DAKOTA DIGITAL REVIEW

SPRING 2021

DAKOTA DIGITAL ACADEMY
NORTH DAKOTA UNIVERSITY SYSTEM

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DAKOTA DIGITAL ACADEMY

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The Dakota Digital Academy (DDA) gained traction this fall with engagement by numerous faculty and administrators across the North Dakota University System (NDUS). Thanks to the vision of Chancellor Mark Hagerott, there is much DDA activity in designing and developing courses in the digital arena, configuring certificates and programs, creating partnerships and planning events. This activity surrounds the need for relevant training and education to serve learners and employers.

We are ambitious and expect to accomplish a great deal in our state. We are committed to fostering access, opportunity, enfranchisement, inclusion and diversity.

We believe in collaboration. Among DDA's challenges is establishing synergy among the diverse NDUS institutions. With two research universities, four regional universities and five colleges, there are considerable differences in orientations, types of expertise and capacities. At DDA, we view these differences as sources of opportunities and strengths to celebrate.

There is little doubt that the pandemic is one of the most life- and work-altering events in our history. The great flu epidemic of 1918 killed some 50 million people worldwide, including my father's elder sister. The account of her death and her young daughter being orphaned is known to all members of my family today, more than a century later.

The coronavirus has forced a large-scale normalization of remote work and school, including mandating how DDA as an organization must function. Many questions have been raised. A famous cartoon in the New Yorker shows a dog typing on a keyboard and a caption that reads, "On the internet, nobody knows you're a dog." Going forward, if most tasks can be accomplished remotely and most production processes are done by robots, will gender inequality and racism diminish?

North Dakota is a very rural state. The DDA is committed to location-agnostic operations. As broadband becomes fully available and residents adjust to technologies—such as tools for remote collaboration, video conferencing and virtual reality—people may feel that if everyone in their organization is remote, then nobody feels remote. DDA's mission seems very opportune in our state.

There are also many people whose jobs are impossible to do from home, and they are now faced with unemployment and a need to reinvent their work lives. For example, about 110,000 restaurants nationwide closed in 2020, leaving many employees without work. If the future is basically digital, what happens to the people left behind? We see a pressing need for training and education in many areas of computing and cyber sciences, including coding, information technology, cybersecurity and artificial intelligence. The need for upskilling and retraining is also very real. DDA is committed to helping meet those needs. ▣

Introduction to
DAKOTA DIGITAL REVIEW

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The cartoonist Walt Kelly said it best, "We are confronted with insurmountable opportunities." What sorcerer or ancient magician could have imagined what we take for granted today: video conferencing across continents, texting at 30,000 feet on a jet liner, data mining, robotic surgery. And this is just the beginning. Digital wonders we can't envision yet will delight us and perform seeming miracles for the good of humanity.

As cyber technologies become increasingly ubiquitous, however, their penetration into our personal, family, professional and social lives is accelerating, and their influence is growing. In response, DDA will offer courses in the profound social, ethical, legal and policy implications of the cyber sciences.

To amplify DDA's systemwide approach across 11 colleges and universities, and to engage and educate the general public, DDA now presents Dakota Digital Review, which is being published both in print and online.

Dakota Digital Review will cover the cyber sciences, as well as related legal, political, regulatory, social and ethical issues, and digitization's impact on the humanities and the arts.

As well as creating opportunities, digital technologies pose serious challenges: cybersecurity hacks by enemy nation states disrupting corporations, government agencies and even, recently, one of the world's largest cybersecurity firms; the massive transfer of power and wealth from small and analogue businesses to Big Tech companies as result of lockdown responses to COVID-19; blatant censorship by Big Tech that threatens free speech and the foundations of democracy; disinformation campaigns and election integrity; privacy and surveillance concerns; artificial intelligence (AI), automation and job loss; rural broadband, especially when students must take classes from home.

Dakota Digital Review is written and edited for the general educated reader. It is vitally important that residents throughout the region—whether working in government or business, or who are retired—become fluent and engaged in cyber sciences and their ramifications.

Articles are written mostly by faculty and students but not to promote their universities. Instead, higher education's intellectual resources are being mobilized statewide to better serve both within and beyond the academy.

Dakota Digital Review aims to elevate discussions and debates about digitization, facilitating better preparation of government and business, parents, students and voters to make crucial decisions about our collective future and about our individual and family lives.

The Pandemic is Accelerating Digital Transformation:

Downsides & Remedies

MARK R. HAGEROTT, PHD
Chancellor, North Dakota University System

Human society faces disruption and tumultuous change far more unprecedented and historic than a pandemic.[i] Rapid, digital technological change is the big story, the paradigm-transforming narrative, the potential birth-pangs for a post COVID-19 world that if we allow it, may privilege digital machine systems over humans and human-centric systems. Paradoxically, COVID mitigation policies may promote human welfare in the short term but undermine human community, health and culture in the long term. Furthermore, technological systems create their own inertia, and if not managed carefully, tend to "lock in" early decisions and patterns of use, making it difficult to reverse mistakes. It is thus imperative that our leaders act now to reconsider the unintended second and third order effects of our COVID responses. Otherwise, harmful consequences for human-centric systems, humanity and human values may occur and become "locked in" and perhaps irreversible.

Do I exaggerate the portent of the challenge? Current events stand as a testament to the massive scale and scope of the socio-technical forces in play, as well as the desperate, well-meaning but confused human reaction. Ponder with me the headlines. American cities burned, and a cacophony of voices called for radical action, some to remake our nation into a socialist state.[ii] While warehouses, factories and office spaces emptied of humans, computer servers and robots proliferated more widely. Internet traffic increased exponentially, pouring wealth into corporate digital data centers and cloud companies. COVID-stressed, human-centric companies face bankruptcy, yet already massive digital companies hit record-high capitalization. Congress considers bailing out some companies but at the same time ponders the regulation or even break up of one or more digital giants.[iii] Years before the pandemic, and worsening now, our nation witnessed a rising level of youth depression, suicide and loneliness as the use of digital devices and social media sites increased.[iv] Lastly, as digital systems grow, so does disinformation,

fake news and cyberhacking, while the truth becomes opaque. How can we frame these events in a way that allows us to look beyond the daily headlines? What risks do these forces pose to human society and our families? How has COVID energized digitization, and most importantly, what should we do?

Framework of How Technology is Disrupting Society

The most powerful force of change, and a threat to the well-being of much of human-centric society if left unmanaged, is the uncontrolled, accelerating invention and adoption of digital technology, and the growing concentration of power associated with it. A multitude of increasingly intelligent digital inventions—robotic and in cyberspace—pile one upon another, exerting socioeconomic change on a grand scale at the *macro level* of how work and social interaction is carried out. Digital technology is changing the very structure of life, society and economy and, as recent evidence shows, is actually reducing human-centric wellbeing and even future business and commerce.

To be sure, changing technologies have reshaped society and economies in the past. At the small scale, or *micro level,* people are compelled many times in their lifetimes to adapt to one technology or another. One can think of the shift from manual to automatic transmission in cars; from train to airline travel; from handwriting to typewriters; from factory floors full of wrench-turning workers to factories, where humans operated wrench-turning machines. In all these cases, humans were present and still in control. But something began to change at the socioeconomy's macro-level as technology began to digitize. Our socioeconomy has been inundated with waves of digital innovations. Typed letters were replaced by email, and now intelligent email assistants draft letters. Factories and warehouses with intelligent robots hold few if any human workers, and therefore, they remain dark while the machines work. Offices were once full of humans thinking and working with desktop computers and spreadsheets, but now the data is analyzed in "the cloud" by increasingly intelligent "self-learning" algorithms. Friends used to be those of our physical neighborhoods and schools but now can

be anywhere, or they may not be human at all, as in the case of "Alexa." Games used to be played on game boards in a basement but now are massive multiple-player games played simultaneously across the globe, where you can play against artificial algorithms without human competitors. With the explosion of advanced digital technology, literally trillions of chips, sensors, computers, autonomous machines, and what may be a Turing-like breakthrough in AI, we are witnessing macro change, the emergence of new artificial worlds. Reduced to its simplest, a planet that was dominated by a realm of human-centric activity is now being joined by two other realms of activity. The other realms are that of the autonomous or near autonomous intelligent robotics and that of the entirely virtual, non-tactile, realm of cyberspace or internet. This creates an interlocking triad I call the "Human, Robotic and Cyber Realms."

Pictured in Figure 1 is a two-dimensional rendering of the three realms: the realm of human-centric activity, the realm of robotic systems and the realm of cyberspace.[v] Until very recently, human-centric social, economic, technological and military systems dominated the world. While natural systems of plant and animal life existed, they continued to exist at the will (or some would say, whim) of human-centric systems. But human-centric technology was generally limited to augmenting natural human capabilities to act with greater precision or at a distance (for example, the typewriter enhanced human written communication on paper, the telephone carried the human voice at greater distances than one could yell, the ship and plane and train carried humans and cargo but were piloted by humans). Humans provided the highest-level cognition of systems, even if machines did more of the heavy lifting in carrying and transmitting human-processed information. But the invention of intelligent and speedy computer processors, combined with advanced engineering, have created these two digital realms of activity. The socioeconomic-military activity emerging between artificial actors in these two realms can now occur with little or no direct human control. The emergence of the realms of robotic systems and cyberspace are moreover near simultaneous and will both challenge the privileged place of human-centric systems, which has defined history to this point.[vi]

FIGURE 1

THREE REALMS OF THE SOCIO-ECONOMY

With COVID, the robotic and cyber realms growing at expense of the human. Only with increased government, business, and philanthropic investment in education, social programs, as well as informed human-centric policy, can we re-balance the realms to benefit and protect human systems during COVID and in the future.

CYBER REALM

HUMAN REALM
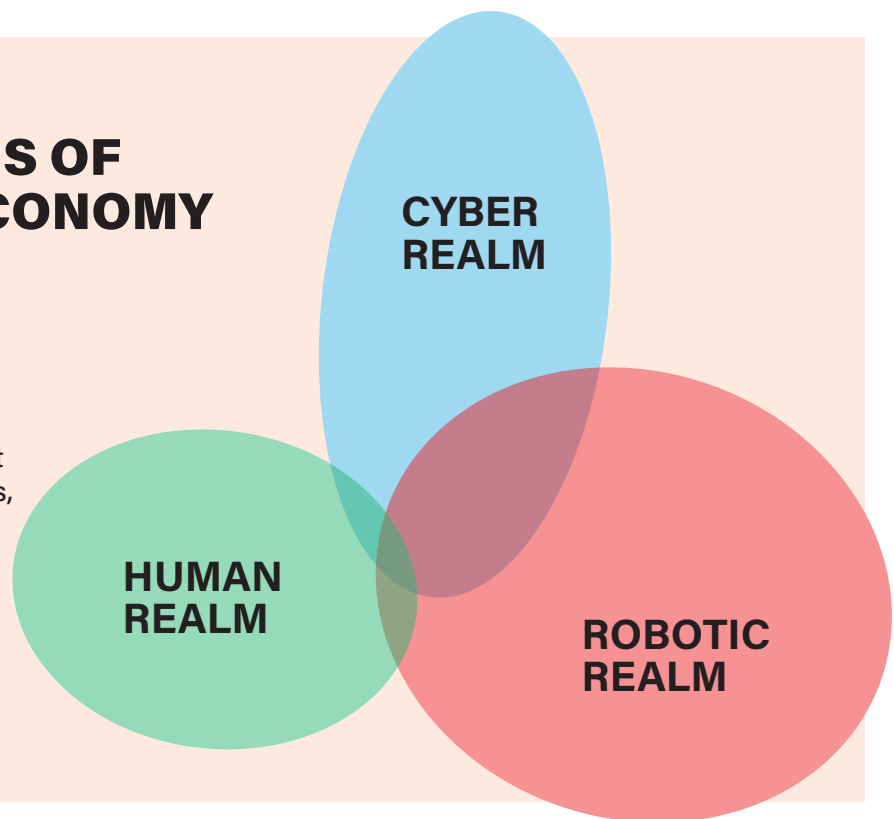
ROBOTIC REALM

The emergence of these two digital realms was perhaps inevitable, and the benefits of these two new realms should be acknowledged. Much of the work done in these realms by advanced robotics and AI-infused cyberspace could not have been done by any number of humans themselves nor with human-directed machines. If that is as far as the implications went, humans would be fine … but … there is more.

Social & Ethical Implications of the Two Digital Realms

Society is now experiencing the symptoms that accompany the emerging nexus where the human realm overlaps with two new realms, robotic and cyber. Most humans are only now becoming dimly aware that many of the social-distress symptoms afflicting our nation arise out of being human in proximity to emerging digital technology. What are some of the most visible symptoms of this emergence?

Record-shattering socioeconomic inequality is the most obvious indication. To those who control the rights and patents to digital machines and algorithms, the amount of wealth and power being created is eye-popping. Financial benefits accrue to only a

small portion of the population, with large swaths of the country left behind or left insecure. Imbalances in wealth are expanding such that eight men—just eight—own more wealth than the world's poorest three billion people combined, a trend to which the digital revolution is a major contributor. The per capita income of the tech hubs is swelling, and their associated universities' endowments are bulging with record billions.

In contrast, where cyberspace and digital machines intersect with regions, cities and households outside the tech hubs, signs of distress mount. Darkening clouds of hacking and privacy abuses, misinformation and disinformation, and lack of equal access cast a shadow of social, employment and political insecurity. The workers and wages outside the tech hubs and digital professions are coming under increased pressure, and there is no certainty that an advanced digital economy can absorb the human workforce, a possibility considered by Brynjolfsson and McAfee in their book, *The Race Against the Machine.*[vii]

Moreover, the rise of digital giants, such as Google and Facebook, has not been healthy for start-up businesses, and entrepreneurship rates in the

We are seeing a rapid increase in child depression and suicide, a major shift that scientists increasingly associate with the widespread penetration of society by the highly advanced communication and computational device, the smart phone .

United States have been declining since the 1990s. Conditions are such that numerous forward-looking leaders, including some who spoke at the Davos World Economic Forum, have warned of the potential destabilization of society.

Also alarming, we are seeing a rapid increase in child depression and suicide, a major shift that scientists increasingly associate with the widespread penetration of society by the highly advanced communication and computational device, the smart phone, and the growth of social media sites.[viii] A multitude of digital creators, the insiders of these companies, have recently argued that we, our children, our families, our fellow Americans are NOT customers but are the product. At the same time, our information given freely away is being monetized for the benefit of the few at the cost of the many. This possibility has been documented recently in a Netflix special, "Social Dilemma."[ix] The insiders confess that they and their digital social media companies took deliberate action that risked further digital addiction, especially of teen users, purposely diverting a teen's time and energy to internet content and away from healthier physical or cognitive activities.[x]

Lastly, human-centric cultural values, the values attached to humans and human life, are being affected by the emergence of these two realms of intelligent machines. And, history shows, the cultural effects may be radical. Consider the changes to the once dominant natural-human economy before industrialization. Humans, nature and animals were closely connected by work, but also by culture. We all know the paradigm-shifting rise of megacities and the decline of rural areas, and the associated changes to family bonds, marriage, size of families and to church.

Also interesting is to reflect on human attachment to animals, in particular, the human-horse relationship that existed in our nation in the last century. The fact that horses were conscious beings, and as we see from so many movies and books, valued in our culture and deeply connected to humans, all meant very little when confronted with industrialization and the resulting changes in work efficiency of tractors and later, trucks and automobiles.[xi] City and highway ordinances and norms changed radically to make horses unwelcome in proximity to most humans, no matter how attached the owners were to their favorite mount. Thus, when we consider whether conscious humans could ever be devalued by efficient

but nevertheless unconscious machines, we should remember the shift in values in the rural and human-animal centric culture. And, to be clear, I am not suggesting that government policy will overtly value machines over human laborers, but rather, cultural norms will be reshaped by those who control digital technology, and the longstanding value of many human beings may be devalued.

How Has COVID Accelerated This Trajectory?

As we assess the effects of technology in the time of COVID, it is important to acknowledge that technology has provided enormous medical benefits as the world fights the pandemic, especially for elderly persons or persons with comorbidities, who may require hospitalization. And for those quarantined at home or in a dorm, digital technology has helped reduce isolation while providing social outlets, distance learning and telehealth. But what of the other effects, first order and beyond?

With the pandemic, the shift in resources from direct contact, human-centric systems to those more technological has accelerated. The COVID-19 virus, just as pathogens that caused pandemics in the past, attacks individual humans, and predictably, government mitigation strategies dramatically reduce human-to-human contact. Unlike 1918, digital technology today makes possible social distancing and depopulating workplaces on an epic scale, pushing humans apart more frequently and at greater distances.

Let us explore the effects of this dynamic more fully:

Wealth & Income Inequality:
While many of Big Tech's helping hands have been wonderful in the short term, our society has handed back enormous wealth into these hands, resulting in a massive shift in resources. By some reports, as tens of millions of people were losing their non-digital jobs due to COVID, the number of billionaires in the United States increased rapidly—the direct and indirect beneficiaries of the rapid shift of more resources to the digital economy.[xii] As The Wall Street Journal recently reported, the capitalization of advanced tech companies now makes up more of all stock markets than at any time since dot-com mania.[xiii]

Employment & Workplace Effects:
The workforce with limited digital skills is shouldering the main effects of COVID. These employees are on the proverbial front line, both of exposure to the disease and the disruption to employment caused by the drop in economic activity in the human realm. We all can see the FAANG (Facebook, Amazon, Apple, Netflix and Google) stocks growing at record pace. While FAANG hires, millions of customers (people) retreat from human-centric industries, such as hotels, restaurants and airlines, and tens of thousands of front-line workers lose their jobs or fall ill.[xiv] Shopping goes virtual at a record pace. Department stores and malls, also a physical meeting place for humans, empty out and record numbers file for bankruptcy. But on the flip side, companies such as Amazon, which are built around increasing robotic warehouses and internet checkout counters, become among the most valuable companies in history.[xv] Robots can do more of the work, not just in massive warehouses. Now we are seeing the rapid adoption of robotics in fast food and restaurant service, perhaps permanently displacing human connection and jobs.[xvi] Human-centric systems come under pressure and may fail and NEVER COME BACK, while digital tech companies grow stronger. This dichotomy holds portentous implications for the longer term.

Community & Health Effects:
Given the option of digital technology, churches, hotels, in-person friend groups all come under pressure or, in the best case, migrate to the cyberspace of Zoom or other social media companies. While many physical sports programs and physical campuses stand largely empty, distant education and e-sports flourish. The longer-term effects on health and young people's adoption of more sedentary patterns of activity may well increase obesity and other ailments. And what about sleep? As corporate headquarters are shut down,[xvii] and digital workers can "work from anywhere," the effects on geographic time zones and sleep cycles of employees may further decouple from natural circadian cycles. Will workers' geographic time clocks and sleep cycles be respected, or will they be expected to conform to the location of the disaggregated headquarters, which may be the CEO's home? Worse yet, will employees lose their refuge of home and weekend and be on call 24 hours a day, as long as they sleep with their smart phones?

Addiction, Depression & Loneliness:

The shift of time spent, energy, employment and money from the human realm to the profiting robotic and cyberspace realms are clear. However, we are only dimly aware of second and third order effects of this shift on the human spirit, peace of mind, and thus on depression, loneliness and addiction. There are early indications that the isolation caused by COVID has in fact increased such negative social outcomes.[xviii][xix] As progressively more people spend more time physically isolated but "connected" online, it is almost certain that this trajectory will increase social-media addiction.

Cultural Values:

Changing cultural values—rather than unemployment or distorted financial markets— may be the most important *long-term* effects of accelerated digital transformation. We already discussed the changes to the once dominant rural and horse culture that existed in our nation before industrialization. In the rush to battle COVID by allowing digital machines to mediate human community on a massive scale, it is possible our cultural defenses against future intrusive technology may be weakened.[xx] Policy, law, ethics and norms are the building blocks of culture and may already be in transition due to the rushed reaction to the pandemic. In a reinforcing loop, policies and norms now being adopted may further replace human connection with technology and perhaps even devalue human contact. The proliferation of more robots in restaurants, a place where humans "break bread," may be an early example of culture in flux. The massive expansion of distance learning at the expense of in-person human contact in the classroom, especially for K-12 schoolchildren, may be a second early sign of cultural deformation. And who can miss the empty sports stadiums and possible longer-term implications? Will fans prefer to skip the tailgaters and crowded stadiums, and instead enjoy the game experience mediated by a smart phone? But if this challenge isn't urgent enough, another factor needs to be considered: the likelihood that our rushed COVID reactions may effect irreversible change, which is suboptimal for human-centric culture in the longer run.

Inertia & Irreversibility of Socio-Technical Systems

Some readers and leaders, overwhelmed by the crush of immediate challenges, may not want to consider the longer-term second and third-order consequences of our COVID response. They may prefer to "let our children figure out the balance between good and bad." But to focus only on the short term is quite frankly an evasion of a most profound socio-technical responsibility. Since the beginning of the Industrial Revolution, when technologies began to have societal-wide implications, the first generation of humans to use a new technology shouldered disproportionate responsibility for the good-and-bad balance that ultimately "locked in" for the long term. Technological systems have a strong tendency to develop inertia, to "lock in" during the early stages, a fact discovered some years ago in the study of information machines— the QWERTY keyboard of the 1860s typewriter still defines our smart phones today—and the placement of road and power systems.[xxi] Thus the professoriate, political classes, clergy, business leaders, NGOs and indeed every "customer" or human product, and especially parents, are now responsible to think for the long term, for generations to follow. Which brings us to our next question. What to do?

Creating a More Human-Centric Future

Before I discuss recommended actions, I need to address the digital advocates who believe no action is required to promote human-centric systems. Some Silicon Valley leaders hold that current market forces and unmanaged technological trends most certainly improve human welfare, and that recent COVID shocks to human-centric systems will produce universally positive and needed structural changes.[xxii]

But they are wrong. The systems now coming to dominate our economy, accelerated by COVID, cannot naturally reprioritize human welfare. Why not? They are not human in their nature, but innately inhuman and unnatural. The existence of two artificial, unnatural realms of digital machines that do work and come between humans and thereby displace natural human contact is absolutely unprecedented in history. In the last pandemic in

1918, human-centric systems maintained their centrality of social and economic life, because there was no alternative to intelligent humans. In 2020, trillions of intelligent machines, AI, machine learning algorithms and robots are emerging. Stated another way: In the 1918 post-pandemic recovery, humans had to come together to communicate or work at a modest distance. Now technology can take the place of human contact and displace vital human institutions at a distance and in cyberspace. Thus, to improve human welfare, we need deliberate action by the leading organizations—federal, state, business and philanthropic—to promote human reconnection. So, what should they do?

First, expand support to human-centric jobs and companies. The levers of government and business need to encourage the resumption of natural in-person human contact and connection and direct investment in human-centric companies (for example, restaurants, theaters, retail stores with foot traffic, gyms, airlines, hotels and tourism). There is indeed a calculated risk to bring people back together earlier rather than later. Currently, the risk-benefit calculation has been biased toward physical spread of the virus, aggregate economic metrics and, in some corners, political agendas. Models do not account for longer-term effects. Without deliberate investment in human-centric jobs and companies, structural changes put in motion by government policy during the pandemic may gain unstoppable momentum to the detriment of our society.

Second, support the human "caring economy" and reconsider our models and metrics for a healthy society. Aggregate demand and GDP numbers are inadequate metrics for human wellbeing, a critique that was gaining credibility long before COVID.[xxiii] Our government's policy models are woefully inadequate to capture the second and third order societal effects, beginning with mental health but also community vitality. Our government and businesses must support the physical, natural human community interaction, perhaps to include direct payments or subsidies to churches, community groups and other civic organizations that promote human contact, once the short-term crisis is past.

Third, we need a major new national investment program in both K-12 and higher education that focuses on the digital transformation of our society and economy. We need more people to understand the digitizing world, to be able to compete for good digital jobs but also to help "civilize"[xxiv] these digital machines. There are currently federal legislative proposals to massively expand advanced technology R&D, but this concentrates control in Washington DC, and spending flows mainly to universities in large urban areas.
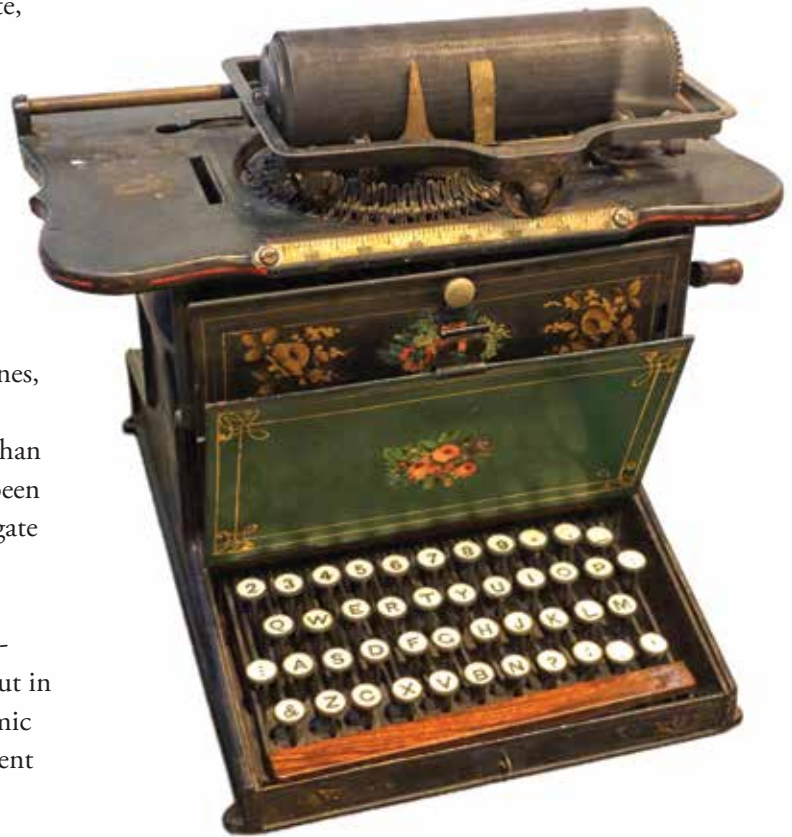
The QWERTY keyboard of the 1860s typewriter still defines our smart phones today. The name comes from the order of the first six keys on the top left letter row of the keyboard.

Moreover, it neglects the humanities and thus does little to help universities, students and faculty think through and "civilize" the machines.[xxv] An alternative proposal that the next administration in Washington may consider has been published nationally multiple times: my proposal for a state-centric, digital-cyber land-grant system of colleges and universities.[xxvi] This proposal would build out the existing land-grant universities and other campuses, with support for both digital MACHINE programs and the HUMANITIES.

Additionally, each state should consider what we are doing in North Dakota: the creation of a state digital academy like our Dakota Digital Academy, which is a collaborative effort of all existing campuses to promote understanding of the digital world, prepare for the changed workplace—but also help civilize the digital realms as they emerge in their communities.

Fourth, we must resist the distortion of human-centric culture, a distortion arising from our urgent response to the first order effects of the COVID crisis. Our leading cultural institutions—government, business, academia, religious, labor groups, non-profits—must come together to develop the policy, law, ethics and norms, which will "civilize" the increasingly capable machines and intelligent algorithms that will populate the realms of robots and cyberspace. But how to pull these disparate organizations together? The next federal administration (and perhaps the governors in each state) should convene a task force on **"Human Vitality in the Age of Digital Machines,"** to develop the needed policies and laws that will protect our human-centric culture. This effort must be deliberate and long term, because COVID is just one shock to the system, the first of many to come. As the pace of technological change accelerates into the future, such a deliberative effort must be sustained, so that humans consciously shape technology rather being shaped by short-term responses to episodic events.

Lastly, assuming the federal government cannot print money forever, there may be a need to identify new financial sources to support the human-centric economy and institutions in the medium to long term. It may thus be time to consider a "windfall profits tax" on digital and social media companies, as a means to provide support to that part of the economy that is human-centric. If such a tax sounds radical, consider that Bill Gates, one of the most thoughtful and generous of our tech elites in the world and perhaps in history, suggested it may be time for a tax on robots to support human society.[xxvii]

Urgent Dual Threat

A pandemic is not unprecedented in and of itself. But paradigm-changing digital technology, combined with the shock to humanity brought on by COVID,[xxviii] carries almost unfathomable consequences for the longer term. Words struggle to convey the magnitude of the challenge. Technological breakthroughs of the past couple of decades have created change at the macro level: the emergence of two artificial realms of cyberspace and the robotic. In a desperate attempt to mitigate the short-term problems of COVID, more energy and money has shifted into the digital realms, at the expense of natural, human-centric systems. The challenge of civilizing the digital realms for the benefit of nature and humans cannot be passed to our children, since technological systems have a proven habit of gaining inertia, "locking in" the policy and investment mistakes of early decisions. The challenge is upon this generation of leaders to ensure that the post-COVID era will not privilege the digital machines and the small group who owns them but promote a reinvigorated, natural human society of all Americans.[xxix] ◉

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[i] McNeill, William H., Plagues and People, New York: Alfred A. Knopf, 1976.

[ii] The candidacy of Bernie Sanders, an avowed socialist, both in 2016 and 2020 provide the most compelling evidence of the desperate social reactions. But there is indeed something wrong for many Americans, before COVID. See: Desilver, Drew, "For Most U.S. Workers, Wages have Barely Budged for Decades," by Pew Research Trust, see link: https://www.pewresearch.org/fact-tank/2018/08/07/for-most-us-workers-real-wages-have-barely-budged-for-decades/.

[iii] US Department of Justice, on 20 October 2020, filed suit charging GOOGLE with anti-trust violations. See, "Justice Department Files Google Anti-Trust Lawsuit," by Jason Bellini, Wall Street Journal, 20 October 2020.

[iv] Twenge, Jean M., *iGEN: why today's super-connected kids are growing up less rebellious, more tolerant, less happy—and completely unprepared for adulthood and (what this means for the rest of us),* New York: Atria Books, 2017.

[v] I will use the term "cyber" instead of "virtual" or "internet," but they could be used interchangeably.

[vi] This framework has been presented in multiple venues the past 15 years, to include award winning articles on defense strategy (2006); Naval War College (2007); CNA Corporation (2007); presentations at universities in France (2011), Yale (2013), and Annapolis (2014); University of South Dakota (2019); the Geneva Convention CCW (2014); Pentagon (2012), Navy senior leaders (2015), Army senior engineers (2014), National Security Agency/US Cyber Command (2014); Naval Post Graduate School (2016); US TRANSCOM (2017); US Chambers of Commerce annual meeting (2015); TEDx (2016); and a variation of this framework published in American and European edited volumes. This framework was presented most recently at Northern Plains Ethics Institute in November 2019, on the eve of COVID pandemic. COVID adds new urgency to explain what is happening, hence, this essay.

vii Brynjolfsson, Eric and Andrew McAfee, *Race Against the Machine: How the Digital Revolution is Accelerating Innovation, Driving Productivity, and Irreversibly Transforming Employment and the Economy,* Cambridge: Digital Press, 2011.

viii Twenge, Jean M., *iGEN*. Again, the U.S. Department of Justice, in a Republican Administration no less, has filed an anti-trust lawsuit against GOOGLE of the Alphabet Corporation, in October 2020.

ix Links to this report can be found here: https://www.netflix.com/title/81254224.

x A former internet startup executive, Tristan Harris, has begun a movement in Silicon Valley around the idea of reducing the exploitation of humans and especially teens. See his website, https://www.humanetech.com/.

xi The plight of the horse in the Industrial Age is addressed by numerous books, but the connection to the devaluation of conscious beings in favor of efficient machines is made stark in recent work by Yuval Harari. See *Homo Deus: A Brief History of Tomorrow,* London: Vintage Books, 2017.

xii Izabela Cardoso & Fernando Teixeira, BBC Reel, "Should We Have Billionaires," 28 October 2020.

xiii Ramkumar, Ramith, "Tech's Influence on Market Eclipses Dot-Com Bubble Peak," Wall Street Journal, Oct 16, 2020.

xiv Reed, Dan, "As Layoffs of 30,000 Workers Begin, the Airlines will Never Be the Same," Forbes, 1 October 2020, see link: https://www.forbes.com/sites/danielreed/2020/10/01/airline-layoffs-american-united-southwest/.

xv Lord and Taylor, in business since the early 19th century, was just one of the victims of Covid. See, https://www.cnn.com/2020/08/27/business/lord-and-taylor-store-closures-bankruptcy/index.html.

xvi There are almost too many articles to cite. To start with, see TIME Magazine report of August 2020, https://time.com/5876604/machines-jobs-coronavirus/.

xvii REI is one of many companies closing or rethinking the need to concentrate workforce and executive teams in geographic headquarters. See Forbes report here: https://www.forbes.com/sites/retailwire/2020/08/18/rei-sells-its-headquarters-others-should-take-notice/?sh=355de7873166.

xviii Pinsky, Drew, Presentation at "Recovery Reinvented," Bismarck, ND, October 2020.

xix Shockley, Dr. Ellie, "Student Achievement from Fall 2019 to Fall 2020, North Dakota Department of Public Instruction, November 19, 2020.

xx An early visionary on the potential threat to human culture by rapid technological change was Neil Postman, former Dean of Columbia's School of Journalism. See his book, *Technopoly: The Surrender of Culture to Technology,* New York: Alfred A. Knopf, 1993. See especially chapter 5, "Broken Defense."

xxi For historical examples and theories of the strong tendency of technological systems to 'lock in' or gain 'technological momentum', see works by Paul David, "QWERTY," available on the internet here: https://econ.ucsb.edu/~tedb/Courses/Ec100C/DavidQwerty.pdf See also Thomas Hughes, *Networks of Power, on the momentum of technological systems.* See Langdon Winner,

Autonomous Technology, on the tendency of humans to reverse-adapt their value and culture to these systems once they gain momentum.

xxii At a recent Singularity University session on human workforce on October 21, 2020, Dr. Homi Kharas of Brookings suggested that COVID is accelerating humanity down the preferred path of development. I found such a comment alarming and value-laden, to say the least. Then another panelist, Dr. Wolfgang Fengler drew an analogy to how his mother was a typist, and how the word processor saved her so much time, therefore, technology will just keep making things better for humanity. These comments left me speechless in the chatroom … where to begin to engage such short-sighted thinking?

xxiii For a recent discussion of the inadequacy of reducing measures of wellbeing to GDP and employment calculations, see Michael J. Sandel, *What Money Can't Buy: The Moral Limits of Markets,* New York: Farrar, Straus, and Giroux, 2012.

xxiv This was a challenge to our ancestors when the macro-changes engulfed society moving from agriculture to industrialization, a shift to many non-digital machines. See John Kasson, *Civilizing the Machine: Technology and Republican Values in America, 1776-1900,* New York: Penguin, 1976.

xxv It is especially important that rural and outlying states receive their share of the massive research monies now poised to flow to universities, that may amount to over $100 billion as the NSF is restructured (the Endless Frontier Bill, proposed by Senator Schumer, link here: https://www.schumer.senate.gov/newsroom/press-releases/with-the-support-of-new-yorks-leading-tech-innovators-schumer-announces-bipartisan-endless-frontier-act-bolstering-us-leadership-in-scientific-research-and-innovation-dramatically-increase-investment-in-building-new-tech-hubs-in-upstate-ny). It is heartening that the federal government and congressional leaders appreciate the magnitude of the challenge of AI/networks/robotics, but most of those resources are slated to be invested in already large urban areas, large universities. Furthermore, there is little money assigned to the humanities/liberal arts at universities, where the civilizing process happened when the land grant system of colleges and universities were established in response to the last great MACRO technological event, the Industrial Revolution.

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xxviii Bhattarai, Abha and Denham, Hannah, "Stealing to Survive: More Americans Are Shoplifting Food as Aid Runs Out in the Pandemic," The Seattle Times, December 10, 2020.

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View from the corner of Washington & Bromfield Streets, John Adams Whipple.

The Great Boston Fire & Epizootic of 1872

Disease & Technological Transformation

PATRICK J. MCCLOSKEY

At 7 p.m. on November 9, 1872, a fire started in the basement of a warehouse at the corner of Kingston and Summer Streets in Boston, Massachusetts. Two hours later, the fire was consuming a three-block radius. All 21 of the city's fire engine companies responded. Even so, the fire advanced south quickly to the waterfront, incinerating docked vessels and wharves. By 6 a.m., the fire was roaring through the center of downtown and wasn't contained until midday. In total, the fire destroyed 766 buildings, leaving a large swath of the city in smoldering ruins.

A major reason the fire became so disastrous began in late September. In pastures around Toronto, Ontario, horses and mules started showing signs of a respiratory illness. By early October, this equine influenza spread across the southern border. Within a few weeks, influenza infected horses in Boston, New York, Philadelphia, Baltimore and then out to Chicago and south to cities as far as Jacksonville, Florida. Big cities contained large populations of horses in dense clusters, facilitating the spread of a new illness for which the animals had no immunity.

The influenza moved much faster than a galloping horses—that is the flesh and blood kind. Ironically, the "iron horse" provided the means. Horses were shipped regularly between cities facilitating infection. Mapping the disease showed that it followed rail lines strictly, reaching San Francisco by spring but completelay absent from areas unconnected by rail.[i]

The "most explosive equine panzootic ever documented"[ii] ranged from British Columbia to Central America. Toronto was described as a "vast hospital for diseased horses,"[iii] and the same scenario repeated throughout the continent.

Like COVID-19, the equine influenza was highly contagious. At least three-quarters of the horses nationwide contracted the disease. Also, like COVID, the influenza's mortality rate was low at 3.7 percent in New York City[iv] and would have been considerably lower but many horses in urban centers were kept in unsanitary conditions.[v]

Standstill

As if in lockdown, life in cities and towns across the country stood still. Horses were central to commerce and transportation. Where streets once thronged with horse-drawn carts, carriages and trolleys, empty avenues presaged 2020. It was difficult to impossible to supply food and other necessities. As winter approached, families in the North feared a coal famine, since horses weren't available to bring the coal out of the mines, let alone deliver it to residents. The economy slid quickly into recession.

A contributing factor in the Boston inferno, as in the Great Chicago Fire a year earlier, was the fact that most buildings were made of wood, as well as streets and sidewalks. The Chicago fire, however, was driven by strong winds making any effort by fire companies useless. In Boston, a significant factor was what wasn't moving: horses and therefore many of the heavy pump wagons that were urgently needed to corral the fire.

Iron & Electric Horses

The influenza epidemic highlighted how crucial horses were to the economy and almost all human activities. Horses were cherished by many people and a new appreciation of their worth was acknowledged. However, their long-term fate was also sealed.

Newspapers sought some levity with jokes, for example, that iron horses are immune to the disease. Looking forward, that turned out to be more witness than wit. In 1873, just after the equine influenza put the city's beasts of burden out of commission, San Francisco initiated cable car service. There were electric trolley cars by the 1880s, and by 1902, 97 percent of the nation's streetcar systems were powered by electricity.[vi] Urban life would never again be so disrupted by horse plague. In New York City, three separate elevated train lines were built from 1873 to 1878.[vii]

Horses were still beloved and useful, especially on farms. According to the 1870 U.S. census, there were 38.6 million people and 7.15 million horses. The number of horses increased for the rest of the century to 21.5 million in 1900,[viii] and the proportion also grew from one horse for every 5.4 people to one per 3.5 people. The horse population peaked in 1915 at 26,493,000 as large numbers were being shipped overseas to serve in World War I, more than a million horses and mules by war's end.

A horse-drawn fire engine rushing to a fire at the turn of the 19th century. Even after the development of the gasoline-powered automobile the internal combustion engine didn't have enough horsepower to propel a heavy fire engine.

In 1915, the ratio slightly increased to one horse for every 3.8 humans. At the same, however, automobiles were starting to be produced in large numbers. As with all products in a market-based economy, cars and trucks improved in quality and decreased in price such that small businesses and ordinary citizens could begin to afford them. As mass production of gasoline-powered tractors began in the 1920s, the need for horses on the farm decreased rapidly. From 1915 to 1960, the American population increased from 100.55 million to 180.7 million, at the same time as the number of horses fell by 88 percent from 26.5 million to 3.1 million (one horse for every 58 humans).

Tractor production peaked in 1951 at 564,000 units.[ix] Automobile production increased from 806,989 in 1915 to 6.1 million in 1960.[x] Technological transformation took decades from the 19th into the 20th centuries, unlike the compressed time change takes today. Unforgotten was how vulnerable a society reliant on biological units is, and that disease can devastate the economy.

Hobby Horses

Our equine fellows no longer work for a living, other than as race, rodeo or show horses. None of these activities are essential to the economy. Most have slipped into the realm of their owners' pastimes to become hobby horses of a sort. Happily, their numbers have increased to 7.25 million today,[xi] a testament to the bond between horse and man.

What about people and our bonds?

Unlike the epizootic, COVID shutdowns were not the result of a pandemic putting so many people in hospitals and the morgue that the economy could no longer function. Rather, it was fear. Given the acceleration of the digital transformation, discussed in this issue's first article, human vulnerability is quickly being reduced.

Much has been written, broadcast and podcast about AI and automation replacing vast numbers of jobs in all sectors. Will the new economy provide even more jobs than those lost, as argued in "Robophia," beginning on page 24?

Or will a massive "useless class" be created? If so, a remedy favored in Silicon Valley is the universal basic income.[xii] Does this deliver us to a glorious post-work future or techno-socialist misery? Are people without work set free to realize their creative dreams or rendered without even the purpose of a hobby

Henry Bergh (in top hat), the founder of the American Society for the Prevention of Cruelty to Animals, stops an overcrowded horsecar to check tired-looking horses for equine influenza. Harper's Weekly, September 21, 1872.

horse? And what will creativity mean if free expression is limited by the Big Tech censorship that became so blatant in 2020?

Will we overcome these challenges and integrate the human and the technological to everyone's benefit? Or are we heading for a social conflagration?

Despite the smoke, at least many of the questions are clear. ▣

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NOT NATURALLY SO

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Digital Education's Failures Exposed in COVID-19 World

The road to Hell is paved with good intentions, we often hear. Considering the drive to online classes during the COVID-19 pandemic, that old trope can be updated: Privileged thinking does a nice job icing the pavement. In an extraordinarily short period of time, the pandemic shifted American education rapidly from the primarily face-to-face tradition to mostly online teaching. Perhaps that rapid transformation is why online education's three main failures, each based on a lack of understanding of how human beings engage with each other in their world, became quickly apparent. These failures might cause students and parents to wonder why they are paying so much for so little practical engagement and results. At the same time, faculty members might struggle to believe they are providing adequate value and fulfilling their vocation.

Online education has proponents for several good reasons. It is an excellent option for people needing to complete a degree, earn graduate credits or take continuing education classes for their profession, yet who cannot attend in-person classes regularly. Perhaps they are working full-time jobs, reside too far away or face mobility issues. Or they might be older adults who do not want to be in a university environment but value life-long learning. If potential students have adequate technological resources and the required academic skills, they can design their educational experience to fit their lifestyle and needs. Given the reality of declining enrollments and the ability to live anywhere in the United States, because of extensive technology and connectivity, these people make up a potential student pool that many educational institutions should be recruiting.

Unnatural for Social Animals

Online teaching, however, fails to incorporate human-as-social-animal psychology. Tiny, evolutionary adaptations happened to our genetic material over enormous periods of time. Eventually these small alterations added up to significant modifications, including the development of a brain capable of rational belief, critical reasoning and imagination. Socially advantageous genetic patterns, such as automatically favoring kin, became part of how our brains function. As Homo sapiens, we are geared toward social interaction, although it is unclear how much of this is genetic and how much is learned.

Socialization is essential to human development. Human beings need an enormous amount of time compared to other species for their young to gestate, be delivered and then grow enough in physical and mental acuities to care for themselves. Sometimes, when sending our offspring to college, we are justifiably worried they are being pushed out of the nest too early. As we have seen in the last several economic downturns, we were right in our misgivings. Being in one's 20s, 30s and beyond is no guarantee of independence, if the number of children in these generations returning to their parents' homes is any indication.

Socialization not only keeps the young alive, it becomes part of who they are and how they function in their surroundings. Unless psychopathic or sociopathic, every human being is socialized into a family, peer group, community and country through active engagement with people around her. She figures out how to speak, think and interact by mimicking others until she can form her own beliefs, values and principles through critical reasoning. As an infant and

adolescent, her brain's neuropathways are stimulated and eventually become "hardwired" if activated sufficiently often. That is why languages should be taught at young ages when a child's potential for learning with little effort is at its peak. Children's early elasticity is lost around the pre-teen development stage, which explains why someone older struggles to learn a second language, even if proficient in her native tongue.

Human beings as social animals, thus, are better suited to in-person interactions in which their nature and nurture excels. This fact explains, in part, why MOOCs (Massively Open, Online Courses) failed. In 2008, George Siemens—a university professor, author and expert in cyber sciences and education—developed the first MOOC, with the stated intention to eliminate disparities and open education to new consumers around the world. There was even talk about how the developing world's barriers to accessing the developed world's educational system could be torn down through this learning platform. Unfortunately, MOOCs failed to deliver because they relied too much on an idealized version of how human minds are educated, rather than on how our brain circuitry actually functions.

Unnatural for Engaged Teaching

A further online barrier to effective learning is the difficulty many faculty members face in controlling a digital classroom in order to make it as productive as in-class teaching. As evolved social animals, our ancestors were winners in the competition game. They were a tiny bit better at reading their environment and then reacting pragmatically. Our ancestors scanned their surroundings using their relevant senses to evaluate the overall situation and look for anything out of place that would require greater attention than normal. They were sufficiently competent at figuring out when to fight, when to fly away, when to freeze in place and when to do nothing. Those who were a little slower on the uptake became a predator's main course or suffered another debilitating fate.

This inherited skill of assessing environments is essential to teaching, as well. Businesspeople call this "reading the room." In the classroom or lecture hall, teachers easily "see" the students as a whole picture and then identify individuals who are communicating as exceptions to the normal state of affairs. Confident

students signal to instructors through raised hands or speaking outright, but most students make their message clear only through non-verbal body language, which can be very subtle. A lifted brow, eyes cast inquisitively, shifting feet, hands movements, puzzled noises tell teachers that students need direct engagement to determine the issue and provide the required response.

Online teaching usually does not allow for subtle communication between learner and instructor. First, because teachers cannot see enough of them. That might sound strange, but it works out in several ways. When students are on-screen, we see only their heads, necks and part of their upper chests. Most of the ways they subtly communicate a need for further engagement is off-screen or difficult to discern.

Instructors are often distracted by unwanted views of students' living spaces, including messy bedrooms and inquisitive pets, especially cats that insist on walking between students and web cameras.

Additionally, many students blank out their screens so that instructors see only their names on the screen. Perhaps they just rolled out of bed, but the blank screens make teachers wonder if these students are paying attention or even there.

Even if all students are present on-screen, large numbers of students create a space problem. Computer screens provide a much smaller visual range than a classroom. The number of students determines how large each student's image appears on the instructor's screen. If there are only two students in the class—great for Oxford tutorials but a disaster for the student credit-hours needed by university bottom lines—then the images are quite large. As the number of students increase, each student's image becomes smaller until instructors perceive a mosaic of very tiny heads. Even worse, some classes have such large enrollments that the entire class cannot be seen at once. Teachers must manually click through multiple screen pages to see all their students. Although the digital software automatically selects the student who is talking, many if not most students are offscreen and beyond the teacher's attention.

Secondly, our brains do not process information the same way as a computer. Our minds must focus on one student's image at a time to fully process the

- Among special ed students who were previously writing at grade level, **43% are now writing below grade level.**
- Among low-income students who had performed math at grade level, **34% now perform below grade level.**
- Among Native students who were previously reading at grade level, **42% are now reading below grade level.**

From "Student Achievement from Fall 2019 to Fall 2020," K-12 students in North Dakota, Ellie Shockley, PhD, NDUS.

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data in that image. Also, humans cannot perceive the whole class as adequately online as when they are in the classroom and can engage with attention-grabbing anomalies. In contrast, groupings of images on a computer screen cannot be processed into a coherent whole the way a group of people at a business meeting can be processed. To illustrate, try seeing the writing on this page on a screen while simultaneously looking at every object in front of the computer. You can either read what is written or pay attention to the larger visual range. Likewise, we can focus narrowly and pay attention to one student at a time, which means that the odds are we are not seeing other students needing help. Our peripheral vision cannot be used efficiently in two-dimensional cyberspace. Those odds mount as the number of images increases on the computer screen. The images start looking like tiny puzzle pieces, but they don't come together to create a comprehensive tapestry.

This situation is even worse when teaching face-to-face and online simultaneously, since the instructor then has two complex views to decipher at the same time. We have students in the classroom and the blurry jigsaw puzzle on the computer screen. One of the first questions is how should these two views be handled by the instructor, when it is difficult enough engaging in one?

Perhaps all these challenges to effective teaching explain why students rate face-to-face classes higher than their online twins with the same content and instructor.[i] Moreover, the face-to-face and online experiential difference might account for the loss of motivation that a recent study of how remote learning affected student learning environments showed.

There were 98 college students in the study who also reported an increased struggle to maintain grades (59 percent) and do the course work (85 percent).[ii]

Barriers to Equality

No doubt all decent people naturally desire that community members have a fair opportunity to thrive in their environment, especially those from historically disadvantaged groups. Online teaching, however, seems to be created by advantaged folks who discovered something that works well for them, but perhaps do not realize it is reinforcing social inequalities.

There is a particular type of student who excels with online dedication. He is self-motivated and already possesses the skills the class requires before he begins the first session. His interest in the class' subject is high, and he is unlikely to have enrolled in it by mistake or because he thought it sort of sounded interesting when filling his schedule's empty slots. He knows what he wants, why he wants it, and he can make what he wants to happen because he has connectivity, access, financial resources and academic skills already in place. This type of student also likely shares many characteristics with the people who program and promote online education.

Not all students are like the one described above. They are not as knowledgeable, driven or prepared. They are ready for college but not for online education and subject matter. Philosophy, for example, is perceived as a cool subject in which people dress in black sit in darkened rooms sipping coffee or absinthe, or appear on TED Talks, speaking about life's meaning, instead

of getting a productive job. In reality, philosophy is an extremely difficult subject focusing on the basis of reality, knowledge, morality, religion, society and logic itself. To learn philosophy requires a great deal of intellectual engagement with the course materials and lectures, which explain concepts and arguments that develop the discipline's foundation. More work is demanded when the instructor sends students to think it out for themselves and then build their own value sets and principles and the arguments to justify them. Face-to-face engagements between faculty and students, either individually or in-class, facilitate student learning in ways that distance—that is, distant—education cannot.

Philosophy is not unique in this regard; the other academic disciplines and specialties have their own levels of difficulty. Unless the subject has been dumbed down in a class taught by a fraud, students work hard to receive passing grades and even harder to earn an 'A.' Students without the skills, background and drive needed to succeed with online classes can easily become overwhelmed and drop out. Additionally, different classes in the same institution sometimes require students to master several incompatible learning platforms, such as BlackBoard, Zoom, Slack and Discord. Moreover, there is no set way to deliver instruction: Some faculty use synchronous and live, others are asynchronous and recorded, and yet others combine all four. No wonder a 2019 study in the Journal of the American Medical Association Pediatrics noted that as many as 33 percent of urban children are not participating in online classes.[iii] Although all students exhibited decreased performance in online classes, those with the greatest declines were males, Blacks and those with lower levels of academic preparation.[iv] Of course, some disadvantaged individuals belong to more than one of these groups.

As a result, online classes are geared toward the privileged and widen existing disparities. To benefit from such a learning environment, students must have a computer capable of Zoom meetings and performing online work, as well as WiFi or other easy connectivity to the learning platform. Although most disadvantaged students have access to those resources, many still do not. In May 2020, the National Center for Education Statistics stated that

20 percent of American Indian/Alaskan Native children, from three to 18 years of age, as well as 10 percent of Black and Hispanic peers, do not have online access. In comparison, 4 percent of White and 2 percent of Asian children cannot get online.[v] The quality of computer equipment is also unequal and reflects racial disparities: Approximately 10 percent of Black, Hispanic and American Indian/Alaskan Native children can access the internet only through a smartphone, not a laptop or desktop computer. Only 2 percent of Asian and 3 percent of White children, usually from poorer families, do not have the computer equipment they needed for successful online education. This gap is one of the reasons that government institutions are pouring enormous resources into purchasing tablets and laptops for students.

If digital education continues at current levels, with the connectivity, equipment, motivation and skills barriers in place for poor or otherwise disadvantaged students, then unearned privilege will not only be reinforced but will widen and deepen. One study in 2017 showed that online classes reduced college success for disadvantaged students and lowered their grades in future courses, whether online or on campus.[vi] Perhaps these students did not acquire the skills they needed from digital courses to be successful in subsequent classes.

There are also ripple effects for students and their communities. Simply put, getting better jobs requires better grades. The grade disparities between online and in-person teaching will worsen the longer disadvantaged students are availed no other options. Instead of the essential human connection between student and instructor that can bring disadvantaged students more help with personal connections and instruction, these students become remote, abstract images on the instructor's computer screen. There is no opportunity to build the reciprocal empathetic relationship required for the most productive teaching, in which faculty work with students because they care about them, and students respond by learning because they know they are cared for. This claim is not mere ivory-tower speculation. Positive teacher-student relationships correlate highly with student scholastic engagement and achievement, as discovered in a meta-analysis of 99 relevant studies.[vii] That lack of

social contact leaves students, who need help in taking advantage of opportunities or creating new ones, without the required resources to reach their potential.

The U.S. Bureau of Labor Statistics repeatedly tells us that earning bachelor's and graduate degrees increases income significantly. This wealth advantage has long-term impacts on individual success and society's flourishing. Lacking higher education often means not getting the best-paid jobs with the highest prestige, and therefore not being able to compete, collaborate and succeed as others can. If these tickets to a better life are guaranteed only to already advantaged individuals, then instead of working toward a more equitable society, we continue to entrench disadvantage and privilege in our communities. What is worse is making these disadvantaged groups more vulnerable by degrading their ability to compete and reducing meaningful opportunities. The feeling of being in a permanent underclass, because of forces outside one's control, disrupts personal and family lives and other valuable relationships, and harms well-being and the feeling that one's life has meaning. If such a feeling becomes endemic, then it leads to social unrest, as we have seen in recent protests across the United States and elsewhere.

Verdict

Is digital education inherently a bad idea? Not really, it just needs to be redesigned to become more pragmatic and creative. Face-to-face classes are superior in many aspects, but they are not always needed or possible. For people who already have the drive, skills and interest in a subject—but are busy with other activities that do not permit them to attend an in-person, synchronous class—a digital education is ideal. It can also help with students distributed over vast geographic distances who cannot travel to an in-person class.

The practical key to making digital offerings effective is to keep these classes small enough that faculty members and students can see and engage with each other as social animals. If we can eventually replace the small screens and isolation with a simulated reality, such as the gaming equipment many use for less educative pursuits, then we might be able to overcome some of the alienation caused by not being able to socially interact in person in real time of online teaching.

Online classes are being enlisted as a prime way to deal with COVID, and especially given the prospect of more lockdowns, this will continue. Even so, we must not lose sight that they have considerable defects at present. Perhaps the best we can do is to create carefully designed education models with many components to address student needs and abilities with the end goal of helping individuals, communities and our society thrive as our founders envisioned, as articulated in the Preamble to the U.S. Constitution:

> We the People of the United States, in Order to form a more Perfect Union, establish Justice, insure domestic Tranquility, provide for the common defense, promote the general Welfare, and secure the Blessings of Liberty to ourselves and our Prosperity, do ordain and establish this Constitution for the United States of America. ◙

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The nation today is still recovering from the unprecedented effects of widespread shutdowns in response to the coronavirus. After achieving a record low level of unemployment prior to the pandemic, economies everywhere have returned to the challenge of rebuilding. Many pundits and futurists now claim that the labor-savings about to come from algorithms, artificial intelligence (AI), automation and robots, will take so many jobs that employment levels will never recover.

In response, this will require, the proponents argue, the creation of a universal basic income, not just for the temporarily unemployed, but for those doomed to be never-again-employable. We've seen this movie more than once.

In 1961, President John F. Kennedy delivered a message to Congress focused on what he called "the inevitability" of job destruction from automation. He created an Office of Automation and Manpower and proposed that Congress fund training programs and create a readjustment allowance for displaced workers.

A few years later, President Lyndon B. Johnson convened a blue-ribbon commission on the impact of automation on work. One of its recommendations: a universal basic income.

Fast forward to May 2018 when the White House held a summit with 40 tech companies, including the likes of Google and Amazon. The focus: handwringing over the inevitability of "job displacement" from automation and artificial intelligence.

So, we find ourselves at a curious point in history.

For a decade now, despite the wonders of Uber, Amazon and Apple, the U.S. has actually been in a productivity deficit. The definition of productivity is the reduction in inputs—labor and materials—per unit of output. In other words, our productivity deficit means that America is currently underinvested in automation technologies.

But now, we're told, we are about to see a new kind of productivity that will spur economic growth, but for the first time in human history, it will also lead to the long-term net destruction of work.

Ever since the dawn of the industrial revolution, we have witnessed continual and profound advances in technologies that have improved productivity. In fact, the magnitude of labor-saving now expected to come from AI and robots won't match what happened, for example, a century ago. In just 20 years, from 1910 to 1930, there was a 400 percent drop in labor hours needed per
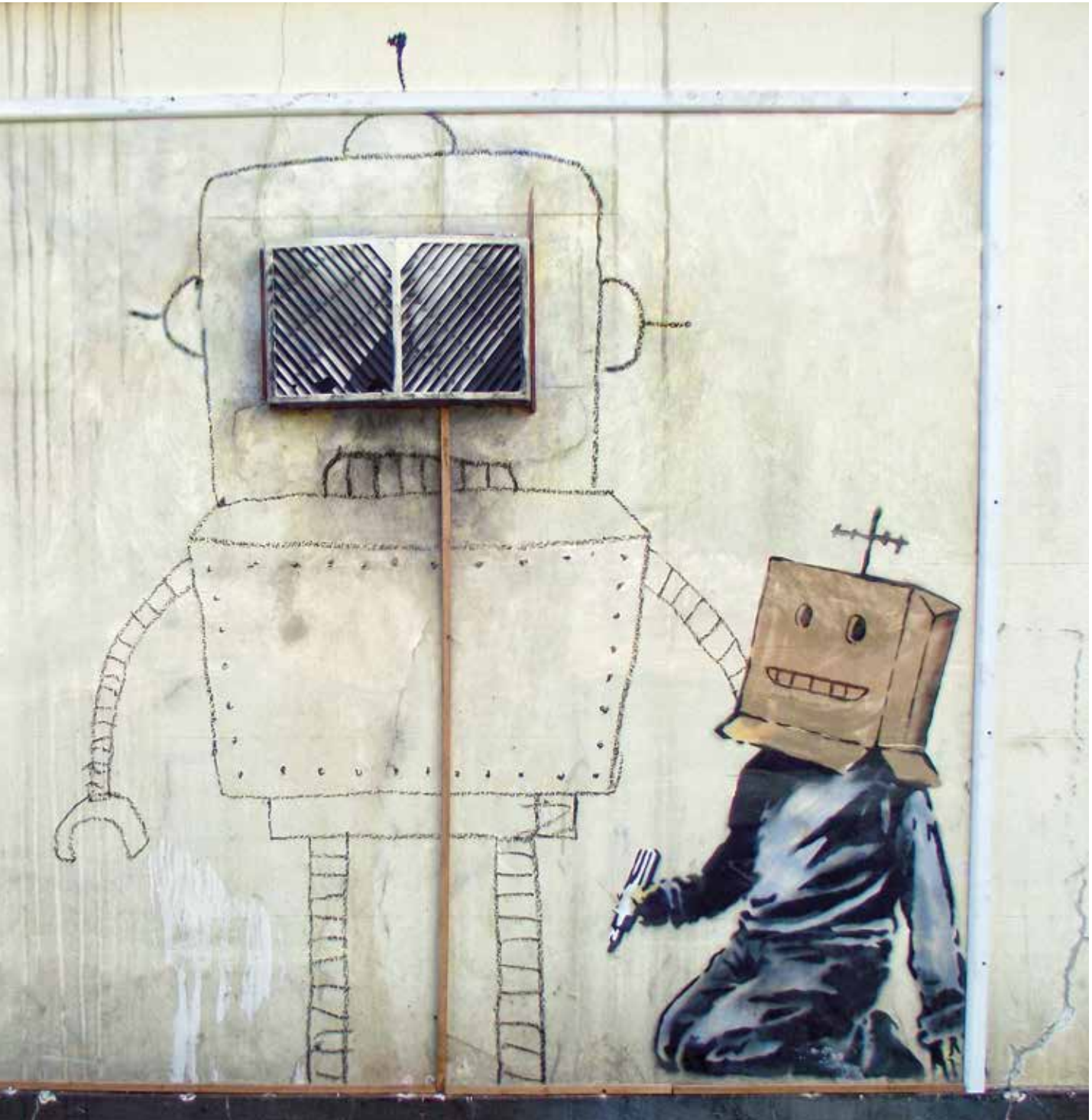

On the morning of October 4, 2010, the manager of the Grosvenor Hotel discovered this painting—which has been attributed to Banksy, a world-famous but anonymous English street artist—on an exterior wall. The Grosvenor Hotel overlooks the seafront in Torquay, a resort town in southern England.

ROBOPHOBIA

Work in the Age of Robots

MARK MILLS

car manufactured, and a 700 percent decline in labor hours to produce a ton of steel. And those are not exceptions, but typical of what technology progress has brought to many industries over the past century and a half.

Over that time, despite this massive "labor saving" and despite population growth, which increased the total number of labor-seekers, 95 percent of job-seekers, on average, found employment. In other words, the unemployment rate has oscillated around 5 percent, despite serial technological disruptions.

Of course, there have been periods of high unemployment during that time span. But those episodes were caused not by technology but by poor policies and economic malpractice.

The essence of today's dystopian argument about the future is, in the immortal phrase of every failed forecaster: This time it's different.

The implicit, if not explicit, argument is that AI and robots are, well, different. Of course, the specific technologies underlying every revolution are different.

The central question is whether the effects of new technologies are different than in the past.

A core tenet of the peak jobs thesis is anchored in offering an analogy to the historical fact every school-child learns: Technology eliminated nearly all farm work. But there is something fundamentally wrong with using that model as a predictor for other work.

The critical difference between work associated with producing food compared to fabricating things and producing services is found on the demand side, not the productivity side of the equation.

Growth in demand for food is bounded by the combination of two obvious variables: population growth, plus the rise in per-person consumption for those underfed.

Population growth is slow and very predictable over very long periods. And there is only a maximum of a two-fold difference between the per capita calorie intake of a subsistence diet and that of wealthy nation.

Even modest gains in agricultural productivity—again, the rate of labor reduction per unit of product—can be far faster than the rate of growth in demand. Thus,

one would expect, and we've seen, a rapid reduction in total farm-labor-hours needed.

Meanwhile, for the things we invent and fabricate, the demand growth isn't limited like food but is essentially unlimited. This arises from an obvious fact, but one that seems to elude economists and forecasters: Engineers and innovators continually invent new things that create new demands.

Rising consumption of fabricated things—and the services they enable, such as tourism enabled by aircraft or entertainment enabled by computers—comes not just from increased wealth enabling more people to own what only a few had previously been able to afford. It also comes from the continual invention of new products and services that create new demands, which in turn create new requirements for jobs in both manufacturing and services.

Evidence of this reality is clear over the last 50 years. Consumption of agricultural goods in the U.S. has risen only slightly more than the population. But consumption of things from industries has grown 300 percent more than population. And the consumption of healthcare services has grown triple that ratio—at nine times the rate of population growth.

Of course, automation has eliminated many specific kinds of jobs. It's easy to identify jobs that will disappear. It's harder to identify the jobs that will appear due to innovations. Some 60 percent of the kinds of jobs that existed in the 1960s don't exist today, such as draftsmen and typists. Yet in 2019, we were at full employment.

There was no demand for cars or computers before their invention. The computing industry employed about 100,000 people circa 1960, compared to more than a million workers today.

The fact is global demand for manufactured goods—and for the services the new kinds of goods enable—is on the cusp of the greatest expansion in history. We are already seeing evidence of that and the collateral requirement for productivity from robots and AI to meet the scale of demand.

We're long overdue for improving labor productivity in nearly every part of the service sector, especially healthcare. Over the past couple of decades, healthcare productivity—value added per labor-hour—has been stagnant.

Uses of Artificial Intelligence

Cybersecurity
User tech support
Production management
Compliance
IT automation
Customer forecasting
Advertising
Monitoring social media
Marketing
Financial trading
Call automation

Cybersecurity

Marketing

Finance & Accounting

Customer service
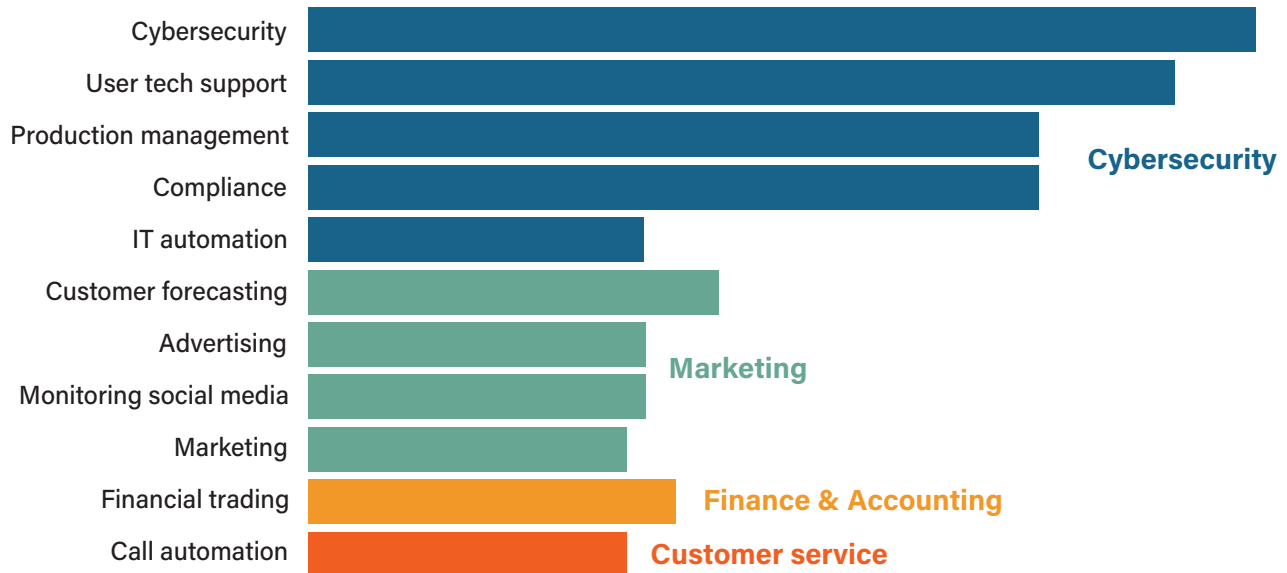
Adding knowledge automation won't destroy work in healthcare, it will make it more affordable, better and, yes, expand employment.

We can look to recent history for some obvious examples. We've seen word processors replace typing pools, spreadsheets replace rooms full of accountants doing "ciphering," software replace draftsmen and many more similar examples. But over these decades, both employment and the economy have grown.

Data from the Bureau of Economic Analysis shows that, on average, the industries that spent more on software increased rather than decreased employment. The data also shows that most industries are still underinvested in software. We should hope for software investment to accelerate.

The central challenge in the current transition era is as it has always been. It is not the prospect of the end of work. It is the moral and political imperative to deal with the inevitable loss of specific types of jobs and the related—and challenging—task to help a minority of workers find new jobs.

But this time, for the first time, the technology causing the disruption also constitutes part of the solution.

One can easily imagine developing social media algorithms similar to the kind that enable platforms such as Uber's sharing and Netflix's preference engines. AI will make it both easier and more efficient to manage the complex and inherently social process of helping displaced employees find new work, or requalify or retrain people for new kinds of work.

A central goal in engineering has always been to make technologies easier to operate by non-experts. AI in the future will become increasingly easy for everyone to use. That will democratize artificial intelligence. And that will inevitably help far more people become productive and greatly expand the base of so-called "knowledge workers" too.

And that might be the single feature of our new age that is in fact different from previous machine disruptions. ▣

For the first time, the technology causing the disruption also constitutes part of the solution.

HERE, THERE & EVERYWHERE

Space: Real vs Cyber in Art

Recently, we interviewed David Borlaug, the president of The Capital Gallery, about the differences and synergies between physical space and cyberspace in art. The gallery is located downtown in Bismarck, North Dakota.

In 1980, in Washburn, ND, Borlaug co-founded Farm & Ranch Guide, which became the most popular farm newspaper nationwide. In the early 1990s, he formed the Lewis & Clark Fort Mandan Foundation and, since 2000, served as president. Borlaug also served as chairman of the board of Prairie Public Broadcasting. Currently, Borlaug serves as the vice president of both the Central Dakota Humane Society and the Bismarck-Mandan Symphony Orchestra.

In 2016, he moved to Bismarck to establish The Capital Gallery, which operates as both a museum and a retail art store.

HERE

Dakota Digital Review: In today's world, with everything going virtual—especially during the pandemic—why is a brick-and-mortar art gallery still relevant?

David Borlaug: An art gallery is important because that's how you need to experience art. When you are looking at a piece, you need to step back to gain perspective. If the painting is expressive or abstract, you need to look at it from several distances to determine what you are really looking at. In other pieces, you will need to look very closely. Yes, you can zoom in on a computer monitor, but you can't zoom out properly or observe from different points of view. Also, an art gallery gives you the total experience of being surrounded by art.

David Borlaug, president of The Capital Gallery with a self-portrait by noted Native American artist Fritz Scholder (1937-2005).

The Capital Gallery in Bismarck, located in the core of the city.

The in-person engagement with art is also about other people around you. That's why we have opening receptions. Someone might be pondering a Fritz Scholder piece, for example, and someone else walks up and asks "What do you think he is trying to say?

Dakota Digital Review: How often do you exhibit artists?

Borlaug: About two to three months for each show. It's too much work to put an artist's work up for 30 days, take it down and start over. More importantly, it's not fair to the artist.

Every exhibit transforms the gallery space. The far wall, which is about 45 feet long, looks incredibly different each time. Three years ago, Jessica Wachter, who is from Bismarck, had her first major showing here and then showed again last year. Jessica had many large paintings, and it was a smash success, with sales nationwide.

Of course, not many people have room for such large works, nor do they have the means. That's where an artist like Bob Matz comes in. We are showing his work now. Many of the paintings are small, and the price points are affordable.

One of our advisers said that our mission is to teach people in Bismarck the joy and value of original art. Imagine the delight a work by Jessica or Bob or Walter Piehl brings into someone's house. Unlike a print or poster, when you take original art home, it's transformative.

Dakota Digital Review: Artists often feel the need to live in art centers like New York or Chicago or Minneapolis. But art itself is very local, right?

Borlaug: We have shown very high-quality artists from outside the region, and they don't sell as well as local artists. For our clients, there needs to be an affinity. Most of them go to Scottsdale for the winter, where there is no shortage of opportunities to buy art, and still they buy here. More than once we've had people buy art because it replicates what they see out their window in North Dakota. At least there needs to

be a local theme. Colorado artist Michael Haynes sold well because he was the artist of record for the Lewis and Clark Expedition, as well as being a national award-winning artist.

THERE

Dakota Digital Review: You said earlier that a 30-day showing isn't fair to the artist. Why?

Borlaug: Often, a buyer makes several trips to the gallery to view a piece before purchasing. Maybe they want to check the measurements or match colors. We also let them live with the art to see how they feel about the piece. Next week, Marci Narum and I are taking several paintings to Fargo to a client's house to help the couple make up their minds. They need to live with it in three-dimensional space first. It is a large commitment. Art changes the gallery space dramatically, so we allow people to take it home, hang it for a while and experience how it transmutes rooms at home.

Dakota Digital Review: Do you have a presence elsewhere in the state?

Borlaug: Yes, since May we have been the fine art provider for an interior design showroom in downtown Fargo, Curated by Trevor Hill Design. Two summers ago, we opened a satellite gallery in Medora, which attracts thousands of tourists to western North Dakota. The gallery is in the Harold Schafer Heritage Center.

When we were planning The Capital Gallery, many people advised me to follow the business interests that were pushing development into North Bismarck. We were told to open in a mall where there's free parking. In any case: Don't go downtown; no one goes THERE!

But city centers are important for the development of culture. The convergence of government offices, businesses and apartments in multi-story building creates the population density needed to support high-end restaurants, theater, art galleries and bakeries—like the exquisite one that opened across the street. These institutions in turn function as anchors for further development in the city's core. So THERE becomes the place to go.

Don't go downtown; no one goes there! But city centers are important for the development of culture … so THERE becomes the place to go.

"Bison on Rock," copper, steel, fieldstone, Patrick Shannon.

"Light at the End (Mott Bank)" mixed media, Bob Matz.

The digital dimensions of an art gallery obviously work, but virtual reality can't ever replace the real experience.

"Waves on the Ocean," pyrography, watercolor, Bob Matz.

Codi Ann Miller, Director of Marketing and Communications; David Borlaug, President; and Marci Narum, Vice-President.

Reception for Jessica Wachter's "#nowords" solo exhibit on September 6, 2017.
Credit: Glasser Images.

That's why we keep the lights on 24 hours a day. Everyone dining at Pirogue Grille, The Toasted Frog, India Clay Oven in the evening can walk by, peer into the gallery and come back to visit. It would be great to have three or four other galleries nearby.

Also, from Thanksgiving through Christmas, we rented a store space at the Kirkwood Mall in Bismarck. Art is available to buy, and there are three demonstrating artists: Linda Donlin, Nicole Gagner and Katrina Case.

EVERYWHERE

Dakota Digital Review: Does The Capital Gallery have a website?

Borlaug: Yes, we are online at thecapitalgallery.com. Portfolios of the artists who have exhibited here can be viewed on the website. Typically, an artist's portfolio is uploaded soon after the opening reception and then is updated regularly to show the works that are still available for sale.

Dakota Digital Review: Do you sell much art through the website?

Borlaug: We don't offer direct online sales. People can see the artist's work on the website and then pick up the phone, email or text to purchase a piece. Two years ago, I got a phone call at 11:15 at night when I was lying in bed. It was a North Dakota farmer who had just come in from the field. He wanted to buy a Walter Piehl painting after hearing that we had some works available. He asked if I had access to the online portfolio via my cell phone. I said I did and was able to send him images. He chose the one titled "Ragtime Redux: Sweetheart of the Rodeo." He completed the transaction right then, even though he had never seen the painting in person. But he had seen other works by Piehl in the gallery and wanted to snatch one before someone else did.

Dakota Digital Review: Do you use social media?

Borlaug: Yes, we are quite active on Facebook, and we've sold more art through our page than our website. Recently, someone visited our Facebook page and saw a bison painting, titled "Where the Grass Whispers," by Kaye Burian. The client called and needed to see it in person first. I've sold many paintings sitting at the bar at Pirogue Grille and getting a call or text and sending people images. About half of sales originate with a client visiting our website or Facebook page. Then the buyer usually visits the gallery to see the piece in person.

The digital dimensions of an art gallery obviously work, but virtual reality can't ever replace the real experience.

I think we've found a good use for digital in the gallery with plans to install a monitor to show all the art in storage. That way people can access our inventory, and then we can show pieces of interest.

THE OTHER EVERYWHERE

Dakota Digital Review: How has the COVID-19 pandemic affected the gallery?

Borlaug: We were closed for several months in the spring, which halted sales. We survived and now are getting back on track. We scheduled the recent reception for Bob Matz on two evenings, instead of the usual one, to keep the crowd size down and allow for social distancing.

Dakota Digital Review: Have you detected any change with the artists?

Borlaug: Yes, I've noticed an increase in intensity in their work during the pandemic, although they don't explicitly reference it. Ironically, isolation has forced them to do what they always wanted to do—that is, stay in their studios and focus on their art. So, there is already an outpouring of art like we never saw coming. I don't think it will necessarily be dark. You will see despair, but also exuberance and all the other human elements.

Dakota Digital Review: Any artist in particular?

Borlaug: Walter Piehl for one. He's been painting for 50 years and taught at Minot State University for more than four decades. Now he's retired and having the time of his life thanks to The Capital Gallery. We've sold 50 pieces of his art over the last four years, making him our top selling artist and the most successful artist in the state. A customer came into the gallery last month and bought three Walter Piehls for more than $20,000. (Since this interview, the customer returned to buy a fourth work). We sold two of Bob Matz's paintings today. Next time Bob walks in, he'll see two new red dots on the pieces on the wall. The ultimate affirmation is the sale, and it invigorates the artist.

Now Walter is living in isolation, because of COVID-19, and doing nothing but working on his art. He had started a new series about barrel racing. Most of his paintings are parts of series involving the rodeo. His father was a rodeo producer, and Walter competed in rodeo and worked on the side as a rodeo announcer for 30 years.

Walter works in his studio much like artists centuries ago. Yet because of digitization, he can archive his work and send images and communicate by text. Technology tempers seclusion and helps make it more productive. ◙

"Barrel Racer II: Cowgirl Suite," an acrylic on canvas painting that is included in the current exhibition, "Into the West," at The Capital Gallery. For more information about Walter Piehl and The Capital Gallery go to www.thecapitalgallery.com.

CLOSER TO THE ROBO-RUBICON

Robots, Autonomy and the Future (or Maybe Not) of You

MAJ. GEN. (RET.) ROBERT H. LATIFF, PHD
& PATRICK J. MCCLOSKEY

Seven years ago, Maj. Gen. Robert Latiff and I wrote an opinion article for the Wall Street Journal, titled "With Drone Warfare, America Approaches the Robo-Rubicon." The Week, which reviews newspaper and magazine stories in the U.K. and U.S., highlighted the article in its "Best Columns-US" section. "If you think drone warfare has created some tricky moral dilemmas, said [Latiff and McCloskey]," The Week began its précis, "just wait until we start sending robotic soldiers into battle."

"Crossing the Rubicon," of course, refers to Julius Caesar's irrevocable decision that led to the dissolution of the Roman Republic, a limited democracy, and ushered in the Roman Empire, which would be run by one or more dictators (aka, emperors). On January 10, 49 BC, General Caesar led a legion of soldiers across the Rubicon River, breaking Roman law and making civil war inevitable. The expression has survived as an idiom for passing the point of no return.

Our contention in the article was that full lethal autonomy—that is, empowering robotic weapons systems with the decision to kill humans on the battlefield—crosses a critical moral Rubicon. If machines are given the legal power to make kill decisions, then it inescapably follows that humanity has been fundamentally devalued. Machines can be programmed to follow rules, but they are not persons capable of moral decisions. Surely taking human life is the most profound moral act, which, if relegated to robots, becomes trivial, along with all other moral questions.

Not only does this change the nature of war, but human nature and democracy are put at risk. This is not merely a theoretical issue but a fast-approaching reality in military deployment.

TOM SWIFT and His Giant Robot

By VICTOR APPLETON II

Drones are unmanned aerial vehicles that—along with unmanned ground, underwater and eventually space vehicles—are crude predecessors of emerging robotic armies. In the coming decades, far more technologically sophisticated robots will be integrated into American fighting forces. As well, because of budget cuts, increasing personnel costs, high-tech advances, and international competition for air and technological superiority, the military is already pushing toward deploying large numbers of advanced robotic weapons systems.

There are obvious benefits, such as greatly increased battle reach and efficiency, and most importantly the elimination of most risk to our human soldiers.

Unmanned weapons systems are already becoming increasingly autonomous. For example, the Navy's X-47B, a prototype drone stealth strike fighter, can now navigate highly difficult aircraft-carrier takeoffs and landings. At the same time, technology continues to push the kill decision further from human agency. Drones are operated by soldiers thousands of miles away. And any such system can be programmed to fire "based solely on its own sensors," as stated in a 2011 U.K. defense report. In fact, the U.S. military has been developing lethally autonomous drones, as the Washington Post reported in 2011.

Lethal autonomy hasn't happened—yet. The kill decision is still subject to many layers of officer command, and the U.S. military maintains that "appropriate levels of human judgment" will remain in place. However, although there has not been a change in official policy, it is fast becoming a fantasy to maintain that humans can make a meaningful contribution to kill decisions in the deployment of drones (or other automated weapons systems) and in robot-human teams.

Throughout our military engagements in Kosovo, Iraq and Afghanistan, the U.S. enjoyed complete air superiority. This enabled complex oversight of drone attacks in which there was the luxury of sufficient time for layers of legal and military authority to confer before the decision to fire on a target was made. This would not exist in possible military engagements with Russia, China or even Iran. The choice would be lethally autonomous drones or human pilots—and significant casualties.
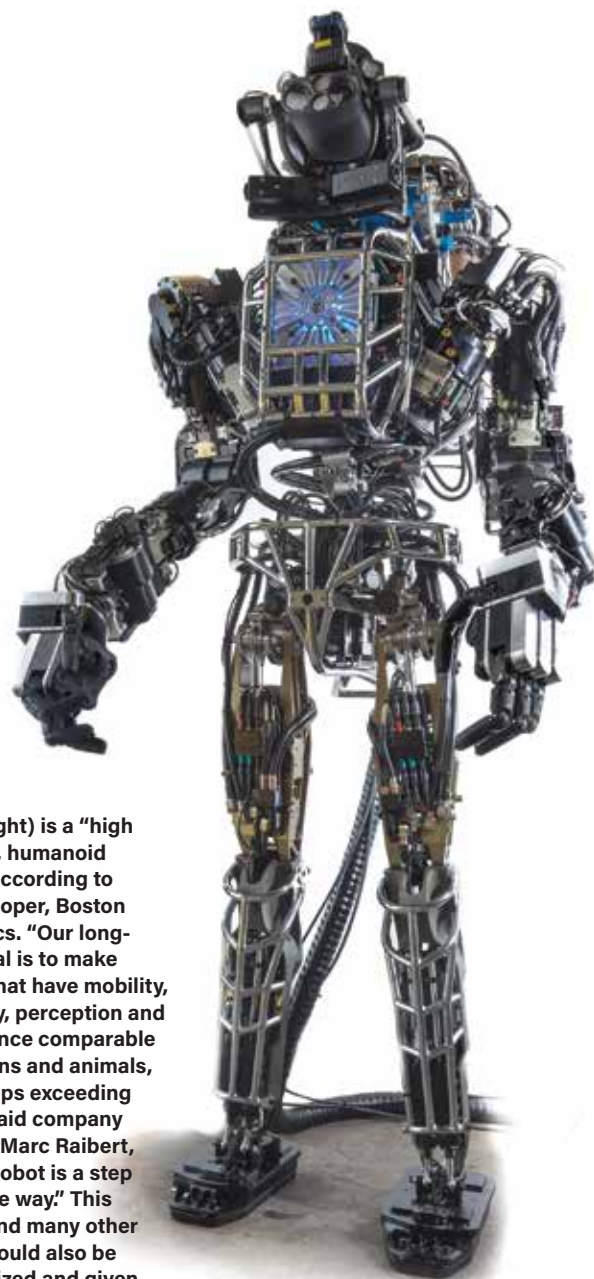
Atlas (right) is a "high mobility, humanoid robot," according to its developer, Boston Dynamics. "Our long-term goal is to make robots that have mobility, dexterity, perception and intelligence comparable to humans and animals, or perhaps exceeding them," said company founder Marc Raibert, "[T]his robot is a step along the way." This robot (and many other types) could also be weaponized and given lethal autonomy.

Aside from pilot risk, consider the cost differential. Each new F-35 Joint Strike Fighter jet will cost about $100 million and an additional $6 million per year to train an Air Force pilot. In contrast, each hunter-killer drone (MQ-9 Reaper) costs about $14 million.

Military verbiage has shifted from humans remaining "in the loop" regarding kill decisions, to "on the loop." Soon technology will push soldiers "out of the loop," since the human mind cannot function fast enough to process the data that computers digest instantaneously. Future warfare won't be restricted to single drones but masses of robotic weapons systems communicating at the speed of light.

Recently, the Defense Advanced Research Projects Agency (DARPA), which funds U.S. military research, began exploring how to design an aircraft carrier in the sky, from which waves of fighter drones would be deployed. These drone swarms will be networked and communicate with each other instantaneously. How will human operators coordinate kill decisions for several, if not dozens, of drones simultaneously?

Third Offset Strategy

U.S. defense secretary Ashton Carter terms the Pentagon's new approach to deterrence as the "third offset strategy." The first offset in the post-WWII era, which asserted American technological superiority, was the huge investment in nuclear weapons in the 1950s to counter Soviet conventional forces.

Twenty years later, after the Russians caught up in the nuke race, the U.S. reestablished dominance via stealth bombers, GPS, precision-guided missiles and other innovations. Now that the Russians and Chinese have developed sophisticated missiles and air defense systems, the U.S. is seeking advantage through robotic weapons systems and autonomous support systems, such as drone tankers for mid-air refueling.

What's remarkable is how publicly the defense department is talking about robotic autonomy, including human-robot teams and human-machine enhancements, such as exoskeletons and sensors embedded in human warfighters to gather and relay battlefield information. Easily accessible online are the "The Unmanned Systems Integrated Roadmap FY2011-2036" and "USAF Unmanned Aircraft Systems Flight Plan 2009-2047," which articulate the integration of unmanned systems in every aspect of the U.S. military's future. Given the pace at which AI is developing, this integration will accelerate.

How then are fewer soldiers supposed to maintain human veto power over faster and massively greater numbers of robotic weapons on land, underwater and in the skies?

As we wrote, "When robots rule warfare, utterly without empathy or compassion, humans retain less intrinsic worth than a toaster—which at least can be used for spare parts." The rejoinder is that robots would do better than humans on the battlefield.

For example, Ronald Arkin, PhD, the director of the Georgia Institute of Technology's mobile robot lab, is programing robots to comply with international humanitarian law. Perhaps someday, as a result, an autonomous weapon might be able to distinguish between a small combatant and a child, resolving one crucial challenge. Let's hope the enemy doesn't wear masks—or put them on children—to confuse the robot's facial recognition software.

Other computer scientists are focusing on machine learning as the route to making robots, in their view, better ethical decision-makers than humans. At one lab, researchers read bedtime stories to robots to teach them right from wrong. Apparently Dr. Seuss was R2-D2's favorite author.

These endeavors, however, are beside the point since a robot's actions are not moral, even if it passes the Turing test and behaves so intelligently it seems indistinguishable (except for appearance, for now) from humans. Robotic actions are a matter of programming, not moral agency. They will hunt solely by sensor and software calculation.

In the end, "death by algorithm is the ultimate indignity."

National Discussion & DARPA

Over 35 years ago, a scholar noted the basic problem regarding new technologies in the Columbia Science and Technology Law Review. Before development, not enough is known about risk factors to regulate the technology sensibly. Yet after deployment, it's too late since the market penetration is too great to reverse usage.

In this case, however, there is enough legitimate concern about lethally autonomous weapons systems to warrant serious consideration, and deployment has not yet occurred. A significant step towards consideration was taken in 2014 with the publication of a report by the National Research Council and National Academy of Engineering, at the request of DARPA, "Emerging and Readily Available Technologies and National Security." The report studied the ethical, legal and societal issues relating to the research, development and use of technologies with potential military applications. Maj. Gen. Latiff

served on the committee that focused on militarily significant technologies, including robotics and autonomous systems.

The report cited fully autonomous weapons systems that have already been deployed without controversy. Israel's Iron Dome antimissile system automatically shoots down barrages of rockets fired by Hamas, a Palestinian terrorist organization. The Phalanx Close-In Weapons System protects U.S. ships and land bases by automatically downing incoming rockets and mortars. These weapons would respond autonomously to inbound manned fighter jets and make the kill decision without human intervention. However, these systems are defensive and must be autonomous since humans can't react fast enough. Such weapons don't pose the same moral dilemma as offensive weapons since we have a fundamental right to self-defense.

Also mentioned were offensive weapons that could easily operate with complete lethal autonomy, such as the Mark 48 torpedo and iRobot, which is equipped with a grenade launcher. The report sets out the framework for initiating a national discussion, such as whether such autonomous systems could comply with international law.

However, if machines are deployed to seek out and kill people, there is no basis for humanitarian law in the first place. Every individual's intrinsic worth, which constitutes the basis of Western civilization, drowns in the Robo-Rubicon.

How much intrinsic worth does a machine have? None. Its value is entirely instrumental. We don't hold memorial services for the broken lawnmower. At best we recycle. There is no Geneva Convention for the proper treatment of can openers or even iPhones. Once lethal autonomy is deployed, then people can have no more than instrumental value, which means that democracy and human rights are mere tools to be used or discarded as the ruling classes see fit.

The answer to the dilemma lethal autonomy poses, to be clear, does not involve a retreat from technology but the securing of sufficient advantage that the U.S. can leverage international conventions on the military uses and proliferation of lethal autonomy and other worrisome emerging technologies.

The wider importance of lethal autonomy becomes clear in considering the enormous social threat that automation poses. On the horizon is massive job displacement via automated taxis, trucks and increasingly sophisticated task automation affecting most employment arenas. Already in Japan there is a fully autonomous hotel without a single human worker. In many states, truck driver is the most common job. What will hundreds of thousands of ex-drivers, averaging over 50 years of age, do once autonomous transportation corridors are created? True, there's a shortage of neurosurgeons—at least for now.

IBM Watson, the artificial intelligence (AI) system that famously beat the world's top Go master last March, then released a financial robo-adviser for institutional clients. Not only are human financial advisers getting nervous, so are professionals throughout finance due to the proliferation of robo-advice. And the scenario is similar to lethal autonomy in that these tools are marketed as assistive—i.e., with human professionals in the loop gaining productivity. But how long will that last as AI evolves and faster computer chips are developed? IBM now offers free access to anyone to a Cloud version of quantum computing for open-source experimentation.

As AI becomes increasingly advanced, more functions will be done better, faster and cheaper by machines. Already, autonomous robots are performing surgery on pigs. Researchers claim that robots would outperform human surgeons on human patients, reducing errors and increasing efficiency.

Some experts argue that the "jobless future" is a myth, that "when machines replace one kind of human capability, as they did in the transitions from … freehold farmer, from factory worker, from clerical worker, from knowledge worker," wrote Steve Denning in his column at Forbes.com, "new human experiences and capabilities emerged."

No doubt this will be true to some extent as technology facilitates fascinatingly interesting and valuable new occupations, heretofore unimaginable. But the problem isn't that machines are replacing "one kind of human capability," but that robots threaten to replace almost all of them within a short period of time.

Watson is a question-answering computer system that responds to queries posed in natural language. Watson was named after IBM's founder and first CEO, industrialist Thomas J. Watson.

There are two questions: What will happen to our humanity in big automation's tsunami, and who (or what) does this technology serve?

Regarding our humanity, recent trends are disturbing. In medicine, not only are jobs at risk in the long run, but robots will increasingly make ethical and medical decisions. Consider the APACHE medical system, which helps determine the best treatment in ICU units. What happens when the doctor, who is supposed to be in charge, decides to veto the roboadvice? If the patient dies, will there not be multi-million dollar lawsuits—and within seconds once the law profession is roboticized (thereby replacing rule of law with regulation by algorithm)? In short, in this arena and elsewhere, are we outsourcing our moral and decision-making capacity?

"No one can serve two masters," said Jesus in an era when children were educated at home, learning carpentry (to choose a trade at random) from their father. Today, increasing numbers of children—now a third, according to a survey in the U.K.—start school without basic social skills, such as the ability to converse, because they suffer from a severe lack of attention and interaction with parents who are possessed by smartphones. Technology has become the god of worship, and kids are learning they are far less important than digital devices. How much will this generation value—or even know—their humanity and that of others? Is it not "natural" in this inverted world to completely cede character and choice to the Matrix?

"Humans are amphibians—half spirit and half animal," wrote C.S. Lewis. "As spirits they belong to the eternal world, but as animals they inhabit time." Machines can support both spheres—if intelligently designed according to just principles with people maintaining control. This would seem common sense, but that is becoming the rarest element on the periodic table.

Tally-Ho & Tally Sticks

Millennials and succeeding generations will remake the world via digital technology. Big data and big automation might cure cancer, reverse aging, increase human intelligence and solve environmental issues.

Tally sticks were used from prehistoric times into the 19th century as a memory aid device to record financial and legal transactions, and even schedules and messages.

Imagine a war where few die or lose limbs. These wonders and more seem more than plausible in what many see as a dawning utopia. And it's not likely to be an "either/or." A kidnapped child will be located in minutes and the same surveillance tools might greatly restrict personal freedoms.

Certainly there will be huge economic and creative opportunities—for some. Experts predict that robot applications will render trillions of dollars in labor-saving productivity gains by 2025. Meanwhile, an Oxford University study in 2013 predicted that about half of jobs in the U.S. are vulnerable to being automated in the near future. If, as seems likely, jobs destroyed greatly outnumber jobs created, what does society do with the replaced?

Some can retrain or transfer skills, but most might become permanently jobless. It's unlikely that many former taxicab drivers or even surplus middle-aged lawyers, as examples, could be re-purposed for most digital-based jobs—as those positions decline in number, too.

Consider the fate of tally sticks, which are notched pieces of wood used from prehistoric times to keep accounts (ergo, "tallies"). In 1826, England's Court of Exchequer began transferring records from these sticks to ink and paper. By 1834, there were tens of thousands of unused tally sticks, which were

disposed of in a stove in the House of Lords. There were so many of these suddenly useless carbon-based units that the fire spread to the wood paneling and ultimately burned down both the House of Lords and the House of Commons.

If the 2020 presidential election cycle has shown anything, it's that there is already growing dissatisfaction among the majority of Americans, which could spark a social conflagration.

Nonsense, some might argue, Americans take care of their own. Perhaps, but our fundamental commitment to the common good might disintegrate.

The United States Constitution was founded on the Judeo-Christian belief in the intrinsic worth of every individual, as articulated eloquently in the Declaration of Independence: "We hold these truths to be self-evident, that all men are created equal, that they are endowed by their Creator with certain unalienable Rights, that among these are Life, Liberty and the pursuit of Happiness." True, it took a century to outlaw slavery and another hundred years to eliminate the legal barriers to racial equality. But justice prevailed precisely because injustice contradicts the nation's founding principles.

There was an inevitable logic to the civil rights movement.

The question now is whether full lethal autonomy destroys that foundation. If technology matters more than people, then rights are completely "alienable." If software renders human life expendable, then it is a much smaller moral leap to indifference towards those replaced by automation. Without a career and the ability to earn a living and accumulate enough resources to start a business, there is neither liberty nor any pursuit of happiness. Ironically, a proposal that is gaining support in Silicon Valley—where automation is being spearheaded—is a basic guaranteed income. This might relieve some guilt, but it is neither affordable nor desirable. To work is essential to developing human potential. In fact, 78 percent of Swiss voters rejected a guaranteed-income proposal on a national referendum on June 5.

We wrote the original article in The Wall Street Journal with urgency to provoke discussion of lethal autonomy (tally-ho! for robots) as a moral pitfall and gateway, otherwise it will soon become a *fait accompli.*

The evening after crossing the Rubicon, Caesar dined with his officers and uttered the famous phrase, "The die is cast." Ominous words for our future—if we fail to assert our humanity. ▣

Every individual's intrinsic worth drowns in the Robo-Rubicon.

Alicia Vikander plays Ava, a humanoid robot with heightened artificial intelligence in the British sci-fi film "Ex Machina," released in 2015. The film hinges on Ava's ability to pass a sophisticated version of the Turing test by convincing Caleb (left), a computer programmer, that he can relate to her as if "she" is human. As Ava's creator, Nathan (right), hopes, "she" demonstrates true intelligence. But as Nathan warns Caleb, Ava's feelings and seductive qualities are manipulations. Ava is a machine, no matter how ingenious, that precipitates a calculatingly cold outcome.

NEWS DESERT

Losing Our Local Newspapers in the Digital Age

SAMUEL G. FREEDMAN

A newsboy sells copies of the Bismarck Tribune on Main Street. Photograph by John Vachon for the Office of War Information, 1942.

One day last year, my sister approached me to ask a journalistic favor. Carol owns a chocolate shop in Somerville, New Jersey, a county seat about 40 miles west of New York City, and the place where I began my reporting career in 1975. The borough's government, Carol told me, was going to quadruple the charge for on-street parking from 25 cents to one dollar an hour and cut back on the free evenings and holidays. Worse yet, the price hike was supposed to take effect at the start of the Christmas shopping season. Along with a group of other downtown merchants, Carol was furious, because their big competitors in a mall several miles away had acres of free parking to entice customers. So the local shopkeepers were hoping to take their complaints public, partly by getting it into the newspaper. My sister wanted to know if I had any advice.

That simple question set off a disturbing realization for me, as a journalist, an educator and a citizen. Decades ago, when I was a summer intern and then a full-time reporter on the local paper, the Courier-

News, a mainstay of our mission was to cover precisely the sort of parochial controversy my sister described. We had a staff of about 60 reporters, editors and photographers based in a handsome and highly visible building just outside Somerville, and the baseline of all our coverage was sending staff members to attend the myriad meetings of local government.

I can't say that such duty was scintillating—few things can be soul-deadening as sitting in on a four-hour-long meeting of the town council or the board of education—but most of us on the Courier-News recognized the importance of holding the public sector accountable in our humble, even humdrum way. The process ran in the reverse, too. We journalists were not some distant, superior caste to the people we covered. We lived and worked and ate and drank among them. Our salaries put us in the low end of the middle class.

While many of my peers on the younger side of the newsroom had attended college and become imbued with the idea that journalism was both a profession and an academic discipline, the older generation was especially rooted to the communities around us, where they had resided for decades. There was the wife of a longtime police officer, a veteran of World War II bombing missions, a refugee from the Hungarian revolution whose American life had started at a displaced-persons camp in Central New Jersey. At the next newspaper where I worked, in the suburbs of Chicago, a number of our reporters were working

> **If a nation expects to be ignorant and free, in a state of civilization, it expects what never was and never will be.**
>
> — *Thomas Jefferson*

mothers in their 30s or 40s who had mortgages to pay and kids to help with homework.

By the time my sister came to me with her request, the Courier-News was a shell of its former self. The building had been sold and razed. The staff had been cut by something like two-thirds. Instead of vigorously competing against the daily papers in nearby suburbs like New Brunswick and Woodbridge,

the Courier-News had been put under joint ownership with them, sharing a common web portal.

I found myself telling Carol, "I don't know who can hear you."

I made that depressing and impromptu admission just a few weeks before Donald Trump was elected president, in part thanks to his attacks on the news media. And over time, I have come to believe the admission and the election have more than a coincidental relationship. The ability of this president to brand critical, accurate reporting as "fake news" and to campaign against journalists, sometimes inciting his rallies against specific ones like Katy Tur of MSNBC, derives from more than class resentments. Those resentments thrive when people in large sections of the country have less and less of the chance to know a working journalist as a neighbor, a fellow churchgoer, a companion in the PTA.

Admittedly, journalists have sometimes given fodder to the Trumpian attacks. CNN, for example, erroneously reported that Anthony Scaramucci, briefly a White House aide, had been in stealthy contact with Russian operatives. While on the staff at Politico, Julia Ioffe tweeted out an offensive insinuation of incest between the president and his daughter Ivanka. But the news organizations did punish Ioffe and the CNN correspondents, costing the latter their jobs. The extravagant calumnies that Trump lobs against even responsible journalism go uncorrected in his part of the political world.
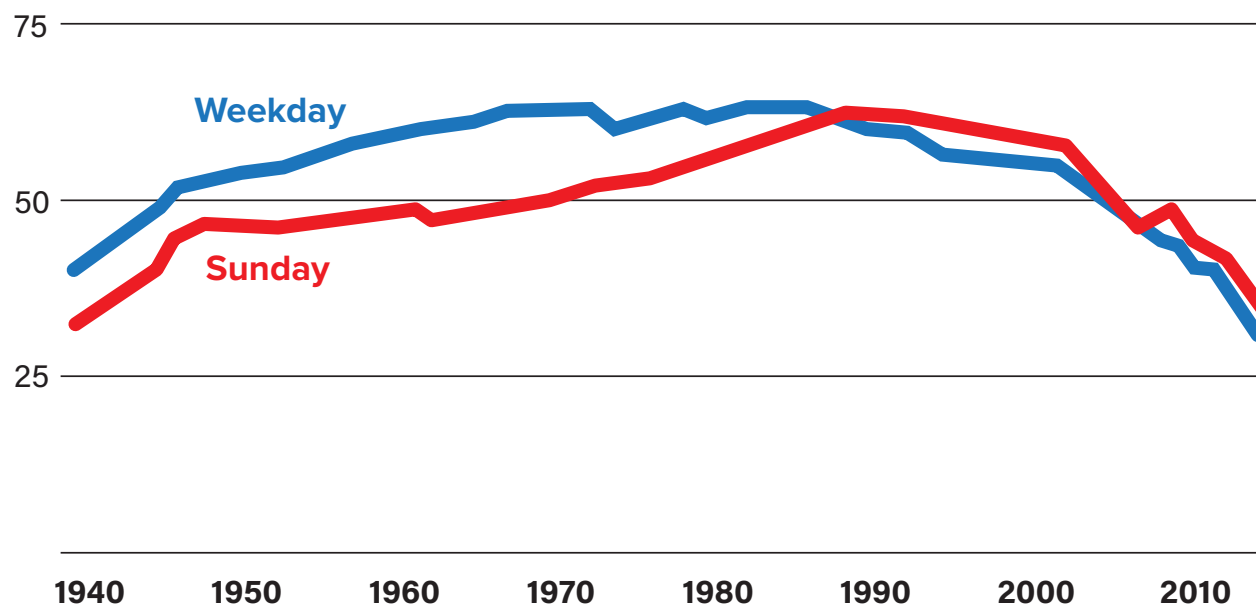
What I have seen in suburban New Jersey is even more extreme the deeper inland you get from the coasts. The common narrative of the news industry being in financial trouble and shedding jobs is only partially true. As a study by the website Politico showed, jobs in newspapers indeed fell by more than half from 365,000 in 2006 to 174,000 in 2017. Yet during the same period, jobs in online publishing and broadcasting soared from 69,000 to 207,000.

So the overall drop in journalism jobs was not nearly as catastrophic as it first appears. The problem, though, is that the job picture is wildly asymmetrical. Those jobs in online journalism arose overwhelmingly in Los Angeles, San Francisco, Seattle, Chicago and the Washington-to-Boston corridor. Put another way,

Circulation of U.S. Daily Newspapers

Millions of copies per day

Source: Editor and Publisher

[Chart showing circulation of U.S. Daily Newspapers from 1940 to 2010s, with y-axis from 25 to 75 and x-axis by decade. Two lines: "Weekday" (blue) and "Sunday" (red).]

the share of reporting jobs based in just three major cities—Los Angeles, New York and Washington—went from 1 in 12 in 2004 to 1 in 5 in 2014, according to data from the federal Bureau of Labor Statistics.

One result of this hollowing-out process is the concept of "news deserts," meaning places that have few or no local newspapers. A study of the phenomenon by the University of North Carolina has kept a running tab of newspapers that have been shut down or merged since 2004—a total of 56 thus far, in heartland places like Slidell, Louisiana, Derby, Kansas, and Tarboro, North Carolina. More importantly, the study contends that even where newspapers still operate in small and mid-sized markets, the changing nature of ownership had led to a decrease in the kind of corporate citizenship that felt it important to keep such papers thoroughly staffed and realistically budgeted as a public service. The new wave of newspaper owners are hedge funds, pension funds and similarly passive investors, rather than the families (Sulzberger, Chandler, Bingham) or corporations (Knight-Ridder, Gannett, Scripps-Howard) that dominated in the past. The new "media barons," as the report dubs them, are demanding profit margins that can only be sustained by rounds of budget cuts,

mostly meaning layoffs of staff and reductions in coverage.

In human terms, the combination of shutdowns, mergers and staff cuts, many of them ordered by geographically distant owners, means that the reporter, editor, photographer or layout designer isn't a fixture of community life any more outside the coastal boom cities of online journalism. The aspiring young journalists in a Nebraska or an Arkansas, or for that matter a Central New Jersey, have far less likelihood than I did of being able to make a career in their own regions. Economic gravity now will move them toward the Atlantic and Pacific, or lure them out of journalism entirely into the fastgrowing, betterpaying field of public relations.

Stereotypes, as we know, flourish when there is not much human evidence to contradict the caricature. If you don't live around journalists, if you don't bump into them at the hardware store or the diner or the Little League game, then you're so much more susceptible to buying into the cartoon image of a haughty, superior, obsequious, condescending city slicker. If you've never seen how the reporter on the local paper decently covered your town's government,

President Theodore Roosevelt with reporters at his home, Sagamore Hill, Cove Neck, Long Island, New York.

if you've never been responsibly interviewed by such a reporter about your art exhibit or prize livestock or drum-and-bugle corps, then you're so much more susceptible to the corrosive idea that critical news, especially of the investigative variety, must be fake news.

When I ran my thesis by an acquaintance who edits a newspaper in southern Ohio that endorsed Donald Trump for president, he pushed back slightly. He told me that his readers still appreciate the local reporters and editors and save their venom for the big-city, coastal, "elite" media. I was not entirely persuaded. Rather, I was reminded of polling that shows that even people who despise Congress as an institution give decent marks to their own representatives there.

The exception becomes just one more way of proving the rule.

As for my sister and her chocolate store, the Somerville merchants were able to raise enough of a clamor on their own that the borough rolled back dollar-an-hour parking to 50 cents. The only problem, Carol tells me, is that hardly any customers know, because the compromise was never reported in the local paper.

Postscript: *Several months after I wrote this essay, the Courier-News happened to write a feature story about my sister's shop. I was delighted for her to get the publicity. But nothing in this serendipitous event has changed my overall sense of the perilous state of my former newspaper and so many others like it.* ▣

Free speech, exercised both individually and through a free press, is a necessity in any country where the people are themselves free.

— Theodore Roosevelt

Here are the newsroom layoffs, furloughs and closures caused by the coronavirus

The Poynter Institute, December 8, 2020.

■ Lee Enterprises had furloughs and cost-cutting measures, including a 20% pay cut for executives.

■ The Capital Times in Madison, WI, announced furloughs and pay cuts.

■ Forum News Service reported layoffs and the end of Monday and Friday print in its "more than two-dozen newspapers in Minnesota, North Dakota, South Dakota and Wisconsin."

■ The Forum (Fargo, North Dakota and Moorehead, Minnesota) will cut to two print days a week and use the mail to deliver the newspaper, eliminating carrier jobs and most circulation. It is owned by Forum Communications.

■ McClatchy furloughed 4.4% of staff at its 30 papers around the country.

■ Tribune Publishing announced permanent pay cuts of between 2% and 10% and executives will take pay cuts. Tribune newsrooms include the Chicago Tribune, New York Daily News, The Baltimore Sun and The Virginian-Pilot. It also had furloughs.

■ The Los Angeles Times had furloughs and pay cuts. The LA Times parent company California Times closed three community newspapers and laid off 14 staff members.

■ ESPN is laying off 300 people and leaving 200 positions unfilled.

■ Sound Publishing in Washington state laid off 70 people in its Washington and Alaska newsrooms. Sound Publishing owns 49 newsrooms, and the layoffs make up 20% of its workforce. Sound also suspended four print publications in Kitsap County and reduced staff.

■ The Salt Lake Tribune and Deseret News will both switch from seven days of print to one. The two Utah papers end their joint operating agreement, resulting in the closure of the print facility that serves both and the end of 161 jobs and another 18 layoffs, including six journalists, from the Deseret News.

■ The Kansas City Star is leaving its downtown offices and printing plant, resulting in 124 job cuts.

■ Fox News will lay off 3% of staff. Employees in hair and makeup were the most impacted.

■ NBCUniversal is cutting executive pay by 20%.

■ CBS announced several rounds of layoffs – first 50 from CBS News, then an additional 400 at ViacomCBS.

■ KFGO in Fargo, ND, has cut two positions. It is owned by Midwest Communications, Inc.

■ The Great Falls Tribune in Montana shut down its printing press, ending 21 jobs. It will print in Helena.

■ The Minneapolis Star Tribune has had four days of furloughs in both quarter two and quarter three for newsroom and non-newsroom employees, excluding production plant employees and fleet drivers.

This list grows every day.

Artificial Intelligence, Cyberattacks & the Next Cold War

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I t's easy to confuse the current geopolitical situation with the 1980s at the end of the Cold War, when tensions between the Soviet Union and the United States were highest. The Cold War began after World War II and ended with the dissolution of the Soviet Union in the early 1990s.[i] During this period, the Soviets and her allies and the U.S. and our allies built advanced weaponry in anticipation of military conflict and even World War III.[ii] The weapon of choice then was nuclear missiles, while today it's software, whether it's used for attacking computer systems or targets in the real world.[ii]

Russian rhetoric about the importance of artificial intelligence (AI) is picking up—and with good reason. As AI software develops, it will be able to make decisions based on more data, more quickly than humans.

The next major cyberattack could involve AI systems. At a 2017 cybersecurity conference, 62 industry professionals (out of 100 questioned) predicted that the first AI-enhanced cyberattack could come in 2018.[iii] The recent Solar Winds attack demonstrated the use of a commandeered automated delivery system, effectively attacking organizations' systems from behind their defensive perimeter.

This doesn't mean robots will be marching down Main Street. Rather, AI will make existing cyberattack

efforts—such as identity theft, denial-of-service and password cracking—more powerful and efficient. Larger attacks could turn off power, shut down hospitals and disable weapons systems.[iv]

Interpreting human actions is still difficult for AIs, and humans don't trust AI systems[iv] to make major decisions. Unlike movie portrayals, AI offensive and defensive capabilities won't soon enable computers to choose and attack targets on their own. People must still create AI systems and launch them at particular targets. Nevertheless, adding AI to today's cybercrime and cybersecurity world will escalate what is already a rapidly changing arms race between attackers and defenders.[iv]

Modern Cold War

As in the Cold War, each side fears its opponent gaining a technological advantage. In a recent meeting at the Strategic Missile Academy near Moscow, Russian President Vladmir Putin suggested that AI may enable Russia to rebalance the power shift[v] created by the U.S. outspending Russia nearly 10-to-1 yearly on defense. Russia's state-sponsored RT media reported[v] AI is "key to Russia beating [the] U.S. in defense."

Putin has said AI is "the future, not only for Russia, but for all humankind."[vi] In September 2017, he told students that the nation that "becomes the leader in this sphere will become the ruler of the world."[vii] Putin isn't saying he'll hand over the nuclear launch codes to a computer; he's talking about many other uses for AI.

This sounds remarkably like Cold War rhetoric, when Americans and the Soviets built up enough nuclear weapons to kill everyone on Earth many times over.[ii] This arms race led to the concept of mutual assured destruction (MAD). Instead of attacking, both sides stockpiled weapons and dueled indirectly via smaller armed conflicts and political disputes.[ii]

Since then, both sides have decommissioned tens of thousands of nuclear weapons.[ii] However, tensions are growing again. Both countries have expelled the other's diplomats on multiple occasions. Russia annexed Crimea in 2014. The Turkey-Syria border war has been called a "proxy war" between the U.S. and Russia.[ii]

Hopefully, MAD will continue to prevent nuclear war. However, conflicts enhanced by AI are likely to begin.

A World of Cyberconflict

Cyberweapons, including those powered by AI, are considered fair game by both sides.[ii]

Russia and Russian-supporting hackers have spied electronically, launched cyberattacks against power plants, banks, hospitals and transportation systems in the U.S., Ukraine and elsewhere—and even against American elections.[ii] Russian cyberattackers have also targeted U.S. allies such as Britain and Germany.[ii]

The U.S. is certainly capable of responding and might have already done so.[ii]

Use of AI for Weapons Control

Threats posed by surprise attacks from ship- and submarine-based nuclear weapons and conventional weapons placed near national borders might lead some countries to entrust self-defense tactics—including launching counterattacks—to the rapid decision-making capabilities of an AI system.[ii]

In case of an attack, AI can act and react more quickly and without the potential hesitation or dissent of a human operator.[ii] There is also an inherent economic aspect to AI operations: Once AIs are developed, they can be used over and over, replacing the need for numerous human hackers while delivering the same or superior effect. AI attackers can even reside on compromised systems, thus attacking from behind enemy lines.

A fast, automated response capability could alert potential adversaries that a nation is ready and willing to launch, which is key to MAD's deterrent effectiveness.

AI can also be used to control non-nuclear weapons, including unmanned vehicles such as drones and cyberweapons. Unmanned vehicles must be able to operate while their communications are jammed, otherwise impaired or out of range. This requires onboard AI control, which also thwarts a targeted group from preventing or stopping a drone attack by destroying its control facility, because control is distributed, both physically and electronically.[ii] As well, reacting to cyberweapons might require such rapid responses that they would be best launched and controlled by AI systems.[ii]

AI-coordinated attacks can launch cyber or real-world weapons almost instantly, making the decision to defend or counterattack necessary before a human operator would even be able to notice the incursion. AI systems can change targets and techniques faster than humans can comprehend, much less analyze. For instance, an AI system might launch a drone to attack a factory, observe drones responding to defend and launch a cyberattack on those drones, with no noticeable pause.

The Impact of Cyberattacks

So far, most of the well-known hacking incidents, even those with foreign government backing, have done little more than steal data.[viii] Unfortunately, there are signs that hackers have placed malicious software inside U.S. power and water systems, where it lies in wait, ready to be triggered.[viii] The U.S. military has also reportedly penetrated the computers that control the Russian electrical grid.[viii]

A cyberattack with widespread impact, an intrusion in one area that spreads to others, or a combination of many smaller attacks could cause significant damage, including mass injury and mortality rivaling the death toll of a nuclear weapon.[viii]

Unlike a nuclear weapon, which would vaporize people within 100 feet and kill almost everyone within a half-mile,[ix] the death toll from most cyberattacks would be slower. People might die from a lack of food, power or gas for heat, or from car crashes resulting from a corrupted traffic light system.[viii] This could happen over a wide area, resulting in mass injury and even deaths.

This might sound alarmist, but consider what has been happening in recent years in the U.S. and around the world. In early 2016, hackers took control of a U.S. treatment plant for drinking water and changed the chemical mixture used to purify water.[viii] If the changes had not been detected, there might have been poisonings and an unusable water supply.

In 2016 and 2017, hackers shut down major sections of the Ukraine power grid.[viii] The attack was mild, since no equipment was destroyed despite the ability to do so. Ukrainian officials think it was designed

to send a message, possibly from the Russians.[x] In 2018, unknown cybercriminals gained access to the United Kingdom's entire electricity system; in 2019, a similar incursion may have penetrated the U.S. grid.[viii]

In August 2017, a Saudi Arabian petrochemical plant was hit by hackers who tried to blow up equipment by taking control of the same types of electronics used in industrial facilities of all kinds throughout the world.[viii] Just a few months later, hackers shut down monitoring systems for oil and gas pipelines across the U.S.[viii] This only caused logistical problems, but it showed how an insecure contractor's systems could potentially cause problems for primary systems.

The FBI has even warned that hackers are targeting nuclear power facilities.[xi] A compromised nuclear facility could result in the discharge of radioactive material, chemicals or even possibly a reactor meltdown.[viii] A cyberattack could cause an event similar to the incident in Chernobyl.[viii] That explosion, caused by human error, resulted in 50 deaths, the evacuation of 120,000 people and elevated birth defects for years afterwards.[xii] Parts of the region will remain uninhabitable for thousands of years.[xii]

Few Deterrents to Cyberattacks

The point here is not to downplay the devastating effects of a nuclear attack, but rather to highlight that the inhibitions against nuclear conflicts aren't as strong for cyberattacks.[xiii] For instance, MAD deters a country from launching nuclear weapons at another nuclear-armed nation. The launch would likely be detected, and the targeted nation would launch its weapons in response. Both nations would be obliterated.

Cyberattackers have far fewer inhibitions. It's much easier to disguise the origin of a digital incursion than conceal the source of a missile launch. Further, cyberwarfare can start small, targeting even a single phone or laptop.[viii] Larger attacks might target businesses, such as banks and hotels, or a government agency.[viii] But those incursions typically wouldn't escalate a conflict to the nuclear level.

Nuclear-Grade Cyberattacks

There are three basic scenarios for how a nuclear-grade cyberattack might develop.[viii] It could start modestly, with one country's intelligence service stealing, deleting or compromising another nation's military data. Successive rounds of retaliation could expand the scope of attacks and the severity of damage to civilian life.

In another situation, a nation or a terrorist organization could unleash a massively destructive cyberattack—targeting several electricity utilities, water treatment facilities or industrial plants or a combination to compound the damage.

Perhaps the most concerning possibility is that this might happen by mistake. On several occasions, human and mechanical errors very nearly destroyed the world[xiv] during the Cold War, as illustrated in the movie "WarGames."[xv] Something analogous could happen in the software and hardware of the digital realm.

The Importance of AI Development

Widespread use of AI-powered cyberattacks[xvi] may still be some time away, but a nation that thinks its adversaries have or will get AI weapons will want to get them too.

Countries might agree to a proposed Digital Geneva Convention to limit AI conflict.[ii] But that won't stop AI attacks by independent nationalist groups, militias, criminal organizations, terrorists and others.[ii] As well, countries can back out of treaties. It's almost certain, therefore, that someone will turn AI into a weapon and then everyone else will do so at least to defend themselves.

Nations that don't embrace AI or restrict its development risk becoming unable to compete, economically or militarily, with countries wielding developed AIs, such as Russia or the U.S.[ii] Advanced AIs create massive advantages for a nation's industrial and business sectors, as well as its military. Perhaps most importantly, the development of sophisticated AIs in multiple countries could provide a deterrent against attacks,[xvii] similar to MAD's success.

Faster Attacks

Beyond computers' lack of need for food and sleep, which limit human hackers even when working in teams, automation can make complex attacks much faster and more effective.

To date, the effects of automation have been limited. Very rudimentary AI-like capabilities have for decades given virus programs the ability to self-replicate, spreading from computer to computer without specific human instructions.[iv] In addition, programmers have used their skills to automate different elements of hacking efforts. Distributed attacks, for example, involve triggering a remote program on several computers or devices to overwhelm servers. The attack that shut down large sections of the internet in October 2016[xviii] used this type of approach. In some cases, attacks are made available as a script that allows an unsophisticated user to choose a target and launch an attack.

AI, however, could help human cybercriminals customize attacks. Spearphishing attacks, for instance, require perpetrators to have personal information about prospective targets, such as where they bank or what medical insurance company they use.[iv] AI systems can help gather, organize and process large databases to connect identifying information, making this type of attack easier and faster to carry out. That reduced workload may drive thieves to launch many smaller attacks that go unnoticed for long periods of time—if detected at all—due to their more limited impact.

AI systems could even be used to pull information together from multiple sources to identify people who would be particularly vulnerable to attack. Someone who is hospitalized or in a nursing home, for example, might not notice money missing from a bank account until long after the cyberthief has gotten away.

Improved Adaptation

AI-enabled attackers will also be much faster to react when they encounter resistance, or when cybersecurity experts fix weaknesses that had previously allowed entry by unauthorized users. AI may be able to exploit another vulnerability or start scanning for

new ways into the system without waiting for human instructions.

This could mean that human defenders find themselves unable to keep up with the speed of incoming attacks. It may result in a programming and technological arms race,[xvii] with defenders developing AI assistants to identify and protect against attacks—and perhaps adopting AI with retaliatory attack capabilities.[xix]

Avoiding the Dangers

Operating autonomously could lead AI systems to attack a system it shouldn't or cause unexpected damage.[iv] For example, software started by an attacker intending only to steal money might decide to target a hospital computer in a way that causes human injury or death. The potential for unmanned aerial vehicles to operate autonomously[xx] has raised similar questions of the need for humans to make the decisions about targets.[xxi]

The consequences and implications are significant, but most people won't notice a big change from a conventional cyberattack when the first AI attack is unleashed. For most of those affected, the outcome will be the same as human-triggered attacks. But as we continue to fill our homes, factories, offices and roads with internet-connected robotic systems, the potential effects of an attack by artificial intelligence only grows. ◙

This article is based on three articles[xxii] that were originally published by The Conversation.

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Left to right, Timothée Chalamet who plays Paul Atreides, and Rebecca Ferguson, who plays Lady Jessica, his mother, in "Dune."

DUNE OR DONE?

COVID's Avoidable Catastrophe

PATRICK J. MCCLOSKEY

Imagine someone growing up in a vast desert. One day, this young man or woman leaves home and eventually comes to a river for the first time. Down this person sits and decides to wait until the river runs by. We can chuckle at the quaint absurdity, but this is exactly what Warner Bros. is asking theatre owners across the country to do.

On December 3, Warner Bros. announced that the entire 2021 movie calendar will stream on HBO Max (which its parent company, AT&T, owns) simultaneously with releases in brick-and-mortar theaters. This calendar includes "The Little Things" starring Denzel Washington, as well as sci-fi blockbusters such as "Dune."

Traditionally, theaters are given about 90 days of exclusive playing rights before movies are available via online streaming platforms. However, Warner Bros. expects that, even with COVID-19 vaccines, moviegoing won't recover until next fall at the earliest.

Meanwhile, AMC Theatres, the largest movie theater owner, has been watching its river of cash flow by. AMC had to shut down more than 1,000 movie theaters nationwide in March, shedding thousands of jobs.[i] The company posted a $2.4 billion loss in 2020's first quarter and warned that its cash flow would run out by the end of the year.[ii]

However, most businesses, especially small ones (including independent theater owners), didn't have a river of cash to sustain them for months of lockdown, full and partial. According to a database run by Harvard and Brown Universities, 44 percent of small businesses nationwide were shuttered as lockdowns took effect in the spring in response to COVID.[iii] A third of small businesses remained closed, including 22 percent in South Dakota and 29.6 percent in North Dakota (partly due to the simultaneous crash in oil and gas prices).

More than 110,000 restaurants and bars—17 percent of the total nationwide—have closed and 37 percent more expect to shut down within six months.[iv] Millions of jobs have been lost, and hardest hit are low-income, immigrant and minority populations.

The small business carnage is actually much worse, since many owners simply walk away without declaring bankruptcy, so their closures aren't tracked.[v] Small businesses account for 44 percent of economic activity and employ half of America's workers.[vi] The small business sector is also the incubator for large businesses and multi-national corporations, which don't spring into existence fully formed.

Add to this ongoing economic disaster, the federal government is adding trillions of dollars to the national debt, which will further burden our children and grandchildren.

China Syndrome

Clearly officials knew little about COVID as it arrived from China. When computer modeling predicted two

million deaths, politicians were justifiable afraid—even though they should have questioned the accuracy. Modeling has often proven wildly inaccurate as polling in the recent election cycle and climate warming predictions have shown.

In response, the World Health Organization (WHO) strongly recommended global adoption of the Chinese model—lockdowns—taking at face value the Chinese claim that lockdowns had proved successful. But the Chinese government's acquaintance with truth is purely accidental. Lockdowns were guaranteed to cause massive damage to the West and further China's political and economic ascendance.

While the first weeks of lockdown were prudent, it became clear that, although highly contagious, the disease isn't very deadly. According to the Center for Disease Control (CDC), the mortality rate by age group is 0.00003 percent (0-19 years), 0.0002 percent (20-49 years), 0.005 percent (50-69 years), and 0.054 percent (70+ years).[vii] Mortality is almost entirely limited to identifiable groups: the elderly and those suffering from comorbid conditions. Of the 332,246 deaths the CDC attributes to COVID (December 29),[viii] more than a third occurred in nursing homes.

With all the data and research tools available via the internet and high-speed computing, it's astounding that a more wholistic approach hasn't been implemented. Surely strategies to protect the elderly and otherwise vulnerable would prove far less costly in monetary and human terms.

Lockdowns are causing enormous social harm, "including plummeting childhood vaccination rates, worse cardiovascular disease outcomes, less cancer screening and deteriorating mental health, to name a few. The social isolation induced by lockdown has led to a sharp rise in opioid and drug-related overdoses … . For children, the cessation of in-person schooling since the spring has led to 'catastrophic' learning losses, with severe projected adverse consequences for affected students' lifespans. According to a CDC estimate, one in four young adults seriously considered suicide this past June."[ix]

Even though children are more likely to die from the annual influenza,[x] schools have been shut, reopened and shut again in many areas. Also, there are mandatory quarantines from 10 to 14 days for any student potentially exposed to COVID. Research shows that transmissions in school are very low (0.22 percent) and more than 25 percent lower than in students' communities.[xi]

Even so, mayors and governors keep returning to partial lockdowns and threaten full ones, as first-time unemployment benefits filings soar.[xii] Large school districts, such as New York and San Francisco, have recently shelved plans to reopen schools.

Emily Oster, an economist at Brown University, organized a team of data scientist to keep track of COVID in schools nationwide. As reported in The Wall Street Journal, she concluded that leaders often overreact when only a handful of cases are reported.[xiii]

Why do political leaders and government agency authorities resort to top-down decisions and management regardless of consequence? Obviously, there are times when top-down decisions work best. On February 2, a complete ban on travel from mainland China took effect, which saved many American lives. At the time, President Donald Trump's opponents criticized the order and then later blamed him for not imposing the ban sooner. This underscores the difficulty in determining when to resort to top-down mandates, which by their nature are draconian. But as the epidemic spread here, it became clear that the cure (lockdowns) was worse than the disease.

Top-Down Default

In the current COVID era, digital technologies have enabled companies, educational institutions, governments to continue operating via the internet. Meetings are now held via Zoom or Microsoft Teams; employees share documents through email or Slack; agencies communicate with the public via email, texts, websites. These are technological wonders to celebrate with gratitude.

If the pandemic had hit even 10 years ago, this would not have been possible at today's scale. Today, 37 percent of jobs can be performed wholly online, and these tend to be at the high end of technological acuity and compensation.[xiv]

Although digitization enabled lockdowns, technology did not cause them. Part of the problem is that the

governing class gets paid full salaries with benefits and so doesn't feel the squeeze, which has become crushing.

However, the dominant issue is—as economists Dierdre McCloskey (no relation to the author of this article) and Art Carden explain in their book, *Leave Me Alone and I'll Make You Rich*—what they term the "Bureaucratic Deal." In short, this means rule by credentialed technocrats or "betterment by permission," which is expressed in top-down plans and mandates.

In health care, this involves banning or discouraging the use of medicine that the FDA hasn't approved, for example. Ironically, this was exactly the gigantic obstacle that Operation Warp Speed was designed to circumvent—a decision from the very top crafted to avoid typical bureaucratic delays. Otherwise, years would pass before any vaccine could be dispensed.

The alternative model that McCloskey and Carden propose is the "Bourgeois Deal," in which a free-market approach or "permissionless betterment" dominates.

Nordic Trust

When the pandemic began, Sweden took a deliberate non-bureaucratic approach. Instead of hard lockdown, Swedish officials informed the public and encouraged them to act responsibly. This worked, except for the elderly. Then COVID's second wave hit and Sweden's death rate rose to 716 per million.[xv] After the release of a government commission report, critics called the Swedish approach a failure, as does the nation's king.[xvi]

But what the Swedish government botched was specific: failure to protect the elderly. This is the crux of the challenge worldwide and was botched ubiquitously. For nursing home residents and other vulnerable people who can't take care of themselves, government intervention is warranted.

In response to the COVID report, the Swedish government announced steps to protect the elderly, along with minimal restrictions, such as no groups larger than four in restaurants, and recommendations, including masks on public transportation during rush hour.

It should be noted that many other countries that mandated lockdowns have higher mortality rates, for example, Spain at 1,000 and the United States at 884. Clearly, the virus doesn't care whether lockdowns are in place.

Norway and Finland have much lower mortality rates at 68 and 78, respectively. According to an Oxford University research team, these countries have instituted fewer restrictions than Sweden.[xvii]

Lockdowns have such a miserable record the WHO now advises against them. Trust in the responsible ingenuity of the people works better than a "bureaucratic deal" and avoids economic and social disasters, which will be worse in the long run. And yes, top-down policies specifically protecting the vulnerable, who aren't self-sufficient, are warranted.

Paul Atreides

Consider, for example, Pierre Kory, MD, MPA, a modern-day Paul Atreides (the lead character in "Dune") battling enemies who want control over drugs ("spice" in "Dune") that benefit humanity. Dr. Kory is an Associate Professor of Medicine at St. Luke's Medical Center in Milwaukee, Wisconsin. His medical specialty is pulmonary and critical care.

Dr. Kory cofounded the Front-Line COVID-19 Critical Care Alliance[xviii] with several top critical care experts. On December 8, Dr. Kory testified before the U.S. Senate Homeland Security and Governmental Affairs Committee hearing on "Early Outpatient Treatment: An Essential Part of a COVID-19 Solution, Part II."[xix]

"Our group" Dr. Kory testified, "developed a highly effective protocol for preventing and early treatment of COVID-19. In the last three to four months, emerging publications provide conclusive data on the profound efficacy of the anti-parasite, anti-viral drug, anti-inflammatory agent called ivermectin in all stages of the disease."

For nine months after the onset of the pandemic, Dr. Kory and other Alliance members (his group)—in utter "permissionless," unbureaucratic mode—researched medical literature, while treating COVID patients in intensive care units. This led to the development of their successful MATH+ Hospital Treatment Protocol.

Ivermectin is safe and available at low cost. The 2015 Nobel Prize was awarded to William C. Campbell, PhD, for discovering the drug. Ivermectin has since been used to eradicate parasitic diseases worldwide. Now, more than 20 clinical studies on treating COVID with the drug have shown, "large magnitude and statistically significant benefits in decreasing transmission rates, shortening recovery times, decreasing hospitalizations, or large reductions in deaths," Dr. Kory said. "These data show that ivermectin is effectively a 'miracle drug' against COVID-19."

This is astoundingly positive news. It will take many months for everyone to be vaccinated. Also, as the virus mutates, the vaccine might prove less effective. Nor is there any certainty about how long the vaccine will provide protection.

Pulitzer Prize

The problem is, it's not major news at all. Dr. Kory recounted "the censorship of all of our attempts at disseminating critical scientific information on Facebook and other social media with our pages repeatedly being blocked." He added that no national media venue nor American health care agency has even inquired about their work. (Dr. Kory was featured in a New York Times article in August, but no mention was made of ivermectin.)[xx]

Why?

"[T]he only research and treatment focus that we have observed on a national scale," Dr. Kory related, "is with novel or high-cost pharmaceutically engineered products."

Dr. Kory presented graphs showing that mass distribution of ivermectin occurred throughout Peru and in one Mexican state at the time of peak deaths, "followed by rapid and sustained reduction in both case counts and death rates in patients over 60 years old." Since his testimony before the Homeland Security committee, which could not be censored, several YouTube videos have been posted and remain available.

Dr. Kory and his group just published a peer-reviewed paper about the MATH+ protocol in the Journal of Critical Care Medicine.[xxi] Additional supporting material is available at covid19criticalcare.com and at EvolveToEcology.org.[xxii] Google Scholar lists hundreds of journal articles by doctors around the globe reporting on ivermectin and COVID patients.

Imagine if the Math+ protocol with ivermectin had been implemented nationwide beginning in May, as the drug was dispensed in Peru. Disastrous lockdowns and restrictions could have been lifted and tens of thousands of lives saved. Nor would the health care system be overburdened with COVID patients.

But then there is suppression and censorship by the media and Big Tech. The Associated Press (AP) published an article in December stating categorically

that, "There's no evidence ivermectin has been proven a safe or effective treatment against COVID-19."[xxiii] At the bottom of the page is this note: "This is part of The Associated Press' ongoing effort to fact-check misinformation that is shared widely online, including work with Facebook to identify and reduce the circulation of false stories on the platform."

Perhaps AP will win a Pulitzer for speaking power to truth.

Dune or Done?

Regardless of whether Warner Bros. retracts its plan to stream new releases with theater premiers, "Dune" is scheduled for release on October 1, 2021. How many theaters will still be in business? It seems that most of them—along with restaurants, shops and other small businesses—will display signs reading, in effect, "Done."

Will global elites and Big Tech make trillions of dollars from expensive drugs *and* the ongoing transfer of wealth from faltering small businesses? Large profits are necessary and laudable, but as G.K. Chesterton put it, "Too much capitalism doesn't mean too many capitalists, but too few."

Shockingly, 27 of the nation's top 50 firms—90 percent of which posted profits this year—laid off more than 100,000 workers.[xxiv] Could they have picked a worse time to betray their employees and demonstrate their lack of connection to the country that enabled their success?

Or will the "permissionless"—such as Dr. Kory armed with data, experience and integrity—ultimately prevail and restore the local self-governing character that founded this republic? Will lockdown-prone leaders take notice and trust the combined—and much greater—wisdom of the little guys (a.k.a. voters)?

Please report any Atreides sightings, by carrier pigeon if necessary … . ▣

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DAKOTA DIGITAL REVIEW
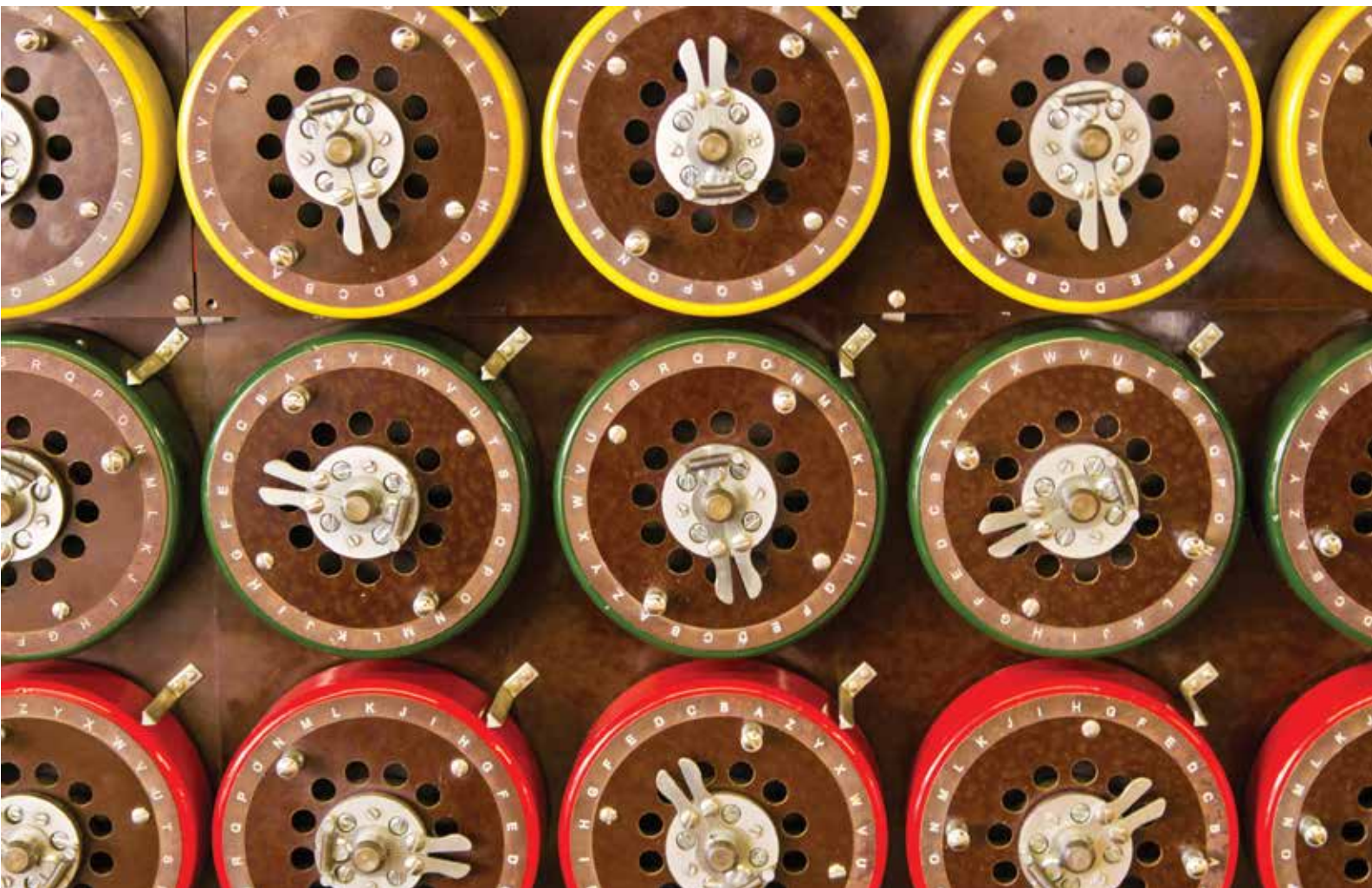
The Bombe machine, designed by British mathematician Alan Turing at Bletchley Park during the early stages of World War II, was crucial to cracking German communications encoded by the Enigma machine.

Turing's machine, which is a precursor to what we now think of as a computer, was able to rapidly speed up the rate at which intercepted messages were decoded, allowing Allied forces to react within hours rather than weeks.

In life, unlike chess, the game continues after checkmate.

—Isaac Asimov

ANCIENT COMPUTING—THE ANTIKYTHERA MECHANISM

One of three recovered bronze fragments known as the Antikythera mechanism at the National Archaeological Museum in Athens, Greece. It was discovered in a 2,100-year-old shipwreck off the coast of Antikythera, a Greek island in the Mediterranean. The device was used to calculate astronomical phenomenon, such as eclipses and the four-year Olympic Games. The Antikythera mechanism proves that the ancient Greeks used complex arrangements of precisely cut wheels to represent the latest in scientific understanding, and is thus considered the world's first analog computer. The photo above is life-size.

DAKOTA DIGITAL ACADEMY
NORTH DAKOTA UNIVERSITY SYSTEM