

THE FUTURE: INNOVATION AND JOBS

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ABSTRACT: Automation in the workplace is being blamed for the possibility and even likelihood of unprecedented job losses and restructuring in the years to come. While the fear has existed for centuries, some experts believe the present and future are unique; and even though the fears of the past never materialized to the extent imagined, this time is different. This article considers whether this time really is different and whether technology innovation should be curtailed as a result. The article further demystifies a unique potential policy solution aimed at reducing the negative impact of workplace automation on society.

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In recent years, economists, academics, writers, journalists, and others have blamed technology and the speed of technological innovation, in whole or in part, for unprecedented job losses, projected future job losses, and corresponding unemployment problems. A report by the National Academy of Engineering (NAE) isolated one highly cited study suggesting that as much as half of total U.S. jobs may be vulnerable to technological displacement.¹ However, this fear is not new. The tension has existed for hundreds of years.

During the first century, rejecting laborsaving technology that had been built to help move stone columns, the Roman Emperor Vespasian allegedly declared, “How will it be possible to feed the populace?”² In the sixteenth century, referring to a knitting machine, Queen Elizabeth I was said to have exclaimed, “Thou aimest high, Master Lee. Consider thou what the invention could do to my poor subjects. It would assuredly bring to them ruin by depriving them of employment, thus making them beggars.”³ In the eighteenth century, Voltaire

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1. COMM. ON FOUNDATIONAL BEST PRACTICES FOR MAKING VALUE FOR AM., NAT’L ACAD. OF ENG’G, MAKING VALUE FOR AMERICA: EMBRACING THE FUTURE OF MANUFACTURING, TECHNOLOGY, AND WORK 44 (Nicholas M. Donofrio & Kate S. Whitefoot eds., 2015) [hereinafter 2015 NAE REPORT]. This projection was based on an Oxford University study that projected 47 percent of total U.S. employment was in job categories that were at “high risk” of being displaced by computerization. See Carl Benedikt Frey & Michael A. Osborne, *The Future of Employment: How Susceptible Are Jobs to Computerisation?* 41 (2013) (on file with the Oxford Martin Sch.), <http://www.oxfordmartin.ox.ac.uk/downloads/academic/future-of-employment.pdf>.

2. Paul Solman, *Man vs. Machine: Will Human Workers Become Obsolete?*, PBS NEWSHOUR (May 24, 2012, 12:00 AM), http://www.pbs.org/newshour/bb/business-jan-june12-man_vs_machine_05-24/.

3. DARON ACEMOGLU & JAMES A. ROBINSON, *WHY NATIONS FAIL* 182–83 (2012).

proclaimed, “Our wretched species is so made that those who walk on the well-trodden path always throw stones at those who are showing a new road.”⁴ Then, in the nineteenth century, came the Luddites. They were a group of English workers who protested against the use of textile machinery manifesting new laborsaving technology for feared unemployment. In the early twentieth century, John Maynard Keynes coined the popular term “technological unemployment.” Keynes, in an essay titled “Economic Possibilities for Our Grandchildren,” famously claimed that “[w]e are being afflicted with a new disease . . . namely, *technological unemployment*. This means unemployment due to our discovery of means of economising the use of labor outrunning the pace at which we can find new uses for labor.”⁵

Characteristics of the previous and current decade have led a growing group of theorists⁶ to claim that technological advancements and the speed of progress are responsible for unparalleled detrimental effects on the present and future employment front. Some, like Martin Ford, argue that “it is different this time” for unique reasons that will be presented. Accepting that argument might lead one to the conclusion that, for the sake of jobs and social tranquility, it may be in society’s best interest to slow or halt technology innovation. If jobs are central to economic and personal well-being, it should follow that jobs should be protected and grow with the size of the population. If this argument holds true today, it does so because that is how society’s beliefs and values have evolved since the advent of wage labor and other types of work, such as volunteerism.⁷ In other words, the correlation between work and self-esteem could be said to be context driven.⁸

However uncomplicated and appealing stopping or limiting technological innovation might sound, this solution is problematic, shortsighted, and arguably impossible. Despite temporary disruptions,⁹ technology has provided uncountable benefits throughout the history of mankind. The key is determining how to effectively deal with the economic and social disruptions that naturally and historically follow periods of technological growth. This time there may be some

4. VOLTAIRE, *Men of Letters*, in THE PHILOSOPHICAL DICTIONARY 214 (H.I. Woolf trans., Dover 2010) (1764).

5. JOHN MAYNARD KEYNES, *Economic Possibilities for Our Grandchildren*, in ESSAYS IN PERSUASION 325 (Palgrave Macmillan 2010) (1931).

6. The theorists include Martin Ford, Marshall Brain, Erik Brynjolfsson, Andrew McAfee, Lawrence Summers, Paul Krugman, Carl Benedikt Frey, Michael Osborne, Jeffrey Sachs, Laurence Kotlikoff, and James Huntington.

7. Derek Thompson, *A World Without Work*, ATLANTIC, July–Aug. 2015, at 55.

8. Andrea Kay, *At Work: Job, Self-Esteem Tied Tightly Together*, USA TODAY (Aug. 31, 2013, 12:57 PM), <http://www.usatoday.com/story/money/columnist/kay/2013/08/31/at-work-self-esteem-depression/2736083/>; see ERIK BRYNJOLFSSON & ANDREW MCAFEE, RACE AGAINST THE MACHINE 64 (2011).

9. Irving Wladawsky-Berger, *The Economy May Face “Technological Unemployment”*, WALL ST. J. (Feb. 2, 2013, 7:15 PM), <http://blogs.wsj.com/cio/2013/02/02/the-economy-may-face-technological-unemployment/>; see World Economic Forum, *Future of Jobs Report* (Jan. 18, 2016), <http://reports.weforum.org/future-of-jobs-2016/>.

distinctions requiring widespread and perhaps novel solutions, unlike other periods in history. Innovation policy, if designed and carried out appropriately and with regard to employment consequences, can be beneficial to both economic and job growth. For reasons that will be developed in what follows, I argue that technological progress is a human tradition that should be managed and directed via policy and legal initiatives but not prevented or curtailed.

It was contended above that the connection between societal well-being and traditional work is the product of nineteenth and twentieth-century working habits, born largely out of the Industrial Revolution. People moved from rural to urban settings to work in factories for a set period of time throughout the day. The “company man” ensued as did work-related and social benefits.¹⁰

Human experience, however, is made up of a series of transitions or revolutions. The issue is whether we are on the brink of yet another such revolution—involving how, when, and even *if* we will continue working.

This essay attempts to answer three questions. First, are jobs in danger because of technological innovation? Second, should we protect jobs by halting or limiting innovation? And third, if we do not actively interfere with job protection, what options are there to ensure the cohesiveness and future of humanity?

I. ARE JOBS IN DANGER?

An often-cited U.S. labor and market-focused Oxford University study (Oxford Study), published in 2013, considered 702 occupations; and it concluded that computerization will place approximately 47 percent of total U.S. employment at risk, primarily in the following job categories: sales, service, office administrative, transportation, and material moving.¹¹

Similarly, a 2014 Reuters Analysis¹² analyzed the revenues and profits of 100 of the largest publicly traded companies in the United States from 2001 to 2013. It came to the conclusion that in general, while revenues and profits rose during the noted time period, employee headcounts were down. This conclusion indicates that human labor is no longer a significant driver of economic growth. The same Reuters study, based on data from the U.S. Bureau of Labor Statistics, also noted that the number of people in the ten lowest-paying jobs rose nearly 15 percent while their inflation-adjusted wages fell by 5.5 percent.

10. Jerry Davis, *Capital Markets and Job Creation in the 21st Century*, BROOKINGS 1 (Dec. 2015), <http://www.brookings.edu/research/papers/2015/12/30-21st-century-job-creation-davis>; Josh Freedman & Michael Lind, *The Past and Future of America's Social Contract*, ATLANTIC (Dec. 19, 2013), <http://www.theatlantic.com/business/archive/2013/12/the-past-and-future-of-americas-social-contract/282511/>.

11. Frey & Osborne, *supra* note 1, at 41.

12. Howard Schneider, *For Largest U.S. Companies, Jobs Growth Has Lagged Profits, Revenues*, REUTERS (Aug. 11, 2014, 11:16 AM), <http://www.reuters.com/article/us-usa-economy-employment-insight-idUSKBN0GB0NF20140811>.

A 2014 Pew Research Report¹³ revealed that the majority of 1,896 experts¹⁴ consulted regarding the future of work¹⁵ envision automation infiltrating various industries by 2025 on a global scale. However, those same experts were divided in their opinions on whether technological advances will displace more jobs than they create: 48 percent of respondents opined that more jobs would be displaced by 2025 whereas 52 percent thought otherwise. The 2015 NAE Report, referred to above, further estimated that 50 percent of all U.S. jobs may be at risk of being displaced by technology.¹⁶

A Canadian study, released in 2016, projects a 42 percent negative impact on jobs, including loss and restructuring, in the Canadian workplace over the next 10 to 20 years.¹⁷ The study flags the top five at-risk occupations as retail salespeople, administrative assistants, food counter personnel, cashiers, and transport truck drivers.¹⁸

Jobs that, at this time, are indicated to be in peril are fixed, middle-skill, routine and repetitive jobs, whereas jobs in a nonstatic environment, involving judgement, flexibility, creativity, social intelligence, and abstract thinking have proven difficult to automate. Also, jobs involving manual labor such as food preparation, janitorial, landscaping, and so forth, are less amenable to automation.¹⁹ This is often referred to as job polarization or the barbell effect.²⁰ Top-tier and lower-tier jobs are remaining safer than middle-tier occupations.²¹

Well-known economist James Bessen²² published the results of his study on the effect of computerization from 1980 through 2013 on 317 occupations within 243 industries. Bessen concluded that occupations that use or rely on

13. AARON SMITH ET AL., PEW RESEARCH CENTER: AI, ROBOTICS, AND THE FUTURE OF JOBS (2014), <http://www.pewinternet.org/files/2014/08/Future-of-AI-Robotics-and-Jobs.pdf>.

14. Including Vint Cerf (Google), Fred Baker (Internet Pioneer), and Jonathan Grudin (Microsoft). *Id.* at 4, 6.

15. Approximately 84 percent of the experts identified with being based in North America, while the rest came from other parts of the world; 19 percent identified with being research scientists; 9 percent were business people; 10 percent were in the publishing industry; 8 percent were technology developers or technology administrators; 8 percent were advocates; 7 percent were futurists or consultants; 2 percent were legislators, lawyers, or politicians; 2 percent were pioneers or originators; and 33 percent noted their main area of interest as "other." Approximately one half of the expert respondents chose to stay anonymous. *Id.* at 17.

16. See 2015 NAE REPORT, *supra* note 1, at 1.

17. CREIG LAMB, BROOKFIELD INSTITUTE FOR INNOVATION & ENTREPRENEURSHIP, THE TALENTED MR. ROBOT: THE IMPACT OF AUTOMATION ON CANADA'S WORKFORCE 3 (2016), http://brookfieldinstitute.ca/wp-content/uploads/2016/08/TalentedMrRobot_BIIE-1.pdf.

18. *Id.* at 12.

19. Tim De Chant, *Navigating the Robot Economy*, NOVA NEXT (Oct. 15, 2014), <http://www.pbs.org/wgbh/nova/next/tech/automation-economy/>.

20. Erik Kain, *The Barbell Economy*, FORBES (Apr. 21, 2011, 9:54 AM), <http://www.forbes.com/sites/erikkain/2011/04/21/the-barbell-economy/#52f77cc42a8e>.

21. See De Chant, *supra* note 19.

22. See *Faculty Profiles: James Bessen*, BOS. U. SCH. L., <http://www.bu.edu/law/profile/james-bessen/> (last visited Aug. 21, 2016).

computers grow, employment-wise, significantly more than others.²³ He was also quoted as saying that “[t]he idea that automation kills jobs isn’t true historically, and if you look at the last 30 years, it’s not true then either.”²⁴ While Bessen focused on occupations, others believe this is misleading and that a proper analysis requires consideration of *activities within occupations* instead, with research suggesting that up to 45 percent of activity tasks are currently capable of being automated.²⁵

In their book, *Race Against the Machine*,²⁶ Erik Brynjolfsson²⁷ and Andrew McAfee²⁸ from the Massachusetts Institute of Technology (MIT) recognize some of the benefits technology has brought to human lives, including economic growth, increased productivity, quality of life, health and longevity, food quality and abundance, transportation, information and communication capabilities, and the elimination of many dangerous and mundane jobs. Nonetheless, the authors note that population growth and job loss from the Great Recession have resulted in a setback, and information technologies are complicating things further by having a negative effect on jobs and wages.²⁹ As a consumer society, they point out that jobs provide income, which conveys purchasing power and in turn leads to consumption. This particular point is also raised and echoed by Silicon Valley author and entrepreneur, Martin Ford.³⁰

Cyclicalities (which occurs when there is insufficient economic growth to place people in jobs) along with development and stagnation (which occurs when there is a lack of innovation and productivity) are not to blame for job disturbances, according to Brynjolfsson and McAfee.³¹ They claim progress is moving ahead exponentially and that current-day innovation, growth, and productivity are simply not attached to employment and higher wages. This noted drift of income away from labor toward capital has also been recognized by Janet Yellen, Chairwoman of the U.S. Federal Reserve.³²

23. James Bessen, *How Computer Automation Affects Occupations: Technology, Jobs, and Skills* 32 (Bos. Univ. Sch. of Law, Working Paper No. 15-49, 2016), <https://www.bu.edu/law/files/2016/08/NewTech-08012016.pdf>.

24. Steve Lohr, *Automation Is a Job Engine, New Research Says*, N.Y. TIMES (Dec. 3, 2015, 10:45 PM), http://bits.blogs.nytimes.com/2015/12/03/automation-is-a-job-engine-new-research-says/?_r=0.

25. Michael Chi et al., *Four Fundamentals of Workplace Automation*, MCKINSEY Q. (Nov. 2015), <http://www.mckinsey.com/business-functions/business-technology/our-insights/four-fundamentals-of-workplace-automation>.

26. BRYNJOLFSSON & MCAFEE, *supra* note 8.

27. *See Faculty & Research: Erik Brynjolfsson*, MIT SLOAN SCH. MGMT., <http://mitsloan.mit.edu/faculty-and-research/faculty-directory/detail/?id=22672> (last visited Aug. 21, 2016).

28. *See Andrew McAfee*, <http://andrewmcafee.org> (last visited Aug. 21, 2016).

29. *See* BRYNJOLFSSON & MCAFEE, *supra* note 8, at 6–9.

30. *See generally* MARTIN FORD, *THE LIGHTS IN THE TUNNEL: AUTOMATION, ACCELERATING TECHNOLOGY AND THE ECONOMY OF THE FUTURE* (2009).

31. BRYNJOLFSSON & MCAFEE, *supra* note 8, at 4.

32. Matt Phillips, *Janet Yellen’s Fed Is More Revolutionary than Ben Bernanke’s Ever Was*, QUARTZ (Aug. 25, 2014), <http://qz.com/247113/janet-yellen-is-a-more-revolutionary-fed-leader-than-bernanke-ever-was/>.

In moving from the Great Recession to what they call the Great Restructuring, Brynjolfsson and McAfee make the following recommendations. Americans must quickly restructure skills, organizations, and businesses to work smarter, allowing workers to compete with and complement machines instead of working against innovative processes. Human beings have skills that at this point in time cannot be mimicked by machines, including intuition, creativity, emotional intelligence, and so forth.³³

Brynjolfsson and McAfee note that the technological disruption of the workplace has been great because of the pervasive influx of automation, and workers have had insufficient time to adjust to the changes that have taken place with occupational reassessments or additional skills training that are required to work alongside machines.³⁴ The authors call on “creative entrepreneurship” to create possibilities for oneself and others (e.g., Facebook, Airbnb, and Uber). They further suggest immigration,³⁵ education,³⁶ investment,³⁷ and employment regulation³⁸ reforms.

Brynjolfsson and McAfee’s second book, *The Second Machine Age*,³⁹ is similar to the first but is more optimistic jobs-wise so long as the right steps are taken. In particular, it notes how times have changed with regard to the “corporation.” The authors use Instagram and Kodak to highlight how fewer employees are needed to effect tremendous corporate profits, creating an enormous

33. *But see* BYRNJOLFSSON & MCAFEE, *supra* note 8, 12–16. As Brynjolfsson & McAfee explain:

This is the world we live in now. It’s one where computers improve so quickly that their capabilities pass from the realm of science fiction into the everyday world not over the course of a human lifetime, or even within the span of a professional’s career, but instead in just a few years.

Id. at 14.

34. *Id.* at 8.

35. Effective immigration reform should include measures to give opportunities to bright foreign students in the United States and to create specialized visas for these individuals and other skilled foreign workers. *Id.* at 66.

36. Technology is moving ahead faster than people’s understanding and use and management of the technology. Information technology provides a way for the masses to learn from the best teachers. Soft skills, like leadership and team building are increasingly important and education would benefit from focus on these areas. One criticism is that given education is itself being automated, there will be fewer and fewer educators needed since online programming can reach thousands. Another is that educational training will always be too slow and that most human capabilities may be insufficient on their own to master more and more complex technologies in the workplace. See Jon Perry, *A Detailed Critique of “Race Against the Machine,”* DECLINE SCARCITY, <http://declineofscarcity.com/?p=1037> (last visited Aug. 21, 2016).

37. Investment in human capital, research & development, education, and infrastructure can encourage and make human employment valuable. See BYRNJOLFSSON & MCAFEE, *supra* note 8, at 67.

38. The authors’ suggestions include separating certain benefits (e.g., health-care insurance) from employment, removing barriers to entrepreneurship and other business creation, tax breaks for employers that hire employees and patent system reform. *Id.* at 68–69.

39. ERIK BYRNJOLFSSON & ANDREW MCAFEE, *THE SECOND MACHINE AGE* (2014). [hereinafter *THE SECOND MACHINE AGE*].

amount of wealth in a short time for a select few. Not only is the face of corporate America changing, but its body is increasingly made up of machinery rather than people.⁴⁰

Technology is very attractive to owners of capital. Machines require no pay, benefits, sick leave, vacation, lunch breaks, or weekends off. They are less prone to err and are more productive than human beings. In a race for the same job, it is therefore difficult for humans to compete with machines. Once again, however, Brynjolfsson and McAfee point out the idea is to complement, rather than work against them.⁴¹

Brynjolfsson and McAfee suggest using human workers to create value alongside technology. They provide short-term and long-term solutions, whereby the short-term include education reform, entrepreneurship, refinement of job matching systems, scientific research funding, innovation prize schemes, infrastructure upgrades, immigration reform, and implementation of a Pigovian tax system. Among the long-term solutions are negative income, consumption, and value-added tax schemes (VAT), and supporting crowdsourced production (e.g., TaskRabbit, Handy, and Homejoy).⁴²

Martin Ford, on the other hand, believes education, while laudable, is not the answer to the fast-approaching inevitability of technological unemployment. He finds, with exceptions, that there is often little relationship between level of education, skill, and losing one's job to automation.⁴³ In his first book on topic, *The Lights in the Tunnel*, Ford puts much emphasis on the United States being a consumption-focused society and claims that in a job-diminishing world people will require an income stream to continue to the cycle of demand and consumption.⁴⁴ Ford advocates for a government-managed income scheme fueled by income-worthy activities one might choose to engage in, resulting in perhaps an unequal but not unfair society. The idea of a government income scheme is also reflected in Ford's follow-up book *The Rise of the Robots*.⁴⁵

One of the most commonly considered government payout schemes is what is referred to as a basic income guarantee (BIG). Generally speaking, BIG is a monetary government-backed and issued guarantee such that all adults have access to an amount of money necessary to meet basic needs.⁴⁶ What differentiates BIG, in particular, from other government-assistance programs is that it is most often conceived as provided regardless of whether a recipient is employed or unemployed (though the amount received could be adjusted based on the recipient's income stream). It is typically explained as neither tied to nor dependent on an individual's economic status. It is simply projected as a citizen's

40. *See id.* at 29.

41. *See id.* at 11.

42. *Id.* at 240–41.

43. FORD, *supra* note 30, at 84.

44. *See generally id.*

45. MARTIN FORD, *THE RISE OF THE ROBOTS* 30–31 (2015).

46. *Frequently Asked Questions About Basic Income*, BASIC INCOME EARTH NETWORK, <http://www.basicincome.org/basic-income/faq> (last visited Aug. 21, 2016).

right. BIG may be crafted with several unique formulations, however best suited to individual governments.⁴⁷

BIG is not a novel concept. In 1918, philosopher and Nobel laureate Bertrand Russell noted that “a certain small income, sufficient for necessities, should be secured to all, whether they work or not.”⁴⁸ Economist Milton Friedman advocated BIG in the early 1960s via a “negative income tax” scheme.⁴⁹ Some years later, Richard Nixon tried but was not successful in passing a version of Friedman’s plan. Interestingly, George McGovern, Nixon’s Democratic opponent in the 1972 presidential election, was also a supporter of BIG.⁵⁰ In addition, in 1967, Martin Luther King Jr. proclaimed, “The solution to poverty is to abolish it directly by a now widely discussed measure: the guaranteed income.”⁵¹

While BIG gained much notoriety in the 1960s, it continues to be discussed as an option. In fact, Switzerland, with 77% of voters against the measure, rejected a BIG initiative in June 2016.⁵² Finland is considering a similar proposal⁵³ in large part because of unemployment concerns and for simplification of Finland’s social security system.⁵⁴ Those against such a measure say it is unworkable, and have gone as far as describing it as “the most dangerous and harmful initiative that has ever been submitted.”⁵⁵ The most common fears are its effect on the motivation to work, excessive immigration, and the financial burden on government.⁵⁶

In terms of whether technological innovation is to blame for feared mass unemployment, some, like MIT Economics Professor David Autor, reject the common fears of technological unemployment. In one interview, Autor stated, “[t]he interactions by which technological changes lead to changes in employment are really rich and complex . . . and it’s not simply a matter of you

47. *Id.*

48. BERTRAND RUSSELL, *THE PROPOSED ROADS TO FREEDOM* 110 (Cosimo 2004) (1919).

49. Noah Gordon, *The Conservative Case for a Guaranteed Basic Income*, ATLANTIC (Aug. 6, 2014), <http://www.theatlantic.com/politics/archive/2014/08/why-aren't-reformicons-pushing-a-guaranteed-basic-income/375600>.

50. *Id.*

51. Steven Shafarman, *A Dream and a Plan—the Full Legacy of Martin Luther King, Jr.*, COMMON DREAMS (Jan. 17, 2016), <http://www.commondreams.org/views/2016/01/17/dream-and-plan-full-legacy-martin-luther-king-jr>.

52. Critics of BIG said that society would not benefit from disconnecting income from work done. *Switzerland’s Voters Reject Basic Income Plan*, BBC NEWS (June 5, 2016), <http://www.bbc.com/news/world-europe-36454060>.

53. Adam Boulton, *Finland Is Considering Giving Every Citizen €800 a Month*, TELEGRAPH (Dec. 6, 2015, 3:40 PM), <http://www.telegraph.co.uk/news/worldnews/europe/finland/12035946/Finland-is-considering-giving-every-citizen-800-a-month.html>.

54. Maija Unkuri, *Finland Considers Basic Income to Reform Welfare System*, BBC NEWS (Aug. 20, 2015), <http://www.bbc.com/news/world-europe-33977636>.

55. Stanislas Jourdan, *Switzerland: Parliament Rejects Basic Income Initiative, but Poll Shows Popular Support*, BASIC INCOME EARTH NETWORK (Oct. 3, 2015), <http://www.basicincome.org/news/2015/10/swiss-parliament-opposes-popular-initiative/>.

56. *Id.*

know, a machine does the job, therefore the worker doesn't do the job, therefore there are fewer workers needed."⁵⁷

While there is disagreement among authorities about whether jobs or workers are going to face elimination, reduction, displacement, or a shift, let us assume the worst—that is, technological unemployment is the near-future reality, whether ten, fifteen, or twenty years from now. Should we, therefore, stop innovation to secure and preserve the jobs we have become accustomed to?

II. SHOULD WE HALT OR LIMIT TECHNOLOGICAL INNOVATION?

In connection with answering the question of whether we should put pressure on reducing or eliminating job-related innovation, let us consider the benefits of doing so. Literature considered herein suggests benefits might include the efficiencies discussed earlier, less job competition with technology, reduction of “bad use” of technology, perceived safety by avoiding exposure to new technologies such as nanotechnology, reduction in risk of alleged “new” health afflictions such as electromagnetic hypersensitivity, and avoiding the pressing need to update or create new laws, regulations, and policies to address novel issues emanating from progressive technologies.

Considering the benefit of less competition between human workers and technology, one Chinese computer-equipment company had human workers toil next to 80 robotic arms used to help assemble computer-related components. This resulted in the company saving \$1.6 million dollars each year and cutting its workforce in 2010 from over 3,000 people to fewer than 1,000.⁵⁸

In 2012, when Amazon acquired the Kiva robotics company, Amazon boasted about equipping its warehouses with 1,000 robots. In 2014, that number was projected to be 10,000.⁵⁹ Between Amazon's drone delivery service and its Kiva robots, one news article suggested that the company was foreseeably eliminating future jobs, although it had not done so back in 2014 when reports on the Kiva robots were first published.⁶⁰ In fact, in 2015, Amazon added 76,500 people to its workforce, doubling its 2014 numbers.⁶¹ Nonetheless, the trend

57. Stephen J. Dubner, *How Safe Is Your Job? A New Freakonomics Radio Podcast*, FREAKONOMICS (Jan. 29, 2015, 10:19 AM), <http://freakonomics.com/2015/01/29/how-safe-is-your-job-a-new-freakonomics-radio-podcast/>.

58. Kelvin Chan, *Robot Revolution Transforms China's Factories as Part of Beijing's Economic Overhaul*, U.S. NEWS & WORLD REP. (Sept. 23, 2015, 3:26 PM), <http://www.usnews.com/news/business/articles/2015/09/23/robot-revolution-sweeps-chinas-factory-floors>.

59. David Cardinal, *Amazon Deploys 10,000 Robot Workers, a Year After Obama's Famous Amazon Jobs Speech*, EXTREMETECH (May 30, 2014, 1:00 PM), <http://www.extremetech.com/extreme/183254-amazon-deploys-10000-robot-workers-a-year-after-obamas-famous-amazon-jobs-speech>.

60. Donna Tam, *Meet Amazon's Busiest Employee—the Kiva Robot*, CNET (Nov. 30, 2014, 9:01 PM), <http://www.cnet.com/news/meet-amazons-busiest-employee-the-kiva-robot/>.

61. Taylor Soper, *That's a Lot of Interviews: Amazon Added 76,700 Employees in 2015*, GEEKWIRE (Jan. 29, 2016, 3:33 PM), <http://www.geekwire.com/2016/amazon-hired-76/>.

may change if robot technology is refined, eliminating the human worker component.

Computer hardware manufacturing company Foxconn is said to be following a similar path,⁶² as is the hotel industry.⁶³ IPsoft's Amelia is being used in the oil industry by companies like Shell and Baker Hughes, to assist with human resources-type tasks.⁶⁴ Physicians are employing Watson, IBM's super-computer, to assist with patient diagnoses and treatment options.⁶⁵ Law firms are using evidence-gathering software thereby automating legal discovery. Rio Tinto's mine in Australia uses 53 autonomous trucks to move precious metals.⁶⁶ The list goes on. While at first blush this might be concerning, some experts claim that automation will not kill employment and that, instead, workers' roles will shift and become more meaningful. In other words, the bots will do the routine work, freeing workers to engage in more interesting job opportunities and requirements.⁶⁷ Of course, this shift will, in many instances, require additional training that a worker may be unwilling or unable to do at the speed required to be useful.

Regarding "bad use" of technology, where technology is used for a nefarious or dangerous purpose, not a day seems to go by that we do not hear about software or hardware hacks. These have had, and will likely continue to have, detrimental effects on banking, transportation, healthcare, communication, and other systems.

Perceived safety concerns often lead to a precautionary approach, whether in government regulation or otherwise. One such example is genetically modified crops. The foods derived from these crops are sometimes called " Frankenfoods," and labeling movements have gained traction amid allegations that

62. See Cardinal, *supra* note 59. The move by Foxconn was allegedly designed to reduce labor costs and promote efficiency. At the time of the report, Foxconn projected the installation of approximately 30,000 robots in its factories. See Steven Musil, *Foxconn Reportedly Installing Robots to Replace Workers*, CNET (Nov. 13, 2012, 9:25 PM), <http://www.cnet.com/news/foxconn-reportedly-installing-robots-to-replace-workers/>.

63. *A Night in Japan's Robot Hotel*, CBS NEWS (July 22, 2015, 6:58 AM), <http://www.cbsnews.com/news/inside-japan-robot-hotel-hennna-where-staff-are-robots/> (reporting that "[t]he world's first hotel staffed almost entirely by robots" opened in Japan in mid-July 2015).

64. Sally Davies, *Baker Hughes and Shell to Trial Artificial Intelligence Software*, FIN. TIMES (Dec. 4, 2014, 12:26 AM), <http://www.ft.com/cms/s/0/56b9320e-7af4-11e4-8646-00144feabdc0.html#axzz4BTsapwu8>.

65. Lauren F. Friedman, *IBM's Watson Supercomputer May Soon Be the Best Doctor in the World*, BUS. INSIDER (Apr. 22, 2014, 10:14 AM), <http://www.businessinsider.com/ibms-watson-may-soon-be-the-best-doctor-in-the-world-2014-4>.

66. Zoë Corbyn, *Robots Are Leaving the Factory Floor and Heading for Your Desk—and Your Job*, GUARDIAN (Feb. 9, 2015, 2:30 AM), <https://www.theguardian.com/technology/2015/feb/09/robots-manual-jobs-now-people-skills-take-over-your-job>. The autonomous Rio Tinto fleet "has now driven 3.9 million kilometres—which is equivalent to five return trips from the Pilbara to the moon or driving around the Earth's circumference 98 times. They respond to GPS directions to deliver loads 24 hours a day supervised by remote operators." See Media Release, Rio Tinto, *Rio Tinto Improves Productivity Through the World's Largest Fleet of Owned and Operated Autonomous Trucks*, (June 9, 2014), http://www.riotinto.com/media/media-releases-237_10603.aspx.

67. James Bessen, *Toil and Technology*, FIN. & DEV., Mar. 2015, at 16, 16–17.

genetically modified foods are unsafe, despite sound science establishing otherwise.⁶⁸

Do new innovations result in new ailments or diseases? Although refuted by reliable scientific researchers and government organizations,⁶⁹ there are claims by some opponents to methods used in modern biotechnology, such as transgenic crop breeding, that genetically modified organisms cause certain cancers.

There are also assertions that the radio frequency emitted by mobile phones may cause cancer, though most scientists believe that this kind of nonionizing radiation is not a health risk.⁷⁰ There are also claims that technology causes particular sensitivities, and stories have been documented about individuals having to live “off grid” in protected environments because of electromagnetic sensitivities.⁷¹

Laws and regulations are being applied to issues that were not foreseeable at the time the laws were codified or judicial precedent was established. Legal issues are being forced, like a wrong puzzle piece, into archaic and unsuitable frameworks. The pace of technology innovation indicates that the legal system will forever be playing catch-up.⁷²

So, in light of the above, there appear to be certain benefits to halting or at least curbing innovation. Nonetheless, it is highly questionable whether this is a good idea. If our nation could elect to stop or limit innovation, it would risk falling behind in global competitiveness.⁷³ It would risk a reduction of economic growth, prosperity,⁷⁴ and standard of living. It would further risk a negative impact on human and environmental health and safety, food supply, communication, infrastructure, convenience, opportunity, education, and human productivity. To be sure, new technologies bring a certain amount of upheaval along

68. Stefaan Blancke, *Why People Oppose GMOs Even Though Science Says They Are Safe*, SCI. AM. (Aug. 18, 2015), <http://www.scientificamerican.com/article/why-people-oppose-gmos-even-though-science-says-they-are-safe/>.

69. Alessandro Nicolia et al., *An Overview of the Last 10 Years of Genetically Engineered Crop Safety Research*, 34 CRITICAL REVIEWS BIOTECHNOLOGY 77, 77 (2014); *Statement by the AAAS Board of Directors on Labeling of Genetically Modified Foods*, AM. ASS'N FOR ADVANCEMENT SCI. (Oct. 20, 2012), http://www.aaas.org/sites/default/files/AAAS_GM_statement.pdf.

70. *Cell Phones and Cancer Risk*, NAT'L CANCER INST., <http://www.cancer.gov/about-cancer/causes-prevention/risk/radiation/cell-phones-fact-sheet#q4> (last updated May 27, 2016).

71. Nicholas Blincoe, *Electrosensitivity: Is Technology Killing Us?*, GUARDIAN (Mar. 29, 2013, 3:00 PM), <http://www.theguardian.com/society/2013/mar/29/electrosensitivity-is-technology-killing-us>.

72. See Gary E. Marchant, *The Growing Gap Between Emerging Technologies and the Law*, in 7 THE INT'L LIBRARY OF ETHICS, LAW AND TECH., THE GROWING GAP BETWEEN EMERGING TECHNOLOGIES AND LEGAL-ETHICAL OVERSIGHT 19 (2011); Elen Stokes, *Nanotechnology and the Products of Inherited Regulation*, 39 J.L. SOC'Y 93 (2012).

73. Bill Gates, *How to Keep America Competitive*, WASH. POST (Feb. 25, 2007), <http://www.washingtonpost.com/wp-dyn/content/article/2007/02/23/AR2007022301697.html>.

74. MICHAEL GREENSTONE & ADAM LOONEY, A DOZEN ECONOMIC FACTS ABOUT INNOVATION 2 (2011), http://www.brookings.edu/~media/research/files/papers/2011/8/innovation-greenstone-looney/08_innovation_greenstone_looney.pdf.

with the benefits they provide, but would we seriously consider life without them?

For the reasons stated in the preceding paragraph, along with noted others, technology is key to the advancement of society. Technology innovation provides many nonemployment-related benefits and creates its own new areas of work. When society lost its horse, it gained the car. When society lost its telephone operators it gained digital graphic designers. When it lost the VCR industry, it gained the on-demand Internet and streaming-media industry. Other examples abound. While technology innovation displaces some jobs, it often creates others. That has been the way it has worked over the course of time. Nonetheless, some theorists say or suggest it is different this time⁷⁵ because technology is permeating most industries, not only one or two. This, along with its pace, is blindsiding a workforce that cannot keep up quickly enough. Theorists⁷⁶ also point to technology's exponential growth and cite to Moore's law, which in its simplest form reflects the doubling of digital capabilities every 18 months to two years.

Fewer workers appear to be required these days, thanks in large part to technology. Returning to the earlier Instagram and Kodak example, when Facebook purchased Instagram in 2012, Instagram employed thirteen⁷⁷ workers and Facebook employed around 4600.⁷⁸ Compare those figures with Kodak's approximately 145,000 employees at peak employment in 1988.⁷⁹ There are other examples of highly valued companies with very few employees on the payroll.⁸⁰ Cloud robotics and Deep Learning are also contributing to the "it's different this time" argument. In cloud robotics, robots efficiently learn a mass of information, particularly from other robots. Deep Learning algorithms use general learning techniques and can be applied to human capabilities like perception, speech recognition, and even vision. Another reason things are said to be different is that, thanks again to the speed of technological progress enshrined in Moore's law, people are living longer and continue to be part of the workforce past the age of 65.⁸¹ But is this reason enough to cause serious concern?

Gordon Moore himself, after whom Moore's law is named, predicts the law dying in the following decade.⁸² Economist Robert Gordon stated that "the rapid

75. See list of theorists cited *supra* note 6.

76. *Id.*

77. Bianca Bosker, *Instagram Acquired by Facebook for \$1 Billion*, HUFFINGTON POST, http://www.huffingtonpost.com/2012/04/09/instagram-facebook-acquisition_n_1412623.html (updated June 9, 2012).

78. See THE SECOND MACHINE AGE, *supra* note 39, at 126.

79. *Kodak's Growth and Decline: A Timeline*, ROCHESTER BUS. J. (Jan. 19, 2012), <http://www.rbj.net/article.asp?aID=190078>.

80. Nathan McAlone, *Here's How Much Tech Giants like Apple and Google Make per Employee*, BUS. INSIDER (Oct. 6, 2015, 2:03 PM), <http://www.businessinsider.com/top-tech-companies-revenue-per-employee-2015-10>.

81. *New Adventures for Older Workers*, PBS NEWSHOUR (2013), <http://www.pbs.org/newshour/spc/new-older-workers/chapter-1-rethinking-retirement>.

82. Manek Dubash, *Moore's Law Is Dead, Says Gordon Moore*, TECHWORLD (Apr. 13, 2010), <http://www.techworld.com/news/operating-systems/moores-law-is-dead-says-gordon-moore-3576581/>.

progress made over the past 250 years could well turn out to be a unique episode in human history.”⁸³ This is echoed by journalist John Markoff who remarked, “In fact, things are slowing down. In 2045, it’s going to look more like it looks today than you think.”⁸⁴

Indeed, emphasizing that things are not as bleak as some would have us believe, “there were [three-fourths of a million] more bank tellers, more bookkeepers, and more sales clerks in 2009 than there were in 1999”⁸⁵ As well, research has consistently shown that “neither automation nor productivity gains . . . lead to decreases in overall employment.”⁸⁶ Even if productivity is no longer tied as tightly to the worker than it was decades ago, the savings to the consumer from increased productivity “are recycled back into the economy to create the demand that in turn creates jobs.”⁸⁷ In 2015, a Deloitte study considered government-issued labor-related datasets from England and Wales and other nongovernmental published research to assess how technological progress has impacted employment.⁸⁸ It concluded that “[t]he work of the future is likely to be varied and have a bigger share of social interaction and empathy, thought, creativity and skill. We believe that jobs will continue to be created, enhanced and destroyed much as they have in the last 150 years.”⁸⁹

In some industries, “managers of warehouses and other supply chain facilities report . . . difficulty hiring enough workers . . . with the skills needed to use the new technologies.”⁹⁰ Phillip J. Bond, former president of TechAmerica noted in 2011 that “each tech[nology] job supports three jobs in other sectors of the economy.”⁹¹ A 2011 U.S.-specific Battelle Memorial Institute analysis es-

83. Robert J. Gordon, *Is U.S. Economic Growth Over? Faltering Innovation Confronts the Six Headwinds* 1 (Nat’l Bureau of Econ. Research, Working Paper No. 18315, 2012), <http://www.nber.org/papers/w18315>. *But see* Tyler Cowen, *Is Innovation Over? The Case Against Pessimism*, FOREIGN AFFAIRS, Mar.–Apr. 2016, at 42 (reviewing ROBERT J. GORDON, *THE RISE AND FALL OF AMERICAN GROWTH* (2016)).

84. John Markoff, *A Conversation with John Markoff*, EDGE (July 16, 2015), https://edge.org/conversation/john_markoff-the-next-wave.

85. James Bessen, *Don’t Blame Technology for Persistent Unemployment*, SLATE (Sept. 30, 2013, 3:31 PM), http://www.slate.com/blogs/future_tense/2013/09/30/technology_isn_t_taking_all_of_our_jobs.html. For more information on BLS Occupational Employment Statistics and Surveys, see U.S. Dep’t of Labor, *Occupational Employment Statistics*, BUREAU LAB. STAT., <http://www.bls.gov/oes/tables.htm> (last modified Apr. 14, 2016).

86. Robert Atkinson & Jeff Burnstein, *Could a Robot Save Your Job?*, CHRISTIAN SCI. MONITOR (May 5, 2015), <http://www.csmonitor.com/Technology/Breakthroughs-Voices/2015/0505/Could-a-robot-save-your-job>.

87. BEN MILLER & ROBERT ATKINSON, INFO. TECH. & INNOVATION FOUND., *ARE ROBOTS TAKING OUR JOBS, OR MAKING THEM?* 2 (2013), <http://www2.itif.org/2013-are-robots-taking-jobs.pdf>.

88. IAN STEWART ET AL., DELOITTE LLP, *TECHNOLOGY AND PEOPLE: THE GREAT JOB-CREATING MACHINE* 10 (2015), <http://www2.deloitte.com/content/dam/Deloitte/uk/Documents/finance/deloitte-uk-technology-and-people.pdf>.

89. *Id.*

90. Bessen, *supra* note 67, at 16.

91. Phillip J. Bond, *Tech Provides Map for Nation’s Future*, POLITICO (Sept. 18, 2011, 8:58 PM), <http://www.politico.com/story/2011/09/tech-provides-map-for-nations-future-063781>.

tablished that “[b]etween 1988 and 2010 the human genome sequencing projects, associated research and industry activity—directly and indirectly—generated an economic (output) impact of \$796 billion, personal income exceeding \$244 billion, and 3.8 million job-years of employment.”⁹² In Glassdoor’s 2016 best jobs in the U.S. list, which was based on salary potential, job openings (registered with Glassdoor), and career opportunities, health and technology-related occupations are top ranked.⁹³ A 2015 International Renewable Energy Association report estimates that in 2014, 7.7 million people were directly or indirectly employed in the renewable energy sector globally, an 18% increase from 2013, with the United States being one of ten countries with the highest renewable energy employment.⁹⁴ McKinsey, in 2013, reported that shale-gas and oil production could produce up to 1.7 million jobs, U.S. trade competitiveness in knowledge-intensive goods up to 1.8 million jobs, and infrastructure investment up to 1.8 million jobs, all by 2020.⁹⁵

Innovation does not have to lead to job loss. It often can lead to job shifts or new jobs. J.P. Gownder, a technology analyst with Boston-based Forrester, notes that opportunities change, and while technology innovations might affect the mix of jobs, at the end of the day they do not take them away from human workers.⁹⁶ Nonetheless, the efficient and sought-after worker will no doubt require the necessary skills, training, or education to work alongside novel technologies.

Certainly not every worker will be up to task and some type of government-policy intervention will likely have to be put in place for individuals unable to keep up with current and future changes and challenges. The entity or entities best suited to develop and implement such policy would be determined once the most viable solution is, or solutions are, identified. As is often the case, despite some benefits of technology trickling down, there will be those who, without the right survivable skills, will be left behind. This statement is supported by economic historian, Joel Mokyr, and his coauthors who believe that “technological advance will continue to improve the standard of living in many dramatic and unforeseeable ways” but that “the path of transition . . . may be disruptively

92. SIMON TRIPP & MARTIN GRUEBER, BATTTELLE MEM’L INST., ECONOMIC IMPACT OF THE HUMAN GENOME PROJECT, at ES-2 (2011), http://www.battelle.org/docs/default-document-library/economic_impact_of_the_human_genome_project.pdf?sfvrsn=1.

93. Alexia Elejalde-Ruiz, *Glassdoor’s Best-Jobs List Full of Health, Tech—And Some Surprises*, CHI. TRIB. (Jan. 20, 2016, 12:30 AM), <http://www.chicagotribune.com/business/ct-glassdoor-best-jobs-0120-biz-20160119-story.html>; see Andrew Chamberlain, *These Are the Best 25 Jobs in America for 2016*, GLASSDOOR (Jan. 19, 2016), <https://www.glassdoor.com/research/best-jobs-2016/>.

94. RABIA FERROUKHI ET AL., INT’L RENEWABLE ENERGY AGENCY, RENEWABLE ENERGY AND JOBS—ANNUAL REVIEW 2015, at 3 (2015), http://www.irena.org/DocumentDownloads/Publications/IRENA_RE_Jobs_Annual_Review_2015.pdf.

95. SUSAN LUND ET AL., MCKINSEY GLOBAL INST., GAME CHANGERS: FIVE OPPORTUNITIES FOR U.S. GROWTH AND RENEWAL 7, 65, 89 (July 2013), http://www.mckinsey.com/insights/americas/us_game_changers.

96. Cade Metz, *Robots Will Steal Our Jobs, But They’ll Give Us New Ones*, WIRED (Aug. 24, 2015, 7:00 AM), <http://www.wired.com/2015/08/robots-will-steal-jobs-theyll-give-us-new-ones/>.

painful for some.”⁹⁷ This, however, is not a plausible reason to stop or limit technological advancement.

III. A UNIQUE APPROACH TO ENSURE THE COHESIVENESS AND FUTURE OF HUMANITY

Even if government policy dictated and could impose limiting innovation, it would not be a viable effort.⁹⁸ A national policy of degrowth could not stand up to other nondegrowthist economies and would result in vulnerability and the inevitable creation of a black market for technological products. Imposing a global degrowthist empire would also fail as any such leader could not reject progressive technologies—and its people, whose curiosity and creativity would be squelched, would eventually move for a growthist policy.⁹⁹ The will to power and innovate is the force that moves humanity. It always has and likely always will. This time is no different.

In a previous essay, my coauthors and I considered certain solutions as noted below.¹⁰⁰

(a) Protecting employment: slow down innovation; mandate human workers; reduce regulatory burdens on employers; conduct adverse impact studies on occupations; and labor law amendment;

(b) Work sharing: [impose] a mandatory retirement age, shorter work week; and more vacation;

(c) Making new work: [establish] government work programs, national service, guaranteed employment, tax credit incentives to hire more workers, and infrastructure investment;

(d) Income redistribution: [implement] BIG, “smart” social programs, and negative income tax;

(e) Education: [promote] lifelong education/training opportunities (science, technology, engineering, mathematics education, and massive open online courses), mental upgrading/technological enhancement; and

(f) New social contracts: replace jobs/income with a different model that will sustain people physically and emotionally.

Another potential solution, advocated by “Internet Father” Vint Cerf and entrepreneur David Nordfors, is “software that matches jobs to skills, talents,

97. Joel Mokyr et al., *The History of Technological Anxiety and the Future of Economic Growth: Is This Time Different?*, 29 J. ECON. PERSP. 31, 47 (2015).

98. This solution is not supported herein; therefore, how such a policy could be implemented is beyond the scope of this article.

99. Riccardo Campa, *Technological Growth and Unemployment: A Global Scenario Analysis*, J. EVOLUTION & TECH., Feb. 2014, at 86, 94–95.

100. Gary E. Marchant et al., *Technology, Unemployment & Policy Options: Navigating the Transition to a Better World*, J. EVOLUTION & TECH., Feb. 2014, 26, 31–40.

passions, experiences, and values.”¹⁰¹ Many people dislike their jobs.¹⁰² Consequently, large amounts of productivity and time are lost on the job.¹⁰³ Under this model, both workers and the economy might be winners.¹⁰⁴

While some of the foregoing suggestions may have more merit than others and much could be said about each, it is the idea of a new social contract, namely, replacing jobs with a different model that I propose to briefly explore further in this article. Perhaps the best way to evaluate technological unemployment, its potential effects, and corresponding solutions is on a spectrum, whereby one end, “A,” reflects complete job obliteration, the middle, “B,” reflects job shifts, new jobs, and lost jobs, and the other end, “C,” projects minor losses, minor shifts, and minor job creation.

The following discussion will be of interest primarily to proponents of the “A” and “B” camps. If we agree, for argument’s sake, that the job market is facing a specter that might or will inevitably have a profound negative impact on society, what should we do about it?

Under a worst-case scenario, if automation leads to severe or complete unemployment, it is necessary to consider whether this is a bad thing or whether we should embrace the age of leisure envisaged in 1930 by John Maynard Keynes. Under such a scheme one must ultimately reflect whether increased and bountiful productivity as a result of automation might render money useless. Money could have little value if unpaid robots are doing everything while unemployed human beings are saddled with little or no purchasing power. Thus, money might have to be replaced by something else.

Perhaps, taking the worst-case scenario into account, namely “A” on the spectrum, the alternative is a completely new social contract, based on a reward system whereby traditional jobs are replaced by a new kind of “work” that “earns” something of material significance like a badge or ribbon of some sort. The idea of replacing traditional work with rewarding, virtuous work that benefits society as a whole is not new.¹⁰⁵ As Bertrand Russell once noted, “a larger income [or other benefit] . . . should be given to those who are willing to engage in some work which the community recognizes as useful. On this basis we may build further.”¹⁰⁶ What would be distinct, however, is a reward system provided within the context of an automated workforce society that lacks nothing and has its basic needs fully and freely met by productive machinery. In such a situation,

101. Vivek Wadhwa, *We Need a New Version of Capitalism for the Jobless Future*, WASH. POST (July 20, 2015), <https://www.washingtonpost.com/news/innovations/wp/2015/07/20/we-need-a-new-version-of-capitalism-for-the-jobless-future/>; see also Vint Cerf & David Nordfors, *How to Disrupt Unemployment*, HUFFINGTON POST (July 25, 2014, 1:49 PM), http://www.huffingtonpost.com/david-nordfors/how-innovation-can-disrupt-unemployment_b_5616562.html.

102. Beth Stebner, *Workplace Morale Heads Down: 70% of Americans Negative About Their Jobs*, *Gallup Study Shows*, N.Y. DAILY NEWS (June 24, 2013, 4:49 PM), <http://www.nydailynews.com/news/national/70-u-s-workers-hate-job-poll-article-1.1381297>.

103. *Id.*

104. See Wadhwa, *supra* note 101.

105. See, e.g., FORD *supra* note 30, at 195–96.

106. RUSSELL, *supra* note 48.

one could use “matching software” as proposed by Vint Cerf and David Nordsfors to match people to noble, reward-worthy activities, such as care giving, artistry, environmental stewardship, education, and so forth. The badges could be bartered and used to “purchase” specialty items. The social fabric might need to be restitched somewhat, but this proposed reward model would likely enable people to continue to be productive and derive meaning from what they produce. Self-esteem and fulfillment currently derived from the traditional jobs model would continue under the proposed model. In fact, self-esteem might even flourish, as people would be pursuing activities they find enjoyable and badge worthy rather than being stuck in jobs they dislike, earning minimum wage.

It is worth noting, however, that under the proposed system for an unknown period of time, there would likely be people still employed in the traditional sense, meaning they would be earning money. The phasing out of money would likely not occur overnight such that during a transition period there would be a system in place that would recognize both money and badges as valuable and as methods of exchange.

Why replace money with badges in the first place? After all, one could simply pay for worthy work with money. For one, there is the negativity associated with money, including crime and recession.¹⁰⁷ Accordingly, as Jacob Davidson notes:

[T]he idea of a completely cashless economy is growing in popularity as research confirms the drawbacks of paper currency and technology provides a safer way forward. The argument is simple: Cash is an untraceable means of exchange that enables (and encourages) a vast criminal economy. . . .

Harvard economics professor Kenneth Rogoff also supports eliminating cash, not just to thwart underground economies, but also to help improve economic policy. Central banks typically fight recessions by lowering interest rates, which stimulates the economy by making saving less lucrative and encouraging consumers and businesses to spend. However, if interest rates dip below zero, meaning banks effectively charge savers, customers can simply withdraw their cash and sidestep the policy entirely. This effect is known as the “zero lower bound,” and is considered a serious limit to the effectiveness of monetary policy. “There are certainly many ways to skirt the zero lower bound, but the most elegant would be getting rid of most cash,” Rogoff says.¹⁰⁸

Countries like Denmark, Sweden, and Norway are in the midst of considering and implementing a cashless society allegedly to combat transaction costs and violence; but as one critic points out, there are many other reasons to favor electronic payments over cash: every transaction could be monitored and taxed.¹⁰⁹ In addition to the above, keeping cash in circulation would reinforce

107. Jacob Davidson, *Why Killing Cash Makes Sense*, MONEY (Apr. 27, 2016), <http://time.com/money/4307717/getting-rid-of-cash/>.

108. *Id.*

109. Michael Snyder, *Largest Bank in Norway Calls for the Elimination of Cash*, PROPHECY NEWS WATCH (Jan. 29, 2016), http://www.prophecynewswatch.com/article.cfm?recent_news_id=86#jAes0EJ86A4agk5V.99.

the inequality between the unemployed and the owners of capital—those who own the automation. Thus, in light of the above, a badge-based system may be a welcome change against even digital money-like currencies, which may carry the same negative connotation and inequality concerns as traditional money.¹¹⁰

The transition would not be a first. While China was the first country in history to use paper money, in the mid-fifteenth century it eliminated its use because of inflation and continued to do so for hundreds of years thereafter.¹¹¹ Transitions also occurred from use of money to use of credit cards¹¹² and from the barter to money economy.¹¹³ Also paving the way for a new badge-based system are the current practices of companies such as Zappos. Zappos, an online shoe and apparel company, has developed a reward system whereby employees can earn various kinds of badges related to accomplishments, roles, and skills.¹¹⁴ Similar programs are in place at Nike, Pearson, Starbucks, and Dell.¹¹⁵ As well, a badge reward concept is being applied in higher education at Purdue University and Quinnipiac University.¹¹⁶ Of course, the Boy Scouts and Girl Scouts of America have been earning their merit badges for years.¹¹⁷

On the other hand, if the worst-case scenario does not come to fruition, basic needs are not freely provided through high-output automation, and money remains in circulation (somewhere between the “A” and “B” spectrums), the badge system may still be viable, and perhaps be even more attractive from a supplementary perspective. For instance, the badge program could be implemented for the acquisition of supplemental goods and services that are desired but not necessary for basic living. If some individuals are still earning and others receiving (perhaps through a government subsidy program) sufficient funds to sustain basic needs, badges nonetheless recognized as having a certain value

110. See Maryam Kouchaki et al., *Seeing Green: Mere Exposure to Money Triggers a Business Decision Frame and Unethical Outcomes*, 121 ORGANIZATIONAL BEHAV. & HUM. DECISION PROCESSES 53, 53–54 (2013); George Monbiot, *Materialism: A System that Eats Us from the Inside Out*, GUARDIAN (Dec. 9, 2013, 3:30 PM), <http://www.theguardian.com/commentisfree/2013/dec/09/materialism-system-eats-us-from-inside-out>.

111. GLYN DAVIES, A HISTORY OF MONEY: FROM ANCIENT TIMES TO THE PRESENT DAY 183–84 (3d ed., 2002); *Top Ten Things You Didn't Know About Money: The First Paper Money*, TIME, http://content.time.com/time/specials/packages/article/0,28804,1914560_1914558_1914593,00.html (last visited July 15, 2016).

112. Catherine New, *Cash Dying as Credit Card Payments Predicted to Grow in Volume: Report*, HUFFINGTON POST (June 7, 2012, 12:07 PM), http://www.huffingtonpost.com/2012/06/07/credit-card-payments-growth_n_1575417.html.

113. See generally Joseph A. Ritter, *The Transition from Barter to Fiat Money*, 85 AM. ECON. REV. 134 (1995).

114. Richard Feloni, *How Zappos Decides How Much to Pay Employees Under Its New “Self-Management” System*, BUS. INSIDER (July 24, 2015, 4:16 PM), <http://www.businessinsider.com/how-zappos-determines-salaries-in-holacracy-2015-7>.

115. SarahJane Walshe, *Digital Badges Finding Use in Education and Across Industries*, EXTREME NETWORKS (Mar. 26, 2014), <http://extremenetworks.com/digital-badges-finding-use-in-education-and-across-industries/>.

116. *Id.*

117. See *Merit Badges*, BOY SCOUTS AM., <http://www.scouting.org/meritbadges.aspx> (last visited Aug. 19, 2016).

could be used to acquire supplementary goods and services or to fulfill other desires.



It is difficult to predict what the future will bring. This is evident when one considers that authorities on the topic of technological unemployment disagree, in whole or in part, on the extent of the potential impacts and repercussions of automation in the workplace.

One thing, however, is certain. Technological innovation should not, and arguably cannot, be curtailed. Under a worst-case scenario, or even somewhere in between, resulting in marked unemployment, creation of a new social contract whereby people are rewarded with a symbol or token for engaging in socially valuable tasks is an option for consideration. Certainly there will be challenges and the transition period would likely be disruptive. But similar transitions have occurred before. Nonetheless, such a transition would also involve a global component, with other countries likely having to either follow suit or develop recognition mechanisms for trade and tourism, if a badge-based compensation or reward system is adopted in whole or in part in the United States. Transitions are never easy, and it remains an open question how to best navigate the move from a monetary-based system to a badge-based recognition system should it become necessary. Past experience¹¹⁸ may provide clues, but at the end of the day all the nuances and unique issues presented will require twenty-first century approaches.

118. See DAVIES, *supra* note 111; New, *supra* note 112; Ritter, *supra* note 113, at 134–135.