



AI and Economics

Erik Brynjolfsson

MIT

erikb@mit.edu

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

Presentation for FLI Conference in San Juan, January, 2015

The Second Machine Age

Changing the world requires two things:

- *Power system*: move or transform things
- *Control system*: decide where and how

Industrial Revolution = Physical Power

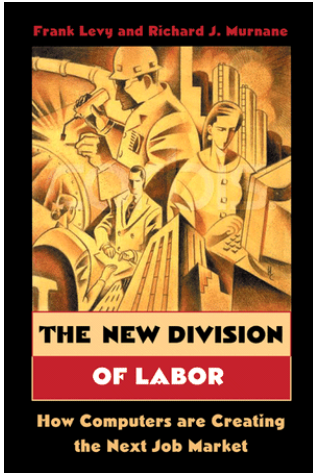
- Steam engine (and Internal combustion engine, Electricity)
- Mostly a complement to humans

Second Machine Age = Mental Power

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



State of Understanding, 2004



Uniquely Human Abilities

1. Autonomous mobility and fine motor control
2. Language and complex communication
3. Pattern matching and unstructured problem solving



Copyright © Erik Brynjolfsson

3

MIT Initiative on the Digital Economy



Machine Intelligence

Interacting with physical world

- Fine and gross motor control
- Vision and other senses

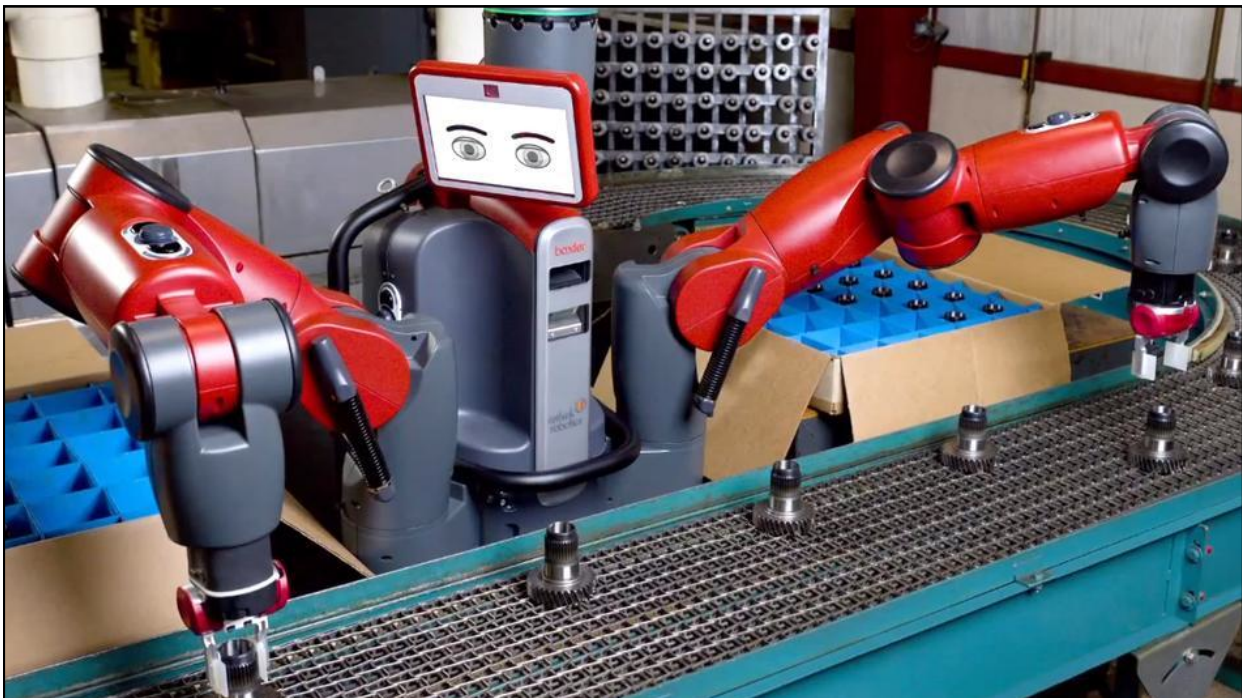
Language

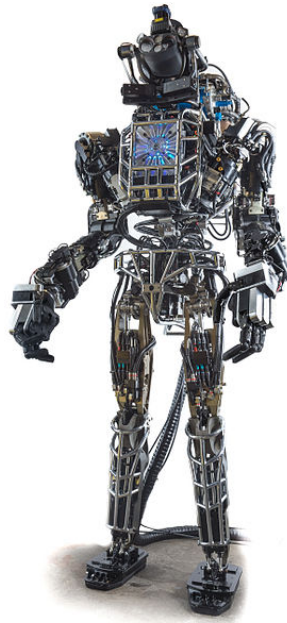
- Voice recognition
- Natural language processing
- Creating narratives

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!*





Copyright © Erik Brynjolfsson

7

MIT Initiative on the Digital Economy

Siri

Voice recognition



Lionbridge

Translation



Narrative Science

Authoring News Stories



Copyright © Erik Brynjolfsson

8

MIT Initiative on the Digital Economy

Forbes Earnings Preview: Apple

By Narrative Science

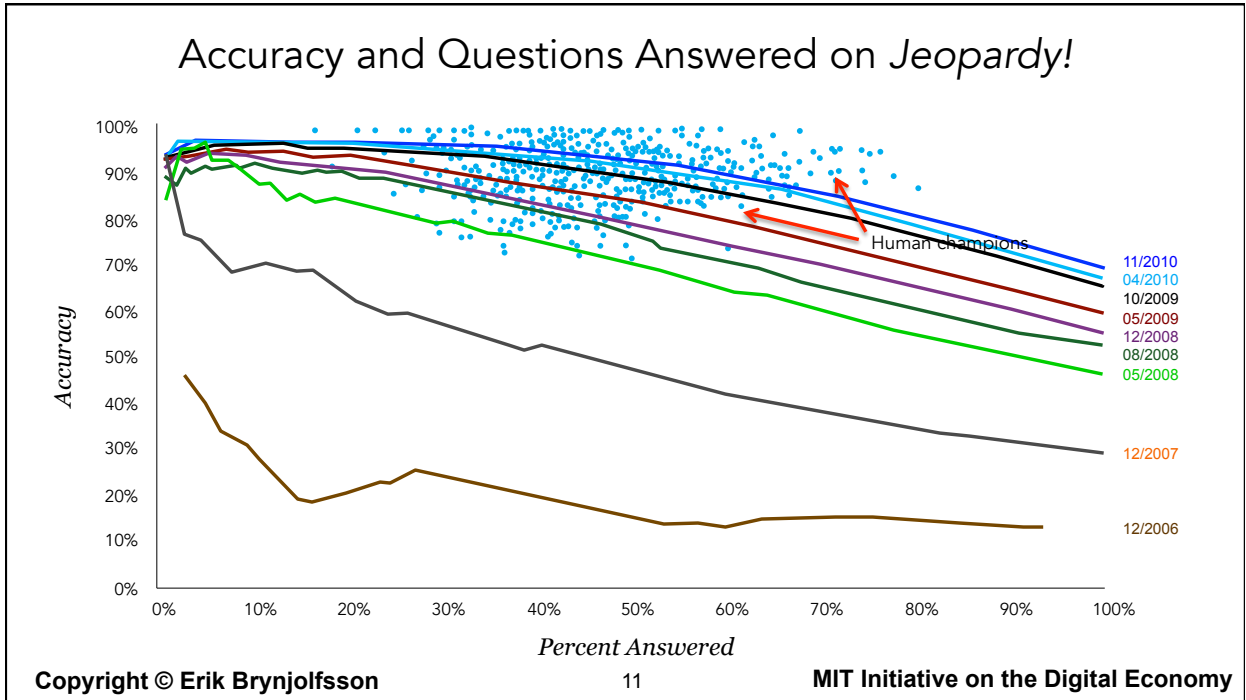
+ Comment Now + Follow Comments

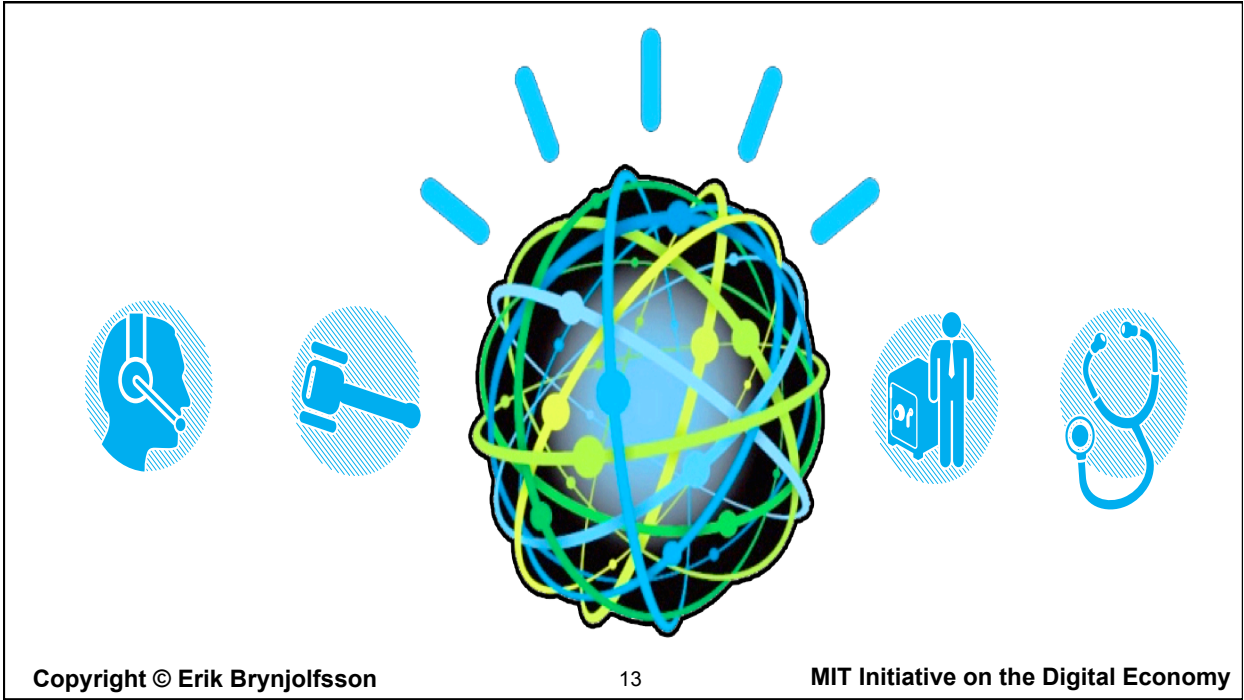
Apple reports its second-quarter earnings on Wednesday, April 23, 2014, and the consensus earnings per share estimate is \$10.21 per share.

The consensus estimate has risen over the past month, from \$10.20, but it's below the estimate of \$11.02 from three months ago. For the fiscal year, analysts are projecting earnings of \$42.72 per share. Analysts project revenue to fall less than a percent year-over-year to \$43.55 billion for the quarter, after being \$43.60 billion a year ago. Analysts are expecting revenue to stay flat at \$43.55 billion this quarter. For the year, revenue is projected to come in at \$180.22 billion.

onomy







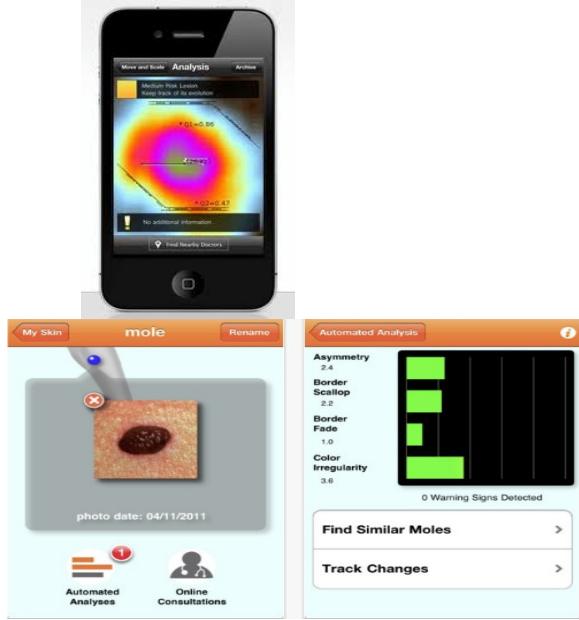
What does this mean for the economy?

Copyright © Erik Brynjolfsson 14 MIT Initiative on the Digital Economy

The Bounty



Copyright © Erik Brynjolfsson



15

MIT Initiative on the Digital Economy

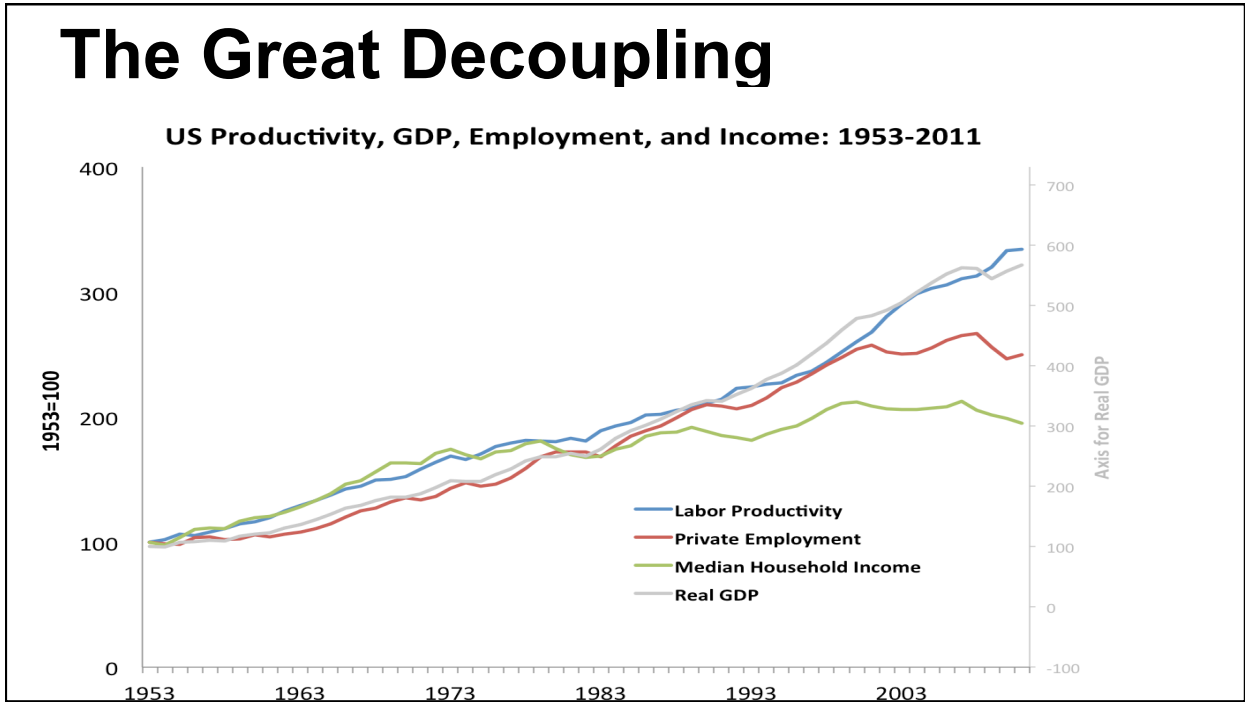
\$300 BILLION PER YEAR

Copyright © Erik Brynjolfsson

16

MIT Initiative on the Digital Economy

The Great Decoupling



WHAT'S GOING ON?

The Hard Truth



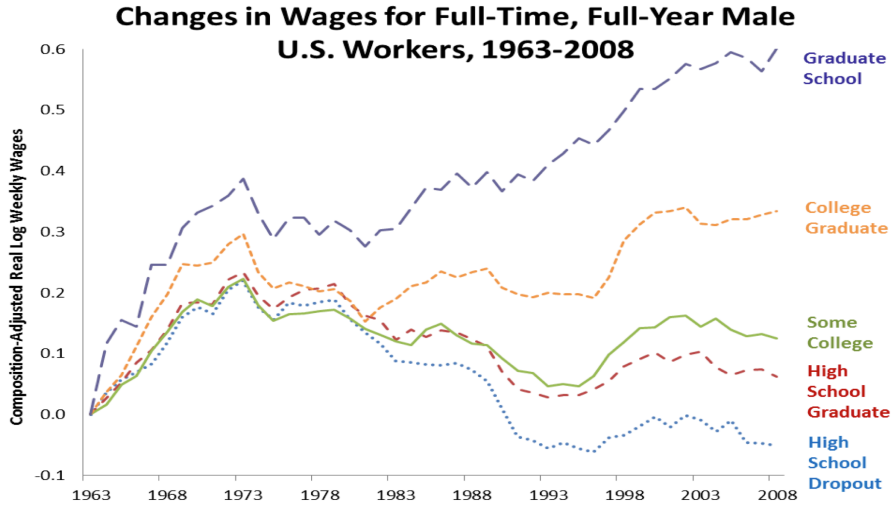
Digital progress makes the economic pie bigger.

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

Three Sets of Winners and Losers

1. High Skilled vs. Low & Mid Skilled Workers

Skill Disparities



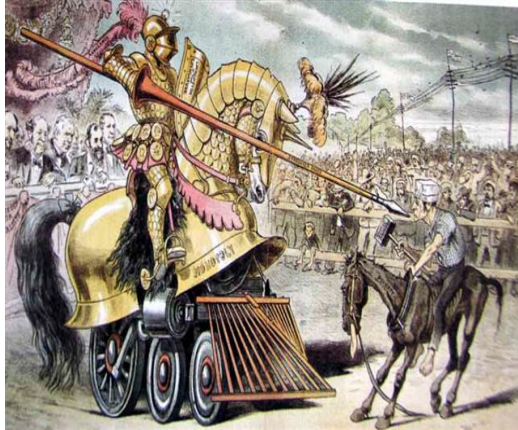
Copyright © Erik Brynjolfsson

21

MIT Initiative on the Digital Economy

Three Sets of Winners and Losers

- 1. High Skilled vs. Low & Mid Skilled Workers
- 2. Capital vs. Labor



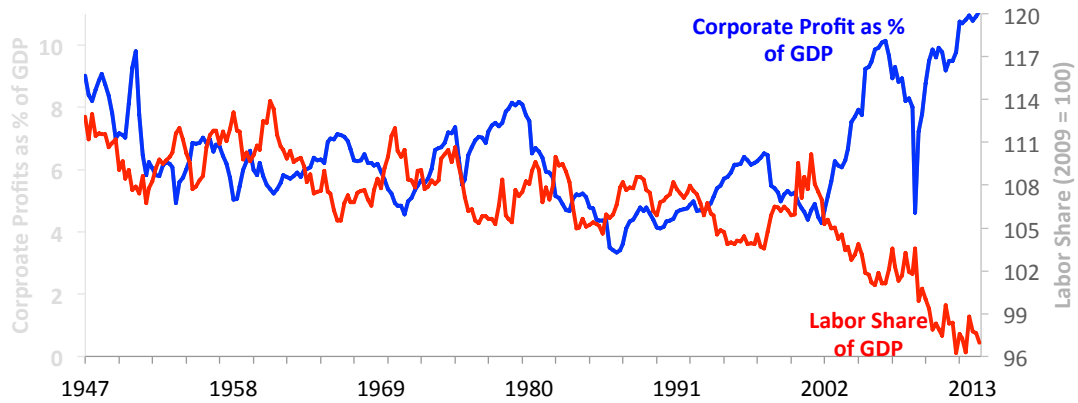
Copyright © Erik Brynjolfsson

22

MIT Initiative on the Digital Economy

Capital vs. Labor

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



Copyright © Erik Brynjolfsson

23

MIT Initiative on the Digital Economy

Source: research.stlouisfed.org

Three Sets of Winners and Losers

1. High Skilled vs. Low & Mid Skilled Workers
2. Capital vs. Labor
3. Superstars vs. Everyone Else



Copyright © Erik Brynjolfsson

24

MIT Initiative on the Digital Economy

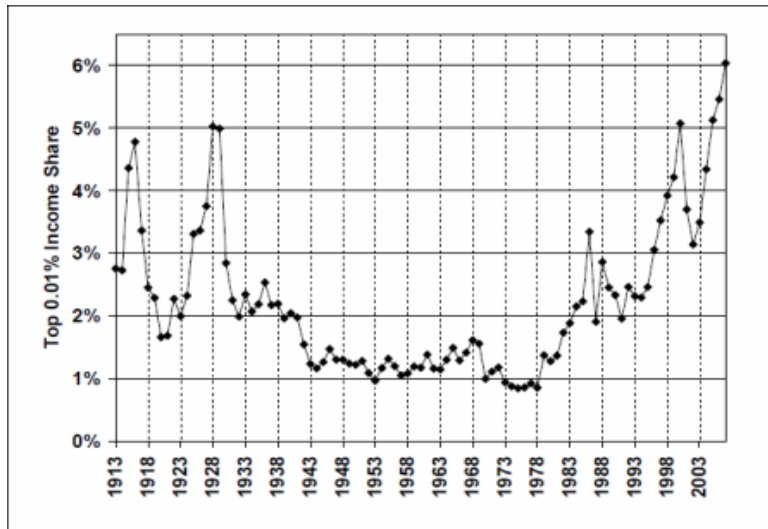
1	1	0	1	1	1	1	0	1	1	1	0	1	1	1	1	0	1	1	1	0	1	1	1	1	0	1	1	0	1	1	0	1	1	1	0	1	1	0	1	1						
0	1	0	1	1	0	1	0	1	0	1	0	1	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0				
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1				
1	1	0	1	1	1	1	0	1	1	1	0	1	1	1	1	0	1	1	1	0	1	1	1	0	1	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1				
0	1	1	1	1	0	1	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1				
1	0	1	0	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0	1	0	1	
1	0	0	0	0	1	0	0	0	1	0	1	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0	1	0	0		
1	1	1	0	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
0	0	1	0	0	0	1	1	0	0	0	1	1	0	0	1	0	0	1	0	0	0	1	0	0	0	0	1	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	1	1	0	1	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
1	0	1	0	0	1	1	1	0	1	0	1	0	0	1	0	1	1	0	1	1	0	1	0	1	1	0	1	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	0	1	0	1
0	1	1	1	1	0	0	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
0	0	1	0	0	1	1	1	0	0	0	1	0	1	0	1	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	1	0	0	0	0	1	0	0	1	0	0	1	0	0		
1	1	0	1	1	1	0	0	1	1	1	0	1	1	1	1	0	1	1	1	0	1	1	1	0	1	1	1	0	1	1	1	1	0	1	1	1	0	1	1	0	1	1	1	1	1	
0	0	0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1	0	1	0	0	1	1	1	0	1	1	1	0	1	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1

Copyright © Erik Brynjolfsson

25

MIT Initiative on the Digital Economy

Superstars



Copyright © Erik Brynjolfsson

26

MIT Initiative on the Digital Economy

WHAT IS TO BE DONE?

Copyright © Erik Brynjolfsson

27

MIT Initiative on the Digital Economy

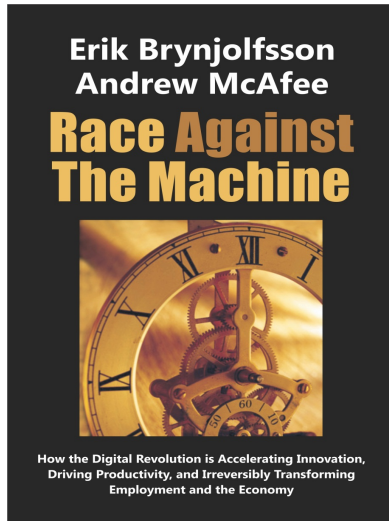


Copyright © Erik Brynjolfsson

28

MIT Initiative on the Digital Economy

Our View



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

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

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 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.

The New Landscape

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

To learn more, visit:

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

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

<http://secondmachineage.com>

