

# THE SECOND MACHINE AGE

WORK, PROGRESS, AND PROSPERITY  
IN THE TIME OF  
BRILLIANT TECHNOLOGIES

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& ANDREW McAFEE

# The Second Machine Age

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# The Second Machine Age

## Changing the world requires two things:

- *Physical Power*: move or transform things
- *Mental Power*: decide where and how

## Industrial Revolution = Physical Power

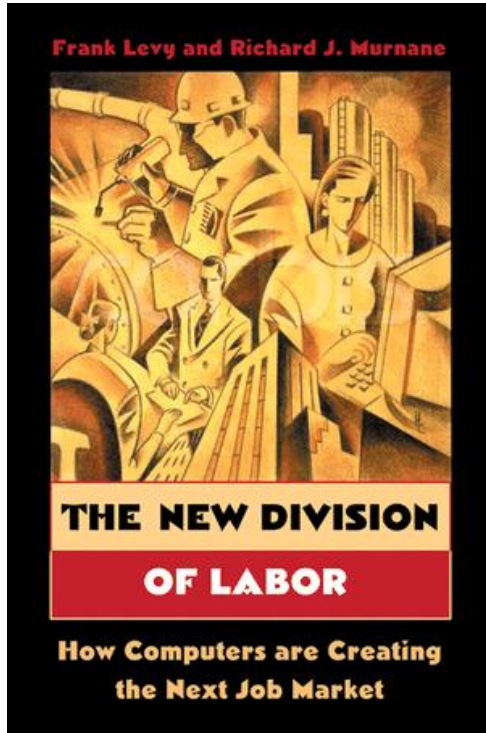
- Steam engine (and Internal combustion engine, Electricity)
- Mostly a complement to humans

## Second Machine Age = Mental Power

- Computers, Software, Big Data, Machine Intelligence
- Complement or substitute?



# State of Understanding, 2004



## Uniquely Human Abilities

- Autonomous mobility and fine motor control
- Language and complex communication
- Pattern matching and unstructured problem solving







# Machine Intelligence

Interacting with physical world

- Fine and gross motor control
- Vision and other senses

Language

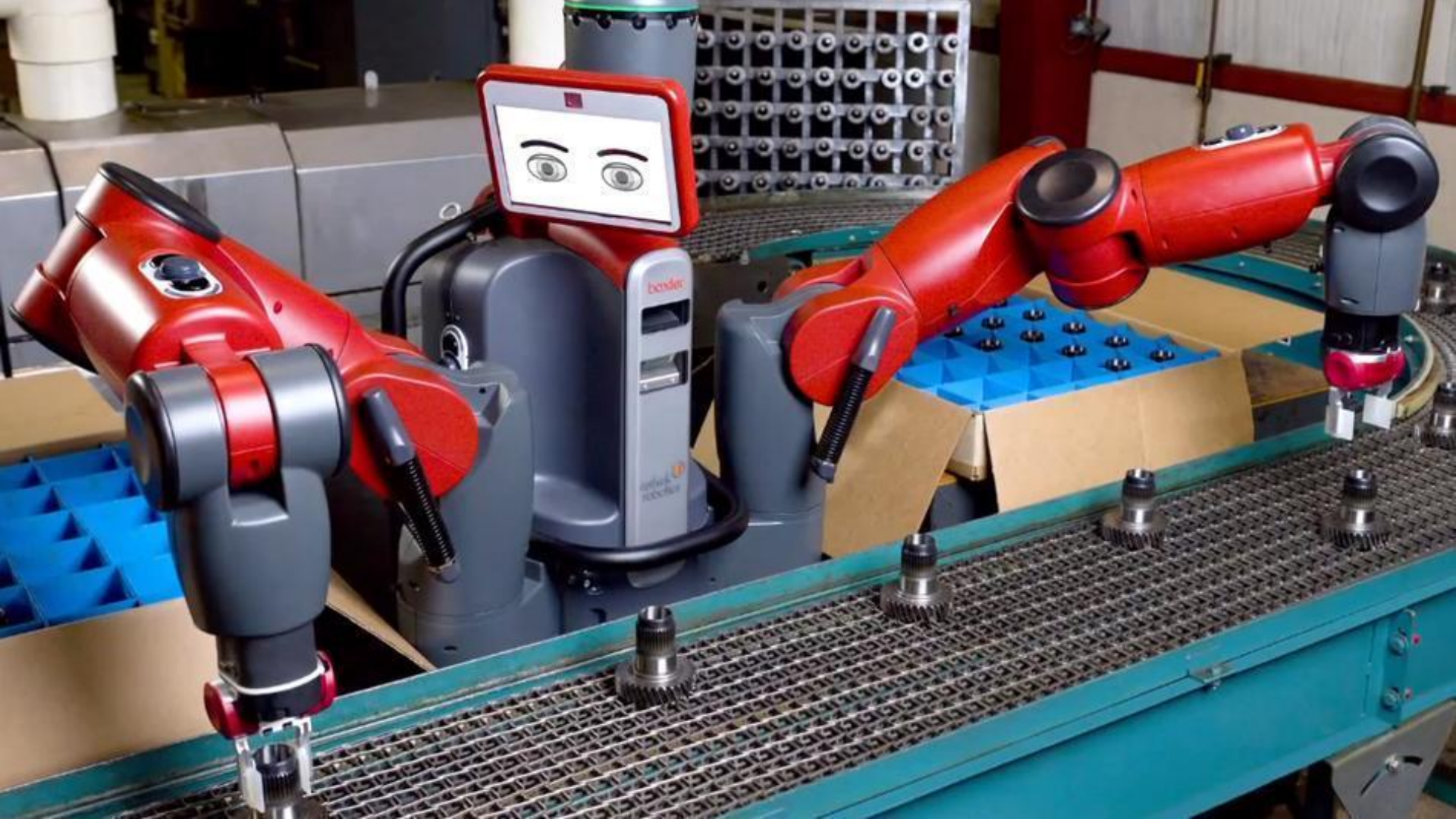
- Voice recognition
- Natural language processing
- Creating narratives

Problem Solving

- Answering unstructured questions
- Rule based analysis
- Pattern recognition and classification

➤ *We're in the midst of the greatest "one-time" event in history!*









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# Siri

Voice recognition



# Lionbridge

Translation



# Narrative Science

Authoring News Stories



# Red Sox Defeat Cardinals 3-1, Lead World Series 3-2

October 29, 2013 2:44 PM  
Automated Insights



[Jon Lester](#) went 7 2/3 innings yielding just four hits and [Koji Uehara](#) closed it out in the ninth as Boston got past St. Louis, 3-1. St. Louis had a batting average of just .138 and a wOBA of .166.

The Red Sox got on the board first in the top of the first when [David Ortiz](#) hit a double off starter [Adam Wainwright](#), driving in [Dustin Pedroia](#). With the game tied at 1-1 in the top of the seventh, the Red Sox went on top for good when [David Ross](#) hit a double off Wainwright, scoring [Xander Bogaerts](#). Soon after, [Jacoby Ellsbury](#) hit a single, scoring Stephen Drew to make it 3-1 and force Wainwright from the game.

Lester got his fourth win of the postseason after he surrendered only one run on four hits with seven strikeouts and no walks. Uehara picked up his seventh save of the postseason after 1 1/3 innings of work striking out two and walking no one. Wainwright (2-3), who gave up three runs on eight hits with 10 strikeouts and one walk over seven innings, received the loss. Ortiz had a strong game for the Red Sox, going 3 for 4 with a double and an RBI. Ross also contributed, going 2 for 4 with a double and an RBI. Matt Holliday went 1 for 4 with a home run, a run, and an RBI in the loss.

The Red Sox take a one-game lead in the World Series and are just one win away from a World Series championship. The Red Sox will face the Cardinals Wednesday in Game 6 of the World Series at Fenway Park at 8:07 PM EDT.



# Forbes Earnings Preview: Apple

by [Narrative Science](#)

+ Comment now

Analysts have become increasingly bullish on **Apple (AAPL)** in the month leading up to the company's second quarter earnings announcement scheduled for Tuesday, April 24, 2012. The consensus earnings per share estimate has moved up from \$9.60 a share to the current expectation of earnings of \$9.86 a share.

8

f Share

49

Twitter Tweet

## What to Expect:



# Machine Intelligence

Interacting with physical world

- Fine and gross motor control
- Vision and other senses

Language

- Voice recognition
- Natural language processing
- Creating narratives

**Problem Solving**

- **Answering unstructured questions**
- **Rule based analysis**
- **Pattern recognition and classification**





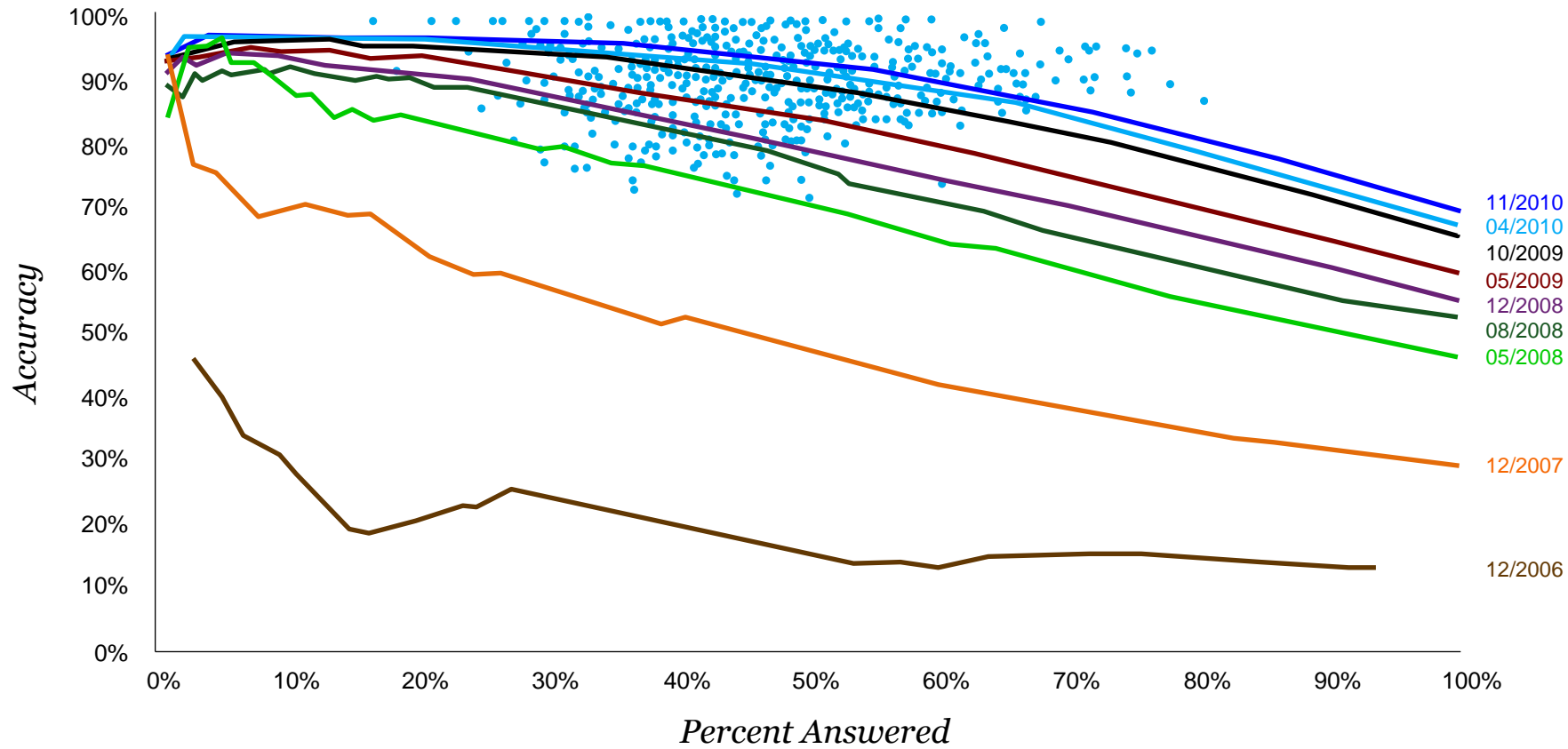
# The Digital Frontier

A Jeopardy! game board with two contestants. The board features three columns of scores and a central question. The background is blue with the word 'THINK' repeated in various colors and fonts. A central screen displays a glowing blue and purple orb with radiating lines.

Contestant	Score
Left	\$18,200
Center	\$23,440
Right	\$5,600

**WILLIAM WILKINSON'S  
"AN ACCOUNT OF THE PRINCIPALITIES OF  
WALLACHIA AND MOLDAVIA"  
INSPIRED THIS AUTHOR'S  
MOST FAMOUS NOVEL**

# Accuracy and Questions Answered on *Jeopardy!*



# The Digital Frontier



FIENSE

THINK

SMACOMIS

गेविए

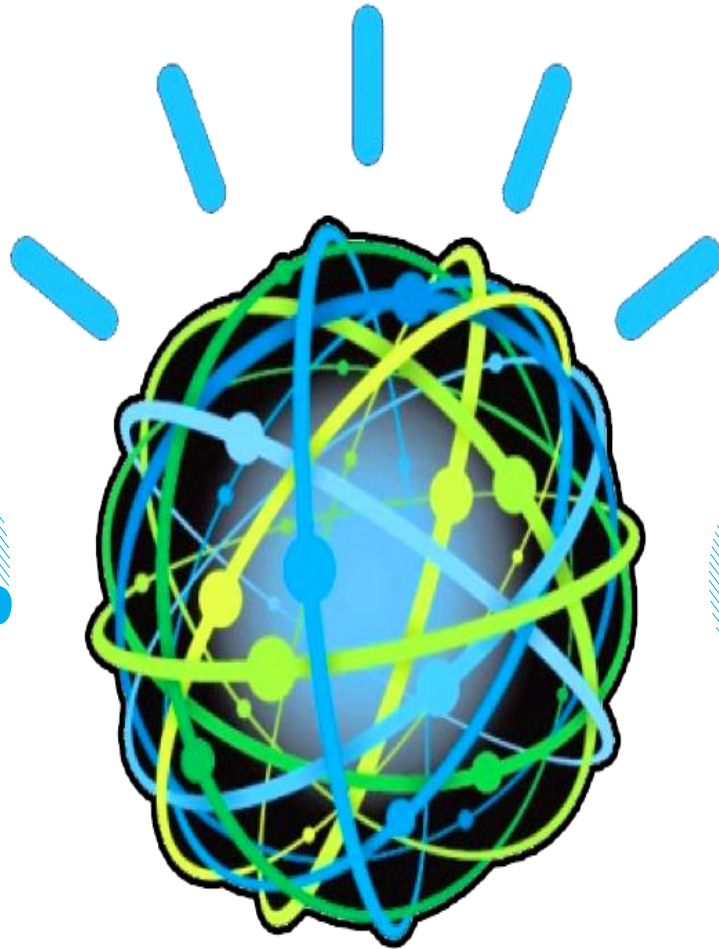
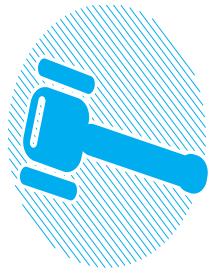
Who is Stoker?

(1 FOR ONE WELCOME OUR  
NEW COMPUTER OVERLORDS)

\$1,000

\$2





# Machines Gauging Your Star Potential Automate HR Hiring

By Aki Ito - Oct 11, 2013 12:01 AM ET



80 COMMENTS

+ QUEUE



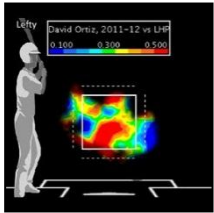
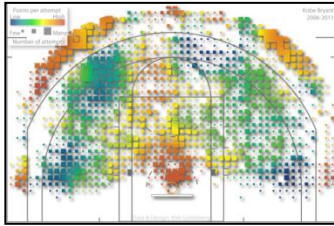
They can drive cars, win Jeopardy and find your soon-to-be favorite song. Machines are also learning to decipher the most human qualities about you -- and help businesses predict your potential to be their next star employee.

A handful of technology companies from [Knack.it Corp.](#) to Evolv Inc. are doing just that, developing video games and online questionnaires that measure personality attributes in a job applicant. Based on patterns of how a company's best performers responded in these assessments, the software estimates a candidate's suitability to be everything from a warehouse worker to an investment bank analyst.

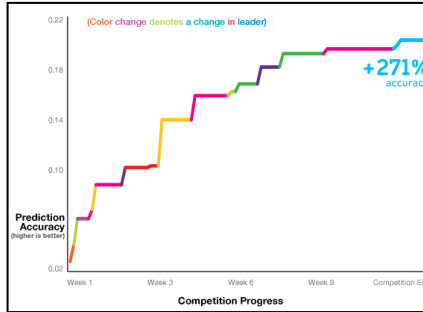


# Analytics is transforming

## Sports



## Underwriting



## Politics



***What does this mean for the  
economy?***





# The Bounty

**Radio Shack**  
AMERICA'S TECHNOLOGY STORE

**PRESIDENT'S BIRTHDAY SALE!**

**DON'T DELAY! 3-DAY SPECIALS ABOVE GOOD SATURDAY THRU MONDAY ONLY!**

**0% INTEREST!**  
NO PAYMENTS UNTIL MAY!  
NO DOWN PAYMENT!

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**TANCO 1000 T/3 Computer System**  
Save \$670  
**\$1599**

• 15.5" Screen PC Compatible  
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• 20MB SmartDrive™ Hard Drive  
• Easy-to-Use 10-in-1 DeskMate™ Software  
• 40 non-erasable disks

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• Lined Spreadsheet For DeskMate  
• DeskMate OLA Write  
• Quicken  
• 2-Button Mouse

**VHS Camcorder**  
Save \$100  
**\$799**

• 1000 Still Photos  
• Realistic Model 902 - includes video tape for color recording, 2 tape bins, fully automatic, #1002

**3-Way Speaker With Massive 15" Woofer**  
Save \$110  
**\$149.95**

• 15" Woofer  
• Distance Match™ System  
• Simple to Operate - 2 tap level  
• Fully automatic, #1003

**Mobile Cellular Telephone**  
Save \$100  
**\$199**

• Low As \$10 Per Month - Reg. 299.00  
• #1007

**Deluxe Portable CD Player**  
Save \$40  
**\$159.95**

• Low As \$10 Per Month - Reg. 199.95  
• Realistic CD-2500 100 16-phonos, 1000 Hz, 1000 Hz, #1008

**Tiny Dual-Superhet Radar Detector**  
Save \$60  
**\$79.95**

• Realistic TRC-430 sets you get software for 1000-yr-old radar traps to detect "legal" radar traps, #1009

**Compact 10-Channel Desktop Scanner**  
Save \$30  
**\$99.95**

• Realistic PRO-27 sets you get software for 1000-yr-old radar traps to detect "legal" radar traps, #1010

**Our Easiest-to-Use Phone Answerer**  
Cut 17%  
**\$49.95**

• Realistic 242-241 answerer is ready to use - just plug it in - no setup or programming, #1011

**Handheld Voice-Activated Cassette Tape Recorder**  
40% Off  
**\$29.95**

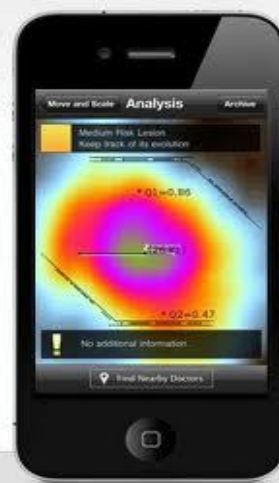
• Realistic CTM-85 recorder has automatic "intelligent" recording for maximum recording time, #1012

**20-Memory Speed-Dial Phone**  
Cut 33%  
**\$29.95**

• Realistic 2100 20-Memory Speed-Dial Phone, #1013

**Check Your Phone Book for the Radio Shack Store or Dealer Nearest You**

**Most Major Credit Cards Welcome**



**My Skin mole Rename**

photo date: 04/11/2011

**Automated Analyses** **Online Consultations**

**Automated Analysis**

**Asymmetry** 2.4  
**Border Scallop** 2.2  
**Border Fade** 1.0  
**Color Irregularity** 3.6

0 Warning Signs Detected

**Find Similar Moles** >  
**Track Changes** >





WIKIPEDIA



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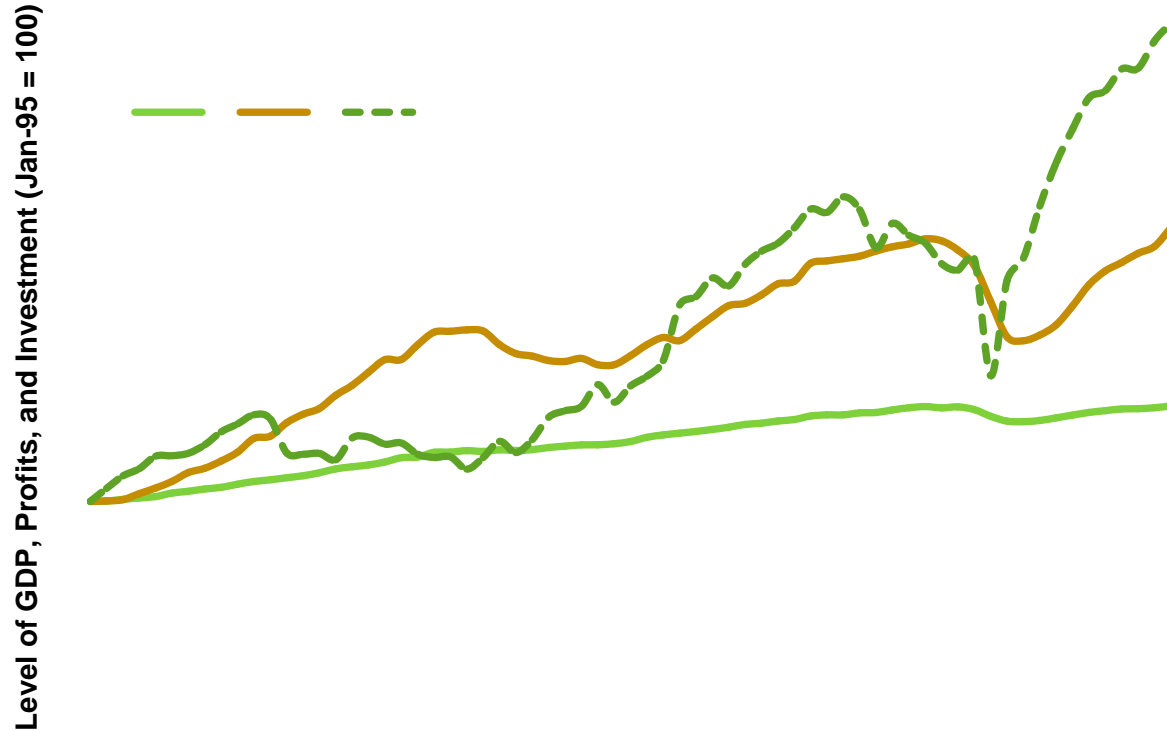


\$300 BILLION PER YEAR



# GDP, Profits, Investment, and Employment

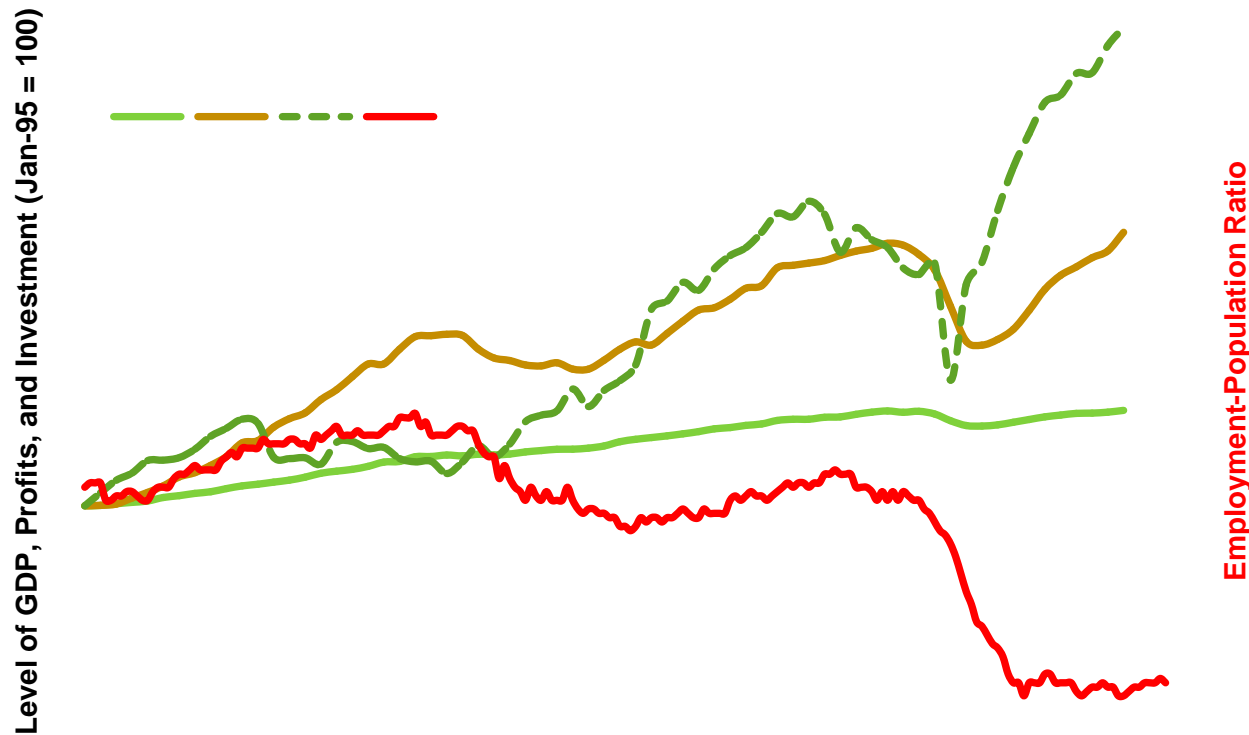
## Trends in US GDP, Profits and Investment





# GDP, Profits, Investment, and Employment

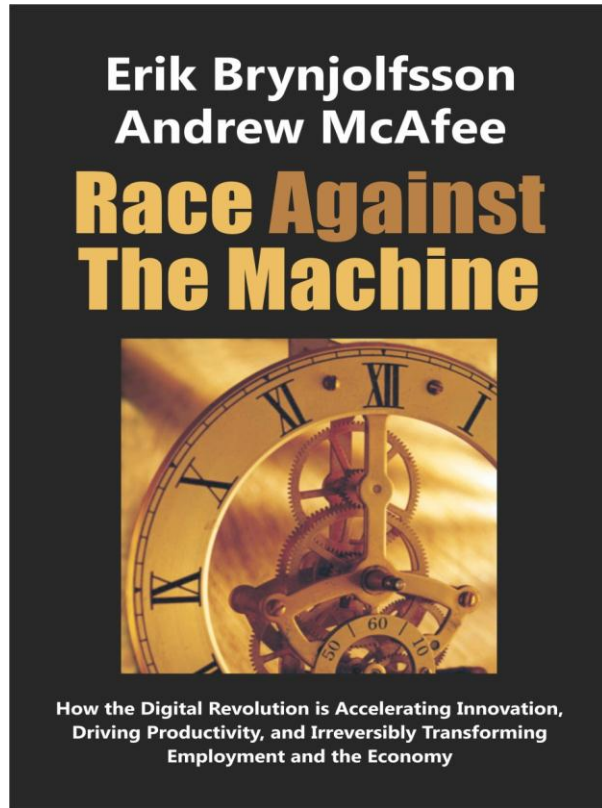
## Trends in US GDP, Profits, Investment, and Employment



# WHAT'S GOING ON?



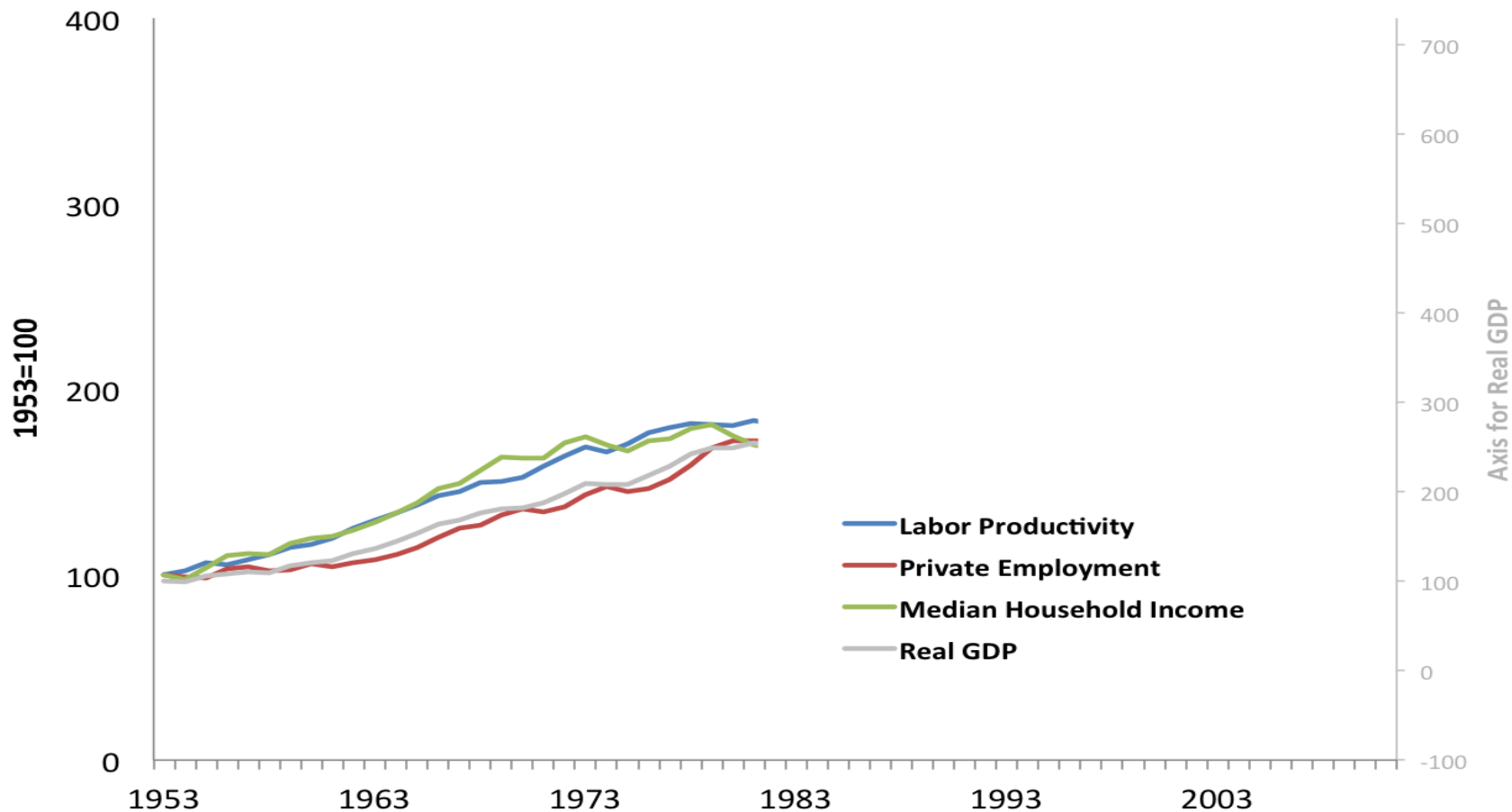
# Our View



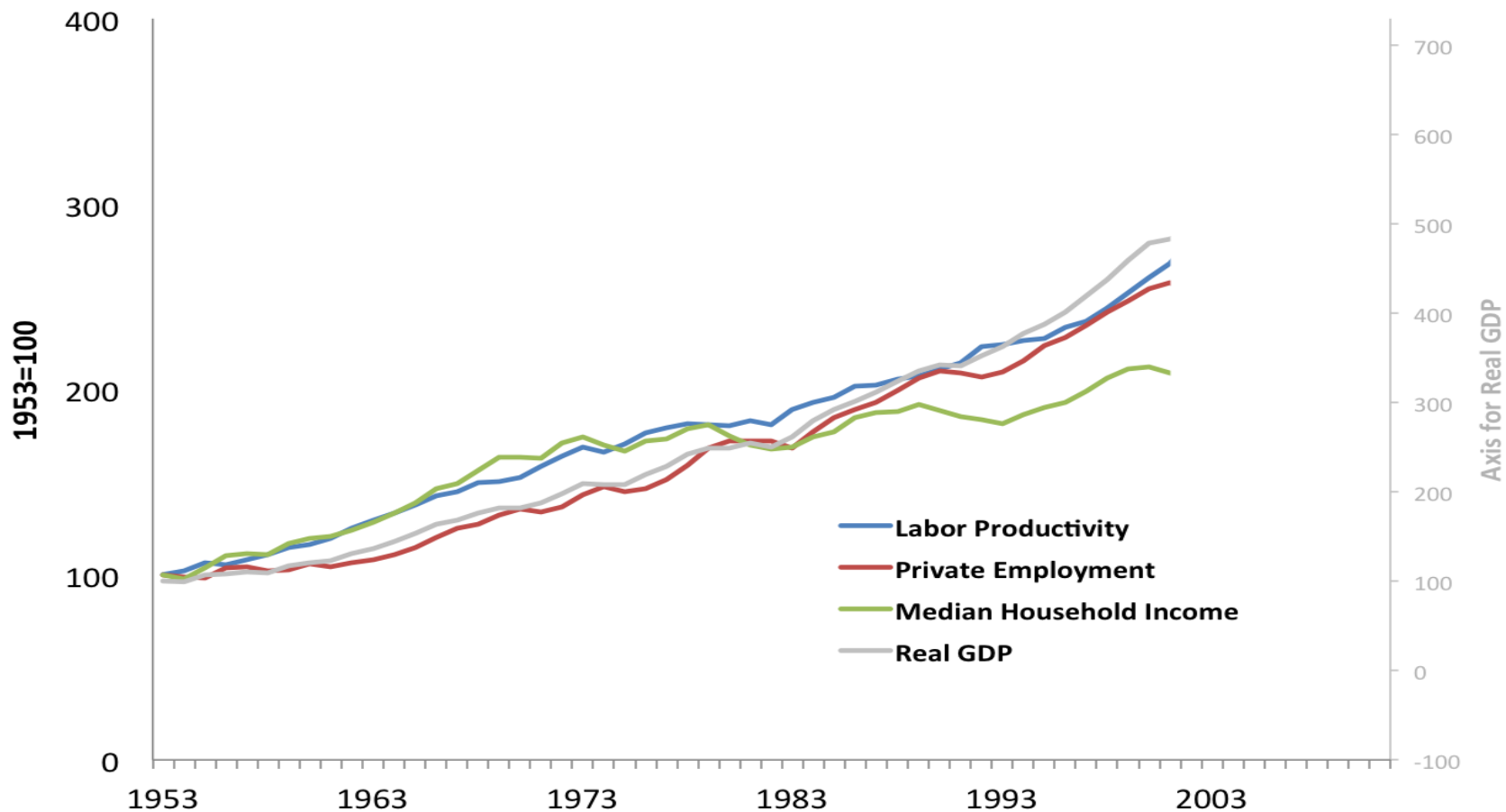
“Digital technologies change rapidly, but organizations and skills aren’t keeping pace.

As a result, millions of people are being left behind.”

# US Productivity, GDP, Employment, and Income: 1953-1981

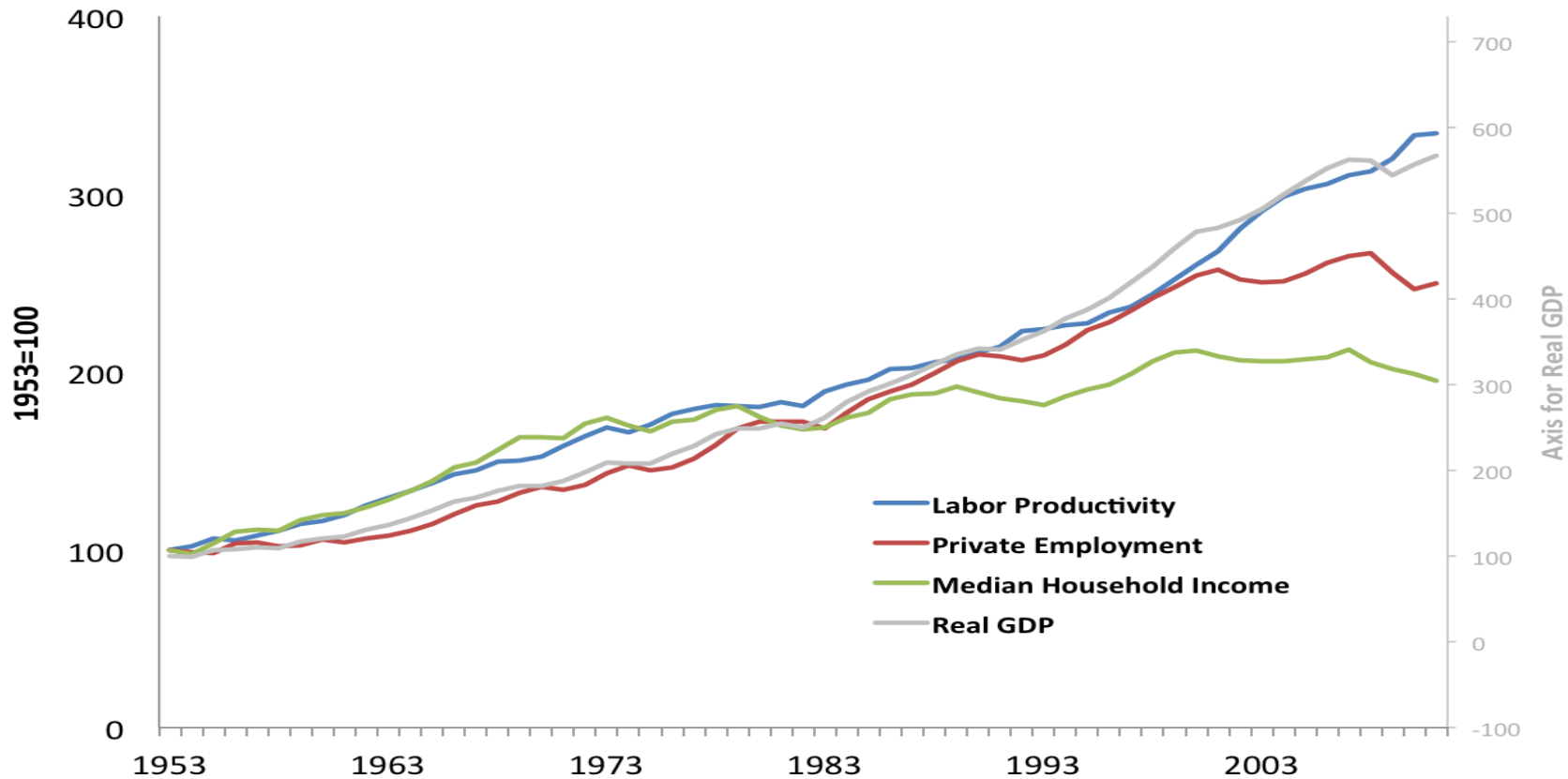


# US Productivity, GDP, Employment, and Income: 1953-2001



# The Great Decoupling

**US Productivity, GDP, Employment, and Income: 1953-2011**





# The Hard Truth

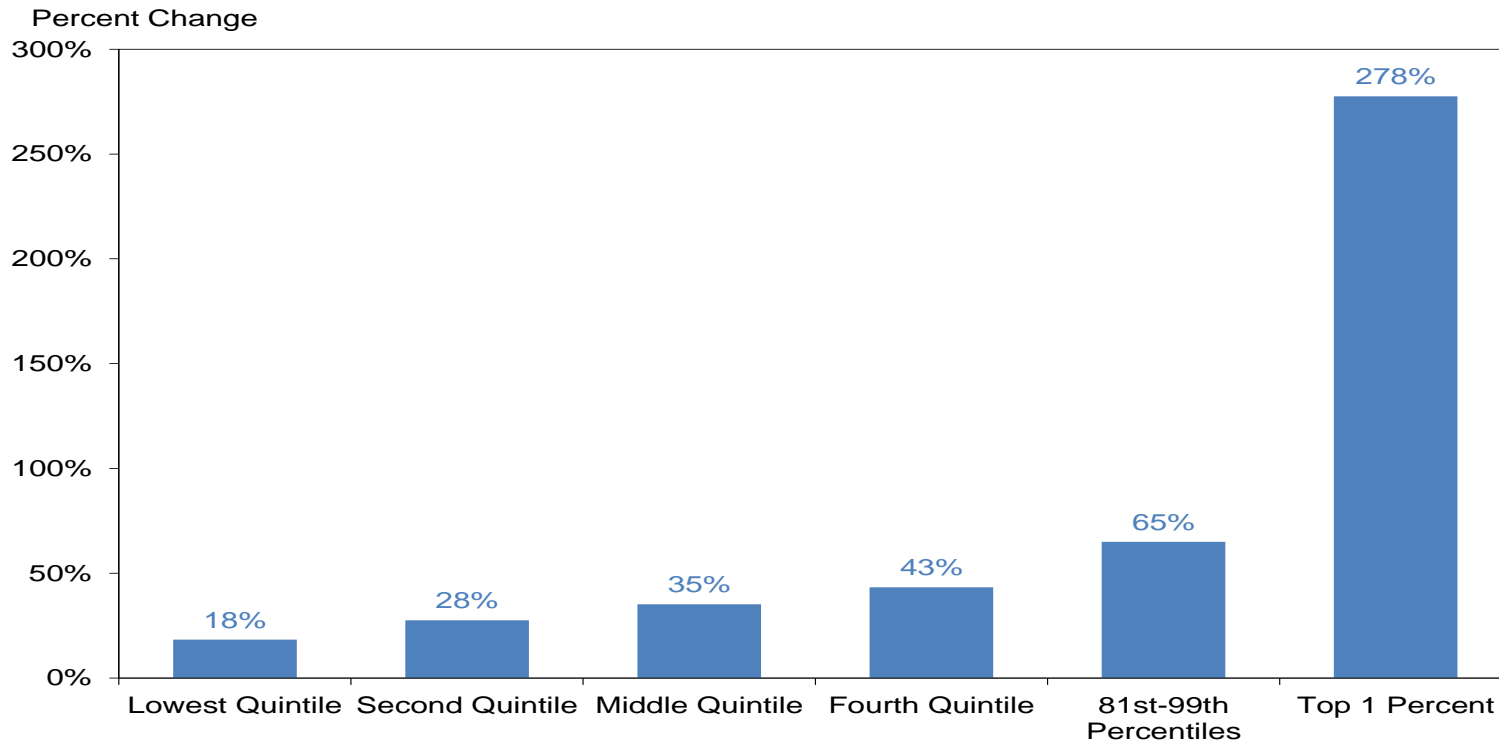


Digital progress makes the economic pie bigger.

But there is no economic law that everyone, or even most people, will benefit.

# The Spread: Individuals

Growth in Real After-Tax Income, 1979-2007

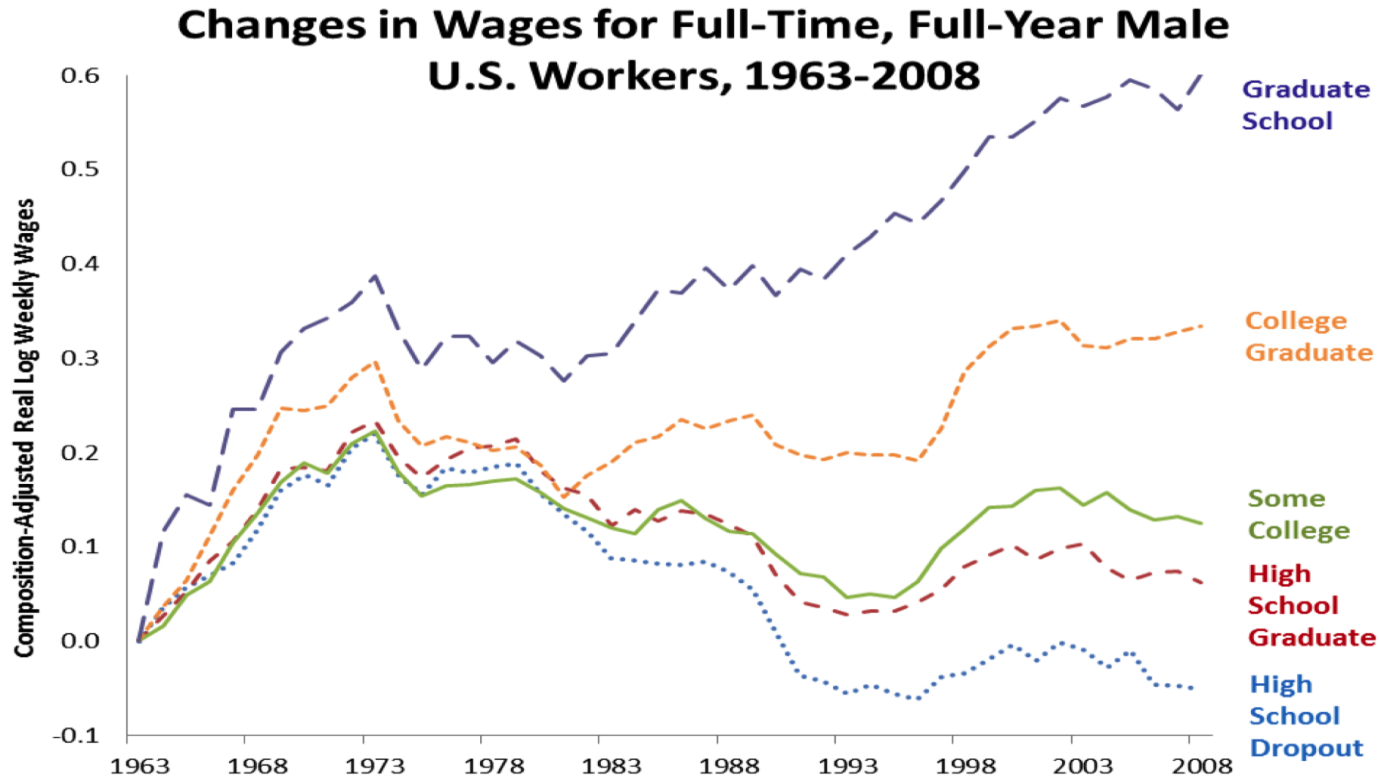


# Three Sets of Winners and Losers

## 1. High Skilled vs. Low & Mid Skilled Workers



# Skill Disparities

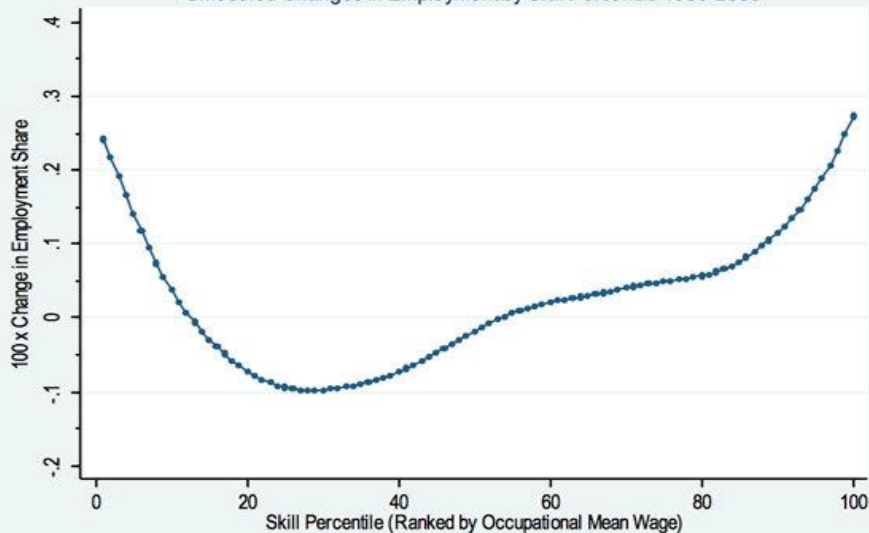


# Polarization of the Labor Market

Mid-wage workers have been hit hardest in both employment and wages

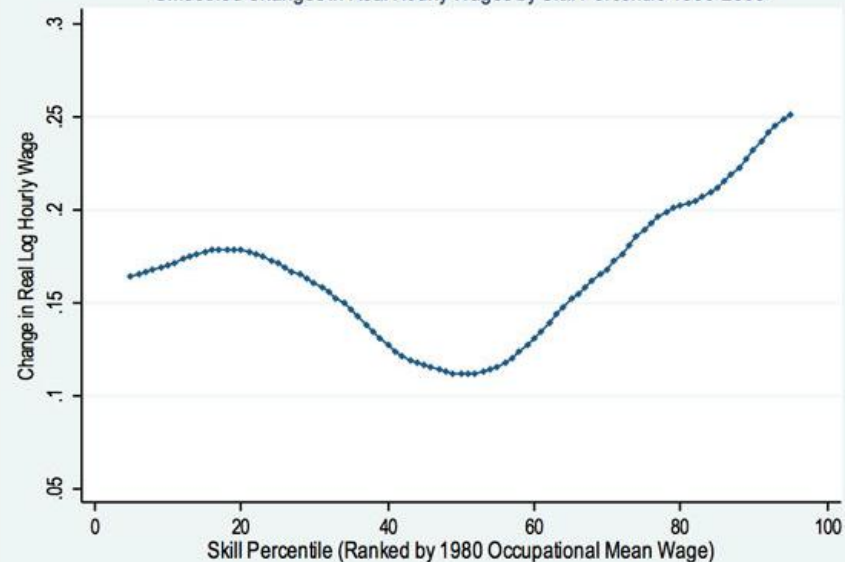
Panel A

Smoothed Changes in Employment by Skill Percentile 1980-2005



Panel B

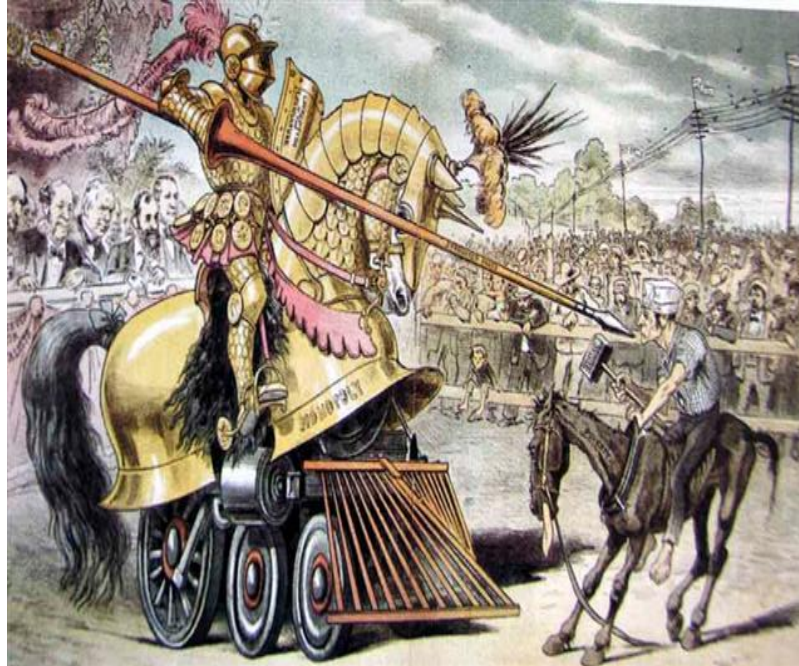
Smoothed Changes in Real Hourly Wages by Skill Percentile 1980-2005



# Three Sets of Winners and Losers

1. High Skilled vs. Low & Mid Skilled Workers

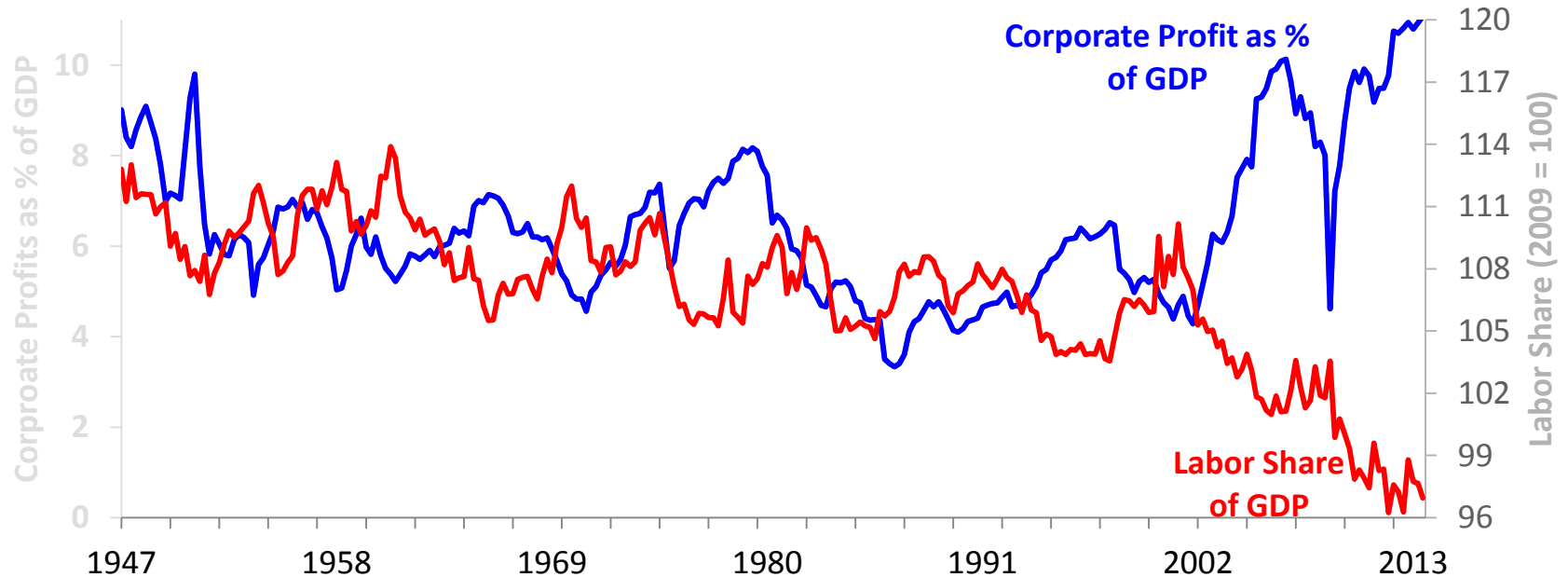
2. Capital vs. Labor





# Capital vs. Labor

Corporate Profits After Tax as % of GDP & Non-Farm Labor Share, 1947-2013



# Three Sets of Winners and Losers

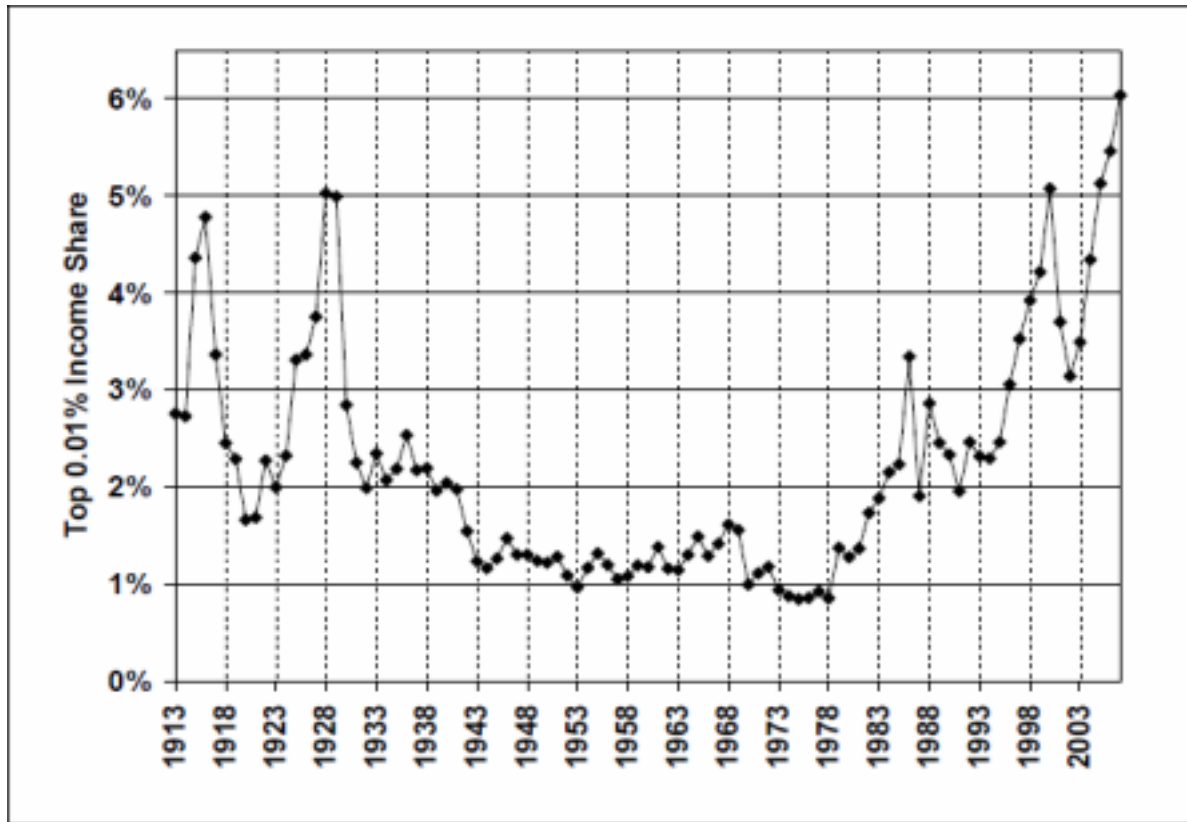
1. High Skilled vs. Low & Mid Skilled Workers

2. Capital vs. Labor

3. Superstars vs. Everyone Else



# Superstars



# WHAT IS TO BE DONE?



# The New Grand Challenge

- Digital technologies will continue to accelerate.
  - Our skills, organizations and institutions are lagging.
  - Business as usual won't solve this problem.
- *We need to reinvent our economy and society to keep up with accelerating technology*



# The New Landscape

- **What challenges and opportunities do you see?**
  
- **What are your concerns and questions?**



# The Initiative on the Digital Economy



## Initiative on the Digital Economy

### Exploring the Digital Revolution

The Initiative on the Digital Economy is a major effort addressing one of the most critical issues of our time: the impact of digital technology on business, the economy, and society. Launched by MIT Sloan in 2013, the Initiative includes faculty from across MIT.

[ABOUT](#)[LEADERSHIP](#)[EVENTS](#)[RESEARCH](#)[SUPPORT](#)[COMMUNITY](#)[CONTACT](#)

*“We need to invent new economic institutions, industries, business models, and ways of organizing work that will thrive in*

## PIONEERING RESEARCH

### Analyzing Our Digital World

The Initiative on the Digital Economy (IDE) is a research effort focused on the impact of digital technology on businesses, the

## UPCOMING EVENTS

Nov.

18

### Roundtable

A invitation-only event for IDE supporters.

To learn more, visit:

<http://digital.mit.edu/erik>

<http://digital.mit.edu/ide>

<http://secondmachineage.com>

