

# MIS 0855 Fall 2017 – Data Science

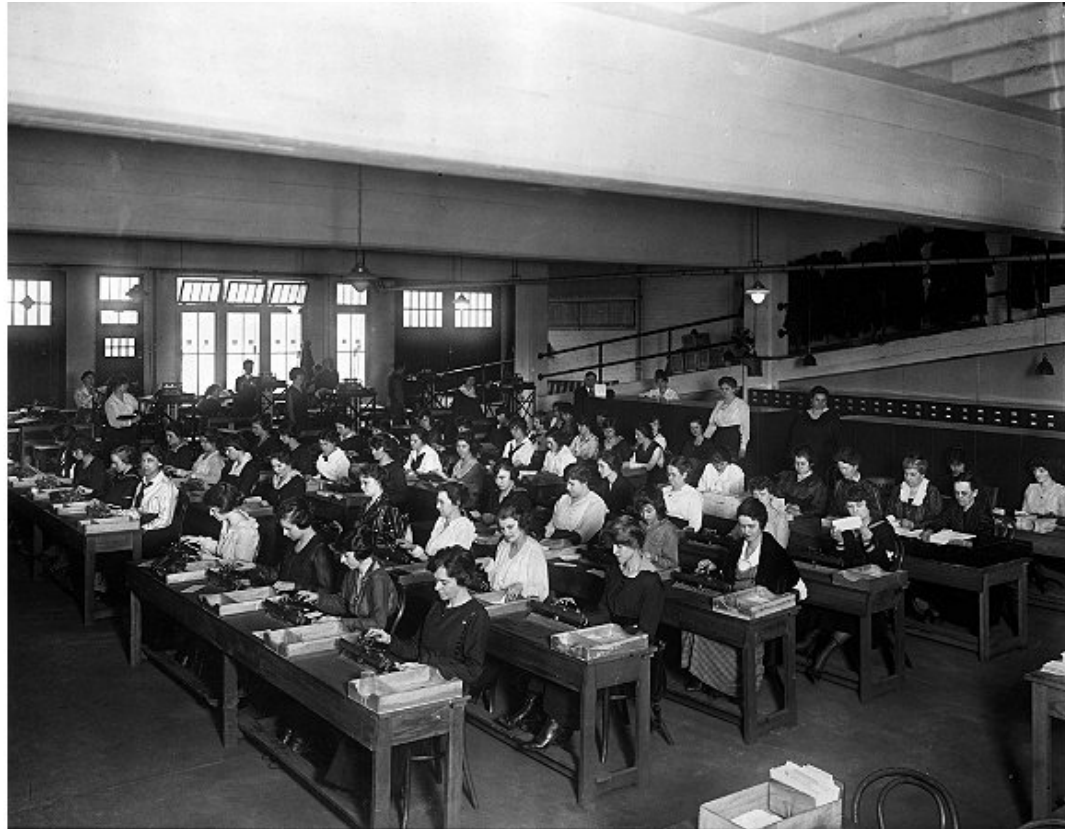
## *Day 35 – Data Science and Your Career*

**Min-Seok Pang**

**Management Information Systems  
Fox School of Business, Temple University  
minspang@temple.edu**

***Nov. 27<sup>th</sup>, 2017***

# Women Mathematicians at World War II

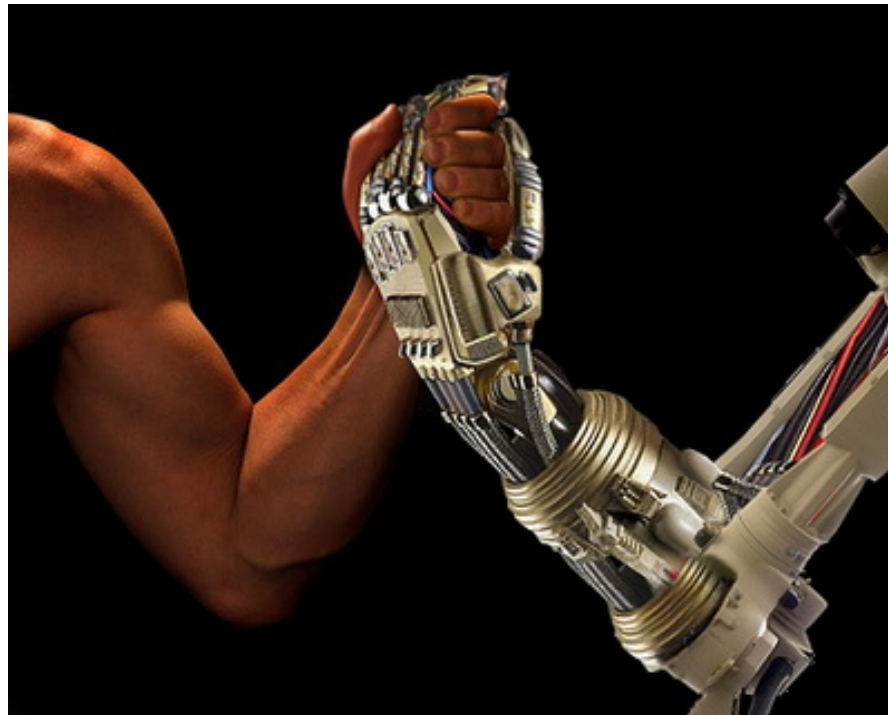


**who were called “Computers.”**

<http://www.theatlantic.com/technology/archive/2013/10/computing-power-used-to-be-measured-in-kilo-girls/280633/>

## Today's Question

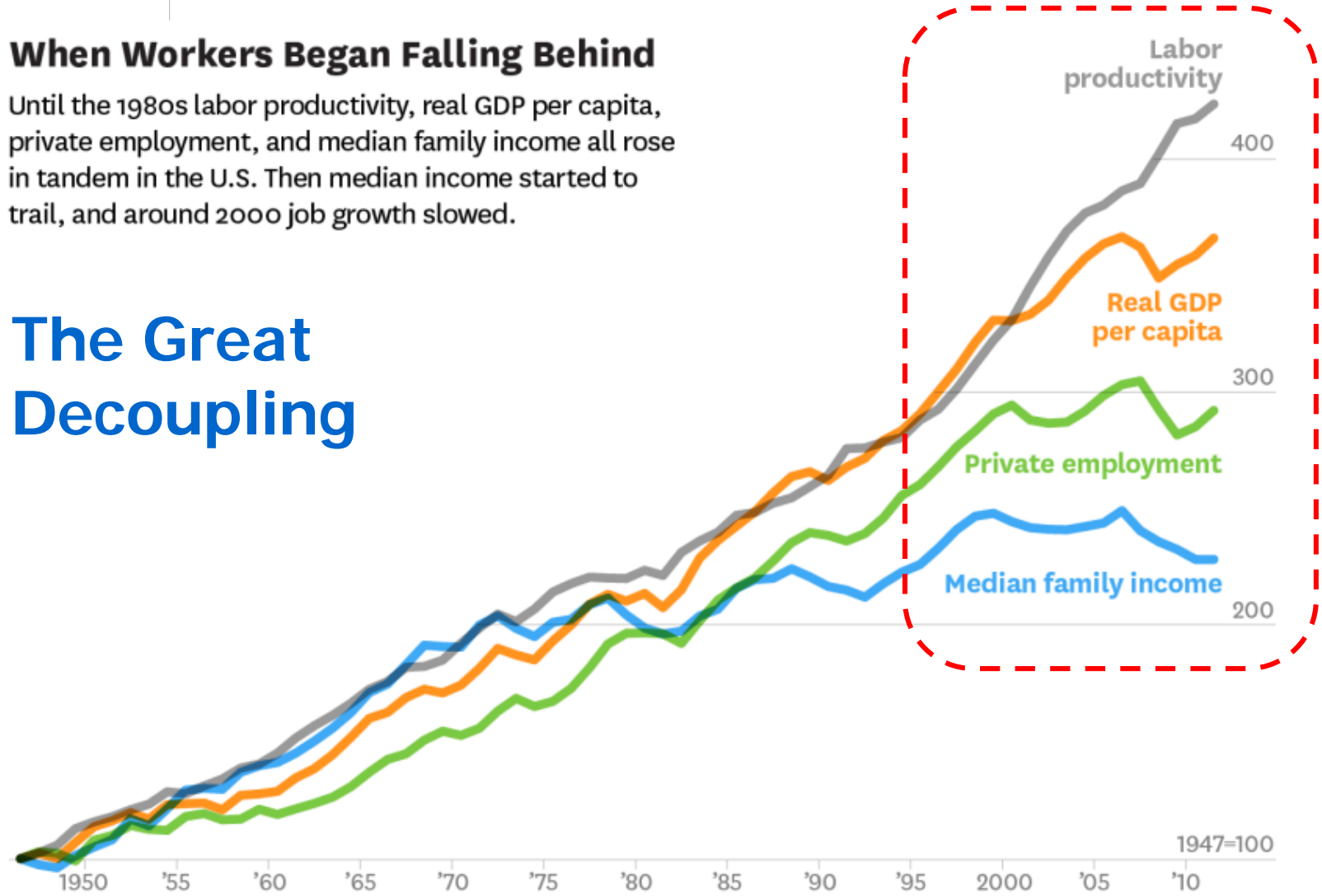
- How to *survive* in the job market and *thrive* in your career by *winning* the battle against the machine?



### When Workers Began Falling Behind

Until the 1980s labor productivity, real GDP per capita, private employment, and median family income all rose in tandem in the U.S. Then median income started to trail, and around 2000 job growth slowed.

## The Great Decoupling



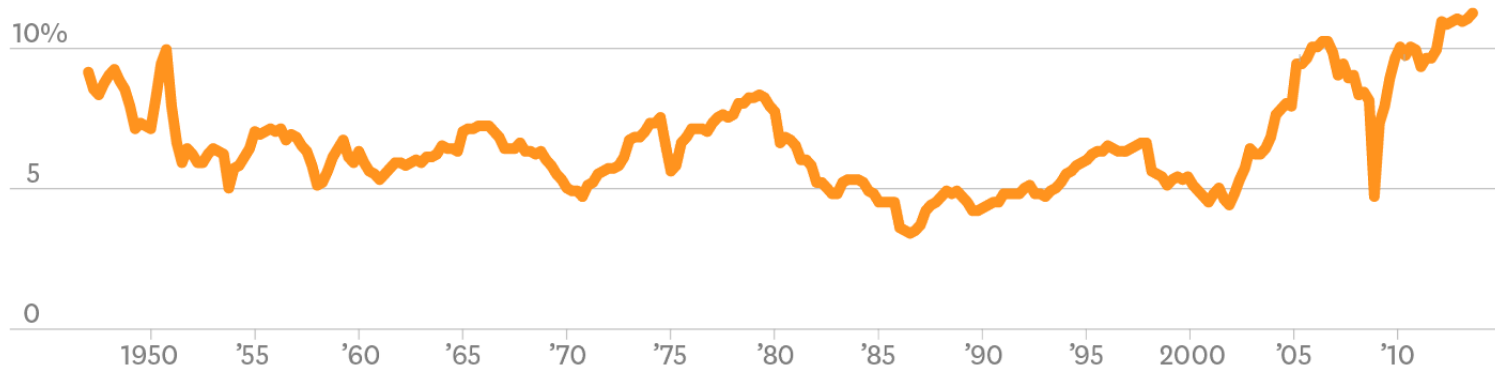
SOURCE FEDERAL RESERVE BANK OF ST. LOUIS; ERIK BRYNJOLFSSON AND ANDREW MCAFEE  
FROM "THE GREAT DECOUPLING," JUNE 2015

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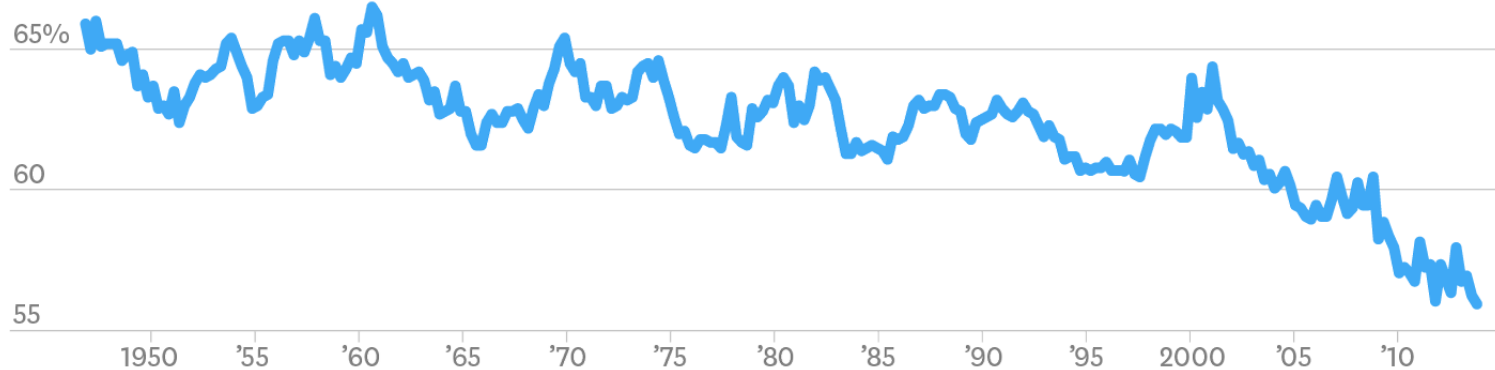
## As Profits Climb, Wages Plummet

In the U.S., corporate profits were rising before the 2008 recession and quickly recovered from it. In contrast, labor's share of GDP, which was healthy for many decades, has fallen sharply since 2000.

### CORPORATE PROFITS AS A PERCENTAGE OF GDP



### WAGES AS A PERCENTAGE OF GDP



**SOURCE** FEDERAL RESERVE BANK OF ST. LOUIS; ERIK BRYNJOLFSSON AND ANDREW MCAFEE  
**FROM** "THE GREAT DECOUPLING," JUNE 2015

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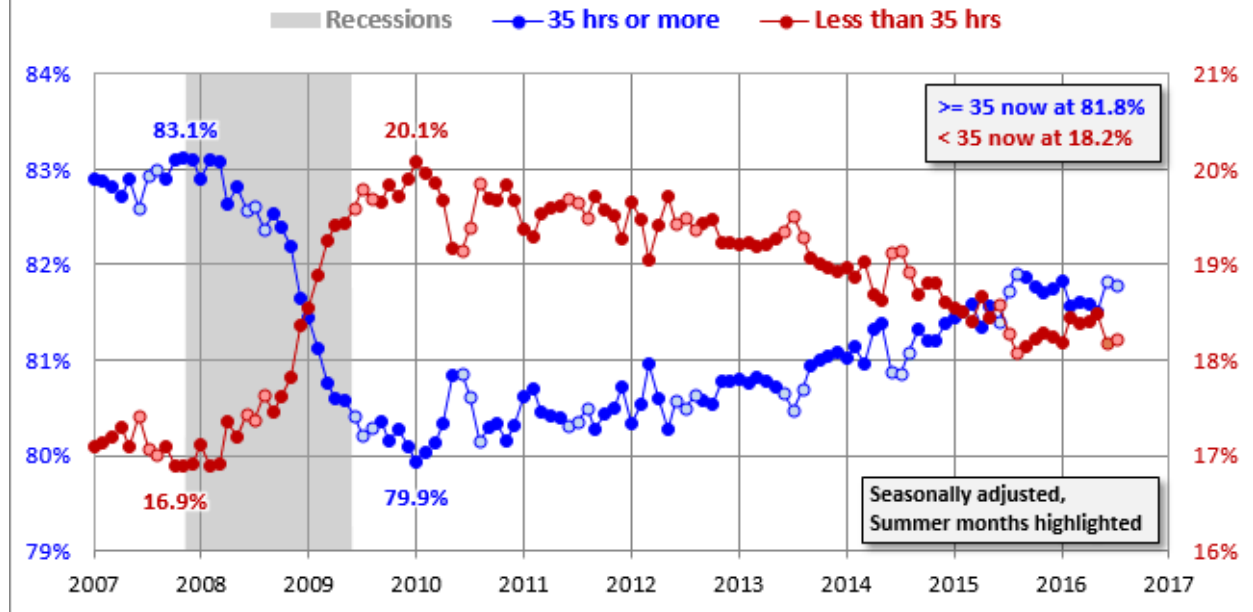
# Wage Growth Flat as Unemployment Rate Falls



Source: Bureau of Labor Statistics

## Full Time vs. Part Time Employment: Percent of Total Employed, Age 16 and Over

dshort.com  
As of July 2016



# Automation (1/2)



## Pennsylvania Turnpike to test out cashless interchanges next year

*E-ZPass and license plate-scanner program will be rolled out at Beaver Valley Expressway and Delaware River Bridge*

UPDATED 11:51 AM EDT Sep 28, 2015

Text Size: A A A



<http://www.washingtonpost.com/blogs/dr-gridlock/wp/2012/10/31/beltway-express-lanes-to-open-before-thanksgiving-operators-say/>

<http://stormhighway.com/blog/july2109a.shtml>

<http://www.wtae.com/news/pennsylvania-turnpike-to-test-ez-pass-cashless-interchange-at-beaver-valley/35527534>

## Automation (2/2)



***What if every item in a grocery store has an EZPass (an RFID chip)?***



# Outsourcing

## The Man Who Makes Your iPhone

Foxconn founder Terry Gou might be regarded as Henry Ford reincarnated if only a dozen of his workers hadn't killed themselves this year. An exclusive look inside a postmodern industrial empire

### Inside the iPhone Maker

**Bloomberg  
Businessweek**

2 of 19 ◀ ▶

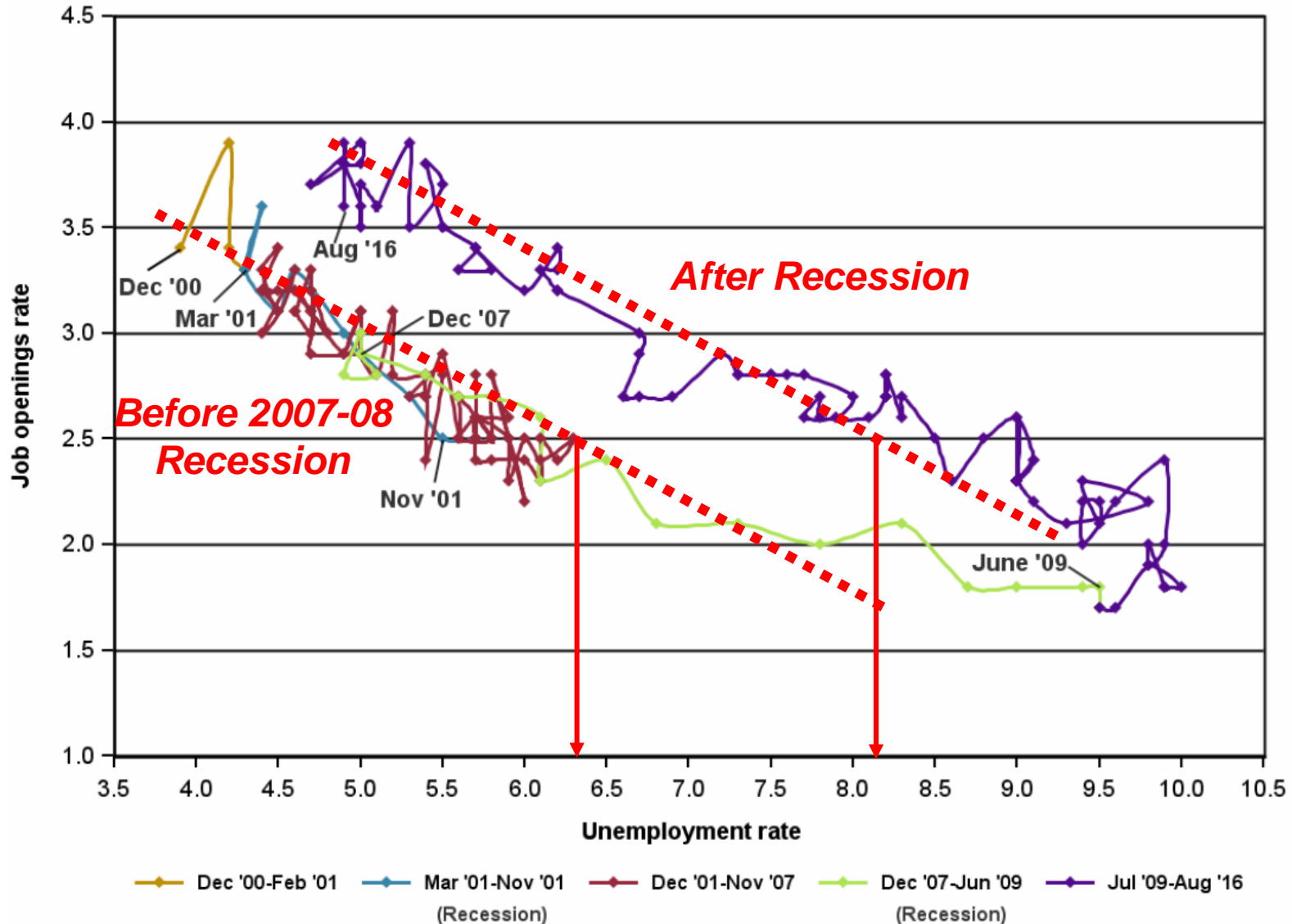


PHOTOGRAPH BY TONY LAW FOR BLOOMBERG BUSINESSWEEK

[http://www.businessweek.com/magazine/content/10\\_38/b4195058423479.htm](http://www.businessweek.com/magazine/content/10_38/b4195058423479.htm)  
[http://images.businessweek.com/ss/10/09/0909\\_foxconn/2.htm](http://images.businessweek.com/ss/10/09/0909_foxconn/2.htm)

# Skill Mismatch (1/3)

Chart 4. The Beveridge Curve (job openings rate vs. unemployment rate)  
Seasonally adjusted

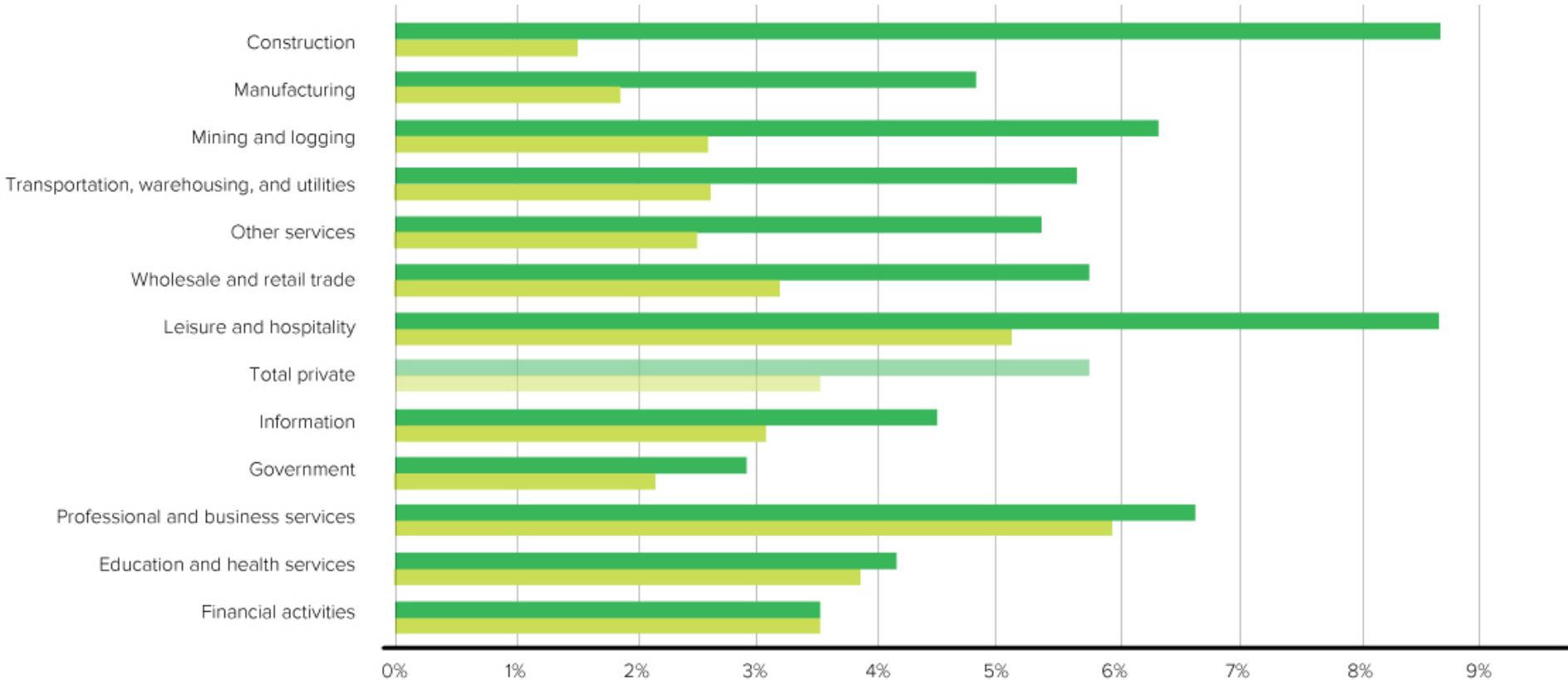


# Skill Mismatch (2/3)

## JOB OPENINGS RATE AND UNEMPLOYMENT RATE, BY INDUSTRY

Percentage of the labor force, three-month-averages, Aug-Oct 2014

■ Openings ■ Unemployment



# Skill Mismatch (3/3)

## Most job growth in mature economies involves complex interactions, not routine production or transaction work

New jobs created in the United States, 2001–09  
Million employees



### Interactions

Exchanges involving complex problem solving, experience, context (e.g., lawyer, nurse)



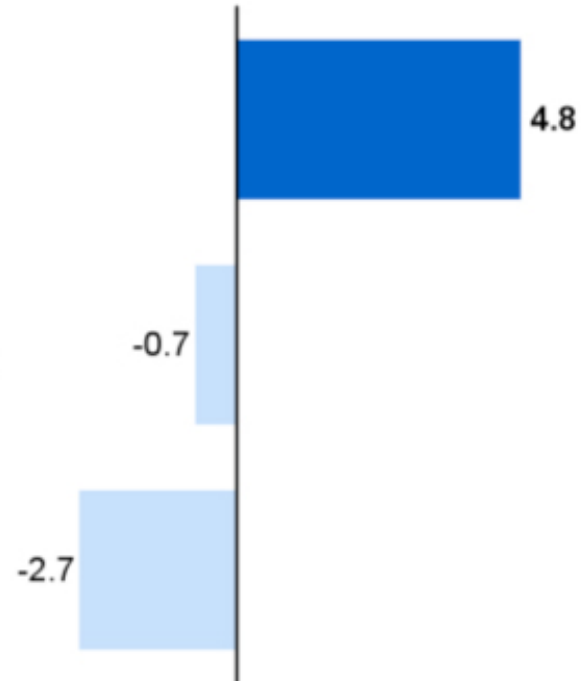
### Transactions

Exchanges that can be scripted, routinized, automated (e.g., bank teller, retail cashier)



### Production

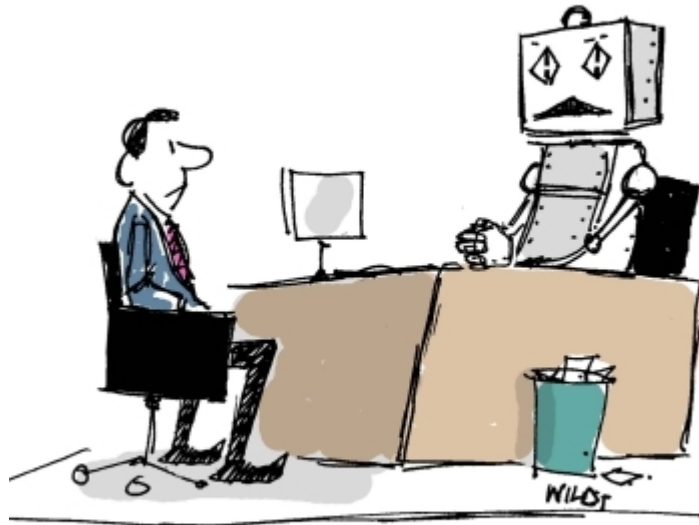
Process of converting physical materials into finished goods (e.g., factory worker, farmer)



SOURCE: US Bureau of Labor Statistics; McKinsey Global Institute analysis

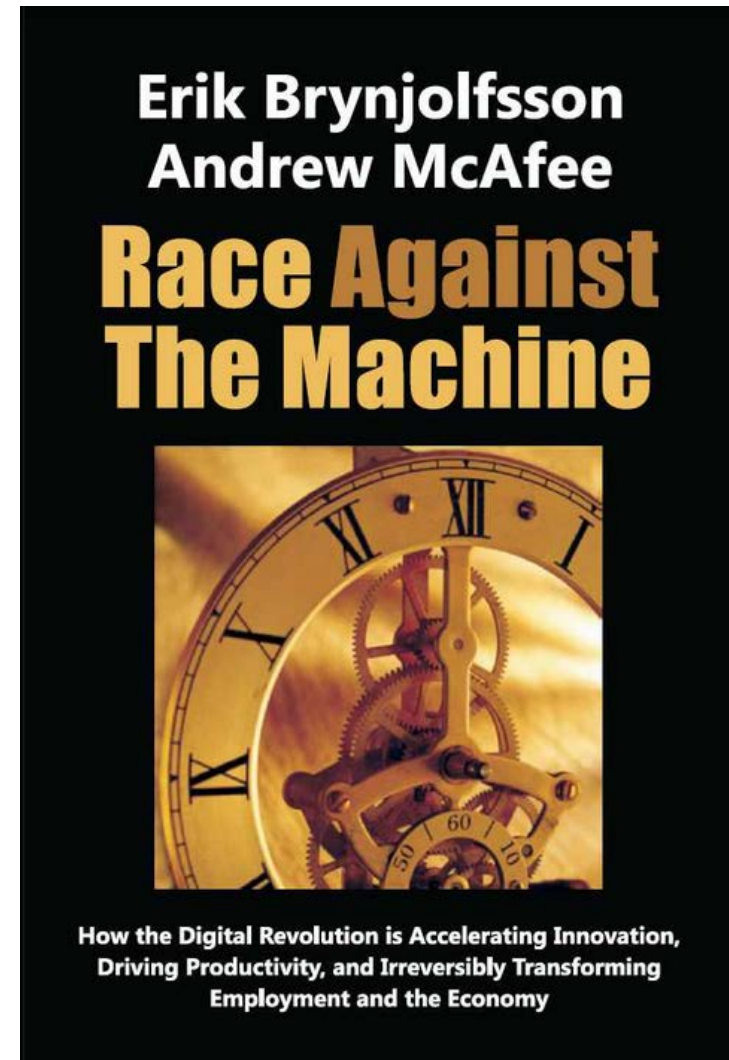
# Race Against the Machine

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[www.CartoonStock.com](http://www.CartoonStock.com)



search ID: cwln2663

"You're hired, but remember, you can be replaced  
by a machine...believe me."



# Wall Street Bankers vs. the Machines



**BloombergBusinessweek**  
**Markets & Finance**

Wall Street banks are replacing people with computers to trade financial instruments that once generated some of their biggest profits. Late last month, UBS (UBS), Switzerland's biggest bank, fired its head of credit-default swap index trading, David Gellers, and replaced him with computer algorithms that trade using mathematical models, according to two people familiar with the matter

Photo illustration by 731; Trading floor: Jin Lee/Bloomberg; Monitors: Oleksiy Maksymenko/Alamy

Swaps

## Computers Elbow Swaps Traders Aside

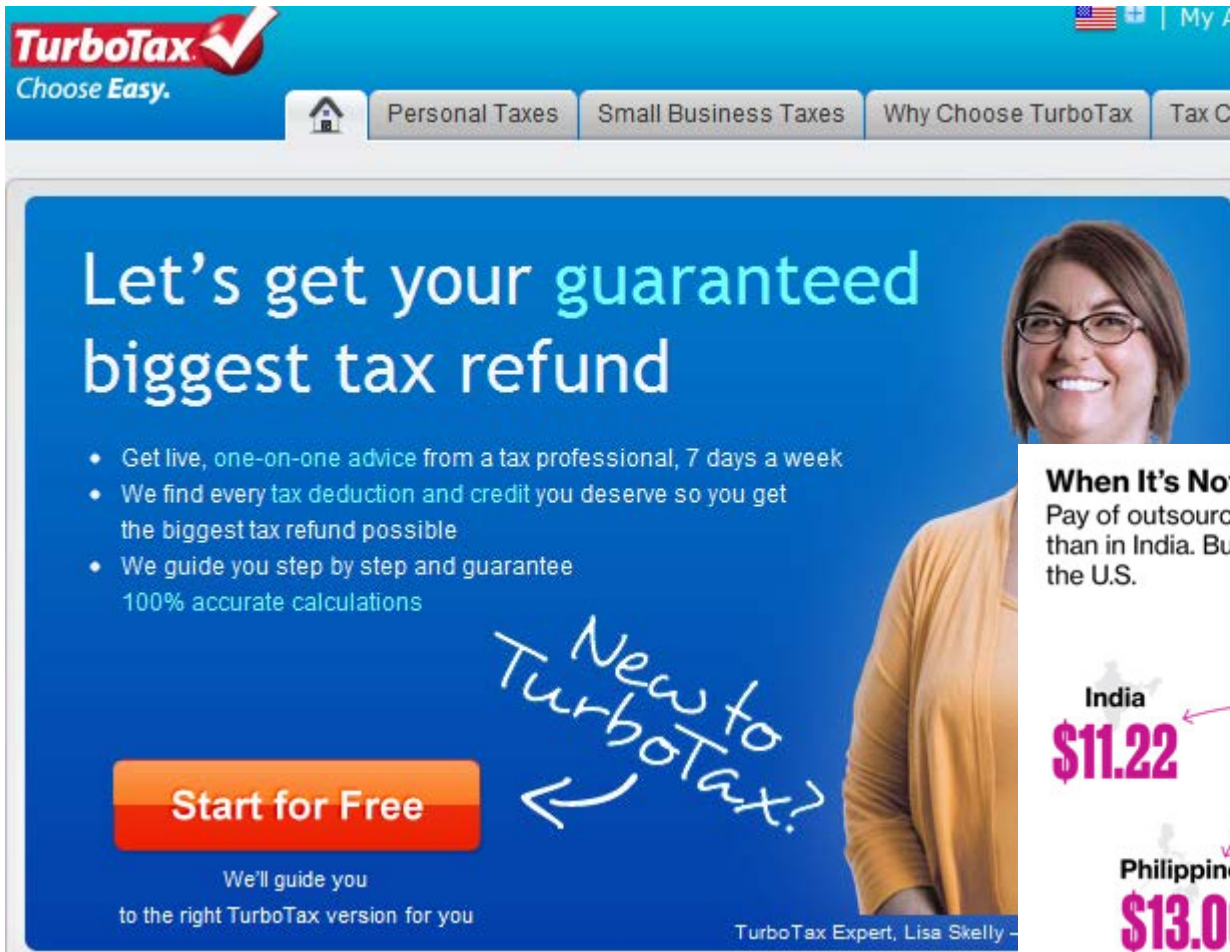
<http://www.businessweek.com/articles/2012-11-15/computers-elbow-swaps-traders-aside>

## Financial Advisors vs. the Machines



*Meet Your New Financial Adviser*

# Accountants vs. the Machines



**TurboTax**  
Choose Easy.

Personal Taxes | Small Business Taxes | Why Choose TurboTax | Tax Ca

## Let's get your guaranteed biggest tax refund

- Get live, one-on-one advice from a tax professional, 7 days a week
- We find every tax deduction and credit you deserve so you get the biggest tax refund possible
- We guide you step by step and guarantee 100% accurate calculations

*New to TurboTax?*

**Start for Free**

We'll guide you to the right TurboTax version for you

TurboTax Expert, Lisa Skelly

**When It's Not All About Wages**  
 Pay of outsourced entry-level accountants in Argentina is higher than in India. But they still earn less than the \$23 hourly wage in the U.S.

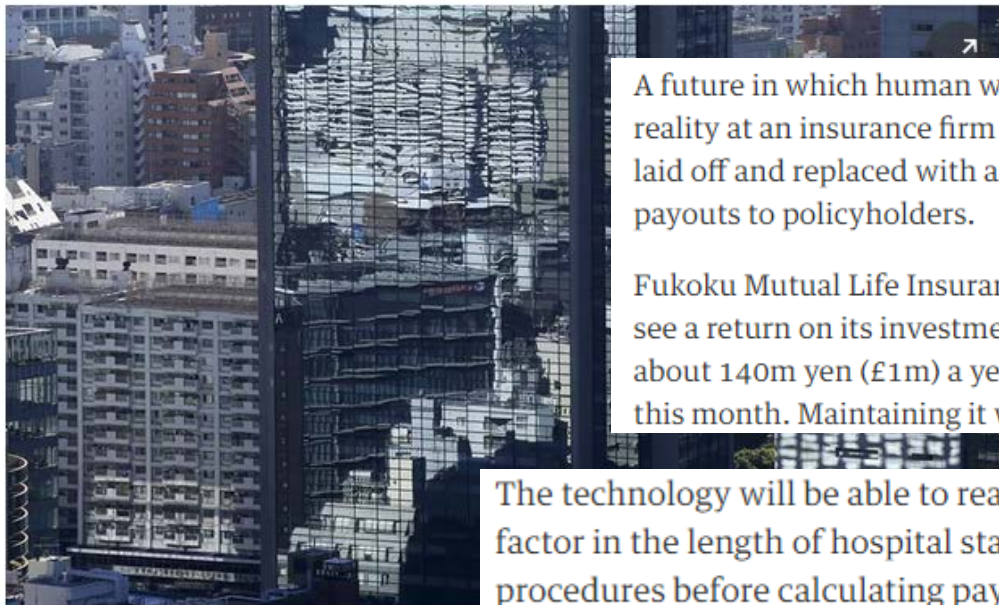




# Insurance Assessors vs. the Machines

## Japanese company replaces office workers with artificial intelligence

Insurance firm Fukoku Mutual Life Insurance is making 34 employees redundant and replacing them with IBM's Watson Explorer AI



A future in which human workers are replaced by machines is about to become a reality at an insurance firm in Japan, where more than 30 employees are being laid off and replaced with an artificial intelligence system that can calculate payouts to policyholders.

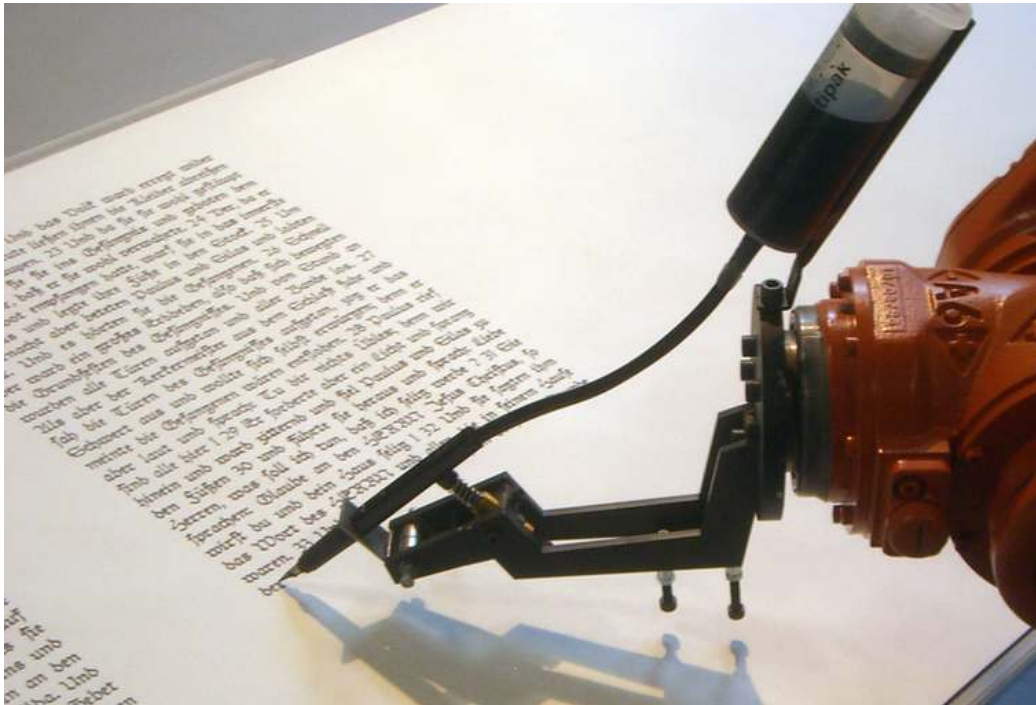
Fukoku Mutual Life Insurance believes it will increase productivity by 30% and see a return on its investment in less than two years. The firm said it would save about 140m yen (£1m) a year after the 200m yen (£1.4m) AI system is installed this month. Maintaining it will cost about 15m yen (£100k) a year.

The technology will be able to read tens of thousands of medical certificates and factor in the length of hospital stays, medical histories and any surgical procedures before calculating payouts, according to the Mainichi Shimbun.

 Fukoku Mutual Life Insurance believes it will increase productivity by 30% Photograph: Toru Hanai/REUTERS

<https://www.theguardian.com/technology/2017/jan/05/japanese-company-replaces-office-workers-artificial-intelligence-ai-fukoku-mutual-life-insurance?>

# Journalists vs. the Machines



AP News

## McCormick beats Street 3Q forecasts

October 02, 2014



SPARKS, Md. (AP) — McCormick & Co. (MKC) on Thursday reported profit of \$122.9 million in its fiscal third quarter.

The Sparks, Maryland-based company said it had profit of 94 cents per share. Earnings, adjusted for non-recurring costs, came to 95 cents per share.

The results topped Wall Street expectations. The average estimate of analysts surveyed by Zacks Investment Research was for earnings of 81 cents per share.

### VIDEO: Adobe 3Q Sales Miss Estimates Amid Shift to Cloud

The spices and seasonings company posted revenue of \$1.04 billion in the period, which also topped Street forecasts. Analysts expected \$1.03 billion, according to Zacks.

McCormick expects full-year earnings in the range of \$3.30 to \$3.37 per share.

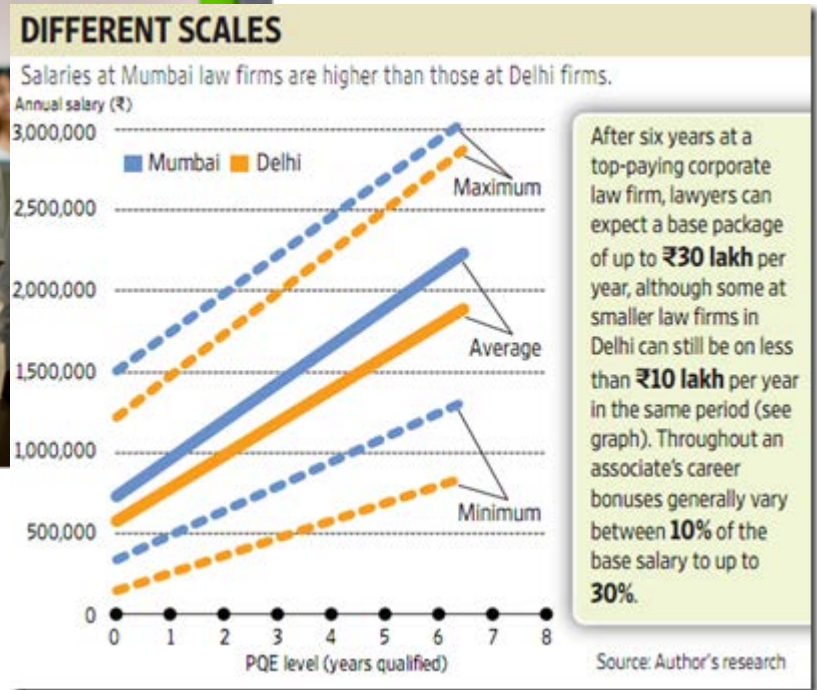
McCormick shares have declined nearly 5 percent since the beginning of the year, while the Standard & Poor's 500 index has increased slightly more than 5 percent. The stock has increased 1 percent in the last 12 months.

### VIDEO: H&M 3Q Gross Margin 58.3%; Est. 58.4%

This story was generated automatically by Automated Insights (<http://automatedinsights.com/ap>) using data from Zacks Investment

<http://www.dailydot.com/technology/robot-journalism-automated-insights-algorithm/>

# Lawyers vs. the Machines (1/2)



[http://www.nytimes.com/2010/08/05/business/global/05legal.html?\\_r=0](http://www.nytimes.com/2010/08/05/business/global/05legal.html?_r=0)  
<http://www.legallyindia.com/201111252419/Analysis/>

## Lawyers vs. the Machines (2/2)

Innovations

# This Silicon Valley start-up wants to replace lawyers with robots



Kan's months-old legal technology start-up, Atrium, is actually incorporated as a law firm — and may be the only Silicon Valley start-up ever to have done so. It has raised \$10.5 million so far, and it is even more unusual in a region where rule-breaking and rule-bending are celebrated, and lawyers are among a start-up founder's last and most reluctant hires.

To that end, one of Atrium's more innovative features is its pricing model. The firm doesn't charge by the hour, as most corporate law firms do. Instead, Atrium estimates the amount of work that it expects to do for every client and charges a single, upfront monthly-fee — regardless of the hours worked.

<https://www.washingtonpost.com/news/innovations/wp/2017/09/14/this-silicon-valley-startup-wants-to-replace-lawyers-with-robots>

## In-Class Exercise – What would happen with driverless Ubers?

- Who would be in trouble if everyone rides on driverless Ubers?
- What if few people own cars?

Innovations

### Robot-driven Ubers without a human driver could appear as early as 2019

By **Peter Holley** November 20 

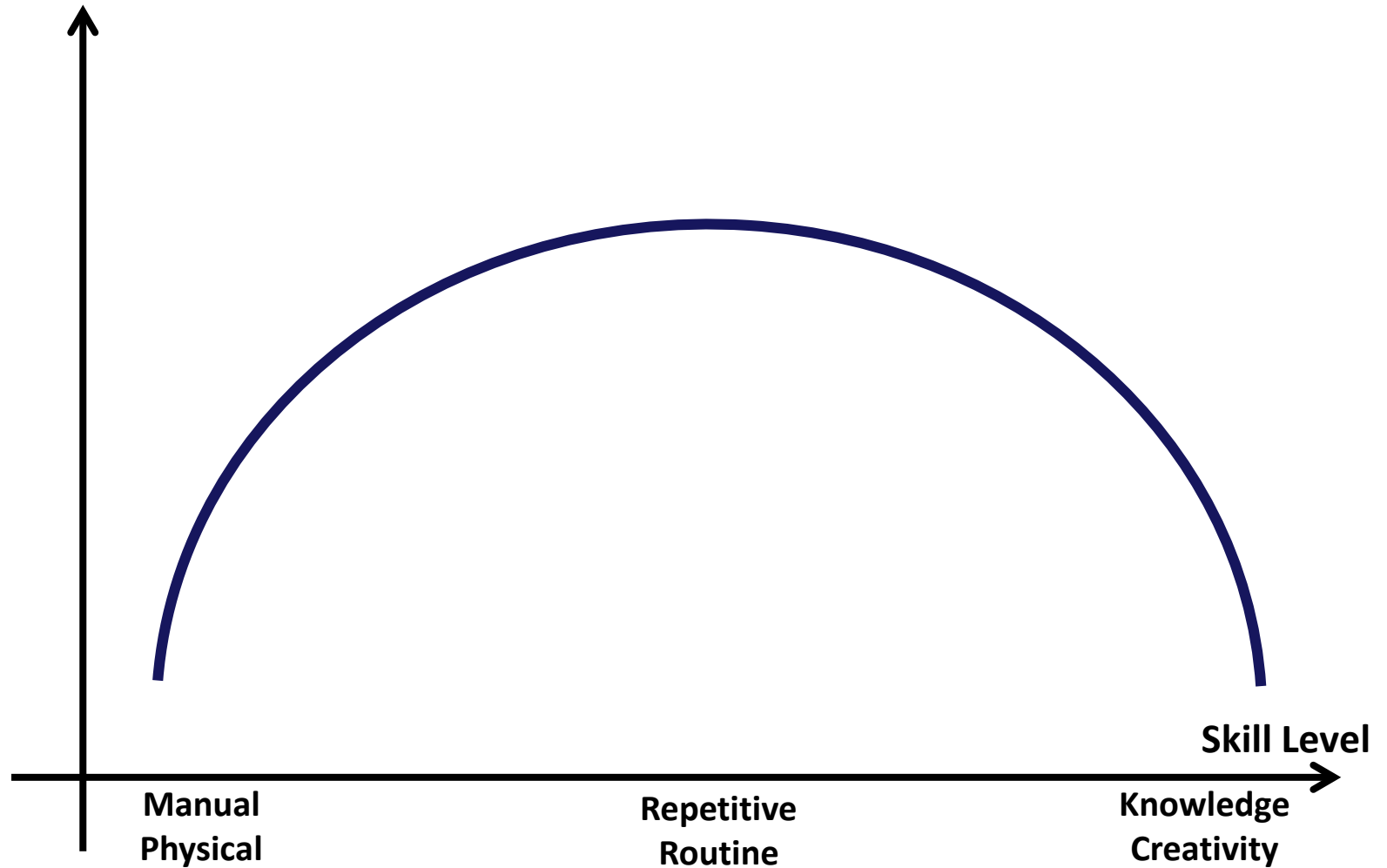


<https://www.washingtonpost.com/news/innovations/wp/2017/11/20/robot-driven-ubers-without-a-human-driver-could-appear-as-early-as-2019/>

## What would happen with driverless Ubers?

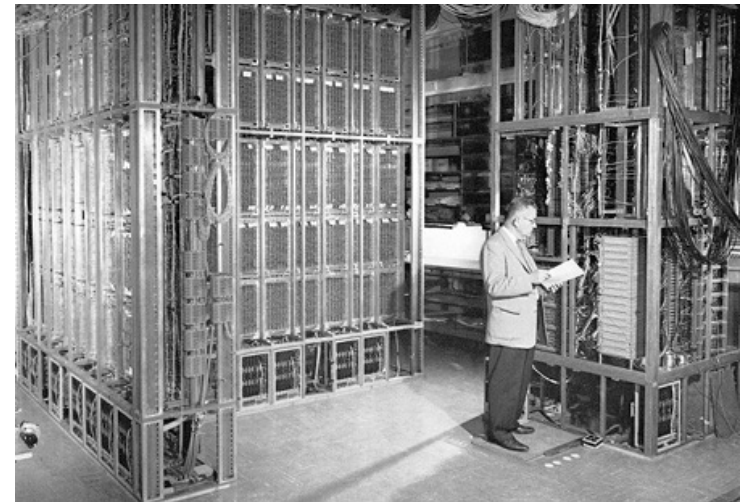
- Whose would be in danger if everyone rides on driverless Ubers?
  - Drivers
  - Car salesmen, Insurance salesmen
  - Mechanics
  - Parking lot attendants
  - Gas station owners
  - Accident investigators and lawyers
  - Tow-car drivers
  - Driving instructors

# Impact of Technology Development (1/2)



## How long do you want to live?

- How long do you think you'll live?
- Then, when do you have to retire if you want to live up to 100 years?
- What kind of technology breakthroughs will take place *for the next 50 years*?



<http://physics.illinois.edu/history/timelines/1960s.asp>



## Let's face it.

- Automation and outsourcing are irreversible trends.
- No occupation is immune to this trend.
- New technologies will continue to emerge for our lifetime and *fundamentally transform* the society and the job market (probably faster and faster).



[http://www.bizbash.com/will\\_these\\_tech\\_advances\\_change\\_the\\_future\\_of\\_events/new-york/story/25226/](http://www.bizbash.com/will_these_tech_advances_change_the_future_of_events/new-york/story/25226/)

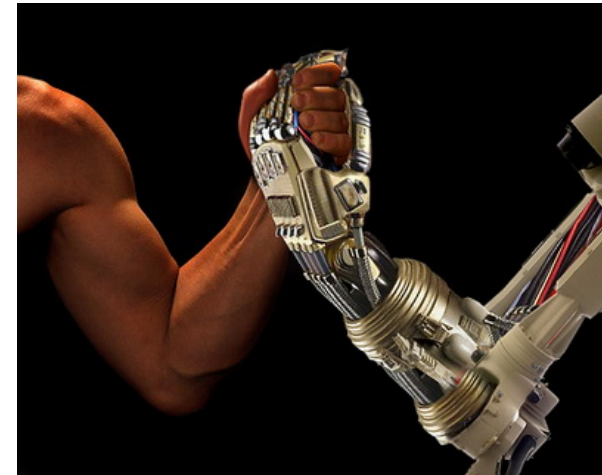
## In-Class Exercise

- Which kind of occupation will be neither replaced by the machines nor outsourced for the next 30 years?
- What kind of skills do such jobs require?



## In order not to be replaced, what kind of skills do we need that the machines don't have?

- Creative, innovative, analytic thinking
- Problem-solving skills for complex, unstructured, open-ended, non-routine problems
- Face-to-face, human-touch, communication skills (e.g. negotiation, persuasion, writing)
- Entrepreneurship and leadership
- anything else?

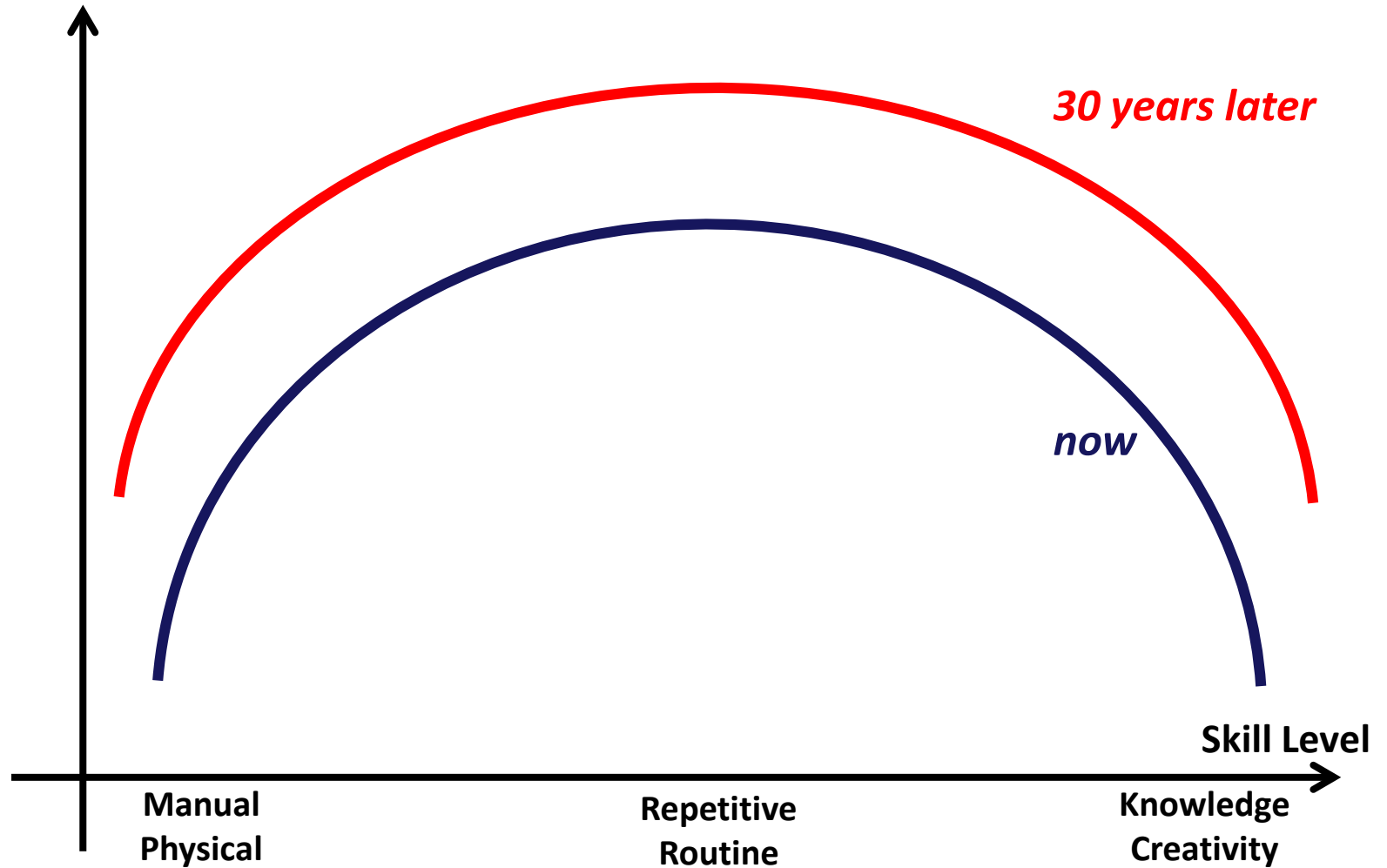


<http://www.kansasbob.com/2011/02/man-vs-machine.html>

## What kind of jobs do you want to have?

- If you want to be a lawyer, what kind of lawyer do you want to be?
- If you want to be a journalist, what kind of journalist do you want to be?
- If you want to work for Wall Street banks, what kind of banker do you want to be?

## Impact of Technology Development (2/2)



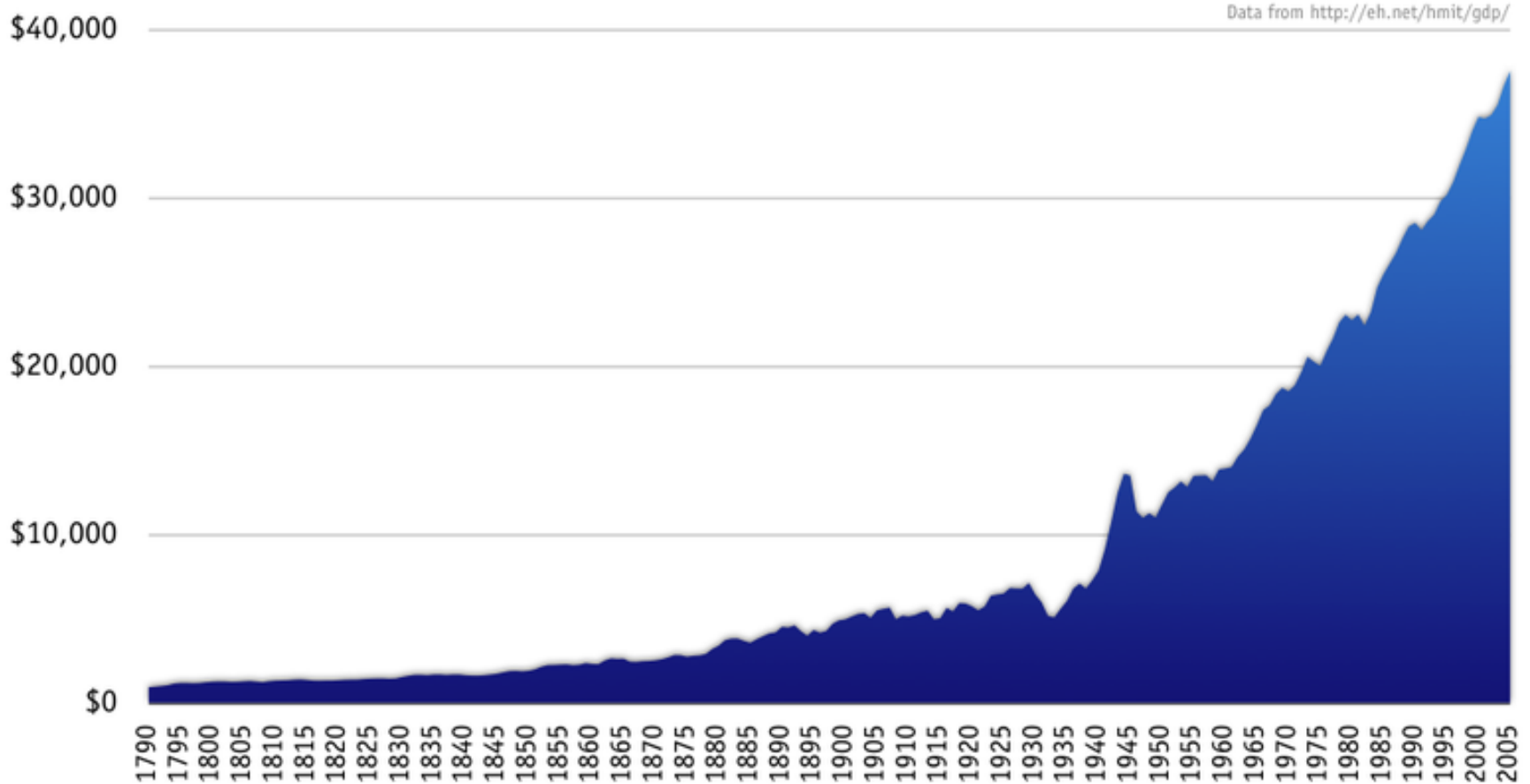
## We are NOT doomed.

- Advances in technologies are creating new opportunities and increasing demands for different skills.
  - Techs destroy some jobs but create new ones too, with the skills in the previous page.
- Tech developments have historically increased the size of the economies for the last several centuries.
- If you can survive in the waves of new technologies, you'll be more thriving than ever before.



[http://en.wikipedia.org/wiki/Survivor\\_\(U.S.\\_TV\\_series\)](http://en.wikipedia.org/wiki/Survivor_(U.S._TV_series))

■ **Real GDP Per Capita**  
(2000 Dollars)



## MIT Technology Review

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### 10 Breakthrough Technologies

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### Self-Driving Trucks

Tractor-trailers without a human at the wheel will soon barrel onto highways near you. What will this mean for the nation's 1.7 million truck drivers?

As long as self-driving trucks require a driver to remain on board, driving jobs seem safe. In some ways those jobs, which pay an average of about \$40,000 a year, could even improve. For one thing, driving a truck 11 hours a day is stressful. “You get physically and mentally tired,” says Mugriyev, the driver in the Texas accident, which occurred in 2013. (He was not found to be at fault.) Besides being able to nap and relax in the cab while Otto does the driving, says Berdinis, drivers could use the time away from the wheel to catch up on trucking's heavy paperwork, locate a “backhaul” load that would pay for the return trip, chat with family and friends, learn a second trade, or run a business. “And while they're doing it, the drivers are still getting paid for driving,” he says.

<https://www.technologyreview.com/s/603493/10-breakthrough-technologies-2017-self-driving-trucks/>

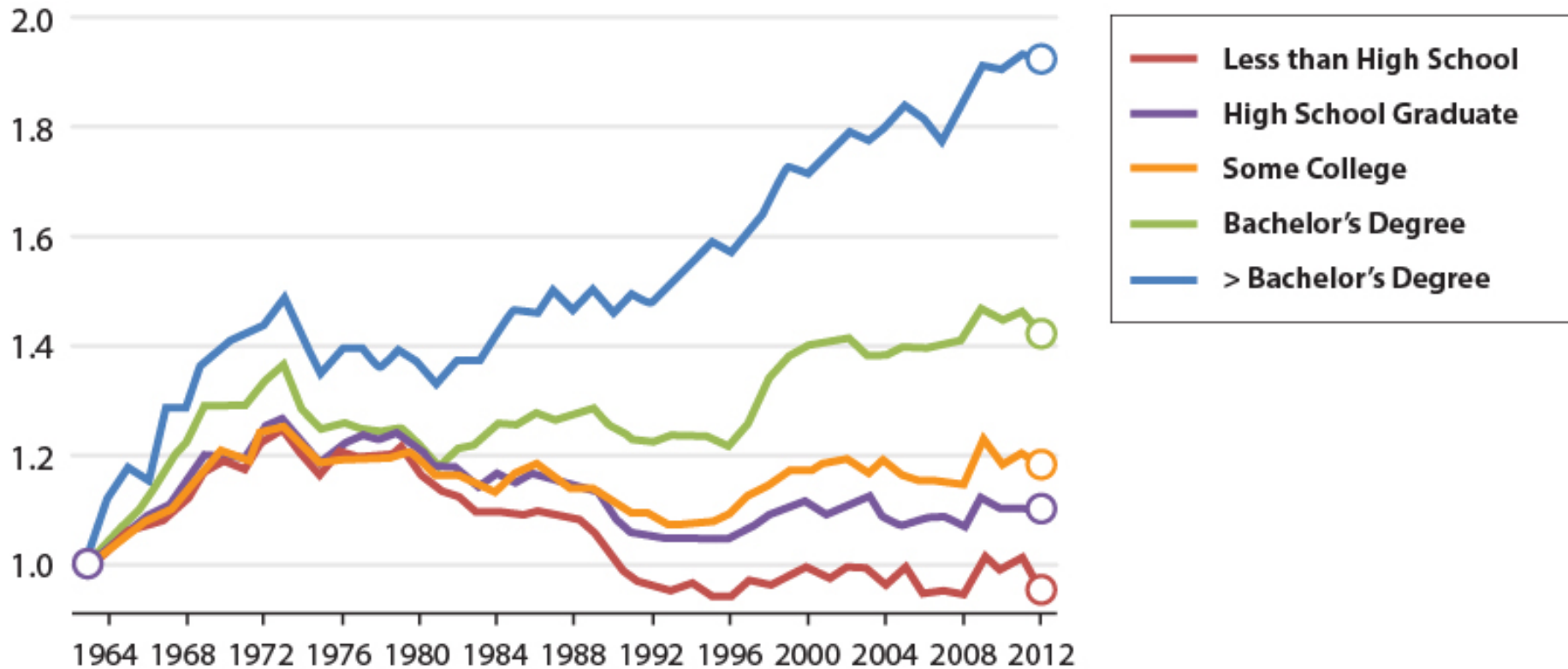


## How to survive? – Be Ambidextrous

- You'll need to develop multiple skills and abilities to survive.
- Having one major may not be enough.
- Double major or graduate degree in a *distant* field
- so that, when you lose a job, you can jump into another occupation right away.

# To make money, go to a graduate school!

**Changes in Wages for Full-Time Male U.S. Workers**



# Why Software Is Eating The World

THE WALL STREET JOURNAL.

Article

Video

Comments (445)



Save



Recommend

18k

By [MARC ANDREESSEN](#)

This week, Hewlett-Packard (where I am on jettisoning its struggling PC business in favor of where it sees better potential for growth. Motorola Mobility's move to a cellphone handset maker Motorola Mobility is also in line with a trend I've seen about the future growth of the American stock market.



In an interview with WSJ's Kevin Delaney, Groupon and LinkedIn investor Marc Andreessen insists that the recent popularity of tech companies does not constitute a bubble. He also stressed that both Apple and Google are undervalued and that "the market doesn't like tech."

Today, the world's largest bookseller, Amazon, is a software company—its core capability is its amazing software engine for selling virtually everything online, no retail stores necessary. On top of that, while Borders was thrashing in the throes of impending bankruptcy, Amazon rearranged its web site to promote its Kindle digital books over physical books for the first time. Now even the books themselves are software.

Today's largest video service by number of subscribers is a software company: Netflix. How Netflix eviscerated Blockbuster is an old story, but now other traditional entertainment providers are facing the same threat. Comcast, Time Warner and others are responding by transforming themselves into software companies with efforts such as TV Everywhere, which liberates content from the physical cable and connects it to smartphones and tablets.

Today's dominant music companies are software companies, too: Apple's iTunes, Spotify and Pandora. Traditional record labels increasingly exist only to provide those software companies with content. Industry revenue from digital channels totaled \$4.6 billion in 2010, growing to 29% of total revenue from 2% in 2004.

Today's fastest growing entertainment companies are videogame makers—again, software—with the industry growing to \$60 billion from \$30 billion five years ago. And the fastest growing major videogame company is Zynga (maker of games including FarmVille), which delivers its games entirely online. Zynga's first-quarter revenues grew to \$235 million this year, more than double revenues from a year earlier. Rovio, maker of Angry Birds, is expected to clear \$100 million in revenue this year (the company was nearly bankrupt when it debuted the popular game on the iPhone in late 2009). Meanwhile, traditional videogame powerhouses like Electronic Arts and Nintendo have seen revenues stagnate and fall.

JUL 29, 2015 @ 09:45 AM 833,901 VIEWS

# That 'Useless' Liberal Arts Degree Has Become Tech's Hottest Ticket

Such creativity can't be programmed. Instead, much of it is minted by one of Slack's 180 employees, [Anna Pickard](#), the 38-year-old editorial director. She earned a theater degree from Britain's Manchester Metropolitan University before discovering that she hated the constant snubs of auditions that didn't work out. After winning acclaim for her blogging, videogame writing and cat impersonations, she found her way into tech, where she cooks up zany replies to users who type in "I love you, Slackbot." It's her mission, Pickard explains, "to provide users with extra bits of surprise and delight." The pay is good; the stock options, even better.

What kind of boss hires a thwarted actress for a business-to-business software startup? Stewart Butterfield, Slack's 42-year-old cofounder and CEO, whose estimated double-digit stake in the company could be worth \$300 million or more. He's the proud holder of an undergraduate degree in philosophy from Canada's University of Victoria and a master's degree from Cambridge in philosophy and the history of science.

<http://www.forbes.com/sites/georgeanders/2015/07/29/liberal-arts-degree-tech/>

## How to survive? – Continue to Learn

- Some of the things you are learning here will probably be *obsolete* in the next couple of decades.
- New knowledge keeps produced in an increasingly faster rate.
- Will need to know not only how to use certain software tools (Excel, Tableau), but also how to learn new technology that is not invented yet.
- Will need to be flexible and to transform yourself anytime with new knowledge and skills
- Always be vigilant over and aware of technology trends and take advantage of them

ANALYTICS

# Data Scientist: The Sexiest Job of the 21st Century

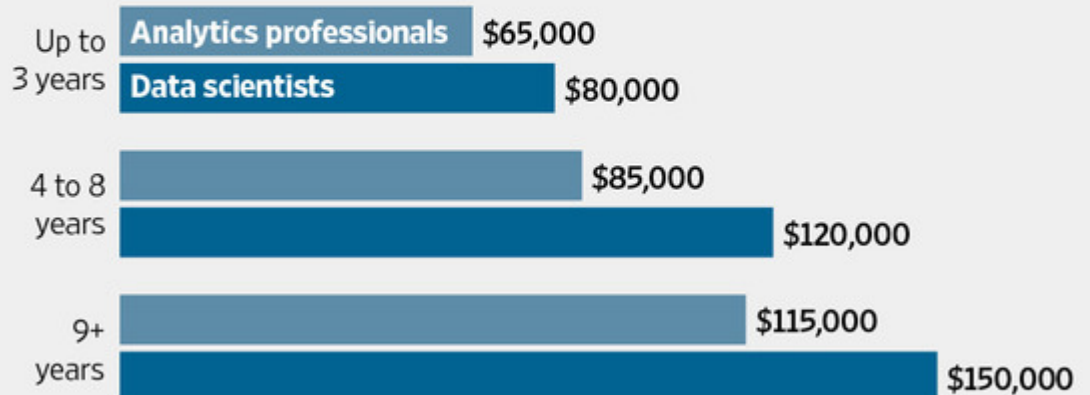
Harvard  
Business  
Review

by Thomas H. Davenport and D.J. Patil

FROM THE OCTOBER 2012 ISSUE

## Big Data, Big Paycheck

Median salary for analytics professionals and those specifically within data science, by level of experience.



Note: Data do not include managers Source: Burtch Works

The Wall Street Journal

<https://hbr.org/2012/10/data-scientist-the-sexiest-job-of-the-21st-century/>  
<http://www.wsj.com/articles/SB10001424052702304819004579489541746990638>



**The illiterate of the 21st century will not be those who cannot read and write, but those who cannot learn, unlearn and relearn.**

**- Alvin Toffler**



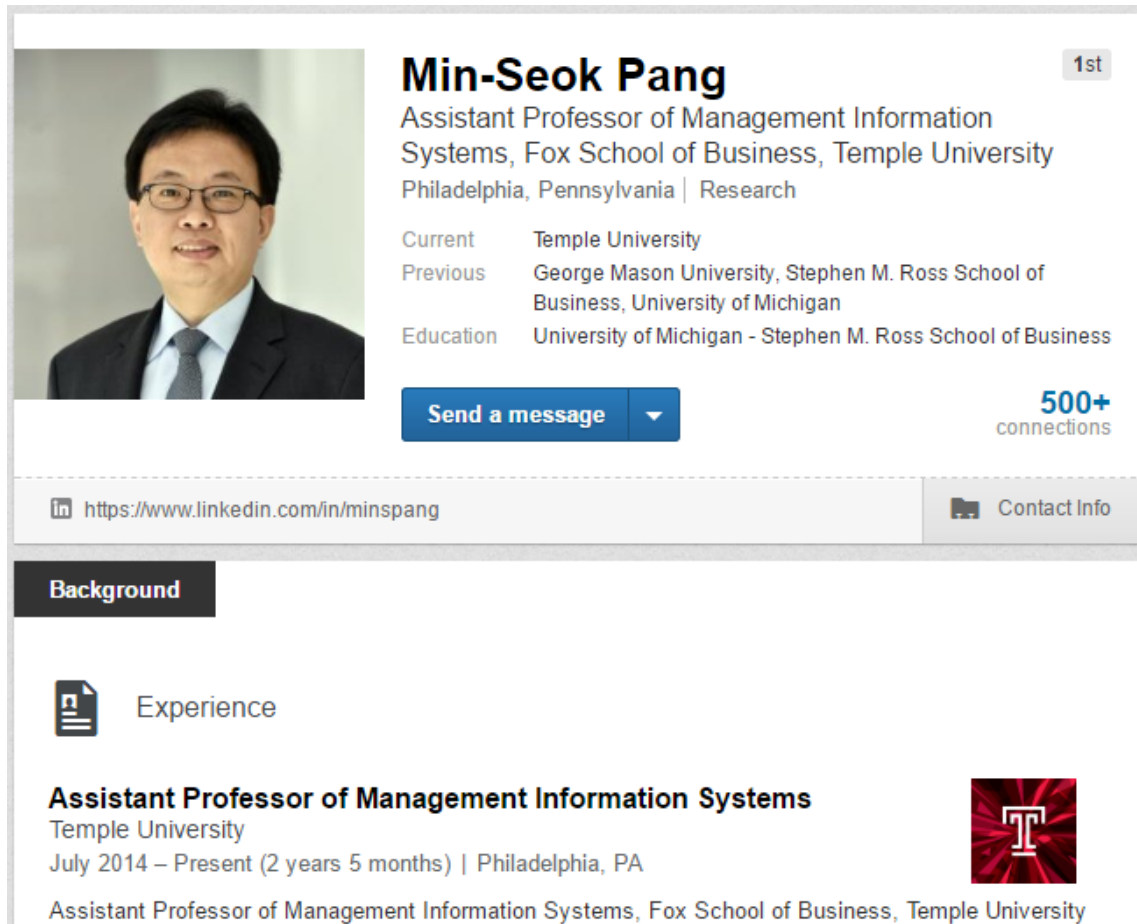


# GOOD LUCK

to your career and future endeavors!

# Connect with me at LinkedIn!

<http://www.linkedin.com/in/minspang>



**Min-Seok Pang** 1st


Assistant Professor of Management Information Systems, Fox School of Business, Temple University  
Philadelphia, Pennsylvania | Research

**Current** Temple University  
**Previous** George Mason University, Stephen M. Ross School of Business, University of Michigan  
**Education** University of Michigan - Stephen M. Ross School of Business


[Send a message](#) ▼ 500+ connections

<https://www.linkedin.com/in/minspang> Contact Info

### Background

 Experience

**Assistant Professor of Management Information Systems**  
Temple University  
July 2014 – Present (2 years 5 months) | Philadelphia, PA



Assistant Professor of Management Information Systems, Fox School of Business, Temple University