



Jobs in America

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The Best Way to Predict the Future Is to Invent It

Alan Kay, Educator and Computing Pioneer

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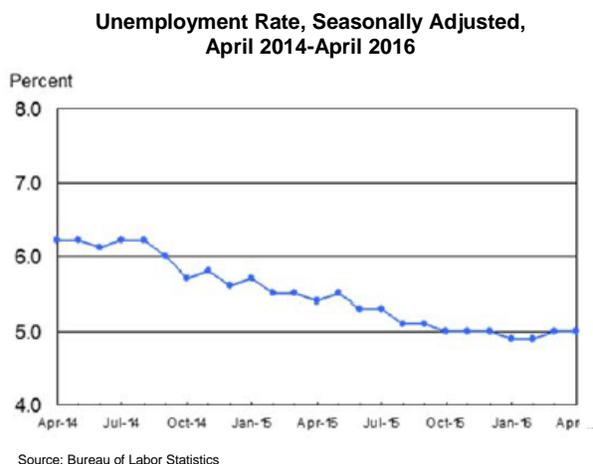
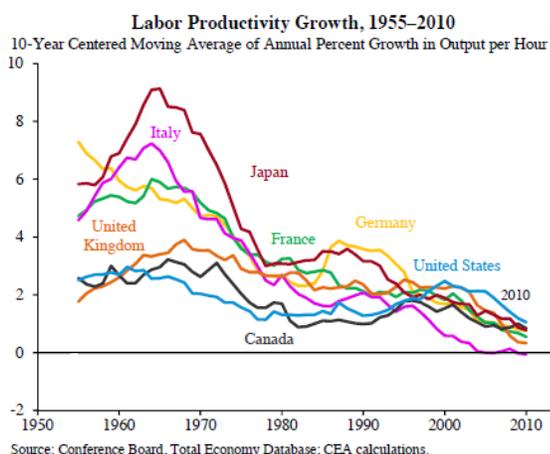
Jobs in America are evolving before our eyes. From 2005 through 2015, net employment in the US has increased by 9.1 million. All of the net job growth during that time is attributable to growth in *alternative work arrangements* primarily through the use of independent contractors.¹ Some of these contractor positions have been created by new technologies such as Uber. The idea that one would stay 30 years at a single company in a traditional work arrangement may be a thing of the past as technology increasingly molds the skills needed for the 21st century job market. The Internet of Things (IoT) and advances within cognitive computing will drastically reshape our employment opportunities and educational system. Advanced artificial intelligence is no longer the exclusive domain of sci-fi movies. These technological changes are not as far into the future as one would expect. Some researchers estimate that 47% of total US employment could be taken over by computers by 2033!²

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Our Current Challenge: Slowing Labor Growth Productivity and the Need for New Skills

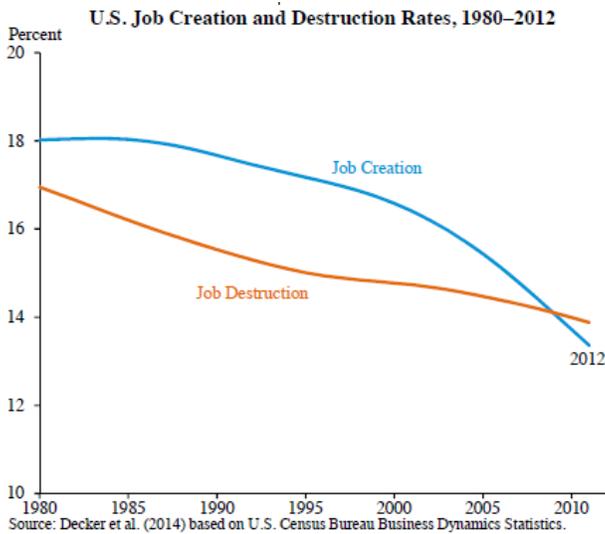
Since the Great Recession in 2008, unemployment numbers have improved dramatically with the most recently released Bureau of Labor Statistics citing US unemployment at 5%. Despite the decline in unemployment, there has been a significant decline in labor growth productivity, or the measure of a worker's ability to generate more output for a given work unit. Growth in productivity in the past has led to higher wages, lower prices of goods and a better work/life balance. Technological advances and production innovation have historically driven labor growth productivity. Looking forward, we believe robotics and cognitive computing could drive the next surge of labor productivity growth in the US.



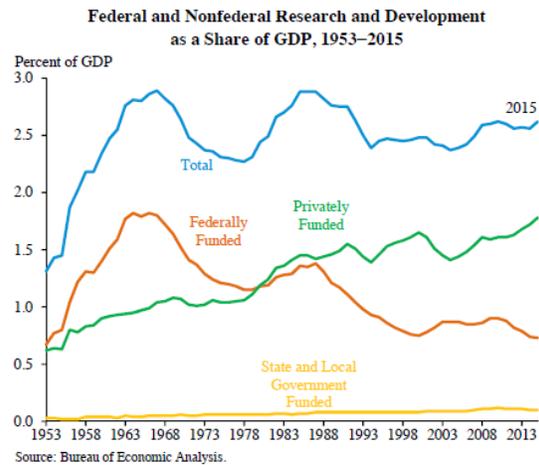
Since the 1980's, the US has also exhibited troubling trends with declining job creation and a nearly **40-year low** in new business creation. Significant barriers to entry related to federal and state regulation have been cited as being partially responsible for the decline in new businesses. Further, with job destruction outpacing job creation, companies may see reduced productivity as workers will be less likely to move to new jobs that best match their skills.

¹ Katz and Krueger (2015) Data from CPS and Princeton-RAND survey, Feb. 2005 and Nov. 2015.
² Carl Benedikt Frey and Michael Osborne: The Future of Employment: How susceptible are jobs to computerization? 9/2013

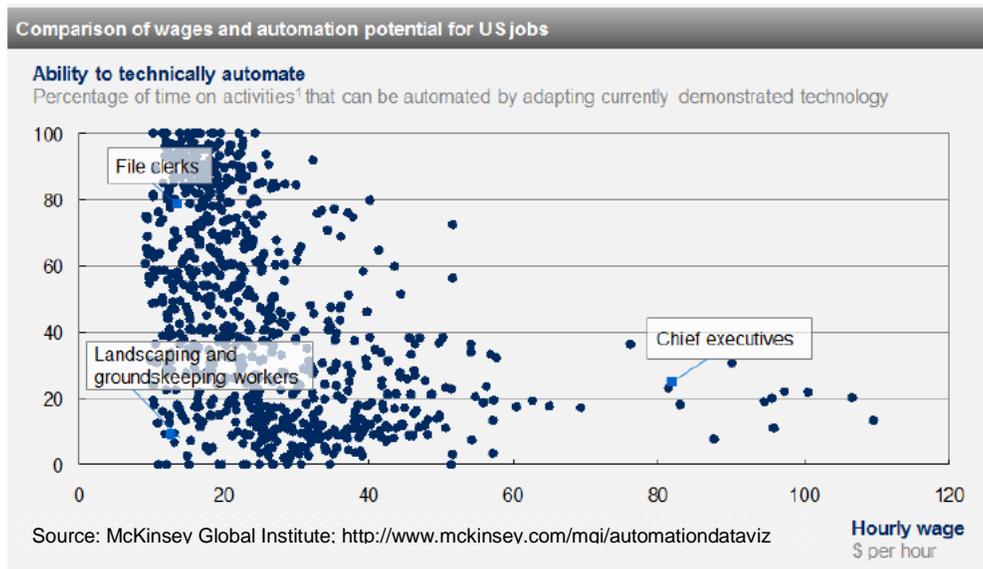
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At the same time, the government has drastically removed itself from Research and Development funding. Taken together, innovation is increasingly on the shoulders of private enterprise.



Increases in innovation and labor productivity could come at a cost to many US workers. The Council of Economic Advisors working with the Bureau of Labor Statistics and data from the 2013 Frey and Osborne study predict that **there is an 83% chance of a job currently performed by hourly workers earning less than \$20 per hour being automated.** With technologies already available, a significant number of work activities could be completely automated today. See the chart below that shows the probability of work activity automatization based on hourly pay. Will the resulting growth in labor productivity be offset by increasing and possibly more permanent unemployment among less skilled workers?



Open Your Eyes: How Is the IoT and Cognitive Computing Shaping the Future of the US Worker Today?

The Internet of Things has already created an “on-demand economy” that is increasingly linked. It is transforming the global marketplace and influencing our daily behaviors. Who would have imagined only a few years ago that your watch would track your fitness level, encourage you to meet defined weigh loss goals, find workout classes to attend based on your calendar and suggest a balanced meal to help achieve your goal? One device has just dictated how you spend time and consume product, and it has increased your productivity.

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Cisco estimates that 50 billion devices will be connected by 2020, up from 15 billion today. McKinsey estimates that the Internet of Things could have an economic impact of \$11 trillion per YEAR by 2025.

Some may not be aware of the advances taking place now. Below, we highlight some examples of the developing sophistication within cognitive computing based on our desire to live in an on-demand and interconnected economy. Spoiler – not only low-paying skills are being impacted; most examples below are in jobs requiring advanced professional education and training!

- Healthcare** – In a field that was once considered a “one on one” profession that could never be outsourced, anesthesiologists, surgeons and radiologists are increasingly depending on and sometimes competing with machines for patient care. J&J’s Sedasys system is able to deliver low-level anesthesia in routine procedures at a fraction of a medical professional’s cost. Surgeons are increasingly reliant on robotics in less invasive procedures and there is now a hair transplant machine available that requires the surgeon to only monitor the procedure, enabling multiple simultaneous procedures! IBM is training its Watson technology platform to “see” and analyze visual data from CT scans, electrocardiograms and MRIs. While it’s doubtful that such machines would replace specialists, they are certainly poised to assist them in the near future.
- Media** – US corporate earnings releases are increasingly being written by computers using Automated Insights and Zack’s Investment Research. Nearly 3000 articles per quarter (a tenfold increase) are being generated with reported accuracy better than that attributed to journalists. The time savings of up to 20% allows reporters to focus on higher end stories that are not readily available from other outlets. The AP Sports department is now automating stories for less-popular events. The company states that “they can weave data into a compelling narrative on a skill level that an experienced writer can do.” With fewer journalists tracking down unique leads, watch for an increase in competition for stories...



Meet the anesthesiologist for your surgery.... J&J’s Sedasys
Photo Source: Newsweek



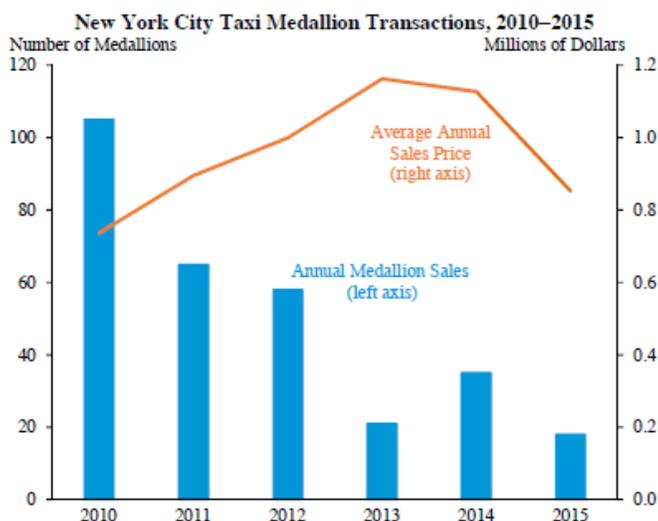
90% of journalistic pieces could be written by a computer by 2030
Photo Source: Mirko Tobias Schaefer/Gastev on Flickr

- Law** – E-Discovery applications now allow attorneys and their associates to review, collect and analyze millions of electronic documents while preparing for the discovery phase of lawsuits. This process was traditionally led by new lawyers or paralegals shifting through piles of paper. Further, the most successful litigators have been paid for their knowledge of case law and applying arguments that will result in the best legal outcomes. Now, legal prediction software is predicting case outcomes as accurately as experienced attorneys. One algorithm developed by Professor Daniel Katz while at Michigan State University law school has accurately predicted over 70% of 7,700 Supreme Court rulings reviewed from 1953 to 2013. The legal industry has been slow to spend

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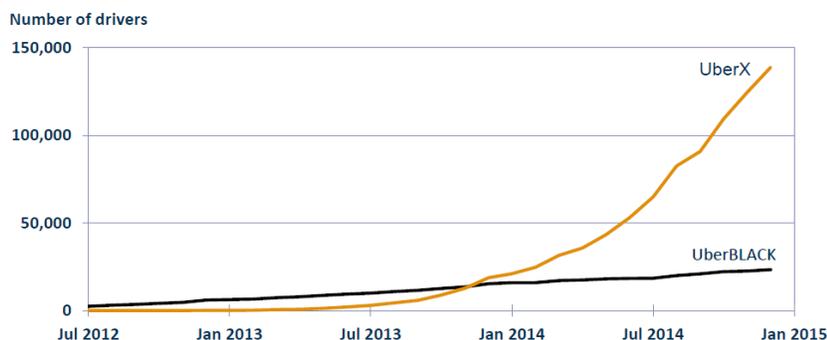
capital on R&D. Experts estimate that the legal industry spends less than 1% of revenue on R&D compared to the average 3.5% spend for US businesses. Based on the 2016 Report on the State of the Legal Market published by Georgetown University Center for the Study of the Legal Profession, demand for legal services is flat for 2015 and has dropped over 25% from 2004-2014. Cognitive computing and improving predictive analytics should help lower legal costs while increasing productivity in a complex and time intensive field.

- Finance** – With the vast amount of data available, equity analysts will increasingly have to show their value add. Bank tellers have largely been replaced by ATMs and Daniel Nadler, CEO of the finance analytics firm Kensho, claims that the jobs of highly paid employees such as “analysts, young associates, vice presidents – anyone whose job is moving a column of data from one spreadsheet to another – will be automated.” The affected number of finance employees could reach 33-50% by 2026. That is a lot of six-figure Wall Street employees!
- Transportation** - The taxi industry is being revolutionized by technology apps that have created a new class of “gig” workers. Today, an NYC taxi medallion sells for 30% less than the \$1.2 million is just sold for two years ago. Meanwhile, the number of UberX drivers alone has exponentially increased. What will happen five years from now when the number of cars on the road with self-driving features is expected to be 10 million?



Source: New York City Taxi and Limousine Commission, Medallion Transfers.

UberX Grows Drivers even as the Economy and Employment have Improved: The Power of the Gig Economy



Source: Hall and Krueger, Milken Institute

Strong Artificial Intelligence: Greatest Technological Achievement of Our Time, or Greatest Threat to Humanity?

Many of the technological advances discussed above are those within the soft artificial intelligence realm. Soft AI is the use of computers to generate statistically driven algorithms that sort through data more efficiently in some cases than humans. Perhaps that is oversimplifying an entire scientific field but soft AI is not gaining the headlines of hard artificial intelligence. Hard AI is the use of technology to *mimic* the human brain so that a machine can at least match human intelligence in learning, reasoning and conversing. Hard AI is still a thing of the future; however, thanks to improvements in algorithms and an increasing ability to teach AI through big data, we will be talking more and more about how far hard AI should be developed without regulation.

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Training AI at Musk's "Robot Gym" Photo: Patrick Lux/Getty Images

Prolific inventors such as Tesla's Elon Musk point to AI as "our biggest existential threat." Ironically, Musk just funded a **BILLION**-dollar Robot Gym that is open to the public for **FREE** to train artificial intelligence to become as versatile as humans cognitively. He must not be that afraid...

Experts agree that for years to come, artificial intelligence will need to partner with humans who have general common sense. But on the near horizon is the opportunity to experience more efficiency in our everyday lives through AI and human partnerships.

Perhaps the more pressing concern in the near term should be the degree of dependence we all have on inter-related technologies that shape our daily lives.

Conclusion

What is the takeaway here? We are not trying to humble our highly educated, professionally skilled readers. We collectively should recognize the vast changes taking place in the world around us and realize they will open the door to new opportunities. In the near term, we should see increases in labor productivity and there will be job creation that we cannot currently conceive. It will also force the current skillsets of workers to change. These advances should motivate all of us to support our youngest minds, giving them the best access to evolving education possible. These advances should energize the entrepreneurs among us to continue to do what they do best as the "innovation buck" is increasingly stopping at the doorsteps of private businesses. Finally, these advances should challenge us as investors to stay ahead of evolving trends and technologies and to take advantage of the many investments that will fuel future growth globally.

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