Automation, Work, and Ideology:

The Next Industrial Revolution and the Transformation of "Labor"

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Dedication

For my father, Anthony Knowles, our countless discussions of the nature of the world and society instilled in me an intellectual curiosity from a young age.

For my mother, Mitzi Knowles, you have given me my strong sense of justice and purpose that animates everything I do and the person I want to become.

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Abstract

Over the last several decades, scholars and commentators from a variety of different fields, expertise, and ideological positions have written on automation technologies and their potential to cause technological unemployment. As a sociological analysis and critical examination of how experts ideologically frame these issues, this thesis demonstrates that ideology plays a crucial role in the revived debate over automation and technological displacement. Weberian ideal types are developed to demonstrate how three major ideological positions—liberal, conservative, and radical—approach and frame the link between automation, technological displacement, and the potential for technological unemployment. The qualitative tools of ideal type construction and theme analysis facilitate synthesis and reconstruction as ideal types the most salient aspects of each ideological perspective on the link between automation and technological displacement.

The liberal ideal type focuses on how liberal concerns that the present circumstances ("this time") may be different, that predicted technological displacement will greatly exacerbate economic inequality, and that technological unemployment could undermine social stability. By contrast, conservative commentators contend that technological displacement will not cause structural technological unemployment, and that disruptions will most likely follow the same patterns of "creative destruction" (Schumpeter) observed throughout the history of capitalism. Finally, radical commentators typically regard the continuation of automation as an opportunity to think of new ways to organize society beyond wage labor, and endeavor to develop a political program designed to transcend the current problems plaguing capitalism.

The final sections critically analyzes all three ideological positions and shows how, ultimately, current arguments and debates are structurally flawed. The tool of ideology critique is used to explain how the mainstream debate between conservatives, liberals, and radicals is devoid of systematic critical understanding of the dynamics of modern society. Relying on the works of the critical Marxian school of value-critique, a critique of current debates is formulated to explain how the historical dynamics of capital continuously transform labor in modern society in ways that will likely subvert the expectations of all three ideologies. The critical concept of a "logic of capital" must be central to any understanding of the processes of automation and technological displacement.

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Part 1 Setting and Context

1.1 Diagnosis of the Present Moment: Crisis of Capitalism and Laboring Society?

Modern capitalism as an economic and social system is defined by the historically unprecedented form that labor takes in modern society. Unlike pre-modern societies, people in modern society do not need to directly manipulate their environment to fulfill their necessities for food, water, clothing, shelter etc. Instead, individuals find a specific job to do amidst the grand social division of labor, and it is this work that allows individuals and families to acquire the means to buy the goods and services produced by others who also have their specialized place in the division of labor. The social coordination of the division of labor allows society to develop high levels of material wealth to fulfill the needs of society, and jobs give people the ability to a share of that material wealth through their wages. The integral role jobs play in the functioning of the economy and society is understood as "natural" to people living and working in modern society. Working time takes up a significant part of the day. The work we do shapes our modes of thought, our experiences, how we experience life, and how we interpret our experiences. Our job is often the most salient part of our social identity and effects how we are treated throughout the different social contexts we encounter daily. Jobs are necessary for the smooth functioning of modern capitalist society, not just as a means to acquire money, but as an overarching social mediation that is foundational to modern social life (Postone, 1993, pg.123-185). However, concretely what jobs are, their number, nature, and function are constantly shifting over time due to the dynamic interlinking social, economic, and political processes in modern society. Innumerable factors affect this: industries rise and fall, business cycles of

boom and bust, markets grow, and businesses move, restructure, cut costs or expand etc. But perhaps the most salient factor that changes the nature of jobs, especially in the long term, is changes in technology.

Technology changes jobs because each new tool allows workers to do their job tasks differently. The task of tending a field takes on a qualitatively different nature depending on if the farmer is using a hoe, a horse driven cart, a tractor, or a gigantic combine machine. Secondly, technology changes jobs because it allows workers to be more productive, to produce more in the same amount of time. To take the same example, the farmer with the hoe can only tend a small fraction of a field in a working day that a farmer with the tractor or combine could. In the long run, this means the latter farmer can perform significantly more work in the same amount of time as the former primarily because of the superiority of his tools that assist in production. Thirdly, technology potentially allows for fewer workers to perform a given job. If the goal of production at the farm is 1,000 crops per year, the farmer with only hand tools may need to hire 20 workers to hit this production goal, while the productivity increase due to the superior technology of the combine may obviate the farmer the need to hire anyone at all. When a new more productive technology is introduced in a business or production process, it may allow the company to hit the same or even expanded production goals using less human labor. The introduction of new technologies allows jobs that were previously necessary to become unnecessary, and therefore some workers can be replaced by the machines. The history of modern capitalism is full of such examples of technology replacing workers, from the early 19th century Luddites smashing machines that threatened to replace their labor to contemporary workers in China being replaced by highly advanced industrial robots coordinated by artificial intelligence. The process of workers losing jobs because new technology makes their jobs

superfluous is called technological displacement. Workers are displaced from their previous employment and, by necessity, must find new work elsewhere.

This process of technological displacement and reallocation of the work force can be observed over the course of the history of modern society, especially since the dawn of the industrial revolution of the late 18th century. One framework that tracks this long-term development is the three-sector theory in economics (see, Fisher, 1939). Since the industrial revolution, employment in industrialized countries has been shifting from being dominated by the primary sector of extraction and agriculture, toward an economy increasingly made up of the secondary sector of industrial manufacture and the tertiary sector of service jobs. In most industrialized countries today, service jobs greatly outnumber both agricultural and industrial or commodity producing jobs.[1] Sector change over time demonstrates how technological changes shift the priorities and worker demand in the economy, ultimately causing disruption in employment as workers move from work in one sector to another. The ability to employ so few people in the production of food and manufactured commodities can only be possible because of productive technologies that allows a small group of workers to provide the necessary agricultural and consumer products for the rest of society.

Not only can technological displacement diminish the need for workers in an industry or sector, its dynamics can completely obviate the need for humans to perform certain tasks, which can result in the elimination of entire job categories. Take the term "computer." A computer used to be a job title of a person who did routinized calculations for a business or organization.

[1] For some examples, in 2016 the United States employed 1.1% of its workforce in agriculture, 19.4% in manufacturing, and 79.5% in services. The European Union employed 1.5% in agriculture, 24.4% in industry, and 70.5% in services. Japan employed 1.2% in agriculture, 27.7% in industry, and 71.1% in services. For comparison, the entire world's workforce in 2016 was estimated at 6.4% employed in agriculture, 30.3% in industry, and 62.6% in services (CIA World Fact Book: https://www.cia.gov/library/publications/the-world-factbook/fields/2012.html).

However, with the advent of electronic computers that could do accurate mathematical calculations at a much faster speed than humans, the job title of computer was virtually eliminated. There came a point where even the fastest "human computers" could no longer keep up with the level of skill, accuracy, and cost effectiveness of an electronic computer to do the necessary work. Now the term "computer" is exclusively used to refer to machines, not to a job a human would perform (Brynjolfsson and McAfee, 2014, pg. 16). Obviously, with the changes in technology, the people who formally worked as "computers" were displaced and needed to find work elsewhere.

Overall, the process of technological displacement has been observed throughout the history of capitalism. However, this process typically develops slowly over time, and tends to create only temporary displacement of workers who are expected to find different jobs in other parts of the economy. The dynamics of technological advances and applications have usually caused economic disruptions for individual industries or sectors and have only directly affected narrow populations of workers. The dynamics of the economy have always eventually managed to find some new industry to reallocate displaced workers. For example, overall growth in the economy has allowed for continuous job growth. This contingent factor, among others, has prevented technological displacement of labor from becoming a long-term structural problem. There have been periods of popular concern over automation and the possibility for long-term structural unemployment, such as in the United States during the Great Depression and during the early 1960s, but the fears have never amounted to a large scale and long term structural unemployment that would threaten society (see, Woirol, 1996). There are cumulative long-term effects that can be observed as technology qualitatively changes the types of work people do and

the way they work, but there has never been long-term structural unemployment due to these changes.

Keynes versus Schumpeter: Technological Unemployment or Creative Destruction?

Despite the historical trends of technological displacement, observers of how technological change transforms society have speculated on the possibility of structural unemployment caused by technology at some point in the future. John Maynard Keynes was one of the first to theorize the power of technological change and its implications for the future of society in his famous 1930 essay "Economic Possibilities for Our Grandchildren" (1963 [1930]). Keynes observed that, even in the midst of the Great Depression, growth in output of material goods was occurring so rapidly that he predicted in the next 100 years industrialized economies may experience a phenomenon he termed "technological unemployment." His argument was that,

> We are being afflicted with a new disease of which some readers may not yet have heard the name, but of which they will hear a great deal in the years to come--namely, technological unemployment. This means unemployment due to our discovery of means of economizing the use of labour outrunning the pace at which we can find new uses for labour" (Keynes, 1963 [1930], pg. 3).

In other words, technology would rapidly advance to the point where jobs eliminated by technology would outpace the ability to create new jobs, thus leading to an unemployment trap for displaced workers who could not find economically viable work due to no fault of their own.

However, instead of seeing this as a negative development, Keynes instead saw technological unemployment as a sign that humanity was on a path toward solving the economic problem, creating the preconditions for a society based on abundance rather than scarcity. He envisioned that the advancing technology could lead to a society of mass *unemployment* where humanity's time would be spent on leisure instead of work. As he states, "for the first time since his creation man will be faced with his real, his permanent problem-how to use his freedom from pressing economic cares, how to occupy the leisure, which science and compound interest will have won for him, to live wisely and agreeably and well" (Keynes, 1963 [1930], pg. 5). Modern society, formally based on the assumption of the universal presence of scarcity and therefore the need to work, could soon be replaced by a society based on abundance, and Keynes felt the central social question in this scenario would be how would humanity live together in this radically new paradigm. While the endpoint of Keynes's one-hundred-year prediction still remains over a decade away, it is obvious that his vision has not yet been realized. On the one hand, technological progress and productivity have continuously grown just as Keynes predicted. On the other hand, the economy is still oriented around scarcity, and labor is still a universalized necessity even as it grows more and more scarce in number and precarious in nature in the neoliberal era. This contradiction, of a society where jobs are growing more precarious in the midst of material plenty, is a paradox that requires serious critical analysis.

Despite the boldness of these predictions coming from such as well-respected economist, Keynes's prediction of science and technology creating a future society of abundance was not seriously reflected upon at his time, especially as he was writing during the Great Depression. Instead, the question of technology's ability to displace labor and the potential for technological unemployment has been largely pushed into the background of mainstream economic discourse

(Woirol, 1996 pg. 1-15). Today, it is widely accepted by most economists that capitalism is a dynamic system propelled by what Joseph Schumpeter terms "creative destruction" (Schumpeter, 2003 [1942], pg. 81-86). He describes creative destruction as the new and innovative displacing the old in a dynamic process,

> Capitalism, then, is by nature a form or method of economic change and not only never is but never can be stationary… The fundamental impulse that sets and keeps the capitalist engine in motion comes from the new consumers' goods, the new methods of production or transportation, the new markets, the new forms of industrial organization that capitalist enterprise creates (Schumpeter, 2003 [1942], pg. 82-83).

This process of creative destruction necessarily does away with the older, less productive forms of production for newer and more productive forms. This has historically created greater surpluses of material wealth, as well as a total increase in jobs. Economists have largely understood the dynamics of technological displacement as a necessary result of the natural workings of the process of creative destruction. Thus, when technological disruptions have occurred, the displacement of workers has been largely framed as a natural result of economic progress. In addition, general economic growth, expansion of markets, and development of new commodities have been countervailing tendencies that keep the economy in equilibrium and has kept structural unemployment from becoming a problem on a large scale or in the long term. In other words, the process of creation has largely kept pace with the dynamics of destruction; therefore, the possibility of technological unemployment is unlikely according to this traditional economic model.

Automation and Technological Displacement: Is This Time Different?

The understanding of technological displacement as a manifestation of the "natural" economic process of creative destruction has held sway among most economists for decades. However, recent observations of trends concerning the progress of technology and transformations in the nature of work have inspired some questioning and dissent against the orthodox understanding of technological displacement and a revival of the idea that technological unemployment may indeed be possible in the near future. Observers and researchers point to the rise in information technology, advanced robotics, software, and artificial intelligence, as technologies with the potential to create a disruptive effect on the economy unlike any we have seen before. They point to technologies currently in development or on the cutting edge of mass market use, such as self-driving cars, 3D printing, virtual reality, and drones and extrapolate on the potential impacts each technology might have on the economy and employment (e.g. Brynjolfsson and McAfee, 2014 pg. 13-96; Ford, 2014, pg. 29-62). These observers argue that these new technologies are fundamentally different from previous forms of automation. Computer and information technologies have the capacity to automate both manual and cognitive tasks, rather than only routine manual tasks that have automated in the past (Frey and Osborne 2013, pg. 14-27). Highly advanced robots and sensors are producing vast quantities of commodities with very little direct human assistance, (Brynjolfsson and McAfee, 2014 pg. 13-38; Ford, 2014 pg. 1-29). Artificial intelligences are driving cars, writing sports articles and financial reports, trading stocks on Wall Street, and choosing the advertisements customers see online (see, Kaplan, 2015 pg. 61-75, 95-106). Big data and machine learning processes are allowing computers to recognize large scale patterns in data that humans cannot process and develop complicated algorithms that can be used to automate even more tasks once believed to be exclusively human endeavors (Kaplan, 2015, pg. 35-48; Ross, 2016, pg. 152-185). The

power and capabilities of these machines are slated to expand as multiple forms of computer technology from computer chips to screens have been improving at an exponential rate approximately every two years since the 1950s (Brynjolfsson and McAfee, 2011, pg. 12-27). There are even teams of scientists working to develop artificial intelligences that could one day meet or possibly exceed human intelligence (see, Bostrom, 2014).

On the one hand, these developments have the potential to transform how we live our lives and allow us to produce more and more material wealth. On the other hand, there is also a growing concern that this new wave of technology, or what could be collectively called the "next industrial revolution," may be capable of creating long-term structural shifts that result in technological unemployment. Researchers are now providing evidence that suggests that structural technological unemployment may soon become a reality due to the advanced nature of new technologies that can automate large swaths tasks traditionally done by humans (e.g. Frey and Osborne 2013; Hicks and Devaraj, 2015). The pace of development of these new technologies has become even more rapid in recent decades and many of these new technologies can penetrate branches of industry typically thought of as "safe" from automation (Frey and Osborne, 2013, pg. 14-22). This evidence is extrapolated upon by many social scientists, futurists, business leaders, and activists who argue that, due to the exponential increase in the power of new technologies allowing for a faster and more widespread process of technological displacement, there may be a time in the near future where the necessity for human workers will diminish greatly around the world. While other factors such as globalization, financialization, politics, and outsourcing play an important role in the increasing precarity of labor, there is an argument to be made that the underlying salient cause of these phenomena is ultimately the increasing productive and technical powers of automated machinery creating the necessary

preconditions for technological unemployment. It is these dynamics that are underlying the transformations of labor have largely been under-theorized by mainstream approaches.

The progressive advancement of natural science, our ability as a species to understand the natural world, has increased dramatically since the industrial revolution. The advancement in technical progress and control of our natural environment allowed by the industrial revolution rose prodigiously and in step with an equally steep rise in the human population. Clearly humanity's increase in knowledge and the application of this knowledge as embodied by improved goods, services, and productive machines are powerful drivers of the population explosion and the general increase in well-being for those who have access to these improvements. There is a clear inflection point where expansive rise of the human population since the mid-19th century was complemented with the development of highly productive labor saving technologies. The explosive rise also gives credence to the idea that modern society since the industrial revolution is a historically unique period compared with all previous eras in human history.

With the dawn of the industrial revolution and the rise of labor saving machines, corporations, businesses, and governments have applied the improved knowledge of nature to advance the spheres of production and distribution of goods and services. Because of the dynamic competitive imperatives of the global market economy, businesses are pressured to implement the latest technologies to effectively compete by saving labor costs and keeping up with industry production, price, and quality standards. If this pressure is applied in a new context where labor saving in one area of the economy is not being complemented with a rise in employment in other areas, the long-term culmination of this dynamic could result in potentially displacing human labor on a wide scale. These developments could have widespread economic

and social ramifications in modern societies because the social structure is centered around the generalized necessity for jobs, as most adults acquire money for themselves and their families through their work.

This begs the question, is there a point where a quantitative development of technologies that displace workers grows so rapidly, without compensating employment in other areas of the economy, that the quantitative change necessitates a qualitative change that transforms the economic and social structure of modern society? Was Keynes correct that technological unemployment is indeed in our future? And are the technologies being developed now the technologies that the economy and labor market cannot adapt to, resulting in technological unemployment? Does this development represent a looming crisis of modern society and of capitalism? Is modern society approaching what science fiction author and futurist Calum Chace (2016) calls the "economic singularity," a point where the normal rules of how the economy and society operate break down and the future of the social system becomes impossible to predict? The most pressing question on the minds of economists, business leaders and other analysts who observe this development is: *is this time different*? In other words, will the dynamics of creative destruction hold true in this new era of advanced robotics and artificial intelligence, or will they require a reimagining of how to organize society, or perhaps could these dynamics result in a disaster if left unaddressed? If this time is different, and advancing technology will cause massive technological unemployment, then the dynamics of recent and forthcoming waves of technological displacement will have significant social, economic, and political implications at all level of society. Governments and policy makers, businesses large and small, organizations of all kinds, individuals, and their families must all grapple with the tectonic shifts in the economy due to the increasing pace of technological change and the resulting technological

displacement. However, at present, it cannot be said for sure if the development of technological unemployment is inevitable, what form it will take, or even if mass technological unemployment will happen at all. The future is always full of contingency. Institutional action, policy implementation, organizational changes, and forms of individual and collective agency can shape the direction these developments take. Nonetheless, the implications of such a development indicate that the issues surrounding automation and technological displacement deserve serious attention by social scientists.

Thesis Summary

Over the last several decades, scholars and commentators from a variety of different fields, expertise, and ideological positions have written on automating technologies, the potential for technological unemployment, and explaining why they think this time will be or will not be different. Their aim has been to shape public discourse and influence policy makers to take some form of action to address the changes brought on by technology. This thesis intends to demonstrate that ideology plays a crucial role in how experts and commentators frame these issues. Many liberals worry that this time may indeed by different, and that the predicted technological displacement could greatly exacerbate economic inequality. However, liberals also often tend to be optimistic that sound policies can help transition the economy through waves of technological displacement. Conservative commentators contend that technological displacement will not cause structural technological unemployment and disruptions will most likely take on the same patterns of creative destruction observed in the history of capitalism. In other words, they argue that "this time" is no different than waves of technological change in the past. There may be economic disruptions and some degree of displacement, but technological unemployment is unlikely. Some radical commentators see this development as an opportunity

to think of new ways to organize society beyond wage labor. Numerous liberal, conservative, and radical social scientists, activists, journalists, business leaders, and various other commentators have written on this phenomenon and its trajectory, using the available evidence to speculate about the future of work in capitalist societies and the economic and social effects expected from the expansion of automation and artificial intelligence in production. There is an intellectual debate between these factions on what is the correct view of automation and technological displacement, as well as a looming political battle that may ensue when the anticipated problems of displacement manifest themselves on a wider scale and enter mainstream public discourse. These literatures of research, especially the ideologically oriented commentary surrounding it, are the primary subjects of interest in this thesis.

My project is located at the intersection of the issues of automation and technological displacement, and intended as a focused sociological analysis and critical examination of the related issues. My primary interest is not just in those issues themselves, but in how they are framed and understood through different ideological lenses. The aim of this thesis is to develop a conceptual map of how three major ideological positions—liberal, conservative, and radical—approach and frame the link between automation and technological displacement.[2] I employ the qualitative methods of ideal type construction and theme analysis to synthesize and reconstruct as an ideal type the most salient aspects of each ideological position's perspective on the link between automation and technological displacement. The goal is to demonstrate how ideology plays a key role in how expert researchers and commentators understand and frame the processes of technological displacement in the contemporary debate. A sociological understanding of

[2]As explained in detail in section 1.3 and 1.4, this work relies heavily on the work of Berkeley economist Benjamin Ward and his work *The Ideal Worlds of Economics* (1979) to frame my understanding and construction of liberal, conservative, and radical ideology.

ideology highlights how ideological position is centrally important to how we think about and interpret the social world (see, Mannheim, 1936). By categorizing arguments in terms of ideology, sociology is in a better position to analyze and critique current manifestations of the contemporary debate surrounding the issues of automation and technological displacement.

My secondary aim in this thesis is to critically analyze the three ideological positions and show how ultimately, the current arguments and debate are structurally flawed. In part three of my analysis, used methodology of ideology critique to explain how the mainstream debate between conservatives, liberals, and radicals, is devoid of a systematic critical understanding of the dynamics of modern society. In my critique, I rely especially on the works of University of Chicago historian Moishe Postone[3] and others from the critical Marxian school of value-critique[4] because their reinterpretation of Marx's critical theory promises to be the most effective framework for understanding the historical dynamics of capitalism and the transformations of labor humanity has experienced in the modern era.[5] I also argue that the critical concept of a "logic of capital" must be central to any understanding of the processes of automation and technological displacement.[6]

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[3] Especially his seminal work *Time, Labor and Social Domination: A reinterpretation of Marx's critical theory* (1993) as well as his later works, Postone (1997; 2005; 2009; 2015).
[4] See Kurz (1986), Trenkle (1998a), and Larson, Nilges, Robinson, and Brown (2014).
[5] This body of work and theory has unfortunately been largely overlooked by most sociologists, including sociologists who use a Marxian framework or analyze political economy. The analysis in Part 3 is implicitly meant to make a case for why value-critique is a useful framework for analyzing the dynamics of modern society that deserves more attention from sociology as a discipline.
[6] As will be discussed in more detail in part 3, comprehensively and systematically describing the logic of capital gives researchers a theoretical framework works toward explaining the underlying mechanisms and dynamics internal to capitalism that generate the automation of jobs and technological displacement.

Chapter by Chapter Summary

In the remaining sections of Part 1, I lay out my literature review, research approach, and methodology. Section 1.2 is a literature review of the three sources of literature relevant for this project: the literature on automation, on the transformations of labor in recent decades, and on the critical approach to ideology research. Section 1.3 describes my research approach by explaining how my thesis draws upon Weber's (2012) concept of the ideal type, Mannheim's (1936) sociological conception of ideology, and Ward's (1979) characterization of economic ideology. Section 1.4 describes in detail the three methodologies I used for this project: ideal type construction, inductive theme analysis, and ideology critique.

Part 2 presents Ward's ideal types and the themes I synthesized from the literatures I sampled. Section 2.1 "Ward's Ideal Types" summarizes the ideal types of ideology used in his work, *The Ideal Worlds of Economics* (1979), to use as a foil and aid in analysis for the following sections 2.2-2.4. Sections 2.2-2.4 constitute the primary body of the thesis. Here I explain the themes I found in the sampled works categorized by their ideological content and formed as an ideal type. It is broken up into how each ideology understands technological displacement, what policies they recommend to address the related issues, and how each ideology frames developments of technological displacement in the future.

Part 3 is where I conduct my critical analysis of the findings presented in sections 2.2-2.4. Section 3.1 explains the framework drawn upon, the reinterpretation of Karl Marx's critical theory known as value-critique. Section 3.2, uses the method of ideology critique and the critical Marxian framework of value-critique to develop a critical analysis of my findings from sections 2.2-2.4. Section 3.2 is the conclusion to the study.

1.2 Literature Review: Automation, Work, and Ideology

This literature review will focus on three key literatures drawn upon in this thesis: the literatures on automation, work, and ideology. The automation literature highlights a brief history of waves of automation scares and professional debates surrounding automation, what is known about what is typically automated and what is not, and how contemporary technologies are driving the current and forthcoming waves of automation. The literature on work outlines how the nature of jobs and economic inequality have changed from the Post-World War II Fordist era of the 1940s through the 1970s, into the neoliberal era of around the 1980s to the present. It generally outlines how work has become more precarious through increasingly disruptive recessions, jobless recoveries, and labor market polarization as well as how income and wealth inequality has risen since the 1970s. The literature review of ideology describes the critical tradition of ideology analysis used in this thesis. The review of each concept will not be comprehensive because each ideology analyzed borrows from these common literatures and uses each in a unique way for its own ends. Many of the basic ideas reviewed here will be expanded on and discussed in more detail in Sections 2.2-2.4. This review is meant, in part, to provide a basic common understanding of the problems to be discussed in subsequent sections. It is also meant to describe the socio-historic circumstances of the contemporary debate that my sampled authors are responding to in their works.

Automation

History of Automation

One of the first recorded instances of fear of automation and technological displacement in the modern era was spurred by the invention of a stocking frame knitting machine by English inventor William Lee in 1589. His aim was to relieve England's textile workers of the necessity to hand knit clothing. However, when he applied for a patent for his invention, Queen Elizabeth the 1st observed the machine and concluded, "Thou aimest high, Master Lee. Consider thou what the invention could do to my poor subjects. It would assuredly bring them to ruin by depriving them of employment, thus making them beggars" (Acemoglu and Robinson, 2012, pg. 182-183). The fear of the technological innovation rupturing the status quo of the guild system was so intense that William Lee was coerced to leave Britain (Acemoglu and Robinson, 2012, pg. 182-184). Centuries later however, the British industrial revolution (approximately 1750-1850) would fundamentally change the relationship between technology, workers, and production. The cautionary traditions of the guild system were being degraded, the modern conceptions of property rights for the factors of production, land, labor, and capital, were being formed during this time, and the modern social relations between labor and capital were becoming universalized (Marx, 1976 [1867] pg. 873-940). Concerning the relationship between invention of labor saving technology and labor, the English parliament passed property rights laws that made destruction of machinery punishable by death (Mokyr, 1990, pg. 257). The Luddite riots in England between 1811 and 1816 are the often-cited example from the period of resistance to implementing productive machines in manufacturing. The Luddites attempted to smash the machines that were threatening to make their skills and their labor superfluous, but in response

the British government took a stand against those who would halt technological progress in the name of jobs and deployed 12,000 troops to quell the Luddite rebellion (Mantoux, 2006, pg. 403-8).

The Industrial Revolution that began in Britain helped spur the continuous development of improvements in technology that would have disrupting effects on the status quo division of labor in society, beginning with the advent of steam power and the railroad, as well as organizational innovations such as the factory system. Steam power, the factory system, and the railroad are three examples of what economists call general purpose technologies (GPTs). Wright (2000) defines GPTs as "deep new ideas or techniques that have the potential for important impacts on many sectors of the economy" (pg. 161-162). In other words, GPTs such as steam power are technologies that can be widely implemented across many or all sectors of the economy to transform how commodities are produced and traded. GPTs are known to greatly increase productivity, material wealth, and spur the implementation of labor-saving technologies, as well as new organizational forms and techniques of production.

It was also during the early period of the Industrial Revolution that economics was becoming a formalized social science thanks to the works of the classical political economists such as Adam Smith, Jean Baptiste Say, Thomas Malthus, David Ricardo and others. Many of the classical political economists wrote about how technological change effects employment. However, most reached the conclusion technological displacement could not be a long-term threat to economic stability because compensatory mechanisms such as Say's law[7] or the wages-

[7] Say's Law is the notion that supply creates its own demand. If technology increases productivity and therefore increases the supply of goods, demand for those goods will also rise, which necessarily stimulates demand for more labor, "the very existence of this equal or larger supply creates an equal or larger demand. Since there is no decrease—and most likely an increase—in total demand, Say's Law implies it is only a matter of time before any displaced workers are reemployed" (Woirol, 1996, pg. 18).

fund theory[8] would make any technological displacement only a temporary labor market adjustment problem (Woirol, 1996, pg. 17-23). The classical political economists appeared to agree that technological change could not cause long-term unemployment, and this consensus would largely be held as the default position of the discipline of economics, even though specific explanations for why this is the case has changed as dominant paradigms rise and fall within the discipline.

Despite the consensus of the classical political economists, there remained some dissident voices. Karl Marx, the famous critic of the classical political economists, saw the dynamics of technological displacement to be a key component of his critique of political economy. In *Capital*, Marx explained how capitalist economies both expel workers through the increasing use of advanced machinery, but also attracts them back into the labor process through processes of reallocation of labor and economic growth (Marx, 1976 [1867])[9]. Marx used the term "industrial reserve army of labor" to describe those who were temporarily technologically displaced due to the dynamics of automation (Marx, 1976 [1867], pg. 781-794). In *Capital*, Marx is attempting to explain the implications of technological advances and employment through his categories of variable capital, constant capital, and relative surplus value, however, Marx does not fully explicate the long-term implications of this historical dynamic in *Capital.* Marx's most detailed treatment of the dynamics of technological change and labor is found in his unpublished work the *Grundrisse* (1973 [1858]); a work that could not have influence on the

[8] In wages-fund theory, technological change could only effect employment if it decreased the volume of circulating capital. However, "…capital investment was noted to be a relatively slow process, and new fixed capital was held to be financed almost always out of profits or rents. Since the amount of circulating capital was affected only infrequently, the general result was that the wages fund is maintained or increased by technological change, and thus reemployment of displaced workers eventually takes place" (Woirol, 1996, pg. 18).
[9] See particularly chapter 15 "Machinery and Modern Industry" pg. 492-639, and chapter 25 "The General Law of Capitalist Accumulation" pg. 762-870 in Marx (1976 [1867]).

debates of his time because it would not be published until nearly a century later in 1939.[10] Marx's views as presented in *Capital* were largely dismissed by economists, held to be "simply wrong and irrelevant," and would not be integrated into mainstream economics (Woirol, 1996, pg 21). However, Marx's treatment of technological displacement continued to have a following in certain Marxian schools of thought (e.g. Kurz, 1986; Postone, 1993). Even still, Marx's treatment of technological displacement and technological unemployment would not have a prominent position in most mainstream Marxist social or political thought, or what Postone (1993) terms "traditional Marxism."

After approximately 1870, the question of how technological change effects employment largely disappeared as a topic of discussion among economists. In light of the general upward trends in investment, production, employment, and living standards, the employment effects of technological change was no longer believed to be a relevant problem of interest to economics (Woirol, 1996, pg. 20-22). With the rise of neoclassical marginal economics, technological change was believed to only be a disturbance that would inevitably be offset in the long run by price adjustments[11] (Woirol, 1996, pg. 21). During this period of the late 19th and early 20th century, the productivity of machines continued to increase and new GPTs such as electricity and the internal combustion engine began to greatly transform productive capacities as well as create the preconditions for new products that would transform the economy such as the automobile. In addition, this area brought about process and organizational restructurings such as Taylorism's form of "scientific management" of the workforce, as well as assembly line, and mass production

[10] Marx's view of automation and technological displacement is explored in detail in Section 3.1 of this thesis.
[11] According to Woirol (1996), "…neoclassical theory took full employment as the characteristic equilibrium condition of an economy and viewed technological change as one factor among many that may disturb that equilibrium. Like all disturbances, technological change was seen as setting in motion price adjustments that guaranteed a new full employment equilibrium" (pg. 21).

techniques (see, Stark, 1980; Kurz, 1986). The integration of these technologies and techniques into social life such a great impact that some commentators have termed this era the 2nd Industrial Revolution (e.g. Schwab, 2016). These technologies and new organizational forms helped fuel the increase in production and living standards which contributed economists' confident optimism.

Technological unemployment did not become a renewed topic of professional or popular discussion until the publication of the first reliable productivity statistics by the Bureau of Labor Statistics (BLS) in the mid-1920s (Woirol, 1996, pg. 23-25). These studies provided evidence for the first time that productivity was increasing in industries such as mining, agriculture, railways, and manufacturing, [12] yet unexpectedly, employment in these same industries were decreasing.[13] These dramatic findings reignited the debate on technological unemployment among economists, and launched the issue into popular consciousness[14] (Woirol, 1996 pg. 23-33). This debate only intensified in the 1930s with the Great Depression creating unprecedented levels of unemployment. In the popular press, commentators were largely worried that "The robots are rolling up a permanent surplus of labor, a perpetual roll of unemployment" (Knappen, 1930, pg. 68). This concern for technological unemployment inspired reactions against technological change, such as suggesting a "moratorium on technological change through a holding action by the patent office," a popular movement to tax machinery, and lobbying through

[12] "The Census and Commerce data showed increases of 40 percent and 41 percent [in manufacturing productivity] over a similar period [1919 to 1925]. The Commerce data also showed productivity increases of 9 percent in railroads, 27 percent in mining, and 18 percent in agriculture" (Woirol, 1996, pg. 24).
[13] "The Commerce data, with a base of 1918-1920 = 100, showed in 1924-26 employment in manufacturing at 91.5, employment in mining at 100, employment in agriculture at 95, and employment in railways at 91.5" (Woirol, 1996, pg. 24). In other words, the data showed a slight decrease in employment in three of the four industries from 1918 to 1926.
[14] It is in the context of these debates that John Maynard Keynes wrote his essay, "Economic Possibilities for Our Grandchildren" (1963 [1930]) as discussed in the introduction.

groups such as the National Organization of Labor-Saving Devices active in the 1930s (Woirol, 1996, pg. 36). Some economists argued in the terms of economic theory whether, "there were automatic mechanisms in the economy that guaranteed the reemployment of technologically unemployed labor" (Woirol, 1996, pg. 72). The conclusion they reached was that the neoclassical model of price adjustments could assuage any technological displacement.[15] Empirically, economists debated whether technological change did indeed effect aggregate unemployment in the 1920s and in the 1930s during the Great Depression. However, the data was limited in both quantity and quality, therefore the empirical debates were largely left unresolved (Woirol, 1996, pg. 35-45).

World War II effectively ended both the popular and professional debate on technological unemployment of the 1920s and 30s. Instead of being concerned for the unemployed, the paradigm changed virtually overnight to a focus on finding enough workers to fill the needs of the wartime economy (Woirol, 1996, pg. 69-76). Both popular and professional concern over technological unemployment occurred when there was economic hardship, but largely disappeared once the economic situation improved and the depression ended. The near full employment conditions during and after the war obviated the need to discuss technological displacement for nearly two decades. However, changes in the late 1950s and early 1960s gave rise to a new debate on the possibility of structural unemployment caused by automation and the shifting skill requirements of the economy (Woirol, 1996, pg. 77-91). Automation, the automatic control of production machinery without human intervention, was developed during World War II, and would not become a popular term until its use in 1948 by the Ford Motor Company

[15] The consensus is summed up by economist Edna Lonigan as, "technological change… tends constantly to accompany rising, not falling employment… if technological progress is *not* followed by rising employment, it is a result of some malfunctioning of the price system or of debt, capital and investment, not of invention" (1939, pg. 248).

(Woirol, 1996, pg. 77). It did not become an issue of popular concern until the early 1960s. Treatises such as "Cybernation: The Silent Conquest" (1962) and the "Triple Revolution" (1964) framed automation as machines and computers replacing the need for human workers at a rapid rate (Michael, 1962; The Ad Hoc Committee on the Triple Revolution, 1964).

Despite the popular anxiety, the consensus among economists largely remained optimistic that automation should not be a concern, yet it had also changed in key respects. By this time, the professional consensus had shifted to the dominance of Keynesian economics. The neoclassical notion of price changes as the automatic adjustment mechanism was no longer the dominant explanation, and instead it was accepted that theoretically there was no mechanism that guaranteed the full absorption of displaced workers or would render technological displacement impossible (see, Nessier, 1942). However, while there was no reason theoretically to believe that technological change and market dynamics could not produce technological unemployment, the Keynesian paradigm postulated that Keynesian policies of government intervention and manipulation of aggregate demand could, "handle all problems of technological unemployment" (Woirol, 1996, pg. 78). In other words, Keynesian interventionist policies could be an effective cure for technological unemployment should it appear.

However, the new professional debate emerged around the fact that unemployment had stubbornly remained above 5 percent since 1957, despite the insistence that Keynesian policies should be able to create and maintain full employment at 4 percent. The first question was whether this "extra" unemployment had structural causes due to automation or changes in the composition in the labor market of skill level, age, sex, or race? The second question was could this be ameliorated through policies that stimulate aggregate demand alone, or were structural adjustments to the labor market necessary? (Woirol, 1996, pg. 77-91). Economist Charles

Killingsworth, the most ardent proponent of the structural argument, contended that technological change and structural economic changes led to "decrease the number of low-skilled and unskilled jobs available and to increase very greatly the demand at the high-skill levels" (Cited in Woirol, 1996, pg. 95). In essence, automation was creating a paradox between the jobs available in the economy and the skills of workers. Low-skilled manual labor was less in demand, high skilled knowledge workers were high in demand, and the, "labor supply could not adjust to the new structure of labor demand quickly enough. The result was the upward creep in unemployment that had been evident in the United States since 1948" (Woirol, 1996, pg. 104). The question of whether automation and structural changes had resulted in higher unemployment were never fully resolved as these debates, like the technological unemployment debates of the 1920s and 30s, would end due to the onset of war. The Vietnam War helped spur the economy and employment, which reduced the level of unemployment back down to be either at or below what is considered full employment at 4 percent (Woirol, 1996, pg. 127-128). Again, the concern over technological displacement and structural unemployment began with the rise of popular concerns and anomalous economic trends, but effectively ended once the economy substantially improved.

The debate over structural unemployment was spurred by the growth of mass consumer production under the Fordist model, but also crucially by the Computer Revolution that began in the 1960s and that is essentially still ongoing. The first use of computers and industrial robots began in the 1960s. The development of computer technology in the 1940-1960s brought a new GPT that would transform the economy: Information technology. With computers and information technology, manual tasks and manufacturing could be automated with the increasing skill and complexity of robots controlled by artificial intelligence. However, advances in

information technology since the 1960s have transformed the economy because information technology and artificial intelligence can also automate cognitive tasks as well. The knowledge work that structuralist economists argued was in high demand during the 1960s were tasks previously thought to be "safe" from automation due to the necessity for complex cognitive skills, but information technology and artificial intelligence is quickly encroaching on areas of knowledge work. The development of the internet and online commerce also represents a GPT that has changed many aspects of the economy since the 1990s. Together, information and computer technology, robotics, artificial intelligence and the internet are all deeply embedded in our economy and in social life. As Silicon Valley CEO and software engineer Martin Ford argues,

> There are very few aspects of our daily lives, and especially of the operation of businesses and organizations of all sizes, that are not significantly influenced by or even highly dependent on information technology. Computers, networks, and the Internet are now irretrievably integrated into our economic, social, and financial systems. IT is everywhere, and it's difficult to even imagine life without it (Ford, 2015 pg. 72).

The development of these technologies, their increasing capability to augment or replace human labor, and the general atmosphere of economic pessimism after the 2008 financial crisis would foster renewed debate on the issues of automation and technological displacement with the emergence of the contemporary literature analyzed in this project.[16]

[16] This raises the historical question of whether the contemporary debate is occurring because of similar contingent historical factors such as the financial crisis and contemporary concerns over outsourcing, immigration, and other issues that raise economic pessimism. In other words, would discussion about technological displacement and automation today abruptly end if there was an economic boom or a major war? This question is examined more in Section 3.2.

The Capabilities of Automation

This section of the review describes what social and natural scientists know about automation in the twenty first century; what can be automated, what cannot, and why. This is important because the contemporary debates over automation and the possibility of technological unemployment largely revolve around the questions of, what can be automated, what will be automated, how will new technologies transform the economy, does this forthcoming transformation warrant concern, and does it warrant intervention? The root of the answers to these questions comes down to how one answers the first question of, what can be automated now and what is expected to be automated in the future? This section does not go into detail about specific technologies such as self-driving cars or 3D printing, but instead take a broader and more abstract approach to describe what we know now about what information technology, robots, and artificial intelligence can do what processes are driving automation forward.

To understand what can be automated, it will be helpful to categorize the different types of tasks people perform in a job. Autor, et al. (2003) provides a useful framework that distinguishes job tasks in a two by two matrix of routine and non-routine tasks on one axis, and cognitive versus manual tasks on the other. Routine tasks follow explicit rules and follow consistent movements that are continuously repeated for a desired result. Non-routine tasks do not follow a determined plan or follow specified rules, they require flexibility and the application of multiple skills in different combinations. Manual tasks require bodily action to perform by manipulate physical objects, commonly associated with factory work or construction. Cognitive tasks require active thinking and usually involves symbolic manipulation of words, numbers, or abstract ideas. Manual tasks can be either routine or non-routine, such as a routine factory worker versus a non-routine caregiver job. The same distinction applies to cognitive tasks, such

as a routine clerical or administrative worker versus the non-routine job of a manager or lawyer. Some jobs combine different categories of tasks in the performance of a given job, therefore automation of certain tasks in a job might not automate the entire occupation away. Nonetheless, automation of tasks can transform how a job is done, or possibly eliminate the job category entirely, given the right conditions.

The history of automation up until the last few decades has largely been a story of increasing automation of routine manual tasks. Before the Industrial Revolution and rise of the factory system, the guild system required highly skilled workers doing both routine and non-routine manual tasks, and yielded significantly lower productivity. However, with the factory system's complex division of labor and the development of complex mechanical labor-saving machines, commodity production could become routinized and the threshold of skills the workers needed to perform these routine tasks becomes continuously lowered (see, Braverman, 1974). As these machines became better and more productive over time, less and less human labor is required for a larger total product. As discussed in the previous section, the concerns of automation in the 19th century and in the technological unemployment debates of the 1920s, and 30s, the primary concern was how jobs that require primarily routine manual tasks were declining despite increased productivity and output. The structural unemployment debates of the 1960s were also concerned with the automatization of routine manual tasks, but also how the structure of the economy was shifting from having a high demand for low-skilled routine manual work toward an economy requiring more high-skilled knowledge workers, and thus building an economy more based around cognitive tasks (Woirol, 1996, pg. 93-109).

The automatization of manual routine tasks continues today as industrial robots guided by highly advanced software have the capabilities to greatly reduce the need for human workers on

the factory floor. Today's industrial robots have the capacity to automate nearly all aspects of manufacturing jobs because as Acemoglu and Autor (2011) state, **"**the core job tasks of these occupations follow precise, well-understood procedures, they can be (and increasingly are) codified in computer software and performed by machines" (pg. 1076). To take a recent example, in one Chinese mobile phone factory, the plant reduced its human workers from 650 employees to a mere 60, and replaced the rest with industrial robots. Despite the severe reduction in workers, the plant experienced a 250% increase in productivity and an 80% drop in product defects (Andrei, 2017). This is an example of a direct loss of jobs for people who were formally employed in routine manual manufacturing activity. However, increases in productivity in manufacturing do not only eliminate existing jobs, but also obviate the need to hire new workers despite increased demand. In a study of manufacturing in the United States in the late 20th and early 21st centuries, it was determined that rising levels of productivity were making it unnecessary to hire more manufacturing workers (Hicks and Devaraj, 2015). As Hicks and Devaraj (2015) state, "Had we kept 2000-levels of productivity and applied them to 2010-levels of production, we would have required 20.9 million manufacturing workers. Instead, we employed only 12.1 million" (pg. 4). What this means is that both demand and production in manufacturing increased in the United States, but productivity increases meant that production could meet increased demand without the need to hire new workers. This is a hidden impact that productivity increases have on employment that is not as easily ascertained. But this relationship is clear when observing the gap between output and employment at different levels of technological development. Here we can see that automation of routine manual tasks not only expresses itself as direct job shedding of existing workers, but also by making it unnecessary to hire new workers.

While the automation of routine manual tasks has created technological displacement since the Industrial Revolution up the present, what makes the contemporary situation unique[17] is that information technology, robotics, and artificial intelligence are capable of automating routine cognitive tasks as well. According to Autor and Dorn (2013) and Goos, et al. (2009), routine tasks, both cognitive and manual, follow explicit rules that can easily be automated by modern computers, while both non-routine cognitive and manual tasks are significantly more difficult for machine programs to automate. Thus, as opposed to previous eras where primarily only routine manual tasks could be automated, the salient determinant of automation today is not whether the job is manual or cognitive, but whether the tasks involved are routine or non-routine. As economist Carl Frey and computer scientist Michael Osborne (2013) summarize,

> While technological progress throughout economic history has largely been confined to the mechanization of manual tasks, requiring physical labor, technological progress in the twenty-first century can be expected to contribute to a wide range of cognitive tasks, which, until now, have largely remained a human domain (pg. 19).

Because the range of tasks susceptible to automation has expanded, the potential impact of new automatizing technologies grows in scale and scope. Indeed, the ability to automate even routine cognitive labor could have a large effect on labor markets. The McKinsey Global Institute (2013) estimates that machine learning based algorithms could substitute for an estimated 140 million full-time knowledge workers worldwide (see also, Frey and Osborne, 2013, pg. 19). According to Frey and Osborne's detailed quantitative study of 702 occupations in the US, approximately 47 percent of US working population is employed in occupations that are determined to be at

[17] Or as phrased in the introduction, *what makes this time different*?

high risk of becoming automated in the next two decades (2013 pg. 38). This high-risk pool includes both the routine manual and manufacturing occupations typically associated with automation, but also includes parts of non-manufacturing sectors such as jobs in the service industry, agriculture, professional work, and various forms of cognitive labor.[18]

Despite the expansion of what can be automated, there still remain some significant bottlenecks and barriers to computer driven automation. Computers and robots are not adept at fulfilling non-routine manual or cognitive tasks. For example, Frey and Osborne (2013) find in their study that the jobs that are least likely to be automated are those that require high levels of social intelligence, creativity, and exceptional perception and manipulation skills (pg. 22-28). Therefore, professions such as public relations specialist, (high social intelligence), fashion designer (high creativity), and surgeon (requires advanced perception and manipulation skills) are all unlikely to be automated by a machine intelligence in the near future because those jobs require performance of complex non-routine tasks (see, Frey and Osborne, 2013; Bakhshi, Frey, and Osborne, 2015).

However, Frey and Osborne (2013) note that the benchmark for what is non-routine is continuously changing, and the advancing power of computer technology is redefining what constitutes non-routine tasks (pg. 15). For example, for scholars writing in the early 2000s such as Autor, et. al. (2003) and Levy and Murnane (2004) driving was considered a highly complex non-routine task that had a very low chance of being automated. However, less than a decade later, Google introduced its models of self-driving autonomous vehicles. As of 2012, these autonomous cars have driven over 300,000 accident-free miles, and data has been released

[18] The statistical likelihood of automation for all 702 occupations can be found in the appendix of Frey and Osborne (2013) pages 57-72.

indicating that Google's cars outperform human drivers in terms of general defensive driving practices (Ford, 2015, pg. 183). This is just one example of how what was considered non-routine at one time can become routinized and automated as the computing power and capabilities of machines improve.

An important question to ask then is, how is it that information technology, robots, and artificial intelligence are improving in their capacity and ability to automate an increasing number of tasks? While the full answer is multifaceted and contingent, this section points toward four main trends and processes that largely explain the exponential increase in the power and capabilities of machines: Moore's Law, big data, machine learning, and narrow artificial intelligence.

Moore's Law

According the Brynjolfsson and McAfee (2011, 2014) increases in the power and capabilities of technology and artificial intelligence has been largely due to an observed phenomenon called Moore's Law. Moore's Law is a crucial dynamic that is propelling the dramatic increases in the processing power of technology. This is not a law derived from natural science, but an observation that the number of transistors that can fit in a dense integrated circuit has been doubling approximately every two years since about 1958 (Brynjolfsson and McAfee, 2011, pg. 12-27). Similar observations of exponential growth every few years has been seen in micro-processors, memory capacity, sensors, and the number of pixels on device screens (Brynjolfsson and McAfee, 2014 pg. 47-56). In other words, multiple aspects of technology, from the processing power, sensors, memory etc. are all doubling in power approximately every two years. This is an exponential increase in the general capabilities of technologies, and as Frey and Osborne (2013) note, Moore's law has largely contributed to the decrease in price of many

kinds of technical devices from personal computers to cell phones to technologies that can automate labor, which creates "vast economic incentives for employers to substitute labour for computer capital" (pg. 14). Indeed, over the past decades, prices for robots have fallen about 10 percent annually, and according to the McKinsey Global Institute (2013), prices are slated to decline at an even faster rate in the near future (pg. 83). Moore's Law has two important effects on the future potential of automation. First, if Moore's Law remains true for the foreseeable future, the exponential increase of processing capabilities could give these machines the necessary computing capacity, speed, and power to automate a wider range of tasks faster and more efficiently. Secondly, Moore's Law consistently makes the improved processing power cheaper, making automation both more accessible and more attractive economically. Taken together, this exponential growth in the power of technology is an important factor in what is driving automation now, and what will continue to drive the potential to automate more jobs in the future.

Big Data and Machine Learning

Former Senior Advisor of Innovation under Secretary of State Hillary Clinton Alec Ross describes the immense importance of data today in this analogy, "Land was the raw material of the agricultural age. Iron was the raw material of the industrial age. Data is the raw material of the information age" (Ross, 2016, pg. 152). The term big data describes how the large amounts of raw digitized data generated everyday can be analyzed by computers and used to understand large scale data trends. The rise in big data stems from two sources. First, the increase in the power of computers, thanks to exponential improvements by processes such as Moore's Law, allow modern computers to handle and analyze the vast amounts of data being produced. Secondly, the data itself is becoming more abundant as everyday life in modern society becomes

focused on daily human-computer interactions. Private companies collect approximately 75,000 data points about the average American consumer, and every minute, approximately "204 million emails are sent, 2.4 million pieces of content are posted on Facebook, 72 hours of video are posted on YouTube, and 216,000 photos are posted to Instagram" (Ross, 2016, pg. 154). Approximately 5.6 zettabytes (or 5.6 trillion gigabytes) of data was produced in 2015 (Ross, 2016, pg. 154). With the co-development of computing power and the expansion of data, the stage is set to utilize this data and produce analysis and algorithms that can improve production and the capabilities of machines that can automate labor.

The way computers use big data to create better algorithms that can perform an expanding range of tasks is called machine learning. A common adage holds that computers are only able to do what humans program them to do, yet machine learning techniques prove this is not always necessarily true. Instead of human programmers needing to create software that can anticipate all possible contingencies, machine learning techniques take in examples of the task to be done and large amounts of data that create algorithms that essentially improve themselves over time the more data is supplied. As computer scientist Jerry Kaplan describes, old programming techniques required programmers to predefine all logical rules the algorithm will follow, but with machine learning, "Rather than tell the computer *how* to solve the problem, you show it examples of *what* you want it to do" (2015, pg. 24). In other words, machine learning constitutes the ability of computers to "automatically refine its methods and improve its results as it gets more data" (Brynjolfsson and McAfee 2014, pg. 91).

If big data is the raw material for the machines, then machine learning is the processor of this raw material to create sophisticated algorithms that can routinize tasks previously considered

non-routine. As Frey and Osborne state, large amounts of data are necessary for machine learning to work as,

> …data is required to specify the many contingencies a technology must manage in order to form an adequate substitute for human labor. With data, objective and quantifiable measures of the success of an algorithm can be produced, which aid the continual improvement of its performance relative to humans (pg. 15).

Therefore, while automation has been primarily confined to explicitly rule-based routine tasks, (Autor, et al., 2003; Goos, et al., 2009; Autor and Dorn, 2013), machine learning techniques paired with large enough quantities of data can develop algorithms that can recognize patterns, account for contingencies, and ultimately substitute for labor in non-routine cognitive tasks (Brynjolfsson and McAfee, 2011; McKinsey Global Institute, 2013; Frey and Osborne, 2013). In other words, automation has the potential to spread to tasks previously considered non-routine if big data is available, which is becoming a significantly wider portion of economic activities (Brynjolfsson and McAfee, 2011; Frey and Osborne, 2013).

Narrow AI Versus General AI

Finally, the development of artificial intelligence drives automation forward. Artificial intelligence obviously implies machine competence in cognitive skills, but advances in artificial intelligence software also allows industrial robots to preform increasingly complicated physical tasks as well. However, some clarifications need to be made in how the term artificial intelligence is used in this thesis. There is a commonly held misconception that artificial intelligence has not yet be achieved yet because we do not yet have a machine with a comparable level of intelligence to a human being. This idea confuses two different types of artificial

intelligence: artificial narrow intelligence and artificial general intelligence (AGI). An artificial general intelligence is a machine intelligence that could perform any intellectual feat that the typical adult human could (Chace, 2016, pg. 3). Of course, no contemporary machine can do this, and thus an artificial general intelligence does not yet exist. However, there are many kinds of artificial narrow intelligences that can perform exceptionally well at tasks the algorithm is meant to perform, but is not capable of branching out into learning new unrelated tasks. For example, programmers have developed chess programs that have superhuman chess skills that can defeat any human opponent easily, but this program is not capable of learning another board game on its own, much less sell a chess set or walk up a flight of stairs (Cowen, 2013, pg. 135).

This may make contemporary artificial intelligence programs appear underwhelming however, artificial intelligence does not need to be an artificial general intelligence to automate jobs and instigate technological displacement. As futurist Colin Chace argues,

> The fact is that machines don't need to become [artificial general intelligences] to displace most of us from our jobs. They simply have to become better than us at what we do for a living… And of course, once a machine can do your job, it will quickly be able to do it faster, better and cheaper than you can. Machines don't eat, sleep, get drunk, tired or cranky. And unlike human brains, their abilities continue to improve at an exponential rate (Chace, 2016, pg. 269).

Indeed, artificial narrow intelligence is all that is needed to perform the specialized, routine, and predictable tasks that many people across many sectors of the economy are employed to do. However, this is obscured in society at large because it is commonly assumed that a true artificial intelligence must have the capabilities of an artificial general intelligence, and therefore, artificial intelligence is often seen as something that only exists in the future or in science fiction. This

attitude misses how various forms of narrow artificial intelligence, from the Google search engine to Apple's Siri are already applications of artificial intelligence that many people interact with daily. However, the fact that most people in modern society daily interact with several forms of artificial intelligence is rarely consciously reflected on. Chace (2016) describes this attitude as, "…once a machine is able to perform a particular task, we usually stop calling it artificial intelligence. This is known as Tesler's Theorem, which defines artificial intelligence as that which a machine cannot yet do" (pg. 61). In other words, artificial intelligence surrounds us, yet people consistently push AI into the nebulous future by changing the benchmark of what counts as AI. An AI does not need to be an artificial general intelligence to be effective in automating a certain tasks or jobs. This thesis primarily focuses on the ability of various forms of narrow artificial intelligence and their potential to displace labor. This is done for several reasons. Firstly, the writers in the sample primarily discuss only narrow artificial intelligence because artificial general intelligence is not yet within reach. Secondly, the potential implications of artificial general intelligence, or of a superintelligence, a machine intelligence that greatly exceeds human intelligence, is at this point too speculative to consider here (see, Bostrom, 2014). Nevertheless, the sociological implications of the arrival of an artificial general intelligence or superintelligence appearing sometime in the future are nonetheless important and deserve attention from sociologists.

With enough computing power and big data, and by using sophisticated machine learning to develop complex algorithms and narrow artificial intelligences, what were considered non-routine tasks can become simplified and routinized into algorithms, programs, and specialized robots that can perform those tasks more effectively and more cheaply than a human worker. Therefore, these developments allow automation to evolve and branch out into areas previously

thought of as "safe" from automation. What is and is not automatable is never static, but is in a state of constant flux given the evolution in technology's capabilities.

Work

The literature on labor and how it changes over time is prodigious. The aim here is to give a review of the literature that describes some of the macro level transformations of work and economic inequality over the course of the late twentieth and early twenty-first century. In other words, the aim is to describe how the conditions of work, wages, income and wealth inequality, what jobs are being created and destroyed, and how this have evolved since the transition from the Post WWII period of Fordist-Keynesianism to the current era of neoliberalism and widespread globalization. Multiple contingent forces play a role in the developments described, not just automation and technological displacement. Multiple works have described how other social forces such as neoliberal policy and ideology (e.g. Harvey, 2005; Centeno and Cohen, 2012), globalization (e.g. Shefner and Fernandez-Kelly, 2011), and financialization (e.g. Krippner, 2005; Mirowski, 2009), have all contributed to some of the transformations of labor described here. Nonetheless, it is important to grasp how the nature of jobs has transformed in recent decades to understand the necessary context for the contemporary debate on automation and technological displacement, and how automation and technological displacement have played a role in these developments.[19] Indeed, many of the sampled commentators directly draw from and comment on many of these trends to base their ideological and policy claims. Therefore, it is important to give a rendition of the current context to understand what are the problems and social context these writers are responding to.

[19] Of course, each of these phenomena are significant enough to have literatures in their own right, but the purpose of this literature review is to describe in broad strokes the trends in labor over the last several decades.

The first phenomenon of significance is that productivity and wage growth have diverged since the late 1970s (Mishel, 2012). From 1948 to the early 1970s, wages and productivity rose together in near perfect lock-step. However, since the 1970s, hourly compensation has become largely stagnant, while productivity has continued to rise, resulting in productivity rising 254.3% from 1948 to 2011, while wages only rose 113.1% in the same period (Mishel, 2012). This general story is reflected in the evolution of the median income over the same time-period. Between 1949 and 1973, US median income doubled from around $25,000 to $50,000 (Cowen, 2011, pg. 15). During this period, growth in income largely grew in tandem with the growth in per capita GDP. However, after 1973, median incomes grew at a much slower rate and were no longer closely correlated to GDP growth (Cowen 2011, pg. 15). If median incomes continued to rise as they had done in the past, the current median income would be around $90,000, instead of $61,000 as it was in 2011 (Cowen, 2011, pg. 15).

Secondly, labor's share of national income has been in decline as well. Labor's share of national income is a portion of the total amount of income distributed during a given year. A certain amount is paid out as wages and benefits to workers and the remaining portion is distributed as returns to the owners of capital. It has been a commonly held belief that the capital-labor split of national income remains largely stable over time. Economist Arthur Bowley first presented evidence of this trend in the early twentieth century, and it has largely been considered a truism among economists for most of the 20th century (Piketty, 2014, pg. 219). However, in Piketty's (2014) rigorous longitudinal study, it was established that the capital-labor split of national income has not been stable over the last two centuries, and furthermore, the amount of income accruing to returns on capital has been increasing since the 1970s. According to Piketty (2014), capital income absorbed between 15 to 25 percent of national income in rich

countries in the 1970s, and between 25 and 30 percent of national income between 2000-2010 (pg. 222). In the United States in particular, Ford (2015) reports that labor's share of national income has declined from approximately 65 percent in 1947 to 58% in 2014 (pg. 39). Only a small number of US citizens derive income from capital ownership because capital ownership is highly concentrated in the hands of very few, with approximately 75 percent of capital ownership held by the top 10 percent of wealth holders (Piketty, 2014, pg. 199-234). This means that a very small number of individuals and families in the United States are accruing the gains from capital, while at the same time the total share of income going to labor, who most people solely depend on for their livelihood, is continuously shrinking.

Income inequality is on the rise as the top decile's share of national income in the United States has risen from a low of 35 percent in the 1950s, up to 45 to 50 percent in the first two decades of the 21st century, a level of income inequity not observed since the eve of the Great Depression (Piketty, 2014, pg. 24). Indeed, the gains of economic growth are increasingly going to the richest households. For example, between 1993 and 2010, over half of the increase of national income in the US went to the top 1 percent of households in the income distribution (Ford, 2015, pg. 46-48). Even during the Great Recession between 2009 and 2012, 95 percent of the total income gains were being distributed to the top 1 percent (Saez, 2013). Finally, perhaps the starkest example of wealth inequality, not just in the United States but globally, is that according to a recent Oxfam report (2017), the top eight richest billionaires in the world own as much wealth as the poorest half of the population of the planet, approximately 3.5 billion people. The central point here is that the socio-historical context of the contemporary debates on technological displacement and automation is a situation of prodigious levels of income and wealth inequality.

Labor force participation measures the percentage of the population in the work force. While the influx of working women in the labor force from around 1970 to 1990 greatly increased the labor force participation rate, since about 2000, the labor force participation rate has fallen in virtually all categories. A declining labor force participation rate can signify many things, such as an influx of new retirees leaving the labor force. However, an overall decrease in all categories, especially those of prime working age, could also be a sign that the number of people who have extreme difficulty finding a job or have given up trying to find a job entirely is on the rise. According to the Bureau of Labor Statistics, the civilian labor force participation rate had its peak in 2000 with a rate of 67 percent, but is around 62 percent in 2017 (U.S. Bureau of Labor Statistics A). The participation rate of those aged 25-54 years old, those in prime working age and too young to retire, has declined from slightly from around 84 percent in 2000 to around 82 percent in 2017 (U.S. Bureau of Labor Statistics B). Similar drops have been experienced by both men and women's rate, from a drop from 75 percent to 69 percent for men from 2000 to 2017, and a drop from the peak of 60 percent to 57 percent for women in the same period (U.S. Bureau of Labor Statistics C; U.S. Bureau of Labor Statistics D).

Of course, part of the reason for the declining labor force participation rate may be coupled with the recent phenomena of jobless recoveries from recessions. Jobs are always lost in recessions, but in recent years the number of months it takes to restore the number of jobs to the level before the recession has been growing. According to the Bureau of Labor Statistics, it took twenty months for jobs to recover to their pre-recession level from the recession of 1974-75, twenty-eight months to recover from the recession of 1981-1983, thirty-two months to recover from the recession of 1990-1991, forty-seven months to recover from the recession of 2001, and a full 79 months to recover from the Great Recession of 2008 (U.S. Bureau of Labor Statistics

E). According to a report from the Federal Reserve Bank of Cleveland, it is taking significantly longer for laid off workers to find new jobs after a recession, a 50 percent increase of time unemployed during the fallout from the Great Recession than from previous recessions (Tasci and Zaman, 2010). What this signifies is that recessions of recent decades are not merely temporary layoffs, but that they are increasingly jobless recoveries where the issue is not merely destruction of jobs, but lack of job creation during the recovery (Ford, 2015, pg. 43-46). There is also some evidence to support the claim that automation has played a role in these recessions. According to the McKinsey Global Institute (2011), 44 percent of firms that reduced their total employment since the 2008 financial crisis have reportedly done so by means of automation (pg. 77).

This leaves open the question of exactly what kinds of jobs are being created in the economy during recessions, subsequent recoveries, and during growth periods. Long term evidence suggests that the US economy is facing a hollowing out of middle income jobs, or what is termed labor market polarization. Labor market polarization means that the net changes in US employment are taking a U-shaped pattern where jobs in the lowest and highest job skill quartile are expanding, while the middle skill distribution of jobs is declining (Frey and Osborne, 2013, pg. 3). In our current definition of what constitutes high and low skill, this means that there is growing employment in high-income cognitive jobs, and in low income manual and service jobs, but a hollowing-out of middle-income jobs, largely manufacturing and other routine jobs (Frey and Osborne, 2013; Autor and Dorn, 2013). Job market polarization trends are exacerbated during recessions. According to Jaimovich and Siu (2012), the jobs that are most likely to be permanently destroyed in recessions are middle income jobs, while the jobs that are created tend to be heavily low wage jobs in hospitality, retail, and food services, and to a lesser degree in

high-wage high-skill professions. With the onset and aftermath of the Great recession, approximately 60 percent of the jobs lost were categorized as mid-wage occupations, while approximately 73 percent of the jobs added since the recession have been lower-wage jobs, with wages at $13.52 an hour or lower (Cowen, 2013, pg. 38). Finally, the phenomena of job market polarization is not limited to the US, but has been observed in most industrialized countries, particularly the European Union, since the 1990s (Autor, 2010).

It is also important to note that many of the low skill jobs created are not full-time but part-time positions. Between December 2007 and August 2013, about 5 million full-time jobs were destroyed in the recession, but the number of part time jobs increased by around 3 million, and that the "increase in part-time work has occurred entirely among workers who have had their hours cut or who would like a full-time job but are unable to find one" (Ford, 2015, pg. 49). In addition, part-time workers are almost never entitled to employee benefits such as health insurance in the US, which can add to the precarity of these workers' financial situations. The decline in full time jobs and the rise in part time jobs results in a structural economic shift towards an economy that structurally produces underemployment and precarity.

In addition, it is especially relevant to point out how trends in job market polarization appears to align with the assessment of what jobs are most susceptible to automation and which are not. The trend appears to be that high paying non-routine cognitive jobs, such as professionals, top managers and computer technicians, and lower paying non-routine manual jobs, such as caregiving or service jobs, are on the rise, while what is being hollowed out are the routine cognitive and manual jobs that tend to be in the middle of the overall income distribution. This implies that changing technologies and automation may be at least partially responsible for the dynamics of labor market polarization.

Two final points need to be made. Firstly, this review has focused on the macro changes in wages, inequality, and job polarization over the last half century. There have been other significant changes in the nature of work that have not been covered here. Some trends directly linked to innovations in information technology such as the rise of the "Gig Economy" or "Sharing Economy" thanks to businesses like Uber or Airbnb. Trends such as these, among others, may be highlighted in more detail in the sections concerning each ideology if a particular ideology tends to focus on those developments.

Secondly, despite reviewing this material in the context of a discussion of technological change and automation, this is not to imply that technological change or automation are directly or solely responsible for the changes in labor and inequality described. The social world is too complex to claim that any one factor would cause these developments, and there are a number of alternative factors to consider such as financialization, globalization, offshoring, and neoliberal economic policies. However, the point of this review is to put forward the proposition that these phenomena should be considered in light of changes in technology and the dynamics of automation and technological displacement to see what role these developments have in the increasing precariousness of labor and growth of inequality.

Finally, one final fact should be considered. The US business sector performed a total of 194 billion hours of labor in 1998. In 2013, the economy had grown to the point where the goods and services produced had grown by $3.5 trillion (adjusting for inflation). This is a 42 percent increase in total output from 1998 to 2013. However, the number of hours required to produce 42 percent more output was precisely the same in 2013 as it was in 1998: 194 billion hours of human labor. What this means is that within the fifteen-year period, 42 percent more goods and services could be produced with exactly the same amount of human labor. Shawn

Sprague (2014) the BLS economist who discovered this trend, noted that "this means that there was ultimately no growth at all in the number of hours worked over this 15-year period, despite the fact that the US population gained over 40 million people during that time, and despite the fact that there were thousands of new businesses established during that time" (pg. 1). This finding implies that the overall importance of human labor in not just maintaining but expanding material wealth may be in decline. It is too soon to tell, but if subsequent reports find that labor hours for human workers remain stagnant or perhaps go into decline, society may find itself at an inflection point, where human labor in general becomes less and less necessary to the maintenance or expansion of material wealth. Regardless of the alternative factors that play a role in the above trends, the fact remains that we are producing more without needing additional human labor, and that is a fact that needs to be confronted and analyzed.

Ideology

To conclude this review, the following is a brief review of the literature on ideology and what conception of ideology used in this thesis. According to Jost, Federico, and Napier (2009), two traditions of ideology scholarship have developed with one tradition, typically associated with Marxian philosophy, focusing on a critical approach to ideology, while the other the other takes the form of a value-neutral approach to ideology, pursued by many scholars in sociology, psychology, and political science. The aim of this project is to be a critical analysis of liberal, conservative, and radical approaches to issues of automation and technological displacement, so this project draws upon on the former tradition. This type of critical analysis of ideology began with Marx and Engels (1846) in *The German Ideology* where they describe the notion of "false consciousness:" ideologues, "inevitably put the thing upside-down and regard their ideology both as the creative force and as the aim of all social relations, whereas it is only an expression and

symptom of these relations (pg. 444)." While many later scholars would critique the notion of false consciousness (e.g. Rehmann 2015; Jameson, 1981), the critical tradition was forwarded by scholars such as Mannheim (1936), Habermas (1989) and Strickland (2012).

This project relies on the theoretical guidance of Mannheim's seminal work, *Ideology and Utopia* (1936). Here, Mannheim contended that every ideology corresponds with a certain vision of utopia which is grounded in the class-based experiences of individuals in society. This type of analytical frame is also central for the analysis, as one of the guiding questions is: what kind of utopia is backgrounded in various author's treatments of the dynamics of technological displacement and automation? In other words, one of the goals of this analysis is to better understand: what is the conservative utopia, the liberal utopia, and the radical utopia? The goal is to develop a critical examination of the ideological frames put forth and advocated in different segments of the literature and commentaries on the development of automation, AI, and technological displacement.

1.3 Technological Displacement and Ideology: The Research Approach

This project is intended to be the first among a series of projects in a research program that examines the sociology and dynamics of automation and technological displacement. It is designed to be a foundation for and first step toward shaping this long-term research program. I am framing it as my own kind of "basic research," that is, a research project with the intent of explicating a fundamental basis for what literatures, theoretical frameworks, and methods are needed to understand to engage the phenomena of technological displacement and the increasing automation of the global economy.[20] The aim of this project is to develop basic frameworks and address some fundamental questions about the current understanding of the social and economic effects of automation and technological displacement. This is done here by examining, categorizing, and critiquing the basic arguments of how experts from three prominent ideological positions, liberal, conservative, and radical, understand the issues of automation and technological displacement, what policies they advocate for in response to these phenomena, and what their vision of the future is in light of their analysis. The aim is to understand how various scholars and commentators who study these problems frame their understanding through their world views and ideological positions. In addition to the basic research mindset, the research approach is both inspired by and modeled on the works of three scholars: Max Weber (2002 [1905]; 2012), Karl Mannheim (1936), and Benjamin Ward (1979). One of the classics of

[20] On the one hand, the basic research mindset means this project on its own does not have a "practical" goal in mind in the sense of an instrumental end. On the other hand, basic research, or research primarily for the sake of reflection and understanding, is better able to get to the core of the issues at hand without the pressure of needing to fulfill instrumental ends, and gives the intellectual freedom that allows for deep reflection that can pay off in substantial ways in the future that cannot be predicted beforehand.

sociology, Max Weber's concept of the ideal type and his methodology of constructing ideal types is central to my research approach. Karl Mannheim, the founder of the sub-discipline of the sociology of knowledge, informs my understanding of how to approach knowledge and ideology sociologically. Finally, University of Berkeley economist Benjamin Ward in his work *The Ideal Worlds of Economics* (1979), systematically categorizes modern economic ideology and the framework he develops in that work has inspired the basic structure of this project. This section briefly describes how each scholar contributes to the research approach.

Max Weber's Methodology of Ideal Types

The ideal type is a central concept in Weber's methodological writings (Weber, 2012, pg. 124-137). Ideal types are used to develop concepts social scientists can use in their empirical investigations. According to Weber, an ideal type is formed from an,

> …accentuation of one or a number of viewpoints and through the synthesis of a great many and diffuse and discrete individual phenomena… which are in conformity with those one-sided, accentuated viewpoints, into an internally consistent mental image. In its conceptual purity, this mental image cannot be found empirically anywhere in reality. It is a utopia, and the task of the historian then becomes that of establishing, in each individual case, how close reality is to, or how distant it is from, that ideal image… (2012, pg. 125).

In other words, in a historical or sociological investigation, ideal types are idealized[21] internally coherent models of a concept or phenomena under investigation. The dynamics of the social

[21] The "ideal" in ideal type does not refer to an ideal in the sense of a literal utopia, as in a perfect society, or a moral judgement of what is ideal, but instead refers to a concept that is logically ideal i.e. internally consistent and without the infinite number of contingencies that can alter the "ideal" operation of the concept. As Weber states, "From the

world are simply too complex and contingent to develop models of social life that are perfectly congruent with reality. However, by developing and utilizing ideal types, researchers can consciously be aware of in what sense or to what degree their characterization of concepts such as "individualism" or "imperialism" may be congruent with or in friction with reality.

Indeed, Weber argues that all such abstract concepts must be made using ideal types.[22] If social researchers ignore the importance of ideal types in their formation or utilization of abstract concepts like "democracy" or "capitalism" then Weber warns that,

> If the historian (in the widest sense of the term) dismisses the attempt to formulate such an ideal type as a "theoretical construction" –that is to say, as being unsuitable or inessential for the concrete purpose of his inquiry, the consequence will regularly be either that he, consciously or unconsciously, makes use of similar concepts, but *without* linguistic formulation and logical elaboration, or that he remains stuck in the area of what is vaguely "felt" (Weber, 2012, pg. 127).

Without the use of ideal types, concepts can only be vaguely grasped, and it can only be relied on by faith that the formulation of the concept the researcher has in mind is accurately imparted to the reader. In other words, it is likely that the "popular" or "common" definition of the concept in the current socio-historic moment will be what is ultimately communicated, and this can be dangerous as it risks anachronism and inaccuracy. However, detailed and concrete explanation is the advantage of the ideal type. They are an explicit attempt to make abstract concepts more

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outset, it should be stressed that the idea of what *ought to* be, of an 'ideal,' must be carefully distinguished from the theoretical constructs that we are discussing and that are 'ideal' in the strictly *logical* sense of the term" (Weber, 2012, pg. 126).

[22] As Weber rhetorically asks, "…can we define concepts such as 'individualism,' 'imperialism,' 'feudalism,' and 'mercantilism' in a 'conventional' manner?" (Weber, 2012, pg. 126).

vivid and understandable by consciously trying to put the complex terms into a linguistic and logical elaboration rather than relying on the "common sense" or everyday usage of such terms.

The ideal type is useful for this project because Weber characterizes ideology as something that can be better understood through ideal type analysis. Weber describes that ideology or "the ideas that govern… the human beings of a certain epoch," can only be grasped "with conceptual precision *in the form of an ideal type*" (Weber, 2012, pg. 128). Indeed, Weber states that to describe the "liberalism of a certain period… or of some intellectually understood variant of 'socialism'" is to describe an ideal type of how the abstract ideological concept of liberalism or socialism operates in a specific socio-historic context (2012, pg. 129). Thus, the categories employed here: liberal, conservative, and radical ideology, are suitable concepts for ideal type construction according to Weber. This project is effectively an exercise in self-reflexive ideal type conceptualization of how different ideological approaches tackle a specific social problem: the assorted problems associated with automation and technological displacement.[23] The characterizations of each ideology in sections 2.2-2.4 resemble ideal types insofar as they are a synthesis of many concrete instances, that is, synthesized from the sample, and are an accentuation of the salient ideological elements and arguments found therein. They produce a picture of each ideology that is internally consistent and coherent. And that the total picture of ideology cannot be fully identified with any one author or work, and thus does not exist empirically in its pure form. In sum, the aim is to synthesize the individual works, to accentuate the essential ideological elements from that sample into a coherent ideological

[23]Self-reflexive research is research where the researcher actively reflects on his or her own position as a researcher embedded in a specific socio-historic context; one that is fraught with historically specific social norms and values, institutions, structures, power relations, and ideologies. The purpose of self-reflexivity is to be conscious of how being embedded in this context effects the research approach, methodology, theoretical frameworks, findings, and conclusions of social research.

narrative. Each ideology forms its own ideal type each with the same goal: to explain the phenomena of automation and technological displacement in the contemporary context. The purpose of doing this is to bring into sharper focus what is meant by the terms liberal, radical, and conservative and how they contend with the issues surrounding automation and technological displacement to avoid leaving the meaning of these terms to what is "vaguely 'felt'" (Weber, 2012, pg. 127).

What this project attempts to do is similar to what Weber did in his seminal work *The Protestant Ethic and the Spirit of Capitalism* (2002 [1905]). Weber used multiple empirical historical examples from the writings of church leaders and theologians of different protestant sects to examine how protestants behaved, their conduct of life, and their theology from across time to construct his ideal types of "the protestant ethic" and the "spirit of capitalism" (2002 [1905]).[24] In other words, Weber's methodology was to examine volumes of citations and footnotes from so many protestant sects in order to be in a position to conceptualize as an ideal type the operation of their conduct of life and the social, cultural, and economic consequences of this development. Parts 2.2-2.4 utilize a similar method by using a sample of works from each ideological position and synthesizing them into an ideal type of how each ideology understands the issues of automation and technological displacement. Similar to Weber, the ideal types formed are not formed by guesswork, but by deeply examining an empirical sample of what the representatives of each ideology are concretely saying, and then synthesizing and abstracting into an ideal type the most ideologically important and essential elements of their arguments.

[24] Weber specifically stated in a response to his critics that, "Both the concept of 'capitalism' and, even more certainly, that of the 'spirit of capitalism' are only conceivable as thought constructs of the 'ideal type' variety" (Weber, 2002 [1905], pg. 263).

Karl Mannheim and the Sociology of Knowledge

Sociologist and founder of the sub discipline of the sociology of knowledge Karl Mannheim argues that knowledge does not come to us through individual sense experience alone, but what is understood as knowledge is structured by the given socio-historic context and social position of the thinker (Mannheim, 1936, pg. 1-3). Every written work in some way reflects the author's socio-historic context and their social position, each with its historically specific experiences of socialization and integration into society. In this way, for Mannheim it is wrong to say an individual "thinks" or creates ideas on his or her own apart from the social context. Rather, each person, "finds himself in an inherited situation with patterns of thought which are appropriate to the situation and attempts to further the inherited modes of response or to substitute others for them in order to deal more adequately with the new challenges which have arisen out of the shifts and changes in his situation" (Mannheim, 1936, pg. 3). Everyone functions within a social context in which the norms, values, structures, and institutions are determined apart from any one individual and are largely beyond any single individual's influence. Instead of individuals determining their own context, the context largely determines their character structure as they inherit ideologies developed from the socio-historic conditions of the past. The socio-historical context constantly changes, and empirical evidence can challenge commonly held beliefs, but nonetheless Mannheim contends that there are underlying assumptions and constellations of thought that are inherited from society rather than produced from individual contemplation or rationality as such, as enlightenment thinkers like Kant would have it. (1936, pg. 13). For Mannheim, the study of ideology is inherently sociological because ideology finds its roots in society, not in the individual.

Everyone makes various assumptions and omissions based on their ideological viewpoint, and this exposes the weaknesses of viewing any issue through a narrow ideological frame. A person's claims are motivated by, either explicitly or implicitly, by principles or normative imperatives, values, and visions of how the world should be that are shaped by their experiences of socialization in their socio-historic context. For example, a conservative may have a strong belief in the power of the free market to create prosperity and a radical may be politically active because of a normative drive to decrease social inequality. Ideology can both lead us to accept the status quo, or give us some reason to attempt to change the specific circumstances through public policy or through altering the social structure. These value orientations structure the mental framework and influence how researchers identify their research questions, and choose theoretical frameworks and methodology, and finally how they interpret their findings.

Mannheim (1936) contends that authors develop political proposals shaped by their own conception of "utopia," what an ideal society ought to look like. Every ideology is undergirded by a utopia in the sense that individuals make claims or promote or support policy proposals as an expression of their ideal conception of the world and of society they want reality to approximate, which in turn is influenced by their ideological viewpoint conditioned by their position in the socio-historic context. The purposeful examination of ideological positions in research literatures is essential if research is to be reflexive and accurately grasp the nature of its object of inquiry, rather than produce research that reflects the biases and unexamined assumptions researchers, implicitly or explicitly, bring to their work. However, to assert that research is ideological is not tantamount to contending that it is wrong per se. A person can use empirical facts and empirical observations to a greater or lesser degree, or alternatively, either

purposefully or unintentionally make false statements. But in either case, the way the arguments are presented, what implicit assumptions inform the argument, and how the argument is framed are all filtered through the lens of ideology, regardless of the relative basis in reality of each argument. To recognize ideology and confront it is to self-consciously reflect on how knowledge and the research that expresses this knowledge is embedded in the specific socio-historic context from which it emerges. Ergo, it is much better, both as a general principle in social life and especially when conducting research, to understand how each of us is embedded in social relations that are permeated with ideology, than to ignore the role of ideology in mediating social reality. This view is in line with Mannheim's analysis as he argues,

> Only as we succeed in brining into the area of conscious and explicit observation the various points of departure and of approach to the facts which are current in scientific as well as popular discussion, can we hope, in the course of time, to control the unconscious motivations and presuppositions which… have brought these modes of thought into existence. A new type of objectivity in the social sciences is attainable not through the exclusion of evaluations but through the critical awareness and control of them (Mannheim, 1936, pg. 5).

The practice of ideology critique and the discipline of the sociology of knowledge give us the possibility to understand and try to control our own thought processes and ideological biases, rather than be controlled by them, thus functioning as functionaries of inherited ideological patterns.

Ward's Ideal Worlds of Economics

This project is inspired by and partially modelled on one book that took seriously the task of understanding and explicating how ideology influences research. Berkeley economist Benjamin Ward in his book *The Ideal Worlds of Economics* (1979) explicitly acknowledged the link between research and ideology in the field of economics. Ward contends that ideological viewpoints have become "worlds unto themselves" and this has become a problem for economics as a discipline. Economics in the United States, Ward argues, is split into three factions based on ideology: the liberal, radical, and conservative ideologies.[25] Furthermore, he states that the discipline has largely failed to recognize how this is the case and have either underemphasized or ignored the role these ideological viewpoints play into how economists conduct their research. Ward attempted to remedy this by consciously trying to understand and explain each major economic world view in its own terms. He did this by thoroughly explaining the assumptions, beliefs, policy positions, and reasoning of each ideology as an "optimal worldview." By "optimal worldview," he wanted to provide a coherent, comprehensive, and honest representation of each ideology and demonstrate how each interprets the, "major contemporary issues in which the economy plays a central role…" (Ward, 1979, pg. vii). One aim of this project was to convince economists to take each ideological position seriously and not dismiss out of hand the claims and frameworks of economists with differing world views. In addition, his work was designed to help economists self-reflect on their own ideology and the ideology of economists across the ideological divide. Ultimately, Ward wanted to show how,

[25] The chosen paradigm of framing ideology into liberal, radical, and conservative camps comes from Ward (1979). It is also important to note that Ward chose his categories based on his understanding of the context of American economics as a discipline and the prominent political divisions in the United States. By borrowing Ward's structure and categories, the structure of this thesis and the categories used are also heavily influenced by the American context.

"economics is thoroughly permeated by ideology in its structure, in the ways it asks questions and answers them, and in the ways policy implications are drawn from it" (Ward, 1979, pg. viii).

In my view, Ward's work represents an attempt to foster a kind of critical reflexivity in the discipline of economics. Ward recognized that without recognizing how ideology affects the practice of science and knowledge creation, the unacknowledged ideology can have tangible structural effects on the course of scientific knowledge creation. As Ward explains,

> scientists in a particular field all tend to be given a set of research-relevant attitudes, of implicit beliefs that one sort of approach will work, while another sort won't, that this assertion may be true, while that one is nonsense. Even relatively solid experimental results may be suppressed, that is, not published, if they fly in the face of such strongly held views (1979, pg. 3).

However, by purposefully examining and explicating different forms of ideology in the discipline, economists can be in a better position to critically reflect on their own assumptions and how their work is embedded in a specific socio-historic context that fosters ideological differences. In other words, by using Ward's explanation of the different world views, economists could be in a better position to understand the viewpoint of ideological opponents and reflect on their own ideology and situated-ness as a social scientist in a broader context of a universe of social research with a variety of different motivations, questions of interest, research methods, theories, and frameworks. In the same way, this project is an attempt to access the debate and literature on technological displacement with a critical eye towards the role ideology plays in the form and content of the debates.

By explicating the various ideological viewpoints in expert understanding of automation and technological displacement, this project develops a framework to understand how ideology and the gravity of concrete socio-historical circumstances have shaped what kinds of questions we ask, assumptions we make, and frameworks we utilize to understand processes of technological displacement, its projected trajectory, and its implications for the future of the global economy and society (Dahms, 2015, pg. 12). By consciously examining the debate's ideological assumptions and positions, this project attempts to transcend any individual point of view, and in a sense, attempts to glimpse the totality of our current understandings to better understand current conditions and to help focus the aim of future research. The goal is to construct a map of the exiting viewpoints as a guide to understanding the debate. This conceptual map can help us better understand the debate and the ideological positions proponents take. In addition, this project can also help sociologists better understand a matrix of adjacent but equally important issues such as society's current understandings of itself, its relationship to technology, technological change, and the centrality of labor in modern capitalist society. In other words, a deep understanding of a particular problem such as technological displacement can help reveal salient aspects about society in general that might not be considered otherwise.[26] By constructing this conceptual map based on ideological differences, this project attempts to create a kind of meta-review of the literature and engage in a critique of the body of work. Observing the meta level of a debate, gives a better vantage point from which to comprehend a broad and diverse literature. It also allows a more effective critique of the debate as it currently exists, and point out structural flaws and blind spots in the existing arguments. Section 3.2 does

[26] In other words, it gives sociologists the ability to better recognize the general or the totality by closely examining the particular.

just that by assessing the debate from a critical standpoint to immanently critique the structural flaws in each world view.

Why is this important for Sociology?

To conclude this section, I want to make a case for why the phenomena of technological unemployment and the study of ideology should be topics of interest for sociology. While economists have done substantial work on the productive and economic benefits deriving from technological change, sociologists have typically responded by pointing out the often-overlooked social costs that develop dialectically with the increasing prosperity of capitalist societies. The potential consequences arising from the development and implementation of automating technologies, advanced robotics, and artificial intelligence do not just have tremendous economic implications, but also implications for the future trajectory of social inequality, the distribution of life chances generally, as well as brings into question the adequacy of our basic social structures, institutions, and social relations in providing a stable framework for existing societies. This project makes the case that sociologists should take the implications of this development seriously, and suggest that now more than ever it is necessary to be self-reflexive about how sociologists examine and explain the social world.

Ultimately, an analysis of ideology and the issues of technological displacement is needed because if social scientists do not self-reflexively understand the underlying ideological stances through which we interpret the world, research is bound to reproduce the same types of analysis and conclusions permeated with unacknowledged ideology. Furthermore, it may be the case that the current ideological frameworks researchers use may in fact be detrimental to effectively understand and addressing the problems of technological displacement. In other

words, it is perhaps the current ideological constellations we are using to confront the problem of technological displacement of labor that are precisely the ideological configurations most detrimental to clearly understanding the true gravity of the situation and the implications these processes may have on social life. If the stakes are as high as the diagnosis of the socio-historic context from the last two sections suggest, critical ways of thinking and conducting research are needed now more than ever.

1.4 Methodology

This project uses three different methodologies for three different sections of the thesis. The first method used is Weber's method of ideal type construction which will be used in part 2.1. The second method is inductive theme analysis which is used to synthesize themes found in the data to form an ideal type. This method is used in sections 2.2-2.4. The third method is ideology critique used in section 3.2. This is where the critical Marxian school of value-critique is used to analyze and critique the findings from sections 2.2-2.4. This section explains each method in order of appearance.

Methodology for section 2.1: Ideal Types

This first section used Weber's concept of the ideal type to construct an ideological foil of liberal, conservative, and radical ideology to assist in the analysis of the data. The primary interest in this project is the role liberal, conservative, and radical ideology plays in the understanding of automation and technological displacement. Constructing ideal types of the general nature of each ideology is used to assist development of the patterns and themes found in the data. These ideal types serve several purposes. These ideal types were constructed before the data was coded and analyzed, so they served as a guide to the ideological content of the data and assisted in analysis. In other words, the purpose of the ideal types is to have a basic understanding of the most salient characteristics for each ideological position to compare the ideal types with the patterns found in the data.

As stated in the last section, Weber's ideal types are, "a mental construct for the scrutiny and systematic characterization of individual concrete patterns which are significant in their uniqueness, such as Christianity, capitalism, etc." (Weber, 1994, pg. 272). In this project, ideal

type constructs of each ideology, liberal, conservative, radical, are made to systematically compare the ideal type with the concrete utterances of the authors belonging to each ideology. This is done to bring into sharper focus how each form of ideology is utilized in each individual case, as Weber states, "The goal of ideal-typical concept construction is always to make clearly explicit not the class or average character, but rather the unique individual character of cultural phenomena" (Weber, 1994, pg. 273). For this project, by constructing an ideal type in advance of the analysis, I was in a better position to understand what is unique about the sampled literature's frameworks and ideological formations. I could readily recognize what aspects of their arguments conform to the constructed ideal type, and which do not. This helped me understand how liberal, conservative, and radical responses to technological displacement and automation are similar or different to how these ideologies would typically be expected to respond to social problems.

The construction of the ideal types for each ideology was constructed using Ward's (1979) explication of each form of economic ideology. Though he does not explicitly cite Weber, Ward's efforts to create "optimal" economic world views were essentially an exercise in ideal type construction, meant to, in my view, encourage self-reflexivity in economists understanding of the different viewpoints present across the discipline. He does this by comprehensively and systematically explaining the basic principles and fundamental characteristics of each ideological position.

While Ward's analysis served as the primary basis for the ideal types the general principles of each ideology, using Ward's categories did have limitations that must be acknowledged. Because Ward's ideal type constructions were made in 1979, his conception of each ideology is decades removed from the current socio-historic context. This is clear because

of gulf of time between 1979 and the evolving nature of socio-historic circumstances and ideology since 1979. What was considered liberal or conservative in 1979 is at least in some ways different from what constitutes liberal or conservative ideology today. Economic conditions have changed, knowledge of society and the economy has grown, the political climate and rhetoric of political parties have changed, and policy concerns have changed. To remedy this gap, a conclusion section has been added to each ideal type to explain how historically the principles of each ideology may have changed since Ward's time. Despite the limitations, Ward's systematic and comprehensive effort to explicate economic ideology provided a useful foundation and starting point for my construction of sections 2.2-2.4. Ward's ideal types were used as a jumping off point to grasp the general principles of each ideology in its pure form. The development of the first set of ideal types was an essential stepping stone toward the construction of the primary ideal types. Ward's ideal types were used to assist the construction of the next set of ideal types, how liberal, conservative, and radical ideologies respond to the problems of automation and technological displacement.

Methodology for Sections 2.2-2.4: Inductive Theme analysis

To sum up the methodology for these sections in brief: these sections used the qualitative research methods of selective sampling, theoretical sampling, inductive coding, and inductive theme analysis to synthesize and analyze three sets of data categorized by ideology. The data is pulled from a sample of research and commentary from books, scholarly journals, professional journalism, and think tank policy statements and articles. The methods are used to synthesize and present the most important themes in these literatures and present them as findings to be analyzed and critiqued in Part 3. As described in section 1.3, while theme analysis is the method used, the goal of this section is to construct a detailed ideal type of each ideology. In other

words, while the actual method is theme analysis, the method is used as a means to an end to construct an ideal type.

Data Collection

This project did not follow a linear process of a clearly delineated data collection phase and a clear data analysis phase. Both data collection and data analysis occurred simultaneously. This project used selective and theoretical sampling techniques to produce an inductive theme analysis of the ideological stances of various authors writing on technological displacement due to automation and the potential social and economic effects of this development in the future.

Data collection for this project involved a three-step sampling process: selective sampling delineation, an initial sample, and then subsequent theoretical sampling. First, a selective sample guideline was made that delineated the limits of the sampling process. According to Sandelowski, Holdich-Davis, and Harris (1992) selective sampling refers to "a decision made prior to beginning a study to sample subject according to a preconceived, but reasonable set of criteria" (pg. 305). Coyne (1997) states that selective sampling helps the researcher develop the conceptual lines that will drive theoretical sampling. For this project, the selective sample delineations were as follows. I only sampled from sources with a professionally recognized level of expertise in the natural or social sciences, or with experience in fields of business or government that are related to automating technologies. For example, the data includes works by economists such as Eric Brynjolfsson and Andrew McAfee (2011, 2014), computer scientists such as Jerry Kaplan (2015), as well as business leaders such as Silicon Valley entrepreneur Martin Ford (2014). Journalistic sources or public sources such as opinion blogs or comment

sections on websites were excluded, with only a few choice exceptions.[27] This was done because this project is intended to examine expert knowledge on this topic and how it is undergirded by ideology. I am not interested in the opinions of members of the public here. I am interested in expert knowledge because the issues of automation and technological displacement have not quite reached mainstream public discourse yet.[28] Understanding the ideology of experts is important because they have the social capital necessary for their opinions to be trusted on these issues. They also tend to have the resources, platform and positions of power necessary to effectively disseminate their knowledge and influence the public. How experts are framing these issues now will inevitably have an influence on the perceptions of the public as these issues become more widely known and discussed.

The next important delineation of my sample is the time frame. The dynamics of technological displacement and the potential for technological unemployment has been a topic for debate since the early 19th century with the Luddite movement and the discussions of the classical political economists. In addition, popular concern and professional debates over automation and technological displacement were a reoccurrence throughout the 20th century (see, Woirol, 1996). This project aims to be of cognizant of the historical context of these issues and to embed the analysis of the most recent debates into an overall literature of the dynamics of technological displacement and automation. However, the actual sample draws from the contemporary debate on automation, robotics, artificial intelligence and the possibility for

[27] For example, journalist Paul Mason has written an extensive manuscript on automation and technological displacement called *Post-Capitalism: A Guide to Our Future* (2016) that describes the potential for automation technology to be used to transition modern society into a post-capitalist society. This book, and relevant articles from Paul Mason, were used as part of the data set for radical ideology. He was chosen for this analysis despite him not having specific credentials in economics, business, or technology fields because of his well-regarded work as an investigative journalist, and how well it represents the radical ideology of interest in this project.
[28] Though it is quickly becoming a mainstream economic concern with each passing year, in part due to the proliferation of the contemporary professional and expert driven debate discussed in this project.

technological unemployment. One reason for this choice is that the primary technologies of interest in this project are only involved in the most recent debates, such as self-driving cars, 3D printing, and artificial intelligence.[29] Secondly, this choice was made because many authors in the sample have observed the rapid pace of technological change over the past few decades and have been struggling with question of "is this time different?" In other words, I was specifically interested in works that questioned whether robotic technology, artificial intelligence, and information technology have the capacity to cause economic disruptions that are fundamentally different from previous iterations of technological displacement. In retrospect, it is obvious that past fears of technological unemployment were misplaced because it is discernable that historically a large-scale mass disruption or breakdown of the economy overall has not occurred due to technological change. However, the most recent debates over the past few decades are exceptional because many well-respected economists as well as leaders in business and government are greatly concerned about the future of the economy and the potential for powerful disruptions (e.g. Schwab, 2016; Brynjolfsson and McAfee, 2011, 2014; Frey and Osborne 2013; Ford, 2015). Therefore, it made sense to limit data collection to those works that specifically address the issues of automation and technological displacement over the last few decades. Specifically, I only used data sources from at least 1985 forward, although a majority of my sources collected so far are from 2010 to the present.

With these limits, an initial sample was made to begin the coding and analysis process. The initial sample consisted of articles from think tanks that self-identify as each type of ideology, liberal, conservative, and radical. This initial sample was chosen through key term searches on the websites of these think tank organizations to find articles that directly deal with

[29] In other words, technologies that have the potential to automate both manual and cognitive labor.

the questions of automation, artificial intelligence and technological displacement. This initial sample consists of seventeen articles from the liberal think tank Demos, twelve articles from the conservative Heritage Foundation, six articles from the conservative/libertarian think tank the CATO institute, and six articles from the radical socialist magazine Jacobin. With this initial sample, I coded and analyzed this initial data, and followed up this process with theoretical sampling for further data collection to expand the data set.

A work was classified as liberal, conservative, or radical based on two tests. First, the classification was based on the author's self-identification of his or her ideological position. For example, it was clear that articles from the Charles Koch Institute website came from a conservative viewpoint. Secondly, if the author did not specify their ideological position, I compared the general content, structure, and arguments of the piece with the constructed ideal types based on the work of Ward (1979), as explained above. With these two tests, each author's ideological worldview was identified and classified over the course of the coding and analysis process.

Theoretical sampling is defined by Glaser and Strauss (1967) as, "the process of data collection for generating theory whereby the analyst jointly collects, codes, and analyzes his data and decides which data to collect next and where to find them, in order to develop his theory as it emerges. This process of data collection is controlled by the emerging theory, whether substantive or formal" (pg. 45). Despite the sampling limits described above, because there are hundreds of written materials on technological displacement that have been written over the years, it was not recommended to try to come up with a preconceived or determinate sample before the research process begins (Becker 1993). Thus, a process of theoretical sampling was chosen. Theoretical sampling was ideal as it allowed for flexibility in the research process (see,

Glaser 1978; Strauss & Corbin 1990). Using this method, the researcher cannot know in advance exactly what to sample for and where it will lead (Glaser 1978, 1992). Instead, what to sample next emerged according to the developing codes and themes (Coyne 1997). In other words, the coding, analysis, and sampling process were all done simultaneously, and this continuous process of coding and developing themes drove the choices of the subsequent theoretical sampling. As the coding and analysis process lead to more sampling, the previous coding and analysis needed to be tested against the new sampled data, to either change or confirm the emerging codes and themes (Chenitz & Swanson, 1986). The purpose of this continuous process was to sample until the categories that develop reach theoretical saturation. Theoretical saturation is the point when, "the codes are further developed theoretically with properties and theoretically coded connections with other categories until, each category is saturated. Theoretical sampling on any category ceases when it is saturated, elaborated and integrated into the emerging theory" (Glaser 1992 pg. 102). When the themes and categories became saturated, they were fully developed and further data collection would not further develop the themes.

Sample

As previously noted, the sample was pulled from multiple think tanks, news articles, and journals, but my primary focus was on a sample of books. The total sample of non-book articles and reports ran as follows categorized by ideology:

Liberal: n=51 Conservative: n=61 Radical: n=33

Over the course of the sampling process, it became clear that book manuscripts proved to be significantly more rich and detailed as data sources rather than reports and articles. This is

because books tended to provide a more comprehensive and detailed examination of the issues than many of the articles. Therefore, much of the sampling and construction of ideal types became focused on the analysis of books and articles became secondary. Because the sample of books was so important to my analysis in sections 2.2-2.4, it is appropriate to provide a brief description of each book sampled. In the following, each book sampled is categorized by ideology and is given a brief description of its contribution to knowledge and to the contemporary debate on automation and technological displacement.

Liberal

Race Against the Machine: How the Digital Revolution is Accelerating Innovation, Driving Productivity, and Irreversibly Transforming Employment and the Economy (2011), By MIT economists Erik Brynjolfsson and Andrew McAfee. This book describes "how information technologies are affecting jobs, skills, wages, and the economy," and how to respond to those changes effectively (2011, pg. 1).

The Second Machine Age: Work, Progress, and Prosperity in a time of Brilliant Technologies (20014), also by Brynjolfsson and McAfee is a sequel to *Race Against the Machine* (2011). It is a further exploration of the themes of the previous book. It examines how brilliant machines are accelerating rapidly, how they will affect the "bounty and spread" in the economy, and provides a group of policy recommendations on how to deal with the effects of brilliant machines on the economy to maximize the bounty and limit the spread.

The Fourth Industrial Revolution (2016) written by the director of the World Economic Forum Klaus Schwab details what he calls the "fourth industrial revolution," a forthcoming age of brilliant technologies poised to change the world. He focuses on describing what these

technologies entail for our future and how to best channel those changes in a way that benefits everyone around the globe.

The Industries of the Future (2016) by former technology advisor to Hillary Clinton, Alec Ross, examines different "industries of the future" such as robotics, big data, and cyber security, and gives recommendations on how to thrive in the next wave of globalization.

Rise of the Robots (2015) by computer scientist and Silicon Valley entrepreneur Martin Ford, describes the future of automation and advocates for a universal basic income.

Humans Need Not Apply (2015) by computer scientist Jerry Kaplan, details the coming robot revolution and the implications for how this will change our lives. He also advocates for some free-market based policy solutions that may help people gain a sufficient income when jobs become scarce due to automation.

In *Saving Capitalism: For the Many, Not the Few* (2015) by former secretary of labor Robert Reich, the concluding chapters of this book describe how increasing automation is displacing workers and how universal basic income may be needed if the economic system is to serve the many, not the few.

Conservative

Average is Over (2013) by George Mason University economist Tyler Cowen describes how racing *with* the machines, i.e. human and machine coordination rather than racing against the machines will be the most effective way to be valuable in the economy of the future.

Humans Are Underrated: What High Achievers Know that Brilliant Machines Never Will (2015), by *Fortune* senior editor Geoff Colvin, explains how skills such as empathy, teamwork, and social skills will be incredibly valuable in a heavily automated economy.

Permissionless Innovation: The Continuing Case for Comprehensive Technological Freedom (2016) by Adam Thierer of the Mercatus Center at George Mason University, advocates for a market based hands-off approach to technology and innovation, and argues that technological unemployment is unlikely to occur.

Radical

Postcapitalism: A Guide to Our Future (2016) by economics editor of Channel 4 News (London) and journalist Paul Mason, makes an argument that information technology and digitization makes prices superfluous and creates an opportunity to move past hierarchical capitalist relations into a new economy and society—postcapitalism.

No More Work: Why Full Employment is a Bad Idea (2016) by Rutgers historian James Livingston gives a history of Universal Basic Income in the United States and advocates for it to be implemented in the future because as he argues, "There's not enough work to employ most adults at a living wage…" (Livingstone, 2016, pg. 28).

Inventing the Future: Postcapitalism and a World Without Work (2016) by sociologists Nick Srnicek and Alex Williams, critiques the current state of leftist politics and provides a blueprint for using advancing automation to advocate for a new political program based on Universal Basic Income and a post-work society.

What's Wrong with a Free Lunch (2001), by philosopher Philip Van Parjis, presents an essay where he advocates for Universal Basic Income, with several response essays from experts, as well as a follow up response from Van Parjis.

Data Analysis

This project used qualitative social science methods to construct and analyze the economic ideology of various commentators on the topics of technological displacement due to automation. I chose what I believed were the best qualitative methods suitable to creating a rich data set to create a detailed analysis. The primary structure of sections 2.2-2.4 used theme analysis to inductively develop themes found in the data. This involved a process of coding the data to develop emerging themes.

Coding

Codes are shorthand notes used in qualitative analysis that label compile and organize qualitative data (Saldana 2013). The coding scheme used was a selective or focused coding scheme. Selective coding was used because this project is not aimed at examining the totality of each writer's ideology, but only their ideology as it pertained to my subjects of interest, automation and technological displacement. Using selective coding, I coded what was most relevant to the question of the social and economic effects of automation, and emphasized the most common codes and those that are most revealing about the data (Saldana 2013). The development of codes was initially driven by the ideal type constructions of each ideology. However, as the project progressed, the coding scheme was expanded to include unique additional codes that do not fit within the themes of the ideal type constructions. Once the codes were made, the codes were sorted and synthesized into larger concepts, then elaborated into

categories that were tested and elaborated against new data until they became fully saturated themes.

Developing Themes

Braun and Clarke (2006) state that theme analysis, "is a method for identifying, analyzing, and reporting patterns (themes) within data" (pg. 6). For them, a theme captures important details in the data and represent a meaning or patterned response in the data set (Braun and Clarke, 2006). These patterns are then organized to describe the data set in rich detail. Theme analysis was the qualitative method to answer the specific research questions. I developed three broad questions for each ideology. First, how does each ideology frame the phenomena of technological displacement? Secondly, what are the policies advocated for by each ideology to either solve or assuage the problems of technological displacement? And finally, how does each ideology frame the future in light of their analysis of the socio-historic conditions? To answer these questions, my analysis of sections 2.2-2.4 are organized into three themes. The following is a brief description of each theme.

- "Framing of Technological Displacement." This asks, how does each ideology frame automation and technological displacement as a historical process? Is technological displacement a problem that needs to be addressed? Is this new wave of technologies and displacement more significant than past waves? Why or why not?
- "Policies." This asks, what does each ideology say regarding how different groups and organizations in society should react to technological displacement? What should

individuals do? What should businesses, governments, or civil society organizations do?[30]

- "The Future." This asks, how does each ideology frame the future? How do they predict technological change, automation, and the economy will change in the future? Do they frame the future in optimistic or pessimistic terms? How do they justify their predictions of the future?

Finally, theme analysis methods were used to formulate the themes found in the data. Theme analysis involved a constant iterative process where the researcher is constantly moving within the entire data set through the phases of data collection, coding, and data analysis (Ryan and Bernard, 2000; Braun and Clarke 2006). The theme analysis process is laid out by Braun and Clarke (2006, pg. 35) as follows:

1. Familiarizing yourself with your data: Transcribing data (if necessary), reading and re-reading the data, noting down initial ideas.

2. Generating initial codes: Coding interesting features of the data in a systematic fashion across the entire data set, collating data relevant to each code.

3. Searching for themes: Collating codes into potential themes, gathering all data relevant to each potential theme.

4. Reviewing themes: Checking if the themes work in relation to the coded extracts (Level 1) and the entire data set (Level 2), generating a thematic 'map' of the analysis.

[30] Essentially, my first two pre-chosen themes are asking how does each ideological position deal with the question of theory and practice regarding the issues of automation and technological displacement.

5. Defining and naming themes: Ongoing analysis to refine the specifics of each theme, and the overall story the analysis tells, generating clear definitions and names for each theme.

6. Producing the report: The final opportunity for analysis. Selection of vivid, compelling extract examples, final analysis of selected extracts, relating back of the analysis to the research question and literature, producing a scholarly report of the analysis.

This methodological outline was the process used to structure and develop sections 2.2-2.4 of this thesis. The developed themes fit into the construction of the ideal type of each ideology to answer my research questions.

Methodology for Section 3.2: Ideology Critique and Value-Critique

The analysis in section 3.2 is where the methods of ideology critique were applied using the framework of the critical Marxian school of value-critique to the preceding analysis in sections 2.2-2.4. As explained in the literature review above, ideology critique is used to unmask and explain the linkages between ideology and position in the social structure and the socio-historic context (see, Mannheim 1936). Value-critique is a school of critical Marxian theory that has been writing about technological displacement and a "crisis of labor" since the mid-1980s (see, Kurz 1986; Larson, Neil; Nilges, Mathias; Robinson, Josh; and Brown, Nicholas. 2014, pg. iv-xvii). Their analysis is critical in that it is self-reflexive of its own socio-historical context (Postone, 2015, pg. 23). It attempts to embed the recent debates of automation and technological displacement in a larger context, and systematically explains these dynamics in terms of the historical dynamics of capitalism and the logic of capital (see, Postone, 1993; 2015). This critical framework is used to analyze and critique each ideology as presented in sections 2.2-2.4.

Part 2 Ideal Types of Ideology

2.1 Ward's Ideal-Types

This section constructs ideal types of the general principles and characteristics of each ideology: liberal, conservative, and radical. Each sub-section uses Ward's (1979) characterization of the "optimal world view" for each ideological position. It presents the ideal-type that was used to guide the analysis, and is intended to both explain the conceptual framework used to construct the ideal types of sections 2.2-2.4, and to assist the uninitiated in understanding the core principles of each ideology. After explaining each ideology in Ward's terms, a coda to each section briefly gives an account of the evolution of the ideology from the time since Ward developed his "optimal world views" of each ideology.

Ward's Liberal Ideal-Type

Liberalism gets its ideological roots from the philosophy of the 18th century Enlightenment era. Its cornerstone is positing the nature of human beings as fundamentally hedonistic, rational, and atomistic. Premodern societies were characterized by irrational forms of domination that prevented people from behaving as they naturally would if given the freedom to make choices for themselves. By contrast, modern society is structured in such a way that human nature is set free and can find its natural expression. This is accomplished by the dual social institutions of market capitalism and democratic parliamentary government.

First, the market based economic system allows for private ownership of businesses and goods for pleasurable consumption, trading based on rational assessment of deals, and the individual freedom to choose without coercion. Thus, the market system appeals to all three

fundamental characteristics of the liberal conception of human nature. Markets are, in essence, a large collection of individual deals. Market participants are free from external coercion and every deal can be refused, so every completed deal is an expression of the individual's voluntary action. Because market actors are rational, they evaluate deals based on cost-benefit analysis from the perspective of their personal status quo. As Ward states, "At any point in time he can preserve that situation by refusing to make a deal, and so any deal he makes must be a little better for him than what he already has" (Ward, 1979, pg. 23). Under this philosophy, in the ideal market, economic processes are the result of, "voluntary exchanges in which all rational participants are gainers and none are losers" (Ward, 1979, pg. 27). In what at first appears to be a chaos of conflicting individual hedonistic desires comes a harmony of interests when mediated by the market mechanism (Ward, 1979, pg. 27).

In the classical liberalism of the 19th and early 20th century, the role of government for liberals was strictly *laissez faire*; the government was only meant to establish rights and maintain order through its legitimate monopoly of force. The hands-off approach was meant to allow the market and private businesses to be the primary mediator of economic life, while the government played a minimal role in keeping order. However, since the New Deal era of the 1930s and 1940s, where Keynesian demand-side economics became liberal orthodoxy, liberals largely came to believe that government should provide both liberty and protection from government through negative rights and has a duty to supply services that could not be provided effectively through the market or through non-coercive means (Ward, 1979, pg. 104). While markets are effective mediators for human conduct, the market is not perfect. Maladjustments of the market can also produce market failures such as monopoly or oligopoly market power, unequal bargaining power, and various types of externalities such as pollution. Thus, for liberals it is the

government's duty to correct market failures and balance the dual forces of market and polity in creating a stable political, social, and economic system. In other words, governments have a responsibility to use regulatory apparatuses to both assuage existing problems and prevent future maladjustments in the market for the benefit of its citizens. In addition, liberal governments play a significant role in the economy by engaging in massive efforts in support of health, education, and welfare.[31] Government's use tax dollars to fund health services in most industrialized countries, run public schools to foster citizenship and job skills, and use assistance programs to alleviate poverty.

A liberal government is meant to mediate market failures and other social problems through its mechanisms of pluralistic democracy. Because there are many interest groups with a variety of conflicting interests, a well-functioning pluralistic democracy should use its powers in marginal ways to fix specific problems in society with the aim of creating minimal effects on the basic structure of society or substantially harm any established interest group. In this way, the method of solving social problems in liberalism is primarily centrist and pragmatic. According to Ward, liberals try to solve social problems by "Starting from where we are, from the status quo, try to make things a bit better here and there, concentrating attention on those areas where productivity of effort is likely to be greatest. Current practice is the appropriate starting point, rather than some utopian vision, because liberals are pragmatic…" (Ward, 1979, pg. 9). For liberals, Government policies that aim for marginal improvements from the status quo are likely

[31] Even in the neoliberal era, these basic services have been reduced and sometimes privatized, but they have yet to be completely eliminated or removed from government responsibility. Total distrust of government's regulatory and bureaucratic power and an ideological assault on its various regulatory and welfare functions primarily characterizes conservative ideology.

to maintain the balance of government and market forces that keep the fundamentals of social harmony intact.

Finally, Ward states that in general, there is a liberal orientation towards progress, and that, "underlying the liberal message is also an aura of optimism" (Ward, 1979, pg. 109). In other words, liberal ideology is centered on the idea that the arc of history does indeed bend toward greater freedom, justice, and progress, at least in the long run. For example, this is expressed in the history of liberalism through liberal's continuous fight for the civil rights of women and racial, sexual, and gender minorities. It is also expressed through the expansion of the welfare state that helps curbs the excesses of market maladjustments and economic inequalities. Liberal society already has the basic structural framework needed to facilitate progress, all that is needed is patience for the gradual movements in the right direction to be made.

Finally, and most importantly in the context of this thesis, liberals view science and technology as an important source for the continuous progress for society and the economy. As Ward states,

> "science based technology lies at the heart of most of the transformations wrought in our lives over the past eighty years…affluent capitalist society…fosters technical change and then also fosters social adaptation to the new possibilities released by the technical change... This… is perhaps the most basic fact that must be understood if the nature of affluent capitalism is to be grasped. (Ward, 1979, pg. 18).

The process of modernization is a dynamic yet slow process, but its fundamental basis in market based private capitalism and pluralistic parliamentary democracy are the institutions that assure the steady march toward a better world.

Liberalism after Ward

The most obvious ideological change in liberalism since Ward's treatise in 1979 is the end of the Keynesian-Fordist model of political economy and the emergence and ascendency of neoliberalism as the new ideological hegemon. According to Wallerstein (2004), the profit-squeeze of the late Fordist period spurred an offensive by many political and business leaders, both liberal and conservative, to roll back production costs to restore profits. This was done by reducing workers' wages and benefits, re-externalizing input costs, and reducing taxation and the welfare state through cuts to education, health, and pension services (pg. 86). This entailed dismantling state regulatory systems, privatization and marketization of many government services, and a shift from production to financialization (see, Sclar 2001). Essentially, the rise of neoliberal ideology is the triumph of the market and economic processes over the state and political processes as the salient determinant of social and economic progress. It can also be seen as the ascendency of economic conservatism over the dominance liberal and Keynesian economics had in Ward's time.

However, despite neoliberalism and conservative market fundamentalism's rise to ideological hegemony, the ideas presented here as the liberal ideal type are still held by many 21st century liberals. What is defined as liberal in this project is neither market fundamentalist conservative nor Marxist radical. Liberals are primarily distinguished by how, as Ward characterizes, they value both the market and the state, and may have nostalgia for the policies of

the Keynesian-Fordist period of the mid-20th century. For example, Reich (2015) argues that the salient economic question is not the dominance of the market or the state, but how markets are crafted and who gains the benefits from the workings of the market, the many in the middle class or the few at the top? For Reich, market fundamentalism is untenable because government policies are necessary to determine how markets run and who they benefit. Piketty (2014) is likewise concerned with who benefits from the global economy and argues that global economic inequality is structurally bound to increase unless government policies intervene. He argues that a return to the high tax scheme of the Keynesian-Fordist period and a renewal of the welfare state might be not only desirable but necessary to prevent staggering levels of income and wealth inequality. Finally, Frank (2015) chastises the Democratic Party in the United States for largely abandoning the liberal economic policies that defined them since the New Deal era. He argues that while they may have a liberal social agenda, the Democratic Party's economic policies have largely shifted to the right, and thus they have lost their vision of being the "party of the people." While economic liberalism as described in the ideal type above may no longer be as widely held as in the past, the principles of liberalism as an ideology still persist, and are these principles and characteristics are expressed by the authors described in Section 2.2.

Ward's Conservative Ideal-Type

According to Ward (1979) conservative ideology is primarily based around core principles, four of the most important being as follows. 1. conservatives reject mechanistic "solutions" to social problems. 2. the individual is the primary element in society, while 3. the family is society's most important social unit. Finally, 4. The essential task of the government is to maintain order both internally and protection from external threats in order to provide the conditions for families and individuals to pursue their self-interest as long as they do not harm

others. It is also important to note from the outset that conservatives see the validity of these principles as essentially transhistorical. The efficacy of principles such as individualism, focus on the family, and order are not just central to modern capitalist nations such as England and the United States, but also had an important bearing on the success of pre-modern nations such as Ancient China and Republican Venice (Ward, 1979, pg. 337-342). This also implies that the application of conservative principles would be advantageous for any new configuration of society in the future.

Like liberal ideology, conservative ideology also finds its roots in the ideas of the 18th century enlightenment; they also see human nature as fundamentally hedonistic, rational, and atomistic. Unlike liberals however, conservative ideology places even more emphasis on the individual as the primary element in society. No one group, organization, or institution in society, especially the government, should assume it knows what is best for the individual because it is only the individual who can judge what is best for themselves, and they know more about their own wants and desires than anyone else ever could. That is why the free and open market is the natural environment for the individual to navigate through life. Trade relations on the open market have been the prime movers in facilitating the creation of the modern world of industry and affluent capitalism (Ward, 1979, pg. 330-336). Its workings constitute the single most dynamic process known in history, and though it is not perfect, it has established itself as a far better basis for human social interaction than any other known social process (Ward, 1979, pg. 349-354).

While the market has primacy in the conservative worldview, the government does have an important role to play in the maintenance of market society. Its primary job is to maintain social stability through defining and enforcing property rights, and secondly, to use its monopoly

of force to maintain peace internally and defend against external threats. The justice system must act as an effective deterrent to would-be criminals to prevent crime and keep the economy running smoothly. However, to the dismay of conservatives, liberal governments in the 20th and 21st centuries have overstepped their traditional *laissez faire* bounds in creating multiple regulatory agencies and welfare programs in an attempt to "correct" or "adjust" so-called problems in the market or in the results of market processes. Though conservatives recognize that the market is not perfect, they contend that market forces generally does a better job of creating equilibrium and increasing prosperity than the government intervention, especially in the long run. While it is assumed by liberals that bureaucratized governments can solve, or "manage" social problems, they provide no coherent theory to show that government can solve problems better than the workings of the market (Ward, 1979, pg. 353).

Conversely, conservatives contend there are compelling arguments that governments nearly always perform worse than markets (Ward, 1979, pg. 353). One argument runs as follows. Conservatives recognize the complexity of social relations. The consequences of any given social policy cannot be predicted with much confidence, no matter how sophisticated the statistical or mathematical model (Ward, 1979, pg. 353). Paternalistic liberal governments consistently fail to prepare for the unforeseen consequences of their policy agendas and the consequence is worse economic outcomes than if market forces played out naturally. In addition, conservatives contend that individuals and families are complex and cannot be fully understood, even by social science. Because of the inherent complexity of the individual needs, wants, and desires of every person, individuals should not be manipulated as instruments of social policy, but should be left alone to aspire to succeed by personal efforts, with the assistance

of one's family if necessary. The power of government should be limited so individuals can express individual freedom, creativity and entrepreneurship in the economy.

Of course, it can be admitted that market capitalism has caused mass upheavals at times through its dynamics, what Schumpeter (2003 [1942]) terms creative destruction. In the long run however, the workings of the market tend to produce more good than harm. For example, according to Polanyi, (2001 [1944]) the establishment of labor markets in England caused massive social upheavals. However, conservatives emphasize how eventually the workings of the market produced a continuous rise in real wages and workers are many times better off than in the past due to these the rise in real wages as well as improvements in technology and increasing productivity that raised living standards across the board. Indeed, when individuals are allowed to pursue their self interest in the market, the general outcome is that the rich get richer, the middle class gets richer, and the poor get richer (Ward, 1979, pg. 347). In short, everyone prospers when market principles are applied and individuals are free to pursue their interests.

The validity of this argument is most convincingly demonstrated when examining the close connection between dynamic market forces and the progress of science and technology. The scientific revolution began around the same time as the development of modern industrial capitalist market economies, and the advancement of one has pushed forward the development of the other. At the same time when private individuals had the freedom and sufficient capital to produce commodities on a mass scale, the natural sciences began to advance to a point where knowledge of the natural world could be consciously applied to the improvement of economic production. At the same time, market forces and competition pressure businesses to push forward the development of science and technology further in the pursuit of profits. This process

is also pushed forward by well-defined property rights such as patents and intellectual property that incentivize investment in research and development as well as other innovative activities (Ward, 1979, pg. 357). As Ward states,

> The increase in scientific information has opened up the door to creating new technologies; and at this point markets have come into their own as creative institutions... It is under the pressure of market incentives that these technological possibilities have been transformed into effective realities (1979, pg. 350).

It is widely recognized that innovative activity is synonymous with profitable activity, and therefore businesses pursue innovation that in the long run greatly improves the productive growth in society as well as raise the standards of living for all.

It should now be clear that conservatism boasts a formula for a prosperous economy and society based on what they claim are universally valid principles. These are summed up by Ward in the following. The primary basis for upward mobility should be meritocratic, based on economic performance and the creation of economic values. The state that governs best is the state which governs least. The most effective, dynamic and stable economic system is the market economy. And finally, the development of new forms of science and technology, and thus human progress, flourishes where freedom flourishes (Ward, 1979, pg. 342).

Conservatism after Ward

In 1979, Ward observed that conservatives were relatively rare in economics departments, as he points out that, "a number of the highest status departments had no conservatives at all on their faculties" (pg. 325). That observation is certainly not true today, as with the rise of

neoliberalism in the late 20th century, many conservative principles have become hegemonic in economic discourse and policy. According to Centeno and Cohen (2012),

> Neoliberalism sought to dismantle or suppress extra-market forms of economic coordination. Concretely, its policies involved the elimination of institutionalized post-Depression and post–World War II policy conventions, such as redistributive taxation and deficit spending, controls on international exchange, economic regulation, public goods and service provisions, and active fiscal and monetary policies…It opposed such policies because they infused noneconomic or political considerations into economic activity, while the rule of markets was viewed as conforming to essentialist and universal principles (pg. 2).

What Ward identified as conservatism in economics largely conforms to what we understand today as neoliberalism, or at least neoliberalism in its purest ideological form.[32] This is important to note because while Ward treats liberal ideology as the dominant ideology in his work, conservative economic analysis is the dominant and most mainstream ideology presented in this analysis. This is because the principles of conservative economics described above have largely become the status quo in mainstream economic discourse. In the time since Ward, the ideological principles of conservatism he outlines have not changed much, rather, society has changed because of the ascendency of conservative economic principles and the application of those principles in various forms of neoliberal policy.

[32] It should be noted that despite its ideological hegemony, concrete neoliberal/conservative policies have not always conformed to the ideology. For example, commentators have noted that despite the anti-state small government rhetoric, most states have not shrunk in a substantial or absolute sense (see, Harvey 2005; Centeno and Cohen 2012).

Ward's Radical Ideal-Type

According to Ward, there are two defining characteristics of a radical: a commitment to the "wretched of the earth," and a belief that this wretchedness present in human society is not inevitable but contingent, yet at the same time cannot be eliminated within the framework of existing society (Ward, 1979, pg. 176). In short, the radical orientation is always toward some kind of transcendence from current conditions.[33] Liberals and conservatives tend to keep their focus on the benefits of the capitalist market economy, but radicals place their attention on the myriad social costs that are often ignored or obscured by liberals and conservatives. The nature of contemporary social problems such as economic inequality, imperialism, racism, sexism, and the inherent irrationality of capitalist society are all unveiled in radical analysis.[34] Critique alone, however, is not enough for radicals, diagnosis should always be coupled with a concrete answer to the question "What is to be done?" In other words, radical thought is centrally concerned with the relationship between theory and practice, "The central task of radical thought is to understand these problems and to understand what to do about them" (Ward, 1979, pg. 176).

Toward that end, radicals have engaged in developing what Marx calls a "ruthless criticism of everything existing," showing how modern capitalist society is inherently contradictory in various ways (Marx, 1977 [1843] pg. 12-15). One of the most well-known radical critiques is a critique of the capitalist market system. For radicals, market forces have a

[33] While there are many of schools of radical thought such as feminism, critical race theory, poststructuralism, postmodernism etc., the following ideal type conception, as well as the ideal type analysis of section 2.4, will primarily focus on the Marxist tradition of radical political economy. This is because it is primarily Marxist or socialist radicals who are most actively engaging in discussions about automation and technological displacement.
[34] Ward (1979) spends roughly half of his treatment of radical ideology describing and critiquing the economics of socialist societies such as the Soviet Union, China, and Yugoslavia. However, because the primary time frame of interest here is after the fall of the Soviet Union and the integration of China into the capitalist global economy, I will not be describing his treatment of socialist economics here.

ruthless effect on people and often adversely affects their livelihoods. The development of the market system had devastating effects on the generations of people who were dispossessed of their land and coerced by necessity into the cities, factories, and ultimately into the labor market. According to Ward (1979), the industrial revolution produced an era of great social turbulence causing an,

> uprooting of traditional modes of life, the throwing of vast numbers of people onto impersonal labor markets, the insecurity of wage labor as a basis for sustaining a family, and the violent swings in the level of economic activity that accompanied the growth trends… (pg. 193).

Fluctuations in the market, business cycles, recessions, and other economic crises directly damage the life chances of many people in society, and many of these issues have root cause in the instability of the market.

Beyond the volatility of the market, radicals critically examine capitalist production, an area that neither liberals or conservatives typically scrutinize. The primary charge against capitalist production for Marxist radicals is that while production in capitalism is highly productive and produces an economic surplus, the direct producers of that surplus benefit relatively less than those who extract the surplus from the producers. As Ward states,

> The surplus accrued to the capitalists by letting the market compel the worker to work for much longer each day than was necessary to recreate the value of his labor. The actual rate of surplus extraction might vary from industry to industry, but the process of extraction was governed by these same impersonal factors, operating under the primary

influence of the capitalist class's monopoly control of the means of production (1979, pg. 206).

This unequal process of extraction and distribution is the primary mode of exploitation under capitalism. Even under conditions of a perfectly operating market system, capitalist production is based on exploitation of labor power as the source of economic surplus. In addition, Ward (1979) draws upon the work of Baran and Sweezy (1966) to point out other forms of exploitation in modern monopoly capitalism such as wasteful production, skewed income distribution, and stagnant wages (pg. 207-211). This analysis of the destructive effects of the market and the exploitation inherent in capitalist production forms the basis for the radical's conception of class struggle as a fundamental element of capitalist society. For radicals, capitalism is fundamentally characterized by its class structure and the struggle for power and resources between classes who embody different economic interests. This has been characterized by radicals as the conflict between the bourgeoisie and the proletariat, the haves and the have nots, the 1% and the 99%, or a number of other conceptual schemes of class relations and class hierarchy. The contradictory nature of class is the fundamental flaw in capitalist society, "the class nature of the society, which generates the endless series of conflicts, negotiations, truces, chicanery, and renewed conflicts that destroys the society's potential" (Ward, 1979, pg. 213).

This class struggle in the workplace and the economy at large is also extended into a struggle over the power of the state. While some radicals believe the state could be used to implement radical reforms, many radicals recognize that, "the primary function of the state continues to be the protection of the regime of private property relations" (Ward, 1979, pg. 215). First, the state uses its legitimized monopoly of force to stabilize and maintain the exploitative capitalist relations of production. But to reduce or tame class struggles, the state also provides

what Ward calls "social-harmony expenditures," such as welfare state programs (1979, pg. 216). While the creation of the welfare state does indeed materially benefit workers and the poor in society, the policies fail to address the structural problems that create social inequalities in the first place. Ultimately, elite control of the state results in the continued maintenance, not eradication, of exploitation and social inequalities.

As previously mentioned, capitalist society is highly productive, and the development of technology allows it to become more productive still. The benefits to humanity from the increasing power of technology is not in dispute by radicals, but what is problematic about technology is its application within capitalist relations of production. The industrial revolution brought the rise of the factory where workers could produce a large surplus that could be widely distributed, but the exploitative relations of capitalism prevent this from happening. However, radicals contend that this relationship between the forces and relations production is ultimately contingent. Technology and capitalism do not necessarily go hand in hand; the development of technology that improves labor productivity is, "a possibility that could [be] realized under several alternative systems of production relations" (Ward, 1979, pg. 192).

The question remains, "What is to be done?" Ward outlines both the successes and failures of socialist countries such as China, Yugoslavia, and the Soviet Union (Ward, 1979, pg. 238-253). However, with the fall of the Soviet Union and the integration of China into the global economy, the traditional form of socialism as well as the traditional means of achieving socialism have largely fallen out of favor among radicals. Even a decade before the fall of the Berlin Wall, Ward notes that, "At the present time [1979] there appears to be a growing number of radicals who feel that none of the existing socialist countries are really socialist. No doubt they are correct" (pg. 260). The problems with socialist bureaucracy and technocracy are well

documented, but then what is the alternative? For radicals, the status quo of capitalism is untenable, so both defining social and economic justice and concretely achieving it is still a task left undone for radical political economy.

Radicalism after Ward

Intellectually, radicals are on the side of the working class. Ward formed his optimal radical ideal type at the tail end of the peak of working class power before, as Harrison and Bluestone (1988) describe, the United States took a "great U-turn" and organized labor was "zapped," by corporations and the state implementing neoliberal labor policies. Since its height in the 1960s, the labor movement and unionization has been on the decline in the United States and many other countries around the world.[35] In this era, much left leaning and radical politics has largely shifted away from economic concerns and towards movements that focus on collective identity, such as those that focus on emancipatory struggles for the rights of women and racial, gender, and sexual minorities as well as indigenous populations and anti-colonial struggles. Especially after the fall of the Soviet Union, socialism as it existed in the 20th century is largely no longer seen as a viable alternative to capitalism. However, class struggles have continued regardless. The aftermath of the 2008 financial crisis saw the rise of new popular movements for economic justice such as Occupy Wall Street. Populist politicians with left leaning economic agendas such as Bernie Sanders in the United States or Jeremy Corbin in the United Kingdom have risen in popularity in recent years.[36] In addition, cooperative and worker controlled businesses have arisen due to the demand for socially responsible and sustainable

[35] For example, the Bureau of Labor Statistics reports that the rate of union membership has dropped from 20.1% in 1983 to 11.1% in 2015 (Dunn and Walker, 2016).
[36] Of course, whether these economic agendas should be considered liberal or radical is up for interpretation.

business practices, as well as a call to, as Marxist economist Richard Wolff describes, "democratize the enterprise" (Wolff, 2012). Wallerstein (2004) frames the renewed struggle not in terms of capitalism versus socialism, but between the defenders of the current world-system versus anti-systemic movements, or what he terms the "spirit of Davos" versus the "spirit of Porto Alegre" (pg. 85-88). Porto Alegre, Brazil was the site of the first annual meeting of the World Social Forum which Wallerstein (2004) terms a "movement of movements" fighting for both economic justice and justice for society's oppressed minorities (pg. 85-88). Its slogan is "another world is possible," and it is up to contemporary radicals to work out what this alternative world should look like.

2.2 Liberal Theory and Ideology

Technological Displacement

The Power and Potential of Technology

We are living in an age of brilliant technologies. Computers and digital technologies are everywhere, from our cell phones to our cars, and the value they add to everyday life is staggering. Of course, computers have been around for over half a century, but the computers of today can do significantly more than the computers of the 1960s, the 1980s, or even computers of five years ago. The power and capability of machines is being pushed forward by many developments such as Moore's law, machine learning, big data, and artificial intelligence, and the application of these incredible technologies in business and every-day life are poised to bring society into a new age of economic and social progress (Brynjolfsson and McAfee, 2011; Ross, 2016; Kaplan, 2015). This new era goes by many names, from the "Second Machine Age," (Brynjolfsson and McAfee, 2014) or the "Fourth Industrial Revolution," (Schwab, 2016) but whatever it is called, the point is that technologies are being developed that have the potential to transform the economy and society. Although it has taken many decades of exponential progress to get to this point, digital and computer technology has advanced to the point where, "the key building blocks are already in place for digital technologies to be as important and transformational to society and the economy as the steam engine" (Brynjolfsson and McAfee, 2014, pg. 9).

The evidence for this imminent paradigm shift is all around us, but are especially poignant when reflecting on the amazing feats of advanced technologies in recent years. For example, the IBM computer Deep Blue defeated chess grandmaster Garry Kasparov in 1997, and

IBM's Watson artificial intelligence beat Jeopardy! champions Ken Jennings and Brad Rutter in 2011. Now Watson is being retooled for multiple economic applications, from being the "world's greatest doctor" by using its computing skills to diagnose diseases, to assisting in online shopping and financial services (Ford, 2015 pg. 101-102). The US government research agency DARPA challenged researchers in 2004 to develop a self-driving car, but none of the entrants' vehicles could successfully drive more than ten miles. Researchers at the time believed that driving was a non-routine cognitive task that would most likely be a human exclusive task for the near future (Levy and Murnane, 2004; Autor et. al., 2003). However, less than a decade later, Google unveiled their self-driving vehicles that may be ready to be released on the market sometime in the 2020s, if not sooner. Examples of technologies once thought to be in the realm of science fiction abound, with software capable of instant language translation and writing news articles, to easily reprogrammable industrial robots and printers that can print 3D objects (Brynjolfsson and McAfee, 2014; Ford, 2015; Schwab, 2016). These examples among many others are possible because of technology that is advancing exponentially, becoming increasingly digitized, and is being combined and recombined for form ideas to innovate new ways of doing business and providing goods and services (Brynjolfsson and McAfee, 2014 pg. 39-89). As technology develops further, we should expect technology to accomplish even more astounding feats in the future.

These developments are likely to greatly increase overall economic productivity and therefore the total number of goods and services provided in the global economy. Digital goods such as apps have a near zero marginal cost of production, therefore digital goods and services can be offered very cheaply or freely to customers (Schwab, 2016 pg. 33). In addition, information technologies are becoming general purpose technologies (GPTs), meaning that

computers are impacting the production of physical goods and services as well, making the production processes more efficient with higher output (Brynjolfsson and McAfee, 2011, pg. 20-22). According to Brynjolfsson and McAfee (2011), there is potential to apply information technology enabled innovations to areas as diverse as "manufacturing, distribution, retailing, media, finance, law, medicine, research, management, marketing, and almost every other economic sector and business function" (pg. 22). Overall, the global economy stands near an inflection point where the application of a new range of powerful computer technologies is ready to greatly transform the economy and society. It is of key importance that societies are ready for the impact of this transformation as, "Innovation is a complex, social process, and not one we should take for granted. Therefore, even though…technological advances [have] the power to change the world, it is important that we pay attention to how we can ensure such advances continue to be made and directed toward the best possible outcomes" (Schwab 2016 pg. 24).

The Next Industrial Revolution and Automation: What Makes This Time Different?

Indeed, it is of upmost importance that society is ready for both the positive and negative impacts from the "next industrial revolution." Although there are many benefits to be gained from the rise of brilliant technologies, any social transformation of this magnitude is bound to create both opportunities and challenges. Brynjolfsson and McAfee (2014) put it succinctly, stating that, "even the most beneficial developments have unpleasant consequences that must be managed" (pg. 10). The coming challenge of the "second machine age" is that the accelerating pace of technological development is likely to bring social and economic disruptions because as computers become more powerful and more capable of performing a wide range of tasks, businesses will inevitably have less need for certain kinds of workers. In other words, "…as technology races ahead it's leaving some people behind. They want to work, to offer their labor

to the economy, but their capacity as workers doesn't match the new environment" (Brynjolfsson and McAfee, 2014, pg. xiii). This could ultimately lead to technological unemployment, as new machines automate the jobs previously done by humans at an accelerating pace. Or as Keynes famously put it, technological unemployment is, "unemployment due to our discovery of means of economizing the use of labour outrunning the pace at which we can find new uses for labour" (1963 [1930] pg. 3). Of course, there have been technological revolutions in the past that have caused great economic and social upheaval, but there is reason to suggest that this time may be different. The emerging technological revolution is different because of the speed of the transformation, as technological progress is happening at a faster pace than ever before. The breadth and depth of the changes are happening across nearly all industries around the same time. Finally, the tendency for these technologies to transform entire systems and reinventing entirely new ways of producing goods and services (Schwab, 2016, pg. 1-4).

The primary sources of disruption come from the ability of new technologies to cause disruptions in the labor market and automate a larger swath of existing employment at an accelerating pace. Moore's law, big data, machine learning, and artificial intelligence are developing simultaneously to allow machines to become capable of performing a wider range of both cognitive and manual tasks (Autor and Dorn, 2013; Goos, et al., 2009; Frey and Osborne 2013). Routine tasks are more easily automated than non-routine tasks, yet what is considered non-routine, and thus not likely to be automated, is shrinking (Frey and Osborne, 2013 pg. 15). The implementation of information technology is creating skill-biased technical change which can result in labor market polarization where certain jobs, primarily routine and middle income jobs, are declining, while non-routine jobs, both low skill and high skill, are comparatively on the rise (see, Jaimovich and Siu, 2012). As Brynjolfsson and McAfee (2014) explain,

> technologies like payroll processing software, factory automation, computer-controlled machines, automated inventory control, and word processing have been deployed for routine work, substituting for workers in clerical tasks, on the factory floor, and doing rote information processing. By contrast, technologies like big data and analytics, high-speed communications, and rapid prototyping have augmented the contributions made by more abstract and data-driven reasoning, and in turn have increased the value of people with the right engineering, creative, or design skills. The net effect has been to decrease demand for less skilled labor while increasing the demand for skilled labor (pg. 135).

The demands of the labor market are shifting away from jobs that are routine and therefore easier to automate and towards an increasing relative importance of non-routine skills and jobs.

As technology races ahead, these new technologies are changing the structure of the labor market and automating certain jobs, but is this necessarily a negative development? Economic theory and historical experience informs us that while technology may destroy jobs, businesses, or industries, technology will likely also, "create entirely new occupations, and the ongoing process of 'creative destruction' will result in the emergence of new industries and employment sectors—often in areas that we can't yet imagine" (Ford, 2015, pg. 176). In the interim of this destructive process there may be maladjustments in the labor market due to the inability of worker's skills to keep pace with technical change, but optimists maintain that, "Eventually, the economy will find a new equilibrium and full employment will be restored as entrepreneurs invent new businesses and the workforce adapts its human capital" (Brynjolfsson and McAfee, 2014, pg. 178). However, there are multiple reasons to believe that the expected pattern may no longer hold true in this new context of brilliant machines. This time is different, and information

technology will likely cause an uptick in technological displacement across multiple industries, and perhaps result in technological unemployment.

First, the exponential progress in the power and capability of technology implies that the speed of disruption will likely be very rapid. As Kaplan (2015) explains, "the skills required to do the available jobs are likely to evolve more quickly than workers can adapt… The nature of the jobs available will shift so rapidly that you may find your skills obsolete just when you thought you were starting to get ahead" (pg. 13). The hollowing out of middle income jobs due to labor market polarization is already occurring, and it can be reasonably expected to accelerate as more tasks become susceptible to automation.

Secondly, technology is not only becoming more powerful, but also becoming increasingly cheaper, effectively competing for economic viability with human labor. Moore's Law makes better technology cheaper over time, so new technologies become more attractive to businesses as a replacement for human labor. For example, in manufacturing, industrial robots are becoming, "mass-produced at declining costs that will make them increasingly competitive with even the lowest-wage workers" (Ross, 2016, pg. 36).[37] It is economically rational for businesses to replace humans for machine labor where it is comparatively advantageous for both productivity and cost saving. However, this rational action can have negative consequences for labor markets that have not adjusted to the changes.

Finally, the destructive impact of technological displacement is likely to be larger than the positive creation of new jobs. Because information technology has become a widely used

[37] For example, in 2011, Chinese manufacturer Foxconn announced they would purchase one million robots to supplement the existing one million human workers. In addition, as of 2016, the robots Foxconn are implementing cost $25,000, about three times a worker's annual salary, but similar versions are slated to be sold for only $10,000, making the implementation of robots significantly more economically attractive (Ross, 2016, pg. 36).

GPT, these technologies will impact virtually all industries, making them all more productive, but also likely to be less labor intensive as the capital in the form of information technology substitutes for labor. In addition, many of the new technology companies that create the new "never-before imagined" jobs have been significantly less labor intensive at their outset.[38] If existing industries are becoming less labor intensive and new industries tend to be inherently less labor intensive, then the,

> "threat to overall employment is that as creative destruction unfolds, the "destruction" will fall primarily on labor-intensive businesses in traditional areas like retail and food preparation, while the "creation" will generate new businesses and industries that simply don't hire many people. In other words, the economy is likely on a path toward a tipping point where job creation will begin to fall consistently short of what is required to fully employ the workforce" (Ford, 2015, pg. 176).

While it is true that historically new technology has both created and destroyed jobs, it is not necessarily the case that the process of job creation and destruction will reach an equilibrium in the short or long term. In sum, the liberal stance on technological displacement is that, "there is no 'iron law' that technological progress must always be accompanied by broad job creation," and the fear is that without policies meant to assuage this situation, the negative consequences of the "next industrial revolution" on the labor market may become untenable for society (Brynjolfsson and McAfee, 2014, pg. 181).

[38] For example, when photo sharing website Instagram was sold to Facebook in 2012, it had 30 million users, but only 13 employees. Compare that to photography giant Kodak that employed 145,000 in its prime. Also, consider that, "in 1964 the four most valuable American companies, with an average market capitalization of $180 billion (in 2011 dollars), employed an average of 430,000 people. Forty-seven years later, the largest American companies were each valued at about twice their former counterparts but were accomplishing their work with less than one-quarter of the number of employees" (Reich, 2015, pg. 207).

The Next Industrial Revolution and Inequality

What is also troubling about this development is how technology, commonly thought of as a social good, has come to be a driver of social inequality. Typically, political debates surrounding inequality point to a number of causes of inequality such as globalization, financial crisis, privatization, tax policy, corporate greed, etc., but the role of technology in driving inequality is rarely recognized (Callahan, 2013, par. 1). This ought to change, as Callahan (2013) suggests that, "technology is becoming an ever bigger driver of inequality as smarter machines emerge that can do a wider range of jobs eliminating the livelihoods of professional and working class Americans alike while generating higher profits for corporations" (par. 2) Historically, technology largely did increase wages along with productivity growth, which, "created a sense of inevitability that technology helped (almost) everyone" (Brynjolfsson and McAfee, 2014, pg. 128). However, it appears that this time is different as median wages have diverged from productivity growth, median incomes have stagnated, and overall income and wealth inequality is on the rise (see, Mishel, 2012; Piketty, 2014). Labor market polarization is creating a relatively small number well-paying jobs at the top, while hollowing out the traditionally middle class jobs and leaving the remaining available work in primarily low-skill low-income occupations.

As technology automates jobs, creates some new jobs, and changes the nature of others, the process is restructuring the economy to create new winners and losers in the market. The winners are likely to be those with high levels of human capital whose skills are either not automatable yet or work as a complement to machine labor, capital owners who increase profit from use of automation technology and saving labor costs, and the talented superstars who can take advantage of "winner-take-all" digital markets to provide the best product or service

(Brynjolfsson and McAfee, 2014, pg. 148-162; Schwab, 2016, pg. 92). The losers are likely to be those with ordinary human capital, those who perform the routine tasks that are now at high risk of being automated in the coming decades (see, Frey and Osborne, 2013). Technology is racing ahead of the average skilled worker. Losing the race against technology spells stagnate incomes, structural unemployment, and increasing inequality. Ultimately, many people are likely to get left behind in the race against the machines, and this is the challenge that all stakeholders, political, business, and civil society leaders must face (Schwab, 2016, pg. 110).

The "next industrial revolution" promises both a great increase in the bounty of society in terms of number, quality, and variety of goods and services, but also threatens to increase the spread of economic inequality between those who can compete against or complement the new machines and those who cannot. Increased productivity and output alone might not be enough to maintain a prosperous society if a significant portion of the population are unemployed and society is highly unequal. Higher levels of unemployment and economic inequality are undesirable and can harm the viability of the fabric of society. Therefore, it is imperative to engage in envisioning effective policy solutions for these problems. As Brynjolfsson and McAfee (2014) state, "It's important to discuss the likely negative consequences of the second machine age and start a dialogue about hot to mitigate them—we are confident that they're not insurmountable. But they won't fix themselves either" (pg. 11). The goal is to find methods to both encourage the positive and innovative consequences of the "next industrial revolution," while simultaneously mitigating the spread of negative consequences such as rising inequality and technological unemployment. The next section describes multiple practices and policy proposals that intend to do just that.

Policies

As the diagnosis has made clear, there are strong reasons to believe that the next industrial revolution will present unprecedented challenges to the economic and social system, and that addressing these challenges requires proactive responses from businesses, government and civil society. Everyone has a stake in the outcomes of the next industrial revolution, so in a democratic society, all citizens, businesses, as well as government should have a role in ensuring that the development and application of new technological developments will benefit everyone. The forthcoming transformations are too great and the stakes are too high to allow for a "wait and see" approach. Conservatives argue that there is no reason to fear technological displacement or economic disruption because letting the market do its work will create an equilibrium in the long run.[39] However, in a context where income has been de-linked from productivity growth and labor market polarization is hollowing out middle income jobs, confidence in the market alone appears less viable. Making regulations and policy decisions is a choice with potential unforeseen consequences, but relying on the market is itself a choice with its own potential downsides. As Kaplan (2015) describes,

> Letting nature take its course—as we did during the Industrial Revolution of the late eighteenth and early nineteenth centuries—is a dangerous gamble. Per capita income rose dramatically, but the changes entailed untold human suffering during an extended period of economic transformation. We can ignore the coming storm and eventually everything will work out fine, but "eventually" is a long time. Without some foresight and action

[39] See for example, Thierer (2016) pg. 99-103, and Sherk and Burke (2015).

> now, we may condemn our descendants to half a century or more of poverty and inequality, except for a lucky chosen few (pg. 15).

With the evidence of disruptive and transformative technological change on the horizon, it is important to both understand the nature of these trends, and attempt to direct them towards the best possible outcomes for society. This requires a new sense of responsibility from society's leaders in business, government, and civil society. Ross (2016) contends that it is the "obligation of those in positions of power and privilege is to shape our policies to extend the opportunities that will come with the industries of the future to as many people as possible" (pg. 249). The overarching goal of the liberal policy strategy is to simultaneously encourage the abundance created by an economy based in advanced technology while working to reduce or mitigate the harmful effects of technological displacement and increasing economic inequality that could result (Brynjolfsson and McAfee, 2014, pg. 206). A second goal is to simultaneously "encourage technology to race ahead while ensuring that as few people as possible are left behind" (Brynjolfsson and McAfee, 2014, pg. 206). The following policy recommendations are meant to help bring society down a path that encourages the positive developments from technological progress, while managing and mitigating the negative developments.[40]

Short-Term Recommendations: Encourage Economic Growth

New technology is poised to transform the economy and society in the coming decades, but these changes are long-term structural shifts. In the short run, the economy will still require millions of human workers to function, and this will continue to be true for years to come

[40] It should be noted that the following recommendations should not be understood as a total policy package that is designed to be implemented as a unit. These policies are meant to fulfill the liberal policy goals, but not all of the recommendations must be followed to achieve the desired results, and some policies have multiple viable versions that could be implemented to achieve the same goal.

(Brynjolfsson and McAfee, 2014, pg. 206-208). However, workers around the world are hurting right now because of stagnant incomes and labor market polarization, among other economic concerns. Therefore, the most sensible short run policies are those that can best improve the condition of the worker and the economy, namely by encouraging economic growth. As Brynjolfsson and McAfee (2014) explain, "For now the best way to tackle our labor force challenges is to grow the economy. As companies see opportunities for growth, the great majority will need to hire people to seize them. Job growth will improve, and so will worker's prospects" (pg. 207). First, the government should increase support for basic scientific research. Transformative innovations such as GPS systems, touchscreen displays, voice recognition software, and the Internet all arose due to U.S. government sponsored basic research (Brynjolfsson and McAfee, 2014, pg. 218-219).[41] Basic research can potentially lead to groundbreaking innovations that can result in new companies that can grow the economy. Secondly, generous immigration policies are important because it allows a country to welcome and attract talented workers and entrepreneurs from around the world. As Brynjolfsson and McAfee (2014) state, "…there is wide agreement among economists that [generous immigration policies] benefit not only the immigrants themselves but also the economy of the country they move to" (pg. 222). Third, there is a critical need to upgrade infrastructure by refurbishing roads, schools, airports, etc. Improving infrastructure is advantageous because it puts people to work, the increased activity could provide an economic stimulus, and high quality infrastructure has many positive externalities for businesses and consumers.[42]

[41] See also, Mazzucato (2013) *The Entrepreneurial State: Debunking Public vs. Private Sector Myths*.
[42] See Ford (2015) pg. 276, and Brynjolfsson and McAfee (2014) pg. 220-221.

While these policies are relatively indirect methods of improving economic growth, the primary strategy to achieve economic growth that is compatible with an economy shaped by advanced technology is by encouraging organizational innovation and investing in human capital (Brynjolfsson and McAfee, 2011, pg. 56-65). The goal is both to encourage economic growth and to foster long term adaptability to market changes. In other words, these practices help transition the economy to what it needs to be to thrive in the new technological era and provide a sufficient number of jobs for workers. This is critical because as Brynjolfsson and McAfee (2011) argue, "our skills and institutions will have to work harder and harder to keep up [with technological change] lest more and more of the labor force faces technological unemployment" (pg. 52).

Encouraging Organizational Innovation

Encouraging organizational innovation entails encouraging entrepreneurship and startup companies that help grow the economy. According to Kane (2012) Startups between 1977 and 2005 created on average three million net jobs annually, while established companies were net job destroyers of approximately one million jobs per year (pg. 2). Entrepreneurship and startups could be encouraged by reducing regulatory barriers to business creation, creating immigration visas that encourage entrepreneurs to move into the country, or by teaching entrepreneurship as a necessary skill throughout higher education (Brynjolfsson and McAfee, 2011, pg. 66-67). The goal here is to rely on entrepreneurs to develop innovative means of employing labor by making new products, services, and business models.

Businesses of all sizes will need to be adaptive and agile to succeed in the new environment. To stay competitive, companies will have to understand the disruptions that lie

ahead, and innovate continuously to stay at the cutting edge of technological change to not be left behind (Schwab, 2016, pg. 52). As Klaus Schwab (2016), Executive Chairman of the World Economic forum states,

> …there is a mismatch between the magnitude of the upcoming changes and the relatively marginal actions being taken by companies to address these challenges. Organizations require a new mindset to meet their own talent needs and to mitigate undesirable societal outcomes (pg. 45).

In other words, not enough is being done by businesses and corporations to prepare them for the next industrial revolution. Businesses need to be cognizant of how robotics, AI, and information technology will necessarily transform their business operation and the business environment in order to develop the agility and adaptability necessary to respond to these changes.

Developing Human Capital

The goal of developing human capital is to "[ensure] that people have the skills they need to participate in today's economy, and tomorrow's" (Brynjolfsson and McAfee, 2011, pg. 56).[43] If one of the root causes of stagnant incomes and labor market polarization is technology racing ahead of human skills, then investing in education to make workers more competitive and compatible with the new world of work is one antidote to this problem. Humans have been perpetually locked in a "race against the machines." People have largely kept pace because of the growth in educational attainment throughout the twentieth century and because the limitations of technology left clear domains of human usefulness.[44] However, the exponentially

[43] See also Stephens (2017) "Automate This: Building the Perfect 21st-Century Worker."
[44] See Goldin and Katz (2008) *The Race Between Education and Technology*.

increasing power of machines is causing technology to race ahead in many domains, as they become both cheaper and more effective than workers. However, educational investment can help relieve this by better matching the skills of the workforce with the skills the economy will need. In addition, education can reduce the spread of inequality because reducing the number of unskilled workers will both relieve some of the suppression of their wages and simultaneously increase the supply of educated workers who will be needed work with new technology (Brynjolfsson and McAfee, 2014, pg. 213).

Several policies and structural changes in the educational system can help improve education to achieve these goals. First, educational programs can be retooled to teach skills that complement the skills of intelligent machines. For instance, computers are still incapable of some cognitive skills such as the creation of original new ideas, large-frame pattern recognition, and complex communication. People still have comparative advantage in these areas, so curricula could be retooled to incorporate these skills into their programs (Brynjolfsson and McAfee, 2014, pg. 193-197). This changes the paradigm of the race against the machines. Instead of trying to compete directly against machines in domains where they have the clear advantage, people should instead try to gain skills that can complement machines, that is, workers should aim to race *with* rather than race *against* machines. As Schwab (2016) argues, "leaders need to prepare workforces and develop education models to work with, and alongside, increasingly capable, connected and intelligent machines" (pg. 40).

Automation will occur in different industries on different timescales, so one of the most important attributes needed for tomorrow's workers is flexibility and adaptability in the face of transforming industries. The expected sequential pattern of first earning an education and then getting a job will no longer hold as automation increases. As Kaplan describes, "The nature of

the jobs available will shift so rapidly that you may find your skills obsolete just when you thought you were starting to get ahead" (Kaplan, 2015, pg. 13). Workers will likely need to periodically upgrade their skill set to maintain competitiveness. Brynjolfsson and McAfee (2014) concur when they state that, "…people will need to be more adaptable and flexible in their career aspirations, ready to move on from areas that become subject to automation, and seize new opportunities where machines complement and augment human capabilities" (pg. 203). In the future, workers will be expected to continuously invest in their own human capital, and develop new skills over the course of their careers.

Regulation, Taxes, and the Role of Government

So far, many of the policies advanced have focused on the need for both businesses and workers to adapt to an ever-changing nature of work and the economy. While adaptation to a dynamic market is important, it is also important for governments to set the market rules and regulations that shapes the working of the market to help ensure broad based prosperity.[45] In a context of rapidly changing technology, the government has an important role in shaping and directing the impacts of technological change, as Wong (2015) explains,

> At times, it may seem as if technology is a force greater than humans, forcing workers and businesses to adapt – or perish. Yet governments play a key role in shaping how technology advances. The sooner governments, in partnership with the rest of society, examine the future impact of this structural shift, the sooner they can act to ensure the shift benefits society (par. 8).

[45] See Reich (2015) for an examination of how governments necessarily set market rules that can bring either broad based prosperity or enormous inequality depending on the composition and enforcement of market rules.

Governments have a critical role in shaping the trajectory of the forthcoming structural shift in the economy, as well as providing the social services and social safety net to ensure smooth transitions during periods of disruption.

However, the role government takes must be handled with care. Too many controls and regulations on technology and businesses can have negative impacts on innovation and entrepreneurship, but too little protection for workers could also have untenable social consequences. The key is to attempt to strike a balance between embracing innovation and the prosperity it can bring, while working to preserving social stability. Schwab (2016) explains the appropriate paradigm as the following,

> Two conceptual approaches exist. In the first, everything that is not explicitly forbidden is allowed. In the second, everything that is not explicitly allowed is forbidden. Governments must blend these approaches. They have to learn to collaborate and adapt, while ensuring that the human being remains at the center of all decisions. This is the challenge for governments, which have never been more necessary than in this fourth industrial revolution: they must let innovation flourish, while minimizing risks (pg. 71).

The goal is to shape the development and application of technologies in ways that align with society's values. Toward that end, governments, in close partnership with business and civil society leaders should, "create the rules [and] checks and balances to maintain justice, competitiveness, fairness, inclusive intellectual property, safety and reliability" (Schwab, 2016, pg. 70).

Taxes are necessary to fund government functions and provide essential social services such as education and welfare programs, but taxing inevitably incentivizes certain behaviors and

dis-incentivizes others. For example, if a country wants to slow down the rate of automation in a particular industry or the economy as a whole, the government could lower taxes on human labor or reduce employer mandates in order to make workers more attractive to employers compared to machines. The shortfall on government revenue from taxes on labor could be replaced by Pigovian taxes on negative externalities such as pollution or perhaps by raising the value-added tax (Brynjolfsson and McAfee, 2014, pg. 239-241).[46] Alternatively, as industries become less labor-intensive due to automation, the tax system could be transitioned away from emphasizing taxes on labor and more toward taxes on capital (Ford, 2015, pg. 278).[47] However, this latter option should be considered sparingly because taxing new technologies may risk stifling innovation. In either case, governments need to be cognizant of how their tax systems create incentives and dis-incentives, and how this effects how the next industrial revolution will unfold.

Long Term Policies: Guaranteed Minimum Income

In the short-term, encouraging economic growth, encouraging organizational innovation, and investing in human capital may improve the situation of the average worker and stave off the threat of technological unemployment, but in the long-term the next industrial revolution may make it difficult or impossible to maintain high levels of employment on these measures alone. If increasing automation results in widespread technological unemployment then overall demand could fall sharply, destabilizing the economy and society in the process. Ford (2015) describes the situation as,

> …increasing technology-driven inequality is likely to threaten broad-based consumption. As the job market continues to erode and wages stagnate or fall, the mechanism that gets

[46] The United States currently does not have a value-added tax, so one would need to be established first.
[47] See also the proposal by Microsoft's Bill Gates to tax robots who replace human workers (Delaney, 2017).

> purchasing power into the hands of consumers begins to break down, and demand for products and services suffer (pg. 264).

In a situation where more people are becoming economically vulnerable due to automation, the social safety net and assistance programs become more important than ever. However, the current system of multiple means-tested programs may prove insufficient if technological unemployment rises significantly. In response, many liberals have proposed the need to revisit the idea of a basic minimum income provided to all citizens. A minimum income provided unconditionally to everyone by the government would allow each person to have a minimum standard of living regardless of whether he or she is employed. It would also serve to supplement consumer spending to maintain a healthy economy.

On its face, a guaranteed minimum income may seem like a radical policy. On the one hand, it would entail an expansion of the welfare state and would require additional tax revenue to pay for it. On the other hand, the minimum income could fulfill its purpose of supporting citizens' income and spending while maintaining the basic social and economic structure of society and its institutions. As Bruenig (2013) explains, universal basic income (UBI) would not require radical change because,

> …a UBI would not dramatically overhaul society. The basic institutions that make up our economic and social structure—private property, capitalist markets, etc.—would remain entirely intact. No new basic institutions would be added either: the government would collect tax revenue, which it already does, and disperse benefits, which it also already does. Compared to actual utopian ideas, a UBI is actually quite modest in what it does and does not change." (par. 5).

Bruenig (2013) also argues that a UBI would be advantageous because it could help reduce poverty and economic inequality, as well as being simple to administer while avoiding some of the perverse incentives and poverty traps associated with means-tested welfare programs (par. 2).

However, for all the potential upsides of a UBI, the primary objection is that such a program could lower the incentive to work. Therefore, for liberals, the goal of UBI would be to "…provide a universal safety net as well as a supplement to low incomes—but without creating a disincentive to work and to be as productive as possible" (Ford, 2015, pg. 261).[48] It's important for people to work, not only because that's how most people make their living, but also because of the many social goods associated with employment. Jobs make communities healthy; they give workers a sense of self-worth, healthy values, work ethic, structure, and meaning in their lives (Brynjolfsson and McAfee, 2014, pg. 234). As Voltaire once said, "Work saves a man from three great evils: boredom, vice, and need." (cited in Brynjolfsson and McAfee, 2014, pg. 234). A UBI would take care of need, but only work can save a person from boredom and vice. Therefore, any UBI scheme should be structured so that it is low enough to avoid idleness and incentivize work. Of course, technology will automate many jobs, but a UBI could allow workers to take even the lowest paying jobs and use the UBI as a supplement to live in relative comfort with the basic necessities of life fulfilled.

There are multiple viable variants of UBI that could provide the same useful effect. For example, Bynjolfsson and McAfee (2014) suggest that a negative income tax, giving money to people who earn below a certain threshold, may be a more effective plan that encourages work (pg. 237-241). Kaplan (2015) proposes that if income from labor is becoming less prominent,

[48] See also, Reich (2015) pg. 215, and Brynjolfsson and McAfee (2014) pg. 234-237.

than encouraging broad based investment in capital may provide a solution. In this plan, companies would be incentivized to sell their stock as broadly as possible by providing tax breaks to those whose stock base is decentralized among many millions of people rather than concentrated ownership by a wealthy few. Widespread capital ownership could provide returns that could operate as a minimum income for many people (pg. 174-186). These are just two examples of a plethora of ways to structure and fund a basic income program.[49] In all of these cases, the intended effect is the same. If technology is making jobs, especially middle class jobs, more scarce over time, than a solution is to provide a minimum standard of living for everyone so the effects of automation and the shocks of economic disruption will be blunted by a sufficient safety net. This can help ensure broad based prosperity continues, is consistent with society's values of providing opportunities and valuing hard work, and ensures that every person has access to goods and services and a decent standard of living.

The Future

The liberal policy plans described above are not meant to be an absolute plan that must be followed, but as a roadmap of the potential policy directions society can travel down that will hopefully lead down the right path. The purpose of these policies is the same, to help ensure that the economic gains from technological development are widely shared across society and the suffering associated with economic disruption and technological unemployment is avoided as much as possible. Technology developed in the coming decades will likely have profound effects on the global economy and society, but the ultimate outcome will be determined by the policy and institutional decisions made now and in the years to come. Society's institutions,

[49] See Reich (2015) pg. 216-217, Ford (2015) pg. 257-275, Kaplan (2015) pg. 174-186, and Brynjolfsson and McAfee (2014) pg. 237-241

government, business, and civil society, all have the power and the responsibility to respond to the challenges presented by the next industrial revolution. As Schwab (2016) states, "The fourth industrial revolution may be driving disruption, but the challenges it presents are of our own making. It is thus in our power to address them and enact the changes and policies needed to adapt (and flourish) in our emerging new environment" (pg. 106). By working together, social institutions, organizations, and citizens can collectively make the necessary choices that can mold the next industrial revolution to reflect society's values and foster broad based prosperity.

For liberals, it is critical that the new risks and the threat of increased inequality and technological unemployment are not ignored. It is only by consciously anticipating the challenges of the future that they can be properly addressed. As Schwab (2016) argues, "…we need to work very hard to ensure that all citizens across cultures, nations and income groups understand the need to master the fourth industrial revolution and its civilizational challenges" (pg. 114). Without some practical response, the trends of stagnant incomes, jobless recoveries, and labor market polarization may grow worse, increasing inequality and potentially threatening the basis of social stability. Brynjolfsson and McAfee (2014) contend that there is both great potential, but also great risks associated with the next industrial revolution, "Technology creates possibilities and potential, but ultimately, the future we get will depend on the choices we make. We can reap unprecedented bounty and freedom, or greater disaster than humanity has ever seen before" (pg. 256). The challenges presented by the next industrial revolution require collaborative solutions to address rising inequality and the decline of jobs. However, if social institutions can rise to the challenge, then there is reason for optimism.

The Importance of Openness

As the next industrial revolution unfolds, there will be countries that will embrace it, and others who will resist it. As Schwab (2016) describes, "we may witness an increasing degree of polarization in the world, marked by those who embrace change versus those who resist it" (pg. 97). To ensure that prosperity is broadly shared, it is critical that countries are open to new technologies, not resistant to them. Failure to do so could exacerbate the gap between rich and poor countries, as the material gains from advanced technology can only be captured by being open to new technologies and the global markets that facilitate their proliferation. For example, Ross (2016) documents how the countries of Estonia and Belarus took very different developmental paths after the collapse of the Soviet Union. He details how Estonia embraced technological change and global investment, while Belarus kept state control over many industries and maintained a neo-luddite philosophy of resistance to technological change (Ross, 2016, pg. 205-216). The choice of either openness or resistance to change became a path dependent trajectory that took Estonia and Belarus in two very different directions. The staggering difference in economic outcomes of these two countries is evidence of how openness to change and willingness to adapt is critical.[50] This general lesson of the need for openness and adaptability can be applied to governments, businesses, and workers. Governments that attempt to stifle or block innovation, businesses that fail to keep up with industry and technological standards, and workers who fail to adapt to the changing skills required to flourish in the new economy may get left behind.

[50] To give just one example, compare the GDP per capita of Estonia, $29,364.70, to the GDP per capita of Belarus, $18,060.40 (World Bank).

To prevent the growth of this kind of inequality requires ongoing cooperation and coordination at the local, national, and supra-national levels (Schwab, 2016, pg. 111-115). In the future, global collaboration and partnerships to determine the global norms and standards of how to develop and implement new technologies as well as address the attendant economic and social concerns will likely grow in importance. Without collective coordination and agreement, the future is likely to be characterized by growing inequality and uneven development both within and between nations as different jurisdictions respond differently to the promise and challenges of the next industrial revolution.

The Importance of Values

Even though openness to new technology is a prerequisite for acquiring the positives they represent does not mean that this also requires openness or acceptance of their potential negative consequences. Adaptation to change is important, but so is making sure that policy frameworks are in place that can maximize the benefits of technological change while minimizing the risks. Therefore, for liberals the central question of the future is how the developments of the next industrial revolution can be shaped to reflect collective societal values. Technology is meant to empower humanity, but paradoxically technology is threatening society by disrupting markets and employment. However, it must not be forgotten that, "new technologies are first and foremost tools made by people for people" (Schwab, 2016, pg. 114). Therefore, technological development should be designed to fulfill that original purpose, toward empowerment and the common good. Policy choices need to be made based on a set of common values to make sure the next industrial revolution creates broad based prosperity and opportunity for all (Schwab, 2016, pg. 13).

Global markets will be greatly impacted by technological change. Markets are essential drivers and facilitators of the economy, but it should be recognized that markets are also actively shaped and maintained by laws as well as formal and informal norms and regulations (Reich, 2015, pg. 81-86). Therefore, markets can be structured by laws and norms to operate in ways the promote freedom as well as fairness, equal opportunity, and security. As Schwab (2016) argues, "Markets are effective drivers of wealth creation, but we must ensure that values and ethics are at the heart of our individual and collective behaviors, and the systems they nourish" (pg. 114). The next industrial revolution will require leaders of institutions to think deeply about how their decisions will affect the unfolding of the next industrial revolution and work to ensure that social institutions and organizations embody social values. As Brynjolfsson and McAfee (2014) argue that in the context of the next industrial revolution,

> our values will matter more than ever…Will our prosperity be broadly shared? What will be the nature and magnitude of rewards we give to our innovators? Will we build vibrant relationships and communities? Will everyone have the opportunities to discover, create, and enjoy the best of life? In the second machine age, we need to think much more deeply about what it is we really want and what we value, both as individuals and as a society (pg. 257).

These are the critical choices that will shape the trajectory of the next industrial revolution. For liberals, it is clear that decision makers, whether in business, government, or civil society, should make the choices that will shape the next industrial revolution to best reflect modern liberal values of diversity, openness, civil rights, and equality of opportunity, to ensure broad based prosperity.

A Cause for Optimism?

Despite acknowledging the dangers and risks of increasing inequality and technological unemployment, liberals have a strong sense of optimism that, in the long run, the next industrial revolution will greatly benefit humanity. As Kaplan (2015) states, "In the end, the tsunami of new technology will sweep in an extraordinary era of freedom, convenience, and happiness, but it's going to be a rough ride if we don't keep our hands firmly on the wheel of progress." (pg. 16). Of course, "keeping our hands firmly on the wheel of progress," means being cognizant of the forthcoming changes and their potential positive and negative consequences, as well as proactively working to ensure the best possible outcome. Hard choices need to be made and hard work needs to be done to secure this better future, but in the liberal imagination, this outcome is likely because, when faced with difficult challenges, hard-working people have always risen to face it head on. Brynjolfsson and McAfee (2014) encapsulate this idea when they make their argument for their sense of optimism,

> Even in the face of all these challenges—economic, infrastructural, biological, societal, and existential—we're still optimistic. To paraphrase Martin Luther King, Jr., the arc of history is long but it bends towards justice. We think the data support this. We've seen not just vast increases in wealth but also, on the whole, more freedom, more social justice, less violence, and less harsh conditions for the least fortunate and greater opportunities for more and more people (pg. 256).

If the arc of history does bend toward justice, then there should be a sense of confidence that effective and responsible decisions will be made to ensure the next industrial revolution brings broad based prosperity. Ultimately, the final conclusion of the liberal outlook is that there is a

reason for optimism, but only if our decisions are made collectively and in the name of our shared values. Technology is not destiny; society working together can collectively shape the future (Brynjolfsson and McAfee, 2014, pg. 257).

2.3 Conservative Theory and Ideology

Technological displacement

Innovation and Progress: the Formula for Prosperity

Innovation is key to economic growth, and economic growth is the key to human progress and prosperity. For over 200 years, openness to and encouragement of innovation has contributed to rising living standards for people all over the world. In recent decades, a large source of innovation has come in the form of exponential improvements in the areas of computer and information technology. Increases in processing power, digitization, storage capacity, and the ubiquity of sensors and computers in everyday life is enabling new businesses, new products, and new services to enrich our lives continuously. These advances allow innovative businesses to create new products such as drones, self-driving cars, and wearable technologies, as well as improve existing products by improving productivity, making goods both cheaper and higher quality. Software and digital platforms allow products and services to be delivered in new ways, such as the rise of the "sharing economy" with innovative business models like Uber and Airbnb. With the continuous improvement of these technologies the hope is that, "We stand on the cusp of the next great industrial revolution and developments that could vastly enhance the welfare of people across the planet" (Thierer, 2016 pg. 16).

For conservatives, to reap the benefits of these innovations, society must stay true to the "bourgeois virtues" that have encouraged innovation and economic growth since the 18th century Enlightenment Era. As economic historian Diedre McCloskey contends, "A big change in the common opinion about markets and innovation," in other words, society's embrace of the bourgeois virtues, "caused the Industrial Revolution, and then the modern world…The result was

modern economic growth" (2010 par. 1). With modern economic growth came the rise in living standards for billions of people around the world, and information technology promises to deliver more innovation, economic growth, and therefore higher living standards in the future.

However, there have been some commentators, including some economists, who have observed these trends and fear that new technological innovations may, paradoxically, threaten to lower living standards (see, Brynjolfsson and McAfee, 2014; Ford, 2015). They argue that these new technologies will cause troubling economic disruptions through the automation of jobs, creating technological displacement in some industries, increase economic inequality, or, in the most pessimistic view, create long-term technological unemployment. They cite how machines are replacing human labor in multiple economic sectors, and claim that something needs to be done to assuage this situation and prevent technological unemployment (see, Ford, 2015). However, this appears to be no more than a return of automation anxiety and technophobia, an attitude that has reoccurred throughout modern history since the luddites of the early 19th century (Woirol, 1996). Pessimists may disown the legacy of the luddites by claiming that "this time is different," that this time there really is reason to fear automation and a changing labor market. However, both history and economic theory suggest that there are, "good reasons to have faith that humans will once again muddle through and prevail in the face of turbulent, disruptive change" (Thierer, 2016, pg. 100).

There is no denying that the innovation driven by information technology will automate some jobs and create some level of economic turbulence, but this is natural for an economy based on creative destruction (see, Schumpeter, 2003 [1942]). It seems that the liberal pessimists forget that despite the processes of creative destruction, people's lives have been continually improving. As Bryce (2014) explains, the truth is that,

> more people are living longer, healthier, freer, more peaceful, lives than at any time in human history… [T]he plain reality is that things are getting better, a lot better, for tens of millions of people around the world. Dozens of factors can be cited for the improving conditions of humankind. But the simplest explanation is that innovation is allowing us to do more with less (pg. xxi-xxii).

Indeed, technological innovation promises higher productivity which means economic growth and higher levels of prosperity. In a situation like this it is important to recognize how crucial our attitudes toward technological progress are. Do we choose to embrace change or do we fear it? Do we choose to adapt to change, or try to prevent it? Do we embrace the future, or try to control it? There are good reasons to believe that it is better to embrace and adapt to the changes of the coming technological revolution rather than try to control them.

History and Technological Unemployment

Both historical precedent and economic theory explain why technological unemployment is unlikely, even in an age of brilliant technologies. First, while it may be tempting to observe today's forms of technological progress such as advanced robotics and artificial intelligence and conclude that technological unemployment looms in the future, one must not forget that many people have feared that inventions as rudimentary, from today's perspective, as the power loom would cause technological unemployment. The luddites were afraid that power looms would destroy their jobs, and indeed, for some the new technology did have a disrupting effect in the short run. However, in the long run, "For every factory worker who lost a job due to technological innovation, new jobs opened up in entirely new sectors" (Thierer, 2016, pg. 100). Not only were new jobs in other sectors made available, but these new jobs usually gave workers

"better wages, a safer work environment, and more leisure time" (Thierer, 2016, pg. 100). In retrospect, it is easy to mock the luddites for their shortsightedness. They could not see how the economy would expand to create new jobs in both existing areas of employment as well as ones they could not even imagine. It is easy to be fearful when innovations feel new and unprecedented, but historically these fears were ultimately unfounded. Indeed, as Colvin (2015) argues, "the fears of Luddites past and present have been not merely unfounded but the exact opposite of reality. Advancing technology has improved the material well-being of humanity more than any other development in history, by far" (pg. 11).

Secondly, technological unemployment has never been an empirically verified problem historically, despite the incredible changes in technology over the past centuries. If technological changes could create unemployment, we would expect the history of employment since the Industrial Revolution to be quite different. Consider as McCloskey (2017) argues, "If the nightmare of technological unemployment were true, it would already have happened, repeatedly and massively. In 1800, four out of five Americans worked on farms. Now one in 50 do, but the advent of mechanical harvesting and hybrid corn did not disemploy the other 78 percent" (par. 8). Instead, economic history shows a long-term employment shift from a heavily agricultural based economy to an economy based on manufacturing and providing services.[51] Of course, technological change can temporarily displace workers from effected industries and cause temporary unemployment, but if workers were truly unable to find employment in other areas of the economy the unemployment rate would have been well above 5 to 10 percent we

[51] According to the CIA World Factbook (2017), in 2016 the United States employed 1.1% of its workforce in agriculture, 19.4% in manufacturing, and 79.5% in services.

typically expect, and would have skyrocketed towards upwards of 50 percent or higher (McCloskey, 2017 par. 9).

Finally, the history of automation shows that displacement has never occurred in a sweeping wave across industries that throws millions out of work. Instead, technical improvements have tended to effect specific industries at different times and at different rates. As Cowen (2013) explains, "It's the bumps and delays that will make the rise of smart machines a livable process…We deal with machines today as well as we do because our progress has been gradual, allowing us to learn along the way" (pg. 133). Recent technological progress has been rapid, but it is not uniformly rapid across all sectors, and not all industries should be expected to automate jobs all at once. The pessimistic commentary unnecessarily gives a sense of urgency and direness to the continuation of the creative destructive process society has experienced for hundreds of years. Economist Robin Hanson (2015) perhaps best expresses the skepticism towards technological unemployment when he asks,

> why should we think something like [robots getting good enough to take most jobs] is about to happen, big and fast, *now*? After all, we've seen jobs replaced by automation for centuries. Sure, there have been fluctuations in which kinds of jobs are more valued and which are most vulnerable to automation. Wage inequality has also varied. But why shouldn't we just expect these things to stay within roughly the same range of variation we've seen in the past? Workers found new jobs before, and the economy never imploded because of automation; more like the opposite (par. 7).

Technological progress has destroyed jobs in some areas and created jobs in others, yet order and stability have been maintained in modern industrialized countries. Historically innovation has not caused technological unemployment, but it has improved the lives of millions. Therefore, if

we look to history as a guide it appears clear that, "time and time again, society has adjusted to technological change and the standard of living for workers and average citizens alike improve at the same time" (Thierer, 2016, pg. 102).

Economic theory and Technological Unemployment

An examination of history shows that technological unemployment has not occurred, but the question remains, what mechanisms maintain high levels of employment despite technological change and technological displacement? There have been many explanations given over the centuries from the debates of the classical political economists of the 19th century to the structural unemployment debates of the 1960s, but here the explanation will be how, according to contemporary economic theory, technological unemployment stemming from advances in information technology is unlikely today (see, Woirol, 1996). The three most salient reasons are that technological unemployment theory is based on the "lump of labor" fallacy, human wants are infinite, and that the process of creative destruction creates new jobs just as it destroys others.

First, those who fear that technological unemployment is imminent usually hold a common economic fallacy called the "lump of labor" fallacy. The lump of labor fallacy is the idea that the economy needs only a fixed amount of work performed at any given time. Therefore, if machines automate the work that used to be done by people, then the total amount of human labor needed in the economy would shrink, reducing total employment (Sherk and Burke, 2015, pg. 2). This fallacy ignores how the economy does not require a fixed amount of work, but can expand with rising demand and economic growth. This fallacy treats the economy as a zero-sum game, where if a machine replaces a human that means the overall economy has lost a job it cannot recover. However, in practice, better machines increase productivity and

therefore spur economic growth which can result in a net gain in job creation. As Stewart et. al. (2015) explains, "[t]he stock of work in the economy is not fixed; the last 200 years demonstrates that when a machine replaces a human, the result, paradoxically, is faster growth and, in time, rising employment" (pg. 10).

Secondly, technological unemployment is unlikely because of human nature and its nearly infinite wants and desires, or as Colvin (2015) states, "No matter how much that technology may do for us, we will always find something to want" (pg. 32). The fear of technological unemployment is premised on the idea that at some point powerful machines could satisfy nearly all our needs through their labor and therefore human labor would be no longer needed. The problem with this idea is that human desires, like the economy's need for labor, are not fixed, and our desires expand as living standards rise. As an example, consider the thought experiment Sherk (2014) suggests,

> Most Americans could work 15 hours a week and make as much as the average Joe in the 1930s did. But few Americans today would accept that standard of living – in a much smaller dwelling with no TV, no air conditioning, and certainly no smartphone. All these "extras" require workers to produce them (par. 6).

Perhaps the machines of today could deliver everyone the living standards of the 1930s with significantly less human labor, but this would not be feasible or desirable because people today expect a much higher standard of living than what was the standard in the 1930s. To meet the higher expectations people must work just as long and hard as before, but with better machines to increase the productivity and output that allows for higher living standards.

What automation ultimately does is reduce the amount of human labor needed for particular goods and services, but this reduction also reduces production costs. When production costs are lowered, market competition compels companies to lower their prices which benefits consumers. The lower prices lead customers to either buy more of the now less expensive product or allows them to spend the saved money on other goods and services in other areas in the economy (Sherk and Burke, 2015, pg. 3). In either case, overall demand rises in economy, and increased demand for goods and services means the "amount of work in the economy expands to use the available labor supply" (Sherk and Burke, 2015, pg. 3). This virtuous feedback loop is how technological progress continues to expand economic growth without increasing unemployment. The only way to disrupt this feedback loop and reduce aggregate employment would be if consumers, "stopped spending their increased earnings on new goods and services—something that has yet to happen" (Sherk and Burke, 2015, pg. 3). In other words, it would only end if human desires had some limit or could reach a permanent satisfaction, which is highly unlikely.

Finally, the center of the conservative argument is the Schumpeterian idea of creative destruction. In the paradigm of creative destruction, the economy is constantly in a state of flux of new being created and old being destroyed. As Thierer (2016) describes, creative destruction,

> Reverberate[s] all around us in the modern tech economy, and the effects ripple throughout the broader economy. New products and services flow from many unexpected quarters as some innovators launch groundbreaking products and services while others devise new ways to construct cheaper and more efficient versions of existing technologies, and still others see opportunities to commercialize and attract consumers to

> all of them. Change has been constant, uneven, and highly disruptive, but it has also been the secret to the progress and innovation… (pg. 99-100).

Pessimistic liberal commentators may acknowledge the idea of creative destruction, but they appear to primarily fear the destruction and do not give enough serious thought to the possibilities of creation. As venture capitalist Marc Andreessen (2014) argues, to be pessimistic on the potential for job creation is to be pessimistic over humanity's capacity for creativity,

> We have no idea what the fields, industries, businesses, and jobs of the future will be. We just know we will create an enormous number of them… To argue that huge numbers of people will be available but we will find nothing for them (us) to do is to dramatically short human creativity. And I am way long [on] human creativity (par. 40).

Time and time again entrepreneurs have taken new technologies and made entirely new business models and new job categories that could not have been imagined before. For example, consider a report from the online jobs site Glassdoor (2017**)** which shows what are the twenty-five highest paying jobs in demand today. Many of the job titles would not have been imaginable until computer and information technology had significantly advanced. For some examples, some of the most highly demanded jobs from that list include IT manager, software development manager, computer hardware engineer, database administrator, and analytics manager (Glassdoor Team, 2017). It is notoriously difficult to predict what the jobs of the future will look like, but to doubt they will eventually appear is to ignore the creative aspect of creative destruction. Of course, creative destruction can be "gut-wrenching and generate… much opposition in the short term, but in the long term, creative destruction leads to economic growth and therefore greater economic prosperity" (Thierer, 2016, pg. 48).

To conclude, conservatives largely expect that automation and technological displacement will likely not be "different this time," in the sense that advancing technology will cause technological unemployment. However, this does not mean that there will not be some important or impactful changes. The expectation is that the process of creative destruction will continue in tandem with continuous innovations in computer technology, which should ultimately result in economic growth. All three processes are interdependent, and the disruption or curtailing of one process will likely lead to the disruption of the others to society's detriment. In other words, as Acemoglu and Robinson (2012) describe, "…sustained economic growth requires innovation, and innovation cannot be decoupled from creative destruction…" (pg. 430) The conservative attitude can perhaps best be summarized in this way: the upsides of innovation almost always outweigh the downsides, and that individuals and societies have been consistently and effectively resilient in the face of uncertain, ever-changing futures (Thierer, 2016 pg. 38).

Policies

If innovation, creative destruction, and economic growth are inseparably linked, then any policy regime must be structured in such a way that all three can flourish. No doubt, technocrats will likely advocate for policies that try to control and direct these processes toward a "higher aim," but as will become clear, meddling with any one of these processes is likely to stifle the full potential development of all three. In other words, trying to control progress ultimately stifles progress. If increased economic growth and prosperity is the goal of policy, then policy should allow the dynamics of the market, entrepreneurs, and innovators to be free to do the necessary work that generates growth. This is more important than ever today, as the rapid development of robotics, computers, and information technology have the potential to generate new waves of economic growth. However, it is also true that facilitating the free development of

these innovations will likely cause new waves of creative destruction. Even though growth and maintained employment are expected in the long term, in the short run there will be economic disruptions. Therefore, the ideal policy regime would encourage flexibility and innovative educational opportunities to best allow individuals to adapt to the changes. Finally, conservatives should try to identify what will be the high value skills and jobs of the future to allow individuals to make informed decisions about how to best develop their skills in the context of a rapidly changing job market. Towards that end, this section will provide a description of two broad categories of jobs that are likely to be in high demand in the future: jobs that require human-machine collaboration, and jobs that require skills that are uniquely human and that cannot be automated by machines.

The Paradigm of Permissionless Innovation

If economic growth requires innovation, then innovation must be fostered. However, innovation cannot be dictated from above, but can only emerge under the right conditions, that is, under conditions of economic freedom. Without freedom, the creative entrepreneurs and scientists will either not be incentivized, not be capable of, or will not be allowed to do the necessary innovative activity. Too often, potentially life changing ideas and technologies are prevented from coming into being because of government regulations or public fears of the potential impact of this or that innovation. This attitude reflects what Thierer (2016) calls the "precautionary principle," which he refers to as, "the belief that new innovations should be curtailed or disallowed until their developers can prove that they will not cause any harm to individuals, groups, specific entities, cultural norms, or various existing laws, norms, or traditions" (pg. 1). This attitude can stifle innovation because it often delays the creation of new innovative products and services or withholds them from the market altogether, as Cowen (2013)

states, "Technological progress slows down when there are too many people who have the right to say no" (pg. 17).

In recent history, entrepreneurs and scientists have been largely able to foster innovations in robotics, computers, and information technology without many regulatory or legal barriers (Cowen, 2013, pg. 17). However, as these machines become more fully integrated into daily life, the precautionary principle has become more widely exercised in these industries. To give just one example, driverless cars represent a potentially momentous innovation that could increase efficiency and save transportation costs in many industries. However, before driverless cars can be released for public or commercial use, they are facing numerous regulatory debates and onerous regulatory hurdles that are delaying their implementation.[52] While some regulatory changes are needed to reflect the paradigm shift driverless cars will bring, there is a risk that policy makers will over-regulate and delay the release of driverless cars in the name of "higher aims" or good intentions. As Scribner (2014b) explains, this dilemma is a prime example of the precautionary principle at work,

> Policy makers must accept that their good intentions—whether in the form of selfstyled consumer protection, distributional concerns, or aesthetic preferences—can have harmful and potentially deadly consequences.[53] Simply put, we should leave the automated vehicle market as unencumbered as possible, to allow for the fastest availability to the most consumers (pg. 7).

[52] See Scribner (2014a) and Scribner (2016).
[53] What Scribner is referring to here is that if driverless cars are on average safer than regular cars, than any delay in the release of driverless cars can translate into more accidents and driving related deaths.

This is just one of many examples of how the precautionary principle can potentially stifle innovations in advanced technology.

The precautionary principle usually creates unnecessary burdens on innovators which delays or prevents the potential economic growth innovation generates. This is often done, paradoxically, in the name of "progress." According to Postrel (1998) technocrats "promise to manage change, centrally directing 'progress' according to a predictable plan… they worry about the government's inability to control dynamism" (pg. 7-8). These technocrats, who usually identify as liberal or progressive, want to have greater control over the pace and form of technological innovation, as well as manage its societal impacts (Thierer, 2016, pg. 24). They try to prevent perceived negative consequences of creative destruction in the name of their values such as justice, equality, privacy, etc. However, while liberals are concerned that if the government does not exercise the precautionary principle that there will be negative consequences, conservatives are concerned that if the government and society does not embrace the alternative paradigm of "permissionless innovation," then the potential growth and prosperity these technologies represent are likely to be curtailed.

As opposed to the precautionary principle, the attitude most in favor of freedom and the innovative spirit is what Thierer (2016) terms permissionless innovation. This policy paradigm contends that,

> experimentation with new technologies and business models should generally be permitted by default. Unless a compelling case can be made that a new invention will bring serious harm to society, innovation should be allowed to continue unabated and problems, if any develop, can be addressed later (Thierer, 2016, pg. 1).

Permissionless innovation is based on the belief that innovative activity is better encouraged in an environment of freedom where experimentation with new products, services, and business models can be done largely unabated by the unnecessary governmental or societal burdens. This paradigm is the most likely to encourage innovation, and therefore will be followed by creative destruction and ultimately result in economic growth. Though creative destruction will occur, the permissionless innovation approach holds that social and economic disruptions are better handled by flexible, nimble, voluntary, spontaneous, bottom-up and adaptive responses rather than technocratic control and planning (Thierer, 2016, pg. 133).

The precautionary principle is rooted in hypothetical fears of the worst-case scenario, pessimism for the future, and the fears of potential social and economic impacts of technology. While history and economic theory demonstrate why these fears are largely unfounded, the claim that "this time is different" stokes fears and encourages plans to control and direct technological change and redistribute income. What the pessimists miss is that by trying to control dynamism to prevent the downsides of dynamism, they also inadvertently prevent the positives of dynamism. As Thierer (2016) poignantly states,

> "…trying to preemptively plan for every hypothetical worst-case scenario means that many best-case scenarios will never come about. That is, the benefits that accompany the freedom to experiment will be sacrificed if fear paralyzes our innovative spirit. Progress and prosperity will be stifled as a result" (pg. 82).

In this way, fear holds back the potential for growth, and the opportunity cost of these decisions is high. There is great potential for robotics, artificial intelligence, and information technology to drive society towards prosperity and higher living standards, therefore the precautionary

attitudes towards technology should be avoided so breakthroughs and improvements that could vastly improve people's lives are not stifled (Charles Koch Institute, 2016, par. 14).

The Need for Adaptation

If the regulatory framework and attitude is centered around permissionless innovation, then entrepreneurs and innovators will have the freedom to create the new products, services, and business models needed to drive economic growth. This will make the economy more dynamic, and this requires businesses and individuals to be more flexible and adaptable to the forthcoming changes. Luckily, people have historically had the "uncanny ability to adapt to changes in their environment, bounce back from adversity, and learn to become wiser and more resilient over time" (Thierer, 2016, pg. 63). Pessimists consistently ignore or underestimate the ability of people to adapt to technological and economic changes. However, this does not mean that there will not be short-term disruptions that may be troublesome for some people. In the process of creative destruction, new technology will destroy jobs and create new jobs, and individuals must respond to new market demands by switching occupations and acquiring new valuable skills. To assist in the disruption and transition periods, governments should make it easier to transition to new employment opportunities. For example, the government could remove licensing requirements from some jobs that do not have serious health or safety concerns (Sherk and Burke, 2015, pg. 12). In addition, new innovative business models such as Uber and Airbnb have expanded employment, and this "sharing economy" model, as well as other potentially new innovative business models based on digital technology, should continue to be protected from government regulation. Such policies, both removing restrictions from entering some existing occupations and preserving the freedom and opportunity to develop new business models, could encourage flexibility in the market that makes it easier to transition in and out of employment.

Education and Meritocracy

Equally as crucial as the need for flexibility is the need for a dynamic and high quality education system. One of the primary goals of education is to give people the means to secure higher earnings, toward that end, the educational system should be flexible to impart to students the skills they will need to be successful in the rapidly changing heavily technology based economy (Cowen, 2013, pg. 179). What should first be emphasized is that a call for improved education does not necessarily require large government programs. This is because the flexibility of the educational system should mirror the needed flexibility in the market, and in a context of brilliant technologies transforming what jobs are available and what jobs are valuable, the need for flexibility is stronger than ever. Uniform, one-size-fits-all government programs are unlikely to successfully reflect the needed flexibility. As McCloskey (2017) argues,

> …job retraining [is not] a good idea when directed from above: The wise heads in Washington don't know the future, and they'll end up teaching people to be machinists for companies that won't exist. Workers themselves know best how to retrain and relocate… We want the labor force to be as flexible as the capital force. And for that we need liberty, not government programs (par. 15).

In concurrence with this argument, Colvin (2015) suggests that perhaps the best ways to foster the new skills that the market demands are by "letting answers emerge from a thousand experiments by local governments, nonprofits, and private enterprise" (Colvin, 2015 pg. xvii).

This also means that conventional teaching methods and traditional institutions need to be reconsidered and reworked to fit the new environment. For instance, Sherk and Burke (2015) suggest that the government marketize higher education accreditation to foster competition and

allow for new innovative teaching institutions to emerge to meet the demand for new skills (pg. 12-13). In addition, machine intelligence and online learning has the potential to revolutionize education. Massive open online courses (MOOCs), free online educational videos, and other computer based learning tools have the potential to let self-motivated students learn and master new skills much faster than in a traditional classroom setting. Online education tends to be significantly cheaper and more accessible than traditional models, and therefore is significantly more egalitarian, as the hard working tend to rise to the top no matter where they live or their background. This also makes education more meritocratic, as non-elites have more opportunities to access high quality educational tools.[54] If these alternative educational models are embraced and valorized, then education will likely become more egalitarian, meritocratic, and capable of providing the new skills people need to succeed in the ever-transforming world of work.

Jobs of the Future: Man-Machine Collaboration

Technology is automating some skills while creating a demand for new skills, but the capability of these machines can be overexaggerated. As Marc Andreessen (2014) explains, "robots and AI are not nearly as powerful and sophisticated as I think people are starting to fear… There are enormous gaps between what we want them to do, and what they can do" (par. 36).[55] Machines are getting better at performing routine tasks, but many jobs require both routine and non-routine tasks (Sherk and Burke, 2015, pg. 10). In these instances, the, "tasks that cannot be substituted by automation are generally complemented by it" (Autor, 2015, pg. 6). In other words, despite the impressive power and capabilities of today's machines, there are still a multitude of ways human labor can complement machines. This means that in an increasingly

[54] See Cowen (2013) chapter 10 "Relearning Education" pg. 179-203.
[55] See also, Sherk and Burke (2015) pg. 7-9.

technology filled workplace, the most valuable workers will be those who can work best with machines in man-machine based teams. Collaborative teams of a person paired with an advanced artificial intelligence is often both superior to a person working on his or her own or an AI on its own. Cowen (2013) gives the paradigmatic example of how freestyle chess teams (human-machine teams) can regularly defeat advanced chess AI (pg. 67-76). This simple example can be extrapolated onto many job categories, from computer analysis of X-rays being corrected or adjusted by doctors to big data analysis assisting managers to make informed decisions. In these instances, the machine does not replace human input altogether, but makes the worker more accurate, efficient, productive, and therefore more valuable.

Cowen (2013) and Autor (2015) argue that this human-machine collaboration paradigm is likely to be increasingly influential and is where many workers displaced by automation can potentially find high-value employment. As Cowen (2013) explains "workers more and more will come to be classified into two categories. The key questions will be: Are you good at working with intelligent machines or not?" (pg. 4) and goes on to argue that, "If you and your skills are a complement to the computer, your wage and labor market prospects are likely to be cheery. If your skills do not complement the computer, you may want to address that mismatch" (pg. 5). This also has implications for how education needs to be modified to fit the new environment. It is not enough to be trained in STEM or technical fields in the traditional way; educational institutions need to be recognize how the skills the market will need are skills of human-machine collaboration. As Autor (2015) argues, "human capital investment must be at the heart of any long-term strategy for producing skills that are complemented by rather than substituted for by technological change" (pg. 27). Skills such as being able to navigate through

complex programs, large-scale pattern recognition, and big data analysis will be crucial for the high-value earners of the future.

Jobs of the Future: Human Interaction

A second category of skills that are likely to be in high demand are the skills of human interaction. The machine-like routine skills workers have been taught since the beginning of the Industrial Revolution are less and less in demand because new machines can perform many of those tasks without human input. However, there are another set of skills that machines can never learn because they are skills that are exclusively human: The skills of human interaction. As Colvin (2015) describes,

> The new high-value skills are… part of our deepest nature, the abilities that literally define us as humans: sensing the thoughts and feelings of others, working productively in groups, building relationships, solving problems together, expressing ourselves with greater power than logic can ever achieve. These are fundamentally different types of skills than those the economy has valued most highly in the past.

There is empirical evidence supporting this claim, as the McKinsey Global Institute (2012) reports that from 2001 to 2009 in the United States transaction jobs and manufacturing jobs have decreased by 0.7 million and 2.7 million respectively, while jobs that require human interaction, doctors, teachers, lawyers etc. have increased by 4.8 million (pg. 2). Personal attributes such as conscientiousness are quickly becoming valued as skills needed for successful job performance (Cowen, 2013, pg. 28-32). Being able to work well in teams, keep moral high, and interface effectively with customers and co-workers alike are increasingly becoming valuable as well (Colvin, 2015, pg. 117-140). Instead of acquiring skills that can be automated by machines or

skills that complement machines, workers can choose another high-value alternative by fostering the skills of human interaction that could never be replicated by computers. Jobs requiring these skills will only become more important as technology automates certain jobs.

Conservative Policies

The aim of these conservative policies is to threefold. The first aim is to foster the economic freedom and liberty necessary for innovation to flourish. This is best done through the paradigm of permissionless innovation. As Thierer (2016) states, "…the case for permissionless innovation is synonymous with the case for human freedom… (pg. 131). By embracing the dynamism of the free market, entrepreneurship and innovation can lead to the kinds of creative destruction dynamics that lead to economic growth, increased prosperity, and higher living standards across society. This attitude is needed now more than ever because of the promising potential robotics, AI, and information technology represent. The second aim is to foster flexibility in the labor market by making it easier for people to change jobs, and re-skill through innovative educational opportunities. The government should remove unnecessary restrictions on licensing, hiring and firing, and other policies that hinder the flexibility in the labor market. In addition, new educational opportunities should open via competition and innovative new machine based learning techniques. Finally, the third aim is to identify what jobs and skills will likely be in demand in the future. Though new technology will likely create jobs unimaginable today, there should still be an effort to identify what skills will likely be needed so each person can make the choices that best suit him or her. In other words, the goal is to provide high quality and reliable information for the job market so job seekers and employers can make the most rational decisions for their position in the free market. The conservative paradigm is to rely on market forces, embrace them, and create the environment necessary for a dynamic and flexible

private sector to produce the innovations that will increase prosperity matched with an equally dynamic and flexible labor market. By doing this, conservatives intend to lay the foundation and necessary conditions for the best-case scenario future of increased human prosperity to occur.

The Future

New technologies are unlikely to cause technological unemployment, but that does not mean new technologies will not have profound impacts on the global economy and society. The utilization of these technologies will likely transform the nature of work, make society more meritocratic, and create a new set of economic winners and losers. However, even though there will be some who have trouble adjusting to the changes, the increase in productivity and new innovative goods and services will likely make everyone better off in the long term. This is necessary for an economic system based on innovation and creative destruction. As Thierer (2016) states, "In order to move forward and prosper, we must sometimes learn to tolerate the disruptive effects with certain new technologies, or else progress becomes impossible" (pg. 81). That is why, despite the troubles that lie ahead for some, there are strong reasons to be optimistic about the future. Most people will adapt and develop resilience in the face of challenges, and those will be the ones who succeed.

The Changing Nature of Work

Forthcoming cycles of creative destruction will bring new products and services as well as new industries, business models, and employment models. The Internet and information technology is rapidly changing the nature of work by connecting employers, employees, and customers in new ways. For example, applications such as Uber and Airbnb make it easier for workers to be matched with consumers who can demand their services in real time and on their

terms (Hassett and Strain, 2016, par. 5).[56] Innovations such as these fundamentally change the nature of many labor contracts. Fifty years ago, it was typical to have a lifelong career in a single company and receive a pension for retirement. Twenty-five years ago, changing jobs multiple times became more common, there was no defined pensions, and the relationship between any individual employer was weaker. In the near future, the traditional workplace will likely still exist in some industries, but will become increasingly less important for many others (Hassett and Strain, 2016, par. 11). In other words, changes in technology and organizational structure are likely to make the workplace "less and less relevant to the organization of society" (Hassett and Strain, 2016, par. 5). A typical scenario of work in the future might look like this, instead of working a single job,

> You might set an income target for yourself: "I want to make $50,000 dollars this year." One day you sell your labor as a taxi driver. The next day, you wake up and decide you'd like to do some programming, so you log onto a job board and bid on a project. You work on that project for a month, and then decide to take 2 weeks off. When you feel like working again, you pick another task. Task is the key word here. You perform tasks, and you receive income. But you work for yourself" (Hassett and Strain, 2016, par. 6-7).

This model of flexibility will become increasingly prevalent as new kinds of voluntary labor contracts organized through digital markets become feasible. Of course, it will not be this way for everyone, many will prefer this flexibility and freedom, and others will prefer traditional work contracts, but those who will succeed will likely be those who can embrace flexibility.

A New Meritocracy

[56] See also, Thierer (2016) pg. 103-104.

New technology and networks are poised to transform the way workers acquire human capital and new skills. If dynamism and experimentation in education are embraced and new forms of educational credentials and certifications are accepted by employers, then there will be widening opportunity for high quality education that will generate upward mobility as the hardest workers rise to the top, creating a more ideal meritocracy. The biggest winners in the future will be those who have developed skills that complement the machines and those that have exceptional skills in human interaction (see, Cowen, 2013; Colvin, 2015). Because educational opportunities will become higher quality and cheaper, the next set of winners in the new world of work will rise from intelligent and self-motivated persons from around the world. These new sets of economic winners are likely to reshape public discourse and challenge, primarily liberal or progressive, conceptions of economic inequality as unjust. In this more meritocratic society it is likely that,

> Worthy individuals will in fact rise from poverty on a regular basis… The wealthy class will be increasingly self-motivated, will be larger over time, and…will have increasing influence. It is their values that will shape public discourse, and that will mean more stress on ideas of personal ambition and self-motivation. (Cowen, 2013, pg. 230).

As the economy's reliance on smart machines grows, the need for workers who can either complement the machines or perform high quality skills of human interaction that machines cannot replicate will rise. Those who take up the challenge to meet the demand by honing these skills will be the high earners of the future.

Everyone Will be Better Off

Despite the long run trajectory of progress, many still fear the "rise of the robots" and are pessimistic about the future of the economy. Those with average human capital or routine skills may find their wages stagnating or declining as they compete on the market with machines. Some jobs will disappear, but new jobs will eventually replace jobs that have been automated (Sherk and Burke, 2015, pg. 11). More importantly, unleashing the full productive power of technology will ultimately society more wealthy, benefitting even the least well off in society (Sherk, 2014, par. 10). As Woods (2016) explains, "with fantastic abundance comes greater purchasing power, because of the pushing down of prices through competition. So even if we earn less in nominal terms, our paychecks will stretch much further" (par. 16). In other words, despite the fears that incomes are stagnating, stagnant or even declining wages for some is not necessarily incompatible with higher living standards if real incomes rise because goods and services become cheaper. In addition, unleashing innovation will spur the creation of new products and services that will likely make future generations more materially wealthy in real terms than some of the most well off people are today.[57] Those who fail to adapt to the new paradigm may be hurt in the short run, but automation will lower prices and raise living standards in the economy overall (Sherk and Burke, 2015, pg. 12). In short, do not fear the robots (Sherk, 2014, par. 19).

[57] For instance, consider the thought experiment proposed by economist Don Boudreaux (2016), "What is the minimum amount of money that you would demand in exchange for your going back to live even as John D. Rockefeller lived in 1916?" (par. 2). With modern technological advances, it is doubtful many people, even some of the poorest, would want to trade places with John D. Rockefeller and forgo the internet, air conditioning etc. Imagine that a hundred years from now, a median income earner may not want to trade places with Bill Gates because a median earner of 2117 has become better off than Bill Gates thanks to technological progress. New innovative goods and services produced in the intervening century may make the median income earner materially better off in real terms, or in the median earner's subjective experience.

The Case for Rational Optimism and Freedom

The orientation of the future for conservatives is ultimately optimistic, even though they still acknowledge there are challenges to be faced. Thierer (2016) argues that conservatives should approach the future with a "rational optimism", which he describes as an attitude that is "generally bullish about the future and the prospects for humanity but is not naive about the challenges associated with technological change" (pg. 43).[58] Rational optimists embrace dynamism and are hopeful about the prospects for new technologies advancing social and economic progress, but the optimism is rooted in empiricism and rational inquiry (Thierer, 2016, pg. 44). Historical experience and economic theory inform us that there is reason to be optimistic about the future, but that does not mean there will not be unforeseen difficulties that lie ahead. In the face of these challenges,

> the blueprint that rational optimists offer is not utopian but anti-utopian: precisely because difficult problems defy easy solutions, we should look to devise a plurality of strategies to tackle them…Ongoing experimentation is the key to unlocking knowledge and prosperity (Thierer, 2016, pg. 44).

The necessary experimentation is only possible in a society that values freedom, not the "freedom" recommended by the technocrats where markets are constantly being twisted and contorted through incessant regulation, but the freedom to invest, trade, make contracts, invent, and experiment with new products, services, organizational forms, and business models.

The next wave of technological innovation is on the horizon, so the trajectory of the future will likely be determined by the decisions that are made now. Will society head down a

[58] See also, Ridley (2010) *The Rational Optimist: How Prosperity Evolves*.

path based on the precautionary principle or permissionless innovation? Will society choose to maximize freedom, adapt to the changes, and receive the full benefits of technological innovation, or will society try to control progress and risk squandering the potential of technological innovation? McCloskey (2017) frames the choice this way,

> In the spirit of John Rawls, we should ask which society we'd rather enter at birth, without knowing where within that society we'd end up. One in which all jobs are protected, bureaucrats decide who gets subsidies and who doesn't, and the economy slides, as France has, into stagnation and high levels of youth unemployment? Or one in which labor laws are flexible, individual workers decide their own futures, and the economy lifts up the poorest among us? (par. 17).

The conservative approach embraces the latter. Conservatives do not desire freedom because they expect a utopia to emerge, there inevitably will be difficulties. Rather, freedom should be embraced because it is the "right thing for society to want" (Shirky, 2008 pg. 298). As Thierer (2016) poignantly states, "It is vital that we embrace dynamism and leave a broad sphere for continued experimentation by individuals and organizations alike because freedom, broadly construed, is valuable in its own right—even if not all of the outcomes are optimal or equal" (pg. 132).

2.4 Radical Theory and Ideology

Technological displacement

Neoliberalism in Crisis

The radical interpretation of technological displacement is linked in a larger narrative of how neoliberal capitalism is increasingly creating social inequality and precarity around the world. Throughout the history of capitalism, modern society has been beset by inequality with stark divisions of class, race, gender, and sexuality. It has also been a history of divisions both within countries and between countries with capitalist social relations exploiting the working class within countries, and imperial, colonial, and exploitative relationships between countries developing in a complex world-system (see, Wallerstein, 2004). While the social democratic or New Deal practices of the mid-20th century may have allowed privileged workers[59] in core countries to live a relatively comfortable life, neoliberal policies and practices such as austerity, the "zapping" of labor, the degradation of the welfare state, privatization, and financialization have caused even the privileged status of the middle classes in core countries to become increasingly fragile.[60] In this context, technological displacement represents both another battlefield for political struggle, but also a process that, in tandem with the other political struggles and structural problems described above, is contributing to the growing precarity of populations around the world.

Precarious Labor in Neoliberal Society

[59] That is, primarily white men and their families in core countries.
[60] For some examples of scholarship on these topics see, Harrison and Bluestone, 1988; Harvey, 2005; Krippner, 2005; Mirowski, 2009; Shefner and Fernandez-Kelly, 2011; Centeno and Cohen, 2012.

Before explaining the role of technological displacement in producing precarity, it is pertinent to explain some of the ways the nature of work has become precarious in the neoliberal era. First, the expectation, common in the Fordist-Keynesian era, of a stable lifelong career is over. Instead, in work under neoliberalism a continuous necessity for flexibility and repositioning oneself is ever-present, "flexibility has become the key attribute… much value is placed on the ability to reinvent yourself…to be good at forgetting old skills and learning new ones…" (Mason, 2015, pg. 207). To have a reliable expectation of long term tenure in any job is an unattainable privilege for many, as observed from the corporate world to academia (Mason, 2015). Part time and freelance work is growing with approximately a quarter of employment in industrialized core countries being employed under only a temporary contract or no contract, and approximately 60 percent of the total global workforce working under no contract (International Labor Organization, 2015, pg. 30). In the United States, as of 2016 more than 5.9 million people work in part time jobs due to economic hardship such as difficult business conditions or being unable to find full time work (Bureau of Labor Statistics F). The nature of jobs has changed as well as work increasingly involves, "more casual working hours, low and stagnant wages, decreasing job protections and widespread insecurity" (Srnicek and Williams, 2015, pg. 93; see also Aronowitz and DiFazio, 2010 [1994], pg. 1-43). Many jobs have become less formalized as the link between employer and employee becomes tangential with the rise of "crowd-sourced tasks, temporary staffing agencies and zero-hours contracts, along with the harsh working conditions and lack of benefits that accompany them" (Srnicek and Williams, 2015, pg. 93). In addition, the rise the "sharing economy" and "gig economy" produce activities that can provide income, such driving for Uber, but cannot provide a solid expectation of steady income and often lack benefits and labor protections. Finally, the overall increasing precarity in the labor market

also contributes to income inequality. As labor market slack increases through neoliberal labor practices, every 1 percent increase in slack is correlated with a 1.6 percent increase in income inequality (Bernstein and Baker, 2013 pg. 12). Clearly labor conditions have been transformed over the last several decades as the social contract of the Fordist-Keynesian era is increasingly constricted under neoliberalism.

What these developments amount to is a reshaping of the power dynamics of class struggle in capitalist societies. A mass of unemployed or precariat labor is beneficial to the capitalist class as it allows them to place more demands and pressure on those who have a job; the threat of joining the precariat is used as a disciplinary tool against the working class. The less well-paying and desirable jobs there are available, the more class power goes to the employers over the employees (Srnicek and Williams, 2015, pg. 93). Threats of both outsourcing and automation threaten many jobs, and "The result is that employers gain strength over workers and the quality of jobs decreases…" (Srnicek and Williams, 2015, pg. 93). These threats are political tactics that weaken the power of the working class, create interclass competition and resentment, and hurt the ability of workers to collectively demand and fight for economic justice. The working class has been severely weakened politically as evidenced by the increasingly precarious nature of labor under neoliberalism.

Precarity and Technological Displacement

However, the precarity of labor in recent decades is not shaped by class struggle and politics alone, but also by structural forces. Technological displacement is one such structural force that has contributed to the growing precarity of labor. According to Collins, (2013) technological displacement of labor can be seen as a "structural crisis," that "transcends cycles

and financial bubbles" and characterizes it as, "the deep threat of the future of capitalism" (pg. 38). While economic cycles, such as the 2008 financial crisis, may be able to explain some of the decline in labor conditions, a cyclical account alone cannot account for the longer-term trends such as the rise of jobless recoveries, the decline of stable well-paying jobs, and the overall rise in marginalized people around the world (Srnicek and Williams, 2015, pg. 87-88). The long-term development of automation and technological displacement of labor by means of advanced robotics, software, information technology, and artificial intelligence are a driving force of precarity and ultimately creating unemployment and a surplus population that is not needed by capitalism.

Skeptics may claim that capitalism has always managed to supply labor despite centuries of technological change. However, there are a myriad of reasons to believe that new computer and robotic technologies will produce a widespread wave of technological displacement. As, Collins (2013) states, "computerization, the Internet, and the wave of new micro-electronic devices are beginning to squeeze out the middle class. Can capitalism survive this…wave of technological displacement? (Collins, 2013, pg. 39). The conservative counter argument to the technological unemployment thesis is that increased productivity lowers production costs which can increase sales and therefore create new jobs. However, if technological change occurs at a sufficiently rapid rate, a large portion of the working population may be unable to keep up with the skills needed to do these new jobs. This creates a situation of structural unemployment where, "there simply are not enough capable workers… The speed of technological change and diffusion may render entire segments of the population as an obsolete surplus" (Srnicek and Williams, 2015, pg. 89). In other words, workers with mismatched or obviated skills may soon join the growing precarious population.

Secondly, information technology is a general-purpose technology, so its widespread application across the entire economy could lessen the general need for labor more than it creates demand for new labor. On the one hand, consider that the new industries based on information technology, the ones that conservatives claim will somehow create the necessary new jobs, have a dismal record of job creation. As Srnicek and Williams (2015) state, "…firms that are leading growth sectors—such as Facebook, Twitter, and Instagram—simply do not create jobs on the scale of classic firms like Ford and GM. In fact, new industries currently only employ 0.5 percent of the American workforce…" (pg. 100). On the other hand, the expected wave of automation from computer technology is enormous. According to Frey and Osborne (2013) approximately 47 percent of jobs in the United States are at a high risk of being automated in the next two decades. Commenting on the implications of this finding, Mason (2015) states, "If… 47 percent of all jobs in an advanced economy will be redundant due to automation, then the result under neoliberalism is going to be an enormously expanded precariat" (pg. 284) While information technology does create jobs, evidence appears to suggest that these technologies will not generate jobs and lost income at the same rate as it is eliminating them (Collins, 2013 pg. 39-43; Aronowitz and DiFazio, 2010 [1994] pg. 14).

New technologies are automating work faster than it is being generated. Technology is obviating skills and is failing to generate new labor-intensive industries. The capitalist class's ability to use advanced machines to substitute for labor hangs over the head of the working class as a constant threat to job security, weakening their power in the class struggle.[61] Those whose skills have been obviated, or who cannot provide marketable labor power either join the

[61] In this way, the threat of automation is similar to the constant threat of outsourcing many industries face in the age of globalization.

superfluous population, or must accept precarious positions on the periphery of the labor market such as part time jobs or low wage service jobs. Livingston (2016) describes the emerging problem of work as, "There's not enough work to go around… We lost our race with the machine and we know the robots are coming to take our jobs…" (pg. 102). This situation represents an overall failure of capitalism to provide the jobs necessary to reproduce the social system.

There are also other processes occurring alongside technological displacement that produce precarious populations. According to Srnicek and Williams (2015) practices of primitive accumulation in areas such as China, Africa, and South Asia are ending traditional modes of social reproduction in those areas to add new cheap labor to the global market. In addition, practices of social exclusion such as mass incarceration and the marginalization racial minority communities add to the marginalized population as well.[62] Practices of active exclusion from society allow formal controls for "unruly" populations whose labor is no longer needed. In light of this, it is clear that the salient social problem is not just of technological displacement or technological unemployment, but of a capitalist social system that cannot find a use for everyone and therefore employs a myriad of tactics to maintain social control. As Srnicek and Williams (2015) explains

> Increasingly, there are simply not enough jobs to employ everyone. As the hegemonic order predicated upon decent and stable jobs breaks down, social control is likely to revert to increasingly coercive measures: harsher workfare, heightened antagonisms over immigration, stricter controls on the movement of peoples, and mass incarceration for

[62] See, Alexander, 2010 and Wacquant, 2001; 2010.

> those who resist being cast aside. This is the crisis of work facing neoliberalism and the surplus populations who make up most of the world's labor force. (pg. 104).

In this context, the question of social justice for radicals becomes how to transcend current circumstances to prevent further marginalization of people around the world.

The Radical Potential of Information

While the trends cited above paint a bleak picture of how automation and technological displacement is contributing to global poverty and precarity, the growth of powerful machine technology also holds potential for global society to be taken in a new direction. This potential largely lies in the nature of information technology and digital goods. Some radical commentators see the potential for the dynamics of information technology to create the basis of a non-capitalist economic and social system. First, all information goods are naturally non-rival and have a virtually zero marginal cost of production, meaning that digital goods can be freely reproduced and shared at basically zero cost (see, Rifkin, 2014). As Livingston (2016) describes, "the most basic requirement of postindustrial society—information—is fast becoming more or less free of charge" (pg. 73). Radical commentators see the potential benefit of non-rival and zero marginal cost goods, and push its implications and possibilities in a radical direction. Of course, capitalists have responded to the unique nature of digital goods by commodifying many digital goods and information by making it illegal to copy and utilize without paying (Mason, 2015, pg. 117-118). However, in principle, these goods could be provided and shared to everyone with little effort and little cost. Capitalist businesses need to commoditize digital goods in order to make profit, but because these goods can be freely reproduced and shared, the contradiction between the commodification of a good and its potential to be free if societal

conditions allowed it become stark. Technically, prices for digital goods are completely arbitrary as they could easily be given away for free, and indeed, some digital goods such as Wikipedia are free to use for everyone (Mason, 2015, pg. 127-131). Projects such as Wikipedia represent non-market and non-work, in the sense of getting paid for one's labor time, activities that nonetheless produce use-values for people to benefit from. These are collaborative projects that may prove to be a shadow of how human activity could be organized in a postcapitalist society (Mason, 2015, pg. 127-131). As Mason (2015) argues, the improvement of networked computers and collaborative digital production allows for,

> Non-market forms of production and exchange [that] exploit the basic human tendency to collaborate – to exchange gifts of intangible value – which has always existed but at the margins of economic life…The proliferation of these non-market economic activities is making it possible for a cooperative, socially just society to emerge (pg. 143).

In other words, a "collaborative commons" could be developed where as many goods as possible are created collaboratively and shared widely in a quintessentially non-market way (Mason, 2015 pg. 141-145; see also, Rifkin, 2014).

While this development is true for digital goods, physical goods do not have the same properties of reproducibility as digital goods. However, according to Mason (2015) further advances in information technology, especially with the rise of big data providing information to improve production practices, the production of physical goods are added a "high information content… sucking them into the same zero-price vortex as pure information goods" (pg. 142). In other words, advances in information technology could help significantly drop the price of physical goods as well as digital goods, creating the preconditions for a society based on abundance rather than scarcity. What is standing in the way of this development is capitalist

social relations that have both produced the high levels of marginality and precarity described above, but also shackle the potential for the free abundance of information and advances in technology to produce a society of abundance. Mason (2015) describes this contradiction as,

> The technological direction of this revolution is at odds with its social direction. Technologically, we are headed for zero-price goods, unmeasurable work, an exponential takeoff in productivity and the extensive automation of physical processes. Socially, we are trapped in a world of monopolies, inefficiency, the ruins of a finance-dominated free market and a proliferation of 'bullshit jobs'. (pg. 144).

It appears that information technology has the potential to fundamentally change the nature of the social system and opens possibilities for radical new visions of the future, but global capitalism holds back this potential. Instead of realizing this potential, capitalism is generating widening inequality and marginality, which is why the capitalism is both an inefficient and inadequate system but is also greatly damaging and dangerous for society.

Potential for a New Direction

The radical diagnosis of technology, automation, and technological displacement simultaneously describes a grossly unjust development, but also some potential pathways towards its resolution. The recognition of this contradiction and its potential resolution fuels the desire to build a political project that can resolve the contradictions and realize the potential of a socially just future society. Srnicek and Williams (2015) describe this contradiction and potential solution as,

> Under capitalism, jobs have been pivotal to our social lives and sense of who we are, as well as being the sole source of income for most people. What the next two decades

> portend is a future in which the global economy is increasingly unable to produce enough jobs (let alone good jobs), yet where we remain dependent upon jobs for our living. Political parties and trade unions appear ignorant of this crisis, struggling to manage its symptoms even as automation promises to toss more and more workers aside. In the face of these tensions, the political project for the twenty-first-century left must be to build an economy in which people are no longer dependent upon wage labour for survival (pg. 105).

The next section will describe this radical political project and its proposed policy and structural changes aimed at creating a global society where wage labor is no longer necessary for survival.

Policies

While radicals do have policy proposals to solve the problems created by technological displacement, a better characterization would be to say radicals advocate for radical politics. The radicals described here do not advocate for incremental social policies, but for transformative radical politics that aim to take society into a post-capitalist future. This group of radicals not only believe that "another world is possible," but that this world is possible in part because of advanced technologies with the potential to realize utopian possibilities. To build this utopia requires a radical alternative politics, as radical as the technologies make it possible. This political project differs in key ways from the political practices of much of the contemporary Left, with one of the most salient differences being how it envisions advanced technology as a driving force to "invent the future." As Srnicek and Williams (2015) describe,

> The utopian potentials inherent in twenty-first-century technology cannot remain bound to a parochial capitalist imagination; they must be liberated by an ambitious left alternative. Neoliberalism has failed, social democracy is impossible, and only an

> alternative vision can bring about universal prosperity and emancipation. Articulating and achieving this better world is the fundamental task of the left today (pg. 3).

The aim is to take the actually existing tendencies of technological development and take them in a qualitatively differently direction, away from neoliberal capitalism and towards a post-work society (Srnicek and Williams, 2015, pg. 85). This is necessary because as the diagnosis of technological displacement makes clear, "jobs are no longer the solution, we must find another way to ensure a standard of living for all" (Aronowitz and DiFazio, 2010 [1994], pg. xxxiv). This requires imagining a future society where not everyone needs to work, as well as a moral universe and social consciousness that is not limited by the need to work as people must "learn to accept income that can't be accounted for by reference to time on the job" (Livingston, 2016, pg. 98). However, before describing the policies and structural changes that radicals propose can get us to that new society, there must first be an explanation of how this project intends to surpass the problems that they claim plague contemporary Leftist politics today.

The Problem of Folk Politics

For this school of radicalism, the global Left has been severely weakened to the point where its current state and preferred practices would be incapable of creating the systemic change necessary for a transition into post-capitalism. Decades of neoliberal hegemony have weakened the working class around the world, and the capitalist application of technology has only increased class domination. There is a sense of stagnation and powerlessness in the Left as "today's politics is beset by an inability to generate the new ideas and modes of organization necessary to transform our societies... While crisis gathers force and speed, politics withers and retreats. In this paralysis of the political imaginary, the future has been cancelled" (Srnicek and

Williams, 2013, pg. 1). The primary problem that holds back the contemporary Left from confronting the systemic problems of capitalism is a tendency to favor a narrow range of political strategies that are inadequate to creating the infrastructure and support necessary for a large scale post-capitalist political project. Srnicek and Williams (2015) diagnose these tendencies with their term "folk politics," which refers to politics that,

> typically remains reactive (responding to actions initiated by corporations and governments, rather than initiating actions); ignores long-term strategic goals in favor of tactics (mobilizing around single-issue politics or emphasizing process); prefers practices that are often inherently fleeting (such as occupations and temporary autonomous zones); chooses the familiarities of the past over the unknowns of the future (for instance, the repeated dreams of a return to 'good' Keynesian capitalism); and expresses itself as a predilection for the voluntarist and spontaneous over the institutional (as in the romantization of rioting and insurrection) (pg. 11).

They ultimately argue that if the radical Left continues to adhere to folk political strategies, leftist movements will be unable to push the future towards post-capitalism.[63]

Folk politics has the tendency to favor the local struggle over tackling global problems, but in a socio-historic context of unprecedented global crisis from climate change to mass technological displacement this strategy is paralyzing. As Aronowitz and DiFazio (2010 [1994]) put it, "we must think globally and act globally; all politics is not local" (pg. 371). In the context of complex global crisis, what is needed is a complex global response, but to create this there

[63] It should be noted that they do not think folk politics is ineffective in all circumstances. They clarify their position stating that, "folk politics is only a problem for particular types of projects: those that seek to move beyond capitalism. Folk-political thinking can be perfectly well adapted to other political projects: projects aimed solely at resistance, movements organized around local issues, and small-scale projects" (Srnicek and Williams, 2015, pg. 12).

must be a "new grand narrative… that takes the totality into account and on the basis of which real agency will be possible again" (Aronowitz and DiFazio, 2010 [1994], pg. 372). However, folk politics has imbibed the postmodern critique of grand narratives and totality, and has therefore largely abandoned any attempt to transcend capitalism. Instead, folk politics tends to focus on, "identity politics or conducting single-issue struggles without making an effort to link them together… making it impossible…to confront the economic crisis or engage in politics that transcends local struggle" (Aronowitz and DiFazio, 2010 [1994], pg. xxix). In sum, this political project is designed to go beyond folk politics by rejecting a politics of "localism, direct action, and relentless horizontalism," for a "politics at ease with a modernity of abstraction, complexity, globality, and technology" (Srnicek and Williams, 2013, pg. 3).

Mont Pelerin of the Left?

Perhaps the strongest reason why a post-work political project must transcend folk politics is because, in the political struggle for the future, the folk political attitude has caused the Left to cede any attempt at becoming the leading force shaping the future, while the neoliberal movements of the right have used a different set of tactics and strategies that have allowed neoliberalism to become hegemonic for the past several decades. The historical rise of neoliberalism was not inevitable, but was contingently based on long term political strategies which took advantage of historical openings to create a popular and elite consensus that became "common sense" to the point where it could be declared that "there is no alternative." However, an alternative can be developed if the tools of folk politics are abandoned for the tools and strategies used by the neoliberals to create a "hegemony of the left." In other words, this project toward a post-work future is a project in the Gramscian paradigm of a struggle between hegemony and counter hegemony (see, Gramsci 2011 [1926]). To construct an effective

hegemony, the Left must take what was successful about the long term political and consensus building movement of neoliberalism, and use it for the constructive purposes of a new post-capitalist hegemony to supplant neoliberalism. Srnicek and Williams (2015) calls this strategy the necessity to form a "Mont Pelerin of the Left," as they claim,

> The call for a Mont Pelerin of the left should therefore not be taken as an argument to simply copy its mode of operation. The argument is rather that the left can learn from the long-term vision, the methods of global expansion, the pragmatic flexibility and the counter-hegemonic strategy that united an ecology of organizations with a diversity of interests. The demand for a Mont Pelerin of the left is ultimately a call to build anew the hegemony of the left (pg. 67).

The neoliberal consensus was built by propagating their ideology through a division of labor through diverse organizations, recruiting academics, employing think tanks to influence policy, and popularizing conservative ideas in the media (Srnicek and Williams, 2015 pg. 67-70; see also Harvey, 2005). The Left must use similar strategies to build up its own network of organizations and mass movements to create a counter hegemony that can transition global society into a new era of post capitalism and a post-work consensus.

The primary goal of any post-capitalist world would be to maximize freedom, not in the neoliberal sense of limited negative freedoms, but of a "synthetic freedom," in the terms of Srnicek and Williams (2015, pg. 80) or "real freedom for all" in the terms of philosopher Philip Van Parjis (1995, 2001). This form of freedom means to be provided with the, "maximal provision of the basic resources needed for a meaningful life" (Srnicek and Williams, 2015, pg. 80). To achieve this freedom, radicals advocate for a set of "non-reformist reforms," that have a "utopian edge that strains at the limits of what capitalism can concede," and that are, "grounded

in real tendencies of the world today, giving them a viability that revolutionary dreams lack" (Srnicek and Williams 2015, pg. 108). These reforms are designed to simultaneously provide everyone with the basic necessities of life, continue to develop technological capabilities, and expand social resources (Srnicek and Williams, 2015, pg. 80). While there are innumerable policies, reforms, and structural changes that would be necessary to push existing capitalist societies into post-capitalism, the three most important policies highlighted here are the call for full automation, the reduction of working hours, and the implementation of a Universal Basic Income.

Full Automation

The call for full automation is a call to use the advanced technology at our disposal to reduce the necessary labor of society to a bare minimum. This strategy is the opposite of the liberal and conservative approach. Instead of desperately finding ways to maintain full employment, the radical proposal is to "unleash latent productive forces," in order to, "liberate humanity from the drudgery of work while simultaneously producing increasing amounts of wealth" (Srnicek and Williams, 2013, pg. 3; Srnicek and Williams, 2015, pg. 109). The material infrastructures of industrialized capitalist societies are well suited to fulfill human needs, but they must be "repurposed towards common ends" as a "springboard to launch towards post capitalism" (Srnicek and Williams, 2013, pg. 3). Full automation should be actively encouraged because the capitalist system is unlikely to push the potential of automation to liberate people from work to its logical endpoint. Mason (2016) describes the dilemma as, "The real dystopia is that, fearing the mass unemployment and psychological aimlessness it might bring, we stall the third industrial revolution. Instead we end up creating millions of low skilled jobs that do not need to exist" (par. 2). This contradictory scenario should be avoided by embracing technology

and encourage its labor saving potential. This should be done by developing a post-work consensus based on the ideal that that what can be automated should be automated, and through structuring economic incentives that make automation more attractive to businesses, such as supporting workers' rights, raising the minimum wage, and making workers more expensive as an input of production by raising labor standards, wages, and benefits (Srnicek and Williams, 2015, pg. 113). Automating the economy as much as possible should simultaneously increase productivity and production, as well as diminish repetitive and degrading forms of work such as many low skill service jobs and dangerous factory jobs at the periphery of the global economy.

Reduce Working Time

The next major step in the program is to reduce working time for all workers with no reduction in wages. The struggle to reduce the length of the working day or working week is as old as the modern labor movement.[64] Today, the development of highly productive machine technology makes the reduction of working hours possible without reduction in production. However, the reduction of labor time is rarely considered a possibility by mainstream economics.[65] As Marxist economist Richard Wolff (2017) explains the problem, technology creates the potential to reduce the need for labor but, "capitalism… uses technological change to increase profits for a few rather than reduce labor for the many" (par. 1). The radical struggle is therefore to manifest the gains in productivity as a gain for the workers by turning the reduction of necessary labor time into increases in leisure time. As Antonio Negri (2014) argues, "The struggle against the automated algorithm must grasp the increased productivity it brings about,

[64] See, Marx (1976 [1867]) pg. 375-416.
[65] For example, in a critique of Brynjolfsson and McAfee's *Race Against the Machine* (2011) Peter Frase (2011b) argues that, "Totally missing from *Race Against the Machine* is any consideration that we might take some of our productivity gains in the form of free time rather than income. Nowhere do the authors even contemplate reducing the length of the work week and work year, or accepting a lower labor-force participation rate" (par. 15).

and impose radical reductions in the amount of time disciplined and/or controlled for each worker by and within machines" (par. 31). In addition to supporting the calls for an "aggressive reduction of the official working day," Mason, (2016, par. 5) reports that countries like Sweden have already cut the working day to six hours. The proliferation of incredibly productive machines calls for a renewed effort to reduce the working day and working week to a minimum so free time to socialize, volunteer or provide community service, work on collaborative projects, develop oneself as a person, or even simply to enjoy life, can be maximized.

A Radical Universal Basic Income

A universal basic income (UBI) is not an inherently radical policy as both liberals and conservatives have advocated for it in the past. However, the radical version of UBI differs from liberal proposals both in its substance and in its intended purpose. Substantively, the radical version of UBI is meant to be a supplement to a robust welfare state, not serve as a replacement for it (Mason, 2015, pg. 284, Srnicek and Williams, 2015, pg. 117-123). As argued by Srnicek and Williams, a UBI that replaces the welfare state is a conservative idea that, "must be avoided at all costs," because in that scenario, "UBI would just become a vector of increased marketisation, transforming social services into private markets" (Srnicek and Williams, 2015, pg. 119). Secondly, the UBI must also be a sufficient amount to live on for the effect of the UBI to be meaningful and substantively provide "real freedom for all" (see, Van Parjis, 1995). The UBI should not be kept at a low level to encourage employment, but instead should be kept high enough to give every person the freedom to choose individually without coercion or insidious incentives.

For radicals, the UBI should be understood as a way to "recognize how everyone participates equally, through every form of labour, in the construction of the commonwealth" (Negri, 2014, par. 32). It is a recognition that in a society of increasing abundance, yet one in which there is not enough work to go around, it is necessary to, "love each other, as ourselves—we have to be our brothers' keepers" (Livingston, 2016, pg. 102). The implementation of a UBI is an expression of this communal love because it provides a livable minimum standard for all, especially for the marginalized. In this way, the UBI validates all human life and provides the material basis for everyone to live a meaningful life.

The UBI is also crucial to realizing the goals of the post-capitalist project. As argued by Philosophers Robert van der Veen and Philippe van Parjis, (1986) the UBI is a means to work within the capitalist system to bring about communism, or post-capitalism in the terms used here (pg. 642-646). It does this in part by overturning the asymmetry of power in capitalism between capital and labor (Srnicek and Williams, 2015, pg. 120). With a basic minimum standard of living guaranteed for all, the threat of poverty no longer hangs over the head of every worker. Instead, workers will be free to choose what jobs they want to do, or choose to not work at all. As Mason (2015) explains, the UBI is essential for expanding the non-market forms of collaborative work made possible by information technology as well as many other worthwhile endeavors,

> A basic income paid for out of taxes on the market economy gives people the chance to build positions in the non-market economy. It allows them to volunteer, set up co-ops, edit Wikipedia, learn how to use 3D design software, or just exist. It allows them to space out periods of work; make a late entry or early exit from working life; switch more easily into and out of high-intensity, stressful jobs (pg. 285).

The ability for people to have the flexibility to make such important life choices is an expression of the synthetic freedom promised by post-capitalism. Indeed, the purpose of the radical vision for UBI is to provide the preconditions and basic groundwork for synthetic freedom. As Srnicek and Williams (2015) describe.

> synthetic freedom demands the provision of a basic income to all in order for them to be fully free. Such a policy not only provides the monetary resources for living under capitalism, but also makes possible an increase in free time. It provides us with the capacity to choose our lives: we can experiment and build unconventional lives, choosing to foster our cultural, intellectual and physical sensibilities instead of blindly working to survive. Time and money therefore represent key components of freedom in any substantive sense (pg. 80).

In concert with the plan to automate as much existing work as possible, and the wide scale reduction of working hours, the universal basic income makes the trifecta of the radical program to help push the existing tendencies of capitalism and the developments in technology towards a post-capitalist and post-work future society.

Building a Post Work Populism

To achieve these goals and invent a socially just post-work future, a new popular consensus is needed. Post-capitalism will not come about through economic necessity but through political struggle. As previously mentioned, the strategies the global Right employed to make neoliberalism hegemonic could be used again to create a new leftist hegemony that could foster post-capitalism. This requires developing a “healthy ecosystem of organizations” that can raise popular consciousness and fight for post-capitalist radical reforms (Srnicek and Williams,

2015, pg. 155). It also requires a building of a genuine populist movement around a post-work consensus. Contemporary leftist politics are enmeshed in a variety of struggles from workers' rights to women's, racial minorities, and LGBT liberation. These movements and causes are extremely important, and any mobilization of a post-work political movement must articulate its platform in such a way that the other movements fighting for social justice and human emancipation could see their interests being reflected in the post-capitalist project (Srnicek and Williams, 2015, pg. 160). This would help encourage existing leftist movements to join collectively toward fighting for a common goal of post-capitalism. By working together toward a common goal, the dream of transcending failing neoliberal capitalism towards a socially just post-capitalism may be realized.

The Future

The future for radicals falls within the dichotomy of the need for a transcendence from capitalism or else the future is expected to become a descent into barbarism.[66] The section on technological displacement painted a bleak picture of how the dynamics of capitalism and the police state are displacing people, increasing precarity, and creating surplus populations in both the core and periphery of the world-system. The next section on policies explained a radical political project that could allow society to escape the cycle of violence and enter a qualitatively different and superior post-capitalist future. In light of the tinges of despair in the diagnosis and the utopian elements of the solution, it appears that the future for radicals is a choice between dystopia and utopia. There is a sense of great pessimism if radical structural changes are not

[66] This dichotomy has been a common theme throughout radical literature. For example, recall the words of Rosa Luxemburg in her reaction to the beginning of World War I, "Bourgeois society stands at the crossroads, either transition into socialism or regression into barbarism" (cited in Frase, 2011, par. 2).

enacted, and a strong reason for optimism if the radical Left manages to secure political victory. As Srnicek and Williams (2013) describe, "The choice facing us is severe: either a globalized post-capitalism or a slow fragmentation towards primitivism, perpetual crisis, and planetary ecological collapse" (pg. 6).

A key element in the dichotomy of a future between socialism or barbarism is that in either scenario, capitalism is not expected to survive. In other words, in the radical conception of the future, capitalism is bound to end in the relatively near future. It will likely not collapse in one recognizable moment, but if the post-capitalist political project fails there will likely be multiple crises, such as the cataclysms of climate change, resource wars, migration crises, financial crisis, and mass technological unemployment, that will eventually destabilize and change the socio-economic system to the point that it can no longer be recognized as capitalism. Collins (2013) specifically predicts that technological unemployment will have a salient role in capitalism's downfall as he states, "technological displacement of the middle class will bring the downfall of capitalism, in places where it is now dominant, before the 21st century is over. Whether these transitions will be peaceful or horrific remains to be seen" (pg. 68).

Frase (2011a; 2016) also recognizes that technological change and automation will likely radically change capitalism, and he outlines four models of potential future societies that could succeed capitalism. The outcome of the future for Frase (2011a) is based on four combinations of two oppositions: resource abundance vs. scarcity and egalitarianism vs. hierarchy (par. 5). The first potential future is a combination of egalitarianism and abundance which results in a form of communism created by the power of widespread automation and an alternative sustainable energy regime (Frase, 2011a, par. 6-16). In a combination of hierarchy and abundance, a form of society called "rentism" would be realized where there is material

abundance yet the "ruling classes… endeavor to preserve a system based on money, profit, and class power" (Frase, 2011a, par. 17). In a third scenario of egalitarianism and scarcity, an egalitarian form of socialism would arise, but it would be limited by scarce resources, relying on restrictions on consumption to maintain an egalitarian distribution of material resources and avert a catastrophic climate crisis (Frase, 2011a, par. 30-38). The final and most disastrous scenario is a combination of hierarchy and scarcity Frase (2011a) terms "exterminism." Here, the benefits of high productivity and automation go to the ruling classes and the rich who enclose themselves in gated communities, private islands and secured fortresses while the unemployed superfluous people are controlled through, "…ghettos, prisons, terrorism paranoia, [and] biological quarantines…" (Frase, 2011a, par. 45). This ultimately amounts to an "inverted global gulag, where the rich live in tiny islands of wealth strewn around an ocean of misery" (Frase, 2011a, par. 45). In the preceding analysis, the exterminism scenario may be the most probable outcome of the future if current trends continue unabated, while the hope of a post-scarcity egalitarian communism or post-capitalism is the driving motivation behind the post-work political project. In any case, the trajectory of the future is clear, capitalism will end and will be replaced by either a new system based on social justice, or a new system characterized by amplified injustices.

Reclaiming Modernity

In order to prevent disaster, it is the historical task of the modern Left to reclaim the future. While a socially just post-work society of abundance is the ideal scenario, it is not a historical inevitability and must be won through hard fought political action. As described by Srnicek and Williams,

> Progress is a matter of political struggle, following no pre-plotted trajectory or natural tendency, and with no guarantee of success…Pathways of progress must be cut and paved, not merely travelled along in some pre-ordained fashion; they are a matter of political achievement rather than divine or earthly providence. (2015, pg. 75).

Accordingly, the path the future takes is contingent on the relative success or failure of the current political struggles. This is also why it is so important to have a combined coalition with common goals. The stakes in this fight are simply too high to not be taken seriously and pursued with vigor.

To unify such a coalition, the struggle for the future should be fought in terms that have the widest appeal. Therefore, the fight for the future of modern society should be fought within the sphere of the ideals of modernity. The ideals of modernity such as freedom, democracy, progress, reason, solidarity, social justice etc. have near universal appeal, but their concrete expression in modern society is emaciated. The variety of political struggles for social justice, in terms of race, class, gender, sexuality, anti-imperialism, climate justice etc. are ultimately struggles within the space of modernity and its ideals; they represent an effort to bring the promises of modernity, that current configurations of society fail to deliver, into being (Srnicek and Williams, 2015, pg. 71). The ideals of modernity must be reclaimed by the Left and refashioned into a platform that is determined to give real substance to the promises of modernity. Srnicek and Williams (2015) describe the potential of reclaiming the future by reclaiming modernity this way,

> What, then, would a left modernity look like? It would be one that offered enticing and expansive visions of a better future. It would operate with a universal horizon, mobilize a substantial concept of freedom, and make use of the most advanced technologies in order

> to achieve its emancipatory goals. Rather than a Eurocentric view of the future, it would rely upon a global set of voices articulating and negotiating in practice what a common and plural future might be. Whether operating through slave revolts, workers' struggles, anti-colonial uprisings or women's movements, the critics of sedimented universalisms have always been essential agents in modernity's construction of the future; they are the ones who have continually revised, revolted and created a 'universalism from below.' Yet to truly enable the liberation of futures in the plural, the current global order premised on waged labour and capitalist accumulation will need to be transcended first. A left modernity will, in other words, require building a postcapitalist and post-work platform upon which multiple ways of living could emerge and flourish (pg. 83).

In this way, the radical vision of the future involves building a society that brings the promises of modernity into harmony with reality. This does not mean there will be one uniform way of living, but, in the modern spirit of tolerance and diversity, a post-work world would open the possibilities for multiple forms of social life that could co-exist. Neoliberal ideology is based on the idea that there is no alternative, that its form of modernity is the correct and only possible form. A Left modernity would reject the limits of neoliberal modernity and instead embrace a plurality of future possibilities.

The Post-Work World

The final question remains, if this ambitious post-work political project is successful, neoliberal capitalism is transcended, and the world transitions into post-capitalism, what will this new world look like? While the specifics are unknowable from the vantage point of the present, it is still possible to speculate what this world could entail. First, it is crucial to emphasize that

the post-capitalist project will likely take many decades or even generations to be fully realized. A post-capitalist society essentially requires a new type of human being compatible with this new society.[67] The development of a post-work consensus is crucial to shaping this new form of human nature, one compatible with a world where wage labor is not a universal necessity. However, a post-work world is not necessarily a world of idleness. Instead it is a world where, "people are no longer bound to their jobs, but free to create their own lives" (Srnicek and Williams, 2015, pg. 86). This means people would choose to do the activities that fulfills them, anything from art, music, sport, craft, research, or anything else they desire, rather than be required to work in the narrow ways the market deems worthy of remuneration. This paradigm recalls Marx's contention that communism would necessarily entail the reduction of the "realm of necessity" and an opening up of the "realm of freedom" (Marx, 1972 [1895] pg. 439-441). In a similar vein, science fiction author Arthur C. Clarke declared in the 1960s that, "The goal of the future is full unemployment.[68]" By harnessing advanced technology to fulfill the basic material necessities for all, the material conditions for expanding the realm of freedom can be realized, and "the economic problem that has defined human history will shrink or disappear" (Mason, 2015, pg. 289). Perhaps under these conditions, the dreams of science fiction can be realized. Large scale projects such as space exploration, the reduction or reversal of climate change, the modification of human bodies or the extension of human life may all become possible.[69]

However, even though the members of the radical Left "need to be unashamed utopians," if a near utopian post-capitalist global society is established, this will still not be the "end of

[67] See Mason (2015) pg. 233-238 and Livingston (2016) pg. 96-103.
[68] Cited in Srnicek and Williams (2015) pg. 107.
[69] See Srnicek and Williams (2015) pg. 179.

history" (Mason, 2015, pg. 288).[70][71] There will still likely be forms of inequality and social injustices to fight, such as continued struggles with racism and sexism, or and even in a context of material abundance there may still be maldistributions of wealth and resources. In addition, there will continue to be the transhistorical struggle of society's relationship with nature, as abundance is a necessary precondition for a post-work society, but this also requires a sustainable relationship with nature if this society is not to exacerbate environmental degradation and worsen the climate crisis.[72] In the context of the Anthropocene, advanced technology will give humanity even more control over the forces of nature, yet they must be cared for in an environmentally just and sustainable way. The possibilities for a post-work future may appear utopian, but there undoubtedly will be struggles for justice in the future as well. Nonetheless, it is the historical task of the modern Left to make the possibilities of the future an active historical force in the present.[73]

[70] This will not be the "end of history" in the sense same sense Fukuyama (1992) uses the term that any form of post-capitalism, such as those envisioned here, will be the final evolution of humanity's social, economic, or political formations.
[71] See also, Collins (2013) pg. 65; Srnicek and Williams (2015) pg. 175; Mason (2015) pg. 288-290.
[72] See Srnicek and Williams (2015) pg. 184-197.
[73] Srnicek and Williams (2015) pg. 127.

Part 3 Value-Critique and Ideology Critique

3.1 Marx, Automation, and Value-Critique Analysis

Part 2 provided the elaboration of ideal types of three ideological perspectives on automation and technological displacement. The purpose of Part 3 is to analyze the three ideologies through the methodology of ideology critique. The constructions of each ideal type have demonstrated how vastly different perspectives are at interpreting a common phenomenon. Based on different interpretations of the available evidence and distinct ideological assumptions and frameworks, widely disparate interpretations of what the effects of automation are, how societies should respond to automation, and what are the likely outcomes of the future have been put forward by experts and commentators. While there are some overlapping areas of agreement between the ideologies, each can be conceived as a separate world-view in the sense that they represent different views of the world and how it operates that are ultimately irreconcilable to each other. Each ideology does effectively operate within a separate world of its own, as Ward (1979) describes, "There is an important sense in which a world view is a separate world…" (pg. 461).[74]

Recalling Mannheim, (1936) ideology does not derive from the conscious construction of individual thinkers. Every person is born in to a specific socio-historical context with a limited range of patterns of thought that are constantly being reshaped as they respond to new challenges and the constantly changing socio-historical context (Mannheim, 1936, pg. 3). However, a

[74] It is important to remember how ideologies are shaped by the historically specific context, and how socialization processes shape each person's ideology. The ideological position a person takes, in other words the world-view they subscribe to, is also shaped by one's ascribed and achieved statuses. In "classical" ideology critique, the salient determinant of ideology is class and attendant class interest, i.e. Marx *The German Ideology* (1846) and Mannheim (1936), but in an expanded examination of ideology, considerations of how ideologies are gendered and racialized is also important.

common feature of the most prevalent mental frameworks is that they do not actively recognize that ideology, including their own, is derived from historically specific social contexts, and do not self-consciously reflect on how that context shapes ideological frameworks. Therefore, these frameworks do not anticipate the effects that the specific context has on their ideological constructions.

This insight has profound implications for the significance of the ideal type constructions of Part 2. Each of the ideal types was constructed from a sample of research and commentary that reflected each ideology. Each researcher[75] attempted to determine the truth about automation and technological displacement utilizing specific tools, frameworks, and research agendas. However, each conducted his or her research without specific reference to how their work is a product of a particular world-view, how their world-view is a product of a particular socio-historic context, and how this being the case affects their research. In other words, each fails to explicitly recognize "the need to examine *the gravity concrete socio-historical conditions exert on the process of illuminating those conditions*" (Dahms, 2015, pg. 12).[76] Each researcher wanted to reveal the dynamics and potential consequences of automation, but without understanding how the socio-historical context affects their research, they could not take into account how the context inevitably warps their analysis and conclusions. The purpose of Part 3 is to demonstrate how the absence of self-reflection on ideology and the effect concrete socio-historical conditions has on ideology makes each world-view structurally flawed. In other words, the purpose is to show how the current arguments and debates over automation and technological displacement are deficient because they do not have a critical understanding of the

[75] As noted in the methodology section, not every sampled work came from a person formally employed as a researcher, but each sampled work was research in the sense that every author was attempting to determine and present the truth about automation and technological displacement as he or she understood it.
[76] See also, Horkheimer (1937) "Traditional and Critical Theory."

dynamics of modern society. To remedy this deficiency requires a critical analysis of automation and technological displacement that explicitly recognizes the gravity concrete socio-historical conditions has on the theory, and attempts to explain the dynamics of modern society (Postone, 2015, pg. 23).[77]

Section 3.1 seeks to demonstrate how the critical school of Marxian thought called value-critique is well-suited to function as a theory that systematically illuminates the nature of modern society in the 21st century, as well as the dynamics of automation and technological displacement (Postone, 2015, pg. 3). This body of work is based on a reinterpretation of Marx's critical theory that differs fundamentally from other readings of Marx. It is especially useful because it elaborates how technological displacement is ultimately an expression of the unfolding historical dynamic of the capitalist system. This reinterpretation of Marx also seeks to grasp and explain the transformations of labor in modern society as another manifestation of this historical dynamic. It makes a distinction between the surface appearances of these phenomena and the underlying forces that make these dynamics possible. It characterizes these underlying forces as a "logic of capital" that is inherently contradictory. It ultimately demonstrates that the critical concept of a logic of capital must be central to any understanding of the processes of automation and technological displacement and the contradictory nature of modern society.

The critique of each ideology in section 3.2 demonstrates how each ideology is structurally flawed because each fails to have a sufficient understanding of the logic of capital as

[77] This does not mean critical theory claims to be entirely immune from the problems of ideology as described above. However, critical theory does claim that by being vigilantly self-aware of how the specific socio-historic context effects research, critically minded researchers are in a better position to produce the kind of research that would be significantly closer to accurately describing the dynamics of social reality than those that do not. In other words, critical theory provides the tools and mindset necessary for recognizing and confronting the challenge of understanding the hyper-complex and rapidly changing social world.

explained in section 3.1. Because each analysis is attempting to address a pressing social and economic question, the operations of the logic of capital are inevitably working beneath the surface of each framework. However, the concrete operations of the logic of capital are not fully explicated in any analysis, and therefore is ultimately covered over and masked by ideology. In other words, failure to take into account how the logic of capital factors into the analysis means that any resulting analysis is to some degree an expression of false consciousness, that is, an inability to recognize the underlying forces informing the construction of reality.[78] Ideology critique reveals how each ideology is structurally flawed because each in its own way inadvertently masks or hides the dynamics of the logic of capital. Section 3.2 will use the insights gleaned from section 3.1 to make it clear how the liberal, conservative, and radical ideologies are structurally flawed because of a lack of recognition of how the logic of capital impacts their arguments and analysis. The remainder of this section will be a full elaboration of the reinterpretation of Marx, value-critique, and the logic of capital.

The Origins of Value-Critique

Besides a few notable exceptions, such as the works of Moshie Postone (1993, 2015) in the United States and Anslem Jappe (2014) in France, the reinterpretation of Marx's theory called value-critique has been primarily confined to German speaking countries.[79] Many of the works were originally written in German and many have yet to receive English translations.

[78] By false consciousness, I mean not only the false consciousness of misrecognizing class interests, but also false consciousness in the sense of misrecognizing the root causes of social problems. In this case, I am arguing that the root causes of automation and technological displacement are either misrecognized or remain unanswered in much of the existing literature.

[79] The term value-critique is the English translation for the word *Wertkritik*, which is what the school of thought is referred to as in Germany.

While this has slowly changed in recent years,[80] this reinterpretation of Marx is still relatively unknown or obscure to most Anglophone scholars. Value-critique stems from a Germanic intellectual history of Marx interpretations that in many respects differs fundamentally from most popular understandings of Marx's ideas in English speaking countries.

Value-critique began formally as a school of thought in Germany in 1986 with the founding of the journal *Krisis* and its first programmatic essay "The Crisis of Exchange Value: Science as Productive Force, Productive Labor, and Capitalist Reproduction" by Robert Kurz (1986). Its members were impacted by the failure of the "movement of 1968" and the group was formed around a general agreement among its members that Marxism was a failure because it was not a radical enough critique of capitalist society (Trenkle, 2003, par. 2). The group has always been a relatively small collective of scholars, with only around thirty to forty individuals forming its editing and writing staff (Larson, Nilges, Robinson, and Brown 2014 pg. xi). In 2004, due to internal disagreements, *Krisis* split into a second group *Exit!*. From 1986 to the present the two groups have written thousands of pages of newspaper articles, journal articles, and books, as well as organized seminars, and discussion events (Larson, Nilges, Robinson, and Brown 2014 pg. xi-xiii). Moishe Postone of the University of Chicago, though not formally a member of either *Krisis* or *Exit!*, is the primary representative of this reinterpretation of Marx in the United States, and his seminal work *Time, Labor, and Social Domination* (1993) is one of the most cited and prominent works in value-critique (Larson, Nilges, Robinson, and Brown, 2014, pg. xlviii-xlix). Likewise, this presentation of value-critique theory will also be heavily influenced by his works.

[80] See for example, the release of a collection of translated essays entitled *Marxism and the Critique of Value*, edited by Larson, Nilges, Robinson, and Brown (2014).

Value-critique draws its intellectual origins and foundation from the works of Karl Marx, one of the classical theorists of sociology. However, value-critique distinguishes itself from other schools of Marxism as well as how Marx is commonly understood in sociology by taking radically different stances on many common precepts of mainstream Marxist thought. The theorists of value-critique distinguish themselves from what they call "traditional Marxism," especially the forms of Marxism practiced under "actually existing socialist societies" during the 20th century (Postone, 1993, pg. 7-15). The fall of the Soviet Union and other nominally socialist societies appeared to call into question the relevance and usefulness of Marx's theory as a means to understand modern society (Postone, 2015, pg. 4-5). However, while value-critique agrees that "traditional" interpretations of Marx have serious limitations, they do contend that a reinterpretation of Marx's critical theory that seeks to explain the internal dynamics and contradictions inherent in capitalist society can illuminate the underlying forces that can serve as a foundation to explain the large-scale structural transformations of modern society. Included in this analysis is an elaboration of the processes of automation and technological displacement as a historical dynamic generated by the workings of the logic of capital.

In addition to Marx, this school of thought is also heavily influenced by the Frankfurt School of Critical Theory, especially the works of Max Horkheimer and Theodor W. Adorno. Critical Theory, formally coined and explicated by Max Horkheimer in 1937, was designed to be a theory of society that sought to understand its own social context by reflexively understanding the gravity that the specific socio-historical context has on attempts to understand modern society.[81] The programmatic aims of Critical Theory proposed by Max Horkheimer was to provide a radical critique of all aspects of social life, including an updated version of Marx's

[81] See Horkheimer (1937); Dahms (2008).

critique of political economy adequate to understanding how capitalism has changed since Marx's death (see, Horkheimer, 1937). However, after its exile from Germany fleeing the Nazi regime, the Frankfurt School took an intellectual turn towards critiques of culture and politics and away from examinations of political economy. The first generation of the Frankfurt School[82] made this first step away from political economy, for example, by obscuring Marxist terms through coded language in the revised edition of Horkheimer and Adorno's seminal work, *Dialectic of Enlightenment* (2001 [1947]).[83] What is called the second generation of Critical Theory, represented by students of the first generation such as Jürgen Habermas, largely abandoned any attempt to update Marx's critique of political economy, instead developing critiques of modern society that excluded consideration of political economy in favor of critiques based on issues of communication or recognition.[84] The scholars of value-critique were inspired by the radical thrust of Critical Theory, but wanted to integrate its spirit into Marx's critique of political economy to form a radical new interpretation of Marx.[85] Value-critique essentially revives the original aim of the project of Critical Theory to provide a radical critique of political economy in capitalist societies of the 20th and 21st centuries.

Before explaining the specifics of value-critique, it is important to first clarify what exactly constitutes "traditional Marxism," according to value-critique. In most interpretations of Marx, the primary thrust of Marx's theory is an analysis of class relations in a system defined by

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[82] Especially Max Horkheimer, Theodor W. Adorno, and Herbert Marcuse.
[83] For a full explanation of why and how the first generation of the Frankfurt School failed to update Marx's critique of political economy as originally intended, see Dahms (2017).
[84] For examples see Jürgen Habermas, (1981) *The Theory of Communicative Action*, and Axel Honneth, (1995) *The Struggle for Recognition: The Moral Grammar of Social Conflicts*.
[85] The scholars of value-critique were essentially disillusioned with the trajectory of both leftist politics and the second generation of Critical Theory spearheaded by Habermas. Because of this, they sought to create an analysis that maintained the driving mission of the "first generation" of Critical Theory, yet took back up the task of revitalizing the critique of political economy that was marginalized in the first generation of Critical Theory and virtually abandoned in the second generation.

private property and market mediated relations where the capitalist class structurally exploits the working class (Postone, 2015, pg. 7). Marxist class analysis is made on behalf of the exploited working class against the exploiting capitalist class in an effort to contribute to class struggle in favor of the working class. The fundamental contradiction of capitalism is characterized by rising tensions between the relations of production, characterized as private property and market relations, and the forces of production, understood as the working class. This situation escalates to accelerating class struggle that gives rise to the possibility of overcoming capitalist social relations in favor of collective ownership of the means of production and wide-scale economic planning (Postone, 2015, pg. 7). In this interpretation, the role of technology is that it represents a technical process that under capitalism is used for the particularistic ends of the capitalist class, but could instead be used for the benefit of all under socialism (Postone, 2015, pg. 7). Such an interpretation implicitly posits that the primary message of Marx's theory is to point toward the historical possibility of a planned administration of industrial society, one that can achieve full employment, higher levels of general consumption, and generous social welfare.

While Marxist class analysis has produced robust critiques of capitalism that are useful for understanding political and economic struggles, value-critique suggests that Marx's theory, "is not, on its most fundamental level, a critique of a mode of class exploitation that distorts modernity, undertaken from a standpoint that affirms labor" (Postone, 2015, pg. 5). Of course, class exploitation still plays an important role in Marx, but, in this interpretation, class relations and class exploitation is no longer *the* central thrust of Marx's theory. In addition, the analysis is no longer seen as a critique of capitalism in the favor of the working class, but is actually a critique of the specific form of labor in modern society. In value-critique, labor is not understood as a humanity's transhistorical relationship with nature that exists in the same form in

all societies throughout history. Labor, for value-critiques interpretation of Marx, is understood to be a historically specific form of labor that exclusively exists in capitalist societies, is defined by the particular way it mediates social relations, and that has a particular, and peculiar, relationship to time. As Postone (2015) explains, "Marx's critique…uncovers and analyzes a unique form of social mediation that structures modernity itself as a historically specific form of social life. This form of mediation is socially constituted by a historically unique form of labor, and, yet, is abstract and temporal" (Postone, 2015, pg. 5).[86] Labor as a historically specific form of social mediation is also characterized by how its dynamics generate forms of social domination that cannot be identified as the domination by a specific class or social institution. Instead, these forms of domination are described by Marx in terms of the categories such as commodity, capital, and value,[87] and the processes and dynamics these categories signify (Postone, 2015, pg. 6). These dynamic processes generate general systemic imperatives that constrain and compel the actions of all social actors even though no individual state, business, or institution purposefully generates these dynamics. The form of domination Marx analyses is ultimately *the domination of people by time* (Postone, 2015, pg. 14). Ultimately, this form of domination is key to understanding the dynamics of automation and technological displacement.

[86] Social mediation is a term that signifies how labor in capitalist society serves as a foundational category that mediates the relationships between people and the economic, political, and cultural structures, institutions, and practices of that society. As Postone (1993) explains, social mediation is "…socially constituted, [yet] has an abstract, impersonal, quasi-objective character. This form of mediation is structured by a historically determinate form of social practice (labor in capitalism) and structures, in turn, people's actions, worldviews, and dispositions" (pg. 5).

[87] Like labor, the categories of commodity, capital, and value as Marx defined them are also historically specific and operate as he describes them only in modern capitalist society.

Basis for a Reinterpretation of Marx

Before fully elaborating the core argument of value-critique, it is important to understand on what basis value-critique constructs their reinterpretation of Marx's critique of political economy. In other words, what in Marx's works gave value-critique scholars the basis to argue that the core of Marx's theory has been misunderstood and was in need of reinterpretation? First, value-critique focuses on some often-neglected texts and puts them back into the focus of Marx's critique of political economy. Value-critique emphasizes the importance of the fundamental categories of capitalist society Marx emphasizes such as labor, value, commodity, and money (Trenkle, 1998a, pg. 1). It presents these categories as historically specific to capitalist society and as fundamentally contradictory. It also emphasizes the significance of the dual character of categories such as labor, as abstract and concrete labor, and value, as use-value and exchange-value. Value-critique derives much of the basis for its interpretation of Marx from the *Grundrisse*, (Marx, 1973 [1858]) the unpublished notebooks Marx used as his foundation for his mature critique of political economy. Written in 1858, these manuscripts served as an outline and groundwork for Marx's *Capital* (1976 [1867]). However, the *Grundrisse* would not be released in German until 1939, and would not be translated into English until 1973. Even though it was originally released in 1939, it did not become widely read by German Marxian scholars until decades later, where it would have a profound influence on many Marx scholars, including the scholars of value-critique.

In the *Grundrisse*, Marx elaborates the meaning and character of categories such as labor, value, and commodity in substantially more detail than what was explained in the early chapters of *Capital* (Marx, 1976 [1867]). For value-critique, these categories are not to be understood as anthropological constants that are valid throughout human history, but are meant to be

understood as historically specific to capitalism (Trenkle, 1998a, pg. 1-2). In addition, these categories are seen as the primary objects of Marx's critique of political economy; that is, Marx develops a critique of labor and a critique of value. He does this because while these categories appear commonsensically transhistorical on the surface, he argues that ultimately the form they take in modern society is historically specific, and in their specificity, they operate with fundamentally different dynamics from how they operate in all previous societies. Instead of the foundation of Marx's analysis being the revelation of class exploitation and maldistribution of wealth in society, Marx critiques the capitalist labor process itself, and how it creates contradictions both of inequality and exploitation, but also of a specific regime of social relatedness and relationship to time that is illuminated by examining the contradictory unfolding of the categories of labor, value, commodity, and capital.

In *Capital*, (1976 [1867]) Marx explains how industrial machinery functions as a means to increase the rate of relative surplus value appropriated by the capitalist class.[88] Later in the book, Marx describes how the implementation of new machinery in production excises members of the working class who are then reabsorbed into production as businesses expand. This produces what Marx called the "industrial reserve army of labor," that is, a certain number of unemployed people "on standby," so to speak, as the dynamics of capitalism and technology displace labor and simultaneously reabsorb them back into other areas of production or in expanded industries.[89] This is essentially Marx's explanation of the dynamics of technological displacement. In *Capital*, Marx does not explain the long-term implications of this dynamic in depth. However, in the *Grundrisse*, (1973 [1858]) Marx does explain the long-term implications

[88] See *Capital* Volume 1 (1976 [1867]) Chapter 15 "Machinery and Large-Scale Industry" pg. 492-639.
[89] See *Capital* Volume 1 (1976 [1867]) Chapter 25 "The General Law of Capitalist Accumulation" pg. 762-870.

of this dynamic, and these passages are especially relevant for value-critique, and for understanding Marx's conception of automation and technological displacement.

The passages of the *Grundrisse* (1858) in question are the sections titled "Capitalism, Machinery and Automation" and "The End of Capitalism." In the first section, Marx argues that the increase of the productive forces of labor over time becomes expressed as the transformation of the means of labor from tools where workers are the dominant driver of production into automated machinery where human input is minimal or not required at all (1977 [1858], pg. 280). The operation of this "automatic system of machinery" can no longer be described as the labor power of any individual worker, but is viewed as the accumulated knowledge and skill of social knowledge in society in general (Marx, 1977 [1858], pg. 278). In other words, material production is based less on a worker's knowledge and skills, but of the skills and knowledge as instilled and manifested by machines. These generally social productive powers increase until,

> the full development of capital, therefore, takes place…only when the means of labor has not only taken the economic form of *fixed capital*… and appears as a machine within the productive process, opposite labor; and the entire productive process appears as not subsumed under the direct skillfulness of the worker, but rather as the technological application of science (Marx, 1977 [1858], pg. 281).

In other words, it is the tendency of capital to over time make the entire production process increasingly based on the labor of machines rather than the labor of workers. As Marx (1977 [1858]) states, the general tendency of capital is "The increase of the productive forces of labor and the greatest possible negation of necessary labor" (pg. 280). Here it is clear that Marx anticipates the growing significance of automation supplanting human labor, and argues that it is the inherent tendency of capital to do so. Supplanting human labor with machines has profound

implications for capitalist societies where labor time expenditure in exchange for wages is the primary means to acquire the means of subsistence and necessities of life. As long as labor time is "posited by capital as the sole determinant element [of value]," and direct labor time is, "reduced both quantitatively, to a smaller portion, and qualitatively, as an…subordinate moment, compared to the general scientific labor, technological application of natural sciences…and to the general productive force arising from social combination in total production," then this means that the dynamics of the system is generating a profound contradictory relationship between workers, machines, and the processes of social reproduction (Marx, 1977 [1858], pg. 282).

The culmination of Marx's argument is described in the section, "The End of Capitalism." Marx describes how the development of the forces of production come into conflict with capitalist relations of production,[90] that "wage labor enters into the same relation towards the development of social wealth and of the forces of production as the guild system, serfdom, slavery, and is necessarily stripped off as a fetter" (Marx, 1977 [1858], pg. 291). That is, Marx predicts that the end of capitalism will result from the contradiction of the development of highly advanced automatic machines that make wage labor just as anachronistic and unnecessary for social reproduction as the guild system was for early capitalist society. In addition, the previous passage also suggests the end of capitalism necessitates an end to labor, rather than the "realization of labor" as commonly supposed in most interpretations of Marx. However, recall

[90] It is important to note how in these passages the forces of production are not identified as the development of the workers themselves, but through the development of highly productive growth of the scientific power of machine production. In "traditional Marxism" the forces of production are usually characterized as the workers, and the relations of production are usually characterized as the relations of the market and private property that favor the capitalist class. However, here the forces of production are identified as the general productive apparatus of society that is primarily run by automatic machines, and the relations of production are, as will be elaborated in more detail below, the historically specific form of social relations of capitalist society, not only the relations of private property and the market.

that by labor, Marx does not mean all forms of work would necessarily end, but that the historically specific form labor takes under capitalism would end.[91] This passage in the *Grundrisse* thus contradicts the common interpretation of how the end of capitalism will unfold as posited by other strands of Marxism. It also extends the logic of technological displacement that Marx outlines in *Capital* (1976 [1867]).

Value-critique's analysis of capitalist society is heavily influenced by the insights gleaned from the *Grundrisse*, and by a close reading of other passages in Marx that explain the unique dynamics of labor, value, and automation. In the contemporary context where there is an upsurge in discussions regarding technology, automation, and machinery's capacity to replace jobs, it appears that Marx's theory is becoming increasingly more relevant in light of these developments. As posited by Postone, "The far-reaching transformations of the world in recent decades have dramatically indicated that critical social analysis must be centrally concerned with questions of historical dynamics and large-scale structural changes," and that these transformational processes can best be described by a reexamination of Marx's critical theory of capitalism (Postone, 2015, pg. 4).

Historical Dynamics of Capitalism, Labor, and the Critique of Value

Labor in Precapitalist and Capitalist Societies

With the preliminary discussions of the origins of value-critique and the basis for its reinterpretation of Marx complete, this section will explain their reinterpretation in full. First, according to value-critique, Marx characterizes labor in modern society as a specific form of

[91] All societies require some mediated relationship with nature to reproduce itself, but the nature of that relationship can be widely variable, and there is no absolute necessity or "iron law" that dictates that this relationship must be based primarily on direct human labor.

labor fundamentally different from labor in precapitalist societies. In precapitalist societies, labor is conceived of as humanity's mediation with nature to procure the material needs for survival. However, labor in capitalist societies is no longer humanity's direct mediation with nature, but the primary means of obtaining value, that is, money in the form of a wage or salary, in order to purchase the goods of others necessary for an individual's social reproduction (Postone, 2015, pg. 12). As Marx (1976 [1867]) explains by his examination of primitive accumulation, the transition from labor in precapitalist societies to labor in capitalist societies was a violent process taking place over many decades and centuries (pg. 873-940). Kurz (2011) explains that the imposition of capitalist social relations was not a peaceful or linear transition, but was imposed unevenly at different times and places across the globe, oftentimes by force and oppressive colonial practices. As precapitalist societies transitioned to or became incorporated into capitalism, pastures were enclosed, lands were seized, traditional fishing, hunting, and wood gathering rights were abolished, and traditional ways of life were shattered as different peoples around the world became dependent upon wage labor to survive.[92] In capitalism, every human being must be either directly or indirectly connected to the capitalist regime of labor to reproduce their means of survival on a continuous basis. As Postone (2015) explains,

> In a society in which the commodity is the basic structuring category of the whole, labor and its products are not socially distributed by traditional norms, or overt relations of power and domination, as is the case in other societies. Instead, labor itself replaces those relations by serving as a kind of quasi-objective means by which the products of others are acquired. It constitutes a new form of interdependence, where people do not consume what they produce, but where, nevertheless, their own labor or labor-products function as

[92] See, Kurz, 2011; *Krisis-Group*, 1999, section 9.

> a quasi-objective means of obtaining the products of others. In serving as such a means, labor and its products in effect preempt that function on the part of manifest social relations; they mediate a new form of social interrelatedness (pg. 12).

This new form of interrelatedness and interdependence is what constitutes the foundation of capitalist society as a historically specific form of social life. Labor in capitalism becomes not just a means of production, but is also a means of distribution that preempts the distributive function of immediate social relations, that is, kinship bonds, direct expropriation etc. The imposition of capitalist labor relations eliminated traditional ways of life, fundamentally changed the relationship between humans and nature, and changed the primary methods and processes of wealth distribution and social reproduction.

Abstract and Concrete Labor

Capitalist society is characterized by how it makes individual reproduction and society's reproduction dependent upon the interdependent labor of workers in a division of labor that now spans the globe. At the core of this interdependence is the unique socially mediating function labor takes in capitalism. Trenkle (1998b) notes how the nature of labor in capitalist society is dependent upon its social context to derive meaning (pg. 1). Labor in capitalism is only considered labor if it "materializes in the abstract-social context of the production of commodities and some wage is awarded for the carrying out" (Trenkle, 1998b, pg. 1).[93] What Marx calls abstract labor refers to when selling labor power for a certain amount of time in

[93] Of course, there are kinds of work that exist "outside" of what capitalism considers labor, because what counts as labor in capitalism is labor time expenditure in exchange for the universal equivalent, money. The most common example of labor "outside" of capitalism is unpaid domestic labor, which is crucial for social reproduction but nonetheless does not count as labor for capital. See, Scholz, (2009) *Patriarchy and Commodity Society: Gender without the Body*.

exchange for a wage that can be used to exchange for commodities is the primary means of social reproduction that is made general across the whole of society. When this system is generalized, labor takes on an abstract socially mediating character it did not have in previous forms of social life. Regardless of what concrete form labor takes, be it productive labor, service labor, agricultural labor or intellectual labor, the labor has an abstract character because it is remunerated not based on its concrete quality, but by a quantitative measurement of time. Only when capitalism is generalized does remunerated labor time become viewed as a universally valid form of exchange for the products of others. Ultimately, in modern society it is viewed as "natural" that all human beings must to work to survive, but this obscures how this "need" to work is socially created and enforced because of the structuring power of a society where social reproduction is dependent upon acquiring value through labor.

Abstract Time

Capitalism not only requires a fundamentally different understanding of work, but also required members of society to relate to time in a fundamentally different way. One aspect of the transition from precapitalist to capitalist society was the necessary change in people's perception of and relationship to time. In precapitalist societies, people tended to relate to time not by constant units such as seconds, minutes, or hours, but based on the timings of natural processes such as days, lunar cycles, or seasons. As explained by Postone (1993) this relationship to time termed "concrete time" does, "not depend on a continuous succession of constant temporal units but either are based on events… or on temporal units that vary" (Postone, 1993, pg. 201). This is important to highlight because in a regime of time not determined by constant units, the concept of productivity, producing more in a standard period of time, becomes impossible. Indeed, as Postone (1993) explains, the concept of productivity was largely

unknown to or was not important to people in precapitalist societies (pg. 200-211). Concurrent with the development and dissemination of capitalist modes of life was the spread of a new relationship to time, termed "abstract time" which refers to, "uniform, continuous, homogeneous, 'empty' time, [that] is independent of events" (Postone, 1993, pg. 202). In other words, the progress of abstract time as the dominant relationship to time people experience is closely related to the progress of capitalism as a form of life (Postone, 1993, pg. 213). It is another aspect of the process of primitive accumulation, or the generalized expansion of capitalist relations, that is a necessary precondition for the concept of productivity to become crucially important in capitalism. Ultimately, capitalist dynamics necessitated a new relationship to time. If labor time determines value, then time must be standardized to make labor time quantifiable. Time discipline was used to demarcate working and non-working time, caused workers to live under the tyranny of the clock, and laid the foundation for productivity to become a compelling norm in society.[94]

Commodity, Value, and Use-Value

Marx begins *Capital* (1976 [1867]) with an examination of the commodity. For value-critique, Marx refers to commodities not only as physical products or objects that could exist in any form of society, but as a historically specific form of social relations that define the core of capitalist modernity (Postone, 2015, pg. 11). For instance, Marx argues that physical products or services for sale are commodities, but labor power is also sold as a commodity (1976 [1867] pg. 128).[95] In this way, the buying and selling of labor power, that is, employment, is also a social

[94] See, Postone, 1993, pg. 186- 225, and Thompson, 1967, "Time, Work-Discipline and Industrial Capitalism."
[95] This is similar to, but not identical with, Polanyi's (2001 [1944]) argument about how labor is treated as a commodity. However, value-critique disagrees with Polanyi regarding the notion that labor is a "false" commodity. See Postone, 1993, pg. 149, note 83.

relation between commodity owners. Because labor power is both a commodity and the dominant means of individual and social interrelatedness and reproduction, commodity relations between workers, employers, and their labor products are also a kind of social relations.

According to Marx, commodities, including labor power, have both a value and a use-value dimension. What sets value-critique apart from most other interpretations of Marx is that it treats value as a separate from of wealth from material wealth, that is, wealth as a collection of use-values. Material wealth is the form of wealth derived from the number and quality of use-values in a society. Value is an abstract form of wealth that is temporally determined by human labor time expenditure.[96] In capitalism, all commodities have both a use-value dimension, and a value dimension, but these are not identical. Many interpretations of Marx's labor theory of value hold that human labor is at all times and all places the only social source wealth and use-values (Postone, 2015, pg. 13). This interpretation runs into difficulty however, when machines replace human workers and production becomes mostly or exclusively dependent on technology and machine labor. It therefore appears that the labor theory of value is wrong because commodities and wealth are being produced without human labor. According to value-critique, this interpretation mistakenly conflates value with use-value. For value-critique, the labor theory of value is valid only for capitalist society, and is meant to describe how labor is the only source of value, but not the only source of use-value. Machines can create new use-values, but cannot create new value.[97]

[96] To think of this another way, in the terms of social construction theory, value or money operates as a social construct, which makes value a product of society rather than an attribute intrinsic to any commodity.
[97] According to Marx, machine labor cannot create new value, but does transmit the value of previous labor time expenditure that was used to create the machine onto the new commodity. See Marx (1976 [1867]) pg. 508-517.

This is the case because value is, in this interpretation, most importantly a *social* category. A person's *social* value is constituted by his or her expenditure of labor time as a worker, and his or her means to reproduce socially are provided by his or her employment**.** In other words, the category of value is only relevant in the context of society and only relevant for human beings' social reproduction. The commodity fulfills two uses simultaneously. First, its use-value dimension serves a concrete need that is fulfilled through the unique quality of the commodity. Secondly, the value dimension of the commodity serves the function of contributing to society's collective reproduction. In other words, when a commodity is sold, it contributes the reproduction of all the workers who expended their labor to create the commodity. In this way, the value aspect of the commodity represents an imprint of social relations; it concerns the relations between people and the distribution of the means of social reproduction. The only source of value is human labor because value measures the participation of each individual worker in the totality of social labor, therefore, to claim that both capital, as represented by machines, and labor both create value is essentially to claim that these machines are equal to humans as members of society (Žižek, 2011, p. 207). Machines can create use-values, but they can only create value insofar as they contribute to the social reproduction of workers, or in other words, contribute to the worker's acquisition of value. If workers are being excised from production because of machines, then machines are also excising the worker's opportunity to acquire value, not contributing to it.

Capital

Capital, for value-critique, is a category of continuous movement and expansion; it is value in motion (Postone, 2015, pg.16). As explained by Postone, (2015) capital, "has no fixed form and no fixed material embodiment, but appears as different moments of its spiraling path in

the form of money and of commodities" (pg. 16). This is represented in simplified form in Marx's formula M-C-M'.[98] This formula is a useful visualization, but it must be remembered that it represents a continuous and dynamic process with no fixed end. What is important about this process for value-critique is the distinction between what is the end goal of this process and what is not. According to the logic of capital, the end goals of production are money, profit, and the accumulation of capital. Because value-critique makes a distinction between material wealth, or use-value based wealth, and value, a temporal form of wealth, the end goal of capital accumulation is revealed not to be material wealth, but of value. In addition, because the goal of capital is profit and accumulation, the goal of capital is not value in general, but of a never-ending accumulation of surplus value. Value is a quantitatively measured means used to acquire the labor products of others. Because acquisition and accumulation of this means is the goal of production, the concrete use-value of the commodities is also not the end goal of capitalist production. As Postone (1993) explains, "Value…is a purely quantitative goal; there is no qualitative difference between the value of wheat and that of weapons" (pg. 181). This means that there is no necessary logical connection between what use-values are produced and the end goal of capital accumulation. The specific use-value is immaterial to the logic of capital as long as the commodity can be sold to realize its full value. There is also no necessary logical connection between what combination of commodities and labor are used to make the final product, as long as the final commodity realizes its full value through its sale. Ultimately, for value-critique, the movement of capital does not have a substantive end, but, as Postone (1993) states, "*Production in capitalism becomes a means to a means*" (pg. 181).

[98] M represents money, C represents commodities, the natural resources, tools, machines, and labor used to make the commodity, and M' represents the original investment of money advanced plus profit. See Marx (1976 [1867]) pg. 247-257.

It is also important to recognize precisely where workers fit within the movement of capital and capital accumulation. People and organizations need to buy commodities in order for the commodities to realize their value, but labor power is a unique commodity in that it cannot be sold once and for all; it can only be used for a certain period of time. Labor is a commodity that fits within the C portion of the M-C-M' movement. Labor in the continuous process of capital plays a role in production, along with raw materials, tools, machines, computers, robots, artificial intelligence etc., but is itself not the end goal of production. Therefore, there is no necessary link between the movement of capital and the reproduction of labor. Human workers can be and have been excised from industries due to automation, and this development is not incompatible with the logic of capital. In most areas of production throughout history labor has played a direct role in the production process, but the logic of capital as outlined by Marx is meant to demonstrate that the importance of labor in production is historically contingent, not necessary. In other words, the goal of the movement of capital is not the production of jobs, but toward the accumulation of surplus value. That labor power has been deemed useful and utilized for capital accumulation for most types of production is an indirect effect of concrete historical unfolding of the logic of capital, but reproducing labor power is not the primary goal of the dynamic process of capital accumulation. In other words, there is no "iron law" that capital accumulation will result in the production of jobs. The relationship between capital accumulation and employment is contingent on the needs of production, and, as explained below, the needs of production are continuously redefined over the concrete historical unfolding of the movement of capital accumulation.

Socially Necessary Labor Time

Value is a temporal form of wealth that is relevant only for human society, serves to reproduce workers, and is generated through expenditure of labor time. However, what Marx calls the magnitude of value is not determined arbitrarily, but is mediated by his concept of socially necessary labor time. Marx (1976 [1967]) defines socially necessary labor time as "the labor time required to produce any use-value under conditions of production normal for a given society and with the average degree of skill and intensity of labor prevalent in that society" (pg. 129). In other words, the value a worker receives for their labor time is only given based on their time worked, but is mediated temporally by the compelling norm of what counts as a fully productive period of work in the specific socio-historic context of production in that society. This is not merely a descriptive term of how long it generally takes to produce a particular commodity, instead it, "delineates a socially general, compelling, norm. Production *must* conform to this prevailing, abstract, overarching norm if it is to generate the full value of its products" (Postone, 2015, pg. 14). This norm is partly determined by competition as, to be profitable, businesses must produce commodities using the socially determined expected standard of productive methods and by the socially expected standard of production time so the commodities produced by one business can compete with the commodities of its competitors and businesses can acquire the expected surplus value from the sale of commodities. A "luddite" production process cannot produce competitive commodities and the enterprise that fails to conform to this norm cannot compete effectively and will almost inevitably fail in the market.

However, the norm of socially necessary labor time is more importantly an expression of a form of social domination. It is a norm that compels both individual workers and businesses to operate under specific constraints, standards, and systemic imperatives. Furthermore, these

standards are a form of generalized social domination because they are not determined by any specific social, economic, or political entity, but are overarching norms that must be responded to by human actors, but are not determined by them. Socially necessary labor time is determined historically by the specific conditions and circumstances of the social context. The socially expected standards constrain human action, because workers and businesses who do not conform to these norms risk unemployment, falling profits and productivity, bankruptcy, or other negative consequences. For example, the expectation that a manufacturing worker must produce X number of commodities in one hour, is one manifestation of the compelling norms of capitalist society. This example of socially necessary labor time in the context of productive labor is relatively straightforward, but the norm of socially necessary labor time also manifests itself in different ways for other types of labor. For example, the standard in recent decades that professionals must be available via email to work at any time, including during vacations, is one manifestation of how the norm of socially necessary labor time compels and constrains contemporary workers. In another example, transportation workers are not productive workers because they do not produce commodities, but they do facilitate the economic system by transporting commodities so they can realize their value through sale. Nonetheless, transportation workers also face the compulsions of socially necessary labor time as the expected transportation time is mediated by the standards of what is the expected mode of transport, by semi-truck rather than by horse for instance, and by what is the expected travel time and behavior; excessive sleep, meal time, or breaks must be curtailed. Finally, the norm of socially

necessary labor time is not a static determination, but a dynamic norm that is re-determined continuously by changes in the socio-historic context, namely, by increases in productivity.[99]

Productivity

Increases in productivity have been observed throughout the history of capitalism, but what generates their development? Marx (1976 [1867]) identifies the logic of capital and the pursuit of relative surplus value as the primary driver of this process (pg. 429-438). Once the standard working a day is fixed, the primary way that businesses can increase the amount of surplus value they receive from workers is by increasing productivity. Increasing productivity generates more surplus value for capitalists by "[increasing] surplus labor time by lowering the labor time necessary for workers' reproduction" (Postone, 2015, pg. 17). In other words, increasing productivity increases the proportion of value that goes toward capital accumulation rather than toward workers' reproduction. The "traditional Marxist" view usually takes relative surplus value to be another method that capitalists use to structurally exploit workers by extracting surplus value from the differential of the value of the commodities produced by labor, and the comparatively smaller wages capitalists pay them for their labor power. While recognition of this form of exploitation is still important, value-critique is more interested in how the pursuit of relative surplus value generates increases in productivity that produces both great increases in material wealth, but also increases the intensity of the compulsions and constrains of

[99] Value-critique tends to present its arguments using the production process of the industrial manufacturing worker as the typical case. However, the same dynamics of productivity and socially necessary labor time constrain and compel all workers and businesses, both productive and non-productive, as well as in agricultural labor, cognitive labor, manual labor, professional labor, etc. The pressures of socially necessary labor time effect these forms of labor in qualitatively different ways, and productivity is measured in different ways as well. Nonetheless, value-critique posits that all forms of labor are under socially general imperatives and constraints that differ depending on the type of concrete labor as well as the conditions of the specific socio-historic context.

production and socially necessary labor time. It ultimately describes how this process generates prodigious contradictions.

Science as a Productive Force

The pursuit of productivity increases is rooted in the logic of capital and the pursuit of surplus value. This process unfolded historically by the increasing knowledge of natural science that was directly applied to the process of production. Kurz (1986) identifies two processes of what he calls "scientification" that continually push the powers of productivity forward: the technological application of the natural sciences, and the development of the science of the organization of the processes of production.[100] Natural science was not rigorously studied until the Enlightenment of the 17th and 18th centuries, and the insights from it were not generally applied to improve the means of production until the 19th century. However, the startling acceleration of the scientification of production really begins in the 20th century, especially after World War II. In this period, states and businesses began heavily investing in teams of natural scientists intentionally trying to innovate the means of production by creating innovative advanced technologies that saved on labor time and labor costs (Kurz, 1986, pg. 32-36). This process ran concurrently with the process of the increasingly scientific division of labor. To improve factory efficiency, scientific methods of organization such as Taylorism and assembly line Fordism were slowly adopted over the course of the late 19th and early 20th centuries. This had devastating effects on the workers such as de-skilling of skilled workers and extreme discipline of movements in what Kurz (1986) calls the "scientific torture of labor" (pg. 38; see also Braverman, 1974). Both of these practices reached a high point after World War II, and

[100] In other words, the application of the scientific method to improve the efficiency of the organization and its division of labor.

their application and constant improvement over time ultimately leads to a, "fusion [that] eliminates human labor altogether from the immediate process of production." (Kurz, 1986, pg. 39). The unity of these two processes, what Kurz (1986) calls "science as a productive force," are the methods used by capital to push productivity forward, with the complementary effect of decreasing the need for both skilled and unskilled labor in the production process. The development of science as a productive force has continued into the present with the most recent manifestations of this development being the robots, artificial intelligence, digital software, and computers that are the primary subjects of the automation and technological displacement debates. What is unique about value-critique's account of this development is how it roots this process in the logic of capital and the pursuit of relative surplus value. In other words, it grounds rises in productivity as part of the logic of the system. In addition, value-critique explains how rises in productivity in capitalism develops a historical dynamic that generates growing contradictions.

Productivity as a Contradictory Historical Dynamic

Productivity has approximately doubled since the 1970s (Ortlieb, 2011, par. 1). Between 1998 and 2013, the United States produced 42 percent more goods and services using the same number of labor hours (Sprague, 2014, pg. 1). Yet wages remain stagnant for most workers and labor market polarization is hollowing out middle income jobs (see, Mishel, 2012; Frey and Osborne, 2013; Autor and Dorn, 2013). These are contemporary contradictions that need to be explained. Value-critique attempts to do so by explaining their origin in terms of a historical dynamic generated by the contradictory nature of value and productivity within capitalist production.

An example of the development of this historical dynamic is as follows. First, in a production process, commodities are produced by workers every day for a standard number of hours. In each hour, the worker is expected to produce a certain number of commodities in an hour that is mediated by the standard of socially necessary labor time. The amount of value produced per hour is a function of the time unit alone and remains the same regardless of the level of productivity (Postone, 2015, pg. 14). In a social context fraught with competition, the level of productivity in production cannot stay the same for long, "competition among isolated businesses, which is brought about by the mediation of anonymous markets, necessitates a permanent increase in productivity" (Kurz, 1999 par. 16). Because the goal of the movement of capital is to accumulate surplus value, methods of increasing productivity that increase the rate of relative surplus value are implemented in production. It does not matter what concrete form this takes, the rise in productivity can come from a new organization of the production process or the application of a new technology, from a new hammer to the utilization of artificial intelligence, the effect is the same.

In any case, implementation of new technology has several effects on the production process. Productivity increases the number of use-values that can be made per hour. However, productivity increases do not increase the amount of value proportionally or in the same way as the increase in use-values. If a company develops a way to double their productivity for each worker from 12 commodities per hour to 24 commodities per hour, then the amount of value going to each commodity falls by one half, allowing the commodity to be sold at a cheaper price. This company can then sell the commodity at a cheaper price below the standard price for the commodity, but at a price with a higher rate of profit. In other words, as Marx (1976 [1867]) explains, "*surplus-value* is created for [the capitalist] as soon as the *individual* value of his

product falls *below* its social value and can be sold accordingly at a price *above* its individual value" (pg. 1023). By adopting new methods to improve productivity, first adopters can sell more commodities at an increased rate of relative surplus value and therefore are fulfilling the goal of the logic of capital, to accumulate more surplus value. However, this increase in the rate of relative surplus value is only temporary. In the context of capitalist competition, increased productivity in one section of the industry induces the general adoption of the newer methods of producing for the whole of the industry. Once the new methods of production become generalized, the value yielded per unit time returns to its older level, and the producers who have not adopted the new methods become compelled to do so (Postone, 1993, pg. 290). What once gave a competitive advantage and increased profits now becomes generalized and the competitive advantage and increased profits rates diminish. This ultimately occurs because when new methods that increase productivity become general across society, the normative social standard of what counts as the expected social labor hour has been redetermined. The compelling standard of socially necessary labor time has changed to make the new methods of increased productivity the new socially general standard that *must* be followed. As Postone (1993) explains, "the *social labor hour is constituted by the level of productivity*" (pg. 289). Increases in productivity change the determination of what counts as a fully productive unit of time (Postone, 2015, pg. 14).

Put another way, with increases of productivity due to the development of science as a productive force, more and more use-values are created as material products for human consumption. However, the amount of value given to the worker to reproduce socially and the surplus value acquired by capitalists do not increase in the same way or proportion as use-value production. As productivity increases become generalized across the spheres of production,

what began as a competitive advantage becomes the new norm of production. In this new context, production of use-values increase, but the wage the worker receives is based on the labor time expenditure not use-value production, thus the wage does not grow proportionally with the increase in use-values. In addition, because the innovation of production has been generalized, businesses must pursue new innovations if they are to regain competitive advantage and secure the highest profits (See, Postone, 1993, Chapter 9 "The trajectory of production" pg. 307-384). As Postone (2015) explains, this dynamic, "[results in a] sort of…treadmill. Higher levels of productivity result in great increases in material wealth, but not in proportional long term increases in value per unit time. This, in turn, leads to still further increases in productivity" (2015, pg. 14). This treadmill dynamic makes the pursuit of productivity increases a never-ending process because the gains in relative surplus value are always short-term as the compelling social norms of production adjust to match the higher levels of productivity. Value-critique explains the capitalist impetus for higher levels of productivity through a treadmill dynamic that compels productivity increases in the name of short-term increases in surplus value.

Contradiction 1: Maintaining the Centrality of Human Labor

As this treadmill dynamic operates over the course of the history of capitalism, it generates a historical dynamic that creates increasingly intense contradictions. These contradictions primarily stem from the increasing gap between the use-values produced and the value produced in the evolving capitalist production process. As productivity increases are relentlessly pursued by businesses, production gradually becomes increasingly based on the application of science and technology. In other words, science as a productive force, as embodied in technology and machines becomes a larger portion of the production process as a whole (see, Kurz, 1986). With this development, the production of use-values becomes less and

less dependent upon direct human labor and more dependent on the labor of machines. Therefore, rather than capital being the, "mystified expression of powers that 'actually' are those of the aggregated workers," the increase of science and technology represent socially general productive powers and the accumulation of socially general knowledge applied to production (Postone, 2015, pg. 19). As previously mentioned, machine labor does not create new value, but can create use-values. The movement of the historical dynamic of capital signifies the increasing importance of the productive apparatus of technology and machine labor that creates use-values but not value, and less importance on the system of value created by human labor. This is contradictory for capitalist societies because these societies are foundationally based on a system where human labor serves as the primary means of distribution of material wealth, even though human labor is declining as the source of material wealth.

In other words, the development of technology means the production of material wealth for society becomes less and less dependent on human workers over time. As Postone (2015) explains,

> Capital's drive for ongoing increases in productivity gives rise to a technologically sophisticated productive apparatus that renders the production of material wealth essentially independent of direct human labor time expenditure. The constitution and accumulation of socially general knowledge associated with capital's development renders value and, hence, proletarian labor increasingly anachronistic (pg. 19).

Through the historical development of capital, the productive powers of what Marx (1976 [1867]) termed fixed capital,[101] are becoming increasingly capable of creating material wealth

[101] See Marx (1976 [1867]) pg. 307-319.

with limited human intervention or no human intervention at all. The unfolding of this process lays the preconditions for material wealth to be distributed in qualitatively different ways. However, capitalism is premised on material wealth being distributed based on the acquisition of value through human labor, and the logic of capital is driven by the goal of acquiring surplus value. Therefore, the dynamics of capitalism create the historical possibility of a new system, while at the same time constraining that possibility by the insistence on maintaining labor as the central mediating social relation and primary means of acquiring material wealth. As Postone (2015) explains,

> On the one hand, this dynamic is characterized by ongoing *transformations* of production and, more generally, of social life. On the other hand, this historical dynamic entails the ongoing *reconstitution* of its own fundamental condition as an unchanging feature of social life - namely that value is reconstituted and, hence, that social mediation ultimately remains effected by labor and that living labor remains integral to the process of production…regardless of the level of productivity (pg. 15).

These ongoing transformations of production and social life are a long term directional movement[102] that becomes increasingly contradictory over time. The movement results in higher levels of material wealth, yet the distribution of this wealth remains tied to the expenditure of labor time regardless of the level of productivity (Postone, 2015, pg. 16). While production based on science and technology could create use-values that could hypothetically be distributed to improve human welfare and could potentially diminish the necessity of human labor on a grand scale, capital as a structuring form of social life still maintains human labor as the

[102] While in the long term, this movement does have directionality toward higher productivity, in its concrete unfolding there are non-linear and uneven developments that occur in different countries around the world (Postone, 2015, pg. 18).

foundational means of social reproduction. Labor serves as capitalism's unique form of social interrelatedness and distribution, yet the unfolding of capitalism's own development undermines the ability of labor to serve this purpose. At the same time, the great increases in material wealth are obviating the need for labor to serve this purpose.

Labor time remains central because capitalism roots individual and social reproduction in the expenditure of labor time. The basis for modern society's hierarchies, social structure, and power structure are all based on the premises of this system based in human labor. Work serves as an important and often salient marker of social identity and social status. The distribution of value and capital in society is one of the primary hierarchies in modern society, and this distribution scheme is heavily influenced by the character of the division of labor and the socially mediated designations of status and power different jobs give**.** The historical emergence of potential alternative modes of organizing social life based around the productive capabilities and possibilities of advanced technology would undermine the existing relations of power generated by a system based on the centrality of labor. Alternative possibilities are considered so antithetical and far removed from the reality of capitalism that they become almost unimaginable. Instead, the institutions, social structures, and power structures of society work to maintain themselves by maintaining the importance of value and human labor despite the increasing contradictions. As Kurz (1986) explains,

> Capital, which has its essential core the "miserable foundation" of wealth as the exploitation of living labor, and simultaneously dissolves this foundation through its own movement, will try—must try—with all force to maintain value as value, that is to say, to allow the form to continue as the general form of circulation, even as it becomes empty, robbed of its social content (pg. 54).

In this way, the historical unfolding of the logic of capital creates a historical dynamic that, "ceaselessly generates what is 'new,' while regenerating what is the 'same' (Postone, 2015, pg. 16). It generates a kind of double movement of progress and regress, where the progressive possibilities are simultaneously pushed forward with increases in productivity and shackled by the insistence of maintaining value as value, and of labor continuing as the central mediation of society and means of distributing material wealth.

Contradiction 2: The Increasing Intensity of Labor

The second contradiction generated by the historical dynamic of the logic of capital is that as it moves forward it generates increasingly intense standards on both businesses and labor. The development of these contradictions are rooted in the dynamics of socially necessary labor time. In the treadmill dynamic, productivity increases and use-values increase, but this does not create proportional long term increases in value (Postone, 2015, pg. 14). The benchmark of what counts as fully productive period of work becomes redetermined by the new socially general standards of socially necessary labor time. This means that workers and businesses are compelled and constrained by this normative pressure to conform to the heightened level of productivity. This concretely manifests itself in increasingly intense work and production standards for workers and businesses. Improved technology means workers are expected to produce more commodities, grow and process more agricultural products, write more reports, conduct more research, teach more students, treat more patients, shorten transportation time, work more overtime, always be available to answer email, and always be available to work at any time, all in the same time frame as before.

On the one hand, the continually redetermined standard of socially necessary labor time compels workers and businesses to use technology to create more use-values which can have real material benefits for society. On the other hand, highly productive technology makes the compulsions of socially necessary labor time increasingly intense. It makes every period of work more "dense," in the sense that the same period of time must constitute more productive activity. This corresponds with Postone's (1993) concept of "historical time" (see pg. 291-298). Changes in productivity per unit time do not change the constant abstract unit of time, such as the hour, but does change the output per unit time. To grasp this movement, it is useful to think of it as a movement *of* time, rather than of a movement *in* time (Postone, 2015, pg. 14). In this way, productivity increases, in whatever concrete form they take, in dialectical relationship with the reconstituted standards of socially necessary labor time, make the labor period denser with the expectation that more productive activity be done in the same period of time. In Postone's (2015) terms, historical time refers to how "The redetermination of the abstract, constant time unit redetermines the compulsion associated with that unit" (pg. 14-15). The movement forward of historical time through productivity increases signifies both the expansion of material wealth and the general increasing intensity of labor over time.

While technology and increased productivity represents the possibility to reduce labor time or reduce the intensity of work, the logic of capital and the compulsions of socially necessary labor time make the work burden more intense rather than reduced (Federici, 2015, pg. 207). Work becomes more intense rather than reduced because value does not increase proportionally with use-value creation. The work required to attain the same amount of value is redetermined by socially necessary labor time, therefore increasingly intense labor is maintained as the necessity of the present. The symptoms of this heightened intensity has manifested in

recent decades in a myriad of ways, from the increased sense of alienation and desocialization associated with technology, to the growing epidemic of mental illness, depression, panic attacks, anxiety, attention deficit disorders etc. (Federici, 2015, pg. 206).[103] The compulsions of socially necessary labor time in conjunction with the peculiar treadmill dynamic of value generates increasing contradictions as technology that has the potential to reduce labor time or decrease the intensity of labor paradoxically increasingly compels the continuously growing intensity of labor over time.

Contradiction 3: Increasing Difficulty Maintaining Human Labor

The third contradiction generated by the historical dynamic of the logic of capital is that as it moves forward it becomes increasingly difficult to maintain human labor as the central mediation of society. In other words, the consequences of trying to maintain labor as a social mediation in a context where direct human labor is increasingly becoming an unnecessary anachronism generates profound contradictions. This too, is rooted in the compulsions of socially necessary labor time. As the productive powers of society become more and more manifested as fixed capital rather than labor, it becomes increasingly difficult to maintain human labor as necessary to the production process. Throughout most of the history of capitalism, machine labor complemented human labor because it was still socially necessary for both human and machine labor to work in tandem to produce commodities. However, if or when the machine becomes more proficient and effective at a task than a human worker, than the norm of socially necessary labor time redetermines the standard of the production process to require less and less

[103] As an extreme but poignant example, the Japanese have a term "karoshi" that refers to death, usually caused by heart attack or stroke, associated with overwork, stress, lack of sleep, excessive overtime, and starvation diets. Hundreds of these deaths are reported and recorded each year by the Japanese government (Lane, 2017; see also Federici, 2016, pg. 206). Here it is perhaps most apparent that the reconstitution of socially necessary labor time can shift labor expectations to be so extreme and intense that they exceed beyond the limits of the human body.

human labor or exclude human labor entirely. When this happens, businesses are compelled by these norms to reduce or excise human labor in order to remain competitive and profitable. Of course, how this unfolds concretely is a much more gradual process that is uneven and non-linear. This dynamic is most straightforwardly observed in areas of productive labor such as manufacturing and agriculture, but the compulsions of socially necessary labor time effect all industries. The concrete manifestations of technological displacement can appear as robots replacing factory workers, artificial intelligence obviating paralegal researchers, self-driving cars replacing truck drivers, or self-service checkouts obviating cashiers. In all cases, the decision to employ workers is not fully contingent, but is mediated by the constraints and compulsions of socially necessary labor time. Once machine labor, in whatever form it takes, supersedes the skill of human workers, with higher productivity, and at a lower cost than human labor, the compulsions and constraints of socially necessary labor time make human labor anachronistic, which can ultimately result in technological displacement. As this process moves forward, the possibility of technological unemployment developing as a result becomes more likely, though is not necessarily an inevitability. There are many contingent factors that affect whether technological unemployment will emerge, but the point is that, as the contradictions expand, technological unemployment becomes more likely.

The contradiction is that in the historical unfolding of the logic of capital, it becomes increasingly difficult to maintain full employment because the compulsions of socially necessary labor time pressure society to shed unnecessary labor in industries where the socially necessary norm has been redefined to require less and less human labor. As the contradiction grows, it actively becomes a struggle to maintain the centrality of human labor. When machines are the primary producers of commodities and provider of services without the need for human labor,

the value that is necessary for reproducing human social life is not created or distributed in society. In other words, if acquiring value in society is based on expenditure of labor time, but there are disproportionally fewer opportunities to sell labor power, then the structure of that society becomes increasingly unable to provide its means of distribution of material wealth. This is how advanced machine production ultimately gradually undermines the social basis for capitalist society.

This development is also contradictory because labor is essential for the maintenance of capitalism as a social system, but the logic of capital does not have maintaining or generating labor as its primary goal. The goal of the movement of capital is the endless accumulation of surplus value, and human labor is valuable insofar as it serves as a means to that goal. Within the formula for capital M-C-M', human labor power is one of the commodities used in the production process, it is only involved in one phase of the movement of capital, and the reproduction of labor power is not the end goal of the process. As a matter of fact, labor power tends to be one of the most expensive commodities implemented in the production process. Therefore, capitals, in the pursuit of surplus value, desire to keep labor costs at the lowest minimum. As productivity develops, the norms of socially necessary labor time pressure and constrain corporations to keep necessary labor as low as possible to achieve maximum relative surplus value. This is one of the primary contradictions of capital. As Marx (1973 [1858]) explains in the *Grundrisse*, "Capital itself is the moving contradiction, [in] that it presses to reduce labour time to a minimum, while it posits labour time, on the other side, as sole measure and source of wealth" (pg. 706). Throughout most of the history of capitalism, labor power was a necessary commodity for nearly all economic functions, therefore, buying labor power was a kind of "necessary evil" from the point of view of capital. In other words, for most of the history

of capitalist societies, there was a necessary interdependence between labor and capital. One could not exist without the other. However, the expanding productive apparatus of machines is gradually weakening or severing the interdependent link between labor and capital. As the general productive apparatus of society becomes increasingly constituted by technology and socially general knowledge, labor power increasingly ceases to be necessary in many industries. According to the imperatives of the logic of capital, what ceases to be necessary for capital, necessarily ceases.

In the growth of productivity and technology, the historical possibility presents itself that capital can greatly reduce labor costs to increase profits, but this is simultaneously contradictory because this widespread practice undermines the social basis for modern society. This occurs because what from the point of view of the individual company appears rational, replacing human labor with technology to save labor costs and expand productivity, becomes entirely irrational from the point of view of the system. From the limited point of view of the individual business, the choice to displace workers is necessary for profitability and competitiveness. The displaced worker is "free" to be absorbed into another part of the economy, and it is not the responsibility of the individual business to make sure reabsorption occurs. From a wider societal perspective, it is revealed that by businesses conforming to redetermined norms of socially necessary labor time that compel businesses to reduce or exclude human labor, society gradually loses its social basis. Nonetheless, compelling norms pressure businesses to adopt these methods anyway, despite the contradictory consequences. In this way, the imperatives of capital generate the very contradictory processes that generate technological displacement and technological unemployment.

Capitalism and Social Domination

For value-critique the development of these contradictions are rooted in the structural imperatives and constraints of the logic of capital. Capital, through the historical unfolding of its own logic produces these contradictions that appear to grow and become more intense over time. Capitalism as a social system is historically specific because it redefines categories such as time, value, labor, and commodity to have historically specific qualities that generate a unique historical dynamic not present in any previous form of society. It also essential to notice how this historical dynamic is not generated consciously by any social institution, but comes from the limits, imperatives, and goals embedded in the system itself. For value-critique, this means capitalism generates a new form of social domination, not the domination of a particular class or institution, but the domination of people by an overarching system of compelling norms, constraints, and imperatives. As Postone (2015) explains,

> …the result of this form of mediation is a historically new form of social domination…one that subjects people to impersonal, increasingly rationalized, structural imperatives and constraints that cannot adequately be grasped in terms of class domination, or, more generally, in terms of the concrete domination of social groupings or of institutional agencies of the state and/or the economy. It has no determinate locus and, although constituted by determinate forms of social practice, appears not to be social at all (Postone, 2015, pg. 15).

This form of domination can also be conceived of as a way power operates in modern society. According to Postone (2015) the analysis of value-critique argues that power in modern society is not only cellular, spatial, and capillary, as Foucault (1975) would have it, but is also

processual, temporal, and overarching (pg. 15). In other words, the temporal dynamics of productivity and socially necessary labor time outlined here have a certain kind of power over human agency.

This does not mean human agency is an illusion or that historical contingencies do not occur. However, in capitalist society, agency is expressed within a system with systemic imperatives, compulsions and constraints that must be contended with and ultimately shape expressions of agency. This means that the social domination of capitalism can be expressed as a form of heteronomy. The compulsion to follow the imperatives and constraints of capitalism is ultimately a form of unfreedom (Postone, 2015, pg. 8). As Postone (2015) argues, the logic of capital makes it so that "people make history, but do so in a form that dominates and compels them" (Postone, 2015, pg. 8). Sewell, (2008) argues that while the temporalities of social life in general are eventful, that is, contingent, uneven, irreversible, and transformational, capitalist social processes are, "in certain respects super-eventful…core processes of capitalism...sustain a recurrent logic at their core. This means that the temporality of capitalism is composite and contradictory, simultaneously still and hyper eventful" (pg. 1). In other words, the dynamics of capitalism and the logic at its core operate differently from most other social processes. These historical dynamics unfold unevenly and are not perfectly linear in evolution, but they do have a directional movement and inherent contradictions that can be observed throughout the history of capitalist society. They generate dynamics that social actors and institutions must respond to, yet are often not consciously identified, scrutinized, or directly confronted. It is the purpose of critical theory and value-critique analysis to uncover and directly confront these forms of unfreedom.

Conclusion

The analysis of value-critique grounds the dynamics of technological displacement and automation in the historically specific dynamics of capitalism as a social system. They ultimately argue that this directional movement generates accelerating contradictions. As Postone (2015) explains, this dynamic has profound implications for the future of modern society,

> "[Our productive capacities] open up the historical possibility of a future form of social production that no longer is based on the expenditure of direct human labor in production… On the other hand, the necessity of the present is constantly reconstituted. Yet that necessity becomes increasingly anachronistic…The emergence of the possibility of a future, in which surplus production no longer must be based on the labor of an oppressed class, is, at the same time, the emergence of the possibility of a disastrous development in which the growing superfluity of labor is expressed as the growing superfluity of people" (Postone, 2015, pg. 20-21).

The preconditions for both possible future trajectories can be observed in the contemporary context. As Postone (2015) explains, the contradictions of capital's historical dynamics are expressed in the contemporary context by the increasingly unequal social division of time between those who are unemployed or underemployed, and those who remain employed yet are increasingly overworked (pg. 20). It should also be clear in light of this analysis that the increase in precariat labor should not be seen merely as the decline in security and working conditions in some areas of labor, but as a development where work itself and its role as a social mediation and means of distribution is becoming precarious (see, Lewed, 2004).

While value-critiques analysis may have great explanatory power, it should not be understood as teleological or as attempting to make concrete predictions. Value-critique outlines the historical dynamic of capitalism and shows how it leaves open the possibility that the centrality of labor in social life can be redefined and material wealth can be distributed on a new basis, but it also describes how capital's dynamics constantly reconstitutes the necessities of labor and tries to maintain value as the source of social wealth and labor as the primary means of distribution of that wealth. In this way, value-critique describes a double movement that has both potentially positive and negative developments. While value-critique is not in a position to make concrete predictions about the future, what can be said for sure is that the contradictions outlined by value-critique are very likely to continue and are likely to become more intense as these processes unfold. As long as the historical dynamics of capital remain in place, the structural constraints, imperatives and compulsions associated with capital will continue to have force and influence the decisions of social actors, organizations, businesses, governments and other social institutions around the world. In this way, the future is ultimately still contingent, but the social domination of capital as a form of heteronomy will continue to compel humanity.

3.2 Ideology Critique: Critique of the Contemporary Debate

The critical theory of value-critique reveals and systematically explains the underlying forces behind automation and technological displacement. It historicizes modern society as a historically specific form of social life that redefines and restructures categories such as labor, money, and commodity to have historically unique qualities that belie their supposed transhistorical validity and generality. It also uncovers how the concrete operation of capitalism's unique features generates a historical dynamic that is expressed as a kind of domination over people; it is the social domination of people by time (Postone, 2015, pg. 14). This dynamic is directional and contradictory as productivity generates great quantities of material wealth yet constrains the distribution of that wealth by insisting on the centrality of labor as the primary means of material distribution. It also tends to make labor processes more intense despite the potential to reduce the intensity and length of labor time. Finally, this dynamic creates wider and deeper contradictions as the development of productivity and the general productive powers of society make it increasingly difficult to maintain the centrality of human labor because labor becomes increasingly anachronistic from the point of view of the system. The question now becomes: What does value-critique tell us about the contemporary debate over automation and technological displacement generated by digital technologies, information technology, computers, robots and artificial intelligence? This section applies value-critique's analysis to the contemporary debate through a critique of the debate in general, as well as to the specifics of each ideology. The purpose of this section is to demonstrate how the debate in general and each ideology in particular contains deficiencies and structural flaws because each has an incomplete notion of the underlying forces that generate technological displacement, the

historical dynamics of the logic of capital, and the temporal constraints and imperatives that make capital's historical dynamics a form of heteronomy.

Critique of the Contemporary Debate on Technological Displacement

Value-critique analysis reveals that the contemporary debate is a recognition by economists, business leaders, and other experts of some of the contradictions of capital's historical dynamic now coming to the fore. Mainstream approaches tend to not think of modern society as inherently contradictory, so they do not usually confront contradictory movements such as the processes of technological displacement and technological unemployment until it becomes apparent on the observable surface level of society that there is trouble ahead. In other words, the status quo of modern society is maintained without much serious question until there is a troubling development, such as the possibility of technological unemployment, that demands attention. Woirol (1996) notes how throughout the history of the technological unemployment and structural unemployment debates of the 1930s and 1960s, economists were primarily concerned with the question of technological unemployment only as it appeared to be manifesting empirically in a context of unusually high unemployment (pg. 143). Once the empirical problem appeared to vanish and the popular concerns diminished,[104] the inquiry into the nature of the dynamics of technological displacement and technological unemployment subsided. In addition, Woirol (1996) explains that each professional debate rarely drew upon the literature of the previous episode of concern over technological displacement (pg. 11-14). In other words, the debates over technological displacement and technological unemployment tend to be narrowly focused on the specifics of the contemporary circumstances without embedding

[104] In both cases this was due to the economic boost brought by the onset of World War II and the Vietnam War (Woirol, 1996, pg. 127).

their analysis of the problem within a larger historical context or by characterizing the problem as a surface manifestation of a larger historical dynamic. Value-critique, by contrast, explicitly recognizes that the contemporary phenomena being responded to by these experts are only the most recent manifestations of a much longer historically dynamic process. In other words, the potential of technological displacement and technological unemployment caused by advanced technologies such as advanced robots, artificial intelligence, and digital technologies, are the contemporary concrete surface manifestations of what can be explained abstractly as part of a long-term historical dynamic.

Value-critique also reveals how technological displacement is rooted in the historically specific structuring categories of capitalism. It explains how the pursuit of surplus value and productivity generate increasing contradictions, and how these contradictions make human labor in its historically specific mediating function become increasingly anachronistic. However, the contemporary debate is primarily concerned with the surface level phenomena rather than the underlying forces. The contemporary debates largely focus on the question of "is this time different?" with liberals and radicals tending to answer in the affirmative, and conservatives answering in the negative. The evidence for arguing whether this time is different or not is largely determined by assessing the capabilities of new technologies to displace labor. In other words, the answer to the question is usually determined by how one estimates the capabilities and potential impacts on employment of contemporary robots, artificial intelligence, and digital technologies. If new technologies are determined to be sufficiently powerful and capable of obviating significant numbers of workers, such as the assessment by Frey and Osborne (2013) that 47 percent of US employment is at high risk of computerization in the next two decades, then it is generally accepted that "this time" will be different. This is the stance taken primarily

by liberals and radicals.[105] By contrast, if it is instead estimated that the capabilities of new technologies are exaggerated or the potential effects of these new technologies on the labor market are overexaggerated,[106] then it is usually determined that "this time" will not be different. This stance is most commonly held by conservatives. The concerns appear to primarily stem from the specifics of the technology and its perceived potential to cause technological unemployment or not. Depending on the answer, there is reason to be concerned or there is not.

What is missing from the debate when the primary questions are structured in this way is a long-term historical view of technological displacement as rooted in a contradictory historical dynamic. In light of the analysis of value-critique, it is not the specific capabilities of this or that technology that matter, but the long-term dynamics of capitalism that induce this process. What is missing from these ideological accounts is an explicit recognition that the dynamics of capitalism drive forward the progress of productivity and the attendant contradictions regardless of whether any one specific technology or set of technologies is responsible for disruptions in the labor market. In this way, value-critique is non-teleological because it does not take a stance of whether "this time" will be different. For value-critique, this is an important question, but it is categorically the wrong question. There are many contingent factors that will affect whether the specific technologies of concern today such as self-driving cars or factory robots will ultimately disrupt the labor market to a point of crisis. Governments, businesses, and other social institutions will be confronted with choices and decisions must be made to confront these challenges. It may indeed be true that "this time" will turn out to not be different in the sense that social stability is generally maintained and capitalism as a social system continues well after

[105] For liberal arguments, see for example Brynjolfsson and McAfee (2011; 2014) and Ford (2015). For radical arguments, see for example Srnicek and Williams (2015) and Livingston (2016).
[106] For examples, see Andreesen (2014), Hanson (2015), and Thierer (2016)

the economic disruptions caused by these technologies. It is also possible that these technologies will have a powerful impact that does cause significant social suffering, increases inequality, and generates widespread conflict that could potentially cause the decline of capitalist societies.

Value-critique analysis is not meant to predict the concrete outcomes of the future. However, it does outline a historical dynamic, first outlined by Karl Marx in the 1850s, that continues to the present and is likely to continue as long as capitalism remains the dominant social system.[107] What matters is tuning into both the specific contradictions of each socio-historical context,[108] but also to examine the contradictions and embed them in a larger historical frame to perceive and extrapolate the historical dynamic underlying the surface manifestations. What is key for value-critique is that as long as labor maintains its centrality and its unique socially mediating function, value is maintained as the dominant form of wealth, and the imperatives of the movement of capital dominates economic decision making, then the contradictions of this historical process are likely to continue in increasingly larger forms over time. By embedding the dynamics of technological displacement in a broader historical context and explaining them as a historical dynamic, value-critique reframes the importance of the central question of the contemporary debate "is this time different?" It reveals that regardless of the concrete historical unfolding of self-driving cars or artificial intelligence, the historical dynamics of capitalism will continue to generate contradictions long after the specific effects of contemporary technologies have transpired. Productivity increases will continue, new

[107] It is significant that Marx (1973 [1858]) outlines this dynamic in the mid-nineteenth century because it is clear retrospectively that the question of "is this time different?" in regards to the effects of technology in his day could not be a relevant question for him. The concrete unfolding of the dynamic has shown that capitalism can maintain its dominance in spite of hundreds of years of contradictory forces emerging within it.

[108] For example, by examining how these dynamics unfolded concretely in different historical phases of modern history from 19th century liberal capitalism, mid-20th century Keynesian-Fordist capitalism, to late 20th and early 21st century neoliberal capitalism.

technology will continue to be developed, and Moore's law is likely to make computer technology even more powerful in the years ahead. There is no logical or teleological endpoint to the growth in productivity and therefore there is also no logical or teleological end to this contradictory process. It is likely to continue regardless of the outcome of "this time."

Critique of Ideology

Ideologies function to make the hyper complexity of life in modern society comprehensible. Their purpose is to provide and internally consistent and coherent narrative with which one can explain society. They are lenses that allows the edges of life to be smoothed, provide simplified explanations of complex phenomena, and give meaning to actions and events. They provide frameworks that create order in the world and puts everything in its proper place. Ultimately, ideology creates workable frameworks that allow members of society to avoid confronting cognitive dissonance, the ability to hold as true multiple inconsistent or contradictory ideas at once. As discussed by Mannheim, (1936) the ideologies present in society are inherited from the socio-historic circumstances of the past (pg. 1-48). Yet at the same time, ideological frameworks cannot remain static but must be constantly evolving because modern society is foundationally characterized by its continuous changes, including economic, political, cultural, social, and technological changes. As the contradictions of modern society grow more intense and profound, every ideology must continually adapt to the continuous dynamics of modern society while at the same time interpreting and providing explanations for these changes that somehow make sense within the ideological framework, and ultimately seek to maintain the consistency of each ideology's image of society and how it operates.

Critical theory cannot entirely escape ideology. Critical researchers are also embedded in specific socio-historic contexts with particular ideological constellations. However, the primary difference between critical and traditional approaches is that critical theory seeks to explicitly recognize that their inquiry is embedded in specific ideological constellations and how that being the case undoubtedly has a bearing on research (see, Dahms, 2008). Instead of developing frameworks that do not recognize contradictions or attempt to reconcile manifest contradictions through cognitive dissonance, critical theory seeks to embrace the contradictions in order to understand them. Critical theorists seek to engage in self-reflection to directly confront cognitive dissonance rather than, either consciously or unconsciously, assuage it. Value-critique is one critical theory that seeks to understand the contradictions of technology, automation, and technological displacement by attempting to grasp the underlying forces of these processes through an analysis of the logic of capital. It is not a deterministic framework or claim to provide all the answers, nonetheless it attempts to lay a foundation for understanding these phenomena critically. By directly confronting the difficulties of ideology and embracing the complexity of modern society, critical theory seeks to lay the preconditions for research that can adequately confront the enormous challenges of researching hyper-complex modern societies.

The liberal, conservative, and radical ideological frameworks as explained in Part 2 hold many insights and intriguing arguments. Each narrative provides coherent and plausible explanations of the problems of automation and technological displacement. However, while each framework has its merits, there are undoubtedly elements of cognitive dissonance and ways each ideology smooths over complexity and conceptual difficulties with simplified explanations. The following three sections critique each ideology by assessing what crucial considerations are missing from it, or what problems fail to be directly confronted in each account. Ultimately, the

overall assessment is that each ideology is deficient in some way because each has an incomplete understanding of the operations and dynamics of the logic of capital. The goal of each section is to explain how the contradictory unfolding of the logic of capital is likely to subvert the expectations of each framework. The processes of technological displacement and automation are likely to unfold differently from how each ideology understands it. Each position proposed policies or political programs that are likely to be undermined or have unforeseen consequences because the operations of the logic of capital are insufficiently understood. The concrete unfolding of the future is likely to look different from any of the scenarios posited by each ideology. In each case, the logic of capital subverts the possibility of each ideology's vision of the future from being realized. There is an inevitable gap between how each ideology thinks the world operates from how it concretely operates, and each section suggests that the gap between ideology and reality can be narrowed[109] with a sufficiently rigorous and critical conception of the logic of capital.

Of course, the concrete unfolding of history will always betray expectations or predictions because modern society is simply too complex and there are too many historical contingencies that can profoundly change prevailing circumstances. However, the argument made here is not that ideology insufficiently takes historical contingencies into account, historical contingencies are ever-present in social life, such is the nature of history. Instead, the point is that these ideologies insufficiently take systemic imperatives, compelling norms, and temporal dynamics into account in their analysis. Each expression of ideology in the various books and articles reviewed can be conceived as an expression of agency, an attempt to deliver a

[109] Of course, the gap between how ideology explains reality and how reality actually operates can never be eliminated entirely.

message to the public with the goal that the argument would prove convincing and help move society in the ideal direction posited by each ideology. While these efforts do have varying level of impact on public opinion, policy makers, and institutions, according to value-critique, attempts to assert agency to create social change, whether in a liberal, conservative, or radical direction, must recognize and confront the imperatives, compulsions and constraints of modern society if expressions of agency are to have the desired effect. According to Postone (2015) "any attempt to recover human agency by insisting on contingency in ways that deny or obscure the temporal dynamic form of domination characteristic of capital, is, ironically, profoundly disempowering" (Postone, 2015, pg. 9). In other words, the arguments presented here assert that how agency is constrained by capital's dynamics must be understood. It is an explanation for why capitalism as a form of heteronomy is what subverts the expectations of these ideologies, rather than how historical contingency subverts expectations. Both historical contingency and historical constraints are essential to grasp, however, in this analysis the focus is on how the logic of capital as a historical dynamic of constraints and compulsions subverts the expectations of ideologies.

Critique of Liberal Ideology

Liberals are simultaneously excited about the potential of new technology, yet are also concerned about their potential effects on the labor market and how they may worsen economic inequality. In response, they propose a variety of policy solutions, from encouraging adaptation and education, to using regulation, taxes, and even perhaps a universal basic income to manage and assuage the negative effects of new technologies. Ultimately, they desire to use policies that reflect social values to direct the effects of technology towards widespread beneficial outcomes. They are optimistic that the negative outcomes of great economic disruption and technological

unemployment can be avoided if sound decisions are made and human-centered policies are put in place.

How does the concept of the logic of capital as outlined by value-critique inform this ideology? First, liberals observe that new technology can have negative effects on labor markets and economic inequality, and in response want to implement policies that align with liberal values. They implicitly understand that if the economic logic of the system plays out without intervention, then the trends of growing inequality will continue and technological unemployment becomes more likely to manifest. To address this, they essentially intend to make economic policies that will interrupt or mediate the economic logic of the system with other social logics: political, cultural, social etc.[110] In other words, the goal is to infuse the economic value sphere with moral and ethical principles from other value spheres in society. In order to ensure the next industrial revolution has an overall positive impact, the economic logic needs to be mediated by the other pro-human or pro-worker logics.[111] The economic logic is to be managed by politics, whether government politics or politics within organizations. Liberals try to maintain the basic economic structure of society and its economic logic through mediation with other logics in order to simultaneously achieve economic expansion, maintain general social stability, and keep inequality at socially acceptable levels (Dahms, 2005, pg. 209). What is problematic about this stance is how liberals want to tame the economic logic in fear of its potential consequences, while simultaneously wanting to promote the economic logic in order to receive the material gains from it. In other words, unlike radicals, liberals want to shape the

[110] Essentially, the idea is that modern society is composed of multiple logics corresponding with different institutions that are meant to embody those logics. E.g. the economic logic of society, the political logic of society, the cultural logic of society etc. These logics battle for relative importance in social life. In other words, it is a battle over what social process has saliency in social life, economics, politics, cultural concerns etc.
[111] See, Schwab (2016) pg. 113-116, Brynjolfsson and McAfee (2014) pg. 257, and Reich (2015)

outcomes through their values while simultaneously maintaining the logic of capital.[112] They want to close the gap between facts and norms by making liberal norms and values become embodied in social policy and ultimately become reflected in economic outcomes.[113]

This is contradictory because it is in fact the logic of capital that is generating the underlying forces and contradictions that cause technological displacement and technological unemployment. By maintaining logic of capital, they undermine their own efforts to achieve their intended outcomes. This is not to say that the concrete unfolding of the logic of capital is not effected or mediated by other social processes and institutions, rather, it to point out how it is self-defeating to attempt to manage the contradictions while purposefully maintaining the source of those contradictions. Liberal policies either encourage adaptation to the contradictions or recommend policies that manage the surface manifestations of the problems, such as creating jobs programs in a context of increased unemployment. However, they do not attempt to grasp the underlying forces of this development and how the historical dynamics of the logic of capital are both producing the possibility for increased material abundance, but also making it increasingly difficult to maintain labor as a social mediation. Dahms (2005) explains the contradictory logic of liberal ideology in this way,

> To attain this goal – sustaining social and political stability as the necessary precondition for continuous economic expansion – decision-makers in politics, the corporate world, and the policy establishment draw on established and accepted notions and practices,

[112] Of course, for liberals this is not seen as the logic of capital, a historically specific logic, but is viewed transhistorically as economic logic in general. By seeing the economic logic of capitalism as transhistorical, the contradictory dynamics of capitalism becomes naturalized as an inevitability. It becomes a logic that simultaneously creates great material wealth and inequality that will therefore always be a necessary object of management for liberals.

[113] This is similar to Habermas's (1996) idea of using specific deliberative democratic procedures to create a rational democracy that can mediate and contain the systemic logic and the mediums of money and power from interfering with the life world. See Habermas (1996) *Between Facts and Norms*.

> especially as they relate to "shared values" pertaining to fairness and social justice, as resources to be molded and utilized in the interest of stabilizing order, to create a buffer for capitalist dynamism. As a result, the underlying patterns determining the direction of change tend to remain submerged, even and especially when tension characterizes the relationship between purportedly shared values, the underlying patterns that bring about a societal reality which threatens to weaken, undermine, or render inadequate, those values, and strategies to identify and advance the "public interest." (Dahms, 2005, pg. 209).

In other words, the strategy of managing the surface manifestations of these deep-seated contradictions fails to identify the underlying patterns and forces that undermine efforts to make policies and institutions that embody "shared values" realizable.

To give just one example of this dynamic, imagine a scenario where the United States government decided to either tax robots that take jobs, or lower labor taxes to make human workers more economically viable. In either case, the goal is to manage the effects of the economic logic and prevent technological displacement by blunting the adoption of automation. The realization of this goal could be undermined in many ways by social actors and businesses operating under the constraints and compulsions of the logic of capital. In the case of taxing the robots, businesses could find it more economically viable to move to a country that does not tax robots, generating a race to the bottom dynamic. In the same way, lowering taxes on human workers could also generate a race to the bottom as countries compete to have the lowest taxed and cheapest workers to prevent automation.[114] Even if taxes are lowered on human workers, this would likely prove to be only a temporary solution. The logic of capital's continuous drive

[114] It can be argued that preventing automation and technological displacement could be a motive for outsourcing, even if it is not the most frequently cited reason.

towards productivity induces producers to eventually invent and invest in production methods that could be so productive and comparatively cost effective that no tax rate would be low enough to make human workers viable. Even if all companies in an industry agreed, or perhaps through an international agreement, to not replace workers when more productive methods are available, then employment would be protected at the cost of higher levels of material wealth, which also goes against the liberal aim of increased economic prosperity. Without international coordination and enforcement of employment protecting policies, near totalitarian measures may be required to protect employment from the compulsions and constraints of capital accumulation, which is also antithetical to liberal values. In all of these cases, the pursuit of surplus value and the compulsion of socially necessary labor time generates contradictions that undermine the purpose and effectiveness of the policy, even those made in the name of "shared values." As the contradictions of capital grow ever larger, it will become increasingly difficult to find effective strategies to manage these contradictions.

Value-critique also reveals another contradiction within liberal ideology. It points toward an explanation for why the contemporary debate is centered around automation anxiety and concern about the future. Liberal ideology praises the potential for abundance and prosperity promised by new technology. At the same time, liberals also want to reach full employment and create jobs. In the terms of value-critique, they ultimately wish to maintain labor as the central mediation in society and the primary method for distributing material wealth. However, as the contradictory historical dynamic of capital unfolds, it becomes increasingly difficult to maintain the centrality of labor. What is at first posited as the promise for potential abundance and prosperity in a perverse twist becomes revealed as a threat to broad based prosperity and social stability. This twist results from the contradictory move of trying to both maintain the centrality

of labor and embrace the technologies that make maintaining that centrality increasingly difficult. Liberals, who are concerned about the potential for technological displacement, perceive this contradiction, yet nonetheless try to solve it by methods that can only manage the problems because they insist on maintaining the centrality of human labor.

Liberals insist that the centrality of labor should be maintained, despite the manifesting potential that it need not be, because work, "…saves a man from three great evils: boredom, vice, and need" (cited in Brynjolfsson and McAfee, 2014, pg. 234). They therefore suggest that employment should be encouraged regardless of the level of material wealth or even under a Universal Basic Income scheme.[115] By doing this, they desire to maintain the specific socially mediating role labor plays in capitalist society, and how it serves as a means of distribution. They do not reflect how labor in capitalist society is historically specific, and how the growth of material wealth from machine labor could allow labor be structured on a qualitatively different basis. In an alternative society, people could still work in some capacity, but their means of acquiring value would not have to be based on their labor time. They could be free to engage in work they found fulfilling, rewarding, or work toward self-development, rather than work any available job just to survive.

What is missing from this analysis is how the current scheme of labor is shaped by the logic of capital and market demands. Liberals do not reflect on how the current structure of the labor market, as well as the number and quality of jobs available, are being mediated by the demands of the market and how many jobs exist solely because of the role they play, either as productive labor or non-productive labor that is nonetheless necessary, to the continuing growth

[115] See, Ford, (2015) pg. 261, Reich (2015) pg. 215, and Brynjolfsson and McAfee (2014) pg. 234-237.

and accumulation of capital. In other words, by insisting on the centrality of labor without any qualification, liberals by default leave in place the regime and structure of labor that is oriented toward the accumulation of surplus value. They do not recognize how the compulsions of the labor market and the pursuit of surplus value pressure workers to be compelled by its standards, its pace, and its orientation toward the development of capital. Most jobs that are available structured the way they are because they are useful for the development of capital, not toward alternative social values or toward work that would be rewarding or encourage self-improvement. By promoting the maintenance of labor in general, they also implicitly affirm the historically specific role labor plays in capitalist society and the status quo regime of labor without recognizing that this regime of labor could be structured in different ways. The alternative to a labor market mediated by the logic of capital and oriented towards the pursuit of surplus value does not have to be a society of universal idleness, but could be a society where the structure of labor is no longer determined by the demands and imperatives of capital accumulation.

According to Postone, (2015) it is not just that modern society is defined by a historically unique form of labor, but it also has a directional historical dynamic that pushed forward by productivity (pg. 14-15). As productivity develops, what counts as a fully valuable unit of time is continuously redefined; productivity increases make time more "dense" as more can be done in the same period. The development of productivity gives workers increasing demands to keep up with the socio-historic norm of productivity. The liberal framing of the relationship between humans and technology as a "race against the machines" is an acknowledgement that workers must keep pace with the machines to acquire value (see, Brynjolfsson and McAfee, 2011). The liberal solution of the "race with the machines" is revealed to ultimately be a call for workers to

be increasingly subjected to more intense forms of social domination determined by the norm of socially necessary labor time that is accelerating in intensity.

Rather than tools and machines being complementary to the workers, workers must become complementary to the machines. Workers must be deemed valuable in relation to them, rather than vice versa. This reflects how the general productive powers of society as manifested by machines are becoming the dominant and most essential means of production rather than workers. In other words, machines are becoming the foundational basis to produce material wealth. The worker's position in the C portion of the M-C-M' representation of the process of capital accumulation is becoming more precarious and difficult to maintain as the contradictions of capital grow and human labor becomes more unnecessary for capital. However, in the liberal scheme, workers must nonetheless find their place within this continuously growing machine apparatus to expend the labor time necessary for social reproduction.

What is understood on the surface level as a "race against the machines," is revealed by critical theory to be, on a deeper level, a race against the temporal form of domination rooted in the logic of capital. In other words, it becomes a race for human workers to be adequate to the continuously redetermined standard of socially necessary labor time. The liberal anxiety over technological unemployment stems from the concern that many workers are currently not adequately prepared for the changing norms of socially necessary labor time. Note how this temporal domination does not originate from any institution, business or state, but nonetheless constrains and compels these actors to conform to these compulsions and demands (Postone, 2015, pg. 6). The "race against the machine" thus represents humanities attempt to continue to be necessary within the constraints of its own social system and to continue to be adequate means to generate capital. However, this is becoming a challenge as the contradictions become

more intense and workers have increasing difficulty keeping pace. Liberals encourage workers by extoling education and training as means to respond to these imperatives and compulsions, but do not explicitly recognize how workers are ultimately dominated by them.

The liberal stance on automation is perhaps best summed up as, "Technology is not destiny. We shape our destiny" (Brynjolfsson and McAfee, 2014, pg. 257). It is true that there are many contingent factors that will play into the unfolding of the future and the development and implementation of new technologies. However, value-critique unveils that, in the context of capitalist society, it is not a simple matter of political or collective will that determines the future. The liberal response to automation and technological displacement and their proposed policies goals aims are generally well meaning, but they are ultimately flawed. By failing to recognize how the dynamics of capital assert a form of heteronomy that shapes social life, liberals ultimately try to solve problems in the name of collective values without directly confronting the gravity the logic of capital exerts that undermines any attempt to shape the future along human-centered collective values. They simultaneously desire the material wealth the movement of capital brings, but also want to minimize its negative impacts. However, liberals ultimately do this without recognizing how both the positive and negative developments from this movement are rooted in the historical dynamics of capital. If liberals did consciously try to grasp the underlying forces of these dynamics, they could possibly be in a better position to form policies that could adequately address their concerns and bridge the gap between facts and norms.

Critique of Conservative Ideology

For conservatives, "this time" is unlikely to be different in the sense that technological unemployment unlikely to occur. Technological unemployment has not been observed

historically and economic theory explains why technological unemployment is unlikely in a well-functioning market economy. The three primary reasons are that technological unemployment theory is based on the "lump of labor" fallacy, human wants are infinite, and that the process of creative destruction creates new jobs just as it destroys others. The growing power of technology is a welcome development that should be embraced for its potential to improve economic growth and living standards. Toward that end, conservatives argue that policy makers should allow maximum freedom for new technologies to be developed and implemented in the spirit of permissionless innovation (see, Thierer, 2016). In addition, the educational system should be allowed to be competitive and utilize digital technologies to improve workers' abilities to acquire the skills that will be in high demand in the future. The two broad categories of the future of work include jobs that requires man-machine collaboration, as well as skills of human interaction that machines cannot replicate (see, Cowen, 2013; Colvin, 2015). Finally, if entrepreneurship, markets, and freedom are allowed to flourish, conservatives believe there is reason for optimism about the future as new technologies are poised to greatly enhance living standards.

Conservative and liberal ideology share some similarities, especially in the way both maintain that labor should be central to social life. However, the primary difference between conservative and liberal ideology is that while liberals want to mold the economic process to reflect liberal values, conservatives fully embrace the economic logic. They believe that freedom, entrepreneurship, and markets ought to be the central to organizing the economy and society. The economic processes of society should have saliency over the political, social, and cultural processes as well as any other social value or institution. By doing so, they essentially affirm that the underlying logic of capital should be embraced. They advocate for this because

they claim that this is the most effective way to achieve higher levels of material wealth and increase prosperity for all. They recognize how this has largely historically been the case, that those who embrace the "bourgeois virtues," in other words, those who have been most in tune with the logic of capital, have been those who have become the richest and most powerful in society.[116] In addition, conservatives contend that the most prosperous nations have been those that have historically embraced economic openness, entrepreneurship, and creative destruction.[117] In other words, the nations that have prospered are those that have embraced the logic of capital. Therefore, in the conservative mindset, the link between embracing the logic of capital and general economic growth and prosperity is so strong as to be considered inseparable.

For many years of capitalist development there was a certain amount of truth to this narrative. There is a certain correlation between encouraging the growth of capital and the general welfare of society.[118] That correlation has been closely linked for centuries of capitalist development. It is central to conservative ideology to believe that this link is transhistorically valid, and that applying the principles of the free market and encouraging the accumulation of capital will inevitably lead to economic growth and growing prosperity. However, this view ultimately conceives of the results of the dynamics of capitalism in static terms. In other words, while conservatives embrace the dynamics of creative destruction, they have a basically static view of the long-term results of this process. There will always be disruptions attendant to creative destruction, but in the long-term there will always be an equilibrium to be reached that leaves everyone better off than they were before.

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[116] See, McCloskey (2010).
[117] See, Acemoglu and Robinson (2012).
[118] This at least appears to be generally true for core countries, although there are certainly numerous critiques on the negative effects of this dynamic for peripheral countries. For examples see Wallerstein (2004).

What is missing in this account is how the underlying logic of capital itself is not static, but is evolving and changing through different socio-historic circumstances. This is obviously true when taking the long view of history as capitalism has evolved from different manifestations as 17th and 18th century mercantilism, 19th century liberal capitalism, 20th century state-centric Fordist capitalism, and contemporary neoliberal globalized capitalism (Postone, 2015, pg. 24). However, this is also true for the underlying logic of capital. Value-critique reveals that the logic of capital has a directional dynamic that creates increasingly intense contradictions over time. These contradictions have the potential to de-link the connection between long term economic growth and economic equilibrium as the gap between the material wealth created in society and the value created and distributed through expenditure of labor time grows.

Conservatives focus on the ability for members of society as well as social organizations and institutions to adapt and cope with great social and economic changes.[119] While aptitude for general stability is a feature of most modern societies, the growing contradictions of the unfolding logic of capital give reason to believe that this ability to adapt will be put under increasing strain in the future. On the one hand, the conservatives could be right that recent the technological innovations of "this time" might not cause widespread technological unemployment. On the other hand, conservative ideology fails to appreciate how the economic challenges and contradictions facing society can grow prodigiously and more intense, and how ultimately these contradictions are rooted in the unfolding logic of capital.

For example, conservative ideology places the dynamics of creative destruction at the center of their thought.[120] They argue that creative destruction is essential and necessary for

[119] See Thierer (2016) pg. 63-80.
[120] See Schumpeter (2003 [1942]), Andreesen (2014), Thierer (2016) pg. 99-101.

economic growth and generally hold that the creation effect equalizes the destruction effect in the long-run. This conception of creative destruction makes it appear transhistorically valid that the "creation" produced will closely match the "destruction." They observe that the dynamic has generally held true in the past and extrapolate this confidence in equilibrium into the future. Jobs will be destroyed by technologies, but technology will create new jobs that cannot be imagined (Andreesen 2014, par. 40). The confidence that this equilibrizing process will inevitably continue into the future regardless of the circumstances can become almost an article of faith. However, value-critique's analysis of the unfolding logic of capital gives reasons why the contradictions will grow and the destruction effect will likely come to overpower the creation effect.

Value-critique recognizes that the dynamics of creative destruction are a surface manifestation of the unfolding of the logic of capital. As Postone (2015) states, "Capital…is… a ceaseless process of value's self-expansion, a directional movement with no external *telos* that generates large-scale cycles of production and consumption, creation and destruction (pg. 16). However, value-critique does not take creative destruction to be a "natural" result of economic processes, but as a process that is ultimately effected by the directional dynamic of capital. As productivity increases due to the pursuit of surplus value by businesses and entrepreneurs who develop new products and services that drive creative destruction, the general productive powers of society grow. Even as new products and services emerge, they come to increasingly utilize the highly productive and powerful capabilities of machines to produce new products rather than human workers. As Trenkle (2015) describes the growing contradiction, "At the existing and continually increasing level of productivity, even developing new production sectors…do not create additional need for new labor power" (pg. 3). In other words, the speed of process

innovation is becoming greater than the speed of product innovation, and new products use the increasingly adept apparatus of machinery, making the production process less labor intensive from the outset (Krisis-Group, 1999, pg. 14). Reich (2015) gives an example of this as he compares how the photography giant Kodak had over 145,000 at its peak compared to the digital photography company Instagram had 13 employees when it was sold to Google in 2012 (pg. 207).[121] In addition, the process of productivity that makes human labor increasingly anachronistic will push forward regardless of what new products are created. The same treadmill dynamic that pushes productivity and reduces the need for workers also effect new products and services created in the process of creative destruction. In sum, value-critique grounds the reasons why the destructive aspect of creative destruction is likely to become more powerful than the creative aspect by an analysis of the contradictory historical dynamic of capital. Rather than creative destruction being relied on as creating an inevitable equilibrium, the dynamics of creative destruction can be described as part of the directional dynamic that generates accelerating contradictions.

Conservatives, even more so than liberals, view labor as transhistorical necessity of human life. In other words, conservatives view labor as an anthropological constant. It is believed that work is fundamental to what it means to be human, and a free market capitalist society allows this "true" nature to flourish. Work remains an ever-present necessity, and its continuing salience in the future is rarely questioned by conservatives. However, what is missing in the conservative conception is how labor in modern capitalist societies has a historically specific socially mediating function where each individual becomes a commodity owner whose labor time expenditures serves as a means of obtaining social value to purchase the

[121] See also, Srnicek and Williams (2015), pg. 100.

goods of others necessary for social reproduction (Postone, 2015, pg. 12). Therefore, every human being is compelled into the specifically capitalist regime of labor to reproduce themselves, which creates a new form of interrelatedness unique to modern society. The historically unique socially mediating form labor takes in modern society is not recognized by mainstream economic approaches, but is instead backgrounded as a self-evident expression of labor as an anthropological constant.

However, labor's transhistorical importance for mainstream approaches turns labor into a "labor idol" where the slogan of society becomes "jobs, jobs, jobs!" and the phrase "any job is better than no job" becomes a confession of faith (Krisis-Group, 1999, pg. 1).[122] This attitude becomes increasingly implausible and unnecessary as material wealth and use-value production becomes increasingly independent from human labor power (Krisis-Group, 1999, pg. 1). Labor, for conservatives has become an unshakable dogma that understands labor as the "natural" destiny for human beings (Krisis-Group, 1999, pg. 5). Because of this confidence in the transhistorical importance of labor, conservatives can support the unending accumulation of capital without concern for the centrality of labor. In other words, if the centrality of labor is assumed as a constant, the primary concern for society should then be to unleash the market forces and allow the logic of capital to generate economic growth and prosperity.

What are the consequences of unleashing the logic of capital and relying primarily on market forces? Value-critique reveals that by advocating for unbinding restrictions on capital accumulation, conservatives lay the conditions for an acceleration and expansion of the logic of capital that both produces the great increases in material wealth, but also generates the historical

[122] This attitude also generally characterizes liberal ideology as well.

dynamic that threatens labor. Essentially, conservatives implicitly argue that by accelerating the whole movement of capital, M-C-M', by pursuing individual profits that the C portion where human labor fits will inevitably accelerate and grow as well. If human labor is assumed to always be a necessity for society, then accelerating the logic of capital will inevitably expand human labor along with the expansion of capital. Conservatives hold that human labor will always be necessary because human wants are unlimited, and that by unleashing capital, businesses will be free to innovate, grow, and ultimately fulfill those wants.[123] However, by trying to accelerate and expand capital by unleashing its logic, the underlying forces that generate the decline and excision of labor accelerate as well. Human workers are not hired simply because they are available, but because they are in some way useful for businesses aimed at the pursuit of profits. By unleashing the logic of capital, conservatives also unleash the full force of competition that compels businesses to hire only as many workers as necessary for the organization's operation and for maximum profitability. In addition, the compulsions of socially necessary labor time put pressures on businesses and workers to keep up with the socially general standards of what it means to be a competitive and efficient business. This encourages workers to be put under increased work pressure as well as puts pressure on businesses to employ the newest technologies that restructure the organization of labor and make workers increasingly anachronistic. Essentially, conservatives embrace the compulsions of capital and socially necessary labor time, but what is missing from their analysis is how these compulsions can grow so extreme that they create contradictions that ultimately undermine the ability to maintain human labor.

[123] See Sherk and Burke (2015) and Colvin (2015) pg. 32-33.

Conservatives ultimately encourage dynamism to encourage economic growth. They believe they have fully theorized how this dynamism operates and expect it to continue in roughly the same way across time. However, value-critique analysis demonstrates that there are other dynamics of capitalism that should be considered. What conservatives understand as transhistorical and as a process that is dynamic yet generates consistent and predictable long-term results, is conceived of in value-critique as a historically specific system with a directional dynamic that greatly changes the functioning and concrete operations of the system in the long-term. Conservatives rely on what they claim to be the general validity of their theories to sustain their confidence and optimism for the future, but value-critique reveals that without recognition of the ever-evolving nature the logic of capital, the conservative support for the logic of capital may paradoxically produce accelerating decline rather than accelerating prosperity. If conservatives grasped these dynamics of the logic of capital, they might reconsider the desirability of current conservative policies, and perhaps be in a better position to conceive of methods to produce a dynamic economy that does not become increasingly destructive.

Critique of Radical ideology

Radical ideology frames technological displacement as a contributing force to the growing precarity of labor and social life in general in the neoliberal era. The forces of automation serve to enhance the dominance of capitalists over workers. When combined with primitive accumulation in the periphery and methods of exclusion such as mass incarceration, technological displacement, the stagnation of wages, and the decline of working conditions create widespread conditions of precarity for much of the population. However, the radical Left can potentially harness the emerging trends of powerful new technologies to create a new post-work society of abundance (see, Mason, 2015; Srnicek and Williams, 2015). To achieve this

would require a new kind of political strategy focused on the utilization of political and organizational strategies that made neoliberalism hegemonic. A resurgent Left would require a new hegemonic politics centered around a post-work consensus. The proposed methods of achieving this post work society is to accelerate the potentially emancipatory tendencies of technology to encourage full automation, reduced working time, and a generous Universal Basic Income (see, Srnicek and Williams, 2013; 2015; Van Parjis 1995). If this plan succeeds, the utopian potential of the future is opened, but if a post-work consensus fails to emerge, the current trends are likely to exacerbate to a point of crisis and potential global disaster (see, Frase, 2011a; 2016).

Radical ideology in many ways differs fundamentally from the liberal and conservative viewpoints. While both liberals and conservatives desire to maintain labor as central to organizing society, radicals see the potential for material abundance produced by new technologies and their ability to automate labor as potentially emancipatory. Liberals and conservatives both want to keep the prevailing social and economic system in place whereas radicals want to transcend capitalism and build a post-capitalism based on automating technologies and a post-work consensus. In this way, the radical analysis is similar to value-critique in that it recognizes how increases in productivity manifest powerful productive apparatuses that make human labor increasingly anachronistic and present the possibility of organizing society on a new basis. There is also similar agreement that any critique of capitalism must be a critique of labor in capitalism rather than a critique from the standpoint of labor (Postone, 2015, pg. 8). As the Krisis-Group (1999) argues, "A rebirth of radical critique of capitalism depends on the categorical break with labor" (pg. 21).[124] Nonetheless there are some

[124] Compare with Srnicek and Williams (2015) pg. 105; Livingston (2016) pg. 29-44.

substantive critiques that can be made of radical ideology. While radical ideology draws some conclusions that are similar to the conclusions reached by value-critique analysis, there remain some blind spots in radical ideology that may undermine the success of the proposed post-work political project. By utilizing a more robust conception of the logic of capital provided by value-critique, the radical left may be in a better position to succeed in their fight for social justice and a future post-capitalist society.

Many radical writers are excited about the possibilities of new technologies such as information technology, robots, and artificial intelligence. Commentators such as Mason (2015) and Livingston (2016) put prominence on the possibilities represented by information technology and digital goods.[125] They point towards information's unique qualities of being non-rival and having zero marginal cost of production to support their claim that the dynamics of information and digital goods can be harnessed to bring about a post-work society. While it is true that the wide availability of information, data, and free digital goods is a useful and powerful driver of material wealth and helps increase productivity, these developments on their own do not necessarily point toward the end of capitalism. Value-critique embeds the development of drivers of material wealth such as information and digital technology in a wider historical process of the development of the general productive powers of society. It recognizes the importance and potential of these developments, but does not put stock in the idea that any concrete technology will be *the* technology that irreconcilably brings the end to capitalism. Ultimately, value-critique posits the development of information technology and the increasing use of information and digital goods as a surface manifestation of a much longer process of productivity increases rooted in the dynamics of capital. In addition, it is also important to

[125] See Mason (2015) pg. 143-144; Livingston (2016) pg. 73. See also, Rifkin (2014).

observe how many businesses, oriented toward producing profit from every new product and service, including those that heavily rely on information and digital goods, have used the power of the state to protect data and make it artificially scarce using intellectual property and copyright protections. In this way, the double movement posited by value-critique, of technologies that create the potential for change yet capitalist social relations that try to maintain the existing structure and power relations of society, also manifests in the development of information technology and digital goods. Therefore, it cannot be said with certainty whether or not the full potential of non-rival and freely reproducible digital goods and information can be or will ever be realized in capitalist societies.

This concept of a double movement at the heart of capital's historical dynamic, that capitalism "ceaselessly generates what is 'new,' while regenerating what is the 'same,'" is perhaps the most crucial lesson for any proposed radical activism or social movement (Postone, 2015, pg. 16). Radical ideology observes that there is potential for a radically different future as represented in technologies that could bring high levels of material wealth and abundance. The main aim of the radical political project is to take hold of these existing trends and accelerate them to their fullest extent to transition capitalist society into a new post-work and post-capitalist society (Srnicek and Williams, 2015, pg. 107-127). In other words, the goal is to use the progressive elements of the dynamics of capitalism, its penchant to produce high levels of material wealth and labor-saving technologies, to bring society down a post-capitalist path or a "capitalist road to communism" (see, Van der Veen and Van Parjis, 1986). While the potential for the future is well understood by radicals, what is perhaps undertheorized in their analysis is the double movement of value and labor's continuous reconstitution under capitalism (Postone, 2015, pg. 15). Any radical political project aimed toward overcoming capitalism must explicitly

reflect on the myriad of ways the social system reconstitutes the historically specific categories, such as value, labor, commodity, and capital, that make modern society a specifically capitalist society. Without constant self-reflection and careful consideration, there is the potential that radical plans to accelerate automation and technological development could backfire or produce unforeseen consequences.

For example, consider the radical proposal to push for full automation in as many areas of production as possible.[126] The idea is to push for the development of labor-saving technologies to lay the preconditions for a post-work society that would unleash the latent productive forces towards common ends (Srnicek and Williams, 2013, pg. 3). On the one hand, this proposal pushes the development of productivity and technologies that make human labor increasingly anachronistic, opening up the possibility for the abolition of labor. On the other hand, if capitalist social relations fail to be transcended and the centrality of labor is reconstituted, then the acceleration of automation will coincide with accelerating expulsion of labor from the production process that is still embedded in the context of capitalist society where labor is necessary for survival. The acceleration of automation also means accelerating the redefinition of socially necessary labor time that both compels the expulsion of some labor while making labor more intense for the workers who remain. This is the opposite intended effect of the radical program, but this outcome is possible without reflection of what it would take to transcend the reconstitution of capitalist social relations.

Many radicals are also proponents of universal basic income (UBI).[127] Radicals intend for a UBI to loosen the bond between capital and labor, to empower workers, and to give each

[126] See for example, Srnicek and Williams (2013); Mason (2016).
[127] See Srnicek and Williams (2015) pg. 123-127; Mason (2015) pg. 284-286; Livingston (2016) pg. 13-28; see also, Van Parjis (1995; 2001).

person the freedom to do whatever is most fulfilling or rewarding to him or her. In other words, the goal is to develop "synthetic freedom" in the terms of Srnicek and Williams (2015) or "real freedom for all" in the terms of Van Parjis (1995). If properly implemented, a UBI scheme has the potential to be emancipatory, but it also would face tremendous challenges. As Dahms (2006) explains,

> Establishing economic rights… [such as a Universal Basic Income] probably would constitute the single greatest threat to the trajectory of modern capitalism to date…Consequently, the social and political forces supporting actually existing capitalism in its specificity are more likely to defend it with any and all means available, rather than allowing it to undergo qualitative change (pg. 4).

In other words, it is crucial for radicals to not underestimate how fiercely the logic of capital and the capitalist social order is defended by the existing power structures in society. In addition, there is also the possibility that if the contradictions of capitalist society grew to such large proportions that a UBI was necessary for the continued accumulation of capital, the resulting scheme could be used to maintain the core attributes of capitalism, particularly the centrality of labor and value, rather than transcend them. For example, a UBI scheme that would replace welfare programs and be set low enough to encourage work, would also likely emerge in a context where jobs are becoming more precarious and scarce due to the dynamics of productivity and the growth of the productive apparatus of machinery. In this scenario, the UBI would not be emancipatory, but would likely generate fierce competition for jobs and resources. Dahms (2006) explains the potential danger of a form of "capitalism unbound" produced by the UBI scheme. He describes the danger as,

> instituting basic income [could] be far more likely to increase further the ability of economic organizations and their leaders to impose their values on everyone else – with basic income serving as the primary reason for rejecting efforts to critically examine the capitalist mode of production… (pg. 6).

Providing a UBI as a safety net could be used as a justification for accelerating the logic of capital and legitimation of the increasing levels of economic inequality and precarity likely to result in the process. A radical political project would need to seriously reflect on these possibilities and work to ensure that the potential progressive elements of proposals such as the demand for full automation and universal basic income are not inadvertently co-opted to serve the interests of capital and further entrench the social domination of capital.

Radicals intend to avoid making these negative outcomes by forming a broad-based coalition of the Left that would build a grassroots movement that would work to foster a new post-work consensus.[128] This post-work consensus would become the hegemonic discourse that would allow the emancipatory character of the radical policy proposals such as UBI and full automation to become realizable. To accomplish this, Srnicek and Williams (2015) advocate for a new form of hegemonic politics that avoids the weaknesses of folk politics (pg. 25-49). This hegemonic political strategy borrows heavily from the tactics and strategies used by a coalition of many right-wing organizations, think tanks, and the media to gradually establish the neoliberal hegemony. They argue that the kind of practices used by the right to establish a hegemony were successful, and therefore, the left should use similar strategies to develop a new hegemony that could lead to a post-capitalist society (Srnicek and Williams, 2015, pg. 51-67). On the one hand,

[128] See Srnicek and Williams (2015) pg. 155-174.

the rise of neoliberalism as a historically specific configuration of capitalism did arise contingently and in part due to the implementation of specific strategies by various groups, such as the Mont Pelerin Society, that set the necessary preconditions for the rise of neoliberalism. On the other hand, the argument put forward by radicals in favor of the strategies used by the right to establish neoliberalism leave out other factors that facilitated the conditions for the rise of neoliberalism.

Neoliberalism as a political movement to establish a new hegemony had a key advantage because, while it was qualitatively different from the policies and ideology of the Fordist-Keynesian period, the orientation of the movement was toward the expansion of the logic of capital and the pursuit of surplus value. The emergence of neoliberalism was contingent, but its eventual dominance over business and political leaders was due in part because the goal of neoliberal policies was to decrease the power of labor and government and to increase the power of corporations and capitalists. In other words, the rise of neoliberalism was successful because it used effective strategies *and* because it promoted an ideology and policies that were compatible with the interests of the existing social structure and power structure. Political tactics and strategies are not neutral tools that can be used equally effectively by right wing or left wing movements, but are embedded in a larger social context with specific socio-historic circumstances. The implementation of neoliberal policies could be achieved relatively easily because their implementation expanded the power of the already existing economic power structure of society and accelerated capital accumulation. In this way, the neoliberal movement was successful because it was congruent with the logic of capital. Neoliberalism was successful in part because it would not threaten the existing social structures and the specific balance of power and inequality.

The plan proposed by radicals to form a new hegemony does not have this advantage because the proposed strategy to produce a post-work society would not serve to expand the logic of capital. In fact, the radical proposals run directly counter to the logic of capital, and their faithful implementation would stifle capital accumulation. Therefore, it is likely that any strategy that threatens the logic of capital and the core of the existing power structure in society is bound to face overwhelming resistance.[129] This does not necessarily mean the proposed tactics will be entirely ineffective or that such a movement is bound to fail. However, it is crucial to recognize the specific historical advantages certain movements have over others and not assume social movement strategies that worked in one socio-historical context will work well in another. Value-critique argues that in a social system whose core is the logic of capital, movements and policies that work in the favor of the logic of capital's expansion are much more likely to succeed than those that do not.

Finally, any attempt to form a post-work consensus should reflect on how both workers and capitalists see the existing system as "natural." Establishing a post-work consensus would be an incredible challenge because labor in modern society is viewed as a transhistorical constant rather than as historically specific and contingent. This is generally held by those in leadership and positions of power in corporations and government just as strongly as it is held by workers and marginalized groups. In this way, both the working class and the capitalist class are two sides of the same coin. Both venerate labor as desirable and necessary. Even in the context of class struggle, the working class demands "liberation of labor" rather than "liberation from labor," thus maintaining the capitalist paradigm of wage labor relations of production (Krisis-

[129] Similar to the argument made by Dahms (2006) regarding UBI, the radical political program would likely face social and political forces willing to defend capital with "any and all means available, rather than allowing it to undergo qualitative changes" (pg. 4).

Group, 1999, pg. 7). As Trenkle (1998b) describes, "ordinary people… turn out to be the main obstacle for the abolishment of the prevailing fetish system. They do not want to stop working…" (pg. 2). On the other side of the coin, capitalists are compelled by the "silent (implied) compulsion of competition… if they don't 'do business,' they will be scrapped as ruthlessly as the superfluous 'labor force'" (Trenkle, 1998b, pg. 8). Capitalists are compelled by the dynamics of competition to exacerbate the automation of labor, while the working class demands economic justice through full employment. In this scheme both classes are trapped in a struggle over distribution of power and resources, while the social basis for that system of social relations rooted in labor and value is wrought with accelerating contradictions. Essentially, the working class fetishizes a decent living wage instead of imaging social life beyond the wage labor system. Members of modern society are ultimately capitalists, not in the sense that everyone owns the means of production, but that every person is socialized into a capitalist socio-historic context. Being socialized in this context makes the historically specific conditions and relations of capitalism appear as "natural," and this makes it exceedingly difficult to see a plausible future beyond capitalism and beyond labor. People are also capitalists in the sense that modern life is oriented toward the reproduction of capital, whether through work or consumption. To the extent that people, both capitalists and workers, defend the historically specific form of labor in modern society, the more the overarching logic of capital is defended and safeguarded from qualitative change. The protestant ethic ultimately has most members of modern society trapped in the "shell as hard as steel," which makes it exceedingly difficult to see the specific form of labor in capitalism as anything other than "natural" and eternally necessary (Weber, 2002 [1905], pg. 121).

This critique of radical ideology is meant to put in perspective the enormous challenge of struggling for a post-capitalist world. Value-critique analysis unveils the radical potential for new technologies, but it also reveals how the historical dynamics of capital "[reconstitute] its own fundamental condition as an unchanging feature of social life" (Postone, 2015, pg. 18). Therefore, any radical political program must take full measure of both sides of the double movement in order to adequately grasp the challenge at hand and have the possibility to succeed.

3.3 Conclusion

Automation, Technological Displacement, and Sociology

In lieu of a comprehensive summary, I wish to conclude by making a few key observations that comment on the implications of the findings and assess the importance of the problems of automation and technological displacement for sociology. First, most of the literature and research done regarding automation and technological displacement have been in economics rather than sociology. This distinction is, of course, partly due to the demarcation of the disciplines, as the dynamics of technological displacement have historically been primarily framed as an economic question and is claimed to be well suited for the theoretical and methodological approach of economics (see Woirol, 1996). The analysis of skill-biased technical change causing labor market polarization is the current mainstream approach tackling the question of technological displacement within the disciplinary confines of economics (Autor, 2010; Frey and Osborne, 2013). This framework serves as the most well-known explanation for the impacts of technology on employment and is claimed to be one of the primary contributors to the growing inequality in modern societies (Brynjolfsson and McAfee, 2014 pg. 134-137). Economic sociologists point out how the skill-biased technical change narrative cannot be the whole story, as structural forces such as deindustrialization, globalization, and corporate restructuring have diminished the economic and political power of working people, thus power imbalances, not technology, contribute to the rise of inequality (e.g. Royce, 2009, pg. 94-100). While these sociological insights are certainly warranted and necessary, nonetheless this thesis attempts to demonstrate that an analysis of technological dynamics should be central to any sociological account of economic change and inequality. This is ultimately necessary because,

as value-critique contends, technological change in modern capitalist society is not merely an economic phenomenon, but is inherently a social process that continuously transforms social life. However, in the contemporary examination and analysis of automation and technological displacement, economics largely fails to consider sociological processes in their analysis, and sociology has largely left the question of technological displacement to economics.

This thesis is a critical response to the current scientific division of labor and disciplinary demarcation as a call for sociology to take renewed interest in the development of technology, the dynamics of technological displacement, and the potential for technological unemployment. It also argues that the starting point for any such engagement with these questions should be grounded in value-critique's reinterpretation of Marx's critical theory. This body of work has, unfortunately, gone largely unnoticed by sociology. While Marx is a central figure to the canon of classical sociology and a foundational theorist of the conflict perspective, Marx's theory as presented by value-critique offers a new perspective on Marx that differs fundamentally from the way Marx is typically used in sociology.

For value-critique, Marx not only provides a framework for analyzing material, class, and structural inequalities, but also systematically explains how modernity unfolds as a directionally oriented historical dynamic that generates prodigious contradictions. It provides the basis for a renewed encounter with Marx as a thinker whose theory still has direct relevance today, and a new way of thinking about the crucial role of technological development for shaping the social structure and facilitating social transformations (Postone, 2015, pg. 4). Of course, Marx would be only the beginning, a comprehensive sociological analysis of automation and technological displacement would play to sociology's strengths by examining how the historical dynamics of capital and the continuous redefinition of socially necessary labor time in different industries

affect people in terms of race, class, gender, and sexuality.[130] Sociological analysis demonstrates how inequality falls along intersectional axes of race, class, gender, and sexuality, and a sociological engagement with questions of automation and technological displacement should fully flesh out how these dynamics of inequality develop. In addition, the insights from environmental sociology could be used to take the analysis of automation and technological displacement beyond the narrow economic framework of negative externalities. By engaging in an analysis of automation and technological displacement using value-critique as a foundation, sociology may be in a better position to develop knowledge with a critical awareness of its own ideology and its position and role in the historical dynamics of modernity that is able to effectively understand the dynamics of automation and technological displacement.[131]

The Logic of Capital and Sociology

The most pressing implication of this study is that the concept of the logic of capital is crucially important for sociological analysis. A systematic understanding of the logic of capital gives sociological analysis an explicit awareness of how the subject matter of sociology is not merely society, but specifically modern *capitalist* society. It is an attempt to formulate in a rigorous manner the ways modern societies operate as capitalist societies both with historically specific class dynamics, but also with historically specific forms of labor, value, commodity, and specific mechanisms for the distribution of material wealth. It is also a recognition of how these

[130] The general absence of incorporating race, class, gender, and sexuality into analysis is often one of the main deficits of how economics examines automation and technological displacement today.
[131] Sociology as a discipline does not have one singular ideology, nor is sociology immune from ideology. Sociologists also inevitably have a range of ideological positions including the liberal, conservative, and radical ideologies discussed here. However, the argument is that sociologists wanting to make a meaningful and unique contribution to the contemporary debate and scholarship surrounding automation and technological displacement should have a critical consciousness of ideology and that value-critique analysis would be a good starting point from which to build a sociological analysis of automation and technological displacement.

categories are not static, but directionally dynamic and pointing toward the exacerbation of increasingly intense contradictions. A systematic and comprehensive conception of the logic of capital is perhaps the best means to understand the historically salient dynamics of modern society as a social form unique to all other previous forms in history. This gives sociology a sharper focus of identity as the discipline that studies modern society. The institutions, organizations, and social groupings and individuals that sociology studies are all in some way shaped by their relationship to a social world whose core logic is the logic of capital. This is, of course, not to dismiss the importance of other logics of modern society such as the everchanging dynamics of politics and culture, but is to point out how the dynamics of the logic of capital are often salient forces that shape social life, social structures, and expressions of agency. Of course, the logic of capital is not always salient, but is often backgrounded in subtle ways not often consciously recognized by social agents, organizations, and institutions. In either case, the logic of capital and its historical dynamics can be seen as a form of heteronomy without institutional locus that dominates, compels, and shapes human agency in modern society. Dahms (2015a) describes the importance of recognizing the logic of capital in this way,

> To presume that, after two centuries of the logic of capital molding the layers of our individual and collective existence, we would be the same humans as they were then would not only be problematic, but in fact highly spurious. While this is not to say that the logic of capital determines our existence and way of living, it has been functioning as the center of a force-field that makes it all but impossible to analyze and interpret forms of social, political, and cultural life on their own, respective terms (pg. 10).

In other words, the importance of the logic of capital is not that it is the determinant of social life, but provides a rigorous examination of how the logic of capital serves as core structures and practices from which various formations of modern social life manifest.

The Ideology of Progress

Finally, the findings of this study highly indicate the need to rethink the popular conception of modern progress. The present circumstances of continuously increasing material wealth coupled with increasing economic inequality, poverty, and lack of jobs barring access to that material wealth demonstrates one of the starkest examples of the contradictory nature of progress in modern society. As we have seen, the most prevalent ideologies of modern society, primarily liberals and conservatives, tend to believe in a linear notion of progress, that the arc of history will inevitably somehow bend towards justice and increased prosperity for all. On the contrary, the analysis of value-critique argues that modern progress is not only non-linear, but is inevitably double-sided, producing the possibility for both progress and regress simultaneously. The historical dynamics of modern society point toward the possibility of organizing society on a new basis, but these same dynamics also constrains that possibility. As Marx argues in perhaps his most programmatic formulation of his critical theory,

> "At a certain stage of their development, the material productive forces of society come into conflict with the existing relations of production, or—what is but a legal expression of the same thing—with the property relations within which they have been at work hitherto. From forms of development of the productive forces these relations run into their fetters" (1977 [1859], pg. 4).

In other words, modern social relations are paradoxically holding back the possibility of positive social progress through the development of the productive forces, and therefore are creating the conditions for increasingly exacerbated contradictory fetters that could ultimately result in social regress. The contradictory consequences of modern progress are numerous, and there are multiple trends that point in this direction from climate change to technological displacement.

This thematization of the double-sided nature of modern progress is not new. In fact, it has been a consistent and central theme in Critical Theory since its inception, and most compellingly explored in Horkheimer and Adorno's *Dialectic of Enlightenment* (2001 [1947]). Value-critique ultimately unveils systematically the process of how the unfolding of the logic of capital generates the basis for the dialectical movement of progress as producing both positive and negative developments. This sociological diagnosis of the dynamics of automation and technological displacement calls for a renewed engagement with contradictory social processes based in a critical understanding of the logic of capital and of the nature of modern progress. This is important because holding on to the idea that progress is linear and inevitable has real social consequences. As William I. Thomas stated in his Thomas Theorem, "If [human beings] define situations as real, they are real in their consequences" (Thomas and Thomas, 1928, pg. 571-572). That is why it is important to study ideology, because ideologies influence social action, and these actions made in the name of what is perceived as real or true have material, political, and cultural impacts and consequences. If decision makers continue to make choices based on a one-sided view of progress and that the idea that the march of modern progress is inevitable, then the choices they make will fail to grasp how the dialectical unfolding of "progress" will appear differently from how they expected. Ultimately, a recognition of the contradictory nature of modern progress is necessary now more than ever. Perhaps it is best to

heed the words of Walter Benjamin who argued that we ought to "root out any trace of 'development' from the image of history" and to overcome the "ideology of progress… in all its aspects" (Benjamin, 1982, pg. 845; 392).[132] It should be clear, however, that any attempt to overcome the contradictions of modern progress must intimately understand their dynamics. This, therefore, should be the task of a critical sociology that seeks to understand the dynamics of automation, technological displacement, and the dialectic of modern progress.

[132] Perhaps the language of progress and regress is too limiting and tainted with ideology. A new conceptual language may be needed to better communicate and what exactly is the nature of "progress" in modern society with full awareness of its double-sided character.

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Vita

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