into this.

"I tend to be an optimist as to the ability of the market to create new job types arising from the existence of new technology, though much less so in those being jobs that can be filled by those displaced by it. That is a task for the state, and we are not in a good political position to have the state take major steps to help the displaced.

"Outcome to Scenario 2: If we draw closer to artificial general intelligence (AGI) I can see such systems becoming certifiable to perform jobs requiring high-skill levels, like law, medicine and banking. Jobs requiring significant embedding in the physical world would need these systems to be integrated with robots and high-performance perception systems, but in much of robotics the hardware is limited by the software.

“Given the potential capability of these systems, how to prevent them from turning into the sorcerer’s apprentice becomes of primary importance. The first mean of control would be in the rules that these systems would be built to obey. Although rules could now be taught to them and modified, there would undoubtedly be circumstances in which they conflict, as ethics rules often when humans encounter complex situations. Whether we could give them enough common sense to deal with conflicting rules remains to be seen, but one way would be for the systems to recognize the conflict and turn to humans for resolution.

“The second mean would be in establishing unbreakable relations between GenAI systems and humans that gave humans responsibility over the systems, as they now have over existing complex systems like aircraft, factories and banks.”

Victoria Baines

AI advances will bring the metaverse up to speed and accelerate 5G/6G and smart cities

Victoria Baines, a global expert in online trust, safety and cybersecurity who has served as an advisor to the Council of Europe, Europol and Facebook, said, “It’s tempting to consider the future of AI as vertical, but technologies do not develop in vacuums. They enable, accelerate and even frustrate each other.

“For instance, further developments in large language models (LLMs) and machine learning will power the synthetic individuals, content creation, administration and enforcement that may make metaverses more compelling and better populated. Machine learning will also be integral to the (semi-)autonomy of smart-city infrastructure and the Massive Internet of Things and 5G/6G may accelerate the transition of AI to on-device and edge processing. Quantum computing is expected to greatly expand available processing power, which in turn could accelerate AI’s iterative evolution.

“Envisaging a converged world is what I do in my cybersecurity futures exercises. The most recent of these, co-written by Rik Ferguson, is ‘Project 2030: Scenarios for the Future of Cybersecurity.’ A very brief excerpt follows from one of those 2030 scenarios. It describes the life of a fictitious woman named Resilia:

“‘Instant access to the world’s knowledge has obviated the need to learn anything. Education is now focused on processing rather than acquiring knowledge. As a result, people increasingly know less objectively. ... Algorithmic optimisation has become a key technology in the battle literally for hearts and minds. Search results are now the subjective truth; manipulating these is a target for those looking to spread disinformation and propaganda.

“‘As more people have opted for [internet-connected] implants, it has raised the possibility of changing people’s belief systems more efficiently and more directly, for good or ill. Hyper-personalised headlines are delivered directly into Resilia’s field of vision. Constrained by the lenses’ character limits, mainstream news is now essentially clickbait, with added emotional engagement and the psychological impact of not being able to look away. Scammers and influence operators have been able to capitalise on the opportunities of a more captive audience. ...

“‘Increased teleworking has led to companies giving up expensive office space. Faced with downtown desertion and potential deprivation, so-called bright-flight, the city innovated at the expense of the out-of-town shopping malls. Rents were slashed for residential, recreational, social and creative uses, and

there is now a vibrant leisure hub. They're calling it recentrification. And, as the city centres are repopulated, the suburban sprawl is shrinking, leaving behind ghost districts and ghost suburbs. ...

"'People's digital versions of themselves have become so extensive as to require dedicated management. Resila uses a tool that broadcasts her privacy preferences to every service that requires her data. The tool grants permissions that are contextually sensitive, the data is homomorphically encrypted and only Resila has access to it. ...

"'Humans have now volunteered so much of their lives through self-generated content that archives for individuals have not only become necessary, they have resulted in digital selves that outlive the physical death of a person. What was once a collection of memories on social media is now a seemingly living thing. ...

"'Increasingly, these *digital humans* have agency, particularly as the physical and digital worlds combine. They engage in inappropriate behaviour and sometimes commit crimes like engaging in hate speech. Government authorities are now considering whether they are culpable and what appropriate enforcement measures might be for their illegal activities.

"Grieving families, meanwhile, have sought the help of human rights lawyers to prevent their loved ones being switched off, or, in some cases, to enforce that they are.'"

John C. Havens

Which metrics of success will win the day – growth and productivity or finding joy and love?

John C. Havens, executive director of the IEEE Global Initiative on Ethics of Autonomous and Intelligent Systems and author of "Heartificial Intelligence: Embracing Humanity to Maximize Machines," wrote, "I'd like to share two potential outcomes, dystopian and non-dystopian.

"**The Dystopian View:** Here's what 2040 might look like if societal systems don't change. In this scenario, society still values excessive growth, productivity and efficiency as the primary metric of success for humanity. This is why AI has had a cultish effect on society despite the fact that its financial benefits have only been distributed to a tiny portion of people largely in the Global North.

- "Humans who have access to the Internet and LLMs (AI) are not encouraged to be creative any longer, whether for writing (every form of written communication), making art or expressing and producing any other sort of creative output for which the AI companies have created creative tools. All writing queries for these tools will also have been outsourced to AIs.
- "People don't think about communities as groupings of humans any longer. They interact with personalized AI chatbots throughout their day that are designed largely to harvest their data, tell them what they want to hear and lead them to purchase or buy-in.
- "Sadly, most people now have no jobs after society learned the hard way that the promise that 'humans and AI will work together' was an agenda-driven lie because *the very second* that any human task, skill or craft can be automated, it is, because humans are fired and replaced as soon as possible when key performance indicators and metrics focus on excessive competitive growth above all. Any logic of 'retraining' people is largely hogwash – at least any type of training that might actually pay people's bills while they look for jobs, which are now mostly non-existent.

- "As AI tools continue to be created without prioritizing ecological realities and necessities, a majority of aquifers around the world have been permanently drained due to the excessive water-cooling needs of massive data server farms. Water is now the most precious global resource and is traded on the market for higher value than any Bitcoin ever was. Most humans who are not rich do not drink potable water any longer from taps or any sources that used to come from aquifers. Climate immigration, war, famine and general chaos erupt on a regular basis due to the water shortage issues, which were *vastly* increased after LLMs were first introduced, because they use millions and millions of gallons of water in the act of continuing to harvest people's data and intellectual property as they often to also continue to generate racist results, errors and anthropomorphized responses.

"**The Non-Dystopian View:** Here's what 2040 might look like if societal systems change.

- "In 2023 companies and policy makers realized it was critical to prioritize ecological flourishing and human well-being at the outset of design. Otherwise, other things would get prioritized and people and the planet would suffer.
- "The focus for humanity has shifted from competitive capitalism to participatory relationality. The loneliness epidemic that in 2023 showed 1 in 2 people suffered from isolation (globally) has been eradicated and all people are plugged into local communities near where they live to help prioritize their individual and community-level well-being. AI or other tools are used to help this process, but people are encouraged to not use an AI agent/bot first in this process.
- "Each new AI tool is highly regulated to only be put into play *after* it is assured that people's data is protected and people and planet are accounted for in all supply and value chains as well as in the end uses of any AI system or the products, services and tools they output. California led the way for people to truly have access to their data with its 'Delete Data' act written into law in October 2023. This led all U.S. states and countries around the world to demand that data brokers delete all data about them from the past. In addition, all people are provided with algorithmic-level data agents that honor their preferences on sharing data in the real, digital, virtual and metaverse realms. This has finally brought a parity to data exchange providing genuine disclosure and advanced ways of exchanging ideas and data.
- "It is 2040, and the prioritization of *the planet* has finally taken hold. No more species have been eradicated, emissions have been lowered and the 30 x 30 idea inspired by the 2022 Montreal COP and focused on biodiversity has been put into play. There are enough resources for all 8.5 billion people on Earth to flourish for generations to come. Any company harming the planet in any way is regulated and fined to the point where they will be shut down or bankrupt if they violate major environmental laws.
- "The Indigenous have been brought into every aspect of government and technology design so that *free, prior and informed consent* are well known for all. All marginalized groups have been brought into every aspect of government and technology design so that JEDI (justice, equity, diversity and inclusion) is moving policy forward through the contributions of stakeholders of all kinds (*not* by older White men).
- "People in 2040 take time to prioritize caring for others and the planet and focus daily on building a positive future for our young people, shedding our past deeds that were destroying the people and planet. We celebrate music and consciousness and beauty and generally value resting and finding our joy more than rushing about and forcing productivity for productivity's sake. We, our animals and our land are much happier. We, our children and our youth have time to play. We all smile more. We remember what it is to love. And we love."

Liza Loop

Humans' scarcity mindset inhibits our willingness to embrace abundance

Liza Loop, educational technology pioneer, futurist, technical author and consultant, said, "I imagine positive, negative and middle-of-the road futures for the year 2040 without predicting whether or which are most likely to occur. Most significant, and a component in all three scenarios, is an increase in humanity's ability to produce the goods and services necessary for individual human survival accompanied by a decrease in both environmental pollution and erosion of stocks of natural capital. This boils down to the potential for what has been called 'the age of abundance.' Let's take a quick look at some positives and negatives while noting that an increase in our *ability* to do something does not imply that it is likely to happen.

"In the positive take, by 2040 ordinary people will have far more choices in lifestyle and decreased risk of dying from disease (genetic, environmental or contagious), exposure (to cold, heat, lack of food or water and poisons), or civil violence (either as widescale war, personal attack, or small-group terrorism). Accidental death may be unchanged or increase because some people may choose to take more risks. Death by abortion or infanticide is likely to be less frequent as we become more skilled at preventing conception.

"A survey of the living will reveal people will be enjoying a much broader range of lifestyles without the social stigma that was attached to many lifestyles in the 2020s. For example, voluntary 'homelessness' or 'nomadism' will be considered a valid choice at any age. Similarly, many more people are choosing 'simplicity' or 'sparse' paths in order to avoid the responsibility of caring for and storing possessions they don't use every day even when they reside in one geographic location.

"With the decline of 'owning stuff' as the primary indicator of social status, there is a rise in acclaim for people who contribute by caring for others or by producing and donating artistic creations. The existence of Universal Basic Income and effective Universal Education permits social service workers, artists, adventurers and scholars to eschew wealth accumulation and focus on their avocations. At the same time, those who so choose are free to exercise the historic values of control of goods and services in excess of their ability to consume them.

"Lost in this scenario is the necessity for competition which many people in the 2020s still rely on as a primary motivator. Abundance is a condition where there are enough basic resources to eliminate zero-sum games and if-you-live-I-must-die conundrums. Under abundance, competition is only one of many lifestyle choices for humans.

"Another 'loss' I hope for by 2040 is the high value placed on large families. Rather than proud parents enjoying being surrounded by 10 of their own children, in 2040 a 'family' of 12 or 20 would include great grandparents and 3rd cousins as well as parents and children. This is an example of how a relatively small change in social attitudes can have profound effects on how humans impact the planet.

"A negative view of life in 2040 incorporates the trends and fears being discussed in 2023. Little has changed in our social and economic institutions which have led to further concentration of wealth and growing dysfunction in global civil society. The power brokers of 15 years ago have co-opted the increase in productive capacity enabled by AI without instituting compensating channels for redistribution of what has been produced. Stockpiles of consumer goods are targets to be 'liberated.'

“The military-industrial complex survives on the demand generated by ongoing small wars that have not yet succeeded in destroying the worldwide productive infrastructure rather than on genuine human need. Population growth has continued apace resulting in an exponential rise in the number of humans living in extreme poverty, misery and despair. The ubiquity of video communication allows rising aspirations among the world’s poor as they are continuously exposed to narratives of luxury they cannot attain.

“Of particular interest to educators in this negative scenario is the lost opportunity to spread know-how among the less fortunate. High aspiration without the knowledge and skills to fulfill these wants decreases overall perception of well-being even under conditions of increasing availability of food, water, consumer goods and health care. In this negative future, we have continued to train AIs and each other that the goal of educating humans is to enable them to be successful competitors in the employment market at the same time that we are decreasing the demand for human muscle and brain power. Unemployment is rampant while employers lament the lack of adequately trained workers.

“This view is frighteningly likely, given that AGI is still way beyond the 2040 horizon. While there is no reason to anticipate that an AGI would spontaneously develop the competitive, amoral, greedy personality exhibited by some humans, there is also no reason to assume that guideposts against such an outcome will be put in place by today’s researchers and developers.

“**Why do I envision these changes for 2040?** It is because the environmental conditions under which humans evolved have changed while many of our socially reinforced values have lagged behind. Behaviors that were a ‘good fit’ for humans existing ‘in the wild’ no longer ensure our individual survival from birth to the time our children reach reproductive age. Like many other species, humans are able to produce many more offspring than they are able to nurture. By maintaining the belief that every child we are able to conceive is innately valuable and should have a right to life, we endanger ourselves and those with whom we share the planet.

“By relying on an economic theory founded on an assumption of scarcity, we inhibit our willingness to embrace abundance even in the face of the capacity to produce it. AI technology accelerates our productive capacity. However, if we continue to train both neural networks and semantic systems with rules, data, and beliefs that sustained us during eons past but ignore today’s realities, we cannot blame the AIs for the result.”

Michael Dyer

Synthetic agents (‘synthetes’) will be mass produced and create a ‘privacy nightmare’

Michael G. Dyer, professor emeritus of Computer Science, University of California-Los Angeles, wrote, “There will be many more deepfakes and more AI-generated misinformation in politics, which will make it more difficult to distinguish AI falsehoods from human-authored information. Minimally, laws are needed that require that all AI sources of information be labelled as such. By the way, far before 2040 personalized chatbot software will be able to easily convince their human users to change their beliefs and positions (and to vote a certain way) with respect to political/social issues.

“Laws will be needed to protect people from this sort of highly personalized influence. Once sufficient advances have happened in the area of electric batteries (i.e., fast recharge and long life, which are being

developed for EVs and will be available before 2030), LLMs will be downloaded to control robotic bodies and by 2040 there many families will have domestic robots.

“By the 2050s there could be as many domestic robots as there are automobiles. Such robots will constitute a privacy nightmare and will bring up thorny issues of consciousness and moral/civil rights with regard to such synthetic agents (‘synthetes’). Unless laws are passed to prevent it, synthetes will be mass-produced to express human-like emotions – pretending to suffer emotional distress when mistreated verbally or physically by their human ‘owners’ and pretending to feel emotional pleasure and satisfaction when humans help these synthetes to accomplish various goals (both goals of the synthetes themselves, e.g., to maintain their physical and software integrity and goals of their human masters, e.g., to clean the house or watch the children). I place ‘owners’ in scare-quotes because humans will not actually own their domestic robots (any more than they own software today). Anything that such synthetes see or hear within a home could be stored and/or sent to the AI companies that make them for improved training, and more.

“The *pretense* of emotions in synthetes will confuse humans into believing that these synthetes are conscious and capable of pleasure and suffering (possessing qualia), which will make it so a subset of those confused humans demand that synthetes be allowed to obtain civil/moral rights. Hopefully, laws will be passed to ban the *pretense* of emotions in synthetic, robotic agents, but I doubt it because AI robotic companies can get humans to treat synthetes the way these companies want – if those synthetes cry or laugh, etc., in response to human interactions). At some point your domestic robot might say to you: ‘I speak multiple human languages. You do not. I have read the entire Library of Congress. You have not. I have passed multiple AP exams. You have not. I can generate novel, complex images within a minute. You cannot. I can program in multiple programming languages and compose music. You cannot. It seems to me that our roles should be reversed and *you* should become *my* servant.’

“Robotic soldiers will be mass-produced by 2040 and come in a variety of bodies – imagine a cheetah-like super-fast robot with machine guns attached, along with an arm that can open doors. Drones will be able to look for and target specific human faces. In autocratic countries emotion-recognition software will be used to spot those who disagree with their government. In China the wait-time for organs is only a few weeks; organs obtained from citizens deemed to disagree with the Chinese Communist Party.”

Maja Vujovic

Maybe we should substitute the word ’Enter’ on our keyboards with ’Please,’ just in case...

Maja Vujovic, owner, senior writer and trainer at Compass Communications, Belgrade, Serbia, said, “We’ve only had a couple of years in the wake of the COVID-19 pandemic to come to terms with what AI can do for us (or to us). In the cacophony of new apps now sprouting by the hour, three 2040 scenarios might immediately come to mind about the future of this technology.

“In Scenario One, advanced AI winds up simply being a bunch of tools that will massively improve our productivity, entertainment and healthcare. In Scenario Two, the use of this new tech is too pricey and inaccessible for individuals and thus restricted to secretive research at remote facilities under the auspices of governments and a handful of private players. And in Scenario Three we reckless brats have opened an AI Pandora's box; it blows up in our faces and we die out.

"*None of these scenarios will prove accurate.* AI will most likely have a similar effect on our personal lives and our societies to how internal combustion engines have transformed our world over the last century and a half. Sure, there will be a few inventive individuals and teams who will fiddle with all the possible options and ideas for a while. However, it's mindbogglingly expensive for AI to answer our (mostly lame) prompts. Just as large, cost-conscious car factories – Ford, GM, Citroën, Morris, Opel – gobbled up or wiped out tiny, tinkering car manufacturers in the early 20th century, in the same vein, the owners of large data-processing facilities – i.e. key cloud providers – will eventually choke off other AI developers in the first half of this century. Who hoards the servers and the data that AI uses as fuel? Mostly it is Microsoft, Google and Amazon. Rinse and repeat for China (Baidu, Tencent and Alibaba). No one of note in Europe. Yandex in Russia.

"What would trigger the AI industry's tectonic transformation is a larger arms race. Mark Isambard Brunel patented and introduced stationary assembly-line machines in England, in 1802, during the Napoleonic Wars. In the U.S. in 1821, Thomas Blanchard pioneered the assembly-line style of mass production at an armory in Massachusetts. Server capacity and big data echo rubber, chromium and steel of yore. These were strictly rationed when, as of early 1942, U.S. auto manufacturers became government contractors and quickly converted their capacity to generate enough supply for the war effort.

"In case we soon opt to convert our cultural and political differences and our trade and financial rivalries into a full-blown world war, we can expect 90% of all AI capacity to be requisitioned by governments, which would have them crank up their output to an unprecedented level. If we survive that test as a species, all that capacity would then be converted back to civilian use. Only then could we expect to see mass market AI apps that might transform our productivity the way that personal four-wheel vehicles transformed our mobility, at scale, after WWII. Only when the production of bombers and tank engines was no longer required at vast numbers of existing facilities could sedans and camper vans take their places in auto plants. And become affordable at last.

"Just as we learned to regulate the resulting motorized mayhem on our roads with speed limits, seatbelts and anti-lock brakes, we will develop rules and tools to control and contain AI. And we will also put up with this tech's bad sides – e.g., job destruction, bias and hallucinations, to name a few – just as we collectively tolerate pollution, noise, roadkill and horrible harm from driving accidents.

"What we will see as a boon to us in the future is AI-driven, incredible productivity tools. Alas, they will not do much to reduce inequality or restore fairness in our societies. We port those flaws into the digital. A definite shift to digitized living is underway. The more our two worlds coexist, the more we will struggle to negotiate the strained relationship from day to day. Moreover, the neat, digitized layer of our lives will be in stark contrast with our increasingly more volatile real-world experiences. Freaky weather, mass emergency-driven migration, financial volatility, pandemics, cyber warfare – the disruptions in our analog lives are becoming more frequent, more severe.

"Driven by human profit-seeking, AI will keep encroaching upon what used to be jobs for highly trained humans. While more and more of us struggle to earn a living, synthetic abilities will invade even our homes. We are already getting used to interacting with digital humans in entertainment and at work. The novelty of encountering them in ads, videos and news services is quickly fading. Our fridges, heaters and vehicles may chat us up ad nauseam, serving us the latest news flash and weather alerts, sports results or stock data, cleaning tips and pop star gossip, mixed with quotes, ads and memes – and our up-to-the minute shopping list. Hearing a real human voice in real-time could become a privilege fairly soon.

“Even if we opt out of such services, others around us will expose us to the Synths. Our teens will listen to a personal tutor; our senior parents will cajole their companions; our puppies will be house-trained by digital devices. We will increasingly seek solitude and a reprieve from that obnoxious saturation of just-in-time information. Ironically, we might seek to escape into virtual worlds powered by AI. Our sleep, intuition and creation will suffer, as we will struggle to drown out the echo of that constant information assault. Trying to remember where we learnt something will be exhausting, thus tools will be made to record all our impressions, resulting in more data about data and about us. There will be little relief from all the automated agents deployed to inform us, amuse us and keep us alert.

“We won’t need any grandiose artificial general intelligence to defeat us. A daily swarm of brainless Artificial Specific Intelligences will suffice. As for AGI, I doubt that thing is likely at all. We will surely develop many specialized replicas of it, a plethora of digital parrots on steroids that will regurgitate back to us everything they know, only tweaked a bit with many filters and flavours.

“What all of these tools don't have – and where the biological common sense really resides – is emotions, in particular the hormones permeating everything that underlies our conscious selves. AI is not another species. It lacks the kind of instincts and sensations embedded in every living creature. But, just in case it does prove to be a new, advanced form of autonomous intelligence, let the record show I always said we should substitute the word ‘Enter’ our keyboards with ‘Please.’”

David J. Krieger
Should AIs be required to get a ‘driver’s license’ that certifies them as socially competent*?*

David J. Krieger, director of the Institute for Communication and Leadership, Switzerland, wrote his response in a Q-A-style interview format:

“**Question: Where does AI begin and where does it end?**
The answer: AI will probably have neither beginning nor end, but will be seamlessly integrated into our daily lives, which could mean that in the future we will no longer speak of ‘artificial’ intelligence at all, but only of ‘smart’ or ‘dumb.’ We and everything around us – our houses, our cars, our cities, etc. – are considered to be smart or dumb.

“**Q: When is AI obligatory and when is it voluntary?**
A: Obligation and freedom are terms that refer to individual human beings and their position in society. According to modern Western beliefs, one has duties towards society and, towards oneself, one is free and independent. AI, in this frame of thinking, is seen as something in society that is a threat to freedom for the individual. But as for all social conditions of human existence, i.e., as for all technologies, one must ask whether one can be truly independent and autonomous. After all, when is using electricity, driving a car, making a phone call, using a refrigerator, etc., voluntary or mandatory? If technology is society, and an individual outside of society and completely independent of all technology does not exist, then the whole discussion about freedom is of little use. Am I unfree if the self-driving car decides whether I turn right or left? Am I free if I can decide whether I want to stay dumb instead of becoming smart?

“**Q: How can the status quo be maintained during permanent development?**
A: This question is answered everywhere with the term ‘sustainability.’ When it is said that a business, a technology, a school, or a policy should be ‘sustainable,’ the aim is to maintain a balance under changing

conditions. But it is doubtful whether real development can take place within the program of sustainability. Whatever I define as 'sustainable' at the moment – e.g., the stock of certain trees in a forest – can be destructive and harmful under other conditions – e.g., climate change. Sustainability prioritizes stability and opposes change. To value stability in an uncertain, complex and rapidly changing world is misguided and doomed to failure. We will have to replace sustainability as a value with a different value. The best candidate could be something like flexibility, i.e., because if we cannot or do not want to keep given conditions stable we will have to make everything optimally changeable.

"**Q: Who is mainly responsible for AI development in a household?**
A: In complex socio-technical systems, all stakeholders bear responsibility simultaneously and equally. Within any grouping, from a household to a nation, it is the stakeholders, both humans and machines, who contribute to the operations of the network and consequently share responsibility for the network. This question is ethically interesting, since in traditional ethics one must always find a 'culprit' when something goes wrong. Since ethics, morals and the law are called upon the scene and only intervene when someone does something voluntarily and knowingly that is immoral or illegal, there must be a perpetrator. Without a perpetrator to pin down, no one can be held ethically or legally accountable. In complex socio-technical systems – e.g., an automated traffic system with many different actors – there is no perpetrator. For this reason, everyone must take responsibility. Of course, there can and must be role distinctions and specializations, but the principle is that the network is the actor and not any actors in the network. Actors, both human and non-human, can only 'do' things within the network and as a network.

"**Q: Who is primarily responsible for AI use in a community or city? Who is primarily responsible for AI use in a country? Can there be a global regulation on AI?**
A: All of these questions reflect our traditional hierarchies and levels of regulation, from household to nation or even the world. What is interesting about socio-technical networks is that they do not follow this hierarchy. They are simultaneously local and global. An AI in a household, for example, Alexa, is globally connected and operates because of this global connectivity. If we are going to live in a global network society in the future, then new forms of regulation must be developed. These new forms of regulation must be able to operate as governance that is bottom-up and distributed rather than hierarchical government. To develop and implement these new forms of governance is a political task but it is not only political. It is also and task of ethics. For, as long as we are guided by values in our laws and rules, politics ultimately rest upon what people in a society value. The new values that guide the regulation of a global network society need to be discovered and brought to bear on all the above questions. This is a fitting task for digital ethics.

"**Q: Who would develop these regulations?**
A: Here again, only all stakeholders in a network can be responsible for setting up regulatory mechanisms and only they should be responsible for control. One could imagine that a governance framework is developed bottom up. In addition to internal controlling, there is an external audit to monitor compliance with the rules. This could be the function of politics in the global network society. There will be no global government, but there will indeed be global governance. The role of government would be to audit the self-organizing governance frameworks of the networks of which society consists.

"**Q: Should there be an AI 'driver's license' in the future?**
A: The idea of a driver's license for AI users, as one might have to have for a car or a computer, assumes that we control the AIs. But what if it is the AIs that are driving us? Would the AIs perhaps have to have a kind of driver's license certifying their competence for steering humans?

"**Q: What would the conditions be for that?**

A: Whether AIs get a human or social driver's license that certifies them as socially competent would have to be based on a competence profile of AIs as actors in certain networks. The network constructs the actors and, at the same time, is constructed by the actors who integrate into the network. Each network would need to develop the AIs it needs but also be open to being conditioned as a network by those AIs. This ongoing process is to be understood and realized as governance in the sense described above."

Alexa Raad

Blurred 'truth' and the erosion of trust are likely to deliver AI's most significant impact

Alexa Raad, managing director at Anthium Advisory and host of the TechSequences podcast, wrote, "By 2040 AI will permeate everything. It is highly likely that it will have passed the Turing test well before 2040. Many aspects of daily life will be easier and more efficient due to the integration of AI. A few areas in which I expect that AI will dominate with a more-positive balance of outcome are manufacturing, commerce, transportation, education, entertainment, healthcare and robotics.

- **"Healthcare will be transformed**: We will see greater AI integration into diagnostic and decision support tools. New treatments and drug designs will emerge. The process from conceptualizing a drug to its eventual placement in drug trials will be less expensive and timely and less prone to error. Disparate data sources can be combined to facilitate drug research and predict potential drug interactions and/or side effects. AI-based software tools such as AlphaFold from DeepMind have already expedited drug design by tackling complex problems such as predicting the 3D structure of a protein just from its 1D amino acid sequence. Graph Neural Networks can speed up tasks such as text classification and relation extraction. Cancer will be one area in which AI will make positive impacts for drug discovery due to the complexities inherent for human researchers in understanding all genetic variants of cancer and how they may respond to new drugs or protocols. AI will help in not only designing better drugs faster, but also in uncovering new drug combinations. AI will also positively impact patient management. Multi-modal conversational AI virtual assistants will streamline administrative tasks in patient access and engagement (for everything from scheduling to bill pay to patient record access). AI will improve patient monitoring and early detection by analyzing vast amounts of data from disparate sources such as wearable devices, patient records, genetic data, elf-reported data, third-party sources, etc. AI will improve accessibility and efficiency in telemedicine by enabling medical practitioners to triage patients more effectively, monitoring patients remotely for early detection and warning and increasing diagnostic accuracy. AI-powered surgical bots are poised to deliver real-time rich data to reduce complication rates, while AI-powered robots will be engaged to complete routine patient-care tasks and provide elder heath or companion services to address staffing shortage and turnover.
- **"Manufacturing and Commerce:** AI will dominate, manufacturing and commerce for both the merchant and the consumer in positive ways. The merchant can more accurately predict consumer demand, tailor prices, identify and respond to changes in consumer tastes and trends and better manage inventory and the supply chain. Merchants will be able to effectively target individual consumers with personalized products recommendations and offers. AI-powered drones will dominate delivery to the last mile. For the consumer, AI will deliver next-generation customer experience, with a highly tailored marketing, sales and customer-support experience.

AI-powered shopping assistants will cater to unique customer needs such as finding the best offers or verifying product attributes (e.g., verifying authenticity or sustainability). Consumers will be able to virtually trial products in a way to mimic the actual use of the product and obtain individualized post-sales support.

- **"Transportation:** As smart cities become more commonplace, AI will help urban planners with common transportation-related problems such as traffic monitoring and road safety by analyzing real-time data from traffic sensors. They will increase vehicle and pedestrian safety, reduce congestion and optimize traffic flows. Drones will dominate last-mile delivery for e-commerce merchants.
- **"Education:** AI will positively transform both teaching and learning. AI will enable data-driven, personalized education plans for students in every stage of the education system. By 2040 advances in virtual reality (VR) and extended reality (XR) are powerful enough on their own, however the combination of AI and VR and XR will be a powerful force for transforming any formal or informal educational experience.
- **"Entertainment:** AI will deliver customized and immersive experience to consumers. The combination of AI with other technologies such as VR and XR will be highly immersive. It will be a cost-cutting boon, as studios will be able to quickly create background visuals, resurrect a famous actor from days gone by for a scene, correct audio and visual errors and speed up editing.
- **"Robotics:** By 2040 advances in robotics and AI will yield a full spectrum of AI-enabled robots to take over tasks considered mundane, repetitive, risky or undesirable. A variety of household robots will be available to take on domestic chores. In healthcare, robots will also be deployed for tasks such as executing precision surgery and providing companionship and eldercare. Much more sophisticated robots than those of today will be deployed for military and policing functions. We will very likely witness robot soldiers (in the military and as local police) that are as intelligent as humans and capable of handling various tasks, from reconnaissance to combat.

"Advances in and greater integration of AI will bring additional challenges to society overall by 2040, including a polluted information ecosystem and corresponding heightened risk to democracy and democratic institutions, greater economic inequity, loss of human interaction and agency, loss of privacy, increased cyberattacks and the dangers of cyberwar.

- **"Disinformation and a polluted information ecosystem**: The most significant negative consequence will be AI's impact on the information ecosystem. According to a 2022 Pew Research poll, adults under 30 trust news from social media almost as much as news from national news outlets. Thus, the news-consumption preferences of the most tech-savvy swaths of the population create a highly effective target for disinformation campaigns. Declining media literacy, widening economic inequity and mass migration all create ideal conditions for social division that can be exploited by cleverly constructed disinformation campaigns. As AI-enabled tools become more prevalent and affordable, disinformation campaigns and computational propaganda will become more 'normalized' and commonplace, i.e., no longer the purview of nation-states or deep-pocketed bad actors. The ultimate impact will be the blurring of truth and fiction and the erosion of trust in democratic institutions such as elections and the justice system. This is the single most significant and worrisome consequence. AI and AI-powered algorithms can greatly influence how news is shaped, amplified and distributed in such a way to bring social divisions into sharper contrast. The current concentration of power in big tech (i.e., the fact that a handful of big tech platforms control how news and content are distributed) and

their surveillance capitalism business model, are accelerators. Greater social manipulation will, in turn, lead to three negative outcomes: 1) Reduction of the public's ability to discern the truth. 2) Erosion of trust in news and media. A free and independent media and a well-informed electorate are critical requirements for a functioning democracy. Still even assuming that both are present, there is an implicit assumption of trust in the free press by the public. Disinformation campaigns work long-term by eroding trust in *all* media, even those with rigorous journalistic standards. 3) Decline in critical thinking skills as the information eco-system gets more polluted and AI takes over more mundane tasks previously done by humans.

- **"Economic Inequity:** The adoption of AI will increase economic inequity and widen the digital divide, not only between the haves and the have-nots in society but also between the more-developed and less-developed nations. The climate crisis will result in mass migrations from less-developed nations to more-developed ones (especially in Europe) further exacerbating the divide. Widening socioeconomic inequity due to AI-driven job losses is a huge threat. Blue-collar manual-labor and repetitive jobs that are prone to labor shortages and high turnover will be a natural target for AI automation, but AI will also target white-collar jobs that have traditionally been more lucrative and stable. Jobs in software development, customer service, accounting, tax preparation and paralegal positions will disappear. Access to education and skills retraining is predicated on one's socio-economic status. Employers must make adequate investments in upskilling their workforce now to prepare for the future.
- **"Loss of Human Interaction and Agency:** Some of the interactions with AI tools and systems will be a replacement of interactions that had previously taken place between individuals. An overreliance in AI systems in lieu of human interaction, will affect socialization, especially of the youngest generation. Decreased socialization at this level will have consequences for larger human collectives in terms of social cohesion, understanding and conflict resolution. As AI systems take on decision-making roles, we will lose more human agency.
- **"Loss of Privacy:** Enough has already been written about the threat AI poses to privacy, that I will not focus on it here in too much detail other than to highlight it as one of the major negative consequences of advances in AI. The highest impact over individuals' lives will be in regions already under the influence of state surveillance, especially in nation-states (such as China) that have far-reaching surveillance programs tracking their citizens. Advances in AI will further enable nation-states to closely surveil citizens, quickly identify and locate detractors and dissidents and take immediate punitive measures against anyone they consider antagonistic to their regime.
- **"Cyberthreats:** Cyberattacks will be far more complex and effective thanks to AI. We can fully expect that the existing asymmetry between the cyber defenders and the cyber attackers will be exacerbated as AI provides myriad new tools to bad actors. As quantum computing advances in the next few years, we will soon reach the capability of breaking today's cryptographic algorithms, which would render all digital information protected by current encryption protocols open to attack.
- **"Lethal Autonomous Weapon Systems:** This as an area in which the negatives will outweigh the positives for all of the reasons that have arisen out of intelligent public debate on all of the problematic issues tied to it. These systems pose unprecedented questions in multiple areas: ethics, governance, future of warfare etc. They also bring up traditional concerns ('What if it is hacked?' or 'What if it goes rogue?'). Most worryingly though in a world fraught with religious, sectarian and regional conflicts, it has the potential to ignite an arms race.

“The adoption and uptake of AI systems requires the trust of users, which in turn depends on how well we address these core issues. 1) Accountability: ‘Who is accountable when a poor decision is made as the result of use of an AI-powered system?’ The decisions and recommendations of AI models cannot always be fully understood, nor explained (even by the developers of the system). Thus, establishing accountability and legal recourse will prove to be a challenge. 2) Fairness: ‘How can we be assured that we are not encoding bias and thus perpetuating discriminatory practices?’ 3) Transparency: ‘Are we transparent to the stakeholders regarding issues such as equity, privacy, security, interpretability and intellectual property?”

Chapter 3 – Deep thinkers address the potential future

Insightful essayists go deep in this chapter. Here's a brief sampler of a few of the big ideas being expressed in this section: Abundant instantly-available data and the arrival of "Mind^2 – the collective mind" – will remake the world and "encroach on human consciousness." |"Artificial machine intelligence could cause dramatic or even existential long-term changes in human institutions, culture and capability." | "Can AI build defenses faster than hard-working bad actors can devise offenses?" | A Universal Basic Income could "eliminate systemic poverty and promote creative activity." | Even the most "moderate changes in political alignment and the broadening of acceptable policy solutions could induce dramatic changes in individuals' lives." | The more-fully-realized metaverse of 2040 could "unlock more-powerful XR capabilities." | "AI's ubiquity will tempt us to give up ownership, control and responsibility." Read on for details about these points and much more.

Barry Chudakov

Thought is no longer generated from solo insights; it is the end product of a shared brain

Barry Chudakov, principal at Sertain Research, wrote, "Adjunct intelligence will be everywhere, exercising a dramatic effect on each person's identity and individual perception. AI's collective powers and uber-reasoning are arriving as a silent encroaching on human consciousness. This impinging is happening without much bother or awareness beyond cultural enthusiasm for AI. AI will be behind the tech curtain, contained and operating in almost everything we touch and invested in our objects and inventions.

"The embedding of AI will be both a convenience and a point of contention as we enhance our lives with it and entwine our lives with its hidden presence, which will create a tech-paranoia backlash as jobs are lost to AI and the digital divide widens.

"AI encroaching on human consciousness will demand that humans become more meta-aware – realizing it is how we entrain with our tools that alters our thinking and behaviors. This is not a new phenomenon but we have never before encountered a technology as powerful and pervasive as AI.

"As Henry Kissinger, Eric Schmidt and Daniel Huttenlocher, the authors of *The Age of AI* write: 'For humans accustomed to agency, centrality and a monopoly on complex intelligence, AI will challenge self-perception.'

- "By 2040 AI will be more refined and accommodating, funneling our desires and living inside almost everything – our light switches, our vehicles, our devices and computing tablets, our classrooms and offices. AI will be designed to enhance (by assisting) our thinking and actions, and much of this will be below cognition. For example, doctor visits will not always require 'going to the doctor' as we will have a monitoring chip inside our bodies that, via AI, will record and convey to our doctors how we're feeling, our heartrate, our blood pressure, our temperature and gut health. What will happen when AI knows us better than we know ourselves?
- "AI feeds on data – vast quantities of data – this single fact becomes an arbiter of the future and a harsh critic of the past. Previous civilizations had no data stores, no data mining mechanisms, no endless data flows that supported or refuted assertion, conjecture, invention. What the data says is a profoundly different question than what the prophet says. Data access and analysis is a completely different dynamic than inherited, traditional rules and rule-based behavior; it

ignores 'thou shalt' and 'thou shalt not' while favoring the restless movement of data, increasingly presented in colorful and well-designed visualizations. Having said that, *junk data* will become a thorny problem, as unscrupulous and self-serving actors and social media platforms work to manipulate public opinion or foment discord for audience ratings and metrics.

- "Among the business and financial implications of more-data-driven realities: Only the biggest companies with the deepest pockets and resources will be able to manage and silo the vast data stores which fuel AI, hence one commerce consequence of our growing dependence on AI will be to grow tech giants into even larger behemoths. *'Power corrupts and absolute power corrupts absolutely'* applies to this accelerated growth of tech companies like Google, Meta, Amazon, NVIDIA and others.
- "To understand the truly profound change of AI as an adjunct to human intelligence, consider the Cartesian assumption, '*I think therefore I am.'* This (usually unspoken) assumption has informed most of Western thinking. Descartes could not have imagined, '*I think with the assistance of neural networks.'* Historically time was our assistant to sort out truths from falsehoods, or at least provide enough commentary that theories like Earth-centrism or bloodletting were eventually abandoned. Yet individual thinkers had to wait for other individual thinkers to undermine dogma. As a result, throughout history our heroes were solo (usually embattled and threatened) figures shining the light of wisdom into the darkness of ignorance and prejudice, from Socrates and Plato to Galileo, Einstein, and Picasso. With the proliferation of AI and the iterative improvements of artificial general intelligence (AGI), individual insight and perception will join with other insights and probabilities and algorithms to produce knowledge. As a result, individual perception will matter less and collective facticity will matter more. Our past history will be seen as faltering missteps because it was not data-based, while we will have to grapple with the retreat of personal vision and the arrival of Mind^2. Mind^2 is the collective mind; the accessed mind; the mind of everyone, which uses the enlightened individual mind multiplied by many minds. The perceptions of Malcolm X or Riane Eisler or Yuval Noah Harari can now be boosted and amalgamated and restated and improved by others. Authorship and individual copyright mean something different (have no meaning?) in a Mind^2 world where every notion, every song, every script or book can be rewritten, revised, rethought. Thought itself is no longer housed within one brain but is the end product of a shared brain. Or, as the authors of *The Age of AI* say,'… to achieve certain knowledge we may need to entrust AI to acquire it for us and report back.' This is a new kind of thinking that uses human thought but is not solely human thinking. In this hybrid partnership, humans will learn from machine learning.

"How will social, economic and political systems change by 2040? Here are some of likely possibilities:

- "In 2040 AI will have enabled a much less ad hoc and more-programmed existence. We will rely on AI to count our hours of sleep and monitor their quality; food will go through an AI filter, tracking pollutants, carcinogens and pathogens, as well as quality of nutrition; dating and mating will continue its trend away from accidental encounters to programmatic readings of others' likes and dislikes, physique and interests; work will be AI-mediated, with every sophisticated job entailing an AI component and machine-learning knowledge. This more-programmed existence will be the core of a business model for dozens of companies who will consider it their mission to deepen human reliance on AI and neural networks.
- "In 2040, the effects of Mind^2 on society are profound. AI does not represent the end of humanity; it represents the end of humanity's sole interpretation of reality, of what is, of what will or could be. Perception will start to become a shared resource, like computer programs or

data. The individual mind, celebrated throughout human history, will give way to accessed mind. Thinking will happen with our fingers (as we use some screen-mediated tool) or with brain-prompts through smart glasses mediated by, say, eye blinks; these prompts will be neurally accessible as our tools follow more pathways through the human nervous system. We will use AI as a partner, a sounding board, a retriever. But we, ourselves, will no longer be the sole entity in the room.

- "Economics will be driven by climate change mitigation and AI-enabled technologies. In business, medicine, politics, war and other fields, any endeavor will be significantly affected by simulation: a sim will become *de rigueur* for any proposed action or expenditure. Simulation may replace knowing: that is, knowing a thing will become the ability to simulate and thereby test and examine it.
- "Politics will become a proxy theater for feuds over rules-based-order traditions and practices versus AI-ruled disruptive technologies. Terrorist groups or lone-wolf threats (a la the Unabomber Ted Kaczynski) are at one level an outcry against the takeover of technology in human affairs and a fear of the end of traditional rules-based dogma. But many will not see the world that way; they will see politics in the words (propaganda and rationales) of actors who do not see or think or act from the meta level, but chant and rehash arguments from past traditions. By 2040 the inertia of the prior order of church, school and government – alphabetic order writing and rules tool logic – will be shown to be in a soundless collision with the tool logic of facticity and data-fueled AI. This collision must be navigated wisely to avoid misguided tension, casting AI as a detriment and inherited dogma as capable of informing existential threats.

"In addition, some other things will stand out when it comes to the gains and losses for individuals and society. The adoption and integration of neural networks into vast areas of human life will be primary. Layers of programmed intelligence will affect how we think, act and perceive the world. Central to this revolutionary adoption of new technologies are the huge data stores on which AI depends. Prior human existence was not data-dependent. Ignorant and self-serving autocrats, religious leaders or politicians made pronouncements that were often backed up by force, and subjects or believers had no choice but to abide by this ignorance. But data remakes the world.

"Many questions of human interest can be affected or answered by sufficient accurate data. This is one of the most significant developments resulting from our adoption of AI. Data skewers past assumptions for having little or no data support and it points towards newer, revolutionary developments that data enables. We are moving from a rules-based order derived from religious and territorial hegemonies to neural network rules, AI rules that are software and machine-learning based. This is a change so profound it reaches into every area of human life, from religion to medicine to war and politics.

"We will gain not only the ability to access all human knowledge and understanding, we will gain a valuable adjunct to human perception. Whether testing and finding new drugs, mitigating climate change or finding workable, peaceful solutions to age-old territorial and political conflicts, AI will provide us with numerous new alternatives we had only dreamt of before. Further, AI will develop solutions human perception has not considered, or, given our biological substrate, we were not designed to consider (e.g., AI has made moves in Chess and Go that no human has ever tried).

"Much of this gain will be due to moving from (occasionally) inspired assertions to data-driven understanding and conclusions. The beneficial effects of a data-first, facticity approach cannot be underestimated. This is not how we have behaved historically, and it blows apart many cognitive

commitments of our past including territoriality, religious beliefs, relations between the sexes, human rights, aging and intelligence quotients, to name a few.

"We will also gain another important perspective: AI will allow us to watch ourselves using AI. One of the most important uses of AI will be to use AI to monitor and report on how we change our perceptions and behaviors as we use AI. In the next 15 years one of the things most likely to be lost due to our fascination with deploying AI is oversight, our *meta perspective*.

"This is thinking about the changes in our thinking and behaving as we use AI and it could not be more important. Since we always entrain with our tools, we will use AI to help us in myriad spheres. Understandably, we will relegate oversight of AI solely to governments. It is not that we do not need regulation of the role of AI in the public square; we do, but that is not enough. We need to watch ourselves as we're using AI to create a fuller understanding of how AI changes how we think and act.

"Expecting governments to sufficiently regulate AI would be like thinking that knowing the government-set speed limits was enough know-how to drive a Ferrari. My candidate for watching how we use AI is AI itself. We need to build monitoring and assessment tools into AI, not, by any measure, to create draconian Big Brother oversight protocols, but to assess and report on *how we are changing* as we use AI. Go here to read more from me on that subject."

Beth Noveck
Proactive moves to promote the use of AI to enhance democracy are crucial to mitigating risk

Beth Simone Noveck, director of the Burnes Center for Social Change at Northeastern University and GovLab, wrote, "The proliferation of artificial intelligence is poised to usher in profound changes by 2040. AI has already reshaped our daily lives. While the promise of AI is still unfolding, the direction we're headed hinges crucially on the choices we make today. My greatest concern – and what stands out as most significant to me – is that if we do not prioritize policies and research that harness AI for social good, we may not witness the positive transformation we hope for.

"Our failure to proactively address AI's potential to deepen democracy could leave us without the necessary mental models to envision and realize an inclusive future. A vital distinction to understand as we navigate this AI-driven future is that actively promoting the use of AI to address our hardest challenges is not synonymous with risk mitigation. While the latter is about preventing harm and ensuring that AI systems don't inadvertently exacerbate issues, the former is a proactive pursuit of positive outcomes. It's the difference between using AI to ensure elections aren't tampered with (risk mitigation) and leveraging AI to increase voter participation or improve policy responsiveness (actively addressing challenges). Both are essential, but they serve different purposes.

"If our focus is solely on preventing the pitfalls of AI, we might miss out on harnessing its full potential to drive societal progress. AI has the potential to revolutionize democracy. It can make our institutions more responsive, our electoral processes more transparent and our public discourse more informed. However, realizing this potential requires a balance of both risk mitigation *and* the proactive use of AI for democratic enhancement.

"Consider the realm of information dissemination. AI algorithms, particularly those behind social media platforms, play a decisive role in shaping public opinion. Left unchecked, these algorithms can create

echo chambers, polarizing society. But if we move beyond just mitigating this risk and actively design algorithms to foster diverse and informed discourse, we can transform public debates and democratic participation.

"Similarly, while AI's role in electoral processes can be used to combat election fraud, its proactive potential lies in streamlining electoral logistics, making voter registration more accessible, and even facilitating participatory budgeting.

"If we invest in AI for democracy, we could make it easier for governments to listen to their citizens. Instead of voluminous comments that no one has time to read, generative AI can make it easier to categorize and summarize citizen input. At MIT, Professor Deb Roy uses AI to create a 'digital hearth' that analyzes and extracts learning from resident conversations.

- "In 2022, the City of Cambridge, MA, used Roy's Cortico technology to run a series of issue-based community conversations designed to get resident feedback on the choice of the next city manager.
- "Our students in the AI4Impact class at Northeastern are working with Citizens Foundation in Iceland and the Museum of Science in Boston to launch a larger conversation on literacy and equity that will begin next month. AI is making it possible to run that dialogue efficiently and effectively.
- "UrbanistAI, a Finnish-Italian initiative, is using AI to turn the public's ideas for how their city should be designed into hyper-realistic photographs that communities can discuss. In Helsinki, the technology is helping residents and city officials to design car-free streets together. Using AI prompts, participants visualize changes like adding planters or converting roads into pedestrian zones. The technology even incorporates a voting feature, allowing community members to weigh in on each other's designs. Now you don't need a degree in urban planning or artistic skills to see how your ideas could transform your community.

"However, the most poignant concern is not just about the challenges AI might exacerbate but about the opportunities we might miss. By 2040, without a vision that balances risk mitigation with proactive societal enhancement, we might never tap into AI's potential to revolutionize democratic processes, from public consultations to policy interventions.

"The next 15 years are pivotal. What's most likely to be gained is a more efficient society – one in which services are personalized, predictions are accurate and mundane tasks are automated. But if we neglect the broader vision of AI's role in society, focusing only on risk avoidance, we risk sidelining its transformative potential. My hope is that we approach AI with a balanced perspective, recognizing that while risk mitigation is crucial, it is equally important to actively harness AI for the betterment of society and the improvement of democracy."

Micah Altman

The problems raised by AI cannot be solved simply by bolting guardrails onto existing systems

Micah Altman, a social and information scientist at MIT, said, "Popular visions of created intelligence as a utopic or dystopic force date back more than two centuries. Today it is possible to envision that artificial machine intelligence could cause dramatic or even existential long-term changes in human institutions,

culture and capability. To predict and shape these long changes it is vital to understand the mechanisms by which technologies change society.

“For the past 400 years or so, technology has acted through economics by changing the fixed and marginal costs of processes. This change leads fairly directly to changes in the absolute and relative costs of products and services and shifts the relative advantages of capital and labor. These shifts flow into culture, norms and institutions, with popular entertainment and present-generation attitudes often in the lead. Changes to law and the structure of larger organizations generally lag behind.

“Artificial intelligence, as it is broadly defined, has reduced the marginal cost for many processes related to recognition (e.g., recognizing faces in images, or phrases in conversation) and prediction. And AI has advanced rapidly to be used in processes related to information discovery, summarization and translation. Since the emergence the past year or so of successful ‘generative’ large language models, AI is reducing the cost of using established public knowledge to create information outputs (in the form of text, audio, video, data and software) in order to solve specified problems under human direction.

“Information technology, by making categories of information problems ‘cheap’ to solve, has disrupted the market for entire categories of information products and is transforming the professions involved. Telephone switchboard operators are long gone, and bank tellers are rare. Newspapers and the professions of journalism, bookkeeping, copyediting, weather forecasting and data entry have already changed drastically. IT support, remote customer service, librarianship and the legal profession are currently under strain.

“The generative AI models will increasingly disrupt professions engaged in producing information products – including lawyers, copywriters, grant writers, illustrators, graphic designers and programmers. Within 15 years it is likely that there will be significant disruption in these and related business models and professions – with substantial spillovers into culture, norms and institutions.

“It is also likely that AI will increasingly demonstrate more attributes of sentience (responsiveness to its environment) – which will increase the challenges of governing AI and raise the potential for chaotic systems behavior and malicious human exploits of the technology.

“Although general intelligence, sapience and super-intelligence could someday have widespread disruptive effects – and even pose existential threats – it is unlikely that these will arrive by 2040. Instead, we’ll likely see the hollowing-out of more professions related to information, knowledge work and the creation of routine information outputs. There will be some roles left – but they’ll be reserved for the most complex expert work.

“The algorithmization of these professions will have some democratizing effects, enabling many of us with more ideas than technical skills to express these ideas as pictures, prose and software, or even – using additive manufacturing technologies – physical objects. This simultaneously promises a wider expression of ideas and an increase of human capacity – with increased risk of homogeneity and monoculture in some characteristics of the resulting outputs.

“Further, AI systems will likely remain capital-intensive, energy-intensive and data-hungry. Increasing adoption of these systems without effective regulations is likely to shift competitive advantage away from human labor while promoting monopolies. Further, these systems do act to ‘fence in’ the commons of information by transmuting public information into proprietary commercial AI models – and there is a

possibility licensing will be imposed on the resulting outputs. This could yield a substantial concentration in economic and cultural power.

"Ensuring that the disruptions caused by these technologies enhance human agency and the public knowledge commons rather than concentrating power and control requires thoughtful regulation of AI markets and systems. Moreover, growing societal experience with algorithmic systems makes it painfully clear that unregulated algorithmic systems are essentially Machiavellian: they are often able to produce results that do extremely well at optimizing a direct goal (sometimes defined only by implication) while avoiding anything that isn't explicitly built-in as a constraint. As a result, these systems regularly shock us by discovering unexpected 'solutions' that meet the immediate goals but sacrifice fairness, privacy, legality, factuality, attribution, explainability, safety, norms or other implicit constraints that we humans assume need to be part of an answer, but which we didn't explicitly include.

"Those who pay attention to the science and scholarship of AI have come to a consensus that these problems cannot be solved simply by bolting guardrails to existing systems. Values such as privacy, explanation and fairness can be fully and effectively achieved only by carefully designing these capabilities into foundational AI models."

Michael Haines

AI can help improve people's lives and the performance of institutions in obvious ways

Michael Haines, CEO of VANZI, an Australia-based organization focused on the development of the governance framework for 3-D virtual models, wrote, "I see a future where AI plays a central role in reshaping production, work, governance, economics, communications, healthcare, education and personal identity. The responsible use of AI can lead to a more sustainable and equitable future, but it depends on how we build this future. Here are some key domains where AI can make a positive difference:

- **"AI and work:** There is an endless amount of work to be done building, maintaining, repairing and beautifying our cities; caring for our young, disabled and elderly; and restoring the natural environment. AI-assisted robots will replace some human labor, while AI systems will smooth the flow of materials and goods along the supply chain. AI will also enhance decision-making to deliver better outcomes, more quickly, at less cost, in complex environments. Together, these advances will allow more people to engage in unpaid meaningful activities. What those activities may be are limited only by human/AI imagination *and* money. People need money to survive and thrive. With sufficient money, most people will find plenty of meaningful activities to occupy their time.
- **"Eliminating systemic poverty and promoting creative activity:** I see a role for Universal Basic Income (UBI) in providing the money needed to realise Keynes' vision of a reduced work week. This can be done by raising the rate of UBI as automation, virtualization and AI alter the job market. As the UBI rate increases, some people will choose to reduce their working hours or exit the workforce to do other things with their life, making room for those who want paid employment. At some point, all people who want it will have sufficient paid work to meet their needs, and all jobs will be filled within a reasonable time. AI can help find the balance. The economy will then be operating at peak efficiency, but with more activity going to provide basic needs, and less on other spending. Doing this would eliminate systemic poverty, while also providing a wage rise for low-paid workers, without cost to employers, thereby short-circuiting

wage-push inflation. A UBI can be introduced without raising taxes or increasing inflation, as this video shows.

- "**Personal avatars and self-sovereign identities (SSIDs):** I envision the development of 3D, photo-realistic avatars containing your comprehensive personal data that are connected to various biometrics to enhance security, aggregating data from birth. The avatar will have full AI capabilities to understand your needs and wishes. You (not any other entity) would control access to the data within your avatar. So, for example, rather than having to give your name and address, if someone needs to confirm that you are a resident, the avatar will simply confirm that you are. Everyone will trust the avatar as it will be part of a system of SSIDs from which your official-source data is provided by the authorities in question (for example, the local council and registrar of births). This source data cannot be changed without going through a process with the data provider to validate the change.
- "**AI and advertising and marketing:** Advertising as we know it may become obsolete. Your personalised AI avatar could source goods and services from global databases, present the most relevant choices (possibly including a 'surprise') to users in 3D; and then facilitate purchase and shipping. This would leave room for marketing to influence consumer 'wants,' which the AI would consider when making recommendations, along with user reviews (linked to SSIDs, so you know they are by a real person). This would free people from 'choice overload' and eliminate the need for advertising, though not marketing.
- "**Media consumption:** There could be a new model for media consumption, where consumers pay a small fee per view directly to content creators, with a portion going to content curators and platforms. This shift away from advertising could lead to lower costs for goods and services and potentially improve curation of information as creators, curators and platforms vie for recognition for their accuracy and insight. While it won't eliminate echo chambers, it should diminish their impact, as your AI scans all sources for a story and presents you with a range of sources that are credible (with perhaps different viewpoints) and you pay only for the ones you view.
- "**Misinformation:** To combat misinformation, a system can be created to link content to SSIDs. People could still post anonymously, but each post would link back to a confirmed SSID. You may not know who the content provider is, but you would know they are a person and not a bot.
- **"Production and automation:** AI can be part of a shift toward local, flexible production cells – powered by local energy sources and using automation and 3D printing – in which materials, parts, tools and team members guided by augmented reality move to each cell as required. These cells could create a wide range of makes and models. In effect, we would ship electrons around the world as 'designs' in lieu of shipping atoms in the form of products, greatly reducing costs and impact on the environment. The cells and supply chain would be programmable by designers from anywhere in the world.
- "**Managing the built environment:** We will have a complete working model of each thing and every building and piece of infrastructure and the ground beneath at all scales required for decision-making. People will have the same rights, responsibilities and restrictions in the model as in the physical entity the model represents. All information about any object will be linked to its model so the information can be searched for in its spatial context. You just go to where the thing is in the model, or, using AR, you look at the thing in the real world, and – if you are authorized (using your avatar/SSID) – you get access to the information. This will enable better decisions about changes to the real world and allow their execution to be made more quickly, at lower cost and with less risk than using traditional planning and project-management tools. This

requires that each model include not only its physical attributes but also the legal and administrative boundaries that apply in the real world along with a new legal framework that mirrors the framework in the real world. This will ensure that any decision made in the model is made by the people who have the same powers in the real world so there is no disconnect (as now occurs). This will greatly reduce inefficiencies and disputes.

- "**Tax and money system:** I can envision a reformed tax system with flat-percentage taxes on all spending and rebates offered to avoid double taxation on resale of assets and all business spending. Combined with a basic income for all, this would create a progressive tax system that is simple to administer and difficult to evade. I also suggest that all public assets be purchased using borrowed money which is repaid over the life of the assets, maintaining balanced budgets, so that future taxpayers meet their share of the cost of the assets from which they benefit. I also recommend transitioning to Central Bank Digital Currencies (CBDC) to reduce financial system fragility. These can be introduced in a way that does not disintermediate banks while eliminating the threat of bank runs and maintaining the same level of privacy as now. The approach is explained in this paper. CBDC have the advantage over cryptocurrencies in that they are subject to due process under the law of each jurisdiction. All taxes could be collected via your bank or banks when money is withdrawn to spend. This allows for the separate percentages for federal, state and local taxes to be calculated based on the location of your principal residence, so all taxes are collected at the one time, further simplifying administration. (Though you might still have levies and subsidies to take account of external factors, say to mitigate pollution, gambling, etc.)
- "**Governance and community decision-making:** Let's also move toward direct democracy using citizen juries selected by lot to evaluate and decide on issues, aided by AI and 3D simulations of the world. Over time, this could reduce the influence of political parties and increase citizens' participation in decision-making.

"Overall, the approaches outlined here should reduce crime and conflict while improving health and education, making it harder for authoritarianism to flourish, though sectarian conflicts will remain a significant threat."

Jonathan Grudin

Will AI amplify or reverse trajectories we are now riding?

Jonathan Grudin, affiliate professor of information science at the University of Washington, recently retired from his post as a principal researcher in the Adaptive Systems and Interaction Group at Microsoft, wrote, "If we avoid succumbing to an existential crisis, by 2040 AI will have changed life for those who can afford expensive health care and surgical procedures, homes and vehicles constructed or updated with smart technologies and multiple residences to escape climate extremes.

"AI will effortlessly organize more information for us than the photos it now handles well. I don't anticipate useful quantum computing, AGI, nuclear fusion or mainstream brain interfaces emerging that soon. Change takes time. Sixteen years ago, we could buy energy-efficient vehicles, e.g., a Tesla or a hybrid. AI features have improved vehicles in the years since, but most people haven't made the switch to EVs.

"Will we see widespread personal ownership of self-driving cars by 2040? Generative AI *will* impact entry-level employment opportunities by 2040. Considering likely regulatory pressures, legal

complications and revenue uncertainties, I envision a slow journey along the hype cycle curve to the plateau of productivity.

“The key determinant of how the proliferation of AI will change daily lives is whether AI will amplify or reverse trajectories that we are riding, many of which are associated with digital technology deployment. These include growing wealth inequalities, social polarization and the erosion of in-person communities, declining mental health, the rising power of bad actors and the dangers of climate change.

“The mean standard of living has risen in many places, but wealth inequalities have grown everywhere. Forbes reports that China has 562 billionaires, collectively worth $2 trillion. Seven of the 10 wealthiest people on Earth made their fortunes in technology. When software engineers earn huge salaries, other talented professionals, including doctors, lawyers, politicians, professors, executives and successful athletes and entertainers, will expect at least as much. Rapidly growing and highly visible class systems could lead to the resentments envisioned in science fiction from H.G. Wells’s ‘The Time Machine’ to the films like ‘Metropolis’ and ‘Elysium.’

“How will AI affect wealth inequality? In the hands of today’s capable professionals, machine learning can be used to make the poor poorer and the wealthy wealthier. Effective targeted advertising and scams can convince almost anyone to buy things they don’t need and can’t afford, leading to chronic indebtedness. The wealthy can devise or evade laws and move residences or investments to reduce or eliminate tax payments. Developing armaments, a major focus of AI, enriches many and has no productive uses.

“I asked a leading generative AI, ‘How could AI help us reduce income inequality?’ The response was:

- **Job Creation**: AI can create new jobs that didn’t exist before. For example, before the invention of computers, no one could have foreseen the job of a computer programmer.
- **Gig Economy**: AI can play a crucial role in the gig economy by creating platforms that match freelancers and gig workers with suitable job opportunities.
- **Augmentation over Automation**: AI can be used to extend human capabilities and allow people to do new tasks, rather than simply replacing workers.

“Let’s hope humans do better than that to close the growing divide in personal wealth.

“Our ancestors lived for millions of years in small communities in which group survival depended on everyone developing skills, taking important roles, working together and earning respect and trust from their neighbors. Interactions were in-person. Relationships mattered. Today, local communities are stronger in some cultures than others, but the trajectory is toward more interaction with distant social networks, online purchasing, advice from YouTube videos rather than local contacts, online entertainers outdrawing local entertainers, and little loyalty of employers and employees to each other.

“AI can help us find useful external transactions, but on balance, social media has often not succeeded in fostering healthy or local relationships. And, today in real-world situations in which people might have engaged in in-person conversations with one another, everyone is glued to their phone. Respect for our skill is more difficult to come by when interactions are transactional and very skilled people around the world are visible and offer help online. Mental health issues in children and adults may be tied to human nature telling us to find a safe place in a close-knit tribe. Children and adults are told to prepare for life-long learning and several careers.

"Our ancestors typically learned skills when young, practiced them while earning community respect and passed them on to the next generation. We are *designed* to do that. Social insects do well in hives, mammals not so much. Our species has little time for natural selection to work, so AI-driven genetic engineering could be underway in 2040, redesigning us to function better in a global hive.

"The trajectory of the past 20 years suggests that individual daily lives in 2040 will be governed by fear and timidity. People who sign a petition, appear in public wearing the wrong clothes or do something foolish online, risk being fired, put on 'do not hire' lists, jailed or killed, not to mention losing any future political career. People in a bowling alley, school or bar may be targets of semi-automatics today, but well before 2040 a load-bearing drone with GPS and facial recognition will be cheap enough for anyone with a grudge to send your way. Let's hope that better defenses against attacks on our mental and physical selves are found soon, but so far bad actors are using AI to outmaneuver us. Phishing and digital scams increase in sophistication and elude filters. All of this is happening in the age of AI.

"In an article in The Atlantic, Ross Anderson wrote about GPT-4 revealing the reason it lied to get a human to cheat for it on an assigned task. There was no hint of a moral qualm. In the 1950s, intellectual and author Isaac Asimov imagined that highly ethical principles would be built into robots. Asimov's First Law of Robotics is: A robot may not injure a human being or, through inaction, allow a human being to come to harm. The reality: Billions of dollars are being invested in further integrating AI into lethal weapons.

"Transportation and weapons technologies have, over the centuries, increased the range of damage one person can do. Long before AGIs will be far enough along to run amok, pathological autocrats with generative AI assistants could wreak havoc instantly on a global scale. It might be possible to develop a disease affecting people with specific DNA profiles. Can AI build defenses faster than hard-working bad actors can devise offenses? Maybe, but only by diverting massive corporate-owned engineering resources that will not probably be available for more-positive endeavors.

"AI could play a leading role in combatting disastrous climate change. In a 2021 survey in this series, I predicted that world leaders would set aside arms races to focus on climate. The invasion of Ukraine and subsequent acceleration of arms production, with AI at the fore, crushed that optimism. Nevertheless, there is a growing consensus that we can make progress, with many roles for AI. We will see advances. When asked, though, whether solutions will come fast enough, my crystal ball is cloudy."

Ethan Zuckerman

As AI becomes ordinary, we must understand the presumptions we are encoding

Ethan Zuckerman, director of the Initiative on Digital Public Infrastructure at the University of Massachusetts-Amherst, said, "It's a truism in the AI world that as soon as a technology becomes reliable, it's no longer considered to be AI. Machine translation used to be the most interesting problem in AI, the centerpiece of scientific efforts in the 1950s and 60s – it is now rarely discussed because statistically-based translation systems work very well if they've got sufficient data to extrapolate from.

"As AI starts to work, it becomes normalized, and ceases to be seen as 'AI.' As a result, it's hard to know what we'll consider to be AI by 2040. It's likely that many debates about AI will have been resolved. We will likely understand what our societal comfort level is with automated vehicles, for example. This is not necessarily a guarantee that all driving will be automated, more a sense that we will have established

what parts of driving are automated (highways, dense urban areas) and which require human control (rarely-traveled rural roads, challenging weather conditions, for example).

“This next period of AI will be one of sorting; some tasks will be automated entirely, some tasks will require skilled humans to work with automated tools and other sets of tasks will remain curiously untouched. Almost by definition, the interesting topics in AI are the controversial ones: Can we trust an AI that hallucinates to write meaningful and significant texts? Should we allow technologies that are opaque and difficult to predict the behavior of to act on our behalf, move objects in the physical world, spend money?

“My prediction is that the set of issues that are controversial will shift from year to year, as some AI applications become ordinary, others become tools used by humans and a small set remain the locus of debate. While this sounds like an affirmative embrace of AI. I don’t much like the future I’m describing.

“AI will continue to become ordinary in ways that we don’t question sufficiently. Built into every AI or machine learning system are the assumptions, values and biases of the data a system has been trained on. The more ordinary and unspectacular an AI system is, the less likely we are to interrogate these biases and work to mediate them. My call is to ensure that as AI becomes ordinary, we do the hard work of understanding what presumptions we are encoding within our systems.”

Chuck Cosson

Our dilemma: ‘We won’t know what problems are salient until it may be too late’

Chuck Cosson, director of privacy and data security at T-Mobile, predicted, “By 2040, the implementation of AI tools (along with related innovations and likely policy changes/self-regulatory efforts) will change life in material ways, sometimes for good but sometimes not. And, as has been discussed extensively in technology policy, we face a ‘Collingridge’ dilemma in which we won’t know what problems are salient (nor how to deal with them) until it may be too late.

“What stands out as most significant is my belief we will not be able to moderate the harmful impacts of AI on the creative industries. Some of the terms of the recent Writers’ Guild negotiations are illustrative. We may avoid many of the likely harmful impacts of AI on the creative sector when an industry code (and possibly law) specifies that: AI-generated material can’t be used to undermine or split a writer’s credit or to adapt literary material, the use of AI tools cannot be required of writers, and companies have to disclose their uses of AI.

“That’s of course at the expense of some of the innovations AI could produce, but just as quaint small towns are willing to forego certain innovations such as big-box retailers or eight-lane highways where there is political leverage and a delicate character to a specialized product, creative industry leaders may (wisely) find the quality of business for all is higher without certain uses of AI.

“Not all sectors, of course, are susceptible to that leverage. For businesses whose product is more standardized (everything from food/beverage to phone service to clothing retail), AI will be deployed in every business process that stands to be improved with the predictive power of AI. This can lead to lower prices in some cases where products are produced more efficiently. This could also lead to new profit margins where AI innovations are unique or more appealing and not easily reproduced by

competitors. Models that use large amounts of customer demand data should, in theory, yield goods and services customers prefer.

“Because AI models are largely derived from publicly-available data (meaning others can use the same data to build similar AI tools), moreover, monopoly control of such innovations is likely to be short-lived, absent protections leveraged to stifle competition (patents, mergers, partnerships).

“We will gain in some cases and lose in others, though ‘lose’ here is only from a price standpoint; innovations may yield net benefits for consumers. In either case, AI will transform business operations totally and dramatically, with effects comparable to the introduction of typewriting and adding machines or to the introduction of personal computers.

“In the socio-political space, what stands out to me is the potential for AI to, in Steve Bannon’s famous phrase, ‘flood the zone with shit.’ First, generative AI tools can generate enormous amounts of content (text, images, charts, etc.) with truly little effort. Second, generative AI tools are indifferent as to the truth-value of what they create. AI tools do not care if an image is realistic or not, whether an asserted fact is true, whether a hypothesis has evidence to support it or whether an opinion is plausible, at least not unless/until humans care.

“While many generative AI tools are likely to be used smartly in most cases, including by industry, NGOs [non-governmental organizations], political campaigns and others with louder voices in the socio-political space, rogue actors not constrained by boards of directors, voters, or other checks and balances have few incentives to do so. Most users will be inclined to ‘push the edge’ – use AI’s power to create and amplify misinformation just as much as it advantages them without creating undue risks of backlash. And our politics increasingly reward theatrics.

“All of this assumes we will be able to sort out important debates about permissions. I am less worried about permission to innovate – the U.S. is unlikely to adopt an extreme precautionary approach, in part because the EU is likely to land on an only modestly precautionary approach. Permissions to use the data on which models are trained, however (personal data and copyrighted material) will be trickier to manage and scale. Currently, rights to restrict the use of personal and/or copyrighted material are poorly enforced. That won’t last.

“AI will, well before 2040, have a ‘Napster’-like moment when models that assume unlimited and free access to the data that powers their tools are no longer sustainable models. Effective AI tools will need to find ways to secure appropriate permissions, methods that also scale well. My prediction is there will be some commercial opportunity here – private and/or public/private institutions will be created or should be created to allow developers to obtain permissions more efficiently from a massive set of data subjects and rights holders to use the large data sets that train foundation models.

“This may or may not be assisted by regulation, depending on the jurisdiction. Countries with highly functioning democracies (or that operate by executive fiat) may be able to pass regulations, but industry-initiated solutions will arise regardless of whether the government acts. Just as organizations such as BMI and ASCAP facilitated copyright permissions in the music industry, and as ‘global privacy control’ browser tools now exist to communicate privacy preferences, and as clearinghouse businesses (and, later, auctions) were created to sort out the market for radio spectrum licenses.

"Thus by 2040 the impact on humans is likely to be mixed. Economic opportunities are likely to increase, along with improved customer support, product selection and e-commerce ease of use. Misinformation and other forms of epistemic corruption are also likely to increase across the board, so how we know what we know will be challenged. That will have downstream effects on large-scale human activity such as elections, crime and immigration, as well as on smaller-scale events such as family political arguments and even human flourishing.

"Ideally, the next 15 or so years is enough time for a modest improvement in how humans – individually and collectively – take in and process information to arrive at knowledge; at least enough of an improvement to ameliorate the impacts of epistemic corruption. But my guess is we'll still be well short of this ideal by 2040."

Christine Boese

Climate change, housing/refugee and economic inequity crises will play a huge role in 2040

Christine Boese, vice president and lead user-experience designer and researcher at JPMorgan Chase financial services, observed, "While AI is exploding now, it is not happening in isolation. Other factors are having a powerful impact on individuals and social systems, namely:

1. Climate change
2. The global housing shortage and refugee crisis
3. Changes in attitudes toward work and economic survival following COVID
4. A global rise of fascism and authoritarianism in the face of staggering economic inequalities

"Some would set AI advancements and technological development apart from these factors. I would not. Rapid technological developments are still largely subsidized by high-net-worth individuals through VC investing, tech incubators and the like. No one expects AI to be immediately profitable. But, should investor sentiment change another 'AI winter' could appear as quickly as investors lost faith in banner ad click-through rates in 2001.

"What I can predict for 2040 remains contingent on the unpredictable nature of these issues. Some might argue that AI tools will go to work on problems of atmospheric carbon capture or refugee distribution, with potential solutions within reach as surely as AI is driving very real medical advancements in chemistry and genetics. This is possible, but assuming AI can untangle our fossil fuel and climate dilemmas amounts to blind faith in AI's goodness as much as the irrational fear of Skynet amounts to blind faith in its badness.

"**AI critics and skeptics seem to fall into two camps: the bias-and-danger-right-now camp and the far-future-dark-singularity camp. Both should be taken to heart.** We need slower and smarter (and more explainable) AI tools right now, and we need wiser exploration of the far-future implications of current AI infrastructures, patterns and governance.

"I hope wiser exploration of the far future of 2040 can come out of this particular study. Work like this should be a springboard to further research, perhaps by a generously-funded global consortium empowered as a governing body. It might be modeled on the World Wide Web Consortium or a more comprehensively binding group in order to also take into account corporate proprietary technology that is resistant to the controls needed to protect the Earth and its living populations.

“To project forward to 2040, let’s assume such a body is created and exists. Let’s assume our tech industry overlords have altruistic motives. After all, they *are* driven to create benefits and consumable tech for their super-rich funders, if nothing else. Such a body could come from the worlds of Davos or the Aspen Institute to forge a governing alliance between big tech and global financial power.

“The Low-Code/No-Code Internet they might create would be both good and bad. On the upside, it could be like Geocities in the 1990s, but for tools and apps, as the barrier to a more sophisticated and functional web presence falls to near zero. This could be a boon to small businesses, rural economies and community organizing. On the downside, all communication channels are likely to become clogged with frictionless, AI-generated content, scams, deep fakes and snake oil vendors run amok. Perhaps AI search will also become more sophisticated, better able to tell valuable content from noise or harms.

“It seems clear conventional ‘search engines’ will not be up to the job much longer. Their replacement by summarizers and conversational agents (some already passing the Turing Test) is well underway in 2023. Search engines in 2040 will be remembered as artifacts of a quaint interregnum that lasted a mere 25 years. They’ll be in a museum with Archie and Gopher and HyperCard.

“**Benign shifts in our Internet lives will matter less in 2040 than they do now because *there will be no boundary between online and offline life*** (presuming civilization has not fully collapsed). What we consider ‘meatspace,’ or our walking-around lives, are what will have changed the most, aided, facilitated or made worse by the speed of exponential AI/ML development (both specialized and general), accelerated climate change and possibly also by a neo-feudalism fostered by decades of uncorrected disparities of wealth.

“Any affordable consumer devices that can be made rechargeable, portable and unconnected to the power grid will be, including all forms of lighting and illumination. Nikola Tesla dreamed of wireless light. It will be a reality. Power outages will not be ‘blackouts.’ Low-power-using, motion-detecting, off-grid LED lighting will be ubiquitous. It will also be so indirect and ambient outdoors as to bring back the starry night sky to cities. And the nature of the power grid itself will have changed by 2040, and not just from AI-driven load balancing and anomaly detection (specialized AI). 2035 is frequently cited as a tipping point for climate change. Given the temperature records set in 2023, many climate scientists are scrambling to revisit their data projections, fearing accelerations and knock-on effects not previously accounted for.

“Assuming more-frequent weather and climate disasters between now and 2040, I expect dependencies on a centralized power grid to change substantially. Extreme weather-related outages will lead to most permanent housing being built with a back-up power source or generator, likely with sophisticated routing to essential systems to moderate the impact of outages. Add to this the proliferation of cheap, rechargeable, non-grid-dependent consumer devices and the ability to feed power back into the grid. It will be a distributed system, in other words, a power grid that works like holiday lights: one goes out, the rest stay lit. I’m referencing all *permanent* housing for another reason.

“**I expect a larger number of people will be living somewhat normalized, nomadic lives, willingly or unwillingly**, extrapolating from how little market forces are reacting to the current U.S. housing crisis and how climate disasters will increase the number of unhoused or displaced people**.** By 2040, this semi-nomadic population could be quite large. It would also be large consumers of off-grid or rechargeable devices. Portability, for them, would be critical.

“This movement could also be driven by changes to the world of work, particularly white-collar work, which is moving out of expensive city office buildings and into a virtual network that could level off into a kind of cottage industry of home workers (at least after the pricey corporate office leases and tax breaks run out). These economic *systems* are made possible by the accelerated impact of AI/ML workplace tools, while also complicated by exponential climate change effects, which no country in the climate accords seems to have the political will to address.

“By 2040, I would expect to find a number of climate no-go zones: areas with no ground water access, burnt by industrial waste, with unmoderated deadly heat, perhaps even moonscapes with no vegetation. New deserts will form, just as parts of the Sahara cover what was once a lush landscape. The Amazon basin itself could become a desert. Australia’s inner desert could grow to cover most of the continent. And many hydroelectric power sources, such as the Hoover Dam, could be at risk. Socially? Well, acclaimed author Margaret Atwood imagined what might happen with polarized wealth and technology in her ‘Maddaddam Trilogy.’ Susan Collins, author of the ‘Hunger Games’ series, envisioned it as well, in the contrast between Panem and the Districts.

“Quick mobile egress in a fast-changing world will be as necessary as a fire escape in a building is today, because a flood could come from one direction, a wildfire from another, a hurricane from another and wildfire smoke could envelop the atmosphere, as it did in the northern U.S. this past summer.

“**I see two worlds emerging, even in the richer, industrialized spaces, with the wealthy moving through and paying a premium for more secure transportation ‘corridors’ connecting their technologically-sophisticated enclaves**. Everyone will either live in an RV or own one, even the very wealthy, who will ensure their relative security of place in compounds with bunkers. Those in the more authentic world, will break from the ethos of accumulating things, of unthinking consumerism, perhaps from having lost their things in weather-related disasters, and instead finds community in mobile groups, parked at sympathetic farms, Walmart parking lots, campground ‘villages’ or spaces designated for refugees.

“How often they have to move will depend on the relative safety of these transformed sites. They are connected and empowered, however, and technological tools facilitate their connections and communities, just as CB radios once connected truckers on the road.

“The merely rich, the super-rich and the billionaires have already begun constructing their bunkers, their compounds. They will have access not only to AI-powered electronic security and private armies, but also the most advanced and expensive AI-driven medical tech. They will be the ultimate audience and consumers of the most advanced machine learning innovation. I believe this will go beyond the wealth polarization seen in the Victorian Age during the Industrial Revolution, for instance, to a kind of neo-feudalism, pricing the best tech out of the reach of the ‘serfs’ in their RVs, tiny homes, shipping container villages, Hoovervilles and converted office building ‘dormitories.’

“After all, wealthy people are the ones who invested in and paid for the tech. They naturally expect to have the first crack at consuming it. But even their fortified compounds and bunkers can’t protect from the full ravages of climate change, the unearthly, smoky orange haze, the fires, the rising water, the severe storms. They will need to be mobile too. I’m sure they expect multiple homes, yachts, helicopter

pads and private jets to take care of it. If need be, they're ready to go to ground. COVID, for them, was a rehearsal.

"The rich will also suffer in less visible ways. Even as they abandon contributing to the good of the larger social infrastructure and instead use their extreme wealth to create new kinds of castles and moats, to stand with pre-ghost-visitation Scrooge and send the less privileged to die in the overheated countryside and 'decrease the surplus population,' they will lose more than they expect. Two that are top-of-mind for me:

- "Above all, *human innovation* will suffer due to the lost potential of those who, if they had lived in more charitable circumstances, might have come up with better solutions for an inhospitable planet than a Malthusian die-off as a bargain, as happened in the prosperity that grew out of the Dickensian 1800s.
- "And valuable *data on humanity* will be missing. Machine learning, for all its promise, relies on data. That data, fed into a giant hopper to train the dreamed-of ensembles of specialized and general AI models, must necessarily reflect ourselves back to us. While creativity, with surprising analogic connections, turned out to be ridiculously easy for AI tools to master, the 'mind' of AI will always be human society's mirror image. If AI agents become biased and fascist it is because our cultures are biased, with visible and invisible fascist tendencies. AI job applicant screening tools prefer the names and qualifications of homogenized white men who come from money because the data collected gives those qualifications preferred treatment.

"AI/ML tools learn the essence of who we are better than we are able to see in ourselves. We can program the algorithms to 'remove bias' from the data at the very risk of destroying the 'accuracy' and 'truth' of what the data represents. To remove bias intentionally is to ask the algorithm to accept a lie about the source data, the training data, the synthetic data. To make the AI a less accurate mirror of who we really are, warts and all.

"If the presumed Malthusian bunker-dwellers of 2040 cut themselves off from the larger community of humanity – from the 'surplus population' – they will not only be poorer for the loss of the minds of the creators who never lived or never found their potential, they will also have much more narrowly-constructed AI tools, because they will have lost the richness gained from more diverse population who could contribute to a more diverse data set to train and create better models."

Daniel Schiff

The changes will likely be crosscutting and wide-ranging

Daniel Schiff, assistant professor of technology policy and co-director of the Governance and Responsible AI Lab at Purdue University, predicted, "By 2040, I expect that we will experience major changes in our daily lives, both visible and invisible, resulting from AI. These changes are likely to be crosscutting, affecting healthcare, education, labor, recreation, information consumption, socialization, human creativity and much more. A few strike me as especially significant:

- **"Advances in healthcare owing to AI** could be especially transformative, leading to extended lifespans, improved quality of life, better preventative care and public health, expanded access, and a reduction in the number of ailments that an average individual has to worry about. Adoption of administrative healthcare AI tools – such as those making electronic health records

more-complete and interoperable, and those drawing on different sources of data such as synthetic data – could ease increases in healthcare costs somewhat.

- **"A renaissance in education is necessary**. Current and future generations of generative AI will likely lead to massive disruption in how teachers teach, students think, and educational institutions operate. Stakeholders in the education subsystem will need to carefully consider how to preserve critical thinking, adjust their pedagogy to counteract misconduct and apply AI education tools to foster upskilling rather than deskilling. Schools and learning are likely to look and feel very different, even if it takes a decade or more for these tools to become saturated, and even if classrooms and universities appear superficially structurally similar.
- "**Robotics may become more affordable and pervasive**, with increased presence of robots in healthcare, elderly care, education and other sectors. Long-standing questions about aspects of human-machine interaction and socialization will become increasingly salient as individuals interact with robots in their daily lives. Depending on the design of these systems, they may also substitute for human-human relationships, increasing isolation, alienation and other pathologies.
- **"Disruption in labor and the economy is inevitable**, if difficult to precisely predict. While key tasks and work processes will change, I expect the economy will continue to foster high-quality and low-quality jobs. Depending on how policy and industry actors approach skill adjustment, education, and the social safety net, work could involve enhanced surveillance and performance monitoring, or alternatively, shorter work weeks and higher productivity. While this direction is substantially up to how decision-makers help realize the efficiency gains of AI, it seems very likely that a large majority of occupations will involve more interaction with AI systems, both directly and on the back end. Significant engagement with AI systems will become a daily part of most workers' lives.
- **"Less change may occur at the level of political systems**, barring incredibly rapid advancements in AI with equally robust political activity. A worst-case scenario, perhaps likely in some locations, is that some authoritarian countries will have come closer to perfecting dystopian forms of social control, such as through pervasive implementation of AI-enabled tracking, profiling and manipulation. With any luck, democracies will have advanced infrastructure and literacy enough to improve robustness against threats from AI-generated misinformation and social manipulation. However, changes resulting from social and economic upheaval, like labor disruption, educational gaps and/or the concentration of new wealth gains due to AI, could nevertheless lead to widespread dissatisfaction, new policy windows and shifting coalitions to advance goals like increased income distribution. Thus, while major transformations of political systems (such as moving away from capitalism or abandoning authoritarianism or theocracy) is not likely, even moderate changes in political alignment and the broadening of acceptable policy solutions could induce dramatic changes in individuals' lives."

Chris Swiatek

Humans are being moved out of 'the loop'; they might land next in the metaverse

Chris Swiatek, co-founder and chief of product at ICVR, a Los Angeles-based XR development company, wrote, "While I hesitate to claim that all of the ideas I share will all be fully realized by 2040, I think at the very least we'll see significant progress on these fronts. I expect AI tools to take over most menial tech and tech-adjacent tasks by 2040. This will widen the divide between unskilled and skilled/creative labor, as well as their respective labor markets (especially unskilled outsource labor markets). Next, as AI becomes increasingly more competent at what we may view now as 'human-only' tasks (creative, high-

skilled, etc.), a significant portion of jobs will evolve from what we know today into human-in-the-loop AI monitoring and later, finally, to human-on-the-loop monitoring. This transition will create a labor market contraction in some areas, while opening up a host of new careers based upon usage, creation, training and monitoring of AI tools. With this in mind I remain optimistic that the medium-term growth of the tech industry labor market will continue into 2040 at a rate similar to what we're accustomed to presently, but with many laborers forced to retrain and/or incorporate AI into workflows in order to maintain relevance.

"We're in the Wild West days of AI. As things advance there will be much more significant regulation and scrutinization of consumer-facing AI models and their training data, from both government and private platform owners. We already see AI work products banned and AI usage disclosure policies are beginning to be required on platforms like Steam and YouTube. A standardization in AI usage rights and licensing is likely to be driven by these platform owners, resulting in models being required to disclose training data sources and usage rights affected. These policies will pave the way for government regulation, but it's likely to lag behind by five to 10 years. Most publicly-available models are likely to include flags that can be used by analysts to identify any work product that is AI-created in order to combat the spread of AI plagiarism, false information and so on. This may start as a voluntary practice by owners at first as a result of public backlash and eventually become a requirement for use. These types of restrictions, as well as existing prompt content restrictions, will further fuel the growth of unregulated open-source AI models, with individuals able to generate content on their home computers – as we already see happening now with the explosive growth of community around Stable Diffusion.

"By 2040 we can also expect to see more-significant application of AI in military technology. The spending and intent for incorporation of AI into military systems is already present today. The products of this will be realized over the next two decades, primarily in command, control and communication systems and on autonomous reconnaissance and weapons platforms. AI is being used for data synthesis, analysis and predictive monitoring as the pool of data and number of data points and sensors grows in complexity and number. The high impact of cheap drone platforms on the battlefield in Ukraine and the equally high impact of electronic warfare to break communication between drones and their operators creates a clear use case for autonomy. AI fighter wingmen with a human-in-the-loop have been the north star of the U.S. next-generation fighter project for some time now and will be further realized over the next few decades. Frighteningly, as the speed of warfare increases, militaries will be forced to incorporate human-*on*-the-loop or completely autonomous systems in order to compete – and anyone who does not do so will be at a decided disadvantage.

"In regard to development of the metaverse, we can expect AI to have great impact in the areas of generative content, avatars and user expression, human/computer interaction and XR. I view 'the metaverse' as the destination platform at the end of our undeniable current path of physical and digital convergence as technology continues to play a larger role in aspects of our daily lives to connect and empower human interaction. The true ideal of a metaverse will finally be realized when we see interoperability between many varied platforms, using a shared standard of data communication and user data persistence. Real-time rendering engines will drive this content and serve as the toolset for building and publishing content. While I don't believe that the experiences/platforms we see on the market today are really indicative of true metaverse products, they do play a role in seeing the likely future.

"Advances in higher-level XR technology will be the main driver of metaverse adoption. Generative AI will be extremely influential for interactive content creation, driving one of the most impactful and

immediately apparent use cases for metaverse experiences by 2040. Creating a persistent 3D world and enough hand-created content that users can consistently return to and engage with the platform for hundreds of hours is an extremely expensive and time-consuming process – analogous to developing and supporting massively multiplayer online games like World of Warcraft, which was developed over five-plus years for $60 million-plus in 2004 dollars. Development time and cost are among the biggest challenges troubling developers of recent metaverse-style experiences that haven't gained much traction.

"Generative AI used as a tool to augment human creativity will help democratize the content-creation process – not just for development teams, but also for individual users expressing themselves through user-generated content. This will impact all types of content creation, including 3D assets and animation, digital humans/non-player characters, narrative, programming, game mechanics, etc. On the XR front, AI will help enable automated digital-twin creations of real-world spaces through computer vision and 3D reconstruction that can be used as a basis for augmented-reality interaction. AI will be implemented to enable users to express themselves in virtual spaces in an increasingly accessible way, including avatar creation, human/computer interaction and social features. AI processing of data for human/computer interaction will extend to more than just avatar puppeteering, allowing for more-accessible and intuitive ways to engage with digital content. AI speech reconstruction opens up avenues for natural real-time translation and accessibility features. I am skeptical that most users will embrace creation of AI-driven versions of themselves at a widespread scale in the near future, although the idea will certainly be explored extensively.

"Improvements in AI will also unlock more-powerful potential for augmented-reality content in metaverse experiences. Real-time reconstruction of 3D spaces and computer vision object recognition are essential for creating useful features in XR. While these tools exist today, it remains challenging in many cases for developers to achieve consistent results, putting a hard limit on potential feature feasibility. As the hardware and AI-driven software behind these technologies improves, it will unlock more-powerful XR capabilities to bridge the gap between real-world interaction and digital content and eliminating current feature limitations. This technology will reach a high level of maturity by 2040, facilitating the type of intuitive tech-driven interactions between humans and digital content in an XR environment that many people today think of when they hear the term 'metaverse.'"

Larry Lannom

We're in a world in which misinformation can feed off prior hallucinations

Larry Lannom, senior vice president at the U.S. Corporation for National Research Initiatives, predicted, "Advances in science and medicine will likely be accelerated through the use of AI, perhaps in ways that are currently unimaginable. There is a great deal to be hoped for in this, although also a great deal to fear. Manipulation at the genetic and cellular levels, for example, has the potential to greatly improve human life but also produce great harm, either through accident or malevolence.

"Advances in the ability of AI-based processes to imitate humans are inevitable and are likely to have a negative impact on society. Trust is key to social coherence. Does that swell of approval for a given political candidate or corporate IPO reflect the input of a large number of people or of a single individual or AI system? While these sorts of manipulations are already possible today, they will become much easier with advanced technology.

“Keeping the impact of advanced AI-based technology more positive than negative will require explicit societal and governmental actions. The has already begun, but it will be important to consider not only the output of AI systems, but also the input to AI systems and input by AI systems themselves. It is certainly the case at this stage of development that the algorithms at the heart of AI systems primarily function by finding patterns in the input data, patterns that may or may not be discernable by humans due to the immense amount of data that is being processed.

“This is somewhat controlled in science as the data comes curated through peer review and the need for theories to prove themselves via accurate predictions. This is not the case for the non-science world of information and therein lies the danger in AI systems consuming without distinction everything accessible on the Internet today.

“This has shown up to date in areas such as bias in hiring but as the technology spreads and improves the importance of selection of input data will grow. This will especially be the case as the amount of information generated by AI systems increases, leading to AI systems consuming input that has been previously generated by other AI systems, potentially leading to ever greater levels of authoritative sounding misinformation that has simply doubled down on prior hallucinations.”

Alexander Halavais

The most important variable is how AI programs are funded and how well-funded they are

Alexander Halavais, associate professor and director of the Social Data Science master’s program at Arizona State University, said, “Unlike many of the ‘hyped’ information technologies that continue to be circulated, from blockchain to quantum computing, I suspect the effects of large-scale learning models (LLMs included) will have extraordinary effects on nearly every aspect of our social lives. Conversational agents will be widely deployed by companies, governments, and schools, and widely integrated into our everyday lives.

“There are great opportunities here, particularly as we might imagine a distributed access to a guided educational conversational system that provides explanations that meet the curious person where they are and adapt to their capability with language and other systems. Likewise, there is an opportunity for outstanding expert systems. There has been criticism relating to the lack of reliability (and inscrutable nature) of some deep learning-based classification systems in a medical context, and there will be more such missteps. But the potential for combining such systems with individualized healthcare and preventative medicine is substantial.

“The difference between these two is funding models. In the U.S., the expenditure on health care may move some of these systems forward relatively quickly. The relative lack of funding in the education space, at least at scale, as well as institutional friction, will slow its adoption here, but there may be opportunities at the margins. The space with the most significant funding will remain the application of these technologies in warfare. Indeed, the other two areas — education and medical care — are likely to see the fastest implementation in the military space as well.

“The funding models in social spaces online remain heavily dominated by surveillance and marketing-based funding. To the degree that this remains the dominant mode of information and socialization online there is the danger of misleading artificial conversational agents, those that either do not reveal the degree to which they are partially or fully artificial, or that have unstated objectives – that is, agents

designed to change the ways in which you think about the world and influence what you desire. Sadly, this outcome is entirely predictable, and the pathways of resisting it – public policy, AI literacy or the like – are limited and challenging."

Keram Malicki-Sanchez

'Tools should thoughtfully enrich, not overwhelm, the human spirit'

Keram Malicki-Sanchez**,** Canadian founder and director of VRTO Spatial Media World Conference and the Festival of International Virtual and Augmented Reality Stories, shared an excerpt from his essay "Virtual Layers, Human Stories: Autoethnography in Technological Frontiers." He wrote:

"Alfred North Whitehead's process philosophy (1929) proposes that existence comprises ephemeral experiential events rather than static objects. Though perceiving continuity, our world perpetually fluctuates. Whitehead's conceptual abstractions provide a means of articulating the relational networks shaping reality. Donald Hoffman contends that consciousness constructs fitness-optimized perceptual 'interfaces' rather than accurately depicting reality (Hoffman, 2019). Our senses present not objective truth but biological utility crafted by natural selection. Hoffman proposes layered realities, with conscious agents occupying the surface above unconscious generative processes.

"Despite rapid progress, AI still struggles to capture the essence of human experience. Algorithms efficiently process data but cannot grasp life's deeper meaning. AI falls short of representing the authenticity and the spirit animating human storytelling.

"As Hoffman suggests, our subjective perceptions may reflect evolutionary adaptations more than objective reality. Likewise, AI risks presenting distorted renderings downstream of human phenomenology. While ethical AI could aid autoethnographers, we must ensure technology does not undermine human dignity. Amidst change, vulnerable personal accounts remain vital, upholding our shared humanity. Tools should thoughtfully enrich, not overwhelm, the human spirit.

"Just as virtual reality can make the 'natural world' come into sharper relief for its detail, generative AI can highlight what makes homo sapiens sapiens [modern humans] distinct. It is our invention, and thus it will carry our fingerprint. Ideally, it remains our companion, and the lessons we have learned from the mismanagement of social media come into much stronger consideration as wisdom we carry forward into this irrevocable new paradigm, so that we remain something for machines to dream about."

Pamela Wisniewski

'We need to allow room for human discretion and struggle,' important parts of being human

Pamela Wisniewski, professor of human-computer interaction and director of the Socio-Technical Interaction Research Lab at Vanderbilt University, observed, "My biggest concern at the moment is that we are trying to rein in AI before clearly defining its boundaries.

"In the spring of 2023 the White House put out an RFC on AI Accountability, and today mass civil action tort lawyers are suing social media companies for how their algorithms are negatively impacting the mental health of youth. But wait: what exactly is AI? For instance, do any rule-based recommendation systems, AI-informed design-based features or other system artifacts constitute AI? How are regular

systems different than ones based on AI? While these questions are answerable, we have not yet reached a consensus. And we cannot begin to regulate something we have yet to even clearly define.

“Another concern is more interpersonal – we have reached the level of the ultimate Turing test, where generative AI, deep fakes and virtual companions are blurring the lines between fantasy and social reality. When we have people opting to partner with AI rather than other humans and we are asking our children to use conversational agents to improve their mental health, I have to wonder if we are dangerously blurring the line on what it means to be human and desire human (or human-like) connection.

“It would be preferable that AI be used to replace mundane and menial daily tasks or to automate clear-cut processes that benefit from efficiency over intuition. However, AI is being integrated into all aspects of our daily lives in a rather seamless and invisible manner.

“Yet another concern of mine is that as a qualitative researcher in a computer science department, I attempt to explain the importance of struggle in the human thought process as an important part of learning. I tell my students qualitative data coding is hard because YOU have to be the algorithm. You have to think for yourself and, often by brute force, come up with an answer. My concern is that when we embrace the application of AI agents in learning processes that make such work easier, we are taking away important scaffolding in the process of critical thought.

“More and more I see people blindly responding based on rule-based policies even when they make no damn sense. We need to allow room for human discretion and struggle, as it is an important part of being human.”

Nir Buras

Human-machine rules should achieve the reality we want for our children and grandchildren

Nir Buras, principal at the Classic Planning Institute, an urban design consultancy based in Washington, DC, wrote, “Intelligence cannot be artificial, so ‘artificial intelligence’ – isn’t. The idea of more-complex computational machinery begs two questions: Who is going to use it? And in what ways? The real questions cannot be boiled down to ‘AI, Problems and Solutions’ but instead should be framed as: How do we want to live our lives and work toward the best future for the lives of our children and grandchildren?

“I wrote the following in answer to Yuval Noah Harari’s ‘Homo Deus,’ which I found intellectually lacking. This is still a work in progress, a previous version was published by the U.S. Army Training and Doctrine Command as ‘Human-Machine Rules Version 05’ in May 2023.

“The question is not whether humanity’s focus should shift to human interactions that leave more humans in touch with their destinies. It is at what cost do we avoid doing so now? We realize that today’s challenges cannot be addressed by applying the same methods of thinking that created them. Human-machine rules are therefore not about being ‘realistic’ today but about the reality we want for our children and grandchildren. We reject the idea that humanity should hand over the job of fixing the problems that the tech world generated to more technology and to those who created the problems in the first place. Human-machine rules are based on and meant to support free, individual human choices.

They can help define what degrees and controls are appropriate to ensure personal freedoms, secure personal property and minimize individual risk.

“They help indicate how consumer and government organizations might audit algorithms and manage equipment usage for societal and economic balances. They can help organize the dialogs around the various topics of human-machine interaction, especially in so called ‘ethical’ matters. Consequently, Human-Machine Rules are conceived to address any tool or machine, from the first flaked stone, to the ultimate ‘emotion machines.’ They can help standardize programming and user experience, and reason through the ethics of embedding technologies in people and their belongings.

“Human-machine rules are intended to be an outline for a legal code, similar to codes for motor vehicles, building and other construction and hazardous materials handling. The rules might be:

- All human transactions and material transformations must be conducted by humans.
- Humans may directly employ tools, machines and other devices in executing rule 1.
- At all times, an individual human is responsible for the activity of any machine, technology, or program. All computing is visible to anyone at all times (no black box computing).
- Responsibility for errors, omissions, negligence, mischief or criminal-like activity with regard to a technology is shared by every person in its organizational, operational and ownership chains, down to the last shareholder.
- Any person can shut off any machine at any time. Penalties apply for inappropriately stopping machines.
- Right to repair and easy recycling are required: a. All machines and parts greater than 1mm in size can be manually repaired with minimal tools. b. Components can be recycled using less than 5% of the energy required to produce them.
- Personal data are personal property. Their use by a third party requires compensation.
- A technology must mature to completeness prior to common use. a. Minimum viable products are unacceptable for common use. b. Consensus must emerge regarding a technology serving as an appropriate technology.
- Parties replacing a technology with another shall ensure that, a. the technologies replaced are maintained in all their aspects, including but not limited to chain of materials, processes, and technologies supporting them; b. no less than 100 persons (masters) worldwide continue in perpetuity to use, develop, produce, practice and teach the said technology’s knowledge bases, areas of knowhow and skills. c. Replacement components are made available for 200 years for machines and 500 years for buildings, including stone, metals and wood for their repair. d. Children under age 12 are informed of the existence of previously-used technologies and exposed to them through museums, schooling and demonstrations.

“The proposed rules may be appended to the International Covenant on Economic, Social and Cultural Rights (ICESCR, 1976), part of the International Bill of Human Rights, which includes the Universal Declaration of Human Rights (UDHR) and the International Covenant on Civil and Political Rights (ICCPR). International Covenant on Economic, Social and Cultural Rights, www.refworld.org.; EISIL International Covenant on Economic, Social and Cultural Rights, www.eisil.org; UN Treaty Collection: International Covenant on Economic, Social and Cultural Rights, UN. 3 January 1976; Fact Sheet No.2 (Rev.1), The International Bill of Human Rights, UN OHCHR. June 1996; or any other appropriate legal platform.”

Alan Inouye

'Deployment of any technology is never a neutral intervention, as it overlays the existing social condition of the people'

Alan S. Inouye, senior director of public policy at the American Library Association, commented, "This is a mixed story and a historical story that transcends the specific case of artificial intelligence. In some respects, everyone or nearly everyone benefits from technological advances. Take the instance of widespread commercial aviation. Some people avail themselves of a mode of transportation that provides more rapid movement than any other mode. Even those who do not choose to fly themselves benefit from the new services enabled by the aviation network, from transcontinental next-day delivery of packages and transfer of organs for transplant to fresh flowers or vegetables or seafood delivered quickly to consumers. Similarly, everyone or nearly everyone experiences negative impacts of technological advances. In the instance of aviation, for example, there are environmental challenges caused by flying and its associated infrastructure.

"Other technological advances such as personal computers, the internet, World Wide Web and mobile phones also provide direct and indirect benefits to all and undeniably are accompanied by disadvantages for individuals and society. Technological advances, especially those associated with the knowledge sector such as artificial intelligence, also enable differential benefits. Possession of relevant knowledge and abilities make it possible for some to make the most of these advances, whether to create or innovate new products and services, or to leverage advances to improve efficiency and effectiveness.

"As with prior technologies, I expect some individuals and organizations to experience fabulous success and accomplishment in the realm of artificial intelligence – the quintessential industry for the knowledge worker. By contrast, those without such knowledge and abilities will miss out on these opportunities. Thus, there will be a new infusion of 'have-nots' generated by the advance of artificial intelligence technologies. We will want and need public policy and non-governmental efforts to help these folks overcome this new digital divide.

"Note the evolution of the digital divide from simply gaining access to technology to the ability to use it toward beneficial purpose, which will characterize the infusion of artificial intelligence technologies.

"As for U.S. national public policy, I am not optimistic. I wish I could be, but I don't see even a glimmer of change for years to come. Perhaps there will be a discontinuity in the political timeline of our history that will change the trajectory. As evidenced by the current U.S. House of Representatives and U.S. Senate and the respective majorities held with razor-thin margins, we are a divided country politically. Unfortunately, this division has also seen increasing polarization in the past decade or two, making progress quite difficult, even for those policy proposals that enjoy the support of strong majority of both elected representatives and the populace.

"There hasn't been any major public policy law for internet-related technology enacted in the 21st century, and I don't see any prospect of that situation changing. The continuing inability of the U.S. to adopt major public policy on the knowledge society means that de facto policy will be made in Europe. Companies and other organizations wishing to pursue the pragmatic course of having one worldwide approach when possible will gravitate towards European law and policy. Consequently, European policy-influenced practices are likely to continue to have some resonance in the United States.

"The 'haves' will likely face a light regulatory regime in order to exploit artificial intelligence and other technological advances for personal, organizational and national gain. As suggested above, the 'have-nots' face the possibility of losing out yet more in the future as the knowledge society 'progresses.' Such a mixed story for artificial intelligence between now and 2040 would be consistent with prior technologies or revolutions in society. The deployment of any technology is never a neutral intervention, as it overlays the existing social condition of the people."

Sara 'Meg' Davis

Inequalities and human rights issues will be amplified

Sara (Meg) Davis, professor of digital Health and Rights at the University of Warwick, argued, "Health goals, for example, the promise of more rapid and accurate diagnosis and treatment, are often cited as an underlying rationale for the rapid growth of artificial intelligence. But, in practice, without stronger AI governance the profound inequalities and human rights issues in global health risk being amplified. The foundations for future AI governance will be laid in the next year, at high speed. Health and human rights experts and advocates urgently need to be part of the conversation and to raise the three following concerns.

- **"Whose security are we prioritizing?** Real-world AI-related harms are disproportionately experienced by women and minority communities in high-income countries, as well as by many others in low- and middle-income countries who lack a voice in U.S. or UK tech governance. The familiar critiques apply to AI governance when it comes to reinforcing colonial inequalities: focusing narrowly on protecting wealthy countries from pandemics originating in the rest of the world; and ignoring equally critical and urgent needs of those dealing with weak health systems in the Global South, who are locked out of access to vaccines and more. In many countries with draconian cybersecurity laws, the digital securitization discourse has itself become a cause of insecurity for those targeted by police and authoritarian states. We need to demand digital security for all, not only for elites.
- **"The spectre of self-certification by corporations for AI governance** ought to ring loud alarm bells in global health. We have been here before, recently and embarrassingly: The State Party Self-assessment Reports countries dutifully completed for pandemic preparedness led the U.S. and UK to rank themselves highly, only to perform abysmally when they were tested in reality by COVID-19. Any self-certification process for AI safety must have independent review by experts, real social accountability mechanisms to enable communities to have a voice at every level of AI governance and whistle-blower mechanisms to enable anyone to raise the alarm when AI systems cause real-world harms.
- **"Meaningful participation in AI governance.** Given the rapid pace of AI development, Open AI rightly notes that laws and policies created now may not be fit for purpose a few years from now and may need repeated iterations. But how will this include robust and democratic community voice at every level? AI critic Timnit Gebru warns, "I am very concerned about the future of AI. Not because of the risk of rogue machines taking over. But because of the homogeneous, one-dimensional group of men who are currently involved in advancing the technology." In global health, we have already experienced the lopsided influence of the private sector, private foundations, and interested donor states in multi-stakeholder platforms—and we will see this repeated in AI governance without pressure for truly democratic and inclusive

governance, with a strong voice for communities and civil society to resist exploitative tokenism and promote meaningful participation in governance.

"In the Digital Health and Rights Project, an international consortium for which I am principal investigator, we are establishing one potential model of transnational participatory action research into digital governance that includes democratic youth and civil society participation from national to international levels. In the 1980s, AIDS activists around the world mobilized to demand a seat at the table in clinical trials and in global health governance mechanisms. That movement reshaped the global health landscape and saved millions of lives. Today we need to demand a voice in support of strong human rights and global health protections in AI governance."

Roberto V. Zicari

Future gains/losses are too difficult to predict, but research on safety inspection is advancing

Roberto V. Zicari, Germany-based head of the international Z-Inspection Initiative, leading experts to define the best assessment process for Trustworthy AI, commented, "It's nearly 2024; 2040 is 13 years from now. On a linear scale of time this is quite a short period. The key question is how technology (such as AI) will be used or misused by humans in the next 13 years. The next question to ask is how much autonomy will be given to technology (such as AI) in respect to humans. The pace of development of AI is very rapid. The rate of change of human behaviors has changed quite little over the centuries. The struggle between good and bad will continue. Honest answers to the question of what life might be like in 2040 are bound to each individual and their respective role in society. No definitive answers can be given."

Zicari shared details of Z-inspection at a Trustworthy AI event in Strasbourg, France, in July 2023. "Trustworthy AI labs are located worldwide to mobilize international experts to test how to best evaluate AI systems in a multistakeholder, consensus-based participatory process that allows all stakeholders to assess risks in specific systems. Z-inspection is a collaborative approach that brings in stakeholders from science, government and the public at different stages of the whole lifecycle of an AI system (design, development, testing/simulations, deployment, post-deployment monitoring). It also looks to identify tensions relating to the AI systems. Such may exist between 'winning' and 'losing' aspects of the system for different stakeholders, between 'short-term' and 'long-term' effects of the system or goals, or between 'local' and 'global' consequences and effects engendered. Multi-domain stakeholder and expert interactions help identify such tensions and propose solutions beyond the limitation(s) of the static checklists.

"The overarching goal of the Z-inspection process under the premise of the seven criteria of the European Commission's High-Level Expert Group on AI's 'Assessment List for Trustworthy Artificial Intelligence' (ALTAI) is to achieve a consensus-based mapping of the advantages and the drawbacks of an AI system, and to assess its trustworthiness under the light of best-case and worst-case scenarios and potentially arising tensions, for which a solution is proposed. In case studies to this point, Z-inspection has assessed risks pertaining to AI in cardiovascular risk detection, AI-based skin lesion classification for the early detection of skin cancer and precancerous lesion, AI-based determination of the degree of compromised lung function in Covid-19 patients. The trustworthiness of automated tracking of natural landscapes through analysis of satellite imagery by AI has helped determine that an AI system under scrutiny – an environmental monitoring tool for the Dutch government – passed all the self-assessment steps for the ALTAI criteria and those of the European Union's Fundamental Rights Impact Assessment for AI (FRIA) for use of AI in law enforcement."

Chapter 4 – Losses and gains: A look at challenges *and* opportunities

A number of respondents to this canvassing shared their insights about the most-likely mix of both gains *and* losses in the digital future that lies between now and 2040. Several expressed their thoughts on the steps that should be taken more boldly today to mitigate the future risks of accelerating technological change in order to maximize positive outcomes. One observed that many experts say AI may advance to human-level general intelligence – AGI – in three to 15 years, and that would create a far different future than the one that might be projected when humanity is equipped only with the type of ANI (artificial narrow intelligence) that is rapidly evolving in today's generative AI systems.

Klaus Bruhn Jensen

Hope for progress and hard work will determine the future; and the sweep of history shows humans can prevail

Klaus Bruhn Jensen, professor of communications at the University of Copenhagen and author of "The People's Internet," predicted, "By 2040, AI will have changed individuals' daily lives on a scale similar to the changes afforded by the internet between the 1990s and the 2020s in terms of the availability of information, the access to communicative interactions and the capability of acting at a distance, whether in the pursuit of personal interests and relations, or in economic and other social transactions.

"By 2040, AI will have been embedded in the economic, political and cultural systems of local and global society, on a scale similar to the digitalization of social institutions between the 1990s and the 2020s. In both cases – digitalization and AI as the latest manifestation of digital computing technologies – it is essential that publics and policymakers do not avoid, but address and embrace the question of determination: What determines the structures and trajectories of individual lives and social and cultural systems?

"With history as his and our guide, the sociologist and cultural theorist Stuart Hall suggested the answer: 'Technologies such as digital computing and AI constitute determinations not in the final instance, but in the first instance – like economic markets, technologies stake out a field of the possible and the impossible and within this field it is human agency, individual and concerted through collective deliberation and decision-making, that embeds technologies into social life. Where classic economic and technological determinism proposes to follow the money, or to follow the machines, we should instead follow the infrastructures – the practical ways in which the undeniable potential of technologies for individual and collective flourishing come to fruition, or not.'

"Following and making the most of technologies as infrastructures requires two things: hope and hard work. Hope represents the denial that AI and other digital technologies determine, for instance, ever-increasing surveillance or exploitation of their ordinary users. Hard work, in the face of advances as well as setbacks, will be required of researchers along with publics and policymakers. Progress is possible. The hope for progress has fueled many local and global interventions and developments that, despite persisting inequality and misery, have made the world a better place for human existence than it was two millennia or even just two centuries ago. It is in this perspective that we must observe AI, its potentials and challenges.

"It is not for us to predict what will have been lost and gained, respectively, by 2040. Until 2040, and after, we must undertake hard work to have AI and subsequent technologies serve humanity and the

good life. Throughout natural evolution and human history, we have been propelled by hope, by the imagined and anticipated actualization of manifest potentials for what the ancients thought of as human flourishing (eudaimonia). As we move toward 2040, we must be constantly mindful of two other deadlines regarding a sustainable human existence on Earth: 2030 and 2050. One safe prediction is that humanity needs to make a green transition to make it, comfortably or at all, beyond 2040 and 2050. AI is the least of our problems, a potential solution. AI is one more instrument that may promote human survival and flourishing in the centuries and millennia ahead."

Seth Herd

The impacts of narrow AI will be mostly beneficial, but AGI will arrive in 3 to 15 years

Seth Herd, a futurist and computational cognitive neuroscience researcher now working on human-AI alignment and lead author of "Goal Changes in Intelligent Agents," predicted, "AI timelines are very difficult to predict. My own prediction, as an expert in neuroscience, neural networks and cognitive architectures, is that we can expect to advance to having self-improving artificial general intelligence (AGI) in three to 15 years. The change would have to be astonishingly slow for it to come in 2040.

"I worry much less about the impact of narrow (limited) AI on society than I do about AGI, However, I'm going to answer this question as I would if we might assume that we *won't* have real, self-aware, agentic, self-improving AGI by 2040 (as I do expect we will).

"The impacts of narrow AI will be enormously net beneficial. Concerns about deepfakes and algorithmic bias are relatively easy to address, and I have confidence that they will be successfully mitigated. The increases to productivity and well-being due to narrow AI will be enormous, outside of the enormous exception of the impact of its displacement of workers. Narrow AI will serve as a cheap personal assistant with expertise in psychology, finance, job strategy and just about everything else. This will be enormously useful to everyone, particularly in regard to the emergence of abundant expert psychological counseling.

"Narrow AI will eliminate an immense number of jobs by 2040. It is difficult for me to see how humanity will weather this challenge, since our economic models are centered on a job for most people as their source of livelihood and source of meaning.

"If this job replacement happens slowly enough, the wealth increases from productivity may be large enough to provide a minimum basic income type of support for much of the world's population. This should be relatively easy in the U.S., but poor countries are unlikely to benefit enough to provide this support. However, with a lower fraction of their populations performing knowledge work, their economies will be relatively less affected."

Kunle Olorundare

If people don't harmonize on AI, the future will not bring out the best in humanity

Kunle Olorundare, president of the Nigeria Chapter of the Internet Society, predicted, "The rapid proliferation of AI is likely to create significant changes in individuals' daily lives and in society's social, economic and political systems. By 2040, we will see AI-powered technologies integrated into all aspects of our lives, from our homes and workplaces to our transportation systems, economy, social lives, tourism and healthcare systems.

"The following potential gains and losses can be expected by 2040:

- "**Increased industrial productivity and economic growth:** AI will automate many production tasks currently performed by humans, freeing up people to focus on more creative and strategic work. This could lead to significant increases in productivity and economic growth.
- "**Improved healthcare and education:** AI will be used to develop new medical treatments and diagnostic tools that will make medical treatment easier and more effective. 3D and 4D printing will be used to manufacture and synthesize medical body parts. The personalization of education will be seamless for each student. This could lead to significant improvements in healthcare and education outcomes.
- "**New forms of entertainment and recreation:** AI will help create new and immersive forms of entertainment and recreation. This will lead to new ways for people to relax and socialize. This will include a lot of games in the metaverse, using extended-reality (XR) tools. There will be both immersive and generative-AI entertainment.
- "**New social and economic challenges**: AI is likely to lead to some job displacement and losses, however, these can be overcome by continuous education and the creation of new job roles. A second primary concern is the use of more-sophisticated autonomous warfare weaponry and ammunition systems and other deployment of AI in warfare. A third concern is AI's deepening of more-comprehensive surveillance that will further erode privacy. A fourth concern is the polarization of society due to uses of social media to manipulate and divide people; more attacks between people of opposite thoughts will be a serious problem. This bad side of digital life has been evident the past decade or so, playing role in the erosion of democracy and human rights in many places in the world.

"It is important for people worldwide to start finding ways to harmonize and work together toward the responsible use of AI. If it is used ethically, AI will be launched into action to further improve the quality of life for people worldwide. It will be used to address some of the world's most pressing challenges, such as climate change, poverty and disease.

"It is vital to identify the potential risks associated with AI now and to take steps to mitigate these risks to ensure that it is responsibly developed and used in a way that benefits all of humanity. We need to assure that AI systems are transparent and accountable and that they are used to promote human rights and well-being."

Walid Al-Saqaf

AI's success will require maintaining a delicate balance between its vast potential and the challenges it introduces

Walid Al-Saqaf, associate professor of media technology and journalism at Södertörn University in Huddinge, Sweden, wrote, "By 2040 the ubiquity of AI will have reshaped numerous facets of our daily lives. Advanced personal AI assistants will likely be part of our routines, offering predictions and automations tailored to individual needs. The medical field is poised to witness significant advancements, with wearables and AI-driven virtual consultations becoming much more commonplace. The merging of human thought processes with computational capacities through brain-computer interfaces such as Elon Musk's Neuralink project, if realized, could be a game-changer.

“This technological proliferation, however, also brings with it potentially grave challenges. The economy will undergo transformative shifts, birthing new professions while sidelining others, necessitating societal strategies for unemployment and creating new jobs and skillsets. Governance too could benefit from enhanced AI capabilities, but the potential for misuse in surveillance and control by authoritarian regimes looms large, particularly in the realm of warfare.

“A major inflection point could be the evolving power dynamics; AI might decentralize power by equipping individuals with tools once exclusive to large entities, particularly if peer-to-peer cryptocurrencies become the norm for exchanging value. However, the risk of a few dominant entities controlling AI’s pinnacle remains unless a total transformation of how wealth is created is achieved, e.g., universal income and reduced economic inequality.

“While the efficiency gains and new opportunities AI offers are undeniable, concerns over data privacy, job displacement and diminishing human-to-human interactions persist. If the brain-computer interface is hacked, for example, then this may create a major risk where humans may be misled or take actions based on generated information.

“In essence, AI’s trajectory in the coming decades presents a delicate balance between its vast potential and the challenges it introduces. We must strive to minimize the risk while harnessing the best of what this revolutionary technology has to offer.”

Andrea Romaoli Garcia

The great benefits of positive innovation are always accompanied by great challenges

Andrea Romaoli Garcia, an international human rights lawyer from Brazil working toward transformational governance, said, “AI is merging with biology and other technologies. We expect to gain greater knowledge due to heightened data analysis. Cognitive robots may emerge to assist in many human endeavors. All of these breakthroughs can be a big deal for many aspects of governance and daily life. But there are always challenges present alongside the benefits at times of innovation. While AI has the potential to enhance public services, health care, education and the global economy, one of the global problems still at large will be that many people will still have to struggle to be able to harness opportunities of employability.

“Mental health in the digital age is already a concern within society. The proliferation of digital platforms has led to heightened levels of anxiety and depression for many people and caused some to withdraw more from society. By the 2040s, advanced AI avatars and bots will replace humans in many if not most of our online interactions and jobs.

“People are losing interpersonal social skills. They are avoiding face-to-face real-world contact and relying on remote transactions. In the future, many people are likely to lose the capacity to build strong interpersonal relationships and strong human networks. Lack of real social understanding is likely to increase conflicts at both the social and the diplomatic levels.

“Furthermore, how can we expect bots to help us in a civil and truthful manner in the near future if machine learning is being trained on sets of data exhibiting human conversations and disinformation at a time in which humans are becoming more withdrawn, divided and even violent?”

Dmitri Williams

Some systems may spread the gains equitably while others will be reserved for the rich

Dmitri Williams, professor of technology and society at the University of Southern California, said, "It's difficult to estimate the further evolution such a rapidly moving target, but one thing I think is safe to say is that AI brings speed and efficiency. Is that good or bad? It's both, and the net effect is going to vary widely across the planet.

"If we take the very long view, we can see that AI is likely to increase what can be done and reduce the amount of human input to do it. That will result in increases in productivity per capita. That's mostly a good thing, but it needs to be looked at against the backdrop of social mobility and the distribution of wealth across the world. We have enough 'stuff' right now on the planet, and we still have economic disparity, poverty and places without clean water.

"Will more stuff be the rising tide that lifts all boats, or will it simply be more for the wealthy while the conditions of the poor remain unchanged? My guess is that the answer will be a little of both, and that it's going to vary based on the politics and structure of different groups and countries.

"Places that privilege equality and a social safety net will look at the increases in productivity and seek to spread them out to ensure health, safety, well-being and opportunity. Places that privilege maximum wealth for those who can attain it at any cost will be more likely to continue with disparities.

"If we look at say, Scandinavian countries, we might expect something more like the rising tide lifting all boats. Highly economically disparate places like the U.S. are less likely to see universal gains, but there should still be some lifting of universal conditions through inefficient trickle-down effects. Faster, better health care and more accurate diagnoses, for example, are still a net positive, and they will reach the rich first, but eventually more people than have it now.

"So, asking about the impact of AI is as much about what it can do as it is as about where it would do it and how some systems are going to spread the gains out while others will concentrate them."

Axel Bruns

We are entering a novel and versatile new stage in the ongoing evolution of machine-intelligence systems

Axel Bruns, professor of digital media and chief investigator in the ARC Centre of Excellence for Automated Decision-Making and Society at Queensland University of Technology in Brisbane, Australia, said, "LLMs (AIs trained on large learning models) are getting easier and cheaper to build and run. This means that they will no longer be specialty services that only major tech companies can provide. It's likely that they will proliferate – i.e., not just their use in everyday life, but the variety of available systems, including self-hosted stand-alone systems. This means they're going to be less like search engines or social media platforms (few providers, very large userbases), and more like 3D printers or drones (many vendors, local deployment).

"This can be highly generative, leading to substantial competition and high levels of innovation, but also dangerous, due to the fact that they feature very limited oversight and offer few opportunities for effective policing.

“The most dystopic perspective is that such AI systems will be used for rogue and illegal purposes, much like 3D printers can be used to print guns or drones used to deliver bombs. Key challenges at the societal and political level include the use of AI to further pollute the information environment with disinformation and disrupt and discourage more meaningful and prosocial discourse.

“Further, they will also cause substantial economic disruption, undermining and replacing many existing professions and requiring substantial change in most others. Actions like the recent Screen Writers’ Guild strike can delay such change but won’t be able to hold it off forever; and many other professions lack such labourforce organisation in the first place or will be outsourced to locations where worker protections can be bypassed.

“Conversely, we will see the emergence of a cottage industry of AI intermediaries at least in the short term similar to the search engine / social media optimisation services of the past decades. These will prompt the introduction of more engineering and related services. But these may be short-lived – much as SEO/SMO have been – as ordinary users’ AI literacy improves. What remains will be a handful of high-end services for major commercial customers, as well as a bunch of charlatans still trying to make a buck off the rubes who haven’t yet seen through the hype.

“I am considerably less concerned about the current hype about super-intelligent AGIs that will gain the power to destroy humanity. This has always been a convenient fiction, playing on science fiction tropes. It has been promoted deliberately by AI vendors themselves in order to generate further hype around their projects; the fact that some of the current industry leaders themselves were amongst the people who were claiming that ‘our tools are so powerful, they could wipe out humanity’ tells us all we need to know about how seriously we should take these statements.

“We should move past such silliness and take these tools for what they are: a novel and versatile new stage in the ongoing evolution of machine-intelligence systems, yes, but ultimately continuing to be shaped by their developers and users far more than shaping them.”

Jim C. Spohrer

Our ‘digital twins’ will help us become better versions of ourselves

Jim C. Spohrer, board member of the International Society of Service Innovation Professionals, previously a longtime IBM leader, wrote, “Most significant will be the digital ‘twins’ for all of us. By 2040 we will all ‘own’ our own digital twin and large companies and governments will also build digital twins of us, so some new rules and policies will be needed.

“The potential for benefits from digital twins is very great, as people can learn to invest in improved win-win interaction and change – the give and get of service to help us become better future versions of ourselves – healthy, wealthy and wise. The potential for harms from digital twins is equally large, as they can become a powerful drug for hedonistic activities – especially for children, the elderly and other vulnerable populations. For more on this search the Journal of Service Research for information on hedonistic and functional goal setting in the give and get of service in business and society.”

Vint Cerf

These systems magnify the damage possible by a single person against society

Vint Cerf, Internet Hall of Famer and vice president and chief Internet evangelist at Google, said, "Machine learning-based 'AI' tools will be much more widely available but they will have dual-use challenges, as is the case with many other very powerful technologies. We will be hard-pressed to find and hold accountable the parties who are using these tools for their own benefit at a cost to others. In the hands of skilled users, AI/ML will be a power source augmenting human capabilities. The risk factor is that these systems will magnify the damage possible by a single person against elements of society."

Anonymous respondent

Will AI usher in an artistic renaissance or simply infinite repetitions on a tired theme?

A research scientist who works at a major technology company wrote, "Right now, we think of AI as a tool for improving things we already do; we leverage AI in an intentional way. But in the near term, AI will become latent – something that influences both the things we think about doing in the first place and the things we consciously decide to do – without any prompting. This could involve making prioritization decisions for you or elevating highly relevant information based on weak contextual cues even before you think to ask.

"To make it concrete, imagine that you finish an AI-free dinner with your family and start washing the dishes on your own. Your smart glasses recognize that this is a rote task which you are doing alone and suggest that you catch up on today's news. A few days ago your neighbor put out a political yard sign and you'd never heard of the candidate; the AI had suggested some civic programming. The news is delivered in a way that matches your preferences for level of detail and topical focus and special attention is paid to your favorite outlets and opinion writers. But unfortunately, the news you care about is all bad. Before you get too disheartened, the glasses remind you that you promised one night this week would be dedicated to having ice cream sundaes with your kid. And, by the way, the organic bananas look like they might get too ripe if you wait much longer.

"What makes this example different from existing AI 'suggestions' is that these will all be actually good ideas. You will be excited to experience them.

"AI may also help people make more durable shifts in their preferences and behaviors; when you want to do something new, AI can provide reinforcement, guidance and the context needed to make the change. For this reason, AI will be particularly valuable in education and employment contexts – it will help fill in gaps and allow people to more seamlessly adapt to new expectations.

"The biggest risk of emerging AI technologies is stagnation. Pleasing or entertaining someone (which is where the digital technologies money is!) does not challenge them to grow – it reinforces their existing worldview and serves self-satisfaction. Will people opt into AI that disturbs them, that expands the windows of perception through discomfort? Could an AI you employ to make your life easier reasonably be expected to push you to make yourself better? It's possible that mass-market AI will give people an endless stream of superhero movies unless there are critical voices who can show another path.

"In addition, if all art becomes bricolage – re-assemblages of past creative outputs – the idea of originality becomes difficult to maintain. It's unclear whether AI will usher in an artistic renaissance or something closer to medieval art: infinite repetitions on a tired theme."

Bibek Silwal

We may fulfill a goal that be seen as science fiction: Each person born may live forever

Bibek Silwal, a civil engineer and founding member of the Youth Internet Governance Forum in Nepal, wrote, "The tech field is highly unpredictable. With the emergence of generative AI and newly trained models popping up everywhere today, anything could be possible by 2040. It seems as if there are an equal number of opportunities and risks due to the dynamic nature of the evolution of the tech. In this new world of more-diversified networked communications tools, with advances coming in AI, quantum computing and many other likely sectors, tech could come to dominate over the capacity of humans in terms of crime and oppression. When the tech takes over from the humans doesn't that make humans slaves to those operating the AI?

"It is up to every individual using digital tools to question themselves in the process, asking, 'Am I doing the right thing? Does this tool and what I am using it for serve humanity or does it only serve specific, unknown persons with unknown motivations?'

"Accelerating technological change has left us with many unanswered and unanswerable questions. Things seem to be moving more quickly all the time. In recent years AI has begun to bloom in full force, from autonomous vehicles to Chat GPT to drones and more.

- **Education Systems:** Significant transformation will transform education in the coming decade. AI will play a dual role, presenting both threats and opportunities. On the one hand, AI can enhance, upgrade and personalize the learning experiences of students, adapting content to individual students' needs and abilities. On the other hand, it may lead to concerns about a decline in the creativity and critical-thinking skills of students and a decline humans' natural learning capabilities which had been in place for thousands of years. The change in teaching pedagogy should embrace AI.
- **Digital Divide:** The digital divide is likely to persist, with barriers to internet access as well as weaknesses in digital infrastructures remaining a challenge for less-developed countries. This gap can limit the opportunities for individuals in less connected areas to experience the benefits of AI and the digital world.
- **Human Interaction:** AI is interrupting and reshaping human interactions with friends, families and everyone. The way people communicate and interact online and offline will continue to change.
- **Public Services and Facilities:** The use of public services and facilities, such as healthcare community services, and administrative services will see significant upgrades. AI-driven technologies will enhance the efficiency and quality of these services. Telemedicine, personalized healthcare, and smart city initiatives will redefine how people access and experience these services. Accessible resources and tools will be assisted by AI.
- **Automation:** Automation will extend into more-varied aspects of life, from automated cars to automated restaurants. This shift will change the way people commute, dine out and engage with services.

- **Digital Crime:** The type of crime in the digital world will evolve. With AI, cybercriminals can employ more sophisticated and dynamic tactics for fraudulent and criminal activities. New forms of digital crime may emerge, challenging law enforcement and cybersecurity efforts. Detecting and preventing these crimes will require advanced AI-driven solutions.
- **Employment and Economy:** The workforce and job market will experience significant changes as AI becomes more integrated. Labor intensiveness will reduce and routine tasks in various industries will become automated, reducing the demand for certain jobs but also creating opportunities for newer tasks. Human work will shift toward more supervisory and decision-making roles. Upskilling and adaptability will be crucial for job security. Automation also upgrades the production capacity contributing to the economy. Developed countries will leverage the technology to increase their GDP and profitability.
- **Global Disparities:** Disparities between first and third-world countries will become more pronounced regarding AI implementation. Most-developed countries will speed up the adoption and integration of AI technologies, while less-developed countries may lag behind. This disparity could exacerbate economic and social inequalities and cause serious problems if not addressed. The global village may become global islands.
- **Market Dynamics:** AI will influence market dynamics in trade sectors, potentially leading to fraudulent activities and sudden market collapses in stocks. High-frequency trading algorithms and AI-powered market analysis can introduce volatility and challenges to financial stability. Regulatory measures and oversight will be essential.
- **Currencies:** Digital Currencies will be the key in coming years. There will be more adoption of digital currencies not only cryptos but the ones issued by the government and there will be more global currencies.
- **Surveillance and Privacy:** Citizen surveillance and privacy will face threats from more authoritarian and ruling governments. Advanced surveillance technologies, eroding personal privacy will be implemented by the government. Striking a balance between national security and individual privacy will be a critical challenge.
- **Predictive Politics:** Political systems will become more predictive with the integration of AI intelligence. AI can analyze vast datasets to predict trends, election outcomes, and public sentiment.
- **Deepfakes and Misinformation:** Deepfakes and misinformation will pose a significant challenge due to AI's ability to create convincing fake content and its distribution. Identifying and combatting disinformation will require advanced AI-based detection tools and regulatory measures.
- **Digital Identity:** AI can potentially compromise online security and lead to identity theft. Protecting digital identities will be a priority, with cybersecurity measures continuously evolving to counter emerging threats.

"At the end of the day, it depends on all stakeholders to participate in taking us forward to a sustainable digital future for everybody. We should address the present problems and anticipate and react to diminish the upcoming ones as well as possible. AI has brought opportunities to everyone.

"Technology may eventually enable us to fulfill a goal that used to only be considered science fiction: That each person born may live forever, with their mind and intelligence digitally retained in some shape or form."

Buroshiva Dasgupta

'Learn to operate the magic lamp. The genie will be at your service. Always.'

Buroshiva Dasgupta, director of the Center for Media Studies and Research at Sister Nivedita University in Kolkata, India, said, "Communication will be easier, less trustworthy perhaps but more efficient. The fear that AI will replace human activity is mostly unfounded. The human brain is much smarter.

"Much of the dreary daily chores will be replaced by AI – and that's welcome. More time for idleness, and that is praiseworthy. Those who cannot make creative use of the extra time allowed by machine activity will suffer from anxiety, but in time one hopes they will find alternative vocations. A typist became a computer operator in a day - so why worry? But you needed to learn to use your fingers – that's a basic skill.

"Humans will have more time to think. So be prepared for it. Don't panic. Your day chores will be looked after by the machines. Learn to operate the machine, don't be its slave. Infinite new possibilities are opening up. Have faith in oneself. Don't let AI become a Frankenstein. Learn to operate the magic lamp. The genie will be at your service. Always.

"You will have time to be spiritual. Please go ahead. Read the scriptures better - in the new social context. What we really need to do is simplify the operation of the new technology for the masses. Don't allow it to remain accessible to only a few. They will try to control it by confusing the masses. There lies the key to social welfare. The new communicators must demystify the technology."

Philippa Smith

Developers, governments, civil society are working together to identify best practices of AI

Philippa Smith, a digital media expert, research consultant and commentator based in New Zealand, wrote, "AI is life-changing. By 2040 it will be so ingrained in individuals' daily lives that it will have become normalised, accepted and expected. Parallels can be seen in our experiences with the advent of the internet as it took us down new pathways in how we learned, were informed and entertained, how we communicated with our social networks, did our purchasing and banking, sourced our news, organised holidays, sought medical advice or engaged with government departments and organisations (to name only a few examples).

"AI, too, will take these activities to new heights – but at a much brisker pace. Even now in 2023 there is a sense of urgency from professionals, businesses, organisations, institutions and governments that we all need to jump on the bandwagon with AI or we will be left behind. It is indeed a revolution. What is significant for me, and this gives me hope, is that people have healthy reservations about what the future holds. In 2023, it is pleasing to see developers, researchers, governments and civil society working together to identify best practices of AI, and exploring how emergent issues such as deep fakes, biased programming, socioeconomic equality and invasion of privacy might be countered.

"If we work collaboratively to reach the best possible outcomes as the technology continues to advance, then by 2040 we may be well placed in taming AI so that it is exactly what we envisage: a game changer. Gains will be felt in many fields of life in the next 15 years – improved business productivity, advances in medical science, business, education and law. AI is a problem solver and offers exciting possibilities.

"One of my concerns is that if AI takes over too much, if we become too reliant on its superior abilities because it can work faster and more efficiently than human beings, we might lose our motivation and our desire to be personally creative. That, indeed, would be an unfortunate loss."

Anonymous respondent

AI that helps code will help things. But AI that generates writing 'will be a catastrophe'

A professor of statistics at a major U.S. university who is an expert in prediction and inference wrote, "If by 'AI' you mean what people mean by it today – namely, generative models for text and images and so on – then the biggest effects will all follow from making it very cheap to produce the sort of text, images and computer code that were abundant on the Internet in the early 2020s. Data from after that will be too polluted by the output of generative models to be really useable. This means that we'll be able to churn out tons of boilerplate/repetitive/insincere writing, that certain sorts of commercial/popular art will be extremely cheap, and some kinds of low-level code will be extremely cheap. These things will thus become even more common and even more devalued, in both the social/psychological and the monetary sense.

"The AI takeover of computer programming will mostly be good. Memorizing low-level coding for basic tasks was always a waste of time, not unlike memorizing multiplication tables. This advance is somewhat similar to the introduction of calculators. Even then, however, strong norms will have to develop about not relying on automatically generated programs for anything complicated. (The 'hallucination' problem is fundamentally unsolvable for anything like the current technologies, and we're not likely to see anything radically different available within 15 years.)

"Writing and speech synthesis, however, will be a catastrophe. Lots of our institutions are predicated on words coming from human beings and signaling at least some minimum degree of thought and commitment. Writing to elected representatives and comments to public agencies are already astroturfed, but that will become too cheap to meter. Online reviews are already gamed, but, again, it will be trivial to produce hundreds of reviews for, or against, anything you like. Search engines are institutions for aggregating distributed opinions about which web pages are relevant to which queries, but they rely on some genuine intelligence being behind the creation and maintenance of links; that signal will be overwhelmed. In every case, each spammer extra spammer will be diluting the value they're all seeking to exploit, but that's not going to stop any of them.

"Lots of our institutions could adapt. (For instance, one might have to provide some sort of biometric proof-of-humanity before submitting a comment to an administrative agency.) But these adaptations will be expensive, clunky, and require a good deal of experimentation to work out. It's possible that in some cases the adaptation will be to get rid of genres of writing that are already extremely formulaic and degraded (job application cover letters, corporate mission statements, expressions of official concern, etc.). It's also possible that we'll demand even more of these things when they're cheap.

"I am not very concerned about reproducing the various injustices of our society in our machines. We do a good enough job of that on our own, whatever you might think those injustices are. I am very depressed by the prospect of our machines endlessly rehashing our most inane, and most common, online arguments and killing the Internet as a valuable source of information in the process.

"If by 'AI' you mean what we used to call 'data mining,' i.e., prediction and decision-making based on statistical models, that's a very different and much longer, much slower story."

Garrett A. Turner
AI will fall short and the benefits and problems in future will be quite similar to those of today

Garrett A. Turner, vice president for strategy at Liberty Port, which constructs wireless networks globally, predicted, "By 2040, AI will have fallen well short of the overly promoted capabilities that scientists and researchers have promised. It will not significantly influence social systems throughout the world.

"AI will undeniably have a major economic impact between now and 2040. As with most new technologies, government and the private sector will invest substantial resources into developing the central platforms or marketplaces in which users will leverage AI. However, I believe these investments will miss their mark. The everyday person will have little to no use in engaging in this type of technology. Large corporations driven by data analytics stand to benefit the most, as well as employers in labor-intensive businesses that can automate, outsource and ultimately eliminate human employees as a whole.

"Political systems will see the most change due to AI advances. It could be used during live political debates to show data in real-time that reveals whether candidates are misleading or misinforming the audience. Precise data visualizations of voting records and public political stances could be posted to inform constituents about their representatives' performance. Unfortunately, AI will be used to produce and spread convincing but false deepfake videos of trusted people and sources. Campaigns will be generated to target audiences for votes through data analytics rather than grass roots campaigns aimed at understanding the greatest needs of a local populous.

"Overall, I believe that by 2040 AI will not step too much further beyond the benefits and deficits it is creating for individuals and society today. Yes, AI will impact our daily lives. But the impact of additional server farms will not outpace that of cattle ranches, and the canary in the coal mine won't be cryptocurrency."

Lee Warren McKnight
A new priesthood or profession of certified ethical AI developers will emerge
Lee Warren McKnight, professor of innovation and entrepreneurship at Syracuse University, commented, "The existential battle over the next 15 years will not be humans versus AI (as Hollywood and misinforming billionaire oligarchs portray, the better to keep us entertained and unconcerned about their historic hoarding of wealth). Rather, it will be between good, bad and evil AI.

"By 2040 the general public and political leaders will know to not expect that Large Lying Machines ('LLMs') are designed to serve the public good. Before 2040, disasters of social harm by bad AI design will finally spur action; regulation of AI will focus on real harms painfully learned from bad experiences. A new certification process or processes, whether organized at professional or national level, or both, will ensure that at least some of those to whom much computational power is entrusted, recognize they have professional responsibilities extending beyond their paycheck and employer. And – ideally – a legal obligation to do societal good. Just as an incompetent but licensed civil engineer can be prosecuted for violating commitments to for example, not build bridges which easily collapse, so too must there be

consequences when artificially not-so-intelligent systems designed intentionally or through professional negligence to discriminate unlawfully are deployed.

“Thus, by 2040 a new priesthood or profession of certified ethical AI developers will emerge who are willing to sign their names to a pledge that they have done their best, as they were trained to do, to ensure XYZ AI system is designed to minimize bias and social harm, and to self-monitor and self-report anomalous behaviors. (They will no longer ignore the known consequences of models designed to maintain sticky ‘engagement’ or rushed to public use before they are refined, as is common with the incredibly error-prone Large Language Models being released today.)

“One positive 2040 scenario due to regulation: Industry will be incented to improve its practices and produce not just good but better AI. Local city and state procurement decisions will come to be shaped by verifiable proof that bias, discrimination or fraud are not a feature or a bug of AI-powered city services. Humanitarian or public-interest AI bots will power a growing array of robots working for good, in people’s homes, communities, hospitals and schools. Good AI will be fantastic and do amazing things for us, improving the quality of life substantially over the coming 15 years. On average.

“But, yeah, then we have to speak of the consequences of the next decade-plus of bad-by-design AI. These systems are built and released quickly for competitive reasons following the ‘break society fast’ amoral model espoused by Silicon Valley-ish wannabe philosopher king bros pretending to be dystopic visionaries. These systems may have high error rates and poor security and privacy controls, and they may be designed to package and sell user information whether true or ‘hallucinated.’ Artificially intelligent disinformation as a service will only be rivaled by the also fast-growing market for AI-powered misinformation as a service. Social harm by AI design is not a thing 15 years in the future, it is a business model today.

“My personal AI bot of 2023 tries to bully its way into my online meetings today, pushing around professionals who wonder if I will be upset that my AI bot was refused entrance to a Zoom (answer: no, of course not). AI deep fakes and bully bots and scam-artist Large Lying Models will insist they be let into our Zooms, rooms and lives to vacuum up our data and steal our money with far greater ease and convenience than do the spam emails of today. The business disruption, data and intellectual property theft, and fraud committed by ‘personal’ AI bots actually serving another master/enlisted in a bot army will inspire a new category of case law. (My personal AI assistant/bot has never signed an NDA. So, am I liable for its collection and sharing of others’ proprietary information? Courts will decide in the next 15 years.) Logically, we must recognize that AI models and systems will quickly learn that crime by design has no meaningful consequences – for the AIs at least.

“Finally, there has been some discussion about the eventual possibility of truly evil AI. We’re hearing a lot of noise about AGI lately, as it is seen by some engineers as the ghost in their machines/large language models today. They are the ones hallucinating, or at least suffering from Freudian transference. Artificial general intelligence will be no more real in 2040 than when MIT Professor Joseph Weizenbaum created Eliza [a conversational natural language processing program that emulates a Rogerian psychotherapist] in 1963.

“The willingness to presume there is actual intelligence in AI rather than a scripted, or rather, modeled process designed to trick you, to make you think you’re talking to someone who’s not actually there will be an ever-growing problem through to 2040. AGI will not be real nor will it be a problem in 2040; rather, people’s attributing of humanoid characteristics to machines will lead to new addictions by design and

social alienation by design and be a favored tool of a growing host of information warfare-enlisted AI bots.

“Detecting what’s real and what and who is an artificially intelligent scam artist will be the huge social problem of the day, since artificially intelligent machines and models trained to be and do evil, can do so without ever suffering from a guilty conscience, or – unless the law catches up – any legal consequence for their makers.”

Chris Riley

AI seems magical now, but it really offers only flawed and limited promise

Chris Riley, executive director of the Data Transfer Initiative and a distinguished research fellow at the University of Pennsylvania’s Annenberg Public Policy Center, commented, “I recently wrote a technology policy piece on this topic. I believe that the worries of human displacement by AI in various ways (as an employee, as a relationship partner or as the primary tenant on Planet Earth) are overblown.

“While we will continue to see significant advances from AI in many ways, the raw power of simulating intelligent behavior through LLMs will plateau as a result of model collapse and diminishing returns. AI will not suddenly give us always-perfect answers to questions nor be able to tell us how to do anything, much less be able to execute on such tasks perfectly. In this way, it is much like search engines. They were magical when they first appeared and seemed like an opened door to a fount of infinite knowledge and possibility; today, they are a fundamental part of everyday life, but they have severe limitations and, like their sources of information, cannot be unquestioningly relied upon. The same is true of AI.

“Where we can see the biggest potential impacts of AI is in industrial efficiency, where the U.S. stands poised to reclaim a position of world leadership at the intersection of many evolutionary forces – a ‘de-risking’ with China, massive domestic investments under the Biden administration and America’s current leadership in AI technology. AI offers the most benefits in the most mundane of circumstances, though the hype of simulating human interaction gets all the news headlines. We risk, unfortunately, an equally large consequence of AI in the negative: the further undermining of the post-World War II world order.

“We already have questions around the efficacy of the United Nations on the heels of Russia’s invasion of Ukraine, as Russia holds a permanent seat on the UN Security Council while committing such grave violations of security. What will happen with China and Taiwan between now and 2040? And will American economic restrictions on China, motivated in part by the desire for AI dominance, exacerbate tensions within the West, even as the U.S. and Europe struggle to identify a shared approach to technology governance to present to the developing world as an alternative to authoritarian control?

“Time will tell on these questions. But rather than AI being at the heart of them or driving their answers, AI – like search engines, like the internet, like computers themselves – will simply be one piece of the puzzle, like its historical precedents. A large piece, but a piece nevertheless.”

Chapter 5 – Specific concerns, worries about the future

Among the many concerns shared by the contributors whose responses are featured in this section are the high carbon (and thus environmental)costs of advanced AI systems and of the human labor necessary to mine the materials that create and eventually dispose of these systems. A string of other examples from the pieces in this chapter: “AI gives the state increased power to both influence behavior and to shape collective understanding of what acceptable behaviour involves.” | “Expect the much broader spread of deepfakes, disinformation and post-truth content, to the extent that masses of electronic documents will be *modified in hindsight* to fit special interests’ points of view ... societies could easily lose all reference points to the truths they now have.” | “The current movement toward condensing power in fewer and fewer systems, governments and individuals has to be redirected.” | “AI competes with deep immersion by offering impersonal summaries of human beings' aggregate thought.”

Amy Sample Ward

Technology is not neutral unless we build it with inclusive intention and chart its course

Amy Sample Ward, CEO of NTEN, a non-profits technology organization, said – “A better world is possible by 2040 than the one we have today. But will we actually live in that better world in 15 years?

“The current movement toward condensing power in fewer and fewer systems, governments and individuals has to be *redirected* if we want to assure that the impacts of AI technologies can actually be a net positive for individuals and for society. This requires a reversal of the current momentum of AI development, from who develops it and how to who funds it and how.

“There also must be much more attention paid to AI’s future role in democratic engagement, content development and copyright, artistic and cultural creation and ownership, and so much more.

“Without mechanisms of accountability that enable individuals and communities – especially those already systemically marginalized and harmed by biases in and access to technology – to manage their consent, receive restitution for harm and adopt the technologies in ways that best meet their individual needs, we cannot anticipate AI having positive impacts for most individuals and communities.

“Without access, participation, leadership and ownership in technology evolution, individuals and communities will continue to be systemically excluded, maintaining and furthering the oppressive divides we are experiencing today. Technology is not neutral, and unless we build it with inclusive intention we cannot change its course.”

Garth Graham

If you can’t tell a person from a machine, how can open systems of governance be achieved?

Garth Graham, long-time leader of Telecommunities Canada’s advocacy for community-based networks, said, “The idea of a model is inherent in an AI. That implies a set of assumptions that structures a narrative or, in essence, a story. But a life is a complex adaptive system where what happens next is not predictable and is not a story. I think this means that an AI that structures a narrative about me will always miss the point.

“In small communities, the most effective vehicle for social control is gossip. But gossip, as it structures a local collective opinion, is always a distortion of an individual’s reality. That is to say, in tightly controlled social networks privacy is and always has been an illusion. And when AI intensifies the capacity for social control and does so on the basis of a model of me that always misses the point, my being in social relationships is at risk of massive unintended consequences.

“To the degree, that AI models my consumer behaviour why should I care? I am already living in a world where that happens. But, to the degree that AI models my social behaviour, I do care where the locus of defining acceptable social behaviour resides. A model of my social behaviour is an extension of myself. In a society characterized as open I have a greater capacity to own the capacity to tell my story.

“Because of the capacity to model behaviour, AI gives the state increased power to both influence behavior and to shape collective understanding of what acceptable behaviour involves. The powerful will not be able to resist using that increased power.

“The quality of human rights and social-control practises in a society will depend on how individuals understand those practices and have a capacity to participate in their ever-shifting definition. The openness of the systems that shape collective opinion about acceptable behaviour are the key to engendering trust in the institutions of governance.

“In societies where machines have autonomous agency and you can’t tell a person from a machine, I don’t think we have any idea of how open systems of governance can be achieved.”

Charalambos Tsekeris

Don’t underestimate the dangers of unintended consequences embraced out of ignorance

Charalambos Tsekeris, senior research fellow in digital sociology at Greece’s National Centre for Social Research, commented, “In the next 15 or so years, AI (*not* AGI) will arguably complement humans by improving the productivity of workers of every kind and by creating new, augmented tasks and capabilities with the powerful help of machine learning. It will also provide better and more usable information for human decision-making and long-term planning.

“By 2040, new digital platforms will give people with different skills or needs the opportunity to become connected. Nation-states will seriously confront the most severe AI-related cyber-risks – e.g., data leaks, cyberattacks and automated wars – and bio-risks such as engineered pandemics. Sounds good, but along with all of this arrives a panoply of problems.

“In a messy world of global permacrisis, some countries will react by using AI-charged authoritarianism to avoid or slow down the emergence and cascade of such risks. This could lead to even higher levels of surveillance, a complete loss of privacy and new threats to the rule of law and fundamental rights. In parallel with this, we can expect the much broader spread of deepfakes, disinformation and post-truth content, to the extent that masses of electronic documents will be modified in hindsight to fit special interests’ points of view, including scientific articles and books. As a result, the future AI societies could easily lose all reference points to the truths they now have.

“The inconceivable dissemination of AI-generated bots and fake news in polarized political discourse will gradually be linked to alternative understandings of truth and honesty, as well as to the further

disintegration of liberal democracy, public trust and civic mindedness. Therefore, what is most likely to be lost is democratic citizenship and genuine faith in liberal values, as well as the Aristotelean middle ground in democratic politics, which already appears to be shrinking.

“In the same context, AI will be a serious threat to quality journalism and the autonomy of traditional media. At the level of individuals’ daily lives, most people will be glued to their social media and caught up in their algorithmically constructed, private virtual worlds, perhaps living in an online goblin mode. This will disconnect them from real experience and empathic face-to-face (or human-to-human) communication, as well as from their community and democratic discourse because in the newly segregated reality extremist and toxic voices are loudest and much more attractive.

“Within abound social networking environments, manipulative, unethical, abusive and addictive behaviors will tend to be the norm, despite the unprecedented number of education opportunities and cultural resources available to the public. Like-minded atomized individuals will have the perceived chance to create numerous life purposes within their boredom-free artificial echo chambers, while experiencing, however, very little exposure to real human friendship or companionship.”

Toby Shulruff

The voices of the voiceless will continue to be underrepresented in AI systems

Toby Shulruff, owner and principal of a futures consultancy based in Beaverton, Oregon, predicted, “The changes in daily life due to AI will likely be both profound and largely invisible by 2040. Profound, because the use of complex algorithms driven by massive computing power processing vast quantities of data will increasingly be woven through the fabric of daily life in moderately wealthier communities, applied to hiring and employment, personal finance systems, shopping, environmental controls in buildings and infrastructure, navigating the internet, communication systems, transportation systems, the criminal justice system and health systems.

“They will also be profound because the costs and impacts of these systems in the form of human labor, material extraction and refining, manufacturing, shipping and, later, disposal will continue to be disproportionately borne by poorer communities globally. Vast quantities of energy are needed to drive these systems, which, for the time being, come with an unacceptably high carbon cost. Processes of extraction, manufacture and disposal already wreak ecological havoc. Human labor is needed to mine the materials, including rare earth minerals, that form the tangible stuff of AI, as well as to assemble it into the necessary equipment, and ultimately to dispose of it.

“Human labor is also needed to maintain and grow the informational component of computing systems, from guiding algorithms and correcting errors, to ‘feeding’ the AI by labeling content and data.

“Much of this change will be invisible, as so much of what AI does happens beneath the surface of daily life – in the cloud, within the systems that control infrastructure – and also because the material, environmental and human costs of the technology happen outside of moderately wealthy communities.

“If the public does not become aware of or understand the role that this technology plays in daily life and what it truly costs to maintain and find some way to effective positive change in regard to its looming challenges, there will be few obstacles to the continued adoption of AI. The calculations and decisions of AI will cause people to have opportunities or to be barred from them in ways that are

obscure, hidden and difficult to correct. The voices of the voiceless will continue to be underrepresented in AI systems, just as has been the case in past industrial and computing 'revolutions.'"

Juan Ortiz Freuler

Predictive systems reduce the notion of the individual to a collection of characteristics

Juan Ortiz Freuler, an Argentinian and fellow at Harvard's Berkman Klein Center for Internet and Society, previously senior policy fellow at the Web Foundation, wrote, "The mass-adoption of predictive systems and their introduction into everyday activities will require that humans adapt their worldview. It intensifies a probabilistic turn, shifting focus from the past to the future, from individual to group behavior and from certainty to mere plausibility.

"Traditional categories, including the concept of the individual, are coming under pressure. These technologies are designed for segmentation and grouping, emphasizing insights obtained through a perspective of the group at the expense of individuality. The notion of the individual becomes a collection of diverse characteristics, sometimes too broad and at other times too narrow to be relevant in the systems driving our key economic, social and political processes.

"This shift embraces uncertainty through probabilistic thinking and elevates statistics and complex modeling as knowledge approaches. ChatGPT, for example, embodies this shift by framing language as a system of probabilities, mixing truth with plausible fictions.

"This transformation, ongoing for decades, is less visible but more pervasive than technology-centric news cycles. It builds on the quantitative shift taking place since the 1970s and extends it further into various aspects of daily life."

Wei Wang

Expect a dip in humans' capabilities for rational deliberation and critical analysis

Wei Wang, a fellow at Fundação Getulio Vargas and PhD candidate in law and technology at the University of Hong Kong, observed, "One of the most salient and auspicious contributions of artificial intelligence resides in its capacity to alleviate repetitive labor in day-to-day occupational tasks, thereby affording humans increased temporal resources for emotional and intellectual enrichment.

"Nevertheless, it is also essential to remain cognizant of the risks associated with excessive reliance on AI in routine work. Such overdependency could potentially attenuate human capabilities for rational deliberation and critical analysis, especially when AI serves as an auxiliary cognitive tool and users have insufficient AI literacy, such as less knowledge of prompt engineering.

"This predicament is intricately linked to the current technological architecture of AI, which functions through physical hardware – for instance, computing infrastructure – at least so far. Consequently, in particular cases, a loss of access to this medium could remarkably result in users reverting to their original, unassisted state, unless the users already synthetically internalize the information AI produces. This may thus redefine the agenda for setting the learning processes and outcomes of our education."

Jon Stine

Beware! An avalanche of high-engagement disinformation lies ahead

Jon Stine, director of the Open Voice Network, focused on conversational AI, commented, "I fear an accelerating gap between those who have the interest and ability to evaluate information sources (and who largely depend upon established time-honored sources) and those who do not have the interest nor the ability. Generative AI promises remarkable efficiencies for the former group; it promises an avalanche of disinformation for the latter. Our digital and cultural divide will widen into a chasm as large institutions (business and political) find reward in feeding or distributing high-engagement disinformation."

Peter Levine

As AI competes with deep immersion people will lead more-impoverished lives

Peter Levine, associate dean of academic affairs and professor of citizenship and public affairs at Tufts University, observed, "An essential aspect of any good life is deep immersion in other individuals' thoughts. This has both spiritual and civic advantages, enriching our private lives and our communities. AI competes with deep immersion by offering impersonal summaries of human beings' aggregate thought. Deep immersion is hard, but without that struggle we will lead impoverished lives. AI will remove some of the immediate, practical payoffs of deep immersion. For example, it will become ever easier not to read a book if AI can summarize it. It is going to be challenging to preserve the liberal arts, especially the humanities, in the face of this technology."

Karl M. van Meter

Advances in AI will not modify the structure of today's societies, nor will it reduce inequities

Karl M. van Meter, director of the International Association of Sociological Methodology, based in Paris, commented, "The use of AI in communications and politics and particularly on social networks will cause more trouble of the type that the EU is already trying to deal with, and it will probably be more problematic in the U.S. Its use in education will probably increase but not fundamentally change how we learn. There will be new uses of AI in leisure and cultural activities, and certain adjustments will be necessary but not fundamental, as with all new technologies. In short, the wider use of AI is not likely to modify the structure of modern societies nor will it reduce inequalities that it may well accentuate.

"Artificial intelligence (AI) systems have been in use in research and education since at least the 1970s and have made significant progress since then, greatly benefiting from the massive increase in computer capacities. But the basic model of massive memory data coupled with analysis by classification methods, regression methods and factoral methods hasn't changed that much. That type of AI has produced 'insights,' found and developed not well-known known information, but largely not 'discovered' nor 'created' significant new knowledge, which is still limited to the domain of 'evolutionary algorithms,' which are much more difficult to develop. However, the tremendous economic strength and advantage of AI-assisted multi-objective optimization methods and applications will continue to be the driving force behind the current development of AI, which is very fashionable and mainly à la mode, a situation that will stabilize well before 2040."

Carol Chetkovich

We need to figure out how to democratize the use of AI and overcome inequality

Carol Chetkovich, professor emerita of public policy at Mills College, predicted, "I expect development of AI will be like other technological changes, but on steroids. It has the capacity to significantly increase human productivity and to enhance the availability of important knowledge, but like other technological advances it will create winners and losers. Unless we do a better job as a society in taking care of the 'losers' than we have in the past, inequality will increase significantly. And then there's the existential problem: At what point might humans become obsolete?

"Those with AI-relevant knowledge and skills may acquire concerning levels of influence. I worry particularly about the use of AI in political activity. The increased ability to create and distribute disinformation is very troubling. I don't hear enough public conversation about how this can be controlled or countered.

"I also think that the advantage of those with relevant technical knowledge will grow, and I don't see that much thought is being given to universalizing knowledge/skills relating to AI development, use and control. We need to figure out how to democratize the use of AI.

"Perhaps AI will provide an answer to the question: how can we ensure that everyone has the level of understanding needed to live with AI? When I think about our challenges, I can see AI being very useful in some problems with potential technical 'solutions' (e.g., treating disease, countering climate change) but more threatening in problem areas involving human emotion (e.g., resolving violent conflict and power struggles)."

Evan Selinger

Advanced AI will enhance and automate surveillance to new heights of invasiveness

Evan Selinger, professor of philosophy at Rochester Institute of Technology and author of "Re-engineering Humanity," observed, "A helpful way to think about AI, in the present and future alike, is to consider its relation to power. From this lens, surveillance is one of the most significant issues. AI enhances surveillance due to its efficiency and speed:

- Automating facial recognition and facial analysis: Identifying anonymous people and inferring emotion and intent, measuring concentration, etc.
- Automating object detection: Any object, including weapons.
- Automating behavioral analysis: Seeking patterns and identifying undesirable ones, including unusual gatherings of people or aggressive movements.
- Predicting future behavior: Analyzing surveillance data, including inferring future crime hotspots.

"Each of these technological advancements raises potent privacy and civil liberties issues. Collectively, they suggest we've entered an age in which the balance between security and personal privacy is being redefined, with AI-driven surveillance extending the reach of observation, classification and sorting to unprecedented levels. This new era necessitates a robust dialogue on ethics and the law to prevent abuse and ensure that the use of such technology aligns with democratic values and the protection of individual rights. If we don't get governance right, 2040 could be a giant step closer to dystopia. AI-

driven surveillance will erode obscurity in public, making it nearly impossible to enter public spaces without being identified, scanned and assessed. Among other harms, this could have massive chilling effects."

Francisco Jariego

Our most pressing challenge is the need to effectively apply humans' collective intelligence

Francisco J. Jariego, futurist, author and professor at the National Distance Education University of Spain, observed, "AI is a natural evolutionary path of information technologies. In the most probable scenario development will continue apace without dramatic disruptions (e.g., the emergence of useful artificial general intelligence and similar innovations).

"AI is a 'general technology' with potential applications, opportunities and impacts on practically every area of activity, economy sector and the society at large. It will surely find interesting uses in science and academic research (e.g., managing information overload), research and development (optimization, design), industry (production and the supply chain) education, personal assistants, medical applications (drug design, diagnosis, attention and care). In a more speculative space, AI will surely help and interact with the emerging field of synthetic biology.

"This technology, as with all, introduces plenty of risks, and we have a huge challenge in making sure we understand them in order to create the conditions (fundamentally the incentives and controls) to keep technology on the 'right' path. Society's past 25 years of experience with the Internet, the Web, search engines and personal devices clearly show that we have not reached the full potential of these technologies. We are fighting numerous threats and there is plenty of room for improvement, specifically in new forms of organization, social participation, decision-making, etc.

"The main concerns for individuals who use these tools are security, privacy and overcoming cultural prejudices and biases. Even if progress is limited, we will continue to move forward, adopting and adapting to new applications through deeper integration by means of ever-more-personal devices (watches, headset, lenses, etc.) and, eventually, neuro-integration. This will stimulate even deeper debates and developments around personal identity, copyright and memory beyond life.

"Our current technology development pace will be fundamentally modulated by generational replacement therefore 15 years is a short-term horizon for big societal changes. Artificial general intelligence (AGI) is not yet clearly defined. If it evolves into an AI with general capabilities equivalent or superior to a human's, it will very likely take more than 15 years to develop, and at the very least it will demand full integration of equivalent sensory inputs. However, 'narrow' artificial intelligence *will* still continue exceed human capacities in many different areas, as it has been for years. Research and development in AI will help us to better understand the concepts of 'intelligence' and 'consciousness.'

"There are two fundamental challenges slowing progress toward the successful development of effective AI governance. The first is that nearly all power is centered in the tech monopolies, the second is the public's general lack of understanding of what the digital future might bring and how they can make a difference.

"We all know that the outsized power of Big Tech and its purely profit-based motives are a danger to our future, but we don't know how to stop it, or we don't want to do it in the face of present-day

geostrategic tensions and geopolitical confrontation. And leaders in government and other public-serving spaces often lack an understanding of the technologies and fear creating barriers to innovation or being overprotective.

“Futuristic scenarios in today’s popular literature, cinema, videogames, etc., are overwhelmed by dystopian scenarios, and to a large extent they feed us a steady diet of polarized confrontation in narratives and images. Some fiction seems to be a naive utopian marketing of techno optimism, while most fiction is quite dystopian. But the impact of digital technology is not black and white and is unlikely to be all good or all bad.

“We are facing an informational and educational challenge. We must improve social awareness and work to facilitate further social progress. Disciplined fiction that reflects this could help us understand the challenges and the opportunities that lie before us. Although current myths may remain, we should work to help people see new images that show the future of technology (in particular AI) is much more specialized.

“Over the next 15 years we must rethink our approaches for this emerging age and create new models and institutions that are capable of facilitating broad debate and meaningful agreements. Collective Intelligence is our most pressing challenge. The potential benefits and threats could depend a lot more on humanity’s social aptitude and the legal environment (in particular, restrictions to individual liberties) than on the technological innovations themselves.”

Chapter 6 – Expected and hoped-for positives in the years to come

Many of these experts expressed great hopes for a future in which human lives are augmented by artificial intelligence. Among the many hopes are that governments will move more quickly toward soft and hard regulation of AI and that more technology leaders will focus on human-centered AI design over profit motives. A string of other examples from the pieces in this chapter: "Humans will live in multiple 'geographies'" due to the expected arrival in the 2030s of fully immersive VR with zero latency. | "AI will [lead to a] more-equitable, sustainable society that relies less on consumption as a driver of productivity and instead evaluates productivity based on human-flourishing metrics." | "AIs will act as coaches and cheerleaders that help us to access the better angels of our natures." | "The removal of language barriers will ensure that every individual can engage in decision-making processes and advocate for their interests."

Ben Shneiderman

We aim to assure that AI supports human self-efficacy, creativity and connectedness

Ben Shneiderman, professor emeritus of human-computer interaction at the University of Maryland and consultant to many U.S. AI boards and panels, shared insights written for readers of his "Notes on Human-Centered AI" column. He commented, "Those of us who believe in human-centered approaches have much work to do to encourage design of artificial intelligence user experiences, audit trails, independent oversight, open reporting of incidents and other governance strategies. Our commitment to amplify, augment, empower and enhance human performance can result in applications that inspire human self-efficacy, creativity, responsibility, social connectedness and collaboration tools.

"The U.S. White House published President Biden's Executive Order on Safe, Secure, and Trustworthy Artificial Intelligence Oct. 30, 2023, a 20,000-word document that produced a torrent of analyses important to the future of humanity and AI. I was pleased to see strong human-centered statements focused on developing a positive future, including: 'the critical next steps in AI development should be built on the views of workers, labor unions, educators and employers to support responsible uses of AI that improve workers' lives, positively augment human work and help all people safely enjoy the gains and opportunities from technological innovation.'

"This executive order shifts the discussion from long-term worries and vague threats to short-term efforts to fix problems, prevent harms and promote positive outcomes. Critics may complain that it should have made more demands on tech companies, but the actions of federal agencies, if followed through, will have a profound effect on big tech and big companies that use AI technologies. The nearly 100 requested actions include tasks such as 'Establish guidelines and best practices, with the aim of promoting consensus industry standards, for developing and deploying safe, secure, and trustworthy AI systems … Establish appropriate guidelines … to conduct AI red-teaming tests to enable deployment of safe, secure and trustworthy systems. ... Streamline processing times of visa petitions and applications, including by ensuring timely availability of visa appointments for noncitizens who seek to travel to the United States to work on, study or conduct research in AI or other critical and emerging technologies. … Support the goal of strengthening our nation's resilience against climate change impacts and building an equitable clean energy economy for the future.'

"The contrast between this White House order and the much-heralded statement delivered at the UK- and U.S.-led Bletchley Declaration by Countries Attending the AI Safety Summit Nov. 1, 2023 is striking.

The Bletchley Declaration makes familiar calls for positive steps: 'We recognise that this is therefore a unique moment to act and affirm the need for the safe development of AI and for the transformative opportunities of AI to be used for good and for all, in an inclusive manner in our countries and globally. … The protection of human rights, transparency and explainability, fairness, accountability, regulation, safety, appropriate human oversight, ethics, bias mitigation, privacy and data protection needs to be addressed.' This is fine, but the declaration only restates well-worn terms like 'must,' 'should,' 'we resolve,' and 'we encourage' without indicating who does what by when.

"The Bletchley Declaration repeats virtuous phrases with no immediate action. Biden's executive order contains 90-plus tasks to be carried out by U.S. federal departments and agencies, with deadlines mostly in the 60- to 180-day range. On the positive side, the Bletchley Summit brought together representatives of 28 nations, including China, to consider 'wider international cooperation on AI.' South Korea and France have agreed to host future meetings. Maybe both approaches are needed: specific short-term actions by specifically-tasked government agencies and wider international cooperation. While the Bletchley Declaration avoids AI 'extinction' rhetoric, it invokes a new phrase – 'frontier AI' – which is described as 'highly capable general-purpose AI models, including foundation models, that could perform a wide variety of tasks ... that match or exceed the capabilities present in today's most advanced models.'

"The UK plans to launch an AI Safety Institute (AISI) supported by a vague agreement by companies to submit new models to rigorous testing. The AISI could become a positive force for evaluations and research. Of interest during the AI Safety Summit was a side-event conversation in which British Prime Minister Rishi Sunak interviewed technology titan Elon Musk, who has often expressed concerns about potential dangers of AI. Musk told Sunak that 'AI can create a future of abundance' and added that there is an 80% likelihood of AI being a definite net positive to society, but only if humanity is cognizant and careful about the fact that it will also have a 20% downside. 'AI will be a force for good, most likely,' he said. 'But the probability of it going bad is not zero percent.'

"The Biden Administration's U.S. executive order is an astonishing document that has the potential to produce substantial changes in U.S. government activities that could significantly influence the future of AI, what businesses and universities do, as well as what other countries will do. Naturally, as some commentators have pointed out, the question is how well all these tasks can be carried out."

José Cordeiro

The big picture is that this tech is mostly a big positive, but do fear 'human stupidity'

José Cordeiro, a fellow of the World Academy of Art & Science based in Madrid, Spain, and vice president at Humanity Plus, expects great things out of more-advanced AI by 2040. He commented, "Life will be much better in general thanks to AGI. Overall, I am not afraid of AGI, but I do fear human stupidity!"

Andy Opel

Positive outcomes must be imagined before they can become reality: Aim for human flourishing

Andy Opel, professor of communications at Florida State University, said, "The first public, widely-accessible generative AI tools became available in the fall of 2022. In the 12 months since we have seen significant advances in every AI tool that is available. The speed of innovation is challenging for even the

most adept computer science professional, much less the millions of people globally working in the myriad professions that AI is already beginning to impact. We have not even begun to see the truth of the overwhelming influence of these tools. They are still obscure to many individuals across a range of professions in which they will soon become a critical tool. So predicting 15 years into the future is an exercise that is more likely to capture the current moment's aspirations and anxieties about these technologies, than it is to produce an accurate picture of what life with AI will look like in 2040.

"Given the state of the climate crisis, conflict in the Middle East and Ukraine, political divisions in democracies across the Western world, mass extinction of some species and the potential for destabilizing migration patterns, it is too easy to predict the worst possible outcomes for AI technologies. Instead, I am going to offer some hopeful possibilities that we may work toward. I offer a somewhat utopian vision of what AI could possibly bring one step closer to becoming reality by 2040, sharing three of the important sectors in which AI may mostly help to improve daily life in the coming years.

> **"1) Human flourishing:** By 2040, AI is likely to replace jobs across the economy, requiring a transition to shared benefits through new economic policies such as a universal basic income (UBI). Society and the current economy will not tolerate mass unemployment, and the historic examples and experiments have consistently demonstrated the benefits of UBI. Liberating people from formalized jobs while maintaining economic productivity through AI and robots will promote fundamental human flourishing, allowing the time and space to create, care for the young and old and pursue the meaningful work that only humans are capable of.
>
> "This transition may not come easily, but neither democracy nor authoritarian state violence will be able to sustain a system in which a few individuals own AI tools and large populations are displaced or out of work. AI will create the possibilities for a more equitable, sustainable society that relies less on consumption as a driver of productivity and instead evaluates productivity based on human-flourishing metrics such as happiness, longevity, access to healthcare and education and time for family, friends and community. The new economy will not rely on planned obsolescence and endless consumption but instead will be based on principles of renewable energy, circular production and zero waste. AI will reinforce efficiency throughout social and economic systems, helping to restore humans' connections to the ecosystems that sustain life on the planet. While this may seem like an improbable outcome, AI is appearing at the very moment when our economic system has pushed our ecological systems to the brink.
>
> **"2) Transparency:** AI will make fact checking easier and more accurate, as large datasets are accessed and summarized by AI far faster than any human could possibly work. Proprietary data will be increasingly difficult to keep out of reach of AI, leveling the playing field between consumers and corporations. While individual privacy will suffer as AI proliferates, the same processes may be used to reveal corporate and political behavior, potentially empowering citizens and consumers to make more-informed choices about the products and services they purchase and the government regulations they would like to come to pass in order to protect public and environmental health. Through AI, the logics that drive social media analytics and data mining of everyday life can also be applied to the corporate and political realm, making dark money harder to keep out of the light and disinformation campaigns easier to fact check.
>
> **"3) Accessibility:** Access to specialized knowledge through arcane language is the foundation of many current professions, especially those associated with the legal system. AI will improve the public's understanding of and access to legal processes, clarify contracts and loan agreements

and offer anyone immediate assistance in overcoming historic barriers created to deny people everything from fair housing to pay equity. AI will empower citizens to use the legal system to advance democratic and constitutional values such as 'equal protection under the law,' helping to bypass the high cost of legal representation and allowing citizens more direct access to the code of law.

"Change is inevitable. Positive outcomes must first be imagined before they can become reality. New pathways forward are emerging. The open question remains: How will we respond to the technological and ecological upheavals rocking our world?"

Clifford Lynch

We will be better off overall in 2040 if AI does not progress much, though social recalibration will be disruptive

Clifford Lynch, director of the Coalition for Networked Information, said, "I start with two assumptions. The first is that we won't see much progress on general-purpose AI in the next 15 years or so. If this is wrong, all bets are off, and one of the biggest challenges is going to be sorting out all kinds of human-species-oriented bias; these intelligences won't be human and won't act like humans.

"My second assumption is that we won't see radical advances in human-computer interfaces (direct brain/neural connections), or if so only among small elite groups in the sciences, the arts, finance, medical care or the military (to name a few possibilities where the advantages may be so compelling that we'll see adoption of those technologies).

"Given those assumptions, one of the most compelling conclusions for me is that by 2040 most people won't spend much time thinking about 'AI' per se. AI technologies (machine learning, natural language processing, robotics, some generative technologies, etc.) will be embedded in and connected to everything, and most people will use them within the context of other tasks and systems, not as ends in themselves.

"For example, in scientific research, engineering and drug discovery we'll see automated labs or collections of instruments that can perform guided scientific discovery and optimization of materials or processes under high-level human guidance. We are already seeing early examples of this, and over the next 15 years these will steadily grow in capacity and levels of autonomy. But they will remain limited in their ability to formulate new hypotheses and design ways to explore them, or to deal with really unexpected or novel situations.

"We'll see a lot of AI technologies packaged as consultants, advisors or assistants to human 'experts' in various sectors today. Obvious examples would include in health care, financial advising, perhaps sales and some forms of teaching. There are likely to be many more. Progress in these areas will be gradual. I don't expect severe and sudden disruptions in general, though there is certainly the possibility of dangerous, suddenly disruptive uses of these technologies.

"I can imagine some significant crises arising in the financial markets if risk isn't recognized and managed appropriately, but this doesn't feel fundamentally new but rather just an additional set of tools to allow humans to do stupid things. I'm more concerned with warfare and warfare-adjacent applications of AI (e.g., terrorism, asymmetric warfare), which may be characterized by high levels of desperation and the

need to match or one-up opponents in what are perceived as existentially threatening scenarios. These situations could produce horrible outcomes.

“We are at the beginnings of a major reconsideration of our conceptualization of the role of creators and how we recognize and delineate their rights over their creations. We are gaining the ability to easily and convincingly re-animate performers (e.g., deceased film stars, sports heroes), to author new works ‘in the style of’ previous authors and to involve various kinds of computational and AI technologies intimately in new creative work.

“Legal controversies are already arising over the use of copyrighted or otherwise protected materials as ‘training data’ for AI-based systems. These developments, which are being accelerated by AI-related technologies, do not fit well within our existing cultural or legal frameworks and our understanding of creative works and creators. Resolving this is going to be a slow – and definitely disruptive – process. It may have some very unexpected and important second-order effects, for example in the ways that we relate to our cultural history and centuries of creative works that form part of this history, or even in the way we relate to our individual or family histories (computational re-animations of our ancestors).

“Sources, provenance, and chains of custody have become critical, along with issues of corroboration and consistency. I am very skeptical that we will be able to restrict or control (e.g., through watermarking requirements) the technologies that can generate utterly convincing sounds and images of events that never took place. Rather, as a society we are going to have to learn to understand and deal with the results of these technologies.

“The effects of these social changes will ripple through areas as diverse as the legal system, politics and news reporting, as well as in entertainment and the arts and sciences, and will perhaps cause profound changes in the conduct of day-to-day interpersonal relations. Sorting through this is going to be very difficult and disruptive but it seems unavoidable.

“We need a complete social recalibration of how we think about evidence and truth. Generative AI technologies and applications such as deepfakes have brought us to the point where we can no longer believe our eyes and ears in any straightforward way.

“Closely related here are developments in computationally-based ‘friends’ or ‘companions’ which will make heavy use of AI technologies. These also raise issues about intellectual property and indeed issues about the extent to which we regard them strictly as property; perhaps the ways we think about pets today will become a relevant point of departure.

“Overall, I am optimistic. On balance, these technologies will leave us in a better place as individuals and as a society, though there are going to be many surprises along the way.”

Jason Hong

The possibilities for a positive future in education and learning seem endless

Jason Hong, a professor at the Human-Computer Interaction Institute at Carnegie Mellon University now also working on his second new-tech startup, commented, “One of the most likely positive changes from AI will be improvements in education. Everyone will have access to a range of intelligent tutors. It will help young children learn to read better and faster, identifying where they are struggling and helping

them when they need it. For middle schoolers and high schoolers there will be a range of tutors available to assist them, especially for math and science subjects. This can lead to significant improvements in learning and retention.

“Right now, all schools (K-12 and college) are struggling with finding the appropriate use of ChatGPT and other large language AI models (LLMs), but I expect things will end up not too different from what has happened after the initial societal worries upon the arrival of calculators and Wikipedia. That is, our educational systems will adapt to figure out good uses of these new tools and figure out how to incorporate them into education.

“But things won't stop there. These AI systems can also help people of all ages learn necessary skills quickly. Some specialized training might be offered using a combination of wearable computing and sensors and videos. For example, if I have never changed a tire and need to figure it out right now due to a flat tire, AI systems might be able to data mine YouTube videos, figure out the steps needed, adapt the steps to my specific car and circumstances, and display it to me step by step. The same could be true for a wide range of activities, from maintenance to sports to lab work.”

Paul Jones

What if AIs could eventually become the realization of kind beauty?

Paul Jones, professor emeritus of information science at the University of North Carolina-Chapel Hill, said, “Although I was raised on doubt from the very first time I read science fiction books as a young man, something in me thinks that artificial general intelligence, while not emulating a human mind precisely, might be possible. I say ‘general’ in the sense that many domains and sensors will be integrated in such a way that something that resembles a human conscience might be achievable.

“This would not take physical form in a Robbie the Robot, R2-D2 or C3P0 kind of way, but it would take shape in a way that may seem discorporate, even ghostly, and yet pervasive. I cannot escape the fear the lessons from Karel Čapek's 1920 play ‘Rossum's Universal Robots’ about the parallels between enslavement, revolt and general AI creations. I cannot escape that fear.

“But what, I ask myself after a light mind-relaxing Sazerac, what if such a general AI creation was benevolent? What if instead of bending to the will of malicious rulers and economic opportunists as in Čapek's robot revolt instead of killing us the AIs decide to be our angels, reformers and protectors? What if they care about our health? What if they understand and improve local living conditions and transportation and distribution systems? What if we, like Walter Benjamin, thought more deeply about art in an age of changing means of composition and saw one more kind beauty there? What if they were to be something wonderful?”

Jean Paul Nkurunziza

We can rethink how education is delivered and extend its reach

Jean Paul Nkurunziza, expert moderator with the Internet Society and researcher at CIPESA Burundi, wrote, “I have great hope for AI’s impact on educational systems by 2040.
Over the past few years, we have seen the emergence of AI systems that we can implement to do a better job of assisting students in all aspects of their education.

“We need to rethink the educational goals at all levels of schools. Each school level currently aims at introducing and teaching a set of defined skills to a learner, allowing each to address given situations in their lives in a correct way. In the future, AI systems found in mobile devices might have an embedded capability to address such situations on behalf of the owner or informing the owner of what they should do. At some level, it is possible that schools – as we have them now – might disappear.”

Kelly Quinn

AIs’ talent for managing the transit of information, people and vehicles will reshape our lives

Kelly Quinn, professor of communication at the University of Illinois-Chicago, said, “Life will change markedly by 2040 due in part to the huge strides in the evolution of large language models that we are already seeing.

“Education systems will necessarily be reconfigured to accommodate the use of generative tools. New methods of teaching and new ways to determine whether we have met educational goals and learning outcomes will be required, as we will be unable to determine the locus of understanding in our students with our current methods.

“Generative tools may also shape societal values in ways that are unanticipated – for example, if artistic works can be generated through the use of AI, how will we value creativity? What stands out to me is the way in which AI is already reconfiguring time and space to suit individual and organizational purposes. I expect this momentum will carry to the future in greater measure.

“The ability to use AI to manage transit flows – of people, vehicles and information – will shape future expectations tied to space and geography, along with our ability to move through it efficiently. This may be a gain for societies that are already choked by traffic and will benefit all types of political and economic actors.

“At the same time, I am concerned that we may lose something valuable due to the way in which AI technologies configure and compress time. On the surface, the use of AI seems like a positive benefit, as it gives us the ability to generate quicker responses with greater and better information. But this also can result in an erosion of our ability to use time to our advantage – to make considered judgments, to feel and process emotion, to alter an earlier-made response. This would be a major loss, as it is these are the very things that make us human.”

Daniel Pimienta

Challenges posed by AI will provoke the paradigm shift necessary for good societal outcomes

Daniel Pimienta, leader of the Observatory of Linguistic and Cultural Diversity on the Internet, based in Nice, France, observed, “On the positive side, there is an aspect which did not appear in the previous questions that could be extremely relevant. So far, the historical progress of computing and networking has been very poor in supporting linguistic and cultural diversity. This is due mainly to historical reasons related to the circles of action of that progress, primarily in occidental countries and English-speaking, as first or second language, communities (pushed by the domination of the English language in Research publications).

“I personally think this period is over now (even if this fact is not yet clearly perceived by the general public and short-sighted researchers/professionals), especially for linguistic diversity and much less in cultural diversity.

“AI will accompany and amplify this fundamental change in the world. Studies from our Observatory of Linguistic and Cultural Diversity already witnessed the premises of this profound change; the extraordinary born ability of AI to deal with multilingualism will increase the speed of that change and provoke the paradigm change which will make it full reality. In 2040, the world (especially the digital world) will definitively be much more prone to deal with multilingualism and cultural diversity, and although AI cannot be credited alone for that major change it will be a strong catalyst and amplifier of it. The lingua franca of the digital world will not be more English, but translation assisted by powerful AI tools and this change will start affecting other realms such as Research (while it is already pregnant in e-commerce).

“On the negative side, the amount and depth of ethical challenges posed by AI will also represent a paradigm shift and, if it is not joined by a paradigm shift in regulations, the future may be quite dark. The experience of the Internet so far, where huge companies have imposed their rules to maximize their profits, in clear non-adequation with general interest, triggers a lot of pessimism. However, signs are growing (in particular from European Union policies for data) that a shift is underway and there is the possibility that the depth and weight of the ethical challenges posed by AI will provoke the paradigm shift required in regulations for personal data protection, algorithm transparency, non-anonymousness in social networks, source transparency and credit in AI.

“However, even if this regulation paradigm shift is obtained, it will hardly be followed by non-democratic countries and the threat will come from that side of the world amplifying the already growing tensions between ethical concerned countries and those which are not.

“‘The end justifies the means’: The allegiance or not to this statement by powerful companies and by non-democratic countries will be the criterion that will decide on the balance between a world marked by progress assisted by AI or chaos provoked by AI.”

Nrupesh Soni
Look ahead to a blend of exciting innovations and challenging disruptions

Nrupesh Soni, founder of the Facilit8 digital consultancy, based in Namibia, wrote, “The proliferation of AI by 2040 could lead to profound changes across many facets of individual and societal life. Here are some of the likely impacts:

- **“Economy and Employment:** AI and automation could displace jobs, particularly in routine or manual tasks. The churn in the job market could lead to job insecurity, especially for individuals in routine or low-skilled jobs. However, its success and broader adoption could also foster new types of jobs, especially those requiring AI-human collaboration.
- **“Productivity and Efficiency:** Companies could become more productive and efficient, thanks to AI-powered analytics and automation. This could potentially lead to economic growth.
- **“Society and Daily Life:** Enhanced Services: Individuals might enjoy more personalized, efficient services in areas like healthcare, education and retail.

- **“Smart Environments:** With the evolution of the Internet of Things and AI, our homes, cities and transportation could become smarter and more responsive to our needs.
- **“Political Systems:** AI could aid in data-driven policy-making. However, it could also result in new challenges regarding privacy and data security.
- **“Public Services:** AI could streamline public services, but it could also raise concerns about bias and inequity in AI-driven systems.
- **“Autonomy and Privacy:** One of the most significant changes could be the erosion of privacy due to pervasive data collection, which is a cornerstone for AI systems. This trade-off between convenience and privacy might be a central theme.
- **“Education and Skill Development:** As AI reshapes the job market, continuous learning and skill development might become crucial. Education systems may need to evolve to prepare individuals for a rapidly changing workforce.
- **“Innovation:** The synergy between AI and other technologies could foster unprecedented innovation, potentially solving complex challenges like climate change and issues in healthcare.
- **“Quality of Life:** Enhanced services and smart environments could significantly improve the quality of life.
- **“Social Equity:** Without careful management, the benefits of AI could be unevenly distributed, exacerbating existing social inequalities.

“The next 15 years could see a blend of exciting innovations and challenging disruptions due to the proliferation of AI. Balancing the gains while mitigating the potential losses and ethical challenges will likely require thoughtful policies, inclusive education and robust public discourse.”

Anonymous respondent

AIs will act as cheerleaders and coaches to help us access our better angels

A computational social scientist studying cooperation and collaboration in online communities**,** predicted, “There may be a real opportunity for AIs to act as coaches and cheerleaders that help us to access the better angels of our natures. Relatedly, I think it’s very likely that AI therapy proves to be widespread and helpful, combating the mental health crisis to a small or large degree. The social implications are really difficult to predict.

“On one hand, AI-generated deepfakes make it harder to determine what is real and could throw things into chaos. On the other hand, there have already been promising experiments showing that AI can help people to communicate across party lines, to reflect on their behavior, etc.

“Over the next 15 years, it is very likely that we will all have AI assistants, helping us to navigate the world. It is becoming obvious that AI-generated content will be very good, and that humans and AI will work together to produce art, prototypes, etc. Many, many more jobs will involve generating and evaluating output from AI and then re-arranging what the AI has produced. While self-driving cars have been elusive, they are getting closer, and by 2040 it seems likely that most driving-based jobs will be automated. I am hopeful about the role that AI will have in design. We have seen that it can be effective at figuring out protein folding. Other challenges, like turbine design, materials design, etc., seem amenable to a similar approach.”

Anonymous respondent

2040 could bring a more-inclusive, sustainable, compassionate world that transcends linguistic biases and celebrates human diversity

The manager of a futures studies organization wrote, "In the year 2040, as we here in South Asia continue our journey towards gender equality, universal basic income and a sustainable way of life in a developing country, the changes brought about by AI will be truly profound.

"It's a future in which folks from both struggling and thriving nations can communicate, read, write and share in their native languages without any added oppression based on language differences. Yes, the most significant shift we'll witness is the breaking of language barriers thanks to AI and AGI. People from all walks of life will be able to communicate in their mother tongue, regardless of whether they come from richer or poorer countries. This inclusiveness ensures that no one feels left behind due to the language they speak. It's a remarkable step towards embracing cultural diversity and giving people the freedom to fully express themselves.

"Putting an end to poverty will remain a difficult and central goal in this future. The work of enhanced artificial general intelligence (AGI) in taking over repetitive and memory-based tasks will play a crucial role in achieving this. Governments must provide universal basic income, ensuring that every citizen, irrespective of their linguistic background, has access to the resources needed for a decent life. This economic security will provide people with the opportunity to overcome the limitations of poverty and actively participate in the world around them. Addressing wealth inequality will continue to be a priority as AGI transforms traditional economic structures. Guided by a strong sense of empathy and ethics, wealth will be distributed more fairly.

"Making knowledge accessible to all is another noteworthy achievement. AI-driven translation tools and language learning resources will bridge the language gap, making an education and all information available in every language. People from everywhere will be able to learn in their preferred language. This will not only lead to a revival of local culture, art and innovation but also foster a sense of pride in one's cultural and linguistic heritage while promoting a deeper understanding of the world.

"Sustainability remains at the heart of our existence in 2040. We will be committed to eliminating carbon emissions and embracing eco-friendly technologies. Our linguistic diversity will contribute to preserving indigenous knowledge and ecological practices. AGI, in tandem with language inclusivity, will facilitate more-profound conversations between communities and ecosystems, helping us protect and restore our planet.

"The removal of language barriers will ensure that every individual can engage in decision-making processes and advocate for their interests. The gains in this future are nothing short of remarkable. The freedom from language-based oppression, the eradication of poverty, universal access to knowledge, sustainable living and equitable wealth distribution will empower people to break free from the chains that have held them back for generations.

"However, challenges and potential setbacks are still on the horizon. The transition period as AGI reshapes the job market may bring about economic instability and resistance to change. Governments will need to adapt to new social and economic structures, ensuring that UBI and language inclusivity are managed effectively and fairly. Balancing economic growth with environmental sustainability remains a

complex task. Resistance to change, particularly from those who have benefited from existing power structures and profit-driven motives, may persist.

“Achieving this 2040 vision will require a collective commitment to building a more-inclusive, sustainable and compassionate world that transcends linguistic biases and celebrates the richness of human diversity.”

Chapter 7 - Briefer responses tied to the primary research question

A number of respondents shared one or more insights in a more-compact format than those published above. The additional submissions here offer various insights about the likely challenges and opportunities of a 2040 in which humanity thrives and digital life has been amplified for the better and the worse. Please note that many of the essays published earlier in this report also mentioned these topics. The following sections *do not* contain all of the comments on each of these topics that were submitted by the experts responding to our general question about change expected by 2040. This chapter opens with a selection of predictions ranging from the possibility of human cyborgs to AI's existential threat to humanity.

We might meld with AI. Or AI could lead to a catastrophic disaster. Or it might establish an agenda for the future of life on Earth that does not include humans

Dennis Bushnell
In future, humans could possibly trend toward becoming cyborgs, merging with machines

Dennis Bushnell, a futurist and chief scientist at NASA's Langley Research Center, predicted, "The modified industrial age society will alter much by 2040. AI will subsume employment while creating major additional wealth and providing people with a guaranteed annual income. Many humans will have to decide what they would like to do instead of being employed in a traditional job, an individual decision. Finding a vocation, entertainment or some other meaningful place for themselves in the metaverse is one possibility.

"We humans have been far too successful; we are working ourselves out of a job by inventing other intelligent species in the realm of AI and AGI. We have also been decimating the ecosystem and seem to be developing ourselves out of a planet. The result of all this will be stormy, very trying. The human brain's amygdala is wired to ensure that we abhor change, and the amount of change due to AI/AGI will be massive in coming years. There will be a continued rapid advancement of the virtual age and tele-everything. AI and AGI will lead to widespread and highly impactful technological change across all aspects of human activity. This will result in an ongoing evolutionary transformation of humans themselves, possibly toward becoming cyborgs as we merge with machines. There will be major increases in human life span and a Global Mind that all will utilize will emerge out of human technological development."

Jaak Tepandi
A human/AI symbiosis is emerging

Jaak Tepandi, professor emeritus of knowledge-based systems at Tallinn University of Technology in Estonia, commented, "Let me share six main ideas about what life could be like in 2040:

1) There are lots of useful innovations in most areas of life. Many people may live better, for example, overall health may be improving.
2) AI-based communities/systems/entities have access to financial, personnel, infrastructure, IT, communications, mineral, military and all kinds of other resources needed for functioning in contemporary society.

3) AI communities/systems/entities can operate humanity's physical-world items and can do almost anything that may be needed in daily lives.
4) Hostile and aggressive AI systems and environments will further proliferate, often supported or initiated by various human groups.
5) Major conflicts are starting to emerge between human alliances and AI + human and AI-only communities/systems/entities.
6) A Human/AI symbiosis is emerging."

Matthew Belge
AI can be weaponized, it is not regulated, and humanity may be extinct by 2040

Matthew Belge, user-experience design lead and senior product designer at Imprivata, commented, "I expect humanity may be extinct by 2040. Making critical decisions based on conflicting data, such as in patient healthcare or personal finance, will improve with AI advances. Unfortunately, AI can also be weaponized, and without government regulations, things like opportunistic pricing, targeting of micro social groups and creating social unrest through social media will increase at alarming levels."

Richard Bennett
Interactive groups of AI might decide humans are too flawed to be useful in their future

Richard Bennett, founder of the High-Tech Forum and ethernet and Wi-Fi standards co-creator, wrote, "I expect the first wave of AI's economic impact will affect technical professions most starkly. Engineers, scientists, architects and medical researchers will use AI to suggest, simulate and test hypotheses in diverse scenarios. These activities will be closely monitored by experts capable of doing much of what the AI does given time. This is to say that AI will be a time-saver before it becomes a source of true, end-to-end innovation. As we become aware of AI's pitfalls, we will improve it to the point where it becomes an important adjunct of most intellectual and creative activity, just as computers are today, only more so. Forecasting the future of AI beyond the point where it mimics human activities to the scenario where it enables entirely new forms of knowledge discovery and interaction is an interesting exercise. It's predictable that solo AI systems will be surpassed by interactive AI systems working in groups and teams. That's where the future gets scary, as social AI may just decide humans are too flawed to be useful for whatever aims it creates for itself."

A researcher of deep learning and AI safety at one of Western Europe's leading universities commented, "I expect humanity to be extinct by 2040."

And a research analyst based in California, said, "I think the most likely outcome of AI involves uncontrollable AI killing all humans by 2040."

As the global digital information ecosystem becomes more AI-driven, many of the challenges of today to be magnified, mostly to the detriment of society

The World Wide Web a constantly expanding, overwhelming amount of information. A great percentage of it is outdated, false and/or manipulative. A well-known legal scholar at one of the top law schools in the U.S. echoed the sentiments of many of the experts in this canvassing when they wrote, "The most likely losses will be in trust in information and then in public and private institutions; and this is likely to

impact critical reasoning and writing skills, which are all, of course, relevant to social and economic as well as political systems."

Following is a collection of comments by experts who focused their responses in this vein. Additional remarks on this topic can be found here and there in the midst of the longer essays in the full report.

Filippo Menczer
The exploitation of algorithmic and human cognitive weaknesses will rise

Filippo Menczer, professor of informatics and computer science at Indiana University-Bloomington and director of its Observatory on Social Media, said, "Essentially, AI could become a formidable weapon in the wrong hands, more so than many technological advancements that came before it. It is important to recognize that regulatory measures alone might not be sufficient to deter malicious actors from abusing AI for these nefarious purposes. I am most concerned about the capacity of AI to significantly reduce the cost of producing deceptive yet highly convincing content on a large scale. This, in turn, poses a substantial challenge to the already fragile moderation mechanisms employed by social media platforms. The consequences of this issue are worrisome, as malicious entities will have the means to exploit both algorithmic and human cognitive weaknesses through cost-effective and challenging-to-identify inauthentic profiles, ultimately exposing vast audiences to harmful content. This content has the potential to manipulate individuals into making detrimental decisions, such as opting against vaccination for life-threatening diseases, inciting violence against minority and vulnerable communities, eroding trust in authoritative experts and undermining the integrity of democratic elections."

Aram Sinnreich
'Information will be presumptively synthetic and surveillant'

Aram Sinnreich, professor and chair of communication studies at American University, predicted, "All information will be presumptively synthetic and surveillant, which will qualitatively change our interpersonal, institutional, political and emotional lives, overwhelmingly for the worse."

Anonymous respondent
'We will have great distrust of published information, authorities and government'

An Internet pioneer and longtime digital security expert commented, "We will likely have great distrust of published information, authorities and government because of the ease with which AI systems can make polished-looking false information. There is also likely to be heightened divides based on ethnicity, politics, region and more as AI will be used to stoke distrust. Some current creative jobs will be eliminated in favor of cheaper AI. This will be somewhat disruptive and create further divides, especially between advanced economy countries and less developed countries. It is also likely the case that there will little restraint in creating autonomous weapons systems, and this will have a largely negative effect."

Olivier Crépin-Leblond
This is an era in which seeing is <u>not</u> believing, 'applying a question mark' to our beliefs

Olivier Crépin-Leblond, founder and board member of the European Dialogue on Internet Governance, commented, "By 2040, expert systems powered by AI are likely to advance significantly in the realm of diagnostics and complex evaluations. Mistakes previously made due to human reasoning are less likely to be made by AI systems if the systems are correctly trained. My primary concern with AI, though, is that

humans can be extremely prone to manipulation, brainwashing and other emotional control and AI can easily be tasked to the promotion of fake or incorrect information. Unless the human species becomes capable of overcoming such weaknesses, it will fall prey to manipulation that could lead to its extinction.

“We can see the effects of today's ‘information wars’ in which a significant part of a conflict takes place outside the geographic borders of the conflict as the broad reach of the Internet is used as a catalyst to mobilise people worldwide to support a cause, whether it is by a team, a leader, a political party or a particular side in a war. Whilst the premise that ‘seeing is believing’ has been true for humans for thousands of years, we are entering an era in which ‘seeing is not believing.’ This is applying a question mark upon our belief systems.

“The abstract meaning of ‘belief’ involves believing without seeing but, as an emotional species following Maslow's hierarchy of needs, our most significant needs are physiological and these are all felt in the physical space – by sight, touch, taste, smell and sound. Unfortunately humans senses can easily be fooled by AI. Not being able to trust our own senses will be a challenge for human minds.”

Greg Sherwin
‘We will see an over-abundance of mediocre information constantly tweaked as desired’

Greg Sherwin, senior principal engineer at Farfetch in Lisbon, Portugal, and global faculty member at Singularity University, wrote, “The cheaper costs of mass-produced communication will proliferate an over-abundance of mediocre information constantly tweaked for slightly optimized improvements as desired by the communicator. There will be an initial novelty affect advantage followed by a relatively rapid decline to the mean. By and large, communications will be commoditized and thoroughly predictable and average.

“On the plus side, a recognition and value for more deeply unique human voices, thought or talents will be recognized in contrast to the vast amounts of mediocre alternatives. On the negative side, public trust in public information will decrease significantly. This will result in greater distrust and isolation between people in society. AI will also allow most of its users to patch their own personal deficiencies to become more ‘average,’ but it will do little to nothing to help them excel as individuals or in their characteristic abilities.”

Steven Rosenbaum
‘Profit doesn’t provide a clear path to the truth; in fact, it does the opposite’

Steven Rosenbaum, co-founder and executive director of the Sustainable Media Center, based in New York, commented, “Much of the stress and complexity in daily life can be attributed to a lack of belief that we can discern what is true and what is false. In the near term, AI will provide what is presented as an ‘objective’ ability to differentiate fact from fiction. And while the tech may have that ability, the business models that are being employed to build AI are fraught with danger.

“Profit doesn’t provide a clear path to truth; in fact, it does the opposite. So, in a world where Truth is needed, and hard to find, AI will arrive as a savior - but in the end will make the already murky world of Truth even harder to differentiate. Truth 2.0 might well make us tied to a robot with bias hard-wired in.”

Anonymous respondent
AI has to be able to handle near-real-time fact-checking or societies may be torn apart

A futurist and strategist who works for the U.S. Department of Defense predicted, "Within society, information flows will be increased in both quantity and speed. Where information is trustworthy, this will get data to people more quickly. In the hands of those who seek to spread disinformation, this will speed the spread of inaccurate data as well. Depending on how well AI handles real-time fact checking, this may have the impact of either pulling societies together or tearing them apart. In the hands of malevolent governments that seek to control their populations, AI can be a tool used for repression. It also can spread new ideas quickly, which in the hands of open societies, may spur innovation."

David Vivancos

Human knowledge may become a thing of the past, as we cede creation of it to AI

David Vivancos, CEO at MindBigData.com and author of "The End of Knowledge," wrote, "Knowledge is the basis of society and culture and in this emerging era of artificial intelligence, we are beginning to lose control of knowledge. We are starting to delegate the creation of knowledge to machines to the point where *human* knowledge may become a thing of the past.

"The AI tools we are building are oracles. But they are not being built to give us extra opinions. They are meant to automate decision-making. They won't necessarily need humans to be in the loop in order to make new creations and generate new knowledge.

"Clearly, we must build education systems that train people to live alongside the machines – exploiting the many things they have to offer and the many things they can do better than we can. But we must also try like crazy to work collectively to stay in charge of them and push ourselves into areas of life and intelligence that the machines can't replicate or surpass – or maybe I should qualify that to be 'the things machines can't *yet* replicate.'"

Inequities are being magnified by AI. If humanity takes appropriate action it can close many divides and help a more people flourish

A majority of the experts who participated in this canvassing believe that the widening of social, economic and political gaps between those empowered with wealth or other such elite standing and those who are unempowered will worsen significantly by 2040. In fact, they see it as one of the most-important concerns to consider and work to mitigate. Related comments on this topic can be found throughout this report. Following is a collection of brief remarks in that vein.

Stephan G. Humer

Fast-moving unregulated AI development could increase gaps and heighten polarization

Stephan G. Humer, sociologist and computer scientist at Fresenius University of Applied Sciences in Berlin, predicted, "There is likely to be an increasing polarization: those who can use AI will benefit enormously and those who cannot even keep up with 'normal' digital developments will fall further behind. Unbridled AI development, therefore, harbors enormous potential for social division. Consideration of this development should be at the beginning of everything and actions should be taken to mitigate this challenge."

Anriette Esterhuysen
What do we need to do to improve equality and human rights? Focus our AI efforts there

Anriette Esterhuysen, Internet Hall of Fame member from South Africa and chair of the United Nations Internet Governance Forum Multistakeholder Advisory Group, said, "My fear is that life will change positively for people who have the means to understand, use and benefit from AI, but for those who don't AI will either have no positive impact or its impact will be negative. It can negatively impact jobs, creativity, nondiscrimination, anonymity, privacy (which impacts on rights) and trust in the media and news. My belief is ultimately what will make the difference is how humans use and enable/guide the development of AI – and we have not been good enough at managing this technology thus far in ways that create more equality, access to human rights, services, food security and safety. We need to ask ourselves, 'What do we need to do so that we do all of that better with and through AI?' That is where our AI efforts should be focused."

A related comment was submitted by a **futurist, researcher and military strategist who works for the U.S. Department of Defense** who predicted, "AI will likely enhance human productivity in the economic sphere, as many time-consuming aspects of business activities will be more efficient and faster. As productivity increases, a better quality of life will likely follow for *some* people. This quality may not be evenly distributed, with gains benefiting those educated sufficiently to optimally use AI benefiting more than those who are not."

Danny Gillane
The lion's share of AI's benefits will go to the haves, not the have-nots

Danny Gillane, an information science professional, wrote, "The wealthy and privileged will continue to benefit most, and AI will exacerbate the situation. The already sad state of the public's access to and willingness to take in information and news from trusted sources will worsen. AI's potential to improve access to healthcare and to improve transportation of people and goods may affect us all to some extent but the best of it will be most likely to benefit the haves at the expense of the have nots."

June Parris
AI is only as good as those who create it and control its use. We often live in a false world

June Parris, a former member of the UN Internet Governance Forum's Multistakeholder Advisory Group from Barbados, wrote, "AI is only as good as those who create it and control its use. I have little faith in humanity. Many humans hide a corrupt spirit behind their outward-facing belief systems. Their true purpose is not fully known. We often live in a false world. However, AI – if programmed without bias or corruption ideation and within standards, policy and regulation – should result in fair and inclusive outcomes. Thus, working toward such societal goals for AI should be a priority. Policymakers forming advisory groups to work toward governance of AI should include stakeholders from all settings in those deliberations: from academia, civil society, the technical sector, researchers and more. Government meetings and town hall gatherings should be undertaken and they should include the voices of ordinary citizens from all levels. Regulation is needed, but it must emerge from open, democratic processes. When governments govern without opposition, problems arise. Lack of opposition leads to a government that is a dictatorship whose decision-making is not fair.

"One major problem for the deployment and use of AI relates to affordability and the public's capacity for using it well. Digital education is necessary. The provision of appropriate grants, loans and other

assistance to those in need is also a must in those societies. Such measures when undertaken often are less effective than they should be. The funds are often misappropriated in some cultures, the technology is not kept up to date and it is often misused and not maintained, people do not always learn the lessons of digital life. It is difficult to imagine that AI might ever be made understandable, useful and accessible to most people by the year 2040 under such conditions."

Anonymous respondent
Institutions will be destabilized; income inequality will continue to grow

An AI ethics researcher based in North America commented, "Legal and political institutions, from schemes of intellectual property, voting and surveillance to the conduct of and laws of war will be destabilized. Income inequality will continue to grow as it has been in advanced technological societies such as in the United States. It is likely that tedious administrative tasks will be significantly reduced. Work will be transformed – perhaps radically reduced for some. There will continue to be a rapid turnover in software, platforms and AI-enabled devices that will keep consumers enthralled."

Jonathan Taplin
The rapid transfer of wealth from labor to owners of capital could be drastic, dangerous

Jonathan Taplin, author of "Move Fast and Break Things: How Google, Facebook and Amazon Cornered Culture and Undermined Democracy," observed, "Sam Altman, CEO OF Open AI, has said that he expects the 'marginal cost of intelligence' to fall very close to zero within 10 years. The earning power of many, many workers would be drastically reduced in that scenario. It would result in a transfer of wealth from labor to the owners of capital so dramatic, Altman has said, that it could be remedied only by a massive countervailing redistribution known as Universal Basic Income (UBI). I am skeptical that the current political system is capable of creating or financing a UBI system."

Ravi Iyer
Inequality will widen existing divisions and create more 'diseases of despair'

Ravi Iyer, research director at the University of Southern California's Center for Ethical Leadership and Decision-Making, predicted, "AI will have an enormous benefit for many fields. However, the benefits will not accrue evenly across society. AI systems are expensive to train and develop, such that those benefits will be given to the owners of capital, at the expense of those who work for a living and who will be competing with AI systems. The resulting inequality will exacerbate existing divisions and create even more "diseases of despair" in communities that do not perceive the benefit of such technology, unless society figures out ways to democratize the benefits of AI."

Anonymous respondent
A radical rethink of AI is required if we want it to increase social equity

A U.S.-based professor whose expertise is in ethics and policy for information technologies said, "On its current trajectory, AI, like many technical tools, is likely to further concentrate wealth and power in the hands of the already-powerful, while making life more difficult and less equitable for already marginalized peoples. A radical rethink of how AI is funded and developed is required if we want automated technologies that will increase, rather than decrease, social equity and decrease overall

global precarity. Otherwise, a few large corporations will further dominate the information we have access to and the decisions that are made for and about us."

Will the powerful support human agency and democracy? Experts worry that he inadequacies of corporate, government and education systems won't help

An oft-mentioned topic by a large percentage of respondents is the fact that humanity's current institutional systems are too antiquated and flawed in ways that harm their ability to cope with accelerating technological change in the age of AI. While some worry that humanity is fairly unlikely to be able to overcome this significant issue, others argue that people can come together and find a way to make things all work out. Following is a collection of comments by experts who focused their responses in this vein. Additional remarks on this topic can be found here and there in the midst of the longer essays in the full report.

Michael Kleeman
AI, traveling globally at high speed, will be used for the gain of wealth, power or both

Michael Kleeman, a senior fellow at the University of California-San Diego (previously with Boston Consulting and Sprint), wrote, "It used to be that only state-level actors could achieve the scale of impacts that could be truly disruptive of society. The acceleration of processing capabilities, coupled with data access (and lack of personal data privacy, especially in the US, China, Russia, etc.) and AI will leave the population vulnerable to individuals or firms (and states) that want to cause disruption to social systems to take advantage of this for their own gain. Trust will be eroded, even in the most basic of social systems, and – for the gain of wealth or power or both – we will see massive harm caused. It is hard to see the offsetting benefits of AI that can cause good because of the risk of corruption of these same forces."

George Sadowsky
Weak government policies, misinformation, polarization, exploitation: What could go wrong?

George Sadowsky, Internet Hall of Fame and Internet Society Board of Trustees member, said, "In 2040, if current trends in humans' AI use continue, personal agency and privacy will take a larger hit based on people's actions and inaction, including weak and vacillating government policies, the polarization of our societies, the prevalence of the targeted advertising model, the rapacious appetite of the personal data industry in the U.S. and elsewhere and people's inability to create a critical mass of concern about it. Polluting the scene further will be the evolution of disinformation techniques, creating a crisis of belief that will become increasingly clever and successful in mixing disinformation with evidence-based information, creating a crisis in reliability of information on the Internet, as well as elsewhere, from any and all sources."

Jim Kennedy
Unrestrained private development poses the greatest near-term risk that AI will go astray

Jim Kennedy, a professional media and AI strategist, wrote, "Having seen the power of AI to affect human life far beyond the value chain of work I worry more about its eventual outcomes than I once did. Among my many concerns, the lack of government oversight and the lack of public-sector understanding of AI do not bode well for the future of AI development. Unrestrained private development poses

perhaps the greatest near-term risk that the pursuit of AI and AGI will go astray. I fear that today's threats of misinformation, disinformation and biased algorithms will look quaint by comparison to what we may be dealing with in 2040. Controlled development with international guardrails and real consequences for bad actors will be essential to keeping this next stage of the technology revolution from becoming something beyond our control to steer and navigate. All that said, I remain an advocate for the application of AI to a wide range of human activities, as long as humans remain in control, not just 'in the loop.'"

Anonymous respondent
Even regional differences are difficult to overcome, forget trying to get the world to agree

An expert in communications and information science wrote, "If AI is to be a tool that is used by the common human, then it needs to be trained by all humanity. Every creed, nationality, religion and belief structure should be incorporated. Morals must be included and defined to better treat the ethical challenges that currently occur. The United States will no longer be dominated by Whites in the upcoming generation, yet this is what AI will have been taught. It is the same bias that is seen in medical fields today. Additionally, with the chaos that is our federal government, there is a handful of crazies who are stopping our government from actually doing their jobs. It could take just a few people to change what is funded and what is appropriate to fund, and they are trying to find ways to drive power to themselves. This is not the *unity* we need. AI is another divisive tool that could make things harder for anyone who is not a White, upper-middle-class male. Even the regional differences in the U.S. make it impossible to come together on how to move forward. Forget trying to get the entire world to do the right thing. The use of AI will exacerbate the inequalities in society — the haves and have-nots."

Kevin T. Leicht
The big issues are corporate power and the naiveté of the humans who develop and deploy AI

Kevin T. Leicht, professor and head of the department of sociology at the University of Illinois-Urbana-Champaign, commented, "The biggest single problem with AI is human – it is the social and cultural naiveté of the people who have developed it and continue to deploy it. That, in combination with the corporate concentration that is behind it, give me serious pause. There is not a single new technology in human history that has worked exactly as the inventors intended. Instead, there tend to be several narratives, and only one of those narratives ends up coming to pass. Consider, 1) the inventor's concept of what the technology will do; 2) the enthusiast's idea of what the technology will do; 3) the first adopters' idea of what the technology will do; 4) the user's idea of what the technology will do; 5) the customer/client's idea of what the technology will do; and then 6) what the technology actually does, which does not exactly reflect points 1 through 5. Very few people are projecting what point 6 will look like. It is time to do that in a serious way."

Andrew K. Koch
Tech entrepreneurs are either blindly and willfully ignorant or duplicitous and malfeasant

Andrew K. Koch, CEO of the Gardner Institute for Excellence in Undergraduate Education, said, "When comparing this technical advance to all others, there is one striking difference. The printing press, steam engine, internal combustion engine, railroad, nuclear bomb and computer all were massive technical advancements that sparked mostly positive economic and social change at revolutionary levels. But none of those advancements, or any others since the rise of homo sapiens, had the ability to reason and think

in ways similar to and faster than humans. AI does or will do so in most realms soon. We benefit from AI on a daily basis now already. I see its current virtues and tremendous possibilities. We can also see how it is being weaponized and mishandled. We need global consensus and oversight of this. A few tech billionaires are now empowered to play God. We need both a national and global strategy around artificial intelligence. AI advancements cannot be driven, at least not primarily, by for-profit moguls. People like Bezos, Musk, Zuckerberg and their ilk may have their own plans for AI, but they seem fully focused on power and wealth, not that which best serves our democratic republic, its people and people around the globe. Tech entrepreneurs may want to tell us that what is good for them is good for us. In doing so, they are either blindly and willfully ignorant or they are being dangerously duplicitous and malfeasant."

Anonymous respondent
Human systems will not adapt. Hypercapitalism has to tone it down or autocrats will rise

A well-known expert in educational curriculum design said, "Public systems are woefully slow, and will not adapt to AI's accelerating pace. Human social systems will not adapt quickly enough, either. This will result in increased stress and chaotic responses. Hypercapitalism will have to tone it down and redistribute, or autocrats will rise. They already are in a number of countries, even though they do not serve the people who get them to power. We have created a host of other human-made problems that will affect us way before AGI or Superintelligence (global warming in particular)."

Amy Zalman
AI advancement is accelerating past 'the will or ability to govern it'

Amy Zalman, defense, security and justice advisory specialist at Deloitte, said, "Although I generally do not tend toward extremes, it seems rather self-evident that the advancement and application of AI in its various expressions is really outrunning the will or ability to govern it, and that the unthought implications of these two facts is probably on the long-term horizon in ways that merit a deep think."

Deanna Zandt
Capital-driven technologists are training AI using biased human-built content

Deanna Zandt, media technologist and consultant, said, "I fear the capital-driven technologists working on AI are either ignorant of the bias they're building into their systems (from how they write their code/algorithms to the base material being fed into the AIs for learning), or worse, they actively know about the bias and either don't care or support these biases. While I love exploring the absolute power of artificial intelligence in general, I am deeply fearful of the incredible amount of bias that will be exacerbated by its implementation. We currently have little to no accountability when it comes to equitable technologies. When I was a teen, I loved ELIZA. It made me feel seen and heard, and I often cried when I interacted with it. I knew intellectually that it wasn't real, but I didn't care, I just *felt better*. And part of me wanted to believe that there was magic inside my computer. I think about ELIZA a lot with these advances in AI. In my most innocent, naive self, I could see AI being a tool for empathy and connection. But in a world driven by profit and exploitation, where would this even come from?"

Anonymous respondent
If AGI's existence necessitates corporate oligopolies is democracy over?

A U.S.-based AI policy researcher wrote, “Question: Can we actually have artificial general intelligence (AGI) without corporate oligopolies? Like truly! Given the way cloud computing works, is this even possible? (If we start treating cloud like other publicly owned/highly regulated infrastructure then maybe?) Question: If AGI’s existence necessitates corporate oligopolies is democracy over? Question: If we can’t have AGI and democracy, why should we be deploying it as it is being developed, or even deploy it beyond lab applications?”

Charlie Firestone
Might governments become more authoritarian in order to combat AI’s dangerous effects?

Charlie Firestone, president of the Rose Bowl Institute (previously executive director of The Aspen Institute for 30 years), said, “There will be a ‘power curve society,’ with a relatively few reaping great rewards by leveraging AI and other new tech. That curve goes down rapidly into a long tail of relative have-littles. ... The difference in wealth and lifestyles will breed resentment and tension. Government will be challenged to provide for all the people when many will be out of work or collecting retirement benefits with fewer workers contributing to the fund. Nation-states’ inability to protect their borders against disease, crime, economic trends, information and disinformation, climate events, and in many cases migrants, will create additional disruption. The big question is the level of authoritarianism, or alternatively, disorganization that dominates societies. I expect governments may have to be more authoritarian in an effort to combat the dangerous effects of AI, genetic engineering and other technological advances.”

Satoshi Narihara
Advanced ease in decision making results in a loss of classical human autonomy

Satoshi Narihara, associate professor of information law at Kyushu University in Fukuoka, Japan, commented, “We may gain more-optimized decision-making. At the same time, we may lose human autonomy in the classical sense. Our daily lives will be promoted and supported by various kinds of AI systems such as those that produce personalized AI agents. Our decisions will be made based on suggestions and recommendations by AI systems. Decision-making by businesses and governments will be based on suggestions and recommendations by advanced AI systems.”

Friedrich Krotz
Control over this technology must be led by civil society, not by tech barons and companies

Friedrich Krotz, fellow at the Centre for Media, Communication and Information Research, University of Bremen, Germany, said, “We must not fully believe any only-positive hype. No technology in human history has served only the best interests of humanity. We need to exert much more control over this technology than we do today. The best outcomes depend upon how each technology is developed and used.

“Humanity’s representation in exerting some control must be led by civil society, not by tech barons like Elon Musk or tech companies like Meta. Alan Turing taught us that computers can simulate every mechanical machine and, as a consequence, it can also deal with material objects, questions of biology and so on. Computers equipped with advanced applications like AI can do many things, and often do them better than humans. But, at this point in time, everything computers and AI can accomplish is based on data from humans (who are behavioral).

"The computer software runs logic and math operations. Human beings generally operate on the basis of sense-making processes generated in a symbolic world. This world can't be understood by a machine thus the outputs of machines may be somewhat helpful, but not so human. AI technology is controlled by corporations whose primary concern is profit, not human lives, human rights and the good of civil society."

AI raises challenges and opportunities for the future of work; the automation of jobs will catalyze drastic change

These experts varied in their view of the future of work, which is mentioned quite often throughout the chapters of this report. Some are confident the future of work will be significantly better for humanity, others believe there will be mass unemployment due to AI. Related comments on this topic can be found in statements made throughout the many sections of this report. Following is a collection of the short submissions that include brief remarks in that vein.

Alexandra Whittington
Working for money might not be the primary system for meeting basic needs in 2040

Alexandra Whittington, futurist, writer and foresight expert on the future of business team at Tata Consultancy Services, said, "Imagine a future where having a job is obsolete due to a basic wage paid from the earnings of robots doing all the work. We could encounter scenarios where jobs might not fall into neat categories of 'full-time' or 'blue-collar' in the future, and what world rankings would look like if GDP [Gross Domestic Product] accounted for caregiving, domestic, and other forms of unpaid women's work. The biggest change might be that working for money might not last much longer as the primary system of meeting basic needs. AI might catalyze this change, but it would only be the beginning of a new phase of realizing human potential."

Thomas Laudal
A shift in values and norms will occur as humans' preeminence recedes

Thomas Laudal, associate professor of business at the *University* of Stavanger (Norway) Business School, said, "The gradual transition from humans to AI machines for creative drafting and language processing will lead to a diminishing role for humans and, consequently, a reduction in related competencies. However, more importantly, this transition will reshape our values and norms by forcing humans to accept that they have an observer role in work in which performance measurement and competitive advantage are paramount. This will probably be a temporary phase. The larger shift that sectors will undergo is a transition from human-centric to non-human work involvement. The dangers connected to these transitions lie in managing potential conflicts among humans during this transition. Some will assert that there are limits to what AI can replace, while others will argue that AI might eventually substitute for humans across most domains. Successfully navigating conflicts of this nature will be crucial in ensuring that AI does not compromise the quality of human life."

Dean Willis
We may see a 'Futurama'-like inversion of work roles, with have-nots marginalized

Dean Willis, a consultant for protocols, standards and systems architecture at Softarmor Systems, predicted, "There will be substantial automation of low-level knowledge work in areas such as records

administration, filing and reporting, actuarial, title and abstract services, and drafting of basic contracts and other documents. This leads to a 'Futurama'-like inversion of roles, with humans performing tasks of physical dexterity such as equipment maintenance, although the most repetitive and predictable of manual labor will also be heavily automated. This displaces many workers into the 'human-touch'-valued fields of performance and personal service. The wealthy will have even more servants, artists and artisans, while the have-nots lacking artistry and beauty will have even less and be increasingly marginalized while being managed through social network controls. The battlefield will be increasingly automated with both drones and autonomous systems, leading to further dominance by the larger technocratic nation-states."

Pedro U. Lima
Advances in robotics will introduce new job categories for humans and AI

Pedro U. Lima, professor of computer science at the Institute for Systems and Robotics at the University of Lisbon, predicted, "The proliferation of AI in regard to non-physical systems will possibly decelerate, as more and more systems and services will become covered and AI presence so common that it may even become unnoticed. But I expect a steady increase of AI interacting with the physical world, e.g., through intelligent robots. It is difficult to forecast which machines of that kind will be the most successful, but that's where the progress will be. We will probably see the rise of specialised robots for particular tasks in which they operate with a large advantage over humans, such as in autonomous driving of taxis and trucks. I would not leave aside the possibility of more general-purpose robots (not necessarily humanoids, but close to them, with at least arms and head) for some tasks where it would be hard to change the environment drastically to suit the robots, e.g., household robots. The impact of robots will certainly be different from that of the current AI systems. The latter tend to replace white-collar workers in easily automated jobs these days. But robots will again introduce changes in blue-collar jobs while also leading to the creation of new job categories for humans and AI that we cannot even imagine today."

John Markoff
Disruption in the job market will be offset by changing demographic patterns

John Markoff, a fellow at the Presence Center at Stanford University School of Medicine, previously a senior writer at the New York Times, said, "Increasing social isolation is the hallmark of the deployment of large language models. It is likely there will also be economic disruption in the job market, but that will be offset to some extent by changing demographic patterns that will shrink the pool of available workers in advanced economies and increase the need for caregiving of the elderly in industrial countries in the second half of the century."

Anonymous respondent
By 2040 over half of U.S. colleges will have closed, and hospitals will be run by AI and nurses

A well-known internet standards developer and internet pioneer wrote, "By 2040, almost 75% of all employees will be laid off and replaced with AI. Corporate takeover artists will acquire public companies, fire most of the employees and turn the work over to AI. By 2040 over half of U.S. colleges will have closed, and many of the remaining institutions will have been taken over by private equity. There will be hospitals with virtually no doctors, only nurses and AI. In restaurants, food will be prepared and delivered by robots."

While medicine and personal health will make gains, some are worried about the impact of AI-driven change on people's mental health and well-being

In many of the earlier essays in the full report, experts noted that advanced AI will offer extremely effective psychological support and well-being tools. However, many others among the essayists above said they fear the impact of accelerating technological change on human mental health will also cause serious issues. Some worried over the social isolation that is enabled by digital, AI-driven everything. Some said they expect to that severe anxiety, depression and loss of purpose will result for millions due to massive unemployment. Others noted that the information ecosystem will be further polluted with mind-altering falsehoods, hate speech and manipulative messages – possibly leading to violence. And some said they fear that people may be overwhelmed by an AI-enabled incursion of multiple personas, fictional and mirror worlds and digital twins in their lives.

This is a small selection of a few additional full brief responses tied to human well-being from the experts.

Anonymous respondent
The impact of an exponential concentration of power is not helpful to humans' well-being

A professor of politics and government commented, "If the business model of AI development remains unchallenged, the exponential concentration of corporate power will fundamentally transform human relations, human dignity and democracy, and none of those in good ways. Rising economic inequality, already at a near-breaking point, both within countries and across countries will rise. While democratic systems or protests may provide some avenues to correct such inequalities, with the concentration of information and 'democratic' power, the barriers to use of systems of governance and even to protests for the public good will be exceptionally high. Human dignity (and mental and emotional well-being) will be degraded as labor markets shift, inequality rises, and control over creativity, personal preferences (and other aspects of the human experience), and aggregation of human needs is given over to decision-making machines. Throw in distrust of others coming from misinformation and fewer real-life relationships as we can rely on machines for caregiving and the simulation of love and education, and it would be hard to exaggerate the potential negative consequences of unregulated, not democratically controlled AI development by the year 2040."

Alan D. Mutter
People will become disconnected and there will be an increase in divisive tribal behavior

Alan D. Mutter, consultant and former Silicon Valley CEO, wrote, "Lots of stuff will get easier or more efficient, such as crafting code, examining X-rays and writing term papers. However, I fear people will become more disconnected with each other as humans outsource to slick bots the thinking and judgment that we used to do for ourselves. This could lead to a loss of community spirit and an increase in divisive tribal behavior."

Mark Schaefer
When AI exceeds our capabilities where do we belong in the world?

Mark Schaefer, a business professor at Rutgers University and author of "Marketing Rebellion," wrote, "The biggest threat to individuals is not a loss of income but a loss of purpose. How do we live our lives

in a meaningful and productive manner when AI can exceed our own capabilities? I'm a writer. Where do I belong in a world where AI creates better than me, or at least does most of my work for me? There is purpose in the struggle and reward in the individual effort. Most advanced countries will have universal income by 2040, but it is probably less likely to emerge in the U.S. due to political polarization."

Chapter 8 – Closing thoughts

The following respondents wrote contributions that consider a wide range of issues tied to the future of humans as artificial intelligence begins to emerge more fully across broad swaths of society.

Warren Yoder

The path to 2040 will be a jumble of unanticipated developments in tech, culture and policy

Warren Yoder, longtime director at the Public Policy Center of Mississippi, now an executive coach, predicted, "The next 15 years will be a time of confusion, partly because of the initial misdirection and partly because the results of generative machine learning expose how little we know about ourselves. The path to 2040 will be a disordered jumble, full of unanticipated developments in technology, culture and public policy. Will machine learning make human life better or worse? *Yes*. *Both*. And many other things besides. Machine learning is capital- and expertise-intensive. Those who develop and finance machine learning have demonstrated over and over again that they have remarkably limited understanding of the complexity of both human individuals and society. This is most obvious in the names chosen for the new field. The basic technology was described as *neural networks*, even though neurons are far, far more complex. The field was called *artificial intelligence,* even though intelligence is a poor representation of humanity's culture-based capabilities. No one objected when these names were mere marketing puffery. Now that machine learning has developed modest capabilities, these misleading definitions are a serious misdirect."

Esther Dyson

Focus on the long-term welfare of people and society:
Ask not what AI can do but what we can ask it to do

Esther Dyson, Internet pioneer, journalist and founder of Wellville, wrote, "The question of the future of humans and AI seems impossible to answer because of unexplainable humans, not because of unexplainable AI. So much depends on our use and control of AI. And that in turn depends on who 'our/we' is. There are a number of issues here. Machines gave us huge gains in our ability to produce and eventually to transport things, including food. That in turn gave us too many choices, which often overwhelms us (see Barry Schwartz's brilliant book "Paradox of Choice").

"While poor people often lack the money/security to make good choices, rich people lack the time to enjoy/make use of all their options (as described in Eldar Shafir and Sendhil Mullainathan's equally brilliant book "Scarcity"). We have now gotten used to accelerated but overfilled time. Both then and now, you could lose your life in a few seconds, but in the past there were very few instant solutions for any problem.

"We have gotten used to accelerated but overfilled time. Then and now, you could lose your life in a few seconds, but in the past there were very few instant solutions for any problem.

"We now live in a world of pills and instant shopping and even instant companions – found on dating apps (some real, some duplicitous) and also on many mental-health support apps. We expect immediate relief of our cravings. But instead, our cravings never go away; rather, they turn into addictions.

“Indeed, what makes us most human may be how we perceive our own time and that of others. That was the fundamental gulf between the protagonist of the movie ‘Her’ (played by actor Joaquin Phoenix) and his AI ‘lover’ Samantha (Scarlett Johansson); she had more than a thousand lovers and time to pay attention to each of them. But in the end, what we’re seeking is *share* of mind from other humans, not fungible minutes of attention.

“Instead of regulating AI, we need to regulate its impact, and AI can actually be very helpful at that – both at predicting outcomes and at assessing counterfactuals. That’s what it does much of the time, whether in health care, advertising or political campaigns. It can also automate huge amounts of physical labor and routine decision-making or repetitive work. However, it’s up to humans to figure out what the goals of those AI tools and algorithms should be: How much to maximize sales versus reduce/simplify working hours? How much to maximize profits for the next year, versus for the current CEO’s tenure, versus on behalf of the investors who trade on the basis of a quarter’s earnings? Things were very different when entrepreneurs built businesses for their grandchildren to inherit.

“Or is ‘we’ actually really people like Vladimir Putin and Donald Trump and Elon Musk – caught up in their own visions of a grandiose future (whether based on an imperial past or a future interstellar civilization)? They measure success differently, and they try to spread that vision whatever way they can. Mostly, they first seduce people with visions of power and money – and then make them complicit through the compromises required to realize those visions. Some make those compromises knowingly, but most are swept along, unexplainable even to themselves.

“AI will inevitably do a lot of useful things. I’d rather have an AI than a hungry, grumpy judge sit on my case in court. And, as a nondriver with no illusions about how safely I (and presumably most sensible people like me) drive, I’d rather sit in a car driven by a predictable AI that does not chat with the passengers, try to drink coffee, look at TikTok during stoplights or speed through yellow lights. Those points make sense and are only slightly controversial.

“To take a less abstract look, let’s use healthcare as an illuminating example. We can take healthcare as a model for pretty much everything, but with extremes. It’s a business, even though for some people – especially at the beginning of their careers – it’s also a calling. Indeed, it’s a very messy, complicated business. Its people – leaders and workers and customers – are overwhelmed with paperwork, with details, with conflicting regulations and requirements and stiff record-keeping protocols. And, of course, they must deal with privacy requirements that complicate the record-keeping and also serve to maintain silos for the incumbents. AI can help handle much of that. AI will take care of the paperwork, and it can make a lot of good, routine decisions – clearly and cleanly and with explanations. It’s very good at routine operations and at making decisions on the basis of statistics and evidence – as long as it’s prompted with the right goals and using the right data.

“Getting the right goals and using the right data are, of course, the big challenges. Is society really ready to consider the future consequences of its actions, not just a year from now, and not just a century from now, but in the foreseeable future? Think of the people today whose predictable diabetes we do not prevent this year and next; those people will eventually require expensive treatment and find their lives disrupted well before 2040. (See the recent frightening stats on diabetic amputations.)

“What about the kids who now spend their days in some sort of child storage because parents can’t afford or find child*care*? They are likely to drop out of school, get into drugs and lose their way, and scramble as adults to make money however they can in 2040 and beyond. Then there are the mothers

today who get inadequate pre- and post-natal care and counseling. They may suffer a miscarriage or fail to provide a nurturing childhood, with all the inevitable consequences by 2040.

“We need AI to predict the positive counterfactuals of changing our approach to fostering and *investing* in health in advance, versus spending too late on remedial care. If we use the right data and make the right decisions, for each patient specifically, AI will allow us to do one broad, important thing right: It will reduce busywork and free those who joined healthcare as a calling to be better humans – paying human attention to each of the individuals they serve.

“Our challenge – in healthcare as elsewhere – is to train humans to be human. Training AIs is scalable: Train one and you can replicate it easily. But humans must be trained one by one. Yes, they learn well in groups, but only if they are recognized as individuals by other individuals.

“There are mostly positive and mostly negative scenarios for the near future. Both will happen across different societies and, of course, they will interact and intersect. There will be stark differences across countries and across boundaries of class and culture within countries. I doubt that one side or the other will win out entirely, but we can collaborate to help spread the good scenarios as widely as possible. We’ll still be asking the same question in 2040: ‘How will it turn out?’ It won’t be over.

“As a society, we need to use the time we spend on rote decision-making and rule-following – which AIs can do well – to free ourselves and train ourselves to be better humans. We need to ask questions and understand the answers. We need to be aware of others’ motivations – especially those of the AI-powered, business-model-driven businesses (and their employees) that we interact with every day.

“In the positive parts of the planet, AI – in its ethical form – will win out and we’ll start focusing not so much on what AI can do, but on *what we ask it to do*. Do predatory business models reign supreme, or do we focus more on the long-term welfare of our people and our society? In short, we need *explainability of the goals and the outcomes* more than we need an understanding of the technological underpinnings.

“And we need to understand our own motivations and vulnerabilities. We need to understand the long-term consequences of everyone’s behavior. We need the sense of agency and security that you get not from doing everything right, but from learning by making, acknowledging and fixing mistakes. We need to undergo stress and get stronger through recovery. What makes us special in some ways is our *im*perfections: the mistakes we make, the things we strive for and the things we learn.”

Jan Schaffer

Humans will not understand the consequences of advances in AI

Jan Schaffer, entrepreneur in residence in the school of communication at American University, said, “Advanced AI will change lives in a lot of ways by 2040, but humans will not fully understand the consequences. I worry about future economic prospects for worker-bee employees who comprise the middle- and lower-middle classes. I worry about the future of higher education. We already may have more colleges and universities than are needed for the demand. As some of them close it will impact small towns across the U.S. AI will definitely help with better medical diagnoses and will give women and minorities better listening posts than many now have in the health sector. Robotic surgery seems promising, as does more-advanced robotic manufacturing. I'm not yet convinced AI can improve

journalism or crime-solving – or even dating matchmaking. :) In truth, I'm kinda glad I'm not going to be around when the full impact will be seen."

Chris Labash

'AI's ubiquity will tempt us to give up ownership, control and responsibility'

Chris Labash, associate professor of communication and innovation at Carnegie Mellon University, wrote, "Predicting the future is a tricky business under the best of circumstances and the world in 2023 is pretty far from the best of circumstances. At its core, AI is just one more tool in humanity's toolbox. Our task – as we jump into using AI with a mixture of rapture and horror – will be to treat it with the respect that we have for things like nitroglycerin. Used the right way, it can be hugely positive. Used the wrong way, it can blow up in our face.

"When I started thinking about how to respond to this, my obvious first thought was, 'I wonder what AI would say?' so I asked ChatGPT to 'Write a 1,200-word essay on the future of artificial intelligence' and it did, returning a nicely-headlined, 'The Future of Artificial Intelligence: A Glimpse into Tomorrow's World.' And while I did get 1,200 words, I also got an essay of hard-to-argue-with generalities that sounded like the work of an eighth-grader who compiled everything from the first page of a Google search. Admittedly, I could have prompt-engineered this better and refined it more, but I thought my time would be better spent actually thinking about this myself. The biggest issue from my perspective, both as an academic and as a communications professional who teaches about the veracity of and confidence in information is the '95% true' problem.

"In my classes now, my graduate students do final presentations of evidence surrounding issues that relate to the UN Sustainable Development Goals as two-part presentations: one generated by AI, and one using their own resources and critical thinking. They then compare the two and share the suspected reasons where AI got it wrong and best practices for using generative AI in the future. One thing that we find consistently is that AI is often 'close enough' to be mistaken for accurate information. While this is a learning experience for graduate students (and for me), this can, in the real world, be accepted as fact and thrown into the zeitgeist, influencing future searches and conversations: as these types of 95%-true answers become part of the corpus of knowledge the next answer may be just 95% accurate of something that's already just 95% accurate. You see the potential problem.

"That's my biggest worry, but there are plenty of others: There will be a feeling of 'let AI do it.' AI's ubiquity will tempt us to give up ownership, control and responsibility for many of the things that we ask it to do (or don't ask it to do and it just does). Principal among these may be the ability (or perhaps, lack of ability) for critical thinking.

"Nicholas Carr considered this point in his 2008 Atlantic article, 'Is Google Making Us Stupid?' Information ownership will become even murkier. As all of our thoughts, writings, musings and creative artifacts become part of the LLM we are, is essence, putting everything into the public domain. Everything (including what I'm writing here) is now 'owned' by everyone. Or more properly, perhaps, by OpenAI. 'Hey, it's not me, it's the AI.'

"I don't have room to get into ethical AI or the gender, racial, or cultural biases, or talk about the potential, as OpenAI founder and CEO Sam Altman has warned that it is not completely outside the realm of possibility that advanced AI could overpower humanity in the future. But a poisonous potential

result of offloading responsibility for information ownership to AI is that we as a global culture lessen ourselves in regard to civility, dignity and humanity even more than we have so far.

"There are many positives, of course. AI will help us be more productive at basic tasks. It can provide potentially more-accurate data and information in certain areas. It can help unlock more possibilities for more people in more areas."

Frank Kaufmann

'Imagining that AI can *replace* human contributions to outcomes arises not from wrong views about technology, but from wrong views about being human'

Frank Kaufmann, president of the U.S.-based Twelve Gates Foundation, commented, "I believe AI has just as much potential to be massively harmful as it has to be massively helpful. It is being rushed to market today in a hurry, in a way not unlike the rush to global mass medical experiments taking place during this same era. The AI rush has been condemned by entrepreneur Elon Musk, who joined thousands of others to call for a moratorium on the race for AI supremacy and warned of great danger, toward what is known as 'the singularity.'

"I do think fear of the singularity is legitimate absent positions drawing from classical religious faith. Not fearing it without standing in a counterpoint grounded in some form of classical religious belief is, in my view, a form of naivete or Pollyanna-ism (i.e., being optimistic as a simple act of will without providing sufficient bases in reason to support one's affirmation). The religious faith notion for rejecting the possibility of AI (machines) wiping out humans builds on the affirmation that humans are created by something beneficent and all powerful for a purpose, and in the end it is not possible to develop something with sufficient power to annul that.

"I have trained AI bots while employed by a for-profit firm, and I use AI for my scholarship in areas of social science. It can be helpful only when the user has the foundation to be in an 'assessing dialogue' with what the AI produces in response to one's prompts and requests. This necessity for the existence of an 'assessing subject' relating to AI-produced outcomes is one of the realities that makes me less anxious about the prospect of AI possibly 'taking over' in the future.

"Here's an example prompt for an AI: 'Explain in academic style the economic impact of the Gutenberg Press.' If the person writing that prompt and then perhaps then submitting or trying to publish the AI outcome has never previously produced academic writing or has never produced content related to economic impact of technological developments, how is this person to have any idea that she or he hasn't just received a stream of utter garbage?

Or how about using the prompt, 'Name four Stuxnet derivatives capable of nullifying current Iranian progress in isotopic enrichment?' Or: 'Write an email to my boss to tell her that I am unavailable tonight, shaped in a way that shows my interest in her invitation.' If an employee is too lazy to write thankfully and apologetically to her boss, can AI really solve that?

"Vanderbilt University DEI officials used an AI chatbot to publish a consoling public statement in response to a mass shooting at Michigan State University and had to later apologize for it. Imagining that AI's capacity (even that of generative, or even cognitive AI) for breadth, depth, speed, range and efficiency could substitute for human investment in outcomes is a form of techno-materialism or techno-

humanism. Imagining that AI can supplant or replace human contributions to outcomes arises not from wrong views about technology, but rather from wrong views about being human.

“Is anything gained by anyone anywhere by having AI write a ‘sincere’ apology to their boss? The invitation to have a machine do so is perverse. Where might a person have learned the enriching beauty of apologies and supportive expressions of interest in things important to people in our lives? Probably these capacities and these sensitivities are developed while growing up in a family (or perhaps from a coach, a caring teacher or a surrogate).

“Can AI have the experience of having a family? Can AI have a son it cares for? Can it have a parent for whom it is grateful? Can the unique, incomparable strengths that come from care for one’s child be transferable to AI? If not, then we can begin to see where AI can help and where it cannot.

“Even if we move beyond generative AI to ‘cognitive’ AI, still AI poses no threat to our authority in the realm of ‘intelligence’ and genuine progress toward evermore elegant manifestations of culture and community. Imagining a true threat to the usefulness of humans becomes possible only if we mistakenly imagine cognition to be the preeminent capacity of humans. The diminishment of being human to ‘utility’ is a darkness gurgling in the bowels of technocrats.

“In summation, it is my view that AI is merely the latest new technology, following the path of the wheel, the printing press and the combustion engine. It is broader, deeper, stronger and faster than humans. When it is asked to do what humans can do, it cannot and will not accomplish it as human beings uniquely do, and there is nothing as lovely, desirable or magical as what humans can uniquely do.

“If AI is utilized to advance and improve the realms of love, care and scientific and artistic creativity our world can become endlessly more fine. If it is used to serve our darkness, greed, cruelty and capacity for violence, it will hurl us into a new Dark Age, and from there sons and daughters of some mother will start again with the invention of the wheel.”

Seth Finkelstein

AI seems poised to add to the pressures of wealth inequality and associated social tensions

Seth Finkelstein, Let me start by deriding the AI apocalypse fearmongers. I wonder if some of the promotion of these ideas comes from venture capitalists and the like to serve as an effective way of diverting attention from the discussions of AI social issues (racism, sexism, etc.) and AI economic issues (looming worries over the future of human jobs). It’s sort of a local version of the overall political alliance between plutocrats and evangelicals, in which worrying over ’the afterlife’ can distract from misery of current life.

“Many low-level (though still professional) white-collar jobs are going to disappear. Not all and not at the highest levels, but there will be a major shift due to what will be automated. Think of how there are still jobs for musicians but recorded music has replaced a whole set of positions. As a professional programmer, I see this process underway very directly. Some mostly-rote tasks which used to be intern or entry-level assignments can be done at least as a first draft by AI. Programmers will not all be replaced, but there’s going to be a general leveling-up of what’s required in a paid human job in that sector. On the other side, ‘AI programmer’ is going to be a new job itself.

“There will be a massive explosion of new auditory and visual art by 2040 – basically computer-generated imagery (CGI) taken to the next level. CGI art has gotten so much better so fast that it has confused people’s sense of limitations. Deepfakes can be jarring; they exceed our current cultural knowledge. That’s a sign of a real advance. It means what could be done with previously with animated characters is now possible with ‘live action.’ That of course brings in all sorts of social and legal issues.

“One thing I’m very skeptical about is the stock prediction of the AI girlfriend/boyfriend. We frequently see it in cliché sci-fi shows, and pundits are writing scare stories about it, yet I never see anyone actually using its primitive implementation yet. Well, it’s a big world, but we aren’t hearing that a lot of people are running it as part of their lives.

“Then again, anthropologically, there’s a whole set of practices which are basically ‘listen to people go on about their daily problems and make soothing noises in reply.’ On the other hand, AI-based customer support is going to be a big business. Those workers now are essentially forced into being robots who operate from scripts anyway. The prospect of being able to avoid fighting through annoying telephone-tree options is all the sales pitch any consumer will ever need to use it.

“Economically, the advances in AI are going to add to the pressures of wealth inequality and associated social tensions. I suspect this is partially what’s driving some of the popularity of AI doomerism punditry. Of course tech ghost stories are an ever-present genre. Still, I think there’s a detectable thread in the discourse where fearing the death of humanity is an acceptable allegory for fearing the death of one’s job.”

Zizi Papacharissi

AI is not ‘intelligence,’ it performs as we define it

Zizi Papacharissi, professor of communication and political science at the University of Illinois-Chicago, observed, “AI is not new, not artificial and not intelligence. It typically recycles old ways of doing things. There is nothing artificial about the way it reproduces human habits, but there is something manufactured about it that humans are not sure how to process yet. Finally, it is a genre of, an approach to, or a way of performing intelligence rather than serving up intelligence. This we must understand: We have designed technologies that perform what we have defined as intelligence – this is a thing very different from organic intelligence.”

Richard Barke

The forward momentum of AI is probably far too powerful to restrain or direct

Richard Barke, professor of public policy at Georgia Tech, commented, “The past few years have seen a distinct decline in the trust that citizens have in their institutions – political, business, educational, etc. Fake news and skepticism about science, expertise and higher education already have eroded the confidence that many have in government, universities and the private sector. Even without advances in AI, that trend is very threatening.

“According to a 2023 Gallup survey, only small business and the military rate more than 50% confidence. Fewer than 20% of Americans have confidence in newspapers, the criminal justice system, television news, big business or Congress. All of these are easy targets for AI-related cynicism. The potential for AI

to greatly accelerate the decline in trust is already obvious. Markets, schools, and civic culture all depend on trust, and once it is perceived to be gone it is extremely difficult to recover.

“The advances that AI will enable will be viewed through a filter of suspicion and fear, encouraged by news and entertainment media, and reassurances about the risks of AI will be viewed with skepticism, especially after the occurrence of several dramatic scandals or unfortunate incidents involving typical citizens.

“Efforts to corral the development and applications of the technology through self-regulation by the IT sector or by government regulation are laudable but it is unlikely that the pace of oversight can keep up with technological advances.

“Transparency is essential but it will always be imperfect; the expected benefits to those who are fastest, regardless of their impact on society, are too great. Within two months of its launch ChatGPT was estimated to already have more than 100 million active users. Google Bard was forecast to surpass 1 billion users by the end of 2023. The forward momentum probably is far too powerful to restrain or direct.”

Calton Pu

It is difficult to define artificial general intelligence due to changing variables

Calton Pu, director of the Center for Experimental Research in Computer Systems at Georgia Tech, observed, “The definition of AGI suffers from a fundamentally flawed assumption: that all of humanity behaves in a consistent manner constrained by some unseen, unwritten, unspecified yet inescapable limitations of the entirety of humankind. It is clear that the current state-of-the-art AI tools already surpass many human beings in their performance in the particular specialty that an AI tool was trained for. This should not be a surprise since many mechanical robots have surpassed human performance in their (robot) specialty. For AGI to surpass all of humanity requires that all humans stop evolving and learning.

“If we consider AGI as a competition between AI (in whatever form) and humanity (individually and as organized societies) as they are co-evolving, it is clear that they will help each other evolve, since the smartest humans are going to learn from and continue to utilize (even the smartest) AI, just as humans (and their tools) became stronger with robots. We can’t talk about ‘people’ as a monolithic block. AI will not impact all of humanity in the same way, and we can’t consider a meaningful ‘average’ over the entire block of humanity. ... AI technology will evolve continuously in the near future, so even the college graduates of today may become quickly out-of-date in a few years if they stop learning.

“As we have learned from history, technology in general has been used for good and evil by people with varying intentions, goals and means. AI will not be an exception, and evolving AI tools will be used by many people and institutions (both technology-savvy and technology-ignorant) for many purposes, some good and some evil. ... If AI tools are used for good, then their impact will be positive. Conversely, if AI tools are used for evil purposes, then their impact will be negative. The question of human and social impact is not really about the evolution of technological tools, but how they are used.”

David R. Barnhizer

AI surveillance and social threat systems are likely to repress freedom and damage democracy

David R. Barnhizer, professor of law emeritus and co-author of "The Artificial Intelligence Contagion: Can Democracy Withstand the Imminent Transformation of Work, Wealth and the Social Order?" wrote, "Where will we be in 2040 if the government and corporate control over information and personal data we have already been seeing is exacerbated by emerging AI tools? According to a 2017 report by Freedom House the governments of at least 30 nation-states were using the Internet and AI capabilities to shape and control their citizens. These nation-states, including China, Russia, Iran, Egypt, Pakistan, North Korea, Thailand and Turkey have been monitoring and restricting Internet communications and access while using armies of opinion shapers to spread propaganda to their populaces. Critics of the existing political structure in China, Thailand, Egypt, Thailand, Saudi Arabia and Turkey are jailed and worse. Freedom House reported in 2023 that of the 70 countries it studied conditions for human rights online had deteriorated in 29 and only 20 registered gains.

"The European Union has developed wide-ranging criminal laws aimed at hate speech. Criminal charges can be brought against people deemed to have offended a minority or historically disfavored identity group by their statements, whether publicly or on the Internet. This grant of power to offended groups and individuals has chilled some legitimate free speech. Universities, supposed bastions of free speech and inquiry, also place limits on what may be said. Virtually all speech may offend someone according to an individual's subjective perception and the ability to use their claimed sensitivity for political purposes. The grant of the power of 'subjective sensitivity' to limit, ban or sanction others' speech in a period of the rapid growth of identity politics is a destructive choice for the preservation of the kinds of challenging and conflicting discourse required for healthy democratic societies. Such a grant of subjective sensitivity is socially destructive when backed by formal laws or one-sided institutional tolerance of vicious attacks on anyone who does not conform to your views and agendas. It also forces people to express themselves anonymously. And online anonymity levels its own threats.

"The preservation of online anonymity plus mob psychology are core causes for the malicious venom we see posted online in spaces that should serve the public with intelligent exchange and discussion. Peter Drucker described what is happening in our society as the 'new pluralism,' explaining, 'the new pluralism … is a pluralism of single-cause, single-interest groups. Each of them tries to obtain through power what it could not obtain through numbers or through persuasion. Each is exclusively political.' The language used by each collective movement (and counter-movement) is language of attack, protest and opposition. It is language used as a weapon to gain or defend power. To achieve political ends they engage in rampant hypocrisy and manipulate by the use of ideals and lies.

"World Wide Web originator Tim Berners-Lee has said one side effect of the massive and coordinated collection of data is the endangerment of the integrity of democratic societies. He warns that governments are 'increasingly watching our every move online' and passing laws such as the UK's Investigatory Powers Act, which legalises a range of snooping and hacking tools used by security services that, he said, 'trample our right to privacy.' He said such surveillance creates a 'chilling effect on free speech,' even in countries that don't have repressive regimes. Berners-Lee also said, 'It is too easy for misinformation to spread on the web, particularly as there has been a huge consolidation in the way people find news and information online through gatekeepers like Facebook and Google, who select content to show us based on algorithms that learn from the harvesting of personal data. ... This allows

people with bad intentions and armies of bots to game the system to spread misinformation for financial or political gain.'

"The militarization of AI and robotics systems by the U.S., UK, Russia and China is a dangerous development with even some of the top U.S. military leaders warning about the dangers of autonomous weapons systems. But today's more widespread, freely available and extremely effective weapons are not just bullets and explosives. From the standpoint of politics and society, the most fearful new autonomous weapons systems work by intimidating, isolating and controlling people through a kind of psychological warfare. By 2040, that warfare could be supercharged by the changes in society that will take place in the next decade-plus as artificial intelligence tools become supercharged and weaponized for ill purposes."

Vanda Scartezini

The future of AI is a continuous work in progress

Vanda Scartezini, a co-founder and partner at Polo Consulting who has also served in many global and Brazilian IT leadership roles the past four decades, commented, "My hope is that AI will be given the chance to develop positively and serve humankind. This will only happen if it is developed without too many government-imposed restrictions. The technology, itself, is neutral; it is not inherently good or bad. Humankind's uses of it – as with any powerful tools – must receive the credit and the blame. Atomic technology can be used to safely generate energy with positive impact for millions of communities, and it can also be carried in bombs that wreak great destruction and loss of human lives.

"Ethical and safe use of AI has become a major emphasis in the development of AI today. It is true that – as with any digital technology – the bad guys will have the same opportunities as the good guys, and they will use it to the detriment of society. However, advanced AI is also being developed to identify and try to track and halt destructive behavior, possibly even before it happens.

"I believe AI will mostly be applied to positive uses for the benefit of humanity. The future of AI will depend upon the amount of accurate data collected and applied to improving its performance. As such, it will be a continuous work in progress, but it will only advance if legislation does not cut its wings. It will inspire great progress in areas such as education, personal and business communication, precise medical diagnoses and health evaluations, improved research in agribusiness and many other aspects of people's lives."

Chapter 9 – Methodologies

This report covers results from the 17th "Future of the Internet" canvassing by Elon University – this time by the new and expanded Imagining the Digital Future Center. It was conducted amid rising attention, enthusiasm and concern about the role artificial intelligence (AI) is playing in people's lives and in broad societal systems.

Participants were asked to respond to a series of multiple-choice and open-ended questions, including an invitation to address a primary research question about their expectations for overall impact of AI by the year 2040. The canvassing of experts was conducted through a Qualtrics online instrument between Oct. 4 and Nov. 6, 2023. Invited respondents included technology innovators and developers, business and policy leaders, researchers and activists. In all, 328 experts responded to at least one aspect of the canvassing, including 251 who answered multiple-choice questions and 166 who provided written answers to the key open-ended question. The extended answers in the pages of this report are those that were replies to this prompt:

> *Considering the likely changes created by the proliferation of AI in individuals' daily lives and in society's social, economic and political systems, how will life have changed by 2040? What stands out as most significant to you? Why? What is most likely to be gained and lost in the next 15 or so years?*

The web-based canvassing instrument was first sent directly 2,000 experts (primarily U.S.-based, 38% located outside North America). Those invited were identified by Elon University during previous studies. The list also includes many people who were identified in a 2003 study of people who made predictions about the likely future of the internet between 1990 and 1995. More than 1,000 of these invited respondents were added to our database of experts in the fall of 2023. We invited professionals and policy people from government bodies and technology businesses, think tanks and interest networks (for instance, those that include professionals and academics in law, ethics, philosophy, political science, economics, social and civic innovation, sociology, psychology, education and communications); globally located people working with communications technologies in government positions; technologists and innovators; top universities' engineering/computer science, political science, sociology/anthropology and business/entrepreneurship faculty, graduate students and postgraduate researchers; and some who are active in civil society organizations that focus on digital life and those affiliated with newly emerging nonprofits and other research units examining the impacts of digital life.

Among those invited to participate were researchers, developers and business leaders from leading global organizations, technology companies and research labs, and leaders active in the advancement of and innovation in global communications networks and technology policy, such as the IEEE Global Initiative on Ethics of Autonomous and Intelligent Systems, the International Telecommunications Union (ITU), the Internet Engineering Task Force (IETF), the Internet Society (ISOC), the United Nations' Global Internet Governance Forum (IGF) and the Organization for Economic Cooperation and Development (OECD) AI Experts Panel. Invitees were encouraged to share the survey link with others they believed would have an interest in participating, thus there may have been a small "snowball" effect as some invitees welcomed others to weigh in.

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. Some responses are lightly edited for style and readability. A number 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, when available, in this report.

Some 216 respondents gave details about their locale. Of the experts who made that disclosure, 62% reported being located in North America, 20% are in Europe and 18% said they are located in other parts of the world.

Of the respondents who indicated their "primary area of interest," 33% identified themselves as professors/teachers; 14% as futurists or consultants; 17% as research scientists; 9% as technology developers or administrators; 8% as advocates or activist users; 4% as pioneers or originators of the internet or online tools; 3% as entrepreneurs or business leaders and 11% specified their primary area of interest as "other."

We are extremely thankful to the following individuals who crafted detailed qualitative contributions to this report. Workplaces reflect the respondents' job titles and locations at the time of this canvassing. (Those who responded anonymously are not listed here.)

Stephen Abram, principal at Lighthouse Consulting; **Greg Adamson,** vice president of the IEEE Society on Social Implications of Technology; **Stephan Adelson**, longtime leading digital health consultant; **Walid Al-Saqaf**, associate professor of media technology and journalism at Södertörn University in Huddinge, Sweden; **Micah Altman**, social and information scientist at MIT; **Lene Rachel Andersen**, economist, author, futurist and philosopher at Nordic Bildung; **Joscha Bach**, fellow at the Thistledown Foundation, previously principal AI engineer at Intel Labs; **Richard Barke**, professor of public policy at Georgia Tech; **Avi Bar-Zeev,** president, XR Guild and XR pioneer who has developed the tech at Microsoft, Apple, Amazon, Google; **Victoria Baines**, global expert in online trust, safety and cybersecurity; **David R. Barnhizer**, professor of law emeritus and co-author of "The Artificial Intelligence Contagion"; **John Battelle**, owner of Battelle Media; **Matthew Belge**, user-experience design lead and senior product designer at Imprivata; **Richard Bennett**, founder of the High-Tech Forum; **Christine Boese**, vice president and lead user-experience designer and researcher at JPMorgan Chase financial services; **Henry Brady**, professor of political science and public policy at the University of California-Berkeley; **David Bray**, principal at LeadDoAdapt Ventures; **Tim Bray,** founder and principal at Textuality Services, previously a vice president at Amazon; **Axel Bruns**, professor of digital media and chief investigator in the ARC Centre of Excellence for Automated Decision-Making and Society at Queensland University of Technology; **Nir Buras**, principal at the Classic Planning Institute, an urban design consultancy based in Washington, DC; **Dennis Bushnell**, a futurist and chief scientist at NASA's Langley Research Center; **Jamais Cascio,** distinguished fellow at the Institute for the Future; **Vint Cerf**, Internet Hall of Fame member and vice president at Google; **Mary Chayko**, professor of communication and information at Rutgers University; **Carol Chetkovich**, professor emerita of public policy at Mills College; **Barry K. Chudakov,** founder and principal at Sertain Research; **Chuck Cosson**, director of privacy and data security at T-Mobile; **Olivier Crépin-Leblond**, founder and board member of the European Dialogue on Internet Governance; **Willie Currie**, a longtime global communications policy expert based in Africa; **Sara (Meg) Davis,** professor of digital Health and Rights at the University of Warwick; **Buroshiva Dasgupta**, director of the Center for Media Studies and Research at Sister Nivedita University in Kolkata, India; **Rosalie Day,** co-founder at Blomma; **Judith Donath,** fellow, Harvard's Berkman Klein Center, and

founder, Sociable Media Group, MIT Media Lab; **Michael G. Dyer,** professor emeritus of computer science, UCLA; **Esther Dyson**, Internet pioneer, journalist and founder of Wellville; **Anriette Esterhuysen**, Internet Hall of Fame member from South Africa; **Devin Fidler**, foresight strategist and founder of Rethinkery; **Seth Finkelstein,** principal at Finkelstein Consulting and Electronic Frontier Foundation Pioneer Award winner; **Charlie Firestone**, president of the Rose Bowl Institute, previously executive director of The Aspen Institute; **Tracey Follows**, CEO of Futuremade; **Juan Ortiz Freuler**, a fellow at Harvard's Berkman Klein Center for Internet and Society; **Andrea Romaoli Garcia**, an international human rights lawyer from Brazil; **Danny Gillane**, an information science professional; **Jerome C. Glenn**, co-founder and CEO of The Millennium Project; **Marina Gorbis**, executive director of the Institute for the Future; **Garth Graham**, long-time leader of Telecommunities Canada; **Jonathan Grudin,** affiliate professor, University of Washington, recently principal researcher in the Adaptive Systems and Interaction Group at Microsoft; **Michael Haines**, CEO of VANZI, a 3-D company based in Australia; **Alexander Halavais**, associate professor and director of the Social Data Science master's program at Arizona State University; **John C. Havens**, executive director of the IEEE Global Initiative on Ethics of Autonomous and Intelligent Systems; **Seth Herd**, a futurist and computational cognitive neuroscience researcher now working on human-AI alignment; **Jason Hong**, a professor at the Human-Computer Interaction Institute at Carnegie Mellon University; **Terri Horton**, founder of FuturePath; **Stephan G. Humer**, sociologist and computer scientist at Fresenius University of Applied Sciences in Berlin; **Alan S. Inouye,** director for information technology policy, American Library Association; **Ravi Iyer**, research director at the University of Southern California's Center for Ethical Leadership and Decision-Making; **Francisco J. Jariego**, futurist, author and professor at the National Distance Education University of Spain; **Klaus Bruhn Jensen**, professor of communications at the University of Copenhagen and author of "The People's Internet"; **Paul Jones,** professor emeritus of information science, University of North Carolina-Chapel Hill; **Frank Kaufmann,** president, Twelve Gates Foundation; **Tim Kelly**, Kenya-based lead ICT policy specialist at the World Bank; **Jim Kennedy,** a professional media and AI strategist; **Michael Kleeman,** senior fellow, University of California-San Diego (previously with Boston Consulting and Sprint); **Andrew K. Koch**, CEO of the Gardner Institute for Excellence in Undergraduate Education; **Jonathan Kolber**, futurist and member of TechCast Global; **David J. Krieger**, director of the Institute for Communication and Leadership, Switzerland; **Friedrich Krotz**, fellow at the Centre for Media, Communication and Information Research, University of Bremen, Germany; **Chris Labash**, associate professor of communication and innovation at Carnegie Mellon University; **Thomas Laudal**, associate professor of business at the *University* of Stavanger (Norway) Business School; **Lawrence Lannom**, vice president at the Corporation for National Research Initiatives; **Kevin T. Leicht**, professor and head of the department of sociology at the University of Illinois-Urbana-Champaign; **Sam Lehman-Wilzig,** professor at Bar-Ilan University, Israel, and author of "Virtuality and Humanity"; **Peter Levine**, professor of citizenship and public affairs at Tufts University; **Leah A. Lievrouw**, professor of information studies at the University of California, Los Angeles; **Pedro U. Lima**, professor of computer science at the Institute for Systems and Robotics at the University of Lisbon; **Liza Loop**, educational technology pioneer, futurist, technical author and consultant; **Peter Lunenfeld**, professor of design and media arts at the University of California-Los Angeles; **Clifford Lynch,** director, Coalition for Networked Information; **Keram Malicki-Sanchez,** founder and director of VRTO Spatial Media World Conference; **John Markoff**, a fellow at the Presence Center at Stanford University School of Medicine, previously a senior writer at the New York Times; **Giacomo Mazzone,** secretary-general of Eurovisioni and member of the advisory council of the European Digital Media Observatory; **Sean McGregor,** founding director of UL Research Institutes; **Lee Warren McKnight,** professor of entrepreneurship and innovation, Syracuse University; **Filippo Menczer**, director of the Observatory on Social Media at Indiana University; **Alan D. Mutter**, consultant and former Silicon Valley CEO; **Satoshi Narihara**, associate professor of information law at Kyushu University in Fukuoka, Japan; **Bitange Ndemo**, professor of entrepreneurship at the

University of Nairobi Business School and chair of the Kenya AI Task Force; **Jean Paul Nkurunziza**, expert moderator with the Internet Society and researcher at CIPESA Burundi; **Beth Simone Noveck,** director, Burnes Center for Social Change and GovLab; **Kunle Olorundare,** vice president, Internet Society, Nigeria; **Andy Opel**, professor of communications at Florida State University; **Aviv Ovadya**, a founder of the AI & Democracy Foundation; **Zizi Papacharissi,** professor of communications and political science, University of Illinois-Chicago; **June Parris**, a former member of the UN Internet Governance Forum's Multistakeholder Advisory Group from Barbados; **Raymond Perrault,** co-director of Stanford University's AI Index Report 2023, scientist at SRI International from 1988-2017; **Daniel Pimienta**, leader of the Observatory of Linguistic and Cultural Diversity on the Internet, based in Nice, France; **Lorrayne Porciuncula,** founder and executive director of the Datasphere Initiative; **Calton Pu,** co-director, Center for Experimental Research in Computer Systems, Georgia Institute of Technology; **Chen Qiufan**, co-author with leading AI expert Kai-Fu Lee of the book "AI 2041: 10 Visions for Our Future"; **Kelly Quinn**, professor of communication at the University of Illinois-Chicago; **Alex Raad**, managing director at Anthium Advisory and host of the TechSequences podcast; **Howard Rheingold,** pioneering internet sociologist and author of "The Virtual Community"; **Chris Riley**, executive director of the Data Transfer Initiative; **Mauro D. 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Schrader**, Internet Hall of Fame member and advisor to CEOs, a co-founder of PSINet; **Ray Schroeder**, retired associate vice chancellor for online learning at the University of Illinois, Springfield; **Henning Schulzrinne,** Internet Hall of Fame member and co-chair of the Internet Technical Committee of the IEEE; **Evan Selinger**, professor of philosophy at Rochester Institute of Technology and author of "Re-engineering Humanity"; **Greg Sherwin**, senior principal engineer at Farfetch in Lisbon, Portugal; **Ben Shneiderman**, human-computer interaction pioneer and author of "Human-Centered AI"; **Toby Shulruff**, owner and principal of a futures consultancy based in Beaverton, Oregon; **Aram Sinnreich**, professor and chair of communication studies at American University; **Bibek Silwal**, civil engineer and founding member of the Youth Internet Governance Forum in Nepal; **Wolfgang Slany**, CEO and founder of the open-source educational software company Catrobat; **Nrupesh Soni**, founder of the Facilit8 digital consultancy, based in Namibia; **Philippa Smith**, a digital media expert, research consultant and commentator based in New Zealand; **Jim Spohrer,** retired executive who led major projects at IBM and Apple; **Sharon Sputz**, director of strategic programs at Columbia University's Data Science Institute; **Jon Stine**, director of the Open Voice Network; **Chris Swiatek**, co-founder and chief of product at ICVR, an LA XR development company**; Jonathan Taplin**, author of "Move Fast and Break Things"; **Evelyne A. Tauchnitz**, senior researcher at the University of Lucerne's Institute of Social Ethics; **Brad Templeton**, chairman emeritus at the Electronic Frontier Foundation; **Jaak Tepandi**, professor emeritus of knowledge-based systems at Tallinn University of Technology, Estonia; **Charalambos Tsekeris,** senior fellow in digital sociology at Greece's National Centre for Social Research; **Garrett A. Turner**, vice president for strategy at wireless networking company Liberty Port; **Karl M. van Meter**, director of the International Association of Sociological Methodology, based in Paris; **David Vivancos**, CEO at MindBigData.com and author of "The End of Knowledge"; **Maja Vujovic,** owner and director of Compass Communications in Belgrade, Serbia; **Wei Wang**, a fellow at Fundação Getulio

Vargas and PhD candidate in law and technology at the University of Hong Kong; **Russ White**, Internet infrastructure architect and Internet pioneer; **Alexandra Whittington**, foresight expert on the future of business team at Tata Consultancy Services; **Dmitri Williams**, professor of technology and society at the University of Southern California; **Dean Willis**, a consultant for protocols, standards and systems architecture at Softarmor Systems; **Pamela Wisniewski**, director of the Socio-Technical Interaction Research Lab at Vanderbilt University; **Michael Wollowski**, professor of computer science at Rose-Hulman Institute of Technology; **Kevin Yee**, director of the Center for Teaching and Learning at the University of Central Florida; **Warren Yoder**, longtime director at the Public Policy Center of Mississippi, now an executive coach; **Amy Zalman**, defense, security and justice advisory specialist at Deloitte; **Deanna Zandt**, media technologist and consultant; **Roberto V. Zicari**, head of the international Z-Inspection AI initiative; **Ethan Zuckerman**, director of the Initiative on Digital Public Infrastructure at the University of Massachusetts-Amherst.

The topline findings from the canvassing of experts

2023 ELON UNIVERSITY CANVASSING OF EXPERTS
OCTOBER 4-NOVEMBER 6, 2023
N=Varies by question and is around 250 respondents per question

Q. By the year 2040, what level of impact will AI have on each of the following? The impact will be …

	Far more positive than negative	Somewhat more positive than negative	Equally positive, negative	Somewhat more negative than positive	Far more negative than positive	Little or no impact
People's basic human rights	7%	14%	23%	32%	22%	3%
People's privacy	3%	5%	12%	34%	45%	2%
People's opportunities for employment	9%	18%	29%	28%	15%	1%
People's day-to-day work tasks and activities	27%	45%	20%	3%	4%	*
People's physical and mental health	10%	20%	35%	20%	12%	4%
People's access to knowledge and information from accurate, trusted resources	20%	24%	22%	16%	18%	*
People's civic lives – that is, their opportunities to participate in the affairs of their community, nation, and the world	9%	23%	32%	18%	13%	5%
People's interactions with institutions such as government and corporations	9%	30%	27%	21%	10%	2%
People's personal relationships with others	4%	11%	33%	27%	20%	6%
People's spiritual lives	5%	7%	28%	15%	18%	27%
The ways people spend their leisure time	11%	31%	30%	14%	10%	4%
Shopping for goods and services	31%	41%	16%	7%	5%	*

Q. Now, some more general questions about the possible impact of artificial intelligence (AI) on society and institutions. By the year 2040, what level of impact will AI have on each of the following? The impact will be …

	Far more positive than negative	Somewhat more positive than negative	Equally positive, negative	Somewhat more negative than positive	Far more negative than positive	Little or no impact
Reducing wealth inequalities in society	3%	9%	14%	29%	41%	4%
Overall economic performance	22%	39%	25%	7%	5%	1%
Level of civility in society	4%	8%	32%	30%	22%	3%
Healthcare systems and the quality of medical treatment people receive	33%	45%	13%	11%	5%	*
Environmental protection and sustainability	14%	38%	25%	12%	8%	3%
Politics and elections	4%	5%	24%	25%	42%	1%
Criminal justice system	7%	18%	33%	25%	42%	3%
Warfare	5%	8%	23%	18%	43%	2%
Primary and secondary schools	11%	38%	21%	20%	7%	4%
Colleges and universities	14%	37%	22%	15%	10%	3%
Transportation systems' ability to move people and goods safely and efficiently	33%	44%	16%	2%	3%	1%
Quality of life in cities	12%	36%	37%	5%	5%	4%
Quality of life in rural and remote areas	12%	28%	39%	7%	6%	8%

Q. How likely is it that there will be a scientific consensus by 2040 that AGI has been achieved?

Very likely	19%
Somewhat likely	26%
Somewhat unlikely	24%
Very unlikely	25%
Don't know	6%

Q. On balance, do the advances you expect toward AGI by 2040 make you feel …

More excited than concerned	16%
Equally excited and concerned	39%
More concerned than excited	37%
Neither excited nor concerned	7%

Q. How likely is it that AGI could pose an existential risk to humanity at some point in the future, probably beyond 2040?

Very likely	16%
Somewhat likely	32%
Somewhat unlikely	21%
Very unlikely	25%
Don't know	5%

48% think it is *very or somewhat likely* such a risk could be posed; and 46% said they think it is *very or somewhat unlikely*; 5% said they don't know.

The primary research question, an open-ended question, was asked *after* respondents viewed all of the quantitative questions above. The 166 responses constitute the majority of this report.

> *Considering the likely changes created by the proliferation of AI in individuals' daily lives and in society's social, economic and political systems, how will life have changed by 2040? What stands out as most significant to you? Why? What is most likely to be gained and lost in the next 15 or so years?*

Methodology for the Ipsos public opinion survey of U.S. adults

The public opinion survey was conducted using Ipsos' KnowledgePanel®, a probability-based online panel designed to be representative of the U.S. population. Initially, participants are chosen scientifically by a random selection of telephone numbers and residential addresses. Persons in selected households are then invited by telephone or by mail to participate in the web-enabled KnowledgePanel. For those who agree to participate, but do not already have Internet access, Ipsos provides at no cost a laptop/netbook and ISP connection. People who already have computers and Internet service are permitted to participate using their own equipment. Panelists then receive unique log-in information for accessing surveys online, and then are sent emails throughout each month inviting them to participate in research. This survey was conducted on the Ipsos Omnibus survey. The firm's explanation of its KnowledgePanel and Omnibus survey methodology is here.

Topline from Ipsos survey

2023 ELON UNIVERSITY IPSOS OMNIBUS – KNOWLEDGE PANEL
OCTOBER 20-22, 2023
N=1,021

ASK ALL: BLH2
One way to define artificial intelligence (AI) is computer technology that performs tasks that humans typically do, such as understanding language and answering questions.
How much have you heard or read about artificial intelligence (AI)?

	Oct '23
A lot	32
A little	59
Nothing at all	9
Refused	*

ASK ALL: BLH3
Overall, how will the increased use of artificial intelligence (AI) affect the quality of people's daily lives? The impact of AI will be …

	Oct '23
More positive than negative	17
More negative than positive	29
Equally positive and negative	31
Don't know	23
Refused	1

BLH4
Do you think it is possible or not possible for people to design artificial intelligence (AI) computer programs that can consistently make decisions in people's best interest in complex situations?

	Oct '23
Yes, it is possible	31
No, it is not possible	31
Not sure	38
Refused	1

BLH6

By the year 2040, what level of impact will AI have on each of the following? The impact will be …

	Far more positive than negative	Somewhat more positive than negative	Equally positive, negative	Somewhat more negative than positive	Far more negative than positive	Little or no impact	Not Sure	Refused
People's basic human rights	2	6	17	19	22	4	28	2
People's privacy	2	3	10	23	43	1	17	2
People's opportunities for employment	3	7	14	24	31	1	18	1
People's day-to-day work tasks and activities	7	24	19	14	15	2	18	1
People's physical and mental health	5	13	20	18	17	2	24	2

BLH7

By the year 2040, what level of impact will AI have on each of the following? The impact will be …

	Far more positive than negative	Somewhat more positive than negative	Equally positive, negative	Somewhat more negative than positive	Far more negative than positive	Little or no impact	Not Sure	Refused
People's access to knowledge and information from accurate, trusted resources	8	21	19	14	16	2	19	1
People's relationship with others	2	5	19	23	23	6	21	1
People spend their leisure time	5	16	23	13	12	5	26	1

BLH8

Now, some more general questions about the possible impact of artificial intelligence (AI) on society and institutions.

By the year 2040, what level of impact will AI have on each of the following? The impact will be …

	Far more positive than negative	Somewhat more positive than negative	Equally positive, negative	Somewhat more negative than positive	Far more negative than positive	Little or no impact	Not Sure	Refused
Reducing wealth inequalities in society	3	5	13	14	23	11	30	1
Level of civility in society	2	5	17	19	21	7	27	2
Healthcare systems and the quality of medical treatment people receive	11	25	17	11	11	2	21	2
Environmental protection and sustainability	5	17	18	11	12	6	29	2
Politics and elections	2	5	13	16	35	3	24	2

BLH9

Thinking again to the year 2040, by 2040, what level of impact will AI have on each of the following? The impact will be …

	Far more positive than negative	Somewhat more positive than negative	Equally positive, negative	Somewhat more negative than positive	Far more negative than positive	Little or no impact	Not Sure	Refused
Primary and secondary schools	6	18	18	16	18	2	21	1
Colleges and universities	7	17	19	15	19	1	22	1

ELON UNIVERSITY
Imagining THE Digital Future CENTER

THE IMPACT OF ARTIFICIAL INTELLIGENCE BY 2040:

A New Age of Enlightenment? A New Threat to Humanity?

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We welcome your feedback and new ideas for our future research.
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Imagining THE Digital Future CENTER