

The Transformation of the Workplace Through Robotics, Artificial Intelligence, and Automation

Employment and Labor Law Issues, Solutions, and the Legislative and Regulatory Response

February 2014

AUTHORS

Garry Mathiason

John Cerilli

Van Allyn Goodwin

Phil Gordon

Paul Kennedy

Theodora Lee

Michael Lotito

Kerry Notestine

Natalie Pierce

Eugene Ryu

Ilyse Schuman

Paul Weiner

William Hays Weissman

Robert Wolff

Jillian Ballard

Greg Brown

Danielle Fuschetti

Tessa Gelbman

Joon Hwang

Catherine Losey

Brian Morris

Miranda Mossavar

Nima Rahimi

Sarah Ross

Jeff Seidle

Lauren Woon

Aida Wondwessen

Ethan G. Zelizer

IMPORTANT NOTICE

This publication is not a do-it-yourself guide to resolving employment disputes or handling employment litigation. Nonetheless, employers involved in ongoing disputes and litigation will find the information useful in understanding the issues raised and their legal context. The Littler Report is not a substitute for experienced legal counsel and does not provide legal advice or attempt to address the numerous factual issues that inevitably arise in any employment-related dispute.

Copyright ©2014 Littler Mendelson, P.C.

All material contained within this publication is protected by copyright law and may not be reproduced without the express written consent of Littler Mendelson.

ABOUT OUR FIRM

Littler Mendelson is the world's largest labor and employment law firm devoted exclusively to representing management. With over 1,000 attorneys and more than 60 offices throughout the U.S. and globally, Littler has extensive knowledge and resources to address the workplace law needs of both U.S.-based and multi-national clients. Littler lawyers practice and have experience in more than 36 areas of employment and labor law. The firm is constantly evolving and growing to meet and respond to the changes that impact the global workplace.

ABOUT OUR ROBOTICS, AI AND AUTOMATION PRACTICE GROUP

Robotics is the fastest growing industry in the world, poised to become the *largest* in the next decade. The increasing use of artificial intelligence (AI) and related technologies in the workplace are dramatically changing the employment landscape. The nearly 100 attorneys in Littler's Robotics, AI and Automation Practice Group recognize this impending transformation, and are available to assist employers with the labor and employment implications that will follow. As the world's largest law firm focusing solely on legal and regulatory issues affecting employers, Littler is in a unique position to help businesses confront the new challenges that robotics and advanced technologies bring. Our Practice Group provides high-quality employment and labor law representation and compliance assistance to employers in the robotics industry and employers integrating robotics and AI systems into their workplaces in the U.S. and worldwide. Practice Group attorneys can provide employers with a customized review of their robotics products and software to assess whether their use conflicts with workplace law, and recommend ways in which new technologies could be used to achieve workplace compliance. Through Littler's Workplace Policy Institute™, our practice offers model policies, expert testimony, and practical recommendations to legislatures, parliaments and regulatory agencies regarding the adoption and implementation of workplace robotics and related advanced systems. To learn more about our Practice Group, please contact Practice Co-Chairs Garry Mathiason at gmathiason@littler.com, or Adam Forman at aforman@littler.com.

ABOUT LITTLER'S WORKPLACE POLICY INSTITUTE™

Littler's Workplace Policy Institute™ (WPI) is the go-to resource for the employer community to learn about and respond to legislative, regulatory and judicial developments that impact their employees and business strategies. The WPI harnesses the deep subject-matter knowledge of Littler to ensure that policymakers in Washington and around the country hear the voice of employers. The WPI is engaged with Congress, the executive branch, and the courts on the most critical employment, labor and benefits issues of the day, including the requirements of the Affordable Care Act (ACA), Occupational Safety and Health (OSH) Act, Fair Labor Standards Act (FLSA), National Labor Relations Act, Title VII, and their ever-changing implementing regulations.

Table of Contents

SECTION / TOPIC	PAGE
EXPLANATION AND SCOPE OF THIS PRELIMINARY LITTLER REPORT	1
I. INTRODUCTION	3
II. WORKPLACE LAW CHALLENGES AND SOLUTIONS	9
A. Human Displacement	9
B. Union and Non-Union Labor Relations	11
C. Anti-Discrimination	15
D. Wage & Hour	19
E. Health & Safety	21
F. Workers' Compensation	23
G. Tort Liability Issues	24
H. Privacy	24
I. Trade Secrets	29
J. eDiscovery	32
K. Healthcare	35
L. Legislative & Regulatory Considerations	37
III. CONCLUSION AND PRACTICAL RECOMMENDATIONS	39
ENDNOTES	40
APPENDIX: THE EMPLOYMENT TAX IMPLICATIONS OF THE ROBOTICS REVOLUTION	49

THE TRANSFORMATION OF THE WORKPLACE THROUGH ROBOTICS, ARTIFICIAL INTELLIGENCE, AND AUTOMATION

EMPLOYMENT AND LABOR LAW ISSUES, SOLUTIONS, AND THE LEGISLATIVE AND REGULATORY RESPONSE

EXPLANATION AND SCOPE OF THIS PRELIMINARY LITTLER REPORT

This Preliminary Report is being released as part of Littler’s Workplace Policy Institute™ (WPI) February 12, 2014 Roundtable on The Future of the Workforce, How the Robotics Revolution Will Shape the Employment and Labor Law Landscape. The Report has been titled “The Transformation of the Workplace Through Robotics, Artificial Intelligence (AI), and Automation” to reflect the convergence of multiple technologies as they jointly impact the workforce and redefine the workplace. The purpose of this Preliminary Report is to begin identifying the resulting “Employment & Labor Law Issues,” crafting practical “Solutions,” and anticipating and helping to direct “the Regulatory & Legislative Response.” The following are important explanations, definitions, and disclaimers to guide the reader of this Preliminary Report:

- **Soliciting Your Feedback:** This first-of-its-kind Preliminary Report (“Report”) forms the basis for a more comprehensive report to be issued in conjunction with Littler’s Executive Employer Program on May 7-9, 2014. Littler is committed to identifying and crafting solutions to the vital workplace legal issues that are inherent in the explosive growth of robotics, AI, and 21st century automation. This Report identifies some of the hidden pitfalls and possible solutions while soliciting feedback from industry and legal experts, as well as HR professionals. Based on that feedback and a deeper probe into the robotics and AI industries, the May report will revise and expand upon the contents of this Report.
- **The Challenge of Defining Transformative Technologies in the Workplace:** Increasingly specific definitions have emerged to differentiate areas of robotics, software and AI, as well as historical, contemporary, and future automation. For example, an “industrial robot” has been defined as an “automatically controlled, reprogrammable multipurpose manipulator programmable in three or more axes which may be either fixed in place or mobile for use in industrial automation applications.”¹
- While understanding these industry-specific definitions is important, many other definitions are more general in their application. For example, a more elemental definition of “robot” is simply: “a machine that can do the work of a person and that works automatically or is controlled by a computer.”² Stated differently, a robot is: “any automatically operated machine that replaces human effort, though it may not look much like a human being or function in a humanlike manner.”³

Many of the journal articles and popular media stories referenced in this Report freely cross industry boundaries, and often apply the term “robot” and “robotics” to cover a continuum of transformative technologies. In this Report, our analysis covers “robotic systems” as defined below, as well as AI and 21st century automation. In future Reports, as the legal system increasingly recognizes differences between industries and technologies, we will mirror those differentiations in our practical solutions and recommendations.

- A **“robotic system”** is a computer system that, using intelligent, networked devices, the Internet, big data, AI algorithms, and other advanced computing technology, is capable of: automatically and continually **“sensing”** what is going on in a changing physical or other environment; **“thinking”** by analyzing data it collects from the environment it is monitoring (e.g. detecting occurrences, changes, and anomalies), identifying trends, and reaching conclusions; and autonomously **“acting”** by carrying out one or more physical (e.g. navigating through an environment, manipulating an object, etc.) or non-physical (e.g. alerting human operators, recommending potential responses, making decisions, initiating commands, etc.) functions. Stated more simply, it is any computer system capable of sensing occurrences in a dynamic situation or environment, capturing and analyzing the relevant data, and subsequently reaching conclusions, providing recommendations, making decisions, and otherwise taking action, whether of a physical or non-physical nature.
- **In this Report, we include “software robots” or “virtual agents.”** Thus, a “robot” could be a software program that performs a task previously done by humans, or a virtual assistant, such as a telepresence robot that performs services remotely. “Telerobotics is the area of robotics concerned with the control of robots from a distance, chiefly using wireless connections, ‘tethered’ connections, or the Internet. It is a combination of two major subfields, teleoperation and telepresence.”⁴
- **Artificial Intelligence (AI)** is included in this Report. It is defined as “the intelligence exhibited by machines or software, and the branch of computer science that develops machines and software with intelligence.”⁵ Computer scientist John McCarthy, who is credited with coining the term in 1955, defines it as “the science and engineering of making intelligent machines.”⁶ AI is included to underscore that the scope of this Report covers both hardware and software that do tasks previously performed by humans.
- **Automation** is also included in this Report as the term relates to the 21st century. It is defined as the “automatic operation or control of equipment, a process, or a system.”⁷ While automated processes can be traced back centuries, the term “automation” did not come into popular use until 1947, when General Motors established an “automation department.” As used in this Report, automation refers to an operation or control system that uses intelligence. Robotics and AI are subsets of automation. However, in many instances, product manufacturers and system designers have avoided the terms “robotics” and “AI” in favor of some form of the word “automation.” For example, contemporary jet aircrafts are capable of taking off, flying, and landing by themselves with “automatic pilots.” Similarly, the term “vehicular automation” encompasses the “self-driving car,” “robot car” or “autonomous vehicle.”
- **Forecasting Compliance:** Robotic systems, AI, and 21st century automation are developing at an exponential pace, creating work environments and conditions unimagined a half century or more ago when most workplace laws were enacted. Nonetheless, designers, builders, and users of this technology are expected to comply with all pertinent employment and labor laws long before courts have ruled or regulatory agencies have acted. The main goal—and major challenge—of this Report is to forecast how these laws will apply to the evolving workplace and what constitutes reasonable compliance. While we can offer no guarantees and this Report cannot substitute for individualized advice of counsel, it offers a compliance roadmap for many of the issues that lie ahead. With the regular updating of this Report, we seek to offer increasingly insightful and useable observations as to how robotics, AI, and 21st automation—which will inevitably dominate the world’s economy—impact workplace law.
- **Creating Employment:** Historically, the infusion of new technologies into the workplace has greatly increased productivity and human employment. At the same time, the jobs people perform have radically changed. One hundred years ago, one in three Americans worked in agriculture; today, less than 2% of the workforce produces a food surplus resulting in exports. What is different now and over the next decade is the speed of change, the challenge of displaced workers to retrain and quickly adjust to the new economy, and the unprecedented demand for STEM-qualified job candidates. In this Report, we acknowledge the inevitable worker dislocations and offer employers practical solutions for easing the effects of necessary layoffs while using technology to address the growing skills shortage. New technologies increasingly are replacing humans in dangerous assignments, taking over repetitive, lower-skilled tasks, and filling needs to perform unwanted work such as harvesting lettuce and grapes. Higher-skilled, better-paying jobs are created, which in turn create downstream service jobs (sponsoring additional automation). While for the next decade more jobs will likely be created than lost, the intense public debate about net job creation may be misplaced. The practical reality is that we are all part of a global economy and innovation cannot be stopped as restrictive legislation in one country will merely transfer the technological advancement to another. Nor will any nation be willing to give up the great benefits of innovation for humanity. The mission of this Preliminary Report and its successors is to facilitate the inevitable arrival of these transformative technologies into the workplace, while maximizing compliance with existing and future employment and labor laws.

I. INTRODUCTION

The workforce is undergoing a radical transformation. While industrial automation, computer programming, and data storage have been integral to the modern workplace for decades, a number of factors in recent years have spurred the evolution of modern robotics, AI, and 21st century automation. Ongoing advances in microcomputer, networking, and sensor technologies, combined with a corresponding decrease in costs,⁸ is fueling a next-generation computer revolution highlighted by the exponential rise of connected, mobile devices. Such devices (increasingly without the need for human intervention) are able to sense, capture, and analyze information about the surrounding environment and to communicate the relevant data in real time to human operatives and online databases.

Ever-improving computer software algorithms are able to aggregate and analyze the massive amounts of information collected by the networked devices, identify trends, predict outcomes, make recommendations and decisions, and, to a growing extent, initiate and take autonomous action in situations where humans have delegated the authority to do so.

When these advanced computing systems are combined with complex physical machinery, cutting-edge robotic systems are born. Increasingly intelligent and autonomous mechanical devices networked to powerful servers will yield an array of robotic systems and applications destined to have an enormous impact on every aspect of our society.⁹ The impact of these technologies on the workplace is significant and far-reaching.

For example, new technologies have enabled job candidates to post their resumes on more than 50 leading websites and search for desirable job postings across the web. In response, employers and professional recruiters have increasingly used software algorithms during the hiring process.¹⁰

Many companies use applicant tracking systems to review and screen resumes. For instance, Monster.com—one of the world's largest job boards—will submit a resume to an employer only if it gets a green light from its software “6sense.”¹¹ One of the most advanced systems features Arya, identified as the first recruiting robot.¹² Arya is virtual and learns the search patterns used by the recruiter it is assisting. Arya then scans the web selecting candidates and independently arranging interviews. All the workplace laws that govern the way employers consider applicants apply equally to this existing technology that makes candidate selection decisions.

One of the common features of screening software is the reliance on certain “buzz words” in making decisions. However, any pattern that has a disparate effect on protected categories (race, age, sex, national origin, etc.) would likely violate anti-discrimination statutes unless they could be justified by business necessity. This creates risk for both software companies and end users (particularly given that such claims would be particularly susceptible to class treatment). Programs using more straightforward criteria—such as work history and education—must also be carefully reviewed for workplace law compliance. The Equal Employment Opportunity Commission (EEOC) has for over a decade been cognizant of resume-scanning software and the need for verifications that the software does not have such a disparate impact.¹³ For example, a program that excludes resumes that suggest a period of unemployment may run afoul of existing EEOC guidance and state or local law prohibiting discrimination against the unemployed. Indeed, New York City and Washington, D.C. recently prohibited such discrimination.¹⁴

The next generation of robotic recruiters has already arrived with NEC's unveiling of Sophie and her colleagues who interview human job applicants. These cute, two-feet tall members of the HR recruiting staff—intended to be the ultimate objective job candidate evaluators—have been deployed and field tested.¹⁵ Sophie is programmed to not only ask and respond to questions, but also to measure an interviewee's physiological responses. While overtly objective, a robotic interviewer like Sophie must be programmed consistent with employment discrimination laws of the jurisdiction. Behavioral analysis and other data acquired by robots could have a disparate impact on protected categories. To the extent a robot measures an interviewee's physical responses to analyze truthfulness, the companies developing and utilizing the technology must consider and comply with the myriad of state laws regulating the use of lie detectors.

Modern robotics and AI systems are being deployed in a variety of industries, including food service,¹⁶ medical,¹⁷ airline,¹⁸ energy,¹⁹ and ground transportation,²⁰ among others. For example, robots already fill more than 350 million prescriptions each year at over a third of the medium and large hospital pharmacies in the U.S.²¹ While many assembly line job tasks have been mechanized for years,²² trainable robots are being developed to improve and streamline the process.²³ Some robots are even taught how to “think” like a human to improve performance and object recognition.²⁴

“Human-like” robots are being used to fill the growing need for elder care. According to one report, the Japanese Economy, Trade and Industry Ministry anticipates the market for elder care robots will be valued at more than 400 billion yen (\$4.09 billion U.S. dollars) by 2035.²⁵ Recently, a Japanese company has developed a “caring robot” to reduce the workload for nurses.²⁶ Another option to assist with elder care in Japan is a type of battery-operated suit that functions as a robotic exoskeleton to help workers lift patients. This exoskeleton can also be worn by the patients themselves to increase mobility and muscle function. Cyberdyne, the company that manufactures this apparatus, has already delivered more than 330 such motorized suits costing about \$1,780 a piece to care centers in Japan. The suits have been touted as the “first assistive nursing mechanism to be certified under a draft international safety standard for personal robots.”²⁷

Developers must be cognizant of the potential tort liability of introducing this technology to the workplace. Workers’ compensation is intended to provide compensation to injured employees on a no-fault basis and generally preempts state law tort claims. However, the law generally permits tort claims against third parties that cause workplace injuries. Thus, to the extent manufacturing or design defects in exoskeleton technology cause injuries, the companies will likely face personal injury claims. Companies and trade groups may consider legal reform efforts to remove this barrier to fully integrating this technology into the workplace.

Many other types of “wearable” robots are being developed to assist with walking, lifting, and performing other physical tasks. Such robotic exoskeletons can allow a user to exert several times their normal strength while greatly reducing muscle strain. One of the premiere producers of such exoskeletons, Ekso Bionics, expects to have a million people using exoskeleton technology within 10 years. Such systems could greatly reduce workers’ compensation claims and potentially become a safety requirement for various dangerous jobs. For those who suffer back or other injuries, their return to duty could be three times faster wearing an exoskeleton robot. Additionally, as prices continue to fall, these may soon be classified as a reasonable accommodation allowing disabled individuals to perform the essential requirements for employment.

The transportation industry is no stranger to robotics technology either. Automaker Honda has predicted that by the year 2020, it will sell more robots than cars. Google has predicted that self-driving cars will be available in 3-5 years.²⁸

The federal government has similarly taken notice of the robotics revolution. The Transportation Security Administration (TSA) is reportedly considering the expansion of biometrics and other automated screening techniques to use for airport security purposes in place of TSA agents.²⁹ Moreover, the Federal Aviation Administration (FAA) has approved six testing areas for the commercial use of drones.³⁰

If there was any doubt about the robotics market potential, one need only look at the 83% growth of iRobot stock in 2013 for reassurance.³¹ Moreover, in 2013, Google announced it would acquire eight robotics companies—including Nest for \$3.2 billion—to form a new robotics division.

As the robotics, AI, and automation fields advance, so, too, will the interconnectivity of these technologies. According to Cisco Systems, a whopping 50 billion devices will be wirelessly interconnected and communicating with each other by the end of the year 2020, up from approximately 10 billion devices today. And if that is not impressive enough, Rob Lloyd, Cisco’s president of development and sales, has said that “the value at stake of the Internet of Everything is \$14.4 Trillion.”³²

The robotics revolution is a truly global phenomenon. China has established a five-year plan to bring robotic technology to its factories and “all areas of society” to remain an industry leader.³³ In the U.S., no factory is built without a complete review of the efficiencies that can be achieved using robotics.

In sum, robotics is one of the fastest-growing industries in the world. It has been estimated that by 2025, half of the jobs in the United States will be performed by brilliant machines and intelligent systems.³⁴ Robotics is the next major innovation to transform the workplace, and will have as great—if not greater—impact on how employers operate than the Internet.

So where does labor and employment law fit in? Creators and manufacturers of these new technologies must develop products that fall within the strictures of labor and employment laws. Demonstrated compliance will be a competitive necessity for developers that wish to market their products to liability-conscious employers. Moreover, many companies in this industry are new and small. Ensuring internal compliance with labor and employment laws will help keep the focus on their product as opposed to avoidable and costly lawsuits.

Companies that work with the manufacturers and ultimate users of their products to integrate new technologies into the workplace can avoid liability by understanding and working within the confines of labor and employment law. Additionally, all major players have a combined interest in keeping current on proposed legislation and regulations impacting their industry.

Some new legislative and regulatory initiatives may have the laudable intention of bringing outdated employment and labor laws up-to-date with the new workplace, but can have unintended negative consequences. Other efforts will be more focused on special interests such as protecting certain jobs from the disruptive effects of robotics, AI, and 21st century automation. Such proposed legislation or regulations are almost always flawed in that they fail to recognize that technology creates new jobs and innovation in a global economy, and cannot be more than temporarily delayed. Nonetheless, if legislation or regulations are going to be considered, employer organizations have a responsibility to make sure legislators and regulators are fully informed.

The structure of this paper traces the changes that emanate from the introduction of robotics to the workplace and the resulting challenges this poses to current legal regimes. The chapters are arranged as follows:

A. Human Displacement

This section begins by discussing robotics' most well-known—and perhaps least understood—effect: the displacement of jobs and workers. One of the most common debates regarding robotics, AI, and automation is whether the industry creates more jobs than it eliminates. This analysis gets repeated for almost every kind of robot or AI innovation that is introduced. By definition, robotics fulfills its purpose when it outpaces human accomplishment. Thus, the automation of routine work is both the goal and the inevitable result of an increased use of robotics.

At the same time, new technologies are creating new industries, new jobs, and more efficient uses of human capital. This displacement is both vocational and geographic, as automation and telepresence realize the potential of a globalized workplace only decades after the rise of outsourcing.

Regulations and legislation are commonly proposed to lessen the effects of job displacement. Legal issues immediately include obligations for notice of layoffs (WARN), applicable severance pay, if any, and retraining opportunities. The more long-term issues include future regulatory or legislative responses to job eliminations. Rarely do such statutes and regulations absolutely prohibit job elimination, but rather increase the cost to the employer. On a positive note, recognized human displacement encourages a combination of retraining opportunities sponsored both by employers and government.

B. Union and Non-Union Labor Relations

This section discusses the tools available to management and employees to negotiate the impact of technological changes in both union and non-union workplaces. Is an employer required to bargain if it wishes to acquire robots to do work previously performed by unionized employees working under a collective bargaining agreement? Does the collective bargaining agreement control the use of robots to perform this work? A unionized employer seeking to add robots to its business process must consider these questions.

Certain collective bargaining agreements define the work of bargaining unit members, prohibiting such work from being performed by others. Does this exclude robots? Does it matter whether the person who controls the robots is a unionized co-worker or a non-union technician? In the non-union context, can an employer tell employees that if they unionize or seek higher wages, the work will be moved to another location where it will be performed by robots? It becomes increasingly clear that labor law is a critical concern for employers that wish to utilize robots in the union and non-union context.

C. Anti-Discrimination

This section focuses on the challenges of maintaining equal opportunity in the context of changes that test traditional allocations of advantage and disadvantage. Advanced robotics and AI used in recruiting must be compliant with anti-discrimination laws. While robotics creates new compliance challenges, it has the potential to increase compliance with anti-discrimination statutes.

As previously discussed, questions asked by a robot in a job interview can be pre-screened to ensure legal compliance. On the other hand, employers and developers must consider whether the information obtained and analyzed could have a disparate impact on certain classes of individuals. When behavioral data is collected and compared to similar data about successful workers, unintended correlations can emerge that negatively impact candidates. For example, use of certain software programs might be more common for younger workers yet not necessary for certain jobs under consideration.

It may be that workers who have six months of prior unemployment as a group are less desirable, but using such a criterion could adversely impact minorities. Also, several states are considering legislation to protect long-term unemployed people from being screened out on that criterion alone. The ways a software program evaluates a job candidate or existing employees must be reviewed to make certain that disparate impact is not occurring, or if it is, that it is justified by legitimate business requirements.

D. Wage & Hour

This section addresses the application of wage and hour law to the rapidly receding limits on when and where work happens. While robots are not subject to minimum wage and overtime pay requirements, an increasing number of robots are operated by humans located almost anywhere in the world. What wage and hour laws cover an operator who works with robots eight hours a day in a different state or country?

Currently, the most likely law to apply would be the wage and hour laws of the state or country where the operator is located. As this form of distributed work becomes more popular and productive with new generations of robots, will wage and hour laws change? Another area of great interest and a source of current litigation is the appropriateness of treating distant workers as independent contractors.

An example would be retaining a software engineer for a project over the Internet through a third-party site such as Elance and O’Desk (which are merging)—is the worker an independent contractor? These are just a few of the wage and hour concerns that may arise.

E. Health & Safety

This section addresses the application of OSHA and other health and safety standards to some of the unique issues inherent in the use of robotics in the workplace. Under OSHA, employers are required to maintain a safe workplace. Several OSHA regulations and guidelines already cover workplace robotics. Moreover, the American National Standards Institute (ANSI) recently updated its standards governing robotics safety. Every manufacturer of robots for the workplace must be aware of these regulations, and engage in the debate that will ensue as governments at all levels propose new regulations. Ironically, workplace robots are OSHA-regulated to protect humans from robots. On the other hand, robots have the potential to substantially reduce the number of workplace injuries.

There are dozens of specialized agencies that cover various industries and practices that are now being redefined through robotics. From interstate trucking and airlines to implants and medical devices, agencies and regulations designed to protect the public will and are increasingly covering robotics. For example, robots are regulated by multiple federal and state agencies, including the FDA, the FAA, OSHA, and the NHTSA. Agency regulations applicable to “robots” have a major impact on employment and labor laws.

F. Workers’ Compensation

This section considers the ability of workers’ compensation to defray risks of workplace injuries without stifling innovation. Back injuries are the most common injuries covered by workers’ compensation laws. One of the futuristic ways of preventing these injuries or assisting a worker with back injuries is to provide a robotic exoskeleton or “wearable” robot. This technology promises to allow a paraplegic to walk and provide workers with 10 times their normal strength, all while greatly reducing strain on workers’ bodies. A properly developed system taking advantage of workers’ compensation statutes can greatly expand the market for exoskeletons. Accordingly, robotics companies need to consider workers’ compensation programs and the law, both as a source of potential business and a liability to be quantified and minimized.

An entirely different analysis is needed regarding workers’ compensation preemption and the robotics industry. Workers’ compensation provides compensation to injured workers regardless of fault. Meanwhile, employers need not fear tort actions from their workers since such lawsuits are preempted by workers’ compensation statutes. However, tort lawsuits are allowed against third parties such as equipment manufacturers. Developers of new technologies must be active in the policy debate to ensure litigation does not unnecessarily stifle innovation.

G. Tort Liability Issues

This section examines the tort law implications of robotics. If an electric saw injures a worker, the employer is protected by workers’ compensation but the manufacturers of the saw are not. Would the same standards apply to robots who take over jobs previously performed by humans? Right now, the answer is yes and the potential liability could slow the adoption of robotics. Is there any potential for having robotics manufacturers become covered by the preemption that applies to employers? Is entirely new legislation needed or likely regarding workplace robotics? Should we treat robotics as we do the Internet and gun manufacturers, providing immunity if the robot is misused or programmed to do an illegal act? Is there a difference between “open robotics” where the ultimate application is determined by the user or a third-party integrator,³⁵ versus “closed robotics” where the function is preprogrammed and defined by the manufacturer?

H. Privacy

This section addresses individual privacy concerns employers must consider when faced with unlimited access to information about their employees. Many of the robotic systems and AI programs being developed collect data (often big data). This could include names, addresses, account numbers, and credit card information collected to evaluate buying patterns. Legally correct notices allowing the collection and use of the information are required.

Additionally, there is potential liability for the security of the information. If a breach occurs, there are now multiple states with notification requirements. Depending on the country involved and the nature of the information transmitted to and from each location, robotics data privacy directives may apply. The most well-known is in the EU, but many other nations have implemented similar restraints on the transfer of data over national boundaries.

I. Trade Secrets

This section addresses how the law of trade secrets strikes the balance between the incentives for invention and the free exchange of ideas. This area of employment and labor law has a direct application to the development of robotics. Has the robotics producer established sufficient controls to protect proprietary information and trade secrets? Can an employee of a robotics company be required to sign a non-compete agreement? In what state is the work taking place? Can the employee and the robotics company agree to apply the law for a different state? Like all technology companies, robotics developers must have legally enforceable agreements with employees, vendors, and others with access to sensitive information to protect intellectual property.

J. eDiscovery

This section addresses the ability of eDiscovery technology to harness information in litigation. Increasingly, digital robots and software systems are replacing attorneys in the collection and classification of electronic evidence. Meanwhile, other robotic systems generate massive amounts of data providing a digital reproduction of activities and events. This is opening new vistas for eDiscovery and corporate planning for data preservation. How many robotic systems are being engineered to provide evidence if their programming and stored memories are subpoenaed? For example, self-driving cars can be engineered to provide detailed electronic records if a traffic accident occurs. What data should be available for discovery and how long should it be preserved?

eDiscovery is becoming more sophisticated. Software programs are a potential means of intelligently searching vast data banks for relevant information. Is eDiscovery informatics sufficient to meet legal requirements?

K. Healthcare

This section explores the rapidly expanding use of robotics and telemedicine in the healthcare industry. Healthcare is clearly an industry of choice for robotic expansion. Approximately one-third of all robotic systems and AI start-ups are connected to the healthcare industry. It is predicted that in a decade, 80% of what a doctor does today will be done by brilliant machines and software programs. Everything from medical waste transportation to remote presence surgeries are being performed by robots. Advanced computing systems are even being used for diagnostic purposes. Yet, the use of robotics and AI has generated malpractice lawsuits as well as health privacy-related concerns. The legal implications of using robotics in this industry are therefore great and varied.

L. Legislative & Regulatory Considerations

Whether and how the law will respond to this transformation remains to be seen. The final section on potential legislative and regulatory shifts provides some insight into possible legislative responses to the myriad changes in the workplace and working relationships. Employers can expect new laws and regulations that attempt to balance various interests, including workplace safety, increased productivity, retraining opportunities, and technological unemployment resulting from the robotics revolution.

For example, the impending International Labour Organization (ILO) report on robotics to the EU Parliament will greatly influence whether restrictive regulations, legislation or agreements can be expected. Littler, through its Workplace Policy Institute™, will be providing frequent updates and research reports on the importance of the robotics revolution for developers and users of this new technology.

Finally, the Appendix to this Report examines how the robotics revolution will impact the employment-based tax system in this country, and the implications on existing social insurance programs.

Conclusion and Practical Recommendations

The workplace and workforce will change. New jobs will be invented, the need for STEM-educated workers will accelerate, training and non-traditional web-based education will thrive, distance work will become more common, and high-level contingent workers will prosper. Forty percent of the Fortune 500 companies will no longer be on the list due to disruptive technologies.³⁶

We have started with this Report a decade-long journey down the path of the future workplace. Littler's commitment will be to provide a 360-degree analysis of the changing employment and labor laws that will follow. Much of this change will come not from new laws, but from courts and regulatory agencies attempting to apply well-established labor and employment laws to a workforce and virtual workplaces that were unimaginable decades ago. Apart from predicting these interpretations, we will provide practical compliance recommendations. We intend to also educate the judicial bar, regulators, and legislators on the new workplace and practical realities. Generally, we will recommend against new laws and regulations unless and until the need for change is dramatic. We recognize that some of the best-intended changes have unexpected consequences. Our approach borrows a promise from the Hippocratic Oath: "to abstain from doing harm." We recognize also that certain organizations attempting to maintain the status quo will seek restrictions on the use of new technologies as a flawed means of saving jobs. Ironically, in a global interconnected economy with real-time competition, these efforts will result in lost jobs through global competition. To complete a 360-degree view, we will look at this future through the eyes of the workforce to recommend ways to meet needs and preserve workplace values that do not change, such as respect, fairness, and rewarding ingenuity and hard work.³⁷

We hope this Report serves as a valuable roadmap to the labor and employment law issues created by these emergent technologies and the evolving workplace. Again, we invite your suggestions, comments, and other forms of feedback such as unexplored issues and unanswered questions. This input and the increased scrutiny of the nearly 100 employment and labor lawyer making up Littler's Robotics, AI, and Automation Practice Group, promise to make the issuance of the May 2014 Littler Report on Robotics, AI, and Automation one of the Firm's most comprehensive thought leadership efforts.

II. WORKPLACE LAW CHALLENGES AND SOLUTIONS

It is no surprise that advanced technologies improve safety and increase efficiency in the workplace. But while safety and productivity are important goals, other aspects of employment are also impacted by robotics and AI, and must be addressed. The following discusses in detail the most significant areas of workplace law employers need to bear in mind when designing, manufacturing, and/or using robotics technology.

A. Human Displacement

1. Do Robots Create More Jobs Than They Eliminate?

Throughout history, new technology has displaced older technology and related jobs, but generally the result is a net increase in jobs for the overall economy. Electric lights replaced candles. Automobiles replaced horse-drawn carriages and wagons. Computers replaced typewriters. Memory cards replaced film. But no one would doubt that the number of jobs created by these new technologies vastly outnumbered those jobs lost.

There remains much debate whether this same dynamic will apply to the field of robotics. Many existing jobs will be automated in the next 20 years. Several repetitive, low-skilled jobs are already being supplanted by technology. However, a number of studies have found that in the aggregate, the robotics industry is creating more jobs than robots replace. For example, the International Federation of Robotics (IFR) estimates that robotics directly created four to six million jobs through 2011, with the total rising to eight to 10 million if indirect jobs are counted. The IFR projects that 1.9 to 3.5 million jobs will be created in the next eight years.³⁸ Of course, there will be workers displaced as a result of the use of robots, and employers must address the legal rights of such workers.

2. If Robots Displace Employees, What Advance Notice Requirements Exist Under Federal or State Law?

There are no laws in the United States specifically requiring advance notice of job loss due to displacement by robots. There are a number of laws that require advance notice of job loss generally. The most important of these advance notice statutes is the Worker Adjustment and Retraining Notification Act (WARN).³⁹ The purpose of WARN is to attempt to limit the adverse effects on employees and communities associated with a plant closing or mass layoff by requiring advance notice of such events and to allow displaced workers time to retrain and locate alternative employment. Although WARN does not prevent an employer from implementing a mass layoff or closing a facility, it does require certain employers to notify employees, their representatives, and certain local and state government officials, 60 days in advance of such actions.

WARN applies to employers with 100 or more employees in U.S.-based operations. WARN requires covered employers to provide employees with 60 days advance written notice of a plant closing or layoff *only if*

- the plant shutdown (which includes closing of departments, product lines or other recognized organizational units) will result in an employment loss for 50 or more full-time employees at that site within a 30-day period, *or*
- layoffs that are not the result of plant closing result in the loss of employment at a single site of employment for at least 33% of active employees, excluding part-timers, and at least 50 employees; or alternatively, results in loss of employment for 500 or more full-time employees regardless of the percentage.

WARN includes 30-day and 90-day aggregation periods which sometimes result in WARN notice to employees suffering a job loss early in a period that the employer did not expect would warrant a WARN notice. The notice period may also be reduced when the dislocating event is caused by business circumstances that were not reasonably foreseeable 60 days before the mass layoff or plant closing. Also, the 60-day notice period may be reduced with respect to a plant closing for a “faltering company” that is trying to stay in business by seeking additional capital or business. However, an employer relying on the “faltering company” exception must meet several strict requirements. WARN is a complicated statute and employers must plan in advance of plant closings and mass layoffs to determine whether notice is required and to which persons or entities.

A number of states have passed statutes or ordinances, sometimes referred to as “Mini-WARN” statutes, requiring advance notice of certain job actions.⁴⁰ A number of these Mini-WARN obligations are similar to the federal WARN statute, but apply to smaller employers or a smaller number of affected workers (CA, CN, HI, IL, IA, MA, MD, NH, NJ, NY, TN, WI), require severance pay or termination benefits under a stated formula (HI, ME, NJ), or mandate a longer notice period (NY). Some states also require (mandatory) or request (voluntary)

that employers notify the state unemployment agency of group terminations so the agency can be ready for an influx of unemployment claims (AL, GA, MI, MN, NC, OH, TX). A few states essentially replicate the federal WARN provisions but add notice to certain other entities (MN, OR).

Failure to provide adequate notice under WARN or the Mini-WARN statutes generally results in employer liability to employees for compensation that the employee would have earned during the notice period. These statutes also impose penalties of varying amounts for failure to give notice, particularly to government entities and in some instances, to employees due notice. Application of WARN and the Mini-WARN statutes can be quite complicated and advice of qualified counsel is important to insure compliance.

3. Are There Mandatory Severance Obligations?

Absent any written or oral contracts providing for severance upon the termination of an individual's employment, there is no general obligation under either federal or state law requiring severance upon an employee's termination in general or based on displacement due to robots. All states have unemployment compensation systems that provide benefits to displaced workers for varying lengths of time through insurance-based systems. The cost of these benefits is borne by employers generally in the individual states, but companies that lay off greater numbers of workers typically incur higher premiums for unemployment insurance and are "charged back" for the cost of benefits.

As briefly mentioned above, employers may be required to pay mandatory severance benefits for failure to comply with state Mini-WARN laws. Specifically, Hawaii requires the payment of a dislocated worker allowance in the amount of the difference between the employee's last average weekly pay rate and the amount of unemployment for up to four weeks, provided there is no other severance right available.⁴¹ In Maine, an employer that relocates or terminates a covered establishment will be liable to eligible employees for severance pay at the rate of one week's pay for each year of employment in the establishment. Severance pay is in addition to any final wage payments and must be paid within one regular pay period after the employee's last full day of work, but may be offset by other severance benefits paid.⁴² If employers in New Jersey provide less than the required notice for covered facility closings or layoffs, the employee is entitled to severance pay equal to one week of pay for each full year of employment. The rate of severance pay must be the average regular rate of compensation received during the employee's last three years of employment with the employer or the final regular rate, whichever is higher. Such severance is in addition to any other severance paid by the employer, except that any back pay provided by the employer due to a violation of federal WARN will be credited toward the severance penalty.⁴³

Many employers provide severance benefits to employees under employee benefit plans covered by ERISA or under informal severance programs. These programs typically involve payment of severance benefits for job loss due to economic conditions which typically would include displacement by robots. Benefits vary considerably but often are calculated based on the employee's pay rate and length of service. Most employers require employees to sign a release of claims to receive all or part of offered severance benefits. Any release agreements signed by employees in exchange for voluntary severance payments and/or other benefits must comply with the requirements of the federal Older Workers Benefit Protection Act (OWBPA)⁴⁴ in order for a waiver of the right to recover for age discrimination in violation of the Age Discrimination in Employment Act (ADEA) to be effective. The OWBPA requires releases to contain specific terms including being written in understandable language for the average person presented with the release, specifically refer to the ADEA, state that the individual does not waive future claims, provide consideration in addition to what the individual is otherwise entitled, advise the individual to consult with an attorney, and allow at least 21 days to consider whether to sign and provide seven days to revoke after signing.⁴⁵

Severance pay offered as part of an "employment termination program" which can involve as few as two employees, must allow the individuals at least 45 days to consider whether to sign the release instead of the 21-day period referenced above in order to comply with the OWBPA. Moreover, in an effort to provide employees with the information that will allow them (and their attorneys) to make an informed decision relating to the release, employers must attach a disclosure informing the employees of the "decisional unit" considered in the program, the applicable time limits, the criteria for eligibility, and the job titles and ages (but not names) of persons eligible or selected for the program and those individuals in the same job classification or organization unit who are not eligible or selected for the program.⁴⁶ Like with WARN notice requirements, these obligations can be quite complicated and employers should seek qualified counsel to assist with preparing necessary releases and disclosures.

4. Are Federal or State Retraining Funds or Programs Available to Employees Displaced by Robots?

For as many new jobs as will be created through robotics and automation, workers whose positions are replaced by such technology will not slip easily into these newly created jobs. This is particularly true for those holding blue collar positions, who will instead likely become

dislocated workers. A dislocated worker is an individual who has been laid off, and is unlikely to return to his or her previous occupation or industry due to foreign competition or technological change. Local and federal governments reacting to human displacement and WARN events will need to rethink and retool existing retraining programs.

The blue collar jobs of the future will require greater worker adaptability and greater technological sophistication.⁴⁷ Today's displaced blue collar workers will need job training to possibly fill those positions where great needs exist. According to the Bureau of Labor Statistics, the U.S. unemployment rate remained above 7% for the last four years, yet 3.9 million U.S. jobs went unfilled in October 2013.⁴⁸

As briefly discussed above, if jobs are lost due to robotics technology, just as with any other WARN-triggering job loss, employers must also notify the state dislocated worker unit and the chief elected official of the local government where the closing or layoff will occur.⁴⁹

The state dislocated worker units receiving the WARN notices vary in purpose, focus and functionality, but the primary purpose of these units is to help reintegrate dislocated employees back into the workforce. The Department of Labor's Employment and Training Administration (ETA) also provides information on training programs and other services available to assist laid-off workers or those who are about to be laid off. President Obama has pushed to expand funding for job training at community colleges and to establish a network of regional manufacturing hubs pulling together academia, private employers, and the government to foster innovation and retrain workers.⁵⁰ Whether these efforts will succeed, and whether the dislocated worker units will focus training efforts on the next generation of jobs, will continue to depend upon legislative, academic, and corporate efforts.

5. How Should Employers Best Address These Issues?

While no current U.S. laws require advance notice of job loss specifically due to displacement by robots or other automation, employers still must be aware of the requirements under WARN. Failure to comply will expose employers to penalties, back wages and benefits, and attorneys' fees.⁵¹ In addition, because state law, union agreements, and employer policies may provide employees with greater rights than are provided by WARN, a company confronted with a WARN situation needs to be aware of what may be provided by local laws, union agreements, and employer policies.

Employers that operate outside of the U.S. should be aware that other countries maintain diverse laws protecting workers affected by layoffs and closings. Some countries, including China and the member-states of the European Union, require that employers comply with certain notice procedures prior to mass layoffs.⁵² For example, the European Union requires that employers subject to EU law confer with employees when considering mass layoffs by providing workers with information regarding the proposed layoffs, considering workers' constructive proposals, and providing notice to the relevant state authority.⁵³ Countries may also restrict employers' discretion over whom to terminate and even whether layoffs may occur.⁵⁴ Additionally, some countries, including China and Mexico, require that employers compensate employees terminated as a result of layoffs or plant closings.⁵⁵ In fact, Mexican law specifically requires compensation when employees become redundant as a result of the incorporation of new technologies into the workplace.⁵⁶

The patchwork of national laws relating to layoffs creates both risks and opportunities for employers doing business outside of the United States. While some countries regulate the manner and permissible extent of layoffs in great detail, others do not. Thus, in addition to limiting liability, cognizance of various nations' treatment of layoffs can provide a competitive advantage to employers when choosing where to base their operations. In order to avoid the risk of high costs of compliance, and to realize the advantages of hospitable legal regimes, businesses should seek counsel for decisions relating to both personnel and the locations of potential bases of operation.

B. Union and Non-Union Labor Relations

While the subject of robotics involves bleeding-edge technology, decades-old legal concepts govern the labor law implications of the implementation of robotics. In 1935, Congress enacted the National Labor Relations Act (NLRA)⁵⁷ to protect, among other things, the rights of employees to unionize or otherwise engage in protected concerted activity. Most non-union employers do not spend a lot of time worrying about the NLRA, but any employer—union or non-union—considering implementing robotics needs to have a firm grasp on the legal strictures it imposes.

1. Robotics and Protected Concerted Activity

Most employers are non-union, are not currently encountering organizing activity, and prefer to stay that way. To do so, employers must be cognizant of both how they communicate the concept of robotics and the requirements of the NLRA when they decide to introduce robotics into the workplace.

The way an employer communicates the concept of robotics or automation to employees is critical to employee acceptance. While employers view robotics as a method for increasing productivity and efficiency, employees often see only potential job loss. Probably among the greatest drivers of union organizing activity is employees' fear of losing their jobs. Unions might exploit the fear of job loss created by the specter of robotic replacement in their efforts to solicit employees. For this reason, employers should be careful to couch any discussions of robotics in honest terms of the benefits that automation will provide for employees: greater safety, less arduous working conditions, or an overall improvement in the workplace. If productivity doubles due to the use of robots and business correspondingly expands, this does not mean that the human workforce needs to decline. Also, if one employer does not use the latest technology in an effort to preserve employment, it will be unable to compete with other employers worldwide that are using advanced technology. Accordingly, employees would be laid off because of declining business.

Regardless of how the introduction of robotics is presented, employers should be ready for employees to react with concern about their jobs. Section 7 of the NLRA protects employees' right to engage in concerted activity, with or without a union, for mutual aid or protection.⁵⁸ This means that the NLRA protects employees who act with or on the authority of other employees; seek to initiate, induce, or prepare for group action; or bring group concerns or complaints to the attention of management. Thus, within certain limits, employees may speak out against the introduction of robotics, threaten to unionize, complain to the public or the employer's customers, or even walk off the job or picket the employer as a form of protest. For example, in *Trompler, Inc. v. NLRB*,⁵⁹ six non-union workers walked off the job to protest a supervisor's behavior. While in the non-labor context such behavior might be labeled insubordination, or even job abandonment, the National Labor Relations Board ("NLRB" or "the Board"), the federal agency charged with enforcing the NLRA, held it was protected concerted activity.

Over the years, and particularly recently, the NLRB has significantly expanded its view of the conduct that falls within the ambit of the NLRA's protection. In addition to protecting employees who act together in groups of two or more, Section 7's protection also extends to an employee who acts alone if the employee's activities are the logical outgrowth of work-related concerns expressed by employees collectively.⁶⁰ For example, in *NLRB v. Caval Tool Division*,⁶¹ the NLRB found Section 7 protected a single employee's criticism of an employer's new break policy during a company meeting because the employee sought a change in the terms and conditions of employment for all employees. On the other hand, conduct is not protected concerted activity if the employee is engaging in activity "solely by and on behalf of the employee himself."⁶²

This is not to say that the NLRA protects all employee conduct. While the NLRB continues to broaden the scope of Section 7's protections, unlawful, violent,⁶³ or exceptionally disloyal conduct exceeds the protection of the NLRA. For example, the NLRA does not protect materially false public comments about an employer's products or service,⁶⁴ nor does it shield an employee's efforts to convince other employees to quit and go work for a unionized employer.⁶⁵

Employer responses to protected concerted activity must be measured. The NLRA makes it unlawful for employers to discipline, discharge, or otherwise take adverse action against employees because they engage in protected activity. For example, an employee who complains that the introduction of robotics will result in layoffs, or otherwise protests the effect of robotics on the terms and conditions of employment, likely is engaged in protected concerted activity. Subsequently laying the employee off or taking other adverse action against him *because of his complaints* would violate Section 7. However, laying the employee off because the introduction of robotics rendered his position superfluous would not violate the NLRA. When confronted with employee behavior that appears to push the boundaries of protected activity, employers should contact legal counsel before taking action. Again, the best way to deal with employee concerns about the introduction of robotics is by communicating often and effectively with employees about the benefits of a robotic workplace and the critical role employees serve within it.

2. Robotics and the Union Campaign

As discussed above, unions may try to capitalize on employee fears stemming from the possible implementation of robotics to spur unionization. Employers faced with a union organizing drive need to be even more careful of the way they communicate about the potential use of robotics with employees. In addition to protecting employees' right to organize, the NLRA, as interpreted by the NLRB, places significant restrictions on what an employer can and cannot communicate to employees during an organizing campaign. Although employers have a constitutional right to express opinions that are non-coercive in nature,⁶⁶ communications that employees could perceive as an express or implied threat of plant closure (in favor of a new automated facility) or of discharge (in favor of a robotic workforce) made during an organizing campaign generally constitute unlawful interference with employees' Section 7 right to organize.⁶⁷

For these reasons, an employer seeking to discuss a possible transition to a robotic workplace during an organizing campaign should tread lightly. It is almost certainly unlawful for an employer to state that if employees elect a union, it will begin automating the facility to save money and achieve flexibility and efficiency that a unionized workforce could not provide.⁶⁸ Indeed, the NLRB has long held that employers that base their predictions that they will have to close or move if unionized on a general belief that unionization will increase labor costs, violate the NLRA.⁶⁹

Nevertheless, the expression of an employer's views does not constitute an unfair labor practice if the views contain no threat of reprisal, force or promise of benefit.⁷⁰ Employers may lawfully make predictions on the precise effects that the employer believes unionization will have on the company, so long as they base those predictions on objective fact and circumstances outside of their control.⁷¹ If the employer's basis for such predictions is not objective fact, however, the predictions may violate the NLRA.⁷²

If an employer's possible introduction of robotics into the workplace is an issue in an organizing campaign, the employer will need to discuss the possibility in a lawful manner. Probably the safest course would be to acknowledge that the employer has explored the issue, and whether it ultimately chooses to move forward with robotics will not depend on whether employees vote for the union. Moreover, if the employer has already made the decision to transition to robotics before the commencement of a union organizing drive, the employer may communicate that decision to employees.

3. Bargaining over Robotics

Once an employer's employees elect a union to represent them, the NLRA imposes specific obligations on both the employer and the union that may impact the introduction of a robotic workplace. Chief among these obligations is the duty to engage in collective bargaining. Specifically, the NLRA requires:

. . . the performance of the mutual obligation of the employer and the representative of employees to meet at reasonable times and confer in good faith with respect to wages, hours and other conditions of employment . . . but such obligation does not compel either party to agree to a proposal or require the making of a concession.⁷³

Although the NLRA expressly limits the duty to bargain to certain subjects (*i.e.*, "wages, hours and other conditions of employment"), the NLRB interprets those mandatory subjects of bargaining broadly. Thus, mandatory bargaining subjects include not just wages and hours, but also merit increases, bonuses, pensions, profit-sharing, health and welfare plans, discharges, grievance procedures, disciplinary procedures, drug testing, seniority, promotions, transfers, health and safety, work assignments, plant closings, and myriad other subjects that directly impact employees' livelihoods.⁷⁴

Because an employer's use of robotics necessarily affects existing employees' terms and conditions of employment, either by substantially changing the nature of their jobs or by eliminating bargaining unit jobs or work altogether, robotics could become a mandatory subject of bargaining.⁷⁵ While there appear to be few NLRB decisions concerning the transition to a robotic workforce, the NLRB has long held that a technological change that significantly affects an employer's unionized workforce is a mandatory subject of bargaining. For example, in *Renton News Record*, a group of newspaper industry employers sought ways to improve operations, increase output and improve mechanical quality. This improvement process resulted in the automation of certain tasks and a reduction of the workforce. The NLRB found that the NLRA required the employers to bargain "concerning their intended change of operations and its effects upon the composing room employees," and their refusal to do so violated the NLRA.⁷⁶

The NLRB reached the same result in *Leach Corp.*⁷⁷ There, because of automation and other technological improvements, an employer changed from a batch system to a "just-in-time" manufacturing process. Although the changes involved were purely mechanical and involved no fundamental manufacturing process change, the NLRB found the employer unlawfully failed to bargain over the change. Thus, even if an employer's introduction of robotics into the workplace makes no fundamental change to the employer's processes, the mechanical change itself, *i.e.* the change to robotics, is likely a mandatory subject of bargaining.

Absent a waiver of the union's right to bargain, unilateral changes to terms and conditions of employment that involve mandatory subjects of bargaining is a *per se* violation of the NLRA.⁷⁸ An unlawful unilateral change is one made by the employer without first bargaining about the changes with the union *and* either bargaining to an impasse *or* obtaining union agreement.⁷⁹ The rule applies to any change to a mandatory subject of bargaining that is a material, substantial and significant change to the terms and conditions of employment regardless of the employer's motive for the change.⁸⁰

For this reason, employers negotiating an initial collective bargaining agreement (“CBA” or “contract”) should generally attempt to negotiate a robust “management rights” clause that reserves the employer’s right to make operational changes and a “no-strike” clause that prohibits employees from striking over such changes during the term of the agreement. This is particularly true for employers considering a move toward a robotic workplace. Such employers should seek a management rights or other clause that gives them the specific right to adopt technological or mechanical changes to their workplaces without further bargaining with the union. The NLRB and arbitrators generally enforce such clauses as a waiver of the union’s right to bargain over such issues, so long as the clause is clear and unmistakable.⁸¹

An ideal management rights or technological changes clause specifically acknowledges the employer’s right to automate processes or implement robotics. Moreover, because the move toward a robotic workforce may require changes to or expansion of employees’ duties, an ideal management rights clause would allow an employer to make those sorts of changes without bargaining with the union.

By the same token, employers should be aware that certain contract language could restrict their ability to introduce robotics to the workplace. Language that limits when an employer may make operational or technological changes, restricts an employer from changing or altering employees’ job duties, precludes the erosion of bargaining unit work, or requires the employer to discuss any such changes before making a decision, could prevent or significantly delay an employer’s move toward a robotic workplace. Similarly, contract language that precludes an employer from transferring bargaining unit work to new positions or classifications could prevent an employer from creating a new position to operate a robot that performs work previously done by members of the bargaining unit.

Another significant concern for employers negotiating an initial, or even a successor, CBA, is that the union will likely bargain very hard for contract language that protects employee job security. This is particularly true when the union believes that the employer may be considering changes, such as the implementation of robotics, that could significantly alter the bargaining unit, either by changing employee job responsibilities, or more likely, culminating in a reduction-in-force. For example, collective bargaining agreements in the automotive industry, which is both heavily unionized and heavily automated, contain significant employee security and income provisions protecting employees. Factors such as the strength of the union, fear over imminent job loss, or other economic factors could render employees more willing to strike rather than agree to contract language allowing for the implementation of robotics without additional bargaining.

The NLRA does not require either party to agree to the other’s demands. However, when no collective bargaining agreement governs the terms and conditions of employment—either because the parties have not negotiated one or because the previous agreement expired—an employer may bargain to impasse over mandatory subjects of bargaining. If the parties reach impasse on a mandatory subject of bargaining, the employer may implement its proposal. This sort of unilateral implementation should not be undertaken lightly, as it could provoke a strike or other action from the union.

Although an employer’s duty to bargain over terms and conditions commonly arises in negotiations for an initial or successor contract, it applies also during the term of an existing collective bargaining agreement when one of the parties proposes a course of action or change that affects a mandatory subject of bargaining.⁸² Moreover, because the implementation of robotics, in most instances, is a mandatory subject of bargaining, absent a clear and unequivocal waiver of the right to bargain over the subject, an employer will be obligated to bargain over the implementation of robotics even if the CBA is silent on the issue.⁸³

Even when the parties’ CBA expressly permits an employer to increase its reliance on robotics without bargaining with the union, other elements of the decision may still require bargaining. For example, if the increased reliance on robotics includes the relocation of work to a more technologically advanced facility, the employer may be required to bargain over the relocation of bargaining unit work even if the CBA permits the employer to adopt technological improvements unilaterally.⁸⁴ For example, in *Dubuque Packing Co.*, the NLRB concluded an employer has a duty to bargain over the relocation of bargaining unit work if labor costs are a factor in the decision to relocate, unless it can show the union could not have offered labor cost concessions that could have changed the employer’s decision to relocate.⁸⁵

It is also important to note that even if an employer is free to make a decision to transition to a robotic workplace without bargaining with the union, it still may be required to bargain over the *effects* of that decision.⁸⁶ The purpose of effects bargaining is to give the union “an opportunity to bargain over the rights of the employees whose employment status will be altered by the managerial decision.”⁸⁷ “[I]ssues such as severance pay, seniority and pensions, among others, are necessarily of particular relevance and importance” in effects bargaining.⁸⁸ Additionally, failing to give a union sufficient time to bargain over effects may be an unfair labor practice.⁸⁹

4. Practical Recommendations Moving Forward

Just as a robotic future signals optimism for employers seeking to improve efficiency and safety while reducing costs, it may frighten employees who fear job loss. Whether union or non-union, employers should be aware of that apprehension when broaching the subject with employees. Unions may exploit workers' fears to organize non-union workplaces; in union workplaces, unions may leverage those same concerns to make contract language restricting the employer's right to introduce robotics a strike issue during negotiations. For these reasons, communication is the key to a successful transition to a robotic workplace for both union and non-union employers. For the easiest transition possible, employers must "sell" their workforces on the honest, positive benefits of the robotic workplace to their employees.

Employers that are currently bargaining for a new agreement should bargain for language that allows them to introduce robotics without further bargaining. Most unions will vigorously oppose any such language, and/or will seek significant concessions or assurances in return.

Union employers who are parties to an existing CBA should review the contract to determine whether they are obligated to bargain over the introduction of robotics. If the employer is obligated to bargain, it should be prepared to bargain over both the decision itself and the effects of that decision. The employer should also expect the union to refuse to bargain during the term of the existing contract if it can credibly do so, and for the union to oppose vigorously any such change whenever bargaining actually occurs. Employers should also prepare for the union to threaten, and possibly carry out its threat, to strike over the issue.

Labor law creates a minefield for unwary employers that want to integrate robotics into their workplaces. Employers should take their time in planning these changes, and should consult with labor counsel before moving forward in order to ease the transition.

C. Anti-Discrimination

Employers must consider how the robotics revolution will implicate anti-discrimination laws. For example, advanced robotics used in recruiting must be compliant with anti-discrimination laws. In some respects, compliance with anti-discrimination statutes is improved when robotic systems are implemented. By way of example, interview questions asked by a robot, itself unbiased, in a job interview can be pre-screened to ensure legal compliance. However, behavioral analysis and other forms of data acquired by robots could have a disparate impact on protected categories. When behavioral data is collected and compared to similar data about successful workers, unintended correlations can emerge that negatively impact candidates.⁹⁰ For example, use of certain software programs might be more common for younger workers yet not necessary for certain jobs under consideration. It may be that workers who have six months of prior unemployment as a group are less desirable, but using such a criterion could adversely impact minorities. The list of ways a robot or a software program could evaluate a job candidate or existing employee needs to be reviewed to make certain that disparate impact is not occurring, or if it is, that it is justified by legitimate business requirements. This section discusses the relevant anti-discrimination statutes at issue, and suggests practical recommendations for avoiding discrimination claims as the unstoppable robotics revolution enters the workplace.

1. Age Discrimination in Employment Act (ADEA)

The ADEA⁹¹ prohibits discrimination against applicants or employees age 40 or over because of age. The ADEA also prohibits employers from discriminating on the basis of age between two individuals, both of whom are within the protected age group. For example, it is a violation of the ADEA for an employer to hire a 45-year-old applicant as opposed to a 65-year-old applicant on the basis of the difference in age between them.

The ADEA prohibits discrimination in hiring, discharge, promotion, and other terms or conditions of employment. A plaintiff establishes a case of age discrimination by demonstrating that:

- The plaintiff was in a protected age group;
- The plaintiff was qualified;
- The plaintiff was nevertheless adversely affected; and
- The defendant sought someone else with similar qualifications to perform the work.

In addition, the U.S. Supreme Court ruled in *Smith v. City of Jackson*⁹² that workers age 40 and older may prove discrimination under the ADEA using a disparate impact theory. Prior to the holding, an individual could only obtain recovery under the ADEA by claiming the employer had an *intent* to discriminate. Disparate impact occurs when a company's facially neutral policy has an adverse effect upon a protected group.

Two issues present themselves when employers introduce advanced robotic systems into the workplace. First, are the robotic systems pre-programmed so that they function in a discriminatory manner? Second, does using an advanced robotic system have a disparate impact on those employees who are 40 and older?

With regard to the first question, if an employer uses robots pre-programmed to discriminate based on age, then the employer could face exposure under the ADEA. For example, if an employer uses an advanced robotic system to conduct its hiring, a robot pre-programmed to seek out younger applicants—such as sorting applicants by graduation date—could violate the ADEA. Depending on the progression of technology and the needs of the marketplace, employers may have the option of purchasing pre-programmed advanced robotic systems or of programming the systems themselves. In either case, employers should be vigilant in understanding how their advanced robotic systems are designed to behave.

To the second issue, the very use of advanced robotic systems in the workplace could subject an employer to exposure under the ADEA. If those 40 or older are adversely impacted because of an employer's use of advanced robotics systems, then the employer may face exposure under the ADEA. For example, those employees who are 40 or older may not have the technological skills to operate and work with advanced robotic systems. Employers should therefore take a closer look at whether the advanced robotic systems require training or programming skills disproportionately held by younger workers.

To minimize risk, employers can provide training programs to equip their workforce with the necessary skills to work alongside and with advanced robotic systems. It is important to note that in providing training, employers should not assume employees who are 40 or older do not have the technical skills necessary. Moreover, employers should document employees who decline the training despite having the capability of acquiring necessary skills. Together, this will allow employers to assess the impact of the training programs with the goal of avoiding a disparate impact against older workers.

2. The Americans with Disabilities Act of 1990

Title I of the Americans with Disabilities Act of 1990 (ADA),⁹³ amended by the ADA Amendments Act of 2008 (ADAAA),⁹⁴ prohibits both public and private employers from discriminating in employment against persons with physical and mental disabilities. The ADA requires employers to make reasonable accommodation to the needs of disabled applicants and employees, as long as such accommodation does not result in undue hardship to the employer's operations. A reasonable accommodation may include any of the following:

- Making existing facilities used by employees readily accessible to and usable by individuals with disabilities;
- Job restructuring;
- Part-time or modified work schedules;
- Reassigning a disabled individual to a vacant position;
- Acquiring or modifying equipment or devices;
- Appropriately adjusting or modifying examinations, training materials, or policies;
- Providing qualified readers or interpreters;
- Hiring a job coach to help the employee in his or her job for a temporary period of time; and
- Other similar accommodations for individuals with disabilities.

The duty to make reasonable accommodations extends to: the application process; on-the-job training, whether offered directly by the employer or through a vendor or consultant; the employee's ability to enjoy employer-sponsored social activities; and other conditions of employment not strictly related to the ability to perform the job.

a. Can a Robot Become a Legally Required Reasonable Accommodation for a Disabled Worker?

Yes. Today, courts may consider accommodations for certain individuals an undue hardship to an employer's operations. In the foreseeable future, advanced robotic systems may make such accommodations reasonable in the eyes of the court. Advanced technologies could provide never-before-seen opportunities for individuals with disabilities. For example, self-driving vehicles and advanced sensory technology could make jobs previously denied to deaf or blind applicants a real opportunity. Moreover, advanced technologies could make

already existing technology affordable and more accessible. Robotic arms or legs are already allowing individuals with physical disabilities to operate without physical restrictions.

Because an employee does not have to specifically request an effective accommodation to invoke the employer's obligation to accommodate, employers could risk exposure with the impending robotics revolution. To minimize risk, employers should stay ahead of the curve by researching and staying apprised of new and affordable technologies.

For example, the use of robotic exoskeletons, or "wearable robots", to enable disabled employees to perform their job functions could be significant. Wearable robots have already been developed to—among other functions—boost arm strength,⁹⁵ aid in heavy lifting,⁹⁶ and even help those unable to walk.⁹⁷ In addition, as is discussed elsewhere in this Report, by reducing workplace injuries, robotic exoskeletons may eventually result in lower instances of workers' compensation claims. Whether robotic exoskeletons could one day be used as reasonable accommodations for disabled employees or whether doing so would constitute an undue hardship on the employer will likely depend on cost of the device, size of the operation, and practicality of use, among other factors.

b. Can Sensor Technology Provide Employers With Personal Information During the Hiring Process that Violates the ADA?

The ADA prohibits an employer from making certain inquiries and conducting medical examinations before making an offer of employment. Congress intended to restrict employer efforts to uncover hidden disabilities.⁹⁸ With this congressional intent in mind, an advanced robotics system that can detect disabilities or health conditions that are hidden may violate the ADA. Still, a job offer may be conditioned upon successful completion of a medical examination if the information is "job-related and consistent with business necessity."

Also, according to the Equal Employment Opportunity Commission (EEOC) guidelines,⁹⁹ an employer may ask limited questions concerning reasonable accommodation if:

- The employer reasonably believes the applicant will need a reasonable accommodation because of an obvious disability;
- The employer reasonably believes the applicant will need reasonable accommodation because of a hidden disability that the applicant has voluntarily disclosed to the employer; or
- The applicant has voluntarily disclosed to the employer that he or she needs reasonable accommodation to perform the job.

Can a robot be tasked with the challenge of determining whether an applicant will need a reasonable accommodation? It is clear Congress did not write the ADA taking into consideration that an advanced robotic system could conduct interviews, for example. Therefore, it is difficult to determine what constitutes an employer's belief if an advanced robotic system is acting on an employer's behalf. An employer that chooses to use an advanced robotic system in the interviewing process should ensure that the system inquires only about a disability that would be obvious to a human.

3. Title VII/National Origin Issues

Several federal laws prohibit discrimination based on race, including Title VII of the Civil Rights Act of 1964 and the Civil Rights Acts of 1866 and 1871. These laws prohibit employers from using an individual's race or other protected category as a basis for any employment decision. Moreover, Title VII¹⁰⁰ prohibits discrimination based on national origin.

The Supreme Court has ruled that Title VII prohibits not only overt discrimination but also employment practices that appear neutral but are discriminatory in operation. The plaintiff presents a case of discrimination by showing that a neutral policy has a harsher or adverse impact on a protected class (*e.g.*, Hispanics, Asians, women, etc.). The adverse impact analysis has been utilized regarding objective employment criteria such as standardized tests.

a. Are There Unintended Disparate Impacts on Legally Protected Categories of Employees from the Use of Robots?

There could be. Pre-programmed or employer-programmed robotic systems could operate with inherent biases or limitations. For example, technology that operates by voice commands could present challenges for individuals who do not speak English as their first language. Employers could minimize their exposure by customizing advanced robotic systems to meet such challenges. In addition, employers can provide targeted training to employees in a protected class in order to mitigate such challenges. In providing training, employers should document employees who decline the training despite having the capability of acquiring necessary skills. This will allow employers to assess the impact of the training programs with the goal of avoiding a disparate impact against legally protected categories of employees.

4. Other Protected Categories: Are There Unintended Disparate Impacts from the use of Robots on Other Legally Protected Categories?

a. Unemployment as a Protected Status

Early in 2011, the EEOC conducted legislative hearings on whether the unemployed could be considered a protected class under Title VII. In the same year, members of the Senate and House of Representatives first introduced the Fair Employment Opportunity Act of 2011,¹⁰¹ which was recently re-introduced in January 2014. This bill would make it an unlawful employment practice for an employer to deny employment based on an applicant's employment status. Federally, no regulations or laws have yet been enacted to make this a requirement for employers. However, some states and the District of Columbia have passed laws that make it illegal to discriminate based on unemployment status. Additionally, several states have considered such legislation in the last few years. Employers should be on the lookout for such legislation. Moreover, employers that introduce advanced robotic systems in the hiring process should be aware of such legislation or regulations when programming their robots.

b. Other Concerns?

Management makes discretionary decisions daily. The introduction of advanced robotic systems into the workforce could put robots in decision-making positions. Employers should take into account discretionary decision-making scenarios when deciding to implement and/or program advanced robotic systems with management authority. For example, an employer could use an advanced robotic system to discipline workplace violations. Doing so without proper consideration to potential pitfalls could give rise to disparate impact exposure.

5. Displacement Issues: Under What Circumstance Could Displacement of Employees in Protected Categories Give Rise to Discrimination Claims?

Displacement of employees could give rise to discrimination claims under the ADEA. To prove age discrimination during a reduction-in-force, the terminated employee must produce circumstantial or direct evidence from which a fact finder might reasonably conclude the employer intended to discriminate in laying off the older employee rather than a younger employee. No violation of the ADEA occurs if the employer's reasons for terminating an employee were legitimate and not age-related. Legitimate reasons include reductions in the workforce to address adverse financial conditions.

In implementing a reduction in force, employers should pay particular attention to age-related disparate impact. In other words, if the reduction in force is disparately impacting employees age 40 or older, an employer may face higher exposure to an ADEA-based lawsuit. Therefore, in implementing a reduction-in-force, an employer should take an age-balanced approach so as to minimize risk.

In the same vein, employers should be aware of disparate impact potential when implementing reductions-in-force that could disparately affect specific races, sexes, disabled persons, and other protected categories.

6. Practical Recommendations

When incorporating robotics and AI systems into the workplace, employers should consider the following to reduce their risk of discrimination claims:

- Develop narrowly tailored written policies/procedures for utilizing robotic systems in the workplace.
- Pre-screen all questions asked by a robot in a job interview to ensure that all inquiries are job related/consistent with business necessity.
- Understand how the robot or software learns and forms decisions and recommendations. If this process is based on learning technology that compares applicant characteristics with the current workforce, it needs to be tested such that protected categories are not inadvertently used as part of the screening criteria.
- Conduct an adverse impact analysis before screening out any applicant and/or employee based on data or information obtained using advanced robotics.
- Establish a business necessity defense before making any and all employment decisions based on advanced robotics.
- Designate a human resources professional to become the organization's expert on robotics in the workplace.
- Train managers, hiring officials, and decision-makers on how to implement the company's robotics in the workplace policies and procedures consistent with anti-discrimination laws.
- Maintain confidentiality of any and all information obtained from advanced robotic systems.

D. Wage & Hour

As robotics facilitates remote work, the physical and temporal bounds of the workplace are becoming more flexible. These changes raise questions as to how wage and hour laws will apply to an increasingly mobile, decentralized workforce. Realizing the benefits of robotics requires attention to which laws will apply to remote workers, and how such workers must be classified and compensated.

1. What Wage and Hour Laws Apply to Employees who Operate Robots Remotely Across State Boundaries?

Employers are subject to federal wage and hour laws such as the Fair Labor Standards Act (FLSA)¹⁰² and Equal Pay Act (EPA)¹⁰³ with respect to the workers performing work in the United States. In addition, employers may be subject to the wage and hour laws of various states. As a general rule, the law of the state in which the work is performed governs employer's wage and hour responsibilities with respect to that employee. Therefore, a worker located in one state and operating remotely a robot in another state would probably be covered by the laws of the state where she presides when she operates the robot.

Subject to constitutional restraints, states determine the reach of their own wage and hour laws.¹⁰⁴ Therefore, states have discretion over whether to extend wage and hour law coverage to workers whose job tasks primarily produce results in another state. States may define the scope of their wage and hour statutes very broadly.¹⁰⁵ California, for example, has even required California corporations to comply with its own minimum wage standards in the case of workers who live and work primarily out-of-state for any entire days that the out-of-state workers spend working in California.¹⁰⁶ However, so far no state has successfully subjected an employer based in that state to that state's wage and hour requirements for work conducted by an employee who performs all of his work in another state.¹⁰⁷

Therefore, as the law stands now, an employee working remotely from another state on a permanent basis would likely not be subject to the law of the state in which the robot he operates is located, and he would be subject to the law of the state in which he performs the operation. However, employers located on state borders should consider the potential wage and hour implications of allowing their employees to split their time between working in the physical plant and working remotely from another state.

2. What Wage and Hour Laws Apply to Employees who Operate Robots Remotely Across National Boundaries?

Because there is no international body of wage and hour law, the question of what wage and hour laws apply to remote workers is one for individual nations and international bodies to address. Most countries, including the U.S., and many states, follow the international law principle against extraterritorial application of their laws, and will therefore not attempt to regulate the working conditions of people deemed to work outside of their territory. With the rise of cross-border remote work, it may become more difficult to determine, from a legal perspective, where people work. While it is likely that a worker permanently based abroad and operating a robot in a U.S. factory is not covered by U.S. wage and hour law, the law will continue to evolve as technology presents new issues for courts to decide.

Courts' presumption against extraterritorial application of U.S. law precludes most domestic employment law from reaching employees whom courts consider to be working in other countries.¹⁰⁸ U.S. courts usually determine that an employee works at his "employment base" or "work station."¹⁰⁹ Courts generally interpret these terms to mean the physical place where a person is located when he works.¹¹⁰ However, courts have also taken into account whether work done while visiting the U.S. on a temporary basis concerns "foreign operations," which has been found to preclude application of U.S. employment law.¹¹¹ If adopted more broadly, this focus on the basis of operations rather than the physical location of the worker at the time of work, could subject international businesses to domestic wage and hour requirements for remote workers who spend some time in the U.S.

Federal and many state wage and hour codes reflect this presumption against extraterritoriality—and therefore face the same interpretive challenges—because remote working disaggregates the location of the worker from the location of operations. The FLSA states that it "shall not apply with respect to any employee whose services during the workweek are performed in a workplace within a foreign country or within territory under the jurisdiction of the United States."¹¹² Few, if any, courts have had the chance to apply this provision to the question of remote operation of robots located in the U.S. To the extent that courts have interpreted this provision, they usually find that when the worker is physically outside of the U.S. for the majority of the time worked, they are not entitled to U.S. wage and hour protections.¹¹³ The definition of "workplace", however, could be contested in the context of remote operation of robots. When courts do address this question, they may draw from the reasoning behind the institution of FLSA¹¹⁴ to decline coverage to workers permanently based abroad.

Therefore, employers of remote workers who live and work wholly in other countries are not currently subject to federal or state wage and hour requirements with respect to those workers. Workers who travel between countries may come under the protections of federal and state wage and hour codes if they spend substantial time in the U.S. Other countries may choose whether or not to apply their wage and hour laws to employees based in those countries.

3. How Should Remote and Crowdsourced Workers Based Within the United States be Classified?

It appears that, for the foreseeable future, the distinction between employee and independent contractor will continue to provide the threshold for the application of wage and hour laws like the FLSA. Consequently, a question that employers must consider is how the incorporation of robotics will affect workers' classifications under this scheme. While courts have yet to address this question, the answer will likely turn, as it has for decades, on the precise terms and conditions of employment, on a case-by-case basis.

The FLSA and many analogous state wage and hour laws employ a very general definition of employee,¹¹⁵ leaving courts the task of drawing meaningful distinctions between employees and independent contractors. To accomplish this, courts have coined a number of tests. In the wage and hour context, the economic realities test usually provides the standard.¹¹⁶

Although articulations of the economic realities test vary, courts usually rely to some extent on each of six factors to determine whether the worker is “economically dependent on the business to which he renders service or is ... in business for himself.”¹¹⁷ The six factors are:

- the degree to which the alleged employee is independent or subject to the control of the “employer” as to the manner in which the work was performed;
- the alleged employee’s opportunities for profit or loss;
- the alleged employee’s investment in the facilities and equipment of the business;
- the permanency and duration of the relationship between the business and the alleged employee;
- the degree of skill required to perform the work of the alleged employee; and
- the extent to which the services rendered are an integral part of the employing entity.¹¹⁸

It is difficult to predict how the kinds of employment relationships that are emerging in robotic workplaces will be classified. Courts’ application of this test is highly case-specific. The factors may be assigned different relative weights in different contexts, and by courts in different jurisdictions. Furthermore, to the extent that the definition of “employee” is rooted in the lay meaning of the word, its legal definition may change along with public consensus.

Notwithstanding the difficulty of making predictions, several factors of the economic realities test tend to support classifying more flexible employment arrangements as independent contractor relationships. Remote workers’ abilities to control when and where they work supports an inference that the business exercises relatively little control. To the extent that this increased flexibility allows workers to realize gains and losses by allocating time in their days as productively as possible, it also supports classifying remote workers as independent contractors. Programming is generally considered a high-skilled job, suggesting that the programmer is an independent contractor, but the continued growth in computer literacy may soon reverse this presumption. Thus, all else equal, some features of remote and flexible work arrangements facilitated by robotics render these positions more amenable to independent contractor classifications.

Crowdsourcing, a revolutionary model for integrating technology into workplace operations, places unique strains on the traditional classification method. In the most basic sense, crowdsourcing is an internet-based method of outsourcing. On crowdsourcing websites, such as Amazon’s Mechanical Turk, “[w]orkers are offered pay for completion of a series of Human Intelligence Tasks (HITs), easily fragmented activities (like transcription, categorization or tagging) in which computers” require human assistance.¹¹⁹ Crowdsourcing platforms are attractive because they have the potential to realize savings over alternative methods of outsourcing.¹²⁰ There are many crowdsourcing websites, some laying claim to tens of thousands of HITs.

These massive workplaces raise the same question—are crowdsourced workers employees or independent contractors? According to a recent *New York Times* article, “[e]stimates of what workers can earn on these crowdsourced tasks [on one crowdsourcing website] range from about \$1.20 to \$5 an hour without any benefits.”¹²¹ However, a study focusing more broadly on the topic found that “[c]rowd work

today spans a wide range of skill and pay levels, with commercial vendors providing access to a range of workers and focused support for various tasks.¹²² To the extent that the lower hourly pay estimate is accurate, it falls short of the FLSA-established minimum wage, as well as most state minimum wages. Therefore, this pay rate could pose a substantial legal liability to businesses utilizing crowdsourcing, should these workers be deemed employees.

It is difficult to predict how crowdsourced workers will be classified. At first glance, crowdsourced workers appear to be independent contractors. They perform discrete tasks for which they are paid by the piece, use their own equipment, work when and where they want, engage in work for multiple employers, and generally receive no additional training or instruction. However, the purportedly low average rate of pay on some platforms has incited opposition to classifying crowdsourced workers as independent contractors, on the grounds that such classification circumvents the societal goals of wage and hour law.¹²³ If courts take these policy concerns into account, this could lead to crowdsourced workers being deemed employees, or even to a new definition of “employee.”

Even employers who hew to more traditional employment models should be aware of the impact of new technologies on their workers’ classifications. The FLSA exempts from its coverage, in addition to independent contractors, employees whose jobs require a nuanced knowledge of technology to allow them to perform tasks related to programming.¹²⁴ As certain tasks become automated, many positions will come to require a more sophisticated knowledge of computers. Unless the terms of the exemption change, employees in these positions may become exempt from FLSA coverage. Conversely, some jobs may come to require less discretion or specialized knowledge, causing employees to become non-exempt.

Because the standard for employee status is malleable and classifications difficult to predict, employers should approach contractor classifications with these factors in mind. To minimize risk of misclassifications, contracts should clearly provide that workers are independent contractors and indicate the opportunities they have to pursue additional work with other businesses.

4. How Should Remote Employees be Compensated When They Perform Work That Requires Them to be Available, or “On Call”?

The ability to perform work remotely suggests that employers may be able to reduce downtime spent in the physical workplace by transitioning to “on call”-type arrangements. For example, whereas moving boxes in a warehouse has required employees to be physically present during all business hours for which they might be required to move boxes, an automated warehouse could allow such employees to operate as technicians, coordinating robots remotely and spending downtime at their discretion. Whether employers are responsible for compensating this off-site downtime depends on the structure of their employment relationship.

Remote workers may be entitled to compensation for time spent in between performing tasks. The FLSA requires that employers compensate non-exempt employees for the time that they work.¹²⁵ This can include periods of worker inactivity during which the employer’s requirement that employees be available if needed limits their discretionary use of time. For example, the Tenth Circuit has held that employees’ “on call” responsibilities “to continually monitor automated alarms by pager and computer,” which required them to remain close to their homes, were “sufficiently onerous” to require compensation under the FLSA.¹²⁶ In contrast, courts usually do not find that merely requiring an employee to return a phone call or respond to a beeper causes an employer to owe the worker for the time during which that requirement exists.¹²⁷ Therefore, employers seeking to use robots and remote operation to lower payroll costs should structure remote workers’ “on call” time to minimize any restrictions on how the employees use this time, and should be aware that placing restrictive requirements on employees could expose them to claims under state and federal law.

E. Health & Safety

The Federal Occupational Safety & Health (OSH) Act¹²⁸ grants the Secretary of Labor responsibility for administering the federal occupational safety and health program. Among the Secretary’s responsibilities are the promulgation of occupational safety and health standards, and enforcement efforts aimed at ensuring employer compliance. On a day-to-day basis, the Secretary’s responsibilities have been delegated to the Occupational Safety and Health Administration (OSHA).

OSHA ensures compliance through workplace inspections and investigations, the issuance of citations, and the assessment of penalties. The OSH Act requires every employer to furnish a safe place of employment and to comply with all applicable safety and health standards. The OSH Act also allows for broad inspection and investigations of places of employment.

The advancement of robotics and artificial intelligence systems is exponential and inevitable. Equally certain are the challenge of harmonizing advancing technologies with aging employment and labor laws designed for workforces of the past. Accordingly, both the developers of advanced robotics and the users of this essential technology need to anticipate and avoid legal landmines that threaten to explode as work and the workplace change.

Federal and state health and safety laws are one area that will be affected by the advancement of robotics and artificial intelligence systems. Some of the future challenges are discussed below.

1. Is There Compliance with OSHA Regulations on Workplace Robotics?

Employers must ensure that they remain in compliance with OSHA regulations as they begin introducing advanced technologies into the workplace. While there are no OSHA standards specific to the robotics industry, certain general OSHA standards apply, such as those governing machinery and machine guarding,¹²⁹ electrical systems,¹³⁰ and lockout/tagout procedures.¹³¹ OSHA guidelines aimed specifically at the robotics industry are somewhat outdated.¹³² For example, OSHA's Guidelines for Robotics Safety¹³³ was issued in 1987. The agency's Technical Manual on Industrial Robots and Robot System Safety¹³⁴ has a 1999 effective date, and its manual containing a chapter on Robotics in the Workplace was last updated in 1992.¹³⁵ Even older, the National Institute for Occupational Safety and Health (NIOSH) issued a robotics injury prevention guide in 1984.¹³⁶

However, the American National Standards Institute (ANSI)¹³⁷ recently updated its existing standard governing robotics safety in 2012. The new standard harmonizes its standard with the applicable International Organization for Standardization (ISO) standards,¹³⁸ creating a uniform industrial robotic safety standard. While these standards are not OSHA regulations and are voluntary, the agency notes that "they do provide guidance from their originating organizations related to worker protection."¹³⁹

Having a more uniform industrial robotics standard is useful for manufacturers, integrators, and end users of this technology. Thus, employers must be vigilant to stay ahead and proactive as regulators adapt policies to new and advanced technologies. Moreover, employers can protect themselves by recognizing potential hazards, evaluating such hazards, and implementing issue-specific solutions. OSHA does make the recommendation—articulated in the ANSI safety standard for industrial robots—that employers "should accomplish a comprehensive operational safety/health hazard analysis and then devise and implement an effective safeguarding system which is fully responsive to the situation"¹⁴⁰ when robots are used in the workplace.

For example, employers may introduce mobile robotic systems that work alongside humans and help transport materials. Employers can help protect themselves and their workers by implementing training programs for their employees on how to operate the robotic systems and avoid potential injuries, instituting movement policies that avoid potential unintended contact between robotic systems and employees, and conducting timely and appropriate maintenance on the robotic systems.

2. Examples of Workplace Injuries/Fatalities Caused by Robots

OSHA's website warns of potential dangers involved in advanced robotic systems in the workplace. In 2011, an employee suffered a fatality while freeing a jam when he became caught between a robotic arm and a conveyor belt. In 2009, another employee suffered a fatality by a robotic palletizer because she entered the caged cell in which the palletizer operates without having de-energized the equipment. In 2006, a worker entered the cell of a robot to clean its sensors, and suffered a fatality because he did not utilize lockout procedures. While not common, such injuries are obviously catastrophic.

In each of the above instances, the implementation of strict procedures and training programs could have prevented these fatal or serious accidents. Notably, OSHA cites studies performed in Sweden and Japan finding that many robot-related accidents have not occurred under normal operating conditions, "but rather during programming, program touch-up, maintenance, repair, testing, setup, or adjustment. During many of these operations, the operator, programmer or corrective maintenance worker may temporarily be within the robot's working envelope where unintended operations could result in injuries."¹⁴¹

With more advanced technologies, employers can become dependent on sensor technology or other advancements to help prevent accidents. While technology may benefit employers, it can also create a dangerous dependency on preventative technology at the expense of proper training and safety procedures. Awareness of these dangers and pitfalls in addition to proactive safety training and measures will keep employers ahead of the curve on these challenges.

3. Are there Additional State Law Health and Safety Requirements?

Twenty five states¹⁴² have OSHA-approved state plans and have adopted their own standards and enforcement policies. For the most part, these states adopt standards that are identical to those set forth by federal OSHA. However, some states have adopted different standards applicable to this topic or may have different enforcement policies. A review of local laws and regulations is also needed to ensure compliance.

4. Are there Other Federal or State Agencies with Health and Safety Jurisdiction?

Other federal agencies with health and safety jurisdiction include the Federal Aviation Administration (FAA), the Department of Energy (DOE), the General Services Administration (GSA), the Food and Drug Administration (FDA), and the National Highway Traffic Safety Administration (NHTSA). Standards for every related agency should be followed.

Employers should be aware of overlapping agency jurisdiction. For example, the trucking industry could fundamentally change with the advent of the self-driving vehicle. Fed-OSHA regulations govern the safety and health of the workers and the responsibilities of employers to ensure their safety at the warehouse, dock, construction site, and in other places truckers go to deliver and pick up loads throughout the country. The NHTSA exists to ensure motor vehicle and highway safety by helping to prevent crashes and their attendant costs, both human and financial. The self-driving vehicle could have implications under both regulatory schemes for employers in the trucking industry.

Other industries that could see similar overlap include the airline industry, medical devices industry, pharmaceutical industry, agricultural industry, and manufacturing industry.

5. Examples of Safety-Related uses of Robots

NIOSH announced on July 25, 2013, that it developed a talking robotic head to aid research into factors affecting how respirators fit to workers' faces.¹⁴³ The head, named Abel, is covered in an artificial skin made of silicone that simulates the softness and elasticity of human facial tissue. Over five million Americans are required to wear respirators in their workplace. The talking head is an innovative scientific advancement that offers transformational promise to better understanding respiratory protection and respirator fit for an increasingly diverse workforce.

In addition, several companies currently use robots to perform work that is either unsafe or potentially hazardous to humans. For example, robotics perform work in excessive heat, polluted areas, or under other extreme conditions harmful to humans. The use of robots can also improve ergonomics and minimize repetitive stress injuries.¹⁴⁴

As discussed elsewhere in this Report,¹⁴⁵ the use of robotic exoskeletons or "wearable" robotics is another way in which to protect employees from occupational hazards such as overexertion and repetitive motion injuries.

6. Suggestions on How to Address these Issues?

As a general rule, employers should continue following existing regulations and procedures. The impending robotic and artificial intelligence systems revolution will likely fall under the auspice of existing laws and regulations. Employers should be vigilant to foresee new and varied means by which these technologies can create never before seen risks. Moreover, as technologies develop that make existing laws and regulations obsolete, regulators and legislators may look to pass and implement more applicable rules. Employers can stay ahead of potential legal risks by helping to shape these new rules and creating work environments that adapt with the changing laws and technologies.

F. Workers' Compensation

Advances in robotics are likely to improve workers' health and safety and, in turn, reduce employers' workers' compensation costs. Much of these savings will be realized in two ways. First, as robots take over tasks that are dangerous, strenuous, or repetitive in nature, workers will suffer fewer and less severe injuries. Second, creative applications of robotic engineering that are designed to assist workers in performing the physical requirements of their jobs will greatly improve the ability of injured workers to return to work, shorten the "lost-time" period, and reduce the re-injury rate.

The financial impact of getting injured workers back to work and doing so in less time can be substantial. For example, employers with thousands of employees report that reducing the lost-time period by only a few days can result in saving millions of dollars, both in terms of reductions in wage-loss benefits (*i.e.*, "indemnity" benefits) and medical costs. Medical costs are positively affected because, statistically, injured workers who return to work quicker tend to seek less medical treatment.

An example of the types of robotic applications that could have a positive impact in the workers' compensation context is the "wearable robot," such as the so-called "exoskeleton."¹⁴⁶ While such robots will come in many forms, they will have a couple things in common: 1) they will be worn by workers or affixed to workers' bodies in some way; and 2) they will be used by workers to supplement or replace actions previously performed by one or more of the worker's body parts using the worker's muscle power. Such robots will be directed by workers by a variety of methods, such as subtle body or eye movements, voice commands, and even brain waves. Aside from reducing the reliance on muscle power to perform tasks, such robots will greatly improve workers' speed, efficiency, and productivity, and will greatly increase their ability to perform tasks that are heavier and more repetitive with a reduced risk of injury.

Despite the benefits of wearable robots, the risk of injury will always remain. Certainly, as the use of such robots enhances workers' physical capabilities, employers are likely to ratchet up their expectations and demands that workers perform more work, improve efficiency, and perform more physically demanding and dangerous tasks. If not carefully monitored, the benefit of robotics could be lost as the injury rate keeps pace with these heightened expectations and demands. In addition, the robotic devices themselves could cause injuries in a number of different ways. For example, robots that are poorly designed and incompatible with the human body or that are well designed but poorly implemented, could easily damage muscles, tendons, and nerves, particularly when performing repetitive tasks. In addition, increased physical capabilities from using wearable robots will likely tempt workers to push the envelope by performing tasks that exceed their bodies' abilities, thus increasing the risk of injury.

Workers who are injured while using robotic devices will still be eligible for workers' compensation benefits, provided their injuries are incurred in the course and scope of their employment. For the purpose of determining eligibility for workers' compensation benefits, injuries caused by robots will be treated the same as injuries caused by using any other tool used in the workplace, such as a hammer, wrench, or computer keyboard.

G. Tort Liability Issues

In most jurisdictions in the United States, an injured worker's exclusive remedy against the worker's employer and co-workers is a workers' compensation claim.¹⁴⁷ Therefore, injured workers, for the most part, are barred from filing civil suits against their employers and co-workers over their injuries.¹⁴⁸ However, such a bar does not preclude an injured worker from filing a civil lawsuit against third parties (*i.e.* parties other than the worker's employer and co-workers) who manufactured, designed, installed, operated, maintained, or programmed machinery, equipment, and tools used in the workplace. Where an injured worker sues a third party and recovers damages for the injury, the employer or insurance carrier may be able to recover all or a portion of the amount of workers' compensation wage-loss and medical benefits paid to the worker for the same injury. Typically, an employer or insurance carrier obtains such a re-payment by asserting a subrogation lien. In many jurisdictions where an employer has full immunity from civil claims by injured workers, a third party may not, in turn, join the employer in the civil litigation or seek a contribution from the employer for the amount of damages paid to the injured worker.

While the increase of robotics will certainly present many new challenges for employers and equipment manufacturers, without changes in the law, an employer's immunity from civil suits over work-related injuries will not change. Likewise, workers will continue to have the right to sue third parties over work injuries caused by machinery, equipment, and tools. As the use of robotic equipment increases, the frequency of third-party civil suits against those who manufactured, designed, installed, operated, maintained, or programmed the robotics will also increase. Such suits will typically involve two legal arguments: 1) a negligence action—a claim that the third party's negligence caused the worker's injury; and/or 2) a product liability action—a claim that the injury was caused by equipment that is defective or unreasonably dangerous, or by dangerously deficient instructions or warnings. However, given the complexity of robotics equipment, proving the necessary elements for either action will be challenging and will require the use of costly experts. Also, where multiple third parties are involved, proving which third party (or third parties) was at fault and, if so, to what extent, could prove to be a daunting task.

H. Privacy

From the perspective of workplace privacy, the evolution of the work performed by robots, from "manufacturing jobs" to the "information economy," is critical. Whereas early robots were designed to perform only manual tasks, such as building cars, the newer breed of robots are designed to collect and analyze massive amounts of information and solve complex problems. IBM's Watson supercomputer is the iconic example of this transformation. Having defeated two human *Jeopardy* champions, Watson is now being "tutored" by Memorial Sloan-Kettering, the world's oldest and largest private cancer treatment center, to help oncologists diagnose and treat cancer. Watson can

listen to and process information while attending patient visits; process up to 60 million pages of text *per second*; and can understand “natural language.” Watson also has the ability to express doubt. When making a diagnosis or treatment recommendation, the supercomputer usually pairs a level of confidence to each issued series of possibilities.¹⁴⁹

IBM also has created the “IBM ‘Watson’ Engagement Advisor,” which has a self-service mode that permits customers who contact call centers to interact directly with Watson by typing questions in a web browser or by speaking to a speech recognition program.¹⁵⁰ In fact, there is evidence to suggest that call center operations that were once outsourced to India and the Philippines are returning to the United States, only to be handled by robots and artificial intelligence systems such as Watson.¹⁵¹

While Watson may not be quickly introduced into most workplaces, many other forms of “Information Age” robotics and artificial intelligence systems likely will. Several companies, including start-ups and Google, are developing robotic personal assistants in the form of smart phone apps that use predictive search techniques to anticipate what users need *before* they ask for it. For example, such a robotic assistant could issue an alert to a smart phone informing the user to leave the office at a certain time for a meeting because of traffic. The robotic assistant knows to provide this alert by accessing the user’s e-mail and calendar (which contain information regarding the meeting), smart phone location tracking data, and Internet-map access (which the assistant uses to identify existing traffic on the user’s route to the meeting).¹⁵²

In support of wellness programs, employers may require employees to use smart phone applications to track their medical information, such as blood pressure, weight, heart rate, activity counters, and stress levels. Applications such as Azumio and Pulse Phone track the user’s heart rate through finger touch and face reflectivity, respectively.¹⁵³ Other applications, such as MyFitnessPal and Weight Watchers, allow users to compete with each other through group health challenges and require information on the user’s weight, height, daily fitness activity and food intake.¹⁵⁴ In interviews or during investigations, employers could use a robotic tool, like Sophie, that can detect human emotion with integrated facial recognition software.¹⁵⁵

While these technologies may not yet be commonly used in the workplace, other Information Age robotics technologies already are being used. Private sector employers are increasingly using global positioning satellite (GPS) systems to track their employees’ whereabouts.¹⁵⁶ For example, one private security company recently launched new software technology that uses a combination of facial recognition and GPS tracking via mobile applications (mobile apps) so that employees “can punch in by taking photos of themselves on mobile devices.”¹⁵⁷ The software uses algorithms to “automatically verify an employee’s identity when those photos are transmitted to the vendor’s servers.”¹⁵⁸ The robotics technology eliminates the need for the security company to require its supervisors and the guards to be on site for check-in. Instead, the guards can now clock in from the field, and supervisors can confirm that the guards are where they are supposed to be, at the right time, and appropriately dressed in accordance with company standards.

Likewise, a technology company, Sociometric Solutions, Inc., recently began offering to employers a product to track and measure employees within the workplace. The technology uses “sensor-packed ID badges to measure employees’ movements, their tone of voice, where they are in an office and to whom they are talking... to advise companies on how to change their organizations, often through actual physical changes to the work environment.”¹⁵⁹

While these robotics technologies are cutting edge, at bottom, they raise many of the same workplace privacy issues as paper-and-pencil forms and video surveillance cameras. These issues include the following:

- Are employers permitted to collect the information in the first place?
- If so, what form of notice, if any, must employers provide employees before collecting the information?
- What safeguards are employers required to implement for the information?
- What are employers’ responsibilities if the information is compromised?

We address each of these questions below.

1. Restrictions on Using Robotics Technology to Collect Information from Employees

Robotics technologies that can be used to collect information about an employee’s physical condition, such as blood pressure, heart rate, or blood sugar level, pose significant risks for employers. Under the Americans with Disabilities Act (ADA), employers generally are

prohibited from requiring employees to submit to inquiries about their medical condition or their disability unless the inquiry is “job-related and consistent with business necessity.”¹⁶⁰ To satisfy that standard, an employer must demonstrate, based upon objective evidence, that either: (1) the employee appears to have a medical condition that interferes with the employee’s ability to perform essential job functions; or (2) the employee poses a direct threat to himself or others.¹⁶¹ Given this narrow exception to the ADA’s prohibition, employers generally will confront significant limits on the mandatory use of robotics to collect medical information about employees.

By contrast, employers may be able to offer robotics technology that collects health information for use by employees on a purely voluntary basis without running afoul of the ADA. The ADA permits employers to “conduct voluntary medical examinations, including voluntary medical histories, which are part of an employee health program available to employees at [the] work site.”¹⁶² Under this provision of the ADA, employees could share their medical history with a supercomputer, like Watson, using workplace computers or use an employer-provided app to monitor and track their key body functions while at work.

However, employers need to be mindful of the two key limitations on such use of robotics technology. First, participation in this type of wellness program should be “voluntary.” The EEOC takes the position that a wellness program is voluntary only if employees will not be penalized in any way if they decline to participate.¹⁶³ Second, the wellness program must be available to employees “at [the] work site.” While no court appears to have yet interpreted the quoted phrase, if applied literally, the phrase would appear to restrict the use of mobile robotic apps that can be used to track and monitor employees’ wellness outside the workplace.

Notably, the ADA does not apply to wellness programs that are provided as part of an Employee Retirement Income Security Act (ERISA)-covered health benefit plan.¹⁶⁴ Consequently, employers would not be bound by the “at the work site” requirements for such programs and could provide participants with mobile apps that track their bodily functions as part of such programs. Employers would, however, be required to comply with a different set of rules regarding incentives.¹⁶⁵

Putting aside employees’ medical information, employers need to be particularly careful about using robotics technology, like Sophie, that is designed to gauge human emotions as a means for testing employees’ integrity. Such technology could be deemed a “lie detector” as defined by the federal Employee Polygraph Protection Act (EPPA)¹⁶⁶ and analogous state law. The EPPA defines a “lie detector” to include “a polygraph, deceptograph, voice stress analyzer, psychological stress evaluator, or any other similar device (whether mechanical or electrical) that is used, or the results of which are used, for the purpose of rendering a diagnostic opinion regarding the honesty or dishonesty of an individual.”¹⁶⁷ Although no case has yet addressed the issue, this definition arguably could apply to some forms of robotics technology. Under the EPPA, lie detectors may be used in the workplace only in very limited circumstances, and even then, under highly controlled conditions. Notably, a majority of states, including Alaska, California, Hawaii, and New York, have their own laws generally prohibiting the use of lie detectors by employers.¹⁶⁸

Robotics technologies that collect biometric information, such as fingerprints or facial scans, also present hidden risks for employers. For example, New York generally prohibits employers from requiring employees to provide a fingerprint.¹⁶⁹ In April 2010, New York’s Department of Labor published an informal opinion letter that asserts that requiring employees to use a biometric time clock would violate the New York prohibition even though the device only interpreted certain information from the individual’s fingerprint rather than collecting an image of the fingerprint itself. According to the Department of Labor, “it is the fingerprinting rather than the storing of the fingerprint that is prohibited.”¹⁷⁰

While no other state expressly prohibits the collection of biometric data, two states, Illinois and Texas, regulate the collection of such information.¹⁷¹ These state laws apply not only to fingerprints, but also to iris scans, voiceprints, and hand and face geometry. Both laws generally prohibit the collection of biometric information for employment purposes without providing prior notice to employees and obtaining their consent. These laws also generally prohibit the disclosure of biometric information without the employee’s consent and require the employer to (a) implement reasonable and appropriate safeguards for the biometric information and (b) destroy the biometric information securely before discarding it.

2. The Need to Provide Notice Before Using Robotics Technology to Collect Information From Employees

Putting aside the Texas and Illinois laws noted above and a few other exceptions, U.S. employers generally do not have a statutory or regulatory duty to provide notice to employees before collecting information from them. However, California’s Attorney General has recently taken the position that app developers and app platform providers are required to comply with California’s On-Line Privacy Protection Act

(COPPA), which requires that commercial web site operators post a privacy policy on their web site with respect to mobile apps.¹⁷² COPPA does not appear to apply to employers that develop or provide mobile apps for business purposes only because the statute applies only to online services offered for sale or lease by consumers “for personal, family, or household purposes.”¹⁷³ However, COPPA arguably would apply if an employer were to sell mobile apps to employees for personal purposes, such as to participate in a wellness program. Even when COPPA does not apply, given the newness of robotics technology and the potential for employee backlash in response to the use of robotics, employers should consider providing notice when introducing robotics technology into the workplace.

Robotics technology that permits employers to track employees’ location through the use of GPS provides a poignant example of the benefits of informing employees about the use of robotics technology to collect information about them. Unlike human surveillance, robotics tracking technology can capture information about an individual’s movements and location 24/7 for an extended period of time. In a recent decision, *U.S. v. Jones*, the U.S. Supreme Court recognized the highly intrusive nature of continuous tracking.¹⁷⁴ In *Jones*, the Court held that continuous tracking of a vehicle’s location for one month constituted an unreasonable search in violation of the Fourth Amendment even though the vehicle’s location was in public view at any particular point in time. Five justices found a protected privacy interest in the pattern of private activity that can be derived from continuous location tracking notwithstanding the public nature of any particular data point. In the words of Justice Sonia Sotomayor, “GPS monitoring generates a precise, comprehensive record of a person’s public movements that reflects a wealth of detail about her familial, political, professional, religious, and sexual associations.”¹⁷⁵

By providing notice to employees that robotics technology is tracking their location, an employer effectively provides employees with the ability to limit the collection of location data that reveals private information, thereby avoiding the type of intrusion the Supreme Court found violates the federal Constitution. With notice, employees have the ability to deactivate location tracking when they are “off the clock” and to avoid locations that would reveal private information about them when they are being tracked.

Employees appear to be willing to accept such controlled use of location tracking as reasonable. For example, public employees of the City of Chicago, who were represented by union leaders, agreed to the use of tracking technology on city-issued phones as long as the employees were permitted to shut off the phones during breaks and before and after their scheduled working hours.¹⁷⁶

In addition, employers can use the notice to inform employees of the benefits *to them* of location tracking, thereby mitigating the potential “Big Brother” effect of location tracking. Employers can, for example, tout the fact that the “the location tracking records could corroborate a service person’s assertion that he or she went to the customer’s house for a service appointment in the face of a customer’s denial.”¹⁷⁷ Other benefits might include more efficient routing that permits an employee to service more customers and earn more money, the ability to locate an employee in case of an emergency, and the ability to locate a stolen vehicle.

For employers who use mobile apps or other similar robotics technology to track their workforce, the Future of Privacy Forum and the Center for Democracy & Technology recently released a report with instructive guidelines for providing notice to mobile app users.¹⁷⁸ They recommend that privacy notices be clear and specific and disclose “what personal information your app accesses, collects, uses, [and] shares, and the purpose for such collection.”¹⁷⁹ This guidance for mobile app developers appears well-suited for employers to consider when providing notice to employees about the employers’ use of robotics.

3. Safeguarding Employee Information Obtained Through the use of Robotics Technology

Given the variety of roles and tasks that robotics technology can play in the modern workplace, employers should evaluate the categories of information that may be collected, stored and used by each robot or artificial intelligence system to determine whether the employer has a legal obligation to implement safeguards for that information. The categories of information most likely to trigger such legal obligations include health and genetic information; Social Security, driver’s license, and financial account numbers; and personal data received from the European Union and other countries, such as Australia, South Korea, or Mexico, that have enacted broad data protection regimes.

If the robotics technology will collect information that triggers security obligations, the next question for employers is the identity of the person or entity responsible for the robot’s collection of the information. If the employer is contracting with a third-party service provider, such as IBM, to provide robotics services on the employer’s behalf, the employer should first vet the service provider’s information security program. After the employer satisfies itself that the service provider has implemented adequate safeguards, the employer may have a legal obligation to enter into a written agreement with the service provider that requires the service provider to maintain those safeguards. For example, the Health Insurance Portability and Accountability Act of 1996 (HIPAA)¹⁸⁰ requires that HIPAA-covered health plans, such

as group health, dental, and vision plans, enter into a “business associate agreement” with any service provider that creates, receives or maintains protected health information on the plan’s behalf.¹⁸¹ Similarly, Massachusetts’ Standards for the Protection of Personal Information of Residents of the Commonwealth require employers that maintain Social Security numbers, driver’s license numbers and certain other personal information of Massachusetts employees to impose on service providers, by contract, the obligation to implement and maintain reasonable security measures for such information.¹⁸² Even when employers do not have a legal obligation to enter into such an agreement, they should do so as a matter of best practices.

Employers using third-party robotics providers should be particularly careful in contracting with providers that offer a “cloud-based solution.” These solutions typically involve the movement of data among servers that can be located anywhere in the world and potentially in countries with weak legal frameworks for the protection of privacy and information security. In addition, some cloud services intermingle the data of their customers, increasing the potential for access by unauthorized parties and the difficulty of implementing a litigation hold.¹⁸³ The European Union’s Article 29 Working Party has raised concerns that sharing information with cloud service providers can undercut compliance with E.U. data protection laws. Multi-national employers should scrutinize the Working Party’s Guidance on Cloud Computing before moving personal data collected by robotics technology to the cloud.¹⁸⁴

With some robotics technology, the employee may be ultimately responsible for information security. For example, if an employer makes available for download to an employee’s personal mobile device, or reimburses employees for their purchase of, a mobile app that will track certain key body functions in connection with a wellness program, the employee will have ultimate responsibility for safeguarding the information collected by the mobile app. However, the employer should still vet the security capabilities of the robotics technology before making it available to employees or encouraging employees to purchase it.

When the robotics technology will be maintained on the employer’s own network or will reside on mobile devices owned by the employer, the employer will be required to fulfill any information security obligations imposed by statute or regulation. The precise requirements will vary depending upon the type of information that is collected and stored. For example, the HIPAA Security Rule would establish the required safeguards for information collected in connection with certain wellness programs, and Massachusetts regulations would govern certain personal information collected from employees who work in Massachusetts.

Regardless of the specific legal requirements, employers should take several steps when implementing safeguards for information collected through robotics technology. To begin with, employers should conduct a thorough risk assessment. The risk assessment should evaluate how information is transmitted to the robotics technology, where the information is stored, and how the information can be accessed. This risk assessment should identify potential vulnerabilities in the overall system. The employer should then take steps to address vulnerabilities, balancing risk against burden and cost. These steps typically will include implementing administrative policies designed to restrict access, use and disclosure of personal information to authorized employees and technical controls that will prevent unauthorized access by malicious insiders and external hackers.

To the extent the employer already has implemented an information security program, that program can be extended to encompass the personal information collected by robotics technology. For example, the person with overall responsibility for implementing the program can also take responsibility for managing the information security issues raised by robotics. The complaint procedure applicable to other forms of data processing also can be applied to robotics technology. Finally, the employer’s security incident response plan can be modified to include security incidents arising from the use of robotics.

4. Responding to Security Incidents Involving Employee Information Collected by Robotics

Forty-six states and the District of Columbia have enacted statutes that require some form of notice to affected individuals when their sensitive personal information has been subject to unauthorized access.¹⁸⁵ Although most state data breach notification statutes have elements that are similar, there are significant differences ranging from the definition of “personal information” that triggers notification to whether there is a private right of action for the affected individuals.

One of the initial questions that must be asked upon a data breach is whether the information improperly acquired from the robotics or AI system triggers an obligation to notify the affected individuals at all. Only a breach of “personal information” triggers any obligations under the state data breach notification laws. Many state statutes use a common definition of “personal information,” consisting of the affected individual’s name (usually first and last name) and at least one of the following categories of information: Social Security number,

driver's license number or state identification card number, or financial information (*i.e.*, a credit card number, debit card number, or account number and any codes or passwords needed to access the same). Employers should be aware, however, that there is a trend among the states towards expanding the definition of "personal information" to include other categories of information.¹⁸⁶

State data breach notification statutes also vary in their identification of the circumstances that trigger the obligation to notify. A number of states require notification if personal information "was or is reasonably believed to have been" accessed or acquired by an unauthorized person.¹⁸⁷ Some states require notification only if the unauthorized access is reasonably likely to result in misuse of the compromised information, harm, or identity theft, while other states affirmatively require data owners to conduct "in good faith a reasonable and prompt investigation" to determine the likelihood that personal information has been or will be misused.¹⁸⁸

State laws also can differ regarding the method of notification. While almost every state notification statute explicitly permits written and email notification to affected individuals, only 26 states authorize telephonic notices.¹⁸⁹ All states, with the exception of Utah, allow for some form of substitute notice, but the circumstances in which substitute notice is allowed varies substantially from state to state.

Adding to the complexity, there are distinct variations in the content that must be provided in the notice to the affected individuals and who needs to be notified. Some states, such as California, prescribe particular content for the notification. California's notice requires the name and contact information of the data owner, types of personal information compromised, actual or approximate date of the breach, and whether notice was delayed for a law enforcement investigation, among other requirements. Five states require that notice include information regarding the steps the data owner is taking to prevent further unauthorized access to data.¹⁹⁰ Twelve states require companies to notify the state attorney general, even though these requirements vary based on the number of affected individuals.¹⁹¹ Twenty-nine states also require data owners to notify the major national credit reporting agencies of the data breach, but the requirement varies based on the number of affected individuals.¹⁹²

With respect to damages and penalties, some states simply provide a maximum civil penalty per breach,¹⁹³ while others calculate the penalty based on the number of affected individuals.¹⁹⁴ Adding to the complexity, 10 states explicitly provide a private right of action.¹⁹⁵ In these states, employers could face class litigation for a single noncompliant response to a data breach.

As the use of robotics and AI systems continues to expand and evolve, employers should pay particular attention to the "trigger information" that the new technology puts at risk, and the potential liabilities that a data breach could impose.

I. Trade Secrets

The law protects trade secrets to forestall unfair and unethical competition, prevent invasion of privacy, encourage invention, and promote the efficient use of information within a business organization. Conversely, the protection of trade secrets is limited so as not to stifle fair competition. In balancing these two concerns, courts have declined to protect "trade secrets" of negligible value or "secrets" already made public.

Within this context, robotics manufacturers must take steps to protect their business interests. Compared with technology companies dealing in hardware and/or software, robotics manufacturers often bring an even higher level of complexity given their integration of multiple technologies to create movement. Thus, the need for protection of information vital to this next generation of technology development is critical.

Similarly, employers using robotics and AI technology must ensure that their own trade secrets are protected. This section provides a brief overview of what constitutes protected trade secrets, and outlines recommended contractual, administrative, technical, and physical ways to safeguard a company's proprietary information.

1. Trade Secrets Defined

The definition of "trade secrets" encompasses confidential, commercially valuable information. Trade secrets include "any information that can be used in the operation of a business or other enterprise and that is sufficiently valuable and secret to afford an actual or potential competitive advantage over others."¹⁹⁶ Trade secrets can include the unique arrangement or compilation of information, even where the information itself is scattered throughout the public domain. Unlike a patent, a trade secret need not be a "novelty or invention."

The substance of the common law definition of trade secrets has been codified in the Uniform Trade Secrets Act (UTSA) and adopted in some form by every state but for Massachusetts and New York. In general, the application of these principles to determine whether particular information qualifies as a trade secret is a question of fact.

a. Trade Secrets: Valuable and Secret

To be a trade secret, information must afford some economic advantage to its possessor, but that advantage need not be great. Evidence of the advantage may be direct or circumstantial. Circumstantial evidence of a trade secret's value includes:

- investment of resources in the production of the secret;
- precautions taken to protect the secret;
- willingness of others to pay for the secret;
- use of the secret in the operation of a business (actual use, however, is not required: "negative" information about practices worth avoiding can also be protected as a trade secret);
- the value of the information to the employer and to competitors; and
- the ease or difficulty with which the information could be acquired or duplicated by others.¹⁹⁷

Reasonable efforts must be made to maintain the information's secrecy. A trade secret need not, however, be kept absolutely secret so long as it would be difficult or costly to acquire without resort to wrongful conduct. Moreover, that independent discovery of a trade secret is possible does not necessarily mark it as fair game for appropriation. Improper acquisition of a trade secret can be grounds for liability even where legitimate acquisition was possible, though not attempted.

A trade secret need not be known exclusively by a single person or company. Neither independent discovery by others, relatively broad disclosure to employees and licensees in confidence, or even limited open disclosure under contract necessarily destroys the status of a trade secret.

Once information is generally known or accessible to others, however, it is no longer a trade secret. Accordingly, the protection accorded to a trade secret terminates when the secret becomes publicly known.

2. What Are Sufficient Controls to Protect Proprietary Information and Trade Secrets in The Robotics Industry?

Trade secrets must be subject to reasonable security measures. Businesses within the robotics industry seeking to protect trade secrets should implement reasonable technical, administrative, contractual and physical safeguards appropriately tailored to (1) the day-to-day business of the particular enterprise, (2) the confidential information sought to be protected, (3) the community in which the company operates, and (4) the established awareness of the individual participants to whom access to the information may be granted.

Internal security controls and protocols must be robust and should include written information security and confidentiality programs. These programs should be regularly and consistently analyzed and enforced. Use of these protocols can dramatically mitigate the risk of trade secret theft.

a. Contractual Safeguards

Like all technology companies, appropriate and legally enforceable agreements need to be in effect to protect the intellectual property of the robotics company. One way to do this is to use state-of-the-art contracts to protect your trade secrets. These agreements should include the following clauses (or take the form of individual contracts): (i) confidentiality and proprietary information access and use, (ii) disclosure and assignment of inventions, (iii) the ownership and control of confidential information, including, without limitation, work-related social media accounts and confidential information saved on external or mobile devices, (iv) the return or destruction of information upon resignation (including an inventory of the information at issue); (v) the obligation to provide notice about subsequent places of employment and the employee's proposed activities or duties for the new employer, and (vi) the disclosure of preexisting restrictive covenants owed to previous employers.

It would also behoove employers to implement restrictive covenants such as nonsolicitation and/or noncompetition agreements that restrict a narrowly specified scope of activity for a reasonable period of time and within a reasonable geographic territory. The legal rules governing the enforceability of these clauses varies widely among the states. Therefore, robotics companies should consult with counsel on the enforceability of restrictive covenants in the relevant jurisdictions before implementation.

Finally, employers should consider requiring contracts with business counterparties to contain, as applicable, provisions that include the above-mentioned concepts. These contracts should require business counterparties to ensure any subcontractor they engage on their behalf agrees to the same restrictions and conditions that apply to the business counterparty with respect to confidential information.

b. Administrative Safeguards

Many robotics systems and AI programs are designed to have autonomous use of an employer's database, cloud system, and the Internet. Such unfettered access could compromise an employer's trade secrets and other confidential or proprietary materials. The possibility that a robot or AI program could inadvertently make confidential business information public poses risks for all employers, not just those in the robotics industry. Employees who operate robotics or AI systems or otherwise have access to confidential information might also pose a security risk. Therefore, it is imperative to implement and regularly review what controls are in place to keep trade secrets secret. Suggested steps include:

- Reasonably restricting and compartmentalizing information. These restrictions could include dividing company information into separate databases and precluding all but a few employees (or robots) from having access to the entirety.
- Using unique identifiers to enable computer, key pad and other system tracking.
- Regularly reviewing the efficacy of security procedures to address new threats and program deficiencies.
- Classifying information according to type and sensitivity and mark documents with an appropriate legend (such as "confidential" or "top secret").
- Distributing employee manuals or policies that (i) outline what constitutes confidential information or a "trade secret"; (ii) explain the essential nature of the information security and confidentiality program; (iii) reproduce the material terms of any restrictive covenants; and (iv) describe company policies regarding social media use, remote access and mobile devices, and employee privacy.
- Regularly training employees about information secrecy, and issue periodic reminders about secrecy obligations.
- Conducting exit interviews with departing personnel to (i) review secrecy obligations and restrictive covenants; and (ii) require the departing employee to sign a statement providing that such employee has returned all company materials containing confidential information, and understands and agrees to abide by post-employment obligations.
- Reviewing company advertising, websites, press releases, seminar content and articles before publication to ensure that trade secret information is not inadvertently disclosed.
- Implementing a trade secret breach plan that calls for prompt investigation and request for injunctive relief.

While not foolproof, taking the above steps may help buffer an employer's trade secret information from both inadvertent and intentional disclosure.

c. Technical Safeguards

An employer could also take the following steps to avoid trade secrets disclosure:

- Encrypt confidential information that is stored and transmitted across open, public networks.
- Limit access to confidential information through passwords and network firewalls.
- Use and regularly update antivirus software on all systems commonly affected by malware.
- Do not use vendor-supplied defaults for system passwords and other security parameters.
- Track and monitor all access to network resources and confidential information.
- Monitor sizeable downloads or emails with large attachments to help quickly detect potential theft of confidential information.

d. Physical Safeguards

There are some additional measures at an employer's disposal to protect trade secrets. For example, an employer could consider stationing security personnel at each facility entrance and internally near rooms or corridors containing trade secrets such as robotic prototypes. An employer should limit visitor tours of its plants and facilities, and always insist on sign-in and sign-out sheets as well as individually trackable security badges.

Any hardcopy material should remain under lock and key. Key card access is also a must for certain areas of the company, such as any research and development lab. Finally, employers should consider establishing security and surveillance procedures to prevent any unpermitted entry into company facilities or removal of confidential information.

3. Non-Compete Agreements

In some instances, an employee of a robotics company can be required to sign a non-compete agreement, although the ability of an employer to do so depends on where the work is being performed.

A covenant not to compete provides that, for a period of time after employment terminates, the departing employee will not unfairly compete by working for a competitor, starting a competing business, and otherwise attempting to do business with the employer's customers, or use any of the employer's confidential business information. Generally, an employer can use a non-compete agreement to protect its legitimate business interests including customer goodwill, unique training, and confidential information if (1) the agreement is reasonably limited in time and geographic scope, and (2) the employee receives some consideration in exchange for signing the agreement. In many states, the commencement of or continued employment is sufficient to establish consideration. State laws vary dramatically regarding the enforceability and scope of non-compete agreements. For example, in California, an employment non-compete agreement (as opposed to a non-compete arising from the sale of a business) is invalid as a matter of law.

Although an employer and employee can usually designate the forum and choice of law applicable to a non-compete agreement, some states may disregard these mutually-selected provisions absent a reasonable relationship of the parties to the chosen jurisdiction. For example, a Washington employer that employs a California employee in California may not be able to select Washington law for purposes of enforcing the non-compete agreement. Because these issues are by nature state-specific, the law of any particular jurisdiction must be evaluated to assess the enforceability of these provisions.

4. Trade Secret Issues Unique to Robotics Companies

The concept of employees attempting to steal trade secrets, of course, is not new. The protections described above are generally well-established and present effective means for employers to safeguard legitimate protectable interests.

A key challenge for the emerging robotics industry, however, is the pace of developing information and technologies. Thus, the application of trade secret protection must keep up for companies to sustain in the long term. Already, litigation has popped up involving prominent players in the robotics industry over theft of trade secrets issues. For example, a robot manufacturer brought a case involving trade secret misappropriation against a competitor, a former employee who left the company to form a competing robotics company.¹⁹⁸ In that case, the court entered an injunction to preclude the defendants from using stolen trade secret information.

As more players enter the field, the competition for commercially valuable information will continue to rise, and employee mobility will factor heavily, with start-ups birthing from more developed companies. Accompanying any likely talent migration will be serious concern about the information that goes along. Hence, robotics companies especially must focus on preserving the secrecy of information, including ensuring that legally enforceable restrictive covenants are implemented for key employees, identifying and specifically designating confidential and trade secret information, and developing action protocols to address potential employee theft of information. In a deeply competitive market, a critical loss of trade secret information can break a developing company. The stakes, then, are extremely high, necessitating extreme vigilance to protect information.

J. eDiscovery

eDiscovery has been recognized as one of the most important and transformational legal developments in recent history, impacting virtually every aspect of information management in the workplace and litigation in today's digital age. Given that the Federal Rules of Civil Procedure addressing the production of documents and electronically stored information in U.S. litigation are intended to be "expansive and include any type of information that is stored electronically ..." as well as flexible enough to encompass "future developments in computer technology,"¹⁹⁹ employers should expect that eDiscovery will also have significant implications for the field of robotics as it continues to develop.

Throughout history, when manual tasks that were previously performed by humans become automated, a pool of electronic data that did not exist in electronic format (or at all) is created. Once created, such data can have significant eDiscovery implications—in litigation and otherwise.

The trucking industry is a good example. In the past decade, trucking companies have installed on-board GPS tracking and monitoring devices that, among other things:

- Track loads, trailers and trucks (this was previously handled via paper logs);
- Allow drivers and dispatchers to communicate via text messages about their trips (these communications previously took place orally via Citizens Band radios or “C.B.s” and were generally not recorded in any manner);
- Identify in “real time” the exact location of a truck, as well in many instances its speed, engine functionality, and other data (this type of data was not tracked before the on-board computers were installed); and
- Record driving time and submit driving log information electronically (this was previously all handled via paper logs).

The data on those on-board GPS/tracking devices (some of which never existed in any format before the installation of the on-board computers) has been implicated in both the regulatory and litigation contexts. For example, from a regulatory standpoint, in 2010, the Federal Motor Carrier Safety Administration (FMCSA) issued new regulations as part of its Compliance, Safety and Accountability Program. The FMCSA proposed regulations targeting driver fatigue that were designed to limit the hours a driver can be on duty and driving, as well as the total on-duty time for a set period. The FMCSA-proposed regulations required that all carriers with a 10% or greater violation rate in their inspected logs regarding hours-of-service *must* install electronic on-board tracking and monitoring devices on their vehicles (setting a June 2012 compliance deadline). In response to a challenge to the FMCSA proposed regulations, the U.S. Court of Appeals for the Seventh Circuit vacated them,²⁰⁰ holding that the FMCSA failed to consider an issue that it was statutorily required to address. Specifically, the agency failed to address the requirement that any regulation about the use of monitoring devices in commercial vehicles must “ensure that the devices are not used to harass vehicle operators.”²⁰¹

From a litigation standpoint, data from on-board GPS/tracking devices has played a critical role in discovery in all types of trucking industry cases. Most cases concern an employer’s responsibility for maintaining electronic records. For instance, in a personal injury case, the plaintiffs sought GPS data from the employer to identify the truck that was allegedly involved in a motor vehicle accident. The defendant/trucking company failed to produce the data, “claiming that any satellite positioning data recorded on its system on the date of the accident would have been routinely purged fourteen days later, and therefore was unavailable” at the time it was notified of the litigation. Subsequently, the plaintiffs claimed that the data remained on the trucking company’s back-up tapes that were destroyed in 2004, after litigation had begun and contrary to the trucking company’s data retention policy. The court held that the trucking company had a duty to preserve satellite positioning data maintained on its internal computer system, and that issues surrounding the alleged destruction of the data were factual matters that must be resolved by a jury at trial.²⁰²

In another matter stemming from a tractor-trailer accident, the plaintiff brought a partial motion for summary judgment based upon a spoliation claim and alleged that the defendant destroyed or lost, among other information, GPS data. The defendant responded that it could not be responsible for producing the GPS data because its vendor retained the data. The court held that there was a genuine issue of material fact surrounding the circumstances leading up the destruction of the GPS data, and denied the motion for partial summary judgment.²⁰³

Sometimes the use of eDiscovery can benefit the employer. For example, in a racial harassment and discrimination case, a package delivery company was able to prove—through a review of the driver’s GPS records—that the driver was terminated for falsifying documents to show that he had driven to locations to deliver packages he never, in fact, visited, and not for discriminatory reasons.²⁰⁴

Outside of the trucking context, GPS data has also played a role in other types of employment litigation. For instance, in a retaliatory discharge case, the plaintiff was placed on light duty after making a workers’ compensation claim. An investigation revealed that the GPS data from plaintiff’s work truck did not match the data he was reporting to his employer. The arbitrator hearing the employee’s grievance found that submitting falsified time sheets constituted “deliberate dishonesty.”²⁰⁵

No one could have anticipated the central role that GPS/tracking data would play in modern litigation at the time such functionality was being automated and implemented in the workplace. Yet, as a result of this data now existing in the normal course of business, it may need to be identified, preserved, collected, searched and produced in discovery. As workplaces become more automated and data storage becomes virtually limitless, the scope of information available to both plaintiffs and defendants in litigation will undoubtedly grow.

1. Robotic Systems Can Now Evaluate Hundreds of Thousands of Digital Records in Seconds at a Greatly Reduced Cost

Technology has already significantly impacted how discovery is conducted in today's digital age. There is no dispute that data volumes implicated in litigation have exploded during the past decade. As examples only, in recent submissions to the Civil Rules Committee on Rules of Practice and Procedure of the Judicial Conference of the United States in support of proposed amendments to the Federal Rules of Civil Procedure to address eDiscovery preservation and sanctions:²⁰⁶

- One company reported the following statistics with respect to electronic data for its “average” case:²⁰⁷
 - i. it preserves the equivalent of over 48 million pages of written documents;
 - ii. it collects the equivalent of about 13 million pages of written documents; and
 - iii. it reviews the equivalent of over 645,000 pages of written documents.
- Another company reported that in one case, it produced over 90 million pages of data/documents, while in a second products liability litigation it produced over 50 million pages of data/documents;²⁰⁸ and
- A pharmaceutical company reported that for the 12-month period ending October 1, 2013, it collected roughly 1 billion pages from 3,000 custodians in connection with as many as 60 ongoing litigation matters. Of the 1 billion pages collected, approximately 140 million pages were identified as potentially responsive to discovery requests and the company ultimately produced roughly 25 million pages, of which 5.5 million required at least one redaction.²⁰⁹

It is simply not possible for humans to effectively analyze and review this staggering volume of data in 21st century litigation without help from machines. Thus, industry-standard technologies have emerged to help lawyers collect, search, protect and produce information in litigation. Those computer-based tools save legal professionals hundreds of thousands of hours and the related costs that would be required to review and analyze the same volume of data without help from technology. In particular, those computer-based tools allow legal professionals to:

- virtually instantaneously run searches applying keywords and Boolean search techniques (AND, OR, NOT, etc.) across databases that contain terabytes of data;
- reduce the volume of data that is subject to full discovery review by electronically filtering out system files, duplicates, non-relevant file types, irrelevant eMail domains (*i.e.*, www.espn.com and www.marthastewart.com) and by applying specific date parameters based upon issues in a particular case;
- quickly perform mass- or bulk-tagging of evidence that matches certain criteria, including for purposes of applying confidentiality and privilege designations;
- perform advanced concept searching using mathematically based, advanced analytics that rely upon patented Latent Semantic Indexing and/or rules-based classification processes that identify how and where ideas and concepts within the data intersect with similar ideas and concepts. Some of these tools are self-training and learn what they need to know from both the text of documents and metadata contained within a document to rapidly sort and classify information, and then automatically identify other documents in a case that discuss similar concepts, even if they use different words not found in the source document; and
- automate quality assurance activities by electronically categorizing potentially privileged and confidential data that may require closer scrutiny, helping to eliminate or limit the inadvertent production of privileged information.²¹⁰

Many of these types of automated procedures are not possible when evidence is handled via a manual review without the aid of technology.

Moreover, from a defensibility/quality-control standpoint, unlike a manual review that is conducted without the aid of technology, these computer-based tools electronically log and track all activities so there is an auditable trail of every decision that is made about every document (including when it was designated responsive, not-responsive, privileged, confidential, etc., and who did so) as well as precisely what data is produced to an adversary, when and in what format.

While there are certainly limitations on the use of technology in litigation,²¹¹ it is fair to say that robotics is already changing eDiscovery by making possible the analysis and production of incredible volumes of data that would either be impossible or cost prohibitive to handle by a manual review without the aid of technology.

K. Healthcare

According to the World Health Organization, total healthcare spending in the United States was 17.9% of its Gross Domestic Product in 2011. Amid pressure to reduce costs and increase efficiency, robotics and AI have found a place in healthcare. Various examples of robotics and AI systems are already being used and developed for the healthcare industry, and are expected to impact workers at every level in this field. This section examines some advanced technological products that are currently in use or under development in the medical industry, and discusses certain legal implications healthcare employers should keep in mind when adopting robotic and AI technology. Below are just a few examples of the many types of robotic and AI technologies being used in the healthcare industry.

1. Examples of Robotics, AI, and Automation in the Healthcare Industry

a. Watson

As previously discussed,²¹² IBM's *Jeopardy*-winning supercomputer Watson is renowned in the healthcare industry.²¹³ Researchers at Memorial Sloan-Kettering Cancer Center in New York are taking advantage of Watson's complex decision-making to train it to diagnose and make treatment recommendations for cancer patients. Watson is able to analyze the clinical nuances that physicians might miss. Information in medicine generally consists of physician notes on medical records, academic journals, and number sets in databases held by public health departments. In theory, Watson can make sense of this information while present in patient examinations. When providing a diagnosis and recommendation, Watson will give a series of possibilities, each with a confidence level attached. Humans have biases and take shortcuts that lead to mistakes and misdiagnoses. The supercomputing power of Watson is being developed to work in fields with high complexity and high volumes of information to minimize such human errors.

Tools like Watson are already being used in Brazil and India where there is a shortage of doctors for primary care. This is one possibility of how Watson could be used in the United States in the early stages. At the outset, Watson could help non-physician healthcare professionals take care of routine medical needs, like diagnosing strep throat. Years from now, Watson may be capable of performing complex surgeries with precision beyond the capabilities of humans.

b. Sedasys

Watson is not the only robot to be breaking into the healthcare industry. Sedasys has joined the field.²¹⁴

Developed by Johnson and Johnson, Sedasys automates the administration of sedatives for colon cancer screenings and eliminates the need for an anesthesiologist to be present for a colonoscopy. The presence of an anesthesiologist increases the cost of the screening anywhere from \$600-\$2,000. Johnson and Johnson claim Sedasys can do the job for about \$150. To get Sedasys into healthcare facilities, the company is not selling the machine outright, but instead is looking to charge a fee for each use. In May 2013, the Food and Drug Administration (FDA) approved the device for use on healthy adults. Sedasys allows healthcare facilities to replace an expensive anesthesiologist with lower cost midlevel professionals, such as a nurse or physician assistant to operate the machine.

c. Veebot

Under a single contract, a research company conducting a drug trial might do more than 100,000 blood draws in a year. Technologies are being developed to make drawing blood faster and less labor intensive. The Institute of Electrical and Electronics Engineers (known as the IEEE) recently profiled Veebot, a company that developed a robot to draw blood for use in drug trials and healthcare settings. The Veebot system starts by tightening an inflatable cuff around the arm. A camera and infrared light then scan the inner elbow until a vein is found. Software analyses the vein and examines it with an ultrasound. The robot then inserts a needle and draws blood. The whole process only takes about a minute. A technician is needed only to replace the IV bag or test tubes. The machine is able to identify the best vein for blood draws with about the same success rate as humans, roughly 83%. Veebot expects to increase the machine's success rate to 90%.

d. RP-VITA and Telemedicine

RP-VITA Remote Presence Robot is the product of a partnership between iRobot and InTouch to provide physician services remotely. This robot enables a physician to conduct clinical rounds in a healthcare facility without actually being present in the facility. The robot has a display screen so patients can see the physician's face during treatment and is capable of connecting to an iPad for additional interactivity. This robot has been cleared by the FDA and the company claims that use of the robot is HIPAA compliant. This machine creates the potential to treat far away patients, increasing the number of patients seen without wasting time spent on travel. Patients would be able to see the highest quality physicians without the time and expense of traveling to large medical institutions. This robot will also increase the hands-on care nurses and physician assistants provide while a physician supervises remotely.

RP-VITA is just one example of Telemedicine. Telemedicine is the use of medical information exchanged from one site to another via electronic communications to improve a patient's clinical health status.²¹⁵ Telemedicine is being used for primary care and specialist referral services, remote patient monitoring, and medical education. Telemedicine offers greater access to healthcare to both rural and urban patients, and does so in a cost-efficient manner.

e. TUG

Aethon has created a robot to move supplies around a hospital. The TUG was developed for the movement of medication, equipment, materials, linen, food, and waste throughout medical facilities. Aethon boasts the efficiency created by TUG, costing less than a full-time employee with the ability to operate seven days a week, 24 hours a day. TUG has the ability to lock medications and safely quarantine hazardous materials during transport.

f. Bestic

Bestic is a Swedish company that has created a robotic arm that provides assistance to enable people to eat. This robot fits on a table top and has an arm with a spoon on the end. The robot is operated by remote control and can be maneuvered by the user's foot. By enabling individuals to feed themselves when otherwise unable to do so, the device will eliminate the need for some services provided by nurses, nursing assistants, and home health aides.

g. Da Vinci Robotic Surgery System

Robotic surgery has been marketed as a safer and less invasive alternative to conventional surgery. The da Vinci system has been on the market for more than a decade, and over a million procedures have been performed with it. The system is a remote-controlled robotic device, operated by a surgeon who can see the action on a magnified screen. The da Vinci system is a next-generation version of an endoscope, a device with both a camera and snippers that can be sent into the body via a tiny incision for surgery. What surgeons like about da Vinci are its precise controls that allow them to use four robotic arms that bend and twist like their own hands and wrists—only steadier.²¹⁶

As a result of mishaps during robotic surgeries, however, doctors, hospitals, and the system's manufacturer have been facing lawsuits for failure to train doctors using the device, medical malpractice, products liability, and wrongful death. In the first litigated case involving a surgical robot, a jury found that the company was not liable for claims that it inadequately trained the doctor who performed the surgery.²¹⁷ However, in another medical mishap case, a doctor using a surgical robot was found liable for malpractice.²¹⁸ It is clear that as robotic surgeries become more prevalent, so, too, will litigation.

2. Implications and Recommendations for Healthcare Employers

a. The Changing Roles of Healthcare Workers

As robotic technologies come to the marketplace, the job duties of many healthcare industry workers will change. For example, robots like Sedasys will reduce the demand for anesthesiologists, but will increase the need for nurses and physician assistants. The Veebot will eliminate the need for a skilled nurse to draw blood, but will require a technician to operate the machine. Aethon's TUG will change the role of nurses and nursing assistants by reducing the amount of time spent transporting goods throughout a facility, and will permit a greater focus on patient care. For doctors practicing in the most complex areas, Watson may shift the demand away from diagnostics and into research and knowledge development. Physicians will likely find narrower specializations, as remote clinical evaluations will allow

for development of medical practices that were not commercially feasible in the past. Doctors will be able to specialize in the treatment of uncommon conditions and treat patients from all over the world without having to travel. As roles change in the workplace, the traditional models of compensation and benefit administration may need to be reevaluated.

To put it another way, the terms and conditions of employment will change as these technologies are introduced. Currently, many workers in the healthcare industry, such as nurses and nursing assistants, are represented by labor unions. Under the National Labor Relations Act, the employer is not permitted to unilaterally change a term or condition of employment for employees working under a collective bargaining agreement unless the change is first bargained over with the union. As discussed in Section B of this Report, healthcare employers with unionized workforces might need to address such changes.

b. Data Security and HIPAA

In addition to changing the roles and responsibilities of healthcare workers, robotics will increase the data and documentation created by healthcare facilities. As previously discussed, HIPAA governs the privacy and security of health information.²¹⁹ As healthcare employers introduce robotics to the workplace, employers must be vigilant to remain in compliance with the many provisions of HIPAA. One area of HIPAA that will be of particular concern to healthcare employers introducing robotic technologies is the Security Rule.²²⁰ As noted in the Privacy section of this Report,²²¹ the Security Rule specifically governs the use of electronic information and requires administrative, physical, and technical safeguards. Some of the administrative safeguarding requirements include: establishing a written set of privacy procedures that address access authorization and the maintenance and handling of protected information; designating a privacy officer responsible for development and implementation of the privacy procedures; establishing ongoing training procedures for HIPAA compliance; and requiring a plan in case of security breaches.²²² To be in compliance with the physical safeguarding requirements of the Security Rule, employers must restrict access to hardware containing protected health information to authorized individuals and develop procedures for the introduction and termination of software and hardware containing protected health information.²²³ The Security Rule also requires technical safeguards to prevent the interception and intrusion of protected health information by non-authorized personnel.²²⁴ Healthcare employers that use open network systems must meet encryption standards.²²⁵ Authentication standards must be complied with when communicating electronically with outside parties.²²⁶ Healthcare employers must ensure robotic and AI technologies introduced are HIPAA compliant and employees are properly trained to meet the standards set forth by the Security Rule. Employers introducing robotic technologies must be mindful of what information is being stored, how the information is stored, and what personnel has access to the hardware and software containing protected health information.

c. Potential Sources of Litigation

Employers introducing robotic technologies must also consider the impact of the increased data and documentation of health records that will be created. Watson's diagnostic assessments may be sought after in the event of litigation and, in particular, workers' compensation claims.²²⁷ HIPAA permits the disclosure of protected health information as necessary to comply with state law, such as workers' compensation.²²⁸ Depending on the state, adjudication of a workers' compensation claim may permit an employer to obtain medical information regarding the disputed injury or, in some cases, information about past medical care. Robotic technology will create new types of medical records. Watson will be able create an assessment of a worker's illness or injury and may provide insight on recovery times. Or, if the patient is treated remotely, robots like RP-VITA could create a video record of the treatment received. While this information would be useful in determining the value of the claims, it would inhibit both doctors and patients from candid discussions about symptoms and treatment options. As these technologies become available, healthcare employers must expect rapid changes in the law to determine what information should be available to employers in the event of a workers' compensation claim and what information should be admissible evidence in litigation.²²⁹

L. Legislative & Regulatory Considerations

The robotics revolution is transforming the workplace and the workforce. As this transformation accelerates in the years ahead, legislative and regulatory changes may not be far behind. The advances in robotics technology have far-reaching implications for employment and labor law policy. From wage and hour to workplace safety, the robotics revolution will impact virtually every aspect of employment and labor law. The workplace and the workforce itself will look very different as the new technology takes hold. Yet, as discussed throughout this Report, the myriad of laws governing the workplace, many of which were written long before the robotics revolution began, have not kept pace with the rapidly developing technology.

As the use of robotics becomes more widespread, Congress and the regulators will face increasing pressure to alter existing requirements or create new ones to reflect the impact of robotics. For example, as new technologies supplant existing jobs and create others, the resulting labor shifts will likely have major implications on employment tax administration and the funding of social insurance programs, including Social Security, Medicare and unemployment. These changes will require policymakers to revisit and potentially revamp our current employment-based tax system.²³⁰ However, this will not be an easy task. The speed at which these robotics advances are occurring and their scope make it challenging for policymakers to determine what, if any, amendments to current law are needed. Just as laws that have been in place for decades may not have envisioned the interjection of robotics in the workplace when they were enacted, we cannot envision today exactly how the workplace will operate decades from now. Nonetheless, policymakers may be prompted to identify and fill what they perceive to be gaps in current law created by robotics. As a result, employers may face new requirements or restrictions in the years ahead.

A starting point for possible legislative or regulatory changes may come in late spring of 2014 with a report to the EU Parliament. The report will identify laws and regulations needed to reflect the growing use of robotics. The EU report may fuel calls for new laws regulating robotics in the U.S. as well. Workplace safety is one area that is already receiving heightened attention. The International Labour Organization (ILO) has issued a major report on the use of robotics, contending that:

The use of robots . . . requires design, application and implementation of the appropriate safety controls in order to avoid creating hazards to production personnel, programmers, maintenance specialists and systems engineers.²³¹

The ILO reports sets forth safety principles for industrial robots, including technical safety measures that designers and operators need to provide and implement. The fact that the ILO is focusing on robotics and workplace safety suggests that OSHA may also be prompted to do so. Accordingly, OSHA may look to issue new guidelines or regulations addressing modern robotics. Workers' compensation and tort laws are among other likely targets of legislative and regulatory activity.

In the wake of the robotics revolution, a number of jobs that exist today will become obsolete. However, new jobs requiring new skills will emerge. Questions and concerns about job displacement will undoubtedly be at the center of congressional attention to robotics. While some policymakers may try to stem the use of robotics in the workplace, all should focus their efforts on ensuring that workers are equipped with the skills needed to fill the newly created jobs. The robotics revolution calls for a comprehensive approach to job training, and retraining, to mitigate worker displacement and enable workers to benefit from the new jobs that the technology will generate.

The impact of robotics technology on workplace policy is dramatic and complex. It calls for a thoughtful, forward-thinking approach by lawmakers, regulators and employers. Through Littler's Workplace Policy Institute™, Littler will be at the forefront of activity in Congress, the agencies and businesses around the country to prepare for the oncoming transformation of the workplace and workforce.

III. CONCLUSION

Robots, advanced AI systems, and automation are neither fads nor devices confined to niche industries. These technologies are here to stay, and much like the Internet, will be used in virtually every industry in some capacity within a single decade. The potential uses for robotics, AI, and automation in employment are great and ever-expanding. Employers must ensure, however, that this growth is accomplished in a deliberate fashion with an eye toward labor and employment law compliance. We hope that the information provided in this Report and accompanying recommendations will help employers achieve this end.

ENDNOTES

- 1 See American National Standards Institute (ANSI) R15.06-1999, *Industrial Robots and Robot Systems—Safety Requirements*.
- 2 “Robot.” Merriam-Webster.com. 2014. <http://www.merriam-webster.com/dictionary/robot> (Jan. 21, 2014).
- 3 *Id.*
- 4 “Telerobotics.” TheFreeDictionary.com. 2014. <http://www.thefreedictionary.com/Telerobot> (Jan. 21, 2014).
- 5 Artificial Intelligence. (n.d.) In *Wikipedia*. Retrieved Jan. 21, 2014 from http://en.wikipedia.org/wiki/Artificial_intelligence#cite_note-Coining_of_the_term_AI-3.
- 6 John McCarthy, *Basic Questions, What is Artificial Intelligence?* Stanford University, <http://www-formal.stanford.edu/jmc/whatisai/> (revised Nov. 12, 2007), archived at <https://web.archive.org/web/20131011010206/http://www-formal.stanford.edu/jmc/whatisai/whatisai.html>.
- 7 “Automation.” TheFreeDictionary.com. 2014. <http://www.thefreedictionary.com/automation> (Jan. 21, 2014).
- 8 The cost of technology is dropping by 50% every 18 to 24 months. Dual-arm robots such as Baxter are available for approximately \$22,000. See, e.g., Frank Tobe, *Low-cost robots like Baxter, UR5 and UR10 successfully entering small and medium enterprises (SMEs)*, ROBOHUB.ORG, May 14, 2013, <http://robohub.org/rethink-robotics-baxter-and-universal-robots-ur5-and-ur10-succeeding/>.
- 9 International Data Corporation (IDC), among others, refers to these devices as the Internet of Things (IoT). In a recently published research report, IDC projects that by 2020 the total global installed base of such “things” across both consumer and enterprise applications will reach 212 billion (30.1 billion of which will be autonomous) and that annual spending on IoT technology and services will generate annual global revenues of \$8.9 trillion. Attempting to put the magnitude of this opportunity in perspective, Janusz Bryzek, an executive at Fairchild Semiconductor (and known by many in Silicon Valley as the “Father of Sensors”), recently characterized the Internet of Things as something that “could be the biggest business in the history of electronics.”
- 10 See Annie Baxter, *Job Applicants Are Wary Of Firms’ Resume Sorting Software*, NATIONAL PUBLIC RADIO, Feb. 8, 2013, available at <http://www.npr.org/2013/02/28/173122980/job-applicants-are-wary-of-firms-resume-sorting-software>.
- 11 See Jim Boulden, *Software weeds out weak resumes*, CNN, Jan. 8, 2013, available at <http://edition.cnn.com/2013/01/08/business/resume-software-scanning/index.html>. For a brief description of Monster’s software, see *Talent Management Software; 6sense Enterprise Technology*, MONSTER, <http://hiring.monster.com/recruitment/talent-management-software.aspx>.
- 12 *LeoForce Debuts Industry’s First Recruiting Robot*, LEOFORCE (Oct. 8, 2013), <http://www.leoforce.com/leo/press.html>.
- 13 See generally, Agency Information Collection Activities: Adoption of Additional Questions and Answers To Clarify and Provide a Common Interpretation of the Uniform Guidelines on Employee Selection Procedures as They Relate to the Internet and Related Technologies, 69 Fed. Reg. 10152 (Mar. 4, 2004).
- 14 See Nancy Delogu and Jennifer Thomas, *District of Columbia First in Nation to Ban Discrimination Based on (Un)Employment Status*, LITTLER MENDELSON, P.C., Jan. 28, 2012, available at <http://www.littler.com/publication-press/publication/district-columbia-first-nation-ban-discrimination-based-unemployment-s; New York City Cracks Down on Discrimination Against Jobless>, CNBC, March 13, 2013, available at <http://www.cnbc.com/id/100550944>.
- 15 See Rachel Nickless, *Interviewed for a job by Sophie the robot*, FINANCIAL REVIEW, Apr. 10, 2013, available at http://www.afr.com/p/national/work_space/interviewed_for_job_by_sophie_the_gec0B69rcUsaXXFWLZrtvO.
- 16 See Arion McNicoll, *Meet the robot chef who ‘prints’ cookies*, BLUEPRINT, Sept. 2, 2013, available at http://www.cnn.com/2013/08/30/tech/innovation/meet-the-robot-chef-prints-cookies/index.html?hpt=hp_c4; Joseph Flaherty, *This Robot Barista Serves Up Custom, Cloud-Powered Coffee*, WIRED, Aug. 20, 2013, available at <http://www.wired.com/design/2013/08/briggo-coffee-robot-barista-yves-behar-fuse-project/>; Tereza Pultarova, *Robot bartender takes up job in German bar*, ENGINEERING AND TECHNOLOGY MAGAZINE, July 29, 2013, available at <http://eandt.theiet.org/news/2013/jul/robot-bartender.cfm>; Alex Ward, *Mechanic masterchef: Robots cook dumplings, noodles and wait tables at restaurant in China*, DAILY MAIL ONLINE, Jan. 13, 2013, available at <http://www.dailymail.co.uk/news/article-2261767/Robot-Restaurant-Robots-cook-food-wait-tables-Harbin.html>.
- 17 See Jonathan Cohn, *The Robot Will See You Now*, THE ATLANTIC, Mar. 2013, available at <http://www.theatlantic.com/magazine/archive/2013/03/the-robot-will-see-you-now/309216/>; Tekla S. Perry, *Making a robot that can draw blood faster and more safely than a human can*, IEEE SPECTRUM, July 26, 2013, available at <http://spectrum.ieee.org/robotics/medical-robots/profile-veebot>.
- 18 See Eric Olson, *Robot Painters*, BOEING.COM, http://www.boeing.com/boeing/Features/2013/05/bca_robot_painters_05_29_13.page.
- 19 See Diane Cardwell, *Putting Robots to Work in Solar Energy*, THE NEW YORK TIMES, Oct. 14, 2013, available at http://www.nytimes.com/2013/10/15/business/energy-environment/putting-robots-to-work-in-solar-energy.html?_r=0.
- 20 See Dennis K. Berman, *Daddy, What Was a Truck Driver?*, WALL ST. J., July 23, 2013, available at <http://online.wsj.com/news/articles/SB10001424127887324144304578624221804774116>.
- 21 See Peter Murray, *Meet ROBOT-Rx, The Robot Pharmacist Doling Out 350 Million Doses Per Year*, SINGULARITYHUB.COM, June 3, 2012, available at <http://singularityhub.com/2012/06/03/meet-robot-rx-the-robot-pharmacist-doling-out-350-million-doses-per-year/>.
- 22 See Jason Paur, *Long Shunned, Robots Finally Infiltrate Boeing’s Assembly Line*, WIRED, June 14, 2013, available at <http://www.wired.com/autopia/2013/06/boeing-robots-777/>.
- 23 See Anisha Jain, *Baxter, the Trainable Robot*, DESIGN PETRI, Sept. 23, 2012, available at <http://designpetri.com/2012/09/23/baxter-the-trainable-robot/>; Tim Hornyak, *Assembly bot Baxter wants to get close to you (Q&A)*, CNET, Sept. 18, 2012, available at http://news.cnet.com/8301-17938_105-57515022-1/assembly-bot-baxter-wants-to-get-close-to-you-q-a/.

- 24 See Evan Ackerman, *Robots Hallucinate Humans to Aid in Object Recognition*, IEEE SPECTRUM, June 20, 2013, available at <http://spectrum.ieee.org/automaton/robotics/artificial-intelligence/robots-hallucinate-humans-to-aid-in-object-recognition>.
- 25 John Hofilena, *Japan pushing for low-cost nursing home robots to care for elderly*, JDP, Apr. 29, 2013, available at <http://japandailynews.com/japan-pushing-for-low-cost-nursing-home-robots-to-care-for-elderly-2927943/>.
- 26 See N.V., *Difference Engine: The caring robot*, THE ECONOMIST, May 14, 2013, available at <http://www.economist.com/blogs/babbage/2013/05/automation-elderly>.
- 27 *Id.*
- 28 Kimber Sreams, *Google expects its self-driving cars to be ready in three to five years*, THE VERGE, Feb. 11, 2013, available at <http://www.theverge.com/2013/2/11/3975988/google-expects-its-self-driving-cars-in-three-to-five-years>.
- 29 See Jack Nicas, *Can Robots Better Spot Terrorists at Airports?* THE WALL ST. J., Dec. 20, 2013, available at <http://online.wsj.com/news/articles/SB10001424052702304244904579276851803909952>.
- 30 See John Parkinson, *FAA Approves Six 'Delivery By Drone' Test Sites*, ABC NEWS, Dec. 30, 2013, available at <http://abcnews.go.com/blogs/politics/2013/12/faa-approves-6-delivery-by-drone-test-sites/>.
- 31 See *iRobot Isn't Cheap But Strong Growth Potential Make It Worth The Price*, FORBES, Aug. 19, 2013, available at <http://www.forbes.com/sites/zacks/2013/08/19/irobot-isnt-cheap-but-strong-growth-potential-make-it-worth-the-price/>.
- 32 Sean Michael Kerner, *The Internet of Things Worth \$14.4 Trillion*, INTERNET NEWS.COM, Mar. 15, 2013, <http://www.internetnews.com/infra/the-internet-of-things-worth-14.4-trillion.html>.
- 33 See Chen Fei, *How China plans to become a leader in robotics*, THE CONVERSATION, Aug. 15, 2013, available at <https://theconversation.com/how-china-plans-to-become-a-leader-in-robotics-17084>.
- 34 Carl Benedikt Frey and Michael A. Osborne, *The Future of Employment: How Susceptible Are Jobs to Computerization*, Oxford University, Sept. 17, 2013.
- 35 M. Ryan Calo, *Open Robotics*, 70 MD. L. REV. 571-613 (2011).
- 36 PETER DIAMANDIS AND STEVEN KOTLER, *ABUNDANCE—THE FUTURE IS BETTER THAN YOU THINK* (2012).
- 37 At the outset, we offer three practical recommendations:
- **Involve Human Resources (HR) and Legal in Robotics Planning and Development.** The decision to use robotics requires the full involvement of the organization and cannot be limited to any one department. It is not just an efficiency or ROI question to be resolved between the chief technology officer and the CEO. The decision involves and impacts the entire workforce as well as HR policies and programs. Legal compliance issues only become roadblocks when they are unanticipated.
 - **Increase the Use of Contingent and Virtual Workers.** Changing skill requirements, new technologies and economic change have resulted in an increased use of more contingent workers such as consultants, project employees and/or contractors. Increasingly, employees are welcoming shorter-term flexible assignments to match lifestyle choices. Consider expanding your contingent and virtual workforce in anticipation of technological change. If and when robots displace human workers, reducing the contingent workforce is more accepted and legally less problematic. The arrival of the contingent workforce provides a win-win solution for needed current skills and future uncertainty.
 - **Designate an HR Professional or Corporate Counsel to Become the Organization's Expert on Robots and the Law.** The legal impact of robotics on the workplace is a developing discipline. Designating an HR professional or corporate counsel to become the in-house expert and resource is a good division of labor and an investment in your organization's future. Our law firm has created a global Robotics Practice Group providing employment and labor law mentoring, advice and information to the robotics industry, as well as employers deploying this technology in the workplace. See Garry Mathiason and Bonne Chance, *Robots, the Workplace and the Law*, ROBOTICS BUSINESS REVIEW (May 3, 2013), available at http://www.roboticsbusinessreview.com/article/robots_the_workplace_and_the_law.
- 38 Peter Gorle and Andrew Clive, *Positive Impact of Industrial Robots on Employment*, INTERNATIONAL FEDERATION OF ROBOTICS, (updated Jan. 2013)..
- 39 29 USC 2101 *et. seq.* See also *Reductions in Force: Issues, Strategies, And The Process For The Downsizing*, Vol. II THE NATIONAL EMPLOYER, Ch. 16 (Littler Mendelson, ed. 2013-14) for more detail about WARN.
- 40 See Chapter 16 of the National Employer.
- 41 Haw. Rev. Stat. § 394B-10; Haw. Code of Rules § 12-506-8.
- 42 26 Maine Rev. Stat. § 625-B(2), (3); Code of Maine Rules 12-170-015(IV).
- 43 N.J. Stat. § 34:21-2(a).
- 44 29 U.S.C. §§ 621 *et seq.*
- 45 29 U.S.C. § 626(f).
- 46 29 U.S.C. § 626(f).
- 47 *Will Robots Take All Our Blue-Collar Jobs?* BLOOMBERG VIEW EDITORIALS, Aug. 13, 2013, <http://www.bloomberg.com/news/2013-08-13/will-robots-take-all-our-blue-collar-jobs.html>.
- 48 *Id.*; BUREAU OF LABOR STATISTICS, *Job Openings and Labor Turnover Summary*, Dec. 10, 2013.

- 49 29 U.S.C. § 2102(a)(2). A list of state dislocated worker units can be found at: http://www.doleta.gov/layoff/rapid_coord.cfm. Be aware that this site is not regularly updated. The information given should be confirmed by a phone call to the state office listed. As for the required notice to the local chief elected official, the regulations recite that where there are two or more local governments, the notice should go to the government to whom the employer pays the most taxes. 20 C.F.R. § 639.3(g). As a practical matter, employers dealing with WARN problems, particularly on short notice, rarely have time to make inquiries into their tax payments. If this is the case, the employer can cover all bases by giving notice to all local governments, such as municipal *and* county governments.
- 50 See, e.g., President Barack Obama, STATE OF THE UNION ADDRESS (Jan. 24, 2012), available at <http://www.whitehouse.gov/state-of-the-union-2012>; DOL BUDGET PROPOSAL FOR FY 2013, 143-149, available at <http://www.whitehouse.gov/sites/default/files/omb/budget/fy2013/assets/labor.pdf>.
- 51 An employer that fails to comply with WARN's notice requirements is liable for the back pay and value of employment benefits of each aggrieved employee who suffers an employment loss, up to a maximum of 60 days' worth. For example, if an employer was required to provide 60 days' notice, but provided only 20 days' notice, it would be liable for 40 days' worth of back pay and damages for each aggrieved employee. These damages can include medical expenses incurred during the employment loss that would have been covered under an employee benefit plan if the employment loss had not occurred. If the employer fails to notify the local government of a plant closing or mass layoff, it is subject to a civil penalty of not more than \$500 for each day of the violation. This penalty may be avoided, however, if the employer properly compensates each aggrieved employee within three weeks from the date the shutdown or layoff is ordered. 29 U.S.C. § 2104(a).
- 52 Bruno Blanpain, LITTLER MENDELSON GUIDE TO INTERNATIONAL LABOR AND EMPLOYMENT LAW, EUROPEAN UNION, § 15.1 (3d ed. 2012) [hereinafter EUROPEAN UNION LABOR AND EMPLOYMENT LAW GUIDE]; Isabelle I H Wan et al., LITTLER MENDELSON GUIDE TO INTERNATIONAL LABOR AND EMPLOYMENT LAW, CHINA, § 15.1 (3d ed. 2012) [hereinafter CHINA LABOR AND EMPLOYMENT LAW GUIDE]; Álvaro Ivan Cala Carrizosa, LITTLER MENDELSON GUIDE TO INTERNATIONAL LABOR AND EMPLOYMENT LAW, COLUMBIA, § 15.1 (3d ed. 2012) [hereinafter COLUMBIA LABOR AND EMPLOYMENT LAW GUIDE]; Oscar De la Vega and Monica Schiaffino, LITTLER MENDELSON GUIDE TO INTERNATIONAL LABOR AND EMPLOYMENT LAW, MEXICO, § 15.1 (3d ed. 2012) [hereinafter MEXICO LABOR AND EMPLOYMENT LAW GUIDE].
- 53 European Council Directive 98/59/EC (July 20, 1998), available at <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31998L0059:EN:html>. See also BRUNO BLANPAIN, EUROPEAN UNION LABOR AND EMPLOYMENT LAW GUIDE, § 15.1, *supra* note 53.
- 54 China prescribes the order of termination for various types of employees, while Columbia requires state approval for layoffs affecting employees beyond a certain threshold. ISABELLE I H WAN ET AL., CHINA LABOR AND EMPLOYMENT LAW GUIDE, § 15.1; .ÁLVARO IVAN CALA CARRIZOSA, COLUMBIA LABOR AND EMPLOYMENT LAW GUIDE, § 15.1, *supra* note 53.
- 55 Isabelle I H Wan et al., CHINA LABOR AND EMPLOYMENT LAW GUIDE, § 15.1; Oscar De la Vega and Monica Schiaffino, MEXICO LABOR AND EMPLOYMENT LAW GUIDE, § 15.1, *supra* note 53.
- 56 OSCAR DE LA VEGA AND MONICA SCHIAFFINO, MEXICO LABOR AND EMPLOYMENT LAW GUIDE, § 15.1, *supra* note 53.
- 57 29 U.S.C. §§ 151–169.
- 58 29 U.S.C. § 157 (2013).
- 59 338 F.3d 747 (7th Cir. 2003).
- 60 See, e.g., *NLRB v. Caval Tool Division*, 262 F.3d 184 (2d Cir. 2001).
- 61 *Id.*
- 62 *Meyers Industries*, 281 N.L.R.B. 882 (1986). *But see Phillips Petroleum Co.*, 339 N.L.R.B. 916 (2003) (single employee's efforts to amend the company's sick leave policies because the employee was trying to improve his fellow employees' benefits, as well as serve his own need for leave to care for his wife and children).
- 63 *LaGuardia Associates LLP dba Crowne Plaza LaGuardia*, 357 N.L.R.B. No. 95 (2011).
- 64 *St. Luke's Episcopal-Presbyterian Hospital, Inc. v. NLRB*, 268 F.3d 575 (2001).
- 65 *Abell Engineering & Manufacturing, Inc.*, 338 N.L.R.B. 434 (2002).
- 66 *NLRB v. Virginia Electric & Power Co.*, 314 U.S. 469 (1941).
- 67 See, e.g., *Bakers of Paris, Inc.*, 288 N.L.R.B. 991 (1988) (employer's threat that unionization would lead to the purchase of automated equipment to replace employees or a complete shutdown was unlawful).
- 68 See *Idaho Frozen Foods Division*, 171 N.L.R.B. 1567, 1573 (1968) (finding violation of NLRA where employer threatened to automate areas of the plant if the union won the election).
- 69 See, e.g., *Consani Co. dba Pioneer Concrete Co.*, 282 N.L.R.B. 749 (1987) (employer unlawfully threatened plant closure in the event of unionization in absence of evidence of valid economic factors or other factors beyond union control).
- 70 29 U.S.C. § 158(c). See also *Southern Frozen Foods, Inc.*, 202 N.L.R.B. 753, 755 (1973) (finding no violation where employer's remarks were ambiguous in that they did not clearly imply a threat that a union victory would automatically be followed by a loss of employment).
- 71 *NLRB v. Gissel Packing Co.*, 395 U.S. 575 (1969).
- 72 *Patsy Bee, Inc.*, 249 NLRB 976, 977 (1980) (finding violation where employer had no indication from union that it would make demands that would cause economic hardship, let alone plant closure; nor did the employer have evidence that his customers might even pull their contracts).
- 73 29 USC §158(d).

- 74 *NLRB v. Katz*, 369 U. S. 736, 743, 82 S. Ct. 1107, 8 L. Ed. 2d 230 (1962).
- 75 See, e.g., *Renton News Record*, 136 N.L.R.B. 1294 (1962).
- 76 *Id.* at 1297-98.
- 77 312 N.L.R.B. 990 (1993), *enforced*, 54 F.3d 802 (D.C. Cir. 1995).
- 78 See *Nello Pistorosi & SMS, Inc.*, 203 N.L.R.B. 905, 83 LRRM 1212 (1973).
- 79 See *Electri-Flex Co.*, 228 N.L.R.B. 847 (1977).
- 80 *Millard Processing Services*, 310 N.L.R.B. 421, 425 (1993).
- 81 See, e.g., *General Elec. Co.*, 296 N.L.R.B. 844 (1989); *Johnson-Bateman Co.*, 295 N.L.R.B. 180 (1989); *Reece Corp.*, 294 N.L.R.B. 448 (1989). On the other hand, a number of federal circuit courts of appeals will find no duty to bargain over an issue that is “covered” by the contract. See, e.g., *Bath Marine Draftsmen’s Ass’n v. NLRB*, 475 F.3d 14, 25 (1st Cir. 2007). Under the contract coverage analysis, courts look to whether the language of a management rights clause or other term of the CBA covers the otherwise mandatory subject of bargaining. If it does, the union has exercised its right to bargain over the subject and the employer is under no further obligation to bargain. *Id.*
- 82 29 U.S.C. § 158(d); see also *Zimmerman Painting & Decorating*, 302 N.L.R.B. 856 (1991); but cf. *NLRB v. Jacobs Mfg. Co.*, 196 F.2d 680 (2d Cir. 1952) (employers are not relieved from mid-term bargaining obligations over mandatory bargaining subjects not embodied in CBAs’ terms).
- 83 *Renton News Record*, 136 N.L.R.B. 1294 (1962). Although the NLRB refined its approach to determining whether an employer must bargain over a given decision, since *Renton New Record*, its approach to automation cases remains consistent. *Plymouth Locomotive Works, Inc.*, 261 N.L.R.B. 595 (1982) (applying *Renton News Record* paradigm, and finding that an employer had committed an unfair labor practice by failing to bargain over a decision to automate).
- 84 See *Dubuque Packing Co.*, 303 N.L.R.B. 386, *enforced in relevant part sub. nom., United Food & Commercial Workers Local 150-A v. NLRB*, 1 F.3d 24 (D.C. Cir. 1993).
- 85 *Id.* Note, however, that in *dicta* the court of appeals explained that “relocations involving a sufficiently altered pattern of fixed-capital use (such as a shift from a labor-intensive production line to a fully automated factory) would appear exempt from the bargaining duty.” *United Food & Commercial Workers Local 150-A v. NLRB*, 1 Fed at 32.
- 86 *Liberty Source W, LLC*, 344 N.L.R.B. 1127 (2005).
- 87 *NLRB v. Royal Plating and Polishing Co.*, 350 F.2d 191, 196 (3d Cir. 1965).
- 88 *Id.*
- 89 *Penntech Papers v. NLRB*, 706 F.2d 570 (1st Cir. 1983).
- 90 See, e.g., Herminia Ibarra, *Hiring and Big Data: Those Who Could Be Left Behind*, HARVARD BUS. REV. BLOG NETWORK, Dec. 3, 2013, http://blogs.hbr.org/2013/12/hiring-and-big-data-who-wins/?utm_source=Socialflow&utm_medium=Tweet&utm_campaign=Socialflow (discussing how the use of “people analytics” may favor young, white male candidates).
- 91 29 U.S.C. §§ 621-634.
- 92 544 U.S. 228 (2005).
- 93 Pub. L. No. 101-336 (1990).
- 94 Pub. L. No. 110-325 (2008).
- 95 See, e.g., Adario Strange, *Award-Winning Robotic Exoskeleton Boosts Your Arm Strength*, MASHABLE, Nov. 7, 2013, available at <http://mashable.com/2013/11/07/titan-arm-exoskeleton/>.
- 96 See, e.g., Ellie Zolfagharifard, *The wearable robot that turns anyone into a SUPERHERO: Bionic arm lets users lift an extra 40lb effortlessly*, MAIL ONLINE, Dec. 10, 2013, available at <http://www.dailymail.co.uk/sciencetech/article-2521245/Titan-Arm-bionic-exoskeleton-lets-users-lift-extra-40lb-effortlessly.html>.
- 97 See, e.g., Bruce Upbin, *This Amazing Robot Exoskeleton Helps The Paralyzed Walk Again*, FORBES, Nov. 8, 2013, available at <http://www.forbes.com/sites/bruceupbin/2013/11/08/this-amazing-robot-exoskeleton-helps-the-paralyzed-walk-again/>.
- 98 EEOC Enforcement Guidance: *Enforcement Guidance: Preemployment Disability-Related Questions and Medical Examinations* (Oct. 10, 1995), available at <http://www.eeoc.gov/policy/docs/preemp.html>.
- 99 EEOC Enforcement Guidance: *Reasonable Accommodation and Undue Hardship Under the Americans with Disabilities Act* (Oct. 17, 2002), available at <http://www.eeoc.gov/policy/docs/accommodation.html>.
- 100 42 U.S.C. §§ 2000e *et seq.*
- 101 H.R. 2501, S. 1471, 112th Cong., introduced on July 12 and Aug. 2, 2011, respectively. Identical legislation, (H.R. 3972, S. 1972, 113th Cong.), was reintroduced on January 29, 2014.
- 102 29 U.S.C. § 201 *et seq.*
- 103 29 U.S.C. § 206(d).

- 104 See e.g. *Sullivan v. Oracle Corp.*, 557 F.3d 979 (9th Cir. 2009) (Certifying the question of applicability of wage and hour laws to in-state work by non-residents to the state court).
- 105 California's minimum wage law, for example, states that it covers "all" people, without mentioning any geographical limitation. Cal. Lab. Code § 1171-71.5.
- 106 *Sullivan v. Oracle*, 541 Cal. 4th 1191 (2011).
- 107 *Sims v. WorldPac, Inc.*, 2013 U.S. Dist. LEXIS 24740 at *6 (N.D. Cal. Feb. 22, 2013) ("In general, there is a presumption that the 'Legislature did not intend a statute to be operative, with respect to occurrences outside the state ... unless such intention is clearly expressed or reasonably to be inferred from the language of the act or from its purpose, subject matter or history."); See also *Sajfr v. BBG Communs., Inc.*, 2012 U.S. Dist. LEXIS 15198 (S.D. Cal. Jan 10, 2012).
- 108 *Gantchar v. United Airlines, Inc.*, 1995 U.S. Dist. LEXIS 3910, at *23 (N.D. Ill. Mar. 28, 1995)
- 109 *Gantchar v. United Airlines, Inc.*, 1995 U.S. Dist. LEXIS 3910, at **21–22 (N.D. Ill. Mar. 28, 1995); *Wolf v. J.I. Case Co.*, 617 F. Supp. 858, 863 (E.D. Wis. 1985); *Wirtz v. Healy*, 227 F. Supp. 123, 129 (N.D. Ill. 1964); *Hodgson v. Union de Permissionarios Circulo Rojo*, 331 F. Supp. 1119, 1122 (W.D. Tex. 1971).
- 110 *Id.*
- 111 *Gantchar v. United Airlines, Inc.*, 1995 U.S. Dist. LEXIS 3910, at *23 (N.D. Ill. Mar. 28, 1995).
- 112 See e.g. 29 U.S.C. § 213(f).
- 113 *Wright v. Adventures Rolling Cross Country, Inc.*, 2012 U.S. Dist. LEXIS 104378 at **6-7 (N.D. Cal. May 3, 2012) (finding that trip guides hired by a California company on a per trip basis to conduct three-week trips in other countries were not entitled to minimum wage under the FLSA).
- 114 *Wright v. Adventures Rolling Cross Country, Inc.*, 2012 U.S. Dist. LEXIS 104378, at **6-7 (N.D. Cal. May 3, 2012).
- 115 For example, the FLSA defines "employee" as "any individual employed by an employer," with a few narrow exceptions. 29 U.S.C. § 203(d)(1).
- 116 See, e.g., *Rutherford Foods Corp. v. McComb*, 331 U.S. 722, 67 S. Ct. 1473, 91 L. Ed. 1772, 6 Wage & Hour Cas. (BNA) 990, reh'g denied, 332 U.S. 785, 68 S. Ct. 29, 92 L. Ed. 368 (1947); *Martin v. Spring Break '83 Prods., LLC*, 688 F.3d 247, 251-53 (5th Cir.), cert. denied, 133 S. Ct. 795 (2012); *Purdham v. Fairfax County Sch. Bd.*, 637 F.3d 421, 423 (4th Cir. 2011); *Morrison v. Int'l Progs. Consortium, Inc.*, 253 F.3d 5, 10, 346 U.S. App. D.C. 301 (D.C. Cir. 2001); *Baker v. Flint Eng'g & Constr. Co.*, 137 F.3d 1436, 4 Wage & Hour Cas. 2d (BNA) 673 (10th Cir. 1998); *Williams v. Strickland*, 87 F.3d 1064 (9th Cir. 1996); *Martin v. Selker Bros., Inc.*, 949 F.2d 1286 (3d Cir. 1991); *Watson v. Graves*, 909 F.2d 1549 (5th Cir. 1990). See also *Nationwide Mut. Ins. Co. v. Darden*, 503 U.S. 318 (1992).
- 117 *Schultz v. Capital Int'l Security, Inc.*, 466 F.3d 298, 304 (4th Cir. 2006), quoting *Henderson v. Inter-Chem. Coal Co.*, 41 F.3d 567, 570 (10th Cir. 1994).
- 118 Matthew Bender 1-2 Wages and Hour: Law and Practice § 201A(1)(b).
- 119 Nancy Folbre, *The Unregulated Work of Mechanical Turk*, N.Y. TIMES BUS. DAY, Mar. 18, 2013, available at http://economix.blogs.nytimes.com/2013/03/18/the-unregulated-work-of-mechanical-turk/?_r=1.
- 120 "The Mechanical Turk Web site promotes itself with a quotation from a proud chief executive: 'Over all, we estimate saving 50 percent over other outsourcing methods.'" *Id.*
- 121 *Id.*
- 122 Aniket Kittur, et. al., *The Future of Crowd Work* (2013) available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2190946.
- 123 Nancy Folbre, *The Unregulated Work of Mechanical Turk*, N.Y. TIMES BUS. DAY, Mar. 18, 2013, available at http://economix.blogs.nytimes.com/2013/03/18/the-unregulated-work-of-mechanical-turk/?_r=1.
- 124 29 U.S.C. § 213(a)(17) exempts any employee "who is a computer systems analyst, computer programmer, software engineer, or other similarly skilled worker, whose primary duty is—
- (A) the application of systems analysis techniques and procedures, including consulting with users, to determine hardware, software, or system functional specifications;
 - (B) the design, development, documentation, analysis, creation, testing, or modification of computer systems or programs, including prototypes, based on and related to user or system design specifications;
 - (C) the design, documentation, testing, creation, or modification of computer programs related to machine operating systems; or
 - (D) a combination of duties described in subparagraphs (A), (B), and (C) the performance of which requires the same level of skills, and who, in the case of an employee who is compensated on an hourly basis, is compensated at a rate of not less than \$27.63 an hour.
- 125 29 U.S.C. § 206(a-b).
- 126 *Pabst v. Oklahoma Gas & Elec. Co.*, 228 F.3d 1128 (10th Cir. 2000); See also *Reimer v. Champion Healthcare Corp.*, 258 F.3d 720, 725-26 (8th Cir. 2001); *Cleary v. ADM Milling Co.*, 827 F. Supp. 472 (N.D. Ill. 1993); *Shamblin v. City of Colchester*, 793 F. Supp. 834 (C.D. Ill. 1992).
- 127 See, e.g., *Reimer v. Champion Healthcare Corp.*, 258 F.3d 720, 725 (8th Cir. 2001); *Dinges v. Sacred Heart St. Mary's Hosps.*, 164 F.3d 1056, 1059 (7th Cir. 1999); *Ingram v. County of Bucks*, 144 F.3d 265, 269-70, (3d Cir. 1998); *Paniagua v. City of Galveston*, 995 F.2d 1310, 1317 (5th Cir. 1993); *Norton v. Worthen Van Serv., Inc.*, 839 F.2d 653 (10th Cir. 1988).
- 128 29 U.S.C. § 651.

- 129 29 C.F.R. § 1910 Subpart O, available at https://www.osha.gov/pls/oshaweb/owastand.display_standard_group?p_toc_level=1&p_part_number=1910#1910_Subpart_O.
- 130 29 C.F.R. § 1910 Subpart S, available at https://www.osha.gov/pls/oshaweb/owastand.display_standard_group?p_toc_level=1&p_part_number=1910#1910_Subpart_S.
- 131 29 C.F.R. § 1910.147, available at https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9804.
- 132 For information on OSHA's guidelines and standards applicable to the robotics industry, see OSHA's webpage on Robotics, available at <https://www.osha.gov/SLTC/robotics/index.html>.
- 133 OSHA Instruction Pub. STD 01-12-002 [PUB 8-1.3], *Guidelines For Robotics Safety* (Sept. 21, 1987), available at https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=DIRECTIVES&p_id=1703.
- 134 OSHA Directive No: TED 01-00-015 [TED 1-0.15A], OSHA TECHNICAL MANUAL (OTM), § IV: Ch. 4, *Industrial Robots and Robot System Safety* (Jan. 20, 1999), available at https://www.osha.gov/dts/osta/otm/otm_iv/otm_iv_4.html.
- 135 OSHA Pub. 3067, CONCEPTS AND TECHNIQUES OF MACHINE SAFEGUARDING, Ch. 6, *Robotics in the Workplace* (Revised 1992). available at https://www.osha.gov/Publications/Mach_SafeGuard/chapt6.html.
- 136 DHHS (NIOSH) Pub. No. 85-103, *Preventing the Injury of Workers by Robots* (Dec. 1984), available at <http://www.cdc.gov/niosh/docs/85-103/>.
- 137 ANSI 2012 R15.06. According to Robotics online (sponsored by the Robotic Industries Association), this standard provides guidelines for the manufacture and integration of Industrial Robots and Robot Systems with emphasis on their safe use, the importance of risk assessment and establishing personnel safety. This standard is a national adoption of the International Standards ISO 10218-1 and ISO 10218-2 for Industrial Robots and Robot Systems, and offers a global safety standard for the manufacture and integration of such systems. A two-year transition period over to the revised RIA R15.06 ends with the year 2014.
- 138 ISO 10218-1:2011, Robots and robotic devices—Safety requirements for industrial robots—Part 1: Robots; ISO 10218-2:2011, Robots and robotic devices—Safety requirements for industrial robots—Part 2: Robot systems and integration.
- 139 OSHA, Webpage on Robotics, available at <https://www.osha.gov/SLTC/robotics/index.html>.
- 140 OSHA Pub. 3067, CONCEPTS AND TECHNIQUES OF MACHINE SAFEGUARDING, Ch. 6, *Robotics in the Workplace* (Revised 1992), *supra* note 136.
- 141 OSHA, ROBOTICS IN THE WORKPLACE, Chapter 6, available at https://www.osha.gov/Publications/Mach_SafeGuard/chapt6.html.
- 142 Alaska, Arizona, California, Connecticut (public sector only), Hawaii, Illinois (public sector only), Indiana, Iowa, Kentucky, Maryland, Michigan, Minnesota, Nevada, New Jersey (public sector only), New Mexico, New York (public sector only), North Carolina, Oregon, Puerto Rico, South Carolina, Tennessee, Utah, Vermont, Virgin Islands (public sector only), Virginia, Washington, Wyoming. See State Occupational Safety and Health Plans, available at <https://www.osha.gov/dcsp/osp/index.html>.
- 143 See CDC, *Robotic Talking Head Speaks Out in Support of Respirator Fit Research*, [Press Release] (July 25, 2013), available at <http://www.cdc.gov/niosh/updates/upd-07-25-13.html>.
- 144 For additional examples, see International Federation of Robotics, <http://www.ifr.org/robots-create-jobs/work-unsafe-for-humans/>.
- 145 See Section C (Discrimination); Section F (Workers' Compensation).
- 146 See, e.g., David Goldstein, *I am Iron Man: Top 5 Exoskeleton Robots*, DISCOVERY.COM, Nov. 27, 2012, available at <http://news.discovery.com/tech/robotics/exoskeleton-robots-top-5.htm>.
- 147 Several states permit employers to opt out of the state's workers' compensation system. In those states, if the employer has opted out, an injured worker may file a civil lawsuit against the employer claiming that the injury was caused by the employer's negligence.
- 148 A few states have recognized limited exceptions to this rule for injuries caused by an employer's intentional or criminal acts.
- 149 Jonathan Cohen, *The Robots Will See You Now*, THE ATLANTIC, Feb. 20, 2013, available at <http://www.theatlantic.com/magazine/archive/2013/03/the-robot-will-see-you-now/309216/>.
- 150 John Markoff, *The Rapid Advance of Artificial Intelligence*, THE NEW YORK TIMES, Oct. 14, 2013, available at http://www.nytimes.com/2013/10/15/technology/the-rapid-advance-of-artificial-intelligence.html?_r=0.
- 151 *Id.*; Gary Marcus, *Why We Should Think About the Threat of Artificial Intelligence*, THE NEW YORKER, Oct. 24, 2013, available at <http://www.newyorker.com/online/blogs/elements/2013/10/why-we-should-think-about-the-threat-of-artificial-intelligence.html>.
- 152 Claire Cain Miller, *Apps That Know What You Want, Before You Do*, THE NEW YORK TIMES, July 29, 2013, available at <http://www.nytimes.com/2013/07/30/technology/apps-that-know-what-you-want-before-you-do.html>.
- 153 See <http://www.azumio.com/about>; <http://www.gizmag.com/touchless-heart-rate-monitor-apps/24006>.
- 154 See http://www.weightwatchers.com/templates/Marketing/Marketing_Utool_1col.aspx?pageid=1118811.
- 155 See Garry Mathiason and Bonne Chance, *Robots, the Workplace and the Law*, ROBOTICS BUSINESS REVIEW, May 3, 2013, available at http://www.roboticsbusinessreview.com/article/robots_the_workplace_and_the_law.
- 156 *Id.*

- 157 Dave Zielinski, *Biometric Technologies Help Manage Employees*, SOCIETY FOR HUMAN RESOURCE MANAGEMENT, Oct. 29, 2013.
- 158 *Id.*
- 159 Dinah Wisenberg Brin, *Employee-Tracking Data Making Case for Working Face*, SOCIETY FOR HUMAN RESOURCE MANAGEMENT, June 2013.
- 160 42 U.S.C. § 12112(d)(4)(A).
- 161 EEOC, Enforcement Guidance: *Disability-Related Inquiries and Medical Examinations of Employees Under the Americans with Disabilities Act (ADA)*, (response to question No. 5) (July 27, 2000).
- 162 42 U.S.C. § 12112(d)(4)(B).
- 163 See, e.g., Peggy R. Mastroianni, EEOC Informal Discussion Letter, *ADA: Voluntary Wellness Programs & Reasonable Accommodation Obligations* (Jan. 18, 2013), available at http://www.eeoc.gov/eeoc/foia/letters/2013/ada_wellness_programs.html.
- 164 *Seff v. Broward County, Florida*, 691 F.3d 1221 (11th Cir. 2012).
- 165 Russell Chapman, *Double Whammy, Part II: EEOC Stance and ACA Final Regulations Impose New Burdens on Wellness Programs*, LITTLER INSIGHT (Aug. 8, 2013), available at <http://www.littler.com/publication-press/publication/double-whammy-part-ii-eeoc-stance-and-aca-final-regulations-impose-new>.
- 166 29 U.S.C. §§ 2001 *et seq.*
- 167 29 U.S.C. § 2001(3).
- 168 See DOL Compliance Assistance, *The Employee Polygraph Protection Act (EPPA)*, available at <http://www.dol.gov/compliance/laws/comp-eppa.htm>; NOLO Law for All, *State Laws on Polygraphs and Lie Detector Tests*, available at <http://www.nolo.com/legal-encyclopedia/state-laws-polygraphs-lie-detector-tests.html>
- 169 N.Y. Labor Law § 201-a.
- 170 Letter from Maria L. Colavito, Counsel, New York State Department of Labor, dated April 22, 2010.
- 171 740 ILCS 14/10-14/15; Tex. Bus. & Com. Code § 503.001.
- 172 See Cal. Bus. & Prof. Code § 22575; California Department of Justice, *Privacy on the Go: Recommendations for the Mobile Ecosystem* at 4 (Jan. 2013) available at oag.ca.gov/sites/all/files/pdfs/privacy/privacy_on_the_go.pdf.
- 173 Cal. Bus. & Prof. Code § 22577(d).
- 174 *U.S. v. Jones*, 132 S.Ct. 935 (2012).
- 175 *Jones*, 132 S.Ct. at 955.
- 176 Dawn S. Onley, *GPS Systems Help Monitor Employees' Time on the Job*, SOCIETY FOR HUMAN RESOURCE MANAGEMENT (2005).
- 177 Allen Smith, *Impact of Supreme Court's GPS Ruling Weighed*, SOCIETY FOR HUMAN RESOURCE MANAGEMENT, Feb. 7, 2012, available at <http://www.shrm.org/LegalIssues/FederalResources/Pages/GPSRuling.aspx>.
- 178 Future of Privacy Forum & the Center for Democracy & Technology, *Best Practices for Mobile Application Developers* (2011), available at www.cdt.org/files/pdfs/Best-Practices-Mobile-App-Developers.pdf.
- 179 *Id.* The Future of Privacy Forum & the Center for Democracy & Technology also recommend that if a mobile app uses location information, it should obtain express permission from the user before doing so. See *id.*, p. 9 fn. 20. While obtaining express consent to use tracking technology may not be practical in the employment context, especially for employers whose workforce must be out in the field, it may be prudent for an employer to consider having an employee sign an agreement permitting the use of such technology where circumstances permit.
- 180 Pub. L. No. 104–191, 110 Stat. 1936 (Aug. 21, 1996).
- 181 45 C.F.R. pt. 164.504(e).
- 182 201 CMR § 17.03(2)(f)(2).
- 183 A “litigation hold” requires a company to temporarily suspend its document retention destruction policy for the documents that may be relevant or are reasonably anticipated to be relevant to a lawsuit.
- 184 Opinion 05/2012 on Cloud Computing (WP 196), ARTICLE 29 DATA PROTECTION WORKING PARTY (July 1, 2012).
- 185 National Conference of State Legislatures, *State Security Breach Notification Laws*, available at <http://www.ncsl.org/research/telecommunications-and-information-technology/security-breach-notification-laws.aspx>.
- 186 For instance, Iowa, Nebraska, and Wisconsin statutes include biometric data, with the latter two states also classify “voiceprints” as personal information. In addition, Wisconsin considers an individual’s DNA profile as personal information.
- 187 These states include Arkansas, California, Georgia, Hawaii, Illinois, Massachusetts, Minnesota, Nevada, New York, North Carolina, North Dakota, Tennessee, Texas, and Washington.
- 188 These states include Colorado, Delaware, Idaho, Kansas, Maine, Maryland, Nebraska, Utah, and Wyoming.

- 189 States that permit telephonic notices are Arizona, Colorado, Connecticut, Delaware, Georgia, Hawaii, Idaho, Indiana, Maryland, Michigan, Mississippi, Missouri, Montana, Nebraska, New Hampshire, New York, North Carolina, Ohio, Oklahoma, Oregon, Pennsylvania, South Carolina, Utah, Vermont, Virginia, and West Virginia.
- 190 These states include Hawaii, Michigan, North Carolina, Virginia, and Vermont.
- 191 States requiring notification to the attorney general are California, Connecticut, Indiana, Maine, Maryland, Massachusetts, Missouri, New Hampshire, New York, North Carolina, Vermont, and Virginia.
- 192 These states include Alaska, Colorado, Florida, Georgia, Hawaii, Indiana, Kansas, Maine, Maryland, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Montana, Nevada, New Hampshire, New Jersey, New York, North Carolina, Ohio, Oregon, Pennsylvania, South Carolina, Tennessee, Texas, Vermont, Virginia, West Virginia, and Wisconsin.
- 193 States that provide a maximum civil penalty include Idaho, Indiana, Missouri, Oklahoma, Virginia, and West Virginia.
- 194 Alaska, Michigan, New York, Rhode Island, South Carolina, and Utah calculate the penalty based on the number of affected individuals.
- 195 States providing for a private right of action include Alaska, California, Louisiana, Maryland, New Hampshire, North Carolina, Oregon, South Carolina, Tennessee, Virginia, and Washington.
- 196 RESTATEMENT (THIRD) OF UNFAIR COMPETITION § 39 (1995).
- 197 RESTATEMENT (FIRST) OF TORTS, § 757, comment b (1939).
- 198 See *iRobot Corp. v. Jameel Ahed and Robotic FX, Inc.*, Case No. 07cv11611-NG (D. Mass. filed August 29, 2007).
- 199 Fed. R. Civ. P. 34, Advisory Committee Note, 2006 Amendments.
- 200 See *Owner-Operator Independent Drivers Association, Inc. v. Federal Motor Carrier Safety Administration*, 656 F.3d 580 (7th Cir. 2011).
- 201 In response to the court's decision, on May 14, 2012, the FMCSA rescinded the proposed regulations. It also announced its intent to move forward with a new regulation on electronic logging devices with a supplemental notice of proposed rulemaking. See 77 Fed. Reg. 7562 (Feb. 13, 2012). Congress subsequently mandated that the Secretary of Transportation adopt regulations requiring that commercial motor vehicles involved in interstate commerce, operated by drivers who are required to keep records of duty status, be equipped with electronic logging devices. See MAP-21, Pub. L. No. 112-141, § 32301(b), 126 Stat. 405, 786-788 (July 6, 2012), amending 49 U.S.C. 31137. See also, Evan Lockridge, *EOBR/ELD Proposal Advances from FMCSA to DOT Secretary's Office*, TRUCKINGINFO, June 18, 2013 ("No matter if you call them electronic on-board recorders, electronic logging devices, or black boxes, a proposal to mandate their use is slowly winding its way through the bureaucratic hands of the federal government, putting it closer to publication"), <http://www.truckinginfo.com/channel/owner-operators/news/story/2013/06/eobr-eld-proposal-advances-from-fmcsa-to-dot-secretary-s-office.aspx>.
- 202 *Morgan v. U.S. Xpress, Inc.*, 2006 U.S. Dist. LEXIS 36195 (M.D. Ga. June 2, 2006).
- 203 *Montemayor v. Heartland Transp., Inc.*, 2008 U.S. Dist. LEXIS 88990 (S.D. Tex. Oct. 30, 2008). See also *Frey v. Gainey Transp. Servs.*, 2006 U.S. Dist. LEXIS 59316 (N.D. Ga. 2006) (denying plaintiff's spoliation motion based upon defendant's alleged failure to preserve data from satellite tracking and ECM systems used by trucking company, because such data was deleted in the normal course of business before a lawsuit had been filed, and describing those systems as follows: "[Defendant] utilized the QualComm satellite tracking system which is a 'communication device so the driver and the dispatchers or anybody else can communicate with the driver.' The system can also 'find out where the driver within reason is at any given time if it's updating correctly.' If the truck is operating in a metropolitan area, the system will update more frequently than in a less populated area. In metropolitan areas, it should get an update every minute. ... The system can also provide vehicle position history and the history of message communication between the driver and dispatcher. QualComm communication is maintained on the system for the past 90 days. ... [T]he company also employs an 'electronic control module (ECM)' system which can give the 'history of the idle time on the truck, the fuel mileage and it may give a hard brake occurrence as well as an average speed.'").
- 204 *Mableton v. UPS, Inc.*, 2013 U.S. Dist. LEXIS 141615 (N.D. Ala. Sept. 5, 2013).
- 205 *McMicheal v. MidAmerican Energy Co.*, 824 N.W.2d 562, 2012 Iowa App. LEXIS 932 (Iowa Ct. App. 2012). See also *Dudley v. Ohio Dep't of Pub. Safety*, 2007 U.S. Dist. LEXIS 71427 (N.D. Ohio Sept. 25, 2007) (A GPS tracking unit was placed on the plaintiff's vehicle after an investigation revealed discrepancies between her time sheets and time sheets submitted by subordinates when they were allegedly working together); *Hinkley v. Roadway Express, Inc.*, 2006 U.S. Dist. LEXIS 64434 (D. Kan. Feb. 13, 2006) (Plaintiff was terminated after the GPS tracking report indicated that his self-report for deliveries was inaccurate).
- 206 Each of these submissions is available on the "Regulations.gov" website that can be accessed via <http://www.uscourts.gov>, and in particular the "Submit or Review Comments on the Proposed Amendments to the Federal Rules of Civil Procedure," link at <http://www.uscourts.gov/RulesAndPolicies/rules/proposed-amendments.aspx>.
- 207 Microsoft Corporation Comment, Aug. 31, 2011 pp. 4 - 5.
- 208 Bayer Corporation Comment, [Press release] (Oct. 25, 2013), pp. 2—3.
- 209 Pfizer Inc. Comment, [Press release] (Nov. 5, 2013), p. 4.
- 210 For example, a common Presumptive Privilege Protocol uses keywords that are variations of common terms that are used by attorneys and their staff and/or associated with privileged or confidential documents to identify and flag "Presumptively Privileged" documents/data. Once identified, those documents/data can be targeted for closer scrutiny via visual cues (*i.e.*, auto-highlighting in **bright red**) that are automatically created within the review platform and/or by automatically checking the "privilege" box/tag in the substantive review template. A variation of the Presumptively Privileged query can also be run on production sets of documents/data before they are produced, to ensure that no potentially privileged documents are being produced to an adversary.

- 211 A recent study that was conducted by Oracle, several Stanford University professors and the non-profit Electronic Discovery Institute concluded (*emphasis supplied*):

The first phase of the highly-anticipated Oracle/Electronic Discovery Institute joint research project has been completed, and confirms what many advocates have been preaching about technology-assisted review (aka predictive coding)—that spending more money doesn't correlate with greater quality; that senior attorneys know what they are doing; and *that you can't turn discovery over to robots—humans are still the most vital component of the project.*

Monica Bay, *EDI-Oracle Study: Humans are Still Essential in eDiscovery*, LAW TECHNOLOGY NEWS, Nov. 20, 2013, available at <http://www.lawtechnologynews.com/id=1202628778400?slreturn=20140015125006>. See also Steve Green and Mark Yacano, *Pitting Computers Against Humans in Document Review*, LAW TECHNOLOGY NEWS, Oct. 31, 2012, available at <http://www.lawtechnologynews.com/id=1351607884735>, which concludes (*emphasis in original*):

In the past few years, document review has begun to change from a heavily staffed people effort to an approach that optimizes both technology and high-level human involvement. Sometimes, though, the description and business case is pushed too far, as some eDiscovery professionals advocate for futuristic, technical methods and minimize what skilled document reviewers bring to the process.

....

There are reasons to doubt that the [results of the 2009 Text Retrieval conference (TREC) Legal Track Interactive Task study—a leading study cited in favor of the use of Predictive Coding over human review] can lead to generalized conclusions about the efficacy of computer-assisted methods. Of course, the [“Technology-Assisted Review in eDiscovery Can be More Effective and More Efficient than Exhaustive Manual Review,” XVII RICH. J.L. & TECH 11 (2011)—another study that advocates in favor of the use of Predictive Coding over human review] article doesn't conclude that computer-assisted methods *are* more effective—is says that they “can be more effective.” This is stating the obvious: any method can be better than any other, depending on how it is executed. Every eDiscovery tool currently available, even the most technically advanced, still depends entirely on the very “manual” work of its operators.

- 212 See Section H of this Report on workplace privacy.
- 213 Jonathan Cohn, *The Robot Will See You Now*, THE ATLANTIC, March 2013, available at <http://www.theatlantic.com/magazine/archive/2013/03/the-robot-will-see-you-now/309216/>.
- 214 Jonathan D. Rockoff, *Robots vs. Anesthesiologists*, WALL ST. J., Oct. 9, 2013.
- 215 American Telemedicine Association, *What is Telemedicine?* available at <http://www.americantelemed.org/learn/what-is-telemedicine>.
- 216 Maggie Fox, *Electrical burns may burst surgical robot's bubble*, NBC NEWS, June 14, 2013, available at <http://www.nbcnews.com/health/electrical-burns-may-burst-surgical-robots-bubble-6C10321766>.
- 217 *Taylor v. Intuitive Surgical Inc.*, No. 09-2-03136-5 (Wash., Kitsup. Co. (Port Orchard) Super. May 23, 2013); See also Patricia Guthrie and Joel Rosenblatt, *Intuitive Wins Trial, Defeats Negligent Training Claims*, BLOOMBERG NEWS, May 24, 2013, available at <http://www.bloomberg.com/news/2013-05-23/intuitive-wins-trial-defeats-negligent-training-claims.html>.
- 218 *Elsy v. Laury*, No. 1:2012-cv-00707 (D. Or. Nov. 19, 2013); *Medford botched ovary surgery results in \$100,000 jury award*, OREGONLIVE, Nov. 16, 2013, available at http://www.oregonlive.com/pacific-northwest-news/index.ssf/2013/11/medford_botched_ovary_surgery.html.
- 219 See 45 C.F.R. § 160.001 *et seq.*
- 220 45 C.F.R. § 164.306.
- 221 Section H, *supra*.
- 222 45 C.F.R. § 164.308.
- 223 45 C.F.R. § 164.310.
- 224 45 C.F.R. § 164.312.
- 225 *Id.*
- 226 *Id.*
- 227 For a more detailed discussion of how robotics and AI will affect workers' compensation, see Section F of this Report.
- 228 See 45 C.F.R. §§ 164.502(b), 164.512(a).
- 229 For a more detailed discussion of eDiscovery issues associated with robotics and AI, see Section J of this Report.
- 230 For a comprehensive discussion of how the rise of workplace robotics will affect our employment-based tax system, see William Hays Weissman, *The Employment Tax Implications Of The Robotics Revolution*, included in the Appendix of this Report.
- 231 ILO SAFETY PRINCIPLES FOR INDUSTRIAL ROBOTS, available at: http://www.ilo.org/safework_bookshelf/english?content&nd=857170674. <http://www.ilo.org/oshenc/part-viii/safety-applications/item/972-safety-principles-for-industrial-robots>.

APPENDIX: THE EMPLOYMENT TAX IMPLICATIONS OF THE ROBOTICS REVOLUTION

By William Hays Weissman

While robots and taxes may seem to have very little in common, the spread of robotics technologies in the workplace will likely have major implications for two aspects of the U.S. tax system:¹ the reporting of financial information and collection of tax revenues (collectively tax administration) and the funding of social insurance programs (Social Security, Medicare and unemployment).² These implications are predicated upon changes to the assumptions about the division of income going to labor (wages) versus capital. In the aggregate, an increase in robotics investment over labor may depress wages, while the decreased need for employees in certain industries could reduce labor force participation.³ Such changes to the workforce could impact tax administration and social insurance because the current tax system requires the existence of a critical mass of employer-employee (or employment) relationships.⁴

The use of an employer-employee model as the basis of the modern tax system can be traced to the development of large scale “center firms”⁵ that focused on centralized management, economies of scale, and shared use of functional departments such as sales, marketing, accounting, and legal, as well as the separation of owners from labor. The migrations of workers from farms to these center firms created large numbers of “employees” on scales that had not previously existed. Further, social, legal and technological developments in the late 1800s helped shape the debate over taxes, which served both to raise revenue and curb economic power. The severe economic downturns of the late 1800s and early 1900s fostered the perceived need for social programs to combat their negative effects on wage earners and their dependence upon employers for their economic survival.⁶

The tensions between capital and labor that helped shape the debate about taxes and social insurance in the early 1900s have not disappeared. As recently as this summer, workers walked out of fast food restaurants across America to demand a \$15 per hour minimum wage and other working condition improvements.⁷ Their arguments were largely predicated upon a social justice theory that large corporations could afford to pay higher wages, and that minimum wages were not sufficient for employees to support themselves.⁸ However, these jobs are already in the process of being eliminated by robotics and automation technologies. For example, as far back as 2008, *Baggers*, a fully automated restaurant in Germany, was being tested. Not only were the reviews positive, but an added bonus was that there was no need to leave the robot servers tips. Since tips are generally subject to information reporting and social insurance taxes, the elimination of “employees” being paid this form of “wages” dilutes the funding of social insurance.⁹

In addition, Momentum Machines has built a custom hamburger machine. The company claims “making burgers costs US\$9 billion a year in wages in the United States alone. . . . A machine that could make burgers with minimum human intervention would not only provide huge savings in labor costs, but would also reduce preparation space with a burger kitchen replaced by a much smaller and cheaper stainless-steel box.”¹⁰ While *Baggers* still had some human cooks, combining its automation with Momentum Machines custom burger maker could displace virtually all of these low wage fast food workers, and in turn eliminate an employer’s need to worry about information reporting and tax remittance while also reducing the funds flowing to the social insurance programs.

The structure of tax administration and the funding of social insurance programs based on an employment model has remained largely unchanged for nearly 80 years.¹¹ Changes to the workplace and the nature of work generally, caused in part (but not solely) by the increasing use of robotics technology, will likely accelerate the decline in the number of people working for center firms as they have traditionally been organized, as well as eliminate many lower skill jobs. More people will also likely experience longer periods of structural unemployment. These changes will stress the use of the employment model as the basis for tax administration and the funding of social insurance programs.

While technological advances have caused entire industries to disappear before—think, for example, of stevedores¹²—the current technological changes appear to be unprecedented in prior experience because of the replacement of humans by automation in both non-routine and cognitive job functions. This change, coupled with demographic changes such as increases in the population and larger numbers of non-working older dependents, along with more cross-border exchanges of services, has the potential to make the funding of social insurance programs based on the employment model highly questionable. Moreover, the organization and structure of the center firms of the late 19th and early 20th centuries is changing to require less labor.

All these changes have potentially negative implications for tax administration and the funding of social insurance that will likely require alternatives to the current employment-based model. Whatever changes are made to tax administration and social insurance are likely to be unpopular and potentially expensive. Policymakers have only three options: (1) entirely new forms of taxation layered on top of the current employment-based model; (2) fundamental changes to tax administration and social insurance programs; or (3) some combination of these two options. Policymakers need to start thinking about the implications of robotics technologies in the workplace from a tax administration and funding of social insurance programs perspective now or it will be too late to save these programs. On the other hand, strong arguments can be made that robotics creates more jobs than are lost.¹³ However, even if this proves to be true, it is likely that the jobs and correspondingly taxable income may be generated in a different state or a different country.

Robotics May Fundamentally Change the Employment Relationship

In his remarks regarding government reform in early 2012, President Obama stated:

We live in a 21st century economy, but we've still got a government organized for the 20th century. Our economy has fundamentally changed—as has the world—but our government, our agencies, have not. The needs of our citizens have fundamentally changed but their government has not. Instead, it's often grown more complicated and sometimes more confusing.¹⁴

President Obama is correct that the American economy has fundamentally changed and grown more complex and confusing. The way businesses are organized, “work” is performed and the relationship of “owners” and workers have all changed due to advances in numerous technologies, including robotics. President Obama is also correct that our government—and in particular its tax laws predicated upon a 1930s-style employment model—have not been modified to account for those changes. While government agencies may not really care about a business’s organizational structure or the nature of work, it will have to care about a diminishing workforce’s implications for tax administration and the funding of social insurance.

The transactional cost theory of a firm posits that the reason for firms to exist is they are more efficient at organizing resources than are markets.¹⁵ In the context of labor, the transactional cost theory of the firm helps explain whether it is more or less expensive to retain a worker as an employee or an independent contractor. For example, is it less expensive to hire in-house counsel or to purchase legal services in the marketplace when such services are needed. An attorney may be an employee or an independent contractor depending upon the facts, but the difference for tax administration and funding social insurance can be significant.¹⁶

Similar kinds of cost-benefit analyses also help explain a firm’s decision to hire a human being or purchase a machine to perform the same task. The theory, for example, helps explain why Foxconn, with roughly 1.2 million workers in China, recently purchased 1 million robots for installation by 2014,¹⁷ or why companies are returning manufacturing to the United States.¹⁸ Baxter, a new robot that performs various functions, costs about \$22,000 to purchase, which translates into about \$3 per hour to operate over its operating life, significantly less than even a minimum wage worker. In short, when firms determine that it is less expensive and more productive to replace an individual with a robot,¹⁹ the implications for tax administration and social insurance become dire, unless those displaced workers find other employment paying wages subject to information reporting obligations and social insurance contributions.

A recent research paper by Oxford University professors Carl Benedikt Frey and Michael A. Osborne suggests that, unlike past technological advances that were limited to routine tasks in manufacturing, technologies today are capable of performing non-routine and cognitive functions unheard of even a decade ago.²⁰ Thus, unlike prior periods of technological unemployment, in which labor shifted to new industries, current technological advances are eliminating the need for such labor shifts. They ultimately conclude that continued advances in computing technologies, including robotics, will put around 47% of total U.S. employment at risk of being automated within the next decade or two. They go on to predict:

[M]ost workers in transportation and logistics occupations, together with the bulk of office and administrative support workers, and labour in production occupations, are at risk. ... Our findings thus imply that as technology races ahead, low-skill workers will reallocate to tasks that are non-susceptible to computerisation—*i.e.*, tasks requiring creative and social intelligence. For workers to win the race, however, they will have to acquire creative and social skills.²¹

While Frey and Osborne do not attempt to predict the size of the workforce, or what jobs, if any, will actually be eliminated, these predictions are troubling because they portend a structural change to the size of the workforce that could negatively impact the efficiency of tax administration and funding of social insurance by making the employment model less stable and reliable in the future.

Moreover, the nature of firms is changing in the 21st Century. Center firms arose in the late 19th and early 20th centuries to aggregate assets for efficiency, and required large numbers of employees to do so. However, markets today are far more efficient and thus capable of handling transactions that previously were required to be handled within the firm. For example, companies such as ADP and Ceridian are better able to handle payroll functions at lower cost for many employers than if they had their own payroll department. As tasks such as payroll administration became more automated and commoditized, fewer people were needed to perform them. Thus, automation in the second half of the 20th century has driven down the number of employees required to perform these kinds of tasks.

As robotics moves into more cognitive areas of work, the trend toward smaller firms with fewer employees is likely to continue. For example, in 1955 General Motors employed almost 555,000 people in the U.S. to make 4,477,000 cars and trucks.²² Today, GM has a global workforce of only about 212,000,²³ and as recently as 2011 it employed only about 77,000 people in the U.S. while making 3,089,000 cars and trucks in North America.²⁴ Some of that the decrease in employment can be attributable to automation technologies, and that trend is likely to continue.²⁵

Further, even if GM is not a representative example of the overall labor market, it exemplifies the potential challenge for tax administration and social insurance, as the loss of 478,000 wage earners attributable to a single employer will require additional tax administration cost and reduced efficiency. Unless the wages of those 478,000 workers were replaced in similar amounts, further dilution of the social insurance risk pools occur. If these workers become “self-employed,” the consequences for tax administration are substantial.

Concerns with the Social Security and Medicare Insurance Programs

According to a SSA Advisory Council Report, *Restoring Security to Our Social Security Retirement Program*, there are fundamental problems with social insurance because of its “pay-as-you-go” financing:

Pay-as-you-go financing amounts to an income transfer system from workers to retirees rather than a retirement saving mechanism for workers. Under this arrangement, workers—and society more generally—forgo the opportunity to invest in real private capital and to earn the higher rate of return it would afford.²⁶

In addition to concerns about rates of return, pay-as-you-go requires sufficient numbers of current workers to support beneficiaries. Irrespective of the policy arguments about the pros or cons of pay-as-you-go financing, it remains a basic fact that any insurance system needs sufficient numbers to spread risk (*i.e.*, a risk pool).²⁷ Robotics technologies could negatively affect the social insurance pay-as-you-go model because they may reduce the number of available workers over which these insurance risks can be spread.

Take a simple mathematical example. Say there are 10 fast food workers being paid \$10 per hour, working full-time in California. Each worker earns \$20,800 per year in wages, based on 40 hours per week and 52 weeks in a year. Such workers would pay \$301.60 in Medicare taxes and \$1,289.60 in Social Security taxes. Their employer pays the same Medicare and Social Security taxes, and in addition, assuming the maximum contribution rate, \$434 in SUTA and \$56 in FUTA.²⁸ The total contributions to the social insurance programs are:

TAX	EMPLOYEES	EMPLOYER
Medicare	\$3,016	\$3,016
Social Security	\$12,896	\$12,896
SUTA	\$0	\$4,340
FUTA	\$0	\$560
Totals	\$15,912	\$20,812

Now assume the employer purchases Momentum Machines' burger maker and automates its restaurant to run like *Baggers* and therefore lays off the 10 fast food workers. Instead, it hires a single worker to operate the technology whom it pays \$100 per hour.²⁹ Assume that single worker also works full-time, earning \$208,000 per year. While total wages paid are the same, the taxes used to fund social insurance are radically different:

TAX	EMPLOYEES	EMPLOYER
Medicare	\$3,016	\$3,016
Social Security	\$7,049.40	\$7,049.40
SUTA	\$0	\$434
FUTA	\$0	\$56
Totals	\$10,065.40	\$10,555.40

Because of wage base limits on unemployment and Social Security taxes, the amount of wages subject to tax remains the same but the taxes paid on one high-wage worker compared to the 10 low-wage workers is reduced about 33% for the employee-side taxes and about 50% for the employer-side taxes. Thus, as labor market participation rates continue to drop due to displacement of workers by robotics and automation technologies, there is the possibility that the funding mechanism for social insurance will fail to find sufficient replacements, even if wages remain constant.

Further, assume that the 10 workers remain unemployed for 26 weeks, earning a weekly unemployment benefit of \$200 per week. That amounts to \$52,000 in current unemployment benefits (\$200 x 10 workers x 26 weeks), supported by \$434 in current taxes. Unless sufficient numbers of new employees are paid wages for services in employment that are subject to tax, or the amount of wages subject to tax and/or rates are raised substantially, this is simply not financially sustainable.³⁰

While one solution might be to remove the wage-base limits on Social Security and unemployment,³¹ this does not address the eligibility side of social insurance, nor does it address how persons unattached to the labor force obtain eligibility. For the 10 former low-wage employees in the above example detached from the workforce for 26 weeks, the social insurance benefits provided by unemployment end (assuming no extensions). Then what? The prediction that as much as 47% of U.S. jobs could be automated within 20 years does not bode well for their prospects of becoming reattached to the workforce in sufficient numbers. If even half of those workers remain out of the workforce for a substantial period of time (based on the 47% of jobs that become automated), there will be serious consequences for social insurance.

There are all kinds of proposals to shore up the solvency of social insurance, such as raising minimum standards (such as the retirement age), means testing for receipt of benefits (thereby reducing or eliminating "wealthy" senior citizens' Social Security benefits), increasing contributions (by, as noted above, removing the wage base limits), among others.³² Putting aside the merits of such proposals, it remains that all of these options address the problem within the current employment framework used to establish the obligations to fund the social insurance programs and determine eligibility for its benefits. They do little to address a radically different employment profile for the country if, as predicted, as much as 47% of jobs become automated over the next few decades.

Assumptions about the effects of robotics on the complexion of the workforce do not appear to be part of the public assumptions about funding social insurance. For example, *The 2013 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds* ("Report") states that the Disability Insurance Fund will be depleted in 2016, with only enough funds to cover 80% of benefits, while the Social Security Fund will be depleted by 2033, with the ability to pay only 77% of benefits.³³ The Report, based on actuarial data over long periods of time, include numerous assumptions. For example, the report notes "[m]any economic and demographic factors, including longevity, health, disability prevalence, the business cycle, incentives for retirement in Social Security and private pensions, education, and marriage patterns, will influence future labor force participation rates."³⁴ Not mentioned is the impact technology will have on employment. Policymakers need to take these workplace changes into consideration when making assumptions about the long-term efficiency of tax administration and the stability of current social insurance programs.³⁵

Concerns with the Unemployment Insurance Program

The continued use of robotics may result in long periods of unemployment for many individuals, and potentially higher structural unemployment. The rates of long-term unemployment are already at a six-decade high following the Great Recession.³⁶ Job displacement caused by robotics is only likely to exacerbate this problem, particularly for 16-24 year olds, whose unemployment rates are significantly higher than the unemployment rate generally.³⁷ If a young person has an extensive delay entering the workforce, he or she also delays meeting eligibility requirements for all social insurance programs.

There is some evidence, however, that robotics is actually increasing job growth in the U.S., suggesting that concerns about labor participation rates in the long run are overblown, and thus the implications for tax administration and the funding of social insurance should be negligible or even positive. For example, a number of companies have brought back manufacturing jobs from China and other overseas countries in recent years. One recent study found that three to five jobs are created for each robot in use.³⁸ Whether this new job creation and “insourcing” will continue, however, is uncertain.

If, using Frey and Osborne’s assumptions, robotics were to replace nearly half of individuals—or “employees”—in the workplace, and the size of the workplace diminishes such that labor participation rates continue to drop, more individuals will become unemployed, causing more benefits to be drawn from the UI Funds. At the same time, if fewer workers are in the workforce because individuals are being replaced by robots, then there are fewer wages being paid to support the funding of the currently unemployed. Thus, as anticipated technological unemployment increases to cause higher long-term structural unemployment rates, social insurance programs that pay unemployment benefits risk failing.

The Increase in Small Firms and “Independent Contractors” and the Ability to Perform Services Outside the United States

There is currently a significant push by both the Obama Administration and the states to clamp down on worker “misclassification.” There are a variety of reasons for these efforts, both political and economic, including the need to collect more tax revenues to fund social insurance programs,³⁹ the perception that workers need a certain level of benefits to provide a social safety net, and the desire of the Obama Administration to position itself as a champion of the “middle class” against the rich and businesses that intentionally misclassify workers.

There are two countervailing forces at work, however. First, robotics will allow firms to operate at the same levels of productivity with fewer employees than in the past. For example, at a 10-to-1 replacement ratio, a firm with 100 employees today might only require 10 in the future as robotics replicate many of the tasks that employees had been performing.⁴⁰ Moreover, technologies allow for more rapid ramp up and down of workforces, and the outsourcing of tasks to “independent contractors” both in the U.S. and abroad. While the status of workers as employees or independent contractors does not, by itself, cause major problems for tax administration or the funding of social insurance other than unemployment, there is no question that an increase in numerous small “firms”—whether a single person or a few people—potentially makes tax administration less effective.⁴¹

Second, as technologies allow for the performance of services from remote locations, firms may locate labor in the most tax efficient jurisdictions, even if capital is deployed elsewhere. This could further reduce labor participation rates.

Tax Reform Options

As noted previously, there are three options available to policymakers to address the changing workplace’s impact on the employment-based model of tax administration and funding of social insurance: (1) entirely new forms of taxation layered on top of the current employment model; (2) fundamental changes to tax administration and social insurance programs; or (3) some combination of these two options.

New Forms of Taxation

One possible solution is to layer new forms of taxation upon the current system in an effort to shore them up. For example, taxes could be levied on robots that replace human workers in an attempt to mimic the current employment-based tax system. However, such taxes could have the adverse consequence of freezing workforces in place as employers seek to avoid higher taxes. Further, it may also be impossible to determine when a robot is actually replacing a human or being added as a result of growth. Thus, taxes based on a replacement of humans are likely unadministrable and could freeze economic activity at the point in time when the tax gets enacted.

Another alternative is a more straightforward technology-based tax on some or all forms of technology that has no relationship to individuals performing services used to fund social insurance programs. Such taxes could be based upon cost of the technology or some other basis.

An important consideration to tax administration, however, is the effectiveness of tax administration without withholding. Entirely new forms of information reporting would likely be required to address technology taxes if based on costs of technology.⁴² Basing such taxes on profits of the business would mimic income taxes, and could be based on current tax reporting via returns. However, this could limit the flows of taxes to the public without regular withholdings, possibly disrupting public expenditures. Further, shifting to technology taxes has implications for tax administration because it may not be easily adapted to current information reporting and tax remittance processes.

Such taxes are likely to be strongly resisted by the business community. Moreover, as small businesses (or even large businesses) on slim margins work with large amounts of technology, the taxes, if not properly designed, could put such companies out of business, exacerbating tax administration problems and funding for social insurance. More likely, however, many businesses would locate outside the United States, and thus beyond the reach of its taxing authority.

Fundamental Changes to Tax Administration and Social Insurance Programs

Policymakers could completely redesign our system of “entitlements.” For example, the government could make a single payment to all citizens from birth to death, paid on a regular basis (such as bi-weekly basis) to mimic “wages” and guarantee a minimum level of income for everyone, regardless of whether they perform any services in what has traditionally been “employment” for an “employer.” Such an entitlement system could replace the current numerous and disjointed social programs (those funded by social insurance and those that are not), and could be graduated by age, wealth or other factors. However, notwithstanding concerns about the long-term solvency of the current major social insurance programs, elimination of social insurance in its current form is not likely to be seriously considered, and thus a complete redesign of social insurance is unlikely.⁴³

In contrast to social insurance, tax administration has been showing signs of decoupling from the traditional employment-based model over the last decade, albeit in a haphazard manner that is largely reactive to specific economic conditions rather than being based on any systemic effort to fundamentally decouple itself from the employment-based model. The changes to tax administration that have occurred have moved in one direction only: increased information reporting obligations, along with increased withholding obligations, without regard to an employment relationship. For example, the 2008 Emergency Economic Stabilization Act⁴⁴ required, beginning in 2011, brokers to report the cost basis of capital transactions to investors and the IRS.⁴⁵ While the attempt to impose withholding requirements on federal contractors ultimately failed, it would not be surprising to see similar proposals reemerge in the near future.

Another possible solution would be to eliminate the distinctions between employees and independent contractors for tax administration purposes. However, this is likely unadministrable because it would saddle ordinary citizens with information reporting obligations to vendors such as gardeners, house cleaners, plumbers, etc. The likely widespread noncompliance of ordinary citizens to perform such reporting obligations should continue to limit tax administration to employers and other businesses for the foreseeable future.⁴⁶

Perhaps the most fundamental recent change was the addition of a 3.8% Medicare tax on “unearned” income such as dividends and capital gains. This foray into funding of a major social insurance program based on revenue sources unrelated to “wages” paid in an employment relationship may signal a decoupling of the funding of social insurance from a strictly employer-employee-based model.

These changes, however, have been sporadic, disjointed, and at best marginal. More radical changes, such as replacing employment taxes with other methods of taxation, have yet to garner any serious discussion.

Combining New Forms of Taxation with Changes to the Current Employment-Based Model of Tax Administration and Funding for Social Insurance Programs

Because the U.S. tax system is designed as much to stimulate and discourage behavior as it is to generate revenue, it seems that, at least in the near-term, new forms of taxation will be layered on top of the current employment-based model for tax administration and funding of social insurance programs. A radical shift away from an employment-based model seems contrary to the current Administration’s push for greater rights for employees. Further, a polarized Congress is unlikely to create an entirely new tax scheme to fund social insurance programs, notwithstanding current attempts at tax reform (which are largely focused on corporate and personal income taxes, not employment taxes). Nonetheless, pushes for increased information reporting and additional methods of withholding will probably continue.

Robotics in the workplace has the potential to significantly increase the general welfare, as numerous other technologies have in the past. However, it also has the potential to disrupt our system of tax administration and the funding of social insurance programs created nearly 80 years ago when the workplace (and families)⁴⁷ looked very different than it does today. Without planning, robotics may gut the current funding mechanism for the major social insurance programs predicated upon the current employment model. Given that the pay-as-you-go system requires increasing numbers of employed being paid “wages” to fund increasing current benefits, displacements of currently employed workers by non-tax paying robots should at least concern policymakers. Now is the time for policymakers to begin examining the potential implications of robotics in the workplace upon the use of an employment-based model for tax administration and the delivery of funding for social insurance programs. Otherwise, the insolvency of these programs, which are already in trouble, is almost certainly assured to occur.

1 Federal employment taxes include:

- (1) Old-Age, Survivor and Disability taxes, generally known as Social Security (IRC §§ 3101(a); 3111(a)) which fund retirement payments to individuals, benefits for survivors and the disabled;
- (2) Hospital Insurance taxes, generally known as Medicare (IRC §§ 3101(b); 3111(b)), which fund medical coverage for the elderly; and
- (3) Federal Unemployment Tax Act (FUTA) taxes (IRC §§ 3301 through 3311, inclusive), which fund unemployment insurance benefits for persons separated from the workforce through no fault of their own.

Social Security and Medicare are collectively known as FICA taxes. While technically four separate taxes, they are commonly explained as a single tax paid one-half by employers and one-half by employees. The taxes paid are called “contributions.” This was seen as being less offensive at the time of the SSA’s enactment than extracting “taxes.”

- 2 A “social insurance” program is one designed for the “protection of the individual against economic hazards (as unemployment, old age, or disability) in which the government participates or enforces the participation of employers and affected individuals.” *Merriam-Webster’s Online Dictionary*. There are numerous social programs that are not based on a social insurance model, such as the Supplemental Nutrition Assistance Program, once referred to as food stamps. Nonetheless, even programs funded by general fund taxes will be impacted by robotics technologies in the workplace because of the heavy reliance on employment-based considerations embedded throughout the tax code. A prominent example is the tax exempt treatment of employer-paid health insurance premiums that cover not only the employee, but his or her spouse and dependents. IRC § 105.
- 3 See, e.g., Erik Brynjolfsson and Andrew McAfee, *Why Workers Are Losing the War Against Machines*, THE ATLANTIC, Oct. 26, 2011; *A Roundup on Robots, Capital-Biased Technological Change and Inequality (plus how to tell if a person is a fiduciary)*, CLIMATEER INVESTING, Dec. 18, 2002; Noah Smith, *The End of Labor: How to Protect Workers From the Rise of Robots*, THE ATLANTIC, Jan. 14, 2013; Paul Krugman, *Technology and Wages, the Analytics (Wonkish)*, N.Y. TIMES, Dec. 12, 2012; Paul Krugman, *Robots and Robber Barons*, N.Y. TIMES, Dec. 9, 2012; Kevin Drum, *Welcome Robot Overlords. Please Don’t Fire Us?*, MOTHER JONES, May/June 2013.
- 4 The employment model used to fund social insurance programs that provided not only for workers but also dependents, largely developed during the Great Depression, was predicated upon then prevailing attitudes about the family and women’s roles that would strike most as antiquated today. Karen Kornbluh and Rachel Homer, *The New Family Values Agenda: Renewing Our Social Contract*, 4 HARV. L. & POL’Y REV. 73, 76 (Winter 2010) (explaining that the structure of social programs such as Social Security “reflects historical choices made when the breadwinner-caregiver model was predominant, and it was intended to perpetuate that model. The system includes social insurance entitlement programs that provide benefits linked to one’s income, job tenure, and full-time work, so those who sacrifice earnings to care for their children wind up as their spouses’ dependents and with far less in benefits.”). In addition, theories about the links between “work” and citizenship can be seen through the lens of the framers of the Constitution and views about what work did and did not qualify for consideration within the framework of greater society. See, e.g., William E. Forbath, *Caste, Class and Equal Citizenship*, 98 MICH. L. REV. 1 (Oct. 1999).
- 5 See Alfred D. Chandler, Jr., *The Visible Hand: The Managerial Revolution in American Business*, 1-2 (1977) [hereinafter *The Visible Hand*]; John Micklewait & Adrian Wooldridge, *The Company: A Short History of A Revolutionary Idea*, 60-63 (2003); Thomas K. McCraw, *Prophets of Regulation*, 17-25 (1984).
- 6 There are numerous perspectives on how policy changes to social insurance programs (and social programs generally) are implicated by changes to the tax system, how such programs should be organized and what they should accomplish. See, e.g., Stephen D. Sugarman, *Welfare Reform and the Cooperative Federalism of America’s Public Income Transfer Programs*, 14 YALE L. & POL’Y REV. 123 (1996) (discussing reforms in the context of federal-state cooperation); Kornbluh and Homer, *supra* note 4 (discussing the historical development of social policies on families and women and potential changes to such policies). Because taxes are inextricably linked to social policies, completely separating them is not possible. Nonetheless, a debate about the benefits or burdens of social insurance programs, the proper role of the tax system in engineering social behavior or even what the tax code should look like for social or economic reasons is not intended and beyond the scope of this article.
- 7 Gary Strauss, *Fast-food workers strike for higher pay*, USA TODAY, Aug. 30, 2013.
- 8 Census data suggests, however, that the majority of minimum wage jobs are with small businesses, not large corporations. See, e.g., Michael Saltsman, *Who Really Employs Minimum Wage Workers*, WALL ST. J., Oct. 28, 2013.
- 9 Jesus Diaz, *Fully Automated Robo-Restaurant Tested (Verdict: delicious, Fun, No Bloody Tips)*, GIZMODO, Apr. 8, 2008, available at <http://gizmodo.com/377538/fully-automated-robo-restaurant-tested-verdict-delicious-fun-no-bloody-tips>.

- 10 David Szondy, *Hamburger-making machine churns out custom burgers at industrial speeds*, GIZMAG, Nov. 25, 2012, available at <http://www.gizmag.com/hamburger-machine/25159/>. The company's website notes that its machine "does everything employees can do except better" and adds that "the labor savings allow a restaurant to spend approximately twice as much on high quality ingredients and the gourmet cooking techniques make the ingredients taste that much better." Momentum Machines' website, <http://momentummachines.com/#product>.
- 11 This is not to say that there have not been substantial changes in these programs. However, such changes have largely been focused on expanding the benefits received or increasing the burdens incurred, rather than to its underlying employment structure. For example, social security originally covered industrial jobs only, and excluded agricultural jobs, domestic workers, government employees, and many teachers, nurses, hospital employees, librarians, and social workers. Social Security was later expanded to cover many of these professions, and a much larger portion of the workplace generally. Kornbluh and Homer, *supra* note 4, at 80. However, the basic use of an employment-based system has not changed.
- 12 The evolutionary process of the nature of work in a capitalist society caused by new technologies that displace workers has been occurring for centuries. See Joseph A. Schumpeter, *CAPITALISM, SOCIALISM AND DEMOCRACY*, 82-83 (3d ed. 1950); Carl Benedikt Frey and Michael A. Osborne, *The Future of Employment: How Susceptible Are Jobs to Computerization*, Oxford University, Sept. 17, 2013, at 5-14. However, until very recently, such changes were largely limited to manual functions. Technological changes today are capable of cognitive functions that have traditionally only been capable of being performed by humans. This is really the unprecedented aspect of technological change and the one that has the potential to reduce the reliance upon center firms and large employers that have been critical to tax administration and the funding of social insurance.
- 13 See, e.g., Robert D. Atkinson, *Stop Saying Robots Are Destroying Jobs—They Aren't*, MIT TECHNOLOGY REVIEW, Sept. 3, 2013, available at <http://www.technologyreview.com/view/519016/stop-saying-robots-are-destroying-jobs-they-arent/> (disputing Brynjolfsson and McAfee's assumptions, and predicting that by 2023, there will be at least 5% more jobs in the U.S. than exist today).
- 14 White House, Office of Press Secretary, *Remarks by the President on Government Reform*, Jan. 13, 2012.
- 15 Ronald Coase, *The Nature of the Firm* (1937), reprinted in *READINGS IN PRICE THEORY* (George J. Stigler ed., 1952) at 334, 336. For a review of Coase's influence upon the law, as told from the economic analysis of the law viewpoint (a.k.a. the University of Chicago School), see Richard A. Posner, *OVERCOMING LAW*, ch. 20 (1995).
- 16 Both employees and independent contractors are subject to various forms of information reporting, such as wage information on a Form W-2, for employees and non-employee compensation information on a Form 1099-MISC for independent contractors. The nature of the information differs between the forms, and there is no withholding component to independent contractors. In addition, while SECA mirrors FICA for purposes of funding Medicare and Social Security, there is no funding mechanism for unemployment, although, in theory at least, independent contractors should not be entitled to unemployment benefits. Nonetheless, an independent contractor performing services is not separated from the workforce, and unable to obtain another assignment, may be economically in the same place as an employee who is laid off. In this sense, social insurance to fund unemployment based solely on an employment model is incomplete because it is rooted in a paternalistic view of work.
- 17 John Biggs, *Foxconn Allegedly Replacing Human Workers With Robots*, TECHCRUNCH, Nov. 13, 2012 ("Foxconn has been planning to buy 1 million robots to replace human workers and it looks like that change, albeit gradual, is about to start. The company is allegedly paying \$25,000 per robot—about three times a worker's average salary—and they will replace humans in assembly tasks."); Kenneth Rapoza, *As China changes, Infamous Foxconn Goes Robotic*, Forbes, Feb. 22, 2013. As Biggs points out, there may be other reasons that a purely cost based analysis for this decision to use robots, such as negative press characterizing it as a sweat shop, labor unrest and employee suicides.
- 18 Christopher Matthews, *Can Robots Bring Manufacturing Jobs Back to the U.S.?*, Time, Sept. 27, 2012 (noting that manufacturing jobs have increased in U.S. as a result of robotics technologies) (online edition); Michelle Miller, *Bringing back jobs to the U.S. via the robot*, CBS News, Oct. 5, 2013 (online edition).
- 19 In the near term robots may be seen as complimenting human work and performing functions in collaboration with, rather than entirely replacing, humans. Whether that remains a longer term trend as well remains to be seen, but it nonetheless still has the potential to reduce labor participation. Tanya Anandan, *The End of Separation: Man and Robot as Collaborative Coworkers on the Factory Floor*, ROBOTIC INDUSTRIES ASSOCIATION, June 6, 2013, available at http://www.robotics.org/content-detail.cfm/Industrial-Robotics-Featured-Articles/The-End-of-Separation-Man-and-Robot-as-Collaborative-Coworkers-on-the-Factory-Floor/content_id/4140. The robotics industry itself has an incentive to suggest that robotics technologies will increase rather than decrease labor participation rates.
- 20 Carl Benedikt Frey and Michael A. Osborne, *The Future of Employment: How Susceptible Are Jobs to Computerization*, Oxford University, Sept. 17, 2013.
- 21 Frey and Osborne, *supra* note 12, at 44-45.
- 22 Stuart Saniford, *Automating or Offshoring? Evidence from General Motors*, EARLY WARNING, July 26, 2011, available at <http://earlywarn.blogspot.com/2011/07/automation-or-offshoring-evidence-from.html>.
- 23 General Motors website, *Our company* webpage, available at http://www.gm.com/company/aboutGM/our_company.html ("Our 212,000 plus employees work in 396 facilities touching six continents, they speak more than 50 languages and touch 23 time zones.")
- 24 General Motors 2012 10-K, pp. 2, 15.
- 25 Saniford, *supra* note 22. Saniford notes that GM was producing 8 cars per employee in 1955, but 27 cars per employee in 2009, with a 0.3 reduction in jobs, adding "we can attribute a reduction of jobs by a factor of 0.3 to be due to increased productivity which we can presumably mainly put down to automation."
- 26 Joan T. Bok, Ann L. Combs, Sylvester J. Schieber, Fidel A. Vargas, and Carolyn L. Weaver, *Restoring Security to Our Social Security Retirement Program, 1994-1996* ADVISORY COUNCIL, available at <http://www.socialsecurity.gov/history/reports/adccouncil/report/bok2.htm#3>. ("According to estimates contained in a Social Security Administration study, the average rate of return on Social Security taxes for the cohort of workers now turning 65 is about 4 percent, net of inflation. [Citation omitted.] In other words, if the taxes of this cohort of workers had been collected in an account yielding a real compound rate of interest of 4 percent annually, the accumulated balance would be just equal to the present value of the Social Security benefits they are projected to receive. For comparison purposes, cohorts of workers retiring before 1970 enjoyed double-digit rates of return. The cohort retiring in 1960, for example, had a real rate of return of 15 percent annually and the cohort of workers retiring in 1980 had a real rate of return of 7 percent.")

- 27 For a discussion of social insurance financing, see Michael Cichon et al., *Financing Social Protection*, INTERNATIONAL SOCIAL SECURITY ASSOCIATION (2004).
- 28 For purposes of this example, we ignore that the SUTA credit is currently being reduced because of California's insolvency.
- 29 This ten-to-one ratio is based on the real world example at Foxconn. See Rapoza, *supra* note 17. However, this ratio is not meant to represent any specific trend or a replacement rate for the general workforce.
- 30 This is admittedly an overly simplistic model, but is intended to demonstrate the potential problems that displacement of humans in the workforce by robotics can have in stark terms.
- 31 There are a number of policy considerations as to whether it is equitable for a very small number of workers to support social insurance. This suggests that alternatives to an employment based model to fund social insurance may be seen more as equitable in the future.
- 32 See, e.g., Jasmine Tucker, Virginia Reno and Thomas Bethell, *Strengthening Social Security: What Do Americans Want?*, NATIONAL ACADEMY OF SOCIAL INSURANCE (Jan. 2013).
- 33 2013 Trustee Report, at 1-3.
- 34 *Id.*, at 103.
- 35 The purpose here is not necessarily to debate the actuarial assumptions made by the SSA. Rather, while actuarial assumption already recognize that these programs are in trouble of becoming insolvent, the disruptive nature of robotics technologies do not appear to be included among the assumptions about labor participation rates or worker productivity. The continued development of these technologies may accelerate some of the underlying assumptions used to determine the long term solvency of these social insurance programs, and thus should be publicly debated.
- 36 Center for Budget and Policy Priorities, *Chart Book: The Legacy of the Great Recession*, Oct. 24, 2013, available at <http://www.cbpp.org/cms/index.cfm?fa=view&id=3252>.
- 37 BLS, *Employment and Unemployment Among Youth Summary*, August 20, 2013, available at <http://www.bls.gov/news.release/youth.nr0.htm> (noting the youth unemployment rate at 16.3% in July 2013 and labor market participation rate was 50.7%).
- 38 International Federation of Robotics, *Positive Impact of Industrial Robots on Employment*, January 2013.
- 39 Self-employment taxes, which mirror FICA, paid by "independent contractors," ameliorate some of the concerns about the mandatory nature of social insurance programs such as Social Security and Medicare, but do not address unemployment.
- 40 While not specifically about taxes, this has the potential side effect of creating lots of firms that may keep their full-time employees to less than 50, thereby avoiding the health insurance mandates of the Affordable Care Act, and thus reduce the potential tax penalties or benefit costs associated with a larger workforce.
- 41 Some of the efficiencies created by large firms 100 years ago are offset by computerized records and technology. Thus, same technologies that create larger numbers of smaller firms may be offset by the increased efficiencies in data collection, analysis and transmittal. In this sense tax administration may not suffer as much by robotics technologies, and possibly could be aided by it if properly applied.
- 42 While state sales and use tax systems' resale exemptions may provide a starting point for developing information reporting for technology taxes, more comprehensive design would certainly be required.
- 43 President Bush proposed partially privatizing Social Security partly in response to the rate of return issue and partly in response to the concerns about its long-term solvency. However, Bush's proposal did not change the employment model upon the system is currently based. See Jeanni Sahadi, *Bush's Plan for Social Security*, CNNMONEY, March 4, 2005 (online edition), available at http://money.cnn.com/2005/02/02/retirement/stofunion_socsec/. In a report criticizing the plan, the authors basically conceded that not making contributions to social insurance mandatory would effectively cut the system and leave most middle class employees with no benefits. While put in a different context, the use of robotics would have the same kind of hallowing out effect as fewer employees contribute to these mandatory programs. See Jason Furman, Robert Greenstein and Gene Sperling, *Why the President's Social Security Proposals Could Ultimately Lead to the Unraveling of Social Security*, CENTER ON BUDGET AND POLICY PRIORITIES, May 2, 2005.
- 44 Pub. L. 110-343, 122 Stat. 3765.
- 45 See IRS Form 1099-B; IRS Form 8949.
- 46 As money becomes more and more electronic in nature, these tax administration problems could ease. Banks and other financial services businesses could be conscripted to perform these information reporting and withholding functions at the time of the transaction, diverting funds to the government with simplified information reporting. For example, when a person pays his plumber from his PayPal account, PayPal could automatically divert employment taxes to the government in real time with simple information about the transaction. These costs of these systems could be substantial, and would have to be borne by someone. Ordinary citizens are unlikely to absorb such costs, and financial service providers, already saddled with significant reporting obligations, would also likely oppose such efforts. Nonetheless, in the era of big data, reporting billions of small transactions is potentially administrable if proper mechanisms are put in place.
- 47 Kornbluh and Homer, *supra* note 4, at 79 ("The trouble is that these programs were designed for the mid-twentieth century American family and economy. In 1930, only 11.7% of married women were in the paid workforce, while the rest performed the unpaid work of caregiving and homemaking. At the same time, industrial workers expected to spend their entire working lives with a single employer. The programs designed then have been enormously successful in softening the hard edges of the market for countless Americans. However, they fail to address many of the new challenges that families face in today's economy.").

U.S. Office Locations

Albuquerque, NM
505.244.3115

Anchorage, AK
907.561.1214

Atlanta, GA
404.233.0330

Birmingham, AL
205.421.4700

Boston, MA
617.378.6000

Charlotte, NC
704.972.7000

Chicago, IL
312.372.5520

Cleveland, OH
216.696.7600

Columbia, SC
803.231.2500

Columbus, OH
614.463.4201

Dallas, TX
214.880.8100

Denver, CO
303.629.6200

Detroit, MI*
313.446.6400

Fresno, CA
559.244.7500

Gulf Coast
251.432.2477

Houston, TX
713.951.9400

Indianapolis, IN
317.287.3600

Kansas City, MO
816.627.4400

Las Vegas, NV
702.862.8800

Lexington, KY*
859.317.7970

Long Island, NY
631.247.4700

**Los Angeles, CA
Downtown**
213.443.4300

**Los Angeles, CA
Century City**
310.553.0308

Memphis, TN
901.795.6695

Miami, FL
305.400.7500

Milwaukee, WI
414.291.5536

Minneapolis, MN
612.630.1000

Morgantown, WV
304.599.4600

Nashville, TN
615.383.3033

New Haven, CT
203.974.8700

New York, NY
212.583.9600

Newark, NJ
973.848.4700

Northern Virginia
703.442.8425

Northwest Arkansas
479.582.6100

Orange County, CA
949.705.3000

Orlando, FL
407.393.2900

Overland Park, KS
913.814.3888

Philadelphia, PA
267.402.3000

Phoenix, AZ
602.474.3600

Pittsburgh, PA
412.201.7600

Portland, OR
503.221.0309

Providence, RI
401.824.2500

Reno, NV
775.348.4888

Rochester, NY
585.203.3400

Sacramento, CA
916.830.7200

San Diego, CA
619.232.0441

San Francisco, CA
415.433.1940

San Jose, CA
408.998.4150

Santa Maria, CA
805.934.5770

Seattle, WA
206.623.3300

St. Louis, MO
314.659.2000

Walnut Creek, CA
925.932.2468

Washington, D.C.
202.842.3400

*In Detroit, Littler Mendelson, PLC and in Lexington, Littler Mendelson, P.S.C., both are wholly-owned subsidiaries of Littler Mendelson, P.C.

Global Office Locations

Barranquilla, Colombia

57.5.385.6071

Bogotá, Colombia

57.1.317.4628

San José, Costa Rica

506.2545.3600

San Salvador, El Salvador

503.2206.9642

Mexico City, Mexico

52.55.5955.4500

Monterrey, Mexico

52.81.8851.1211

Panama City, Panama

507.830.6552

Caracas, Venezuela

58.212.610.5450

Valencia, Venezuela

58.241.825.3689

