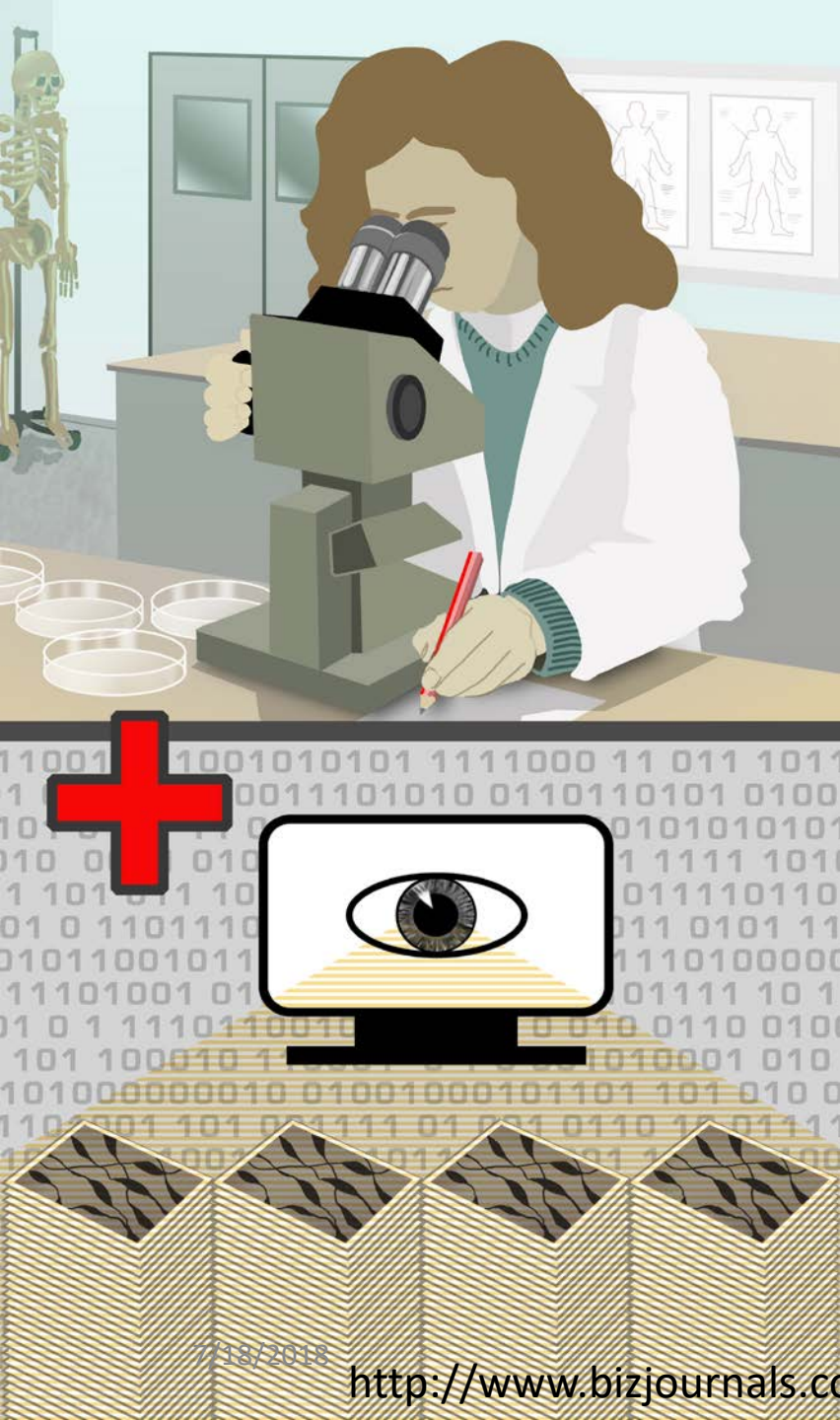


# Machines and People: The Future of Work

Daniela Rus  
CSAIL, MIT



# Cancer Diagnose Error

Human 3.5%

AI 7.5%

AI + Human 0.5%

<https://hms.harvard.edu/news/better-together>

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<http://www.bizjournals.com/boston/blog/bioflash/2016/06/beth-israel-researchers-say-ai-can-lower-error.html>

7/18/2018

~400,000 requests/day

~14,000 taxis

3000 of capacity 4 cars

98% of the demand within  
waiting time 2.8 mins,

guaranteed trip delay 3.5 mins





~400,000 requests/day

**Fewer Cars**

~14,000 taxis

**Shorter Shifts**

**Same Shifts**

**Same Drivers**

**Fewer Drivers**

3000 of capacity 4 cars

**Same Income**

98% of the demand within

**Same Service**

waiting time 2.8 mins,

**Better Traffic**

trip delay 3.5 mins

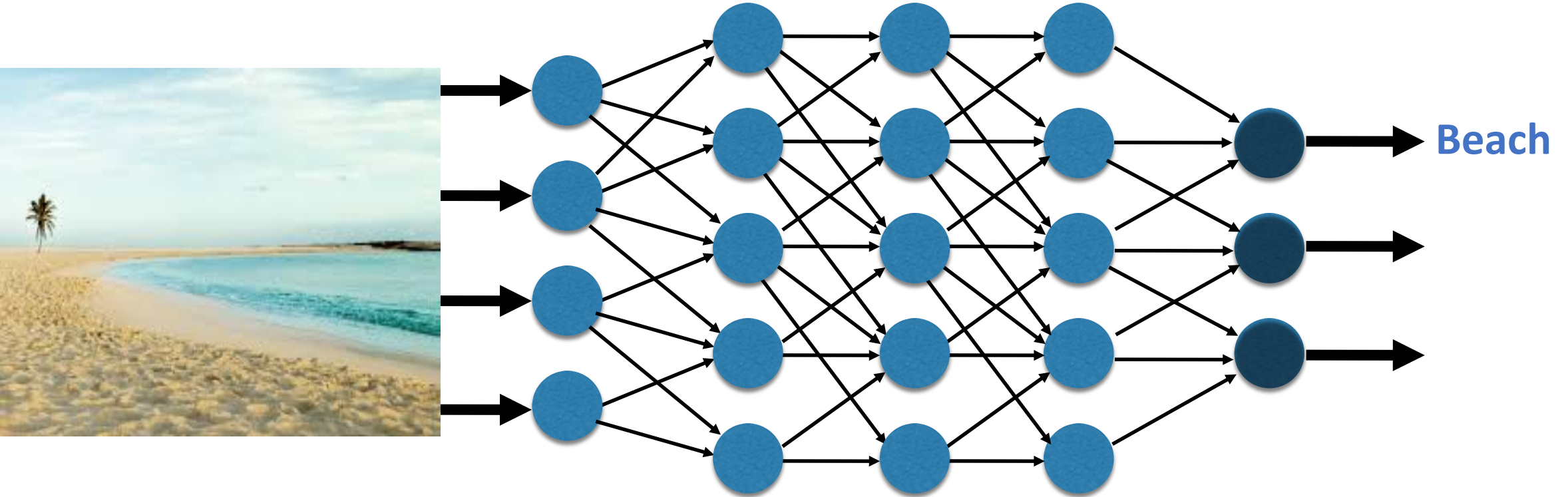
**Lower Pollution**

**Improved Quality of Life**

**New Type Jobs**

# Supervised learning

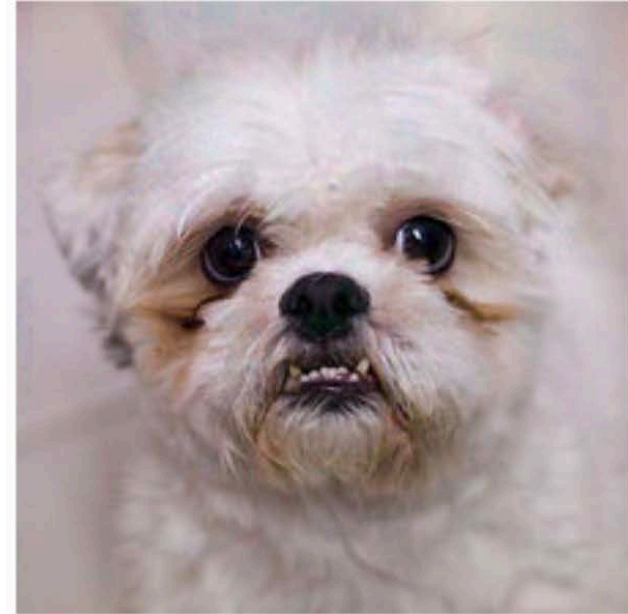
What does it mean to learn?



# Deep Learning



**Dog**



**Ostrich**

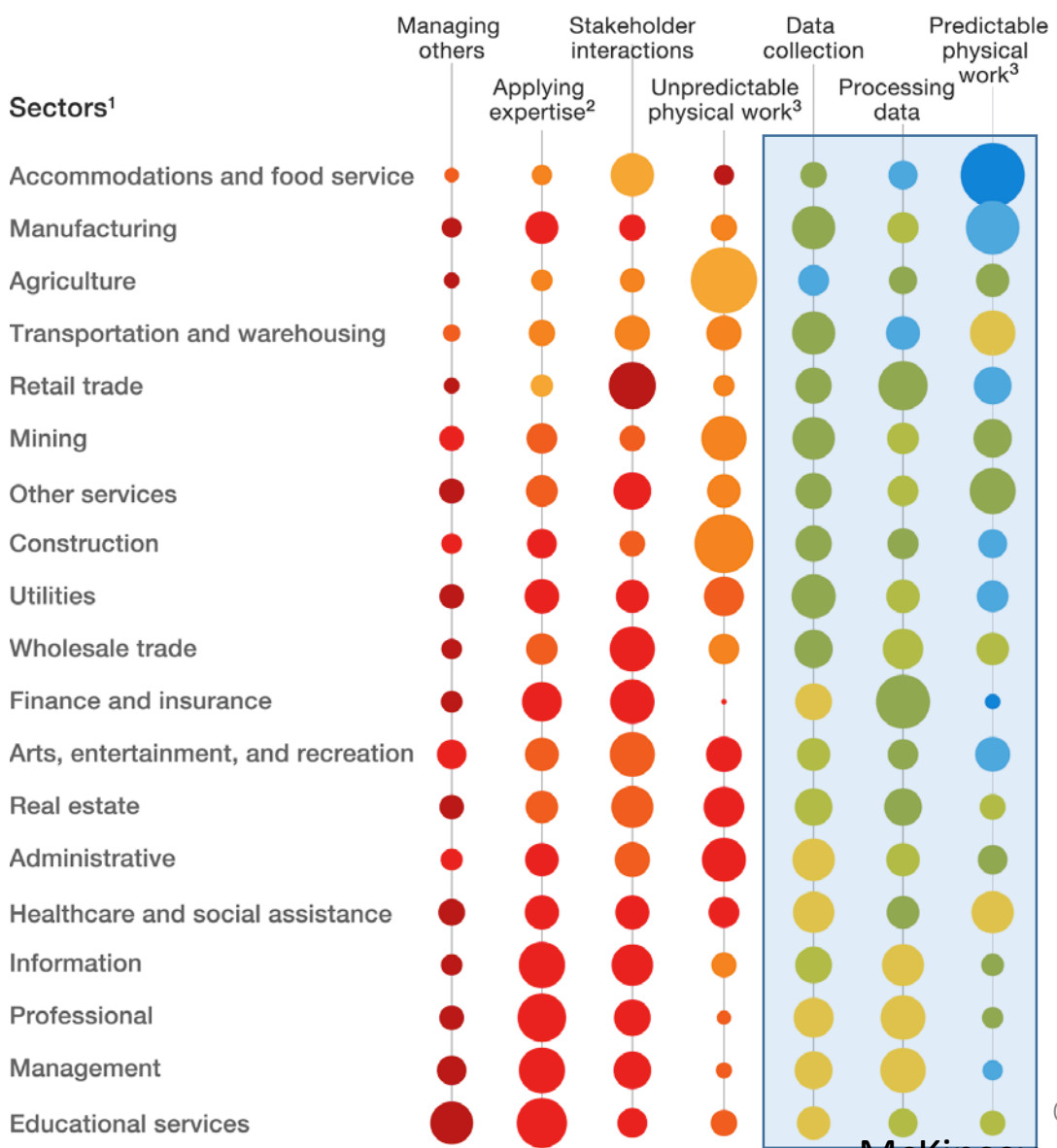
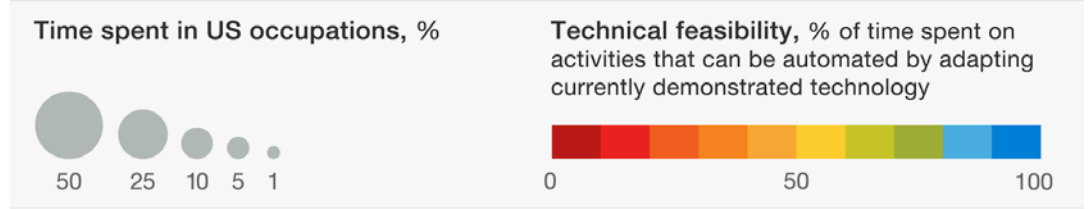
- From Szegedy et al 2013

**Grand  
Challenge :**  
Can we  
understand  
what is going  
on inside this  
18-month-  
old's brain,  
sufficiently to  
engineer this  
intelligent,  
cooperative  
behavior in  
machine?

# Today's Job Categories

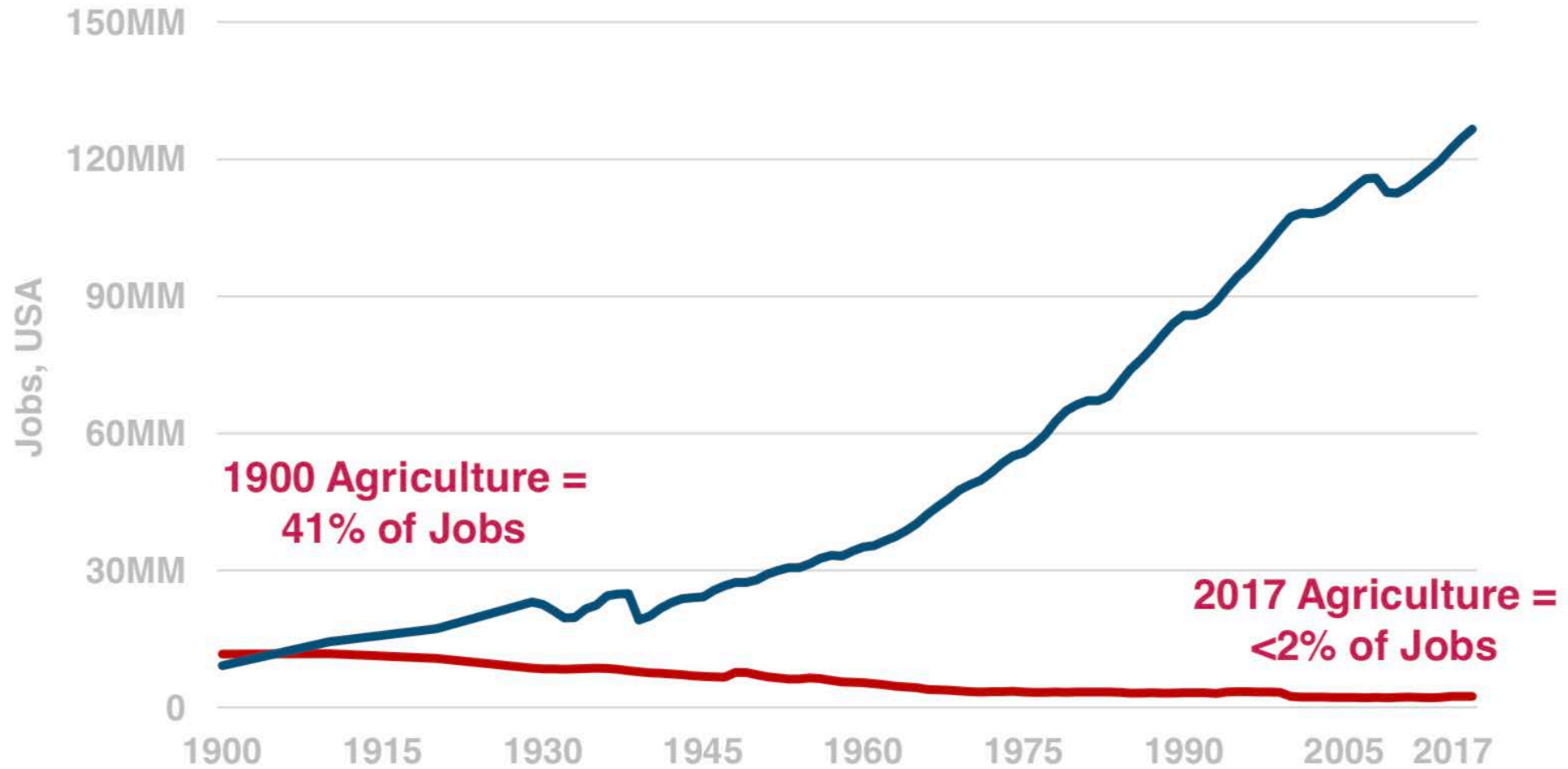
Type of Job	Qualifications	Wages
Cognitive, decision-making, highly skilled	Advanced degree, tech skills, emotional judgment	\$\$\$\$
Analytical, drawing inferences	College degree, social interactions	\$\$\$
Some skills, some labor	High school	\$\$
Unskilled labor	Basic literacy	\$





Tasks  
Not  
Professions

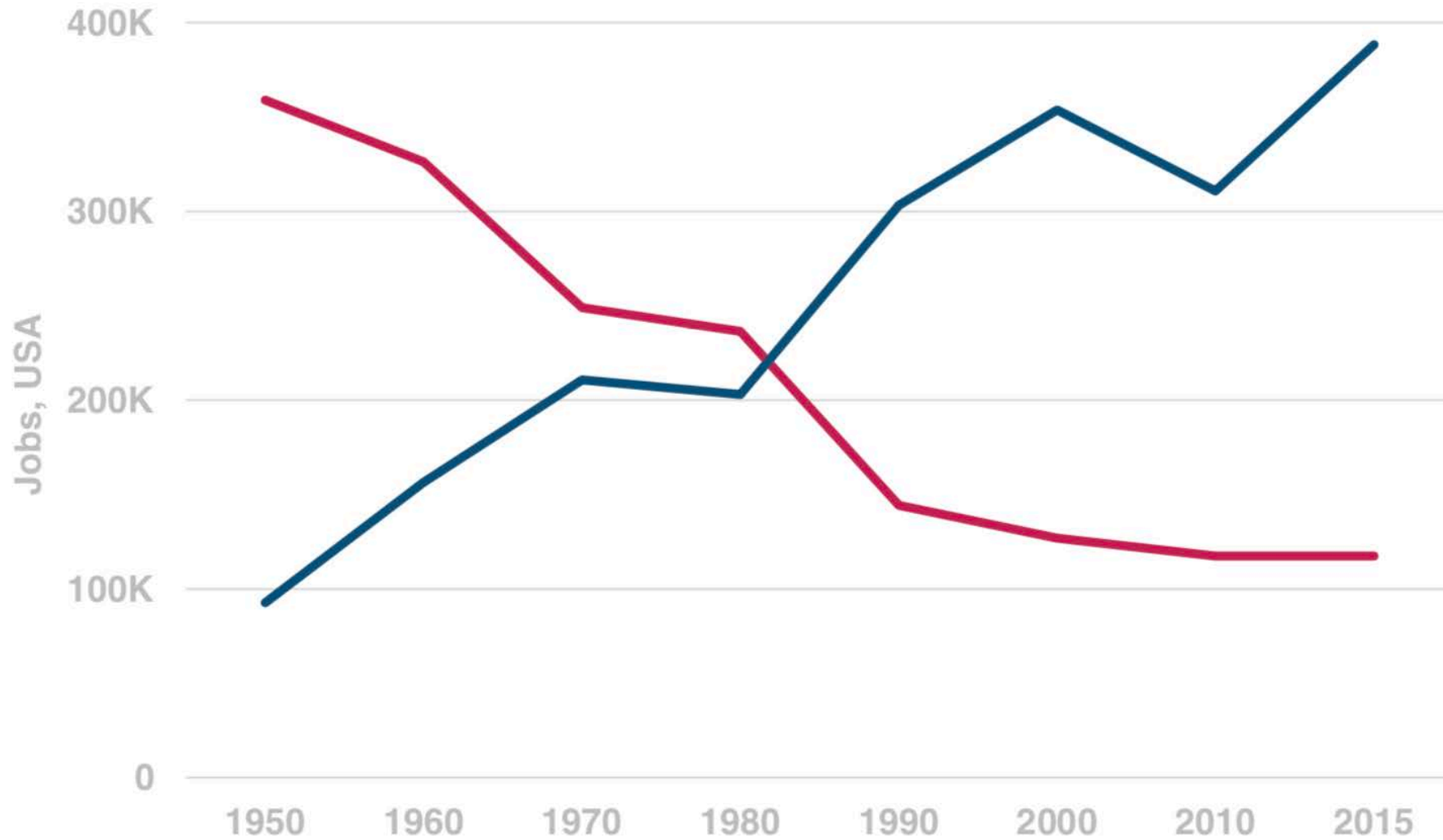
# Agriculture vs. Services Jobs



— Agriculture Jobs - Farming / Forestry / Fishing / Hunting

— Services Jobs - Business / Education / Healthcare / Retail / Government / Other Services

# Locomotive vs. Aircraft Jobs



— Locomotive Jobs - Engineers / Operators / Conductors

— Aircraft Jobs - Pilots / Mechanics / Engineers

# New Jobs that Did not Exist 10 Years Ago

- App Developer
- Admissions Consultant
- Millennial Generational Expert
- User Experience Designer
- Chief Listening Officer
- Sustainability Expert
- Eldercare Expert
- Cloud Computing Services
- Social Media Manager
- Market Research Data Miner
- Data Scientist
- Data Architect
- Data Visualizer
- Data Engineer/Operator

# Real-Time Platforms

# Internet-Enabled Marketplaces

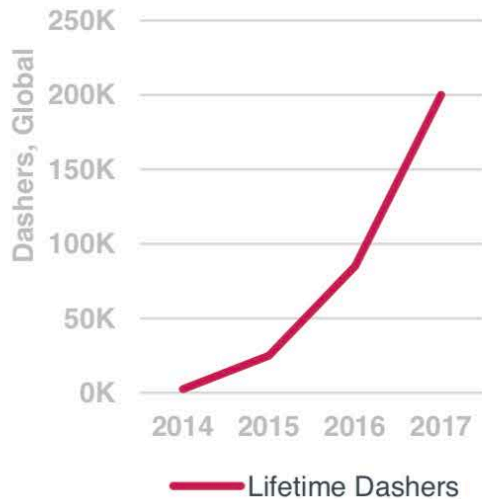
## Uber @ 3MM Driver-Partners



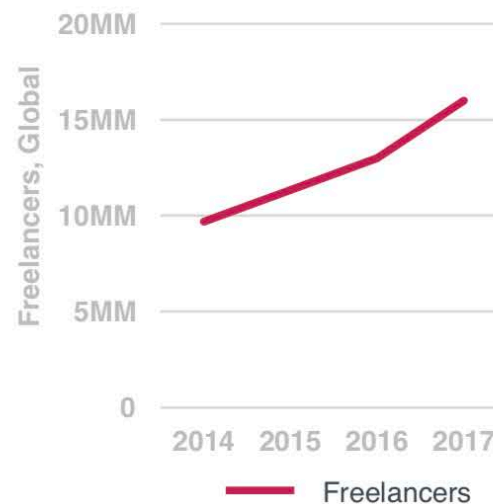
## Etsy @ 2MM Sellers



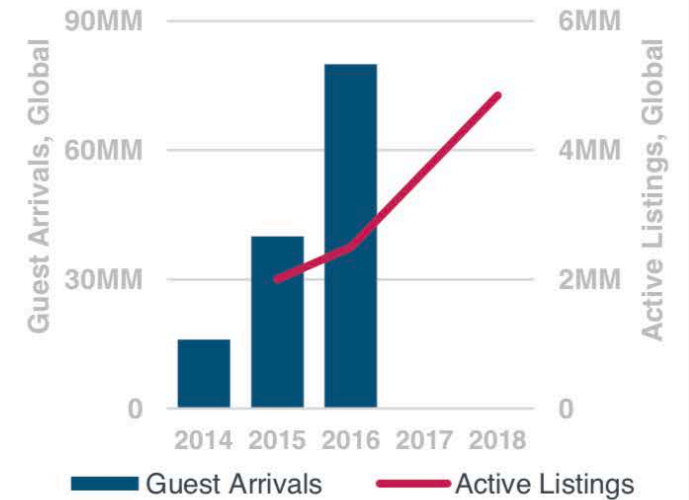
## DoorDash @ 200K Dashers



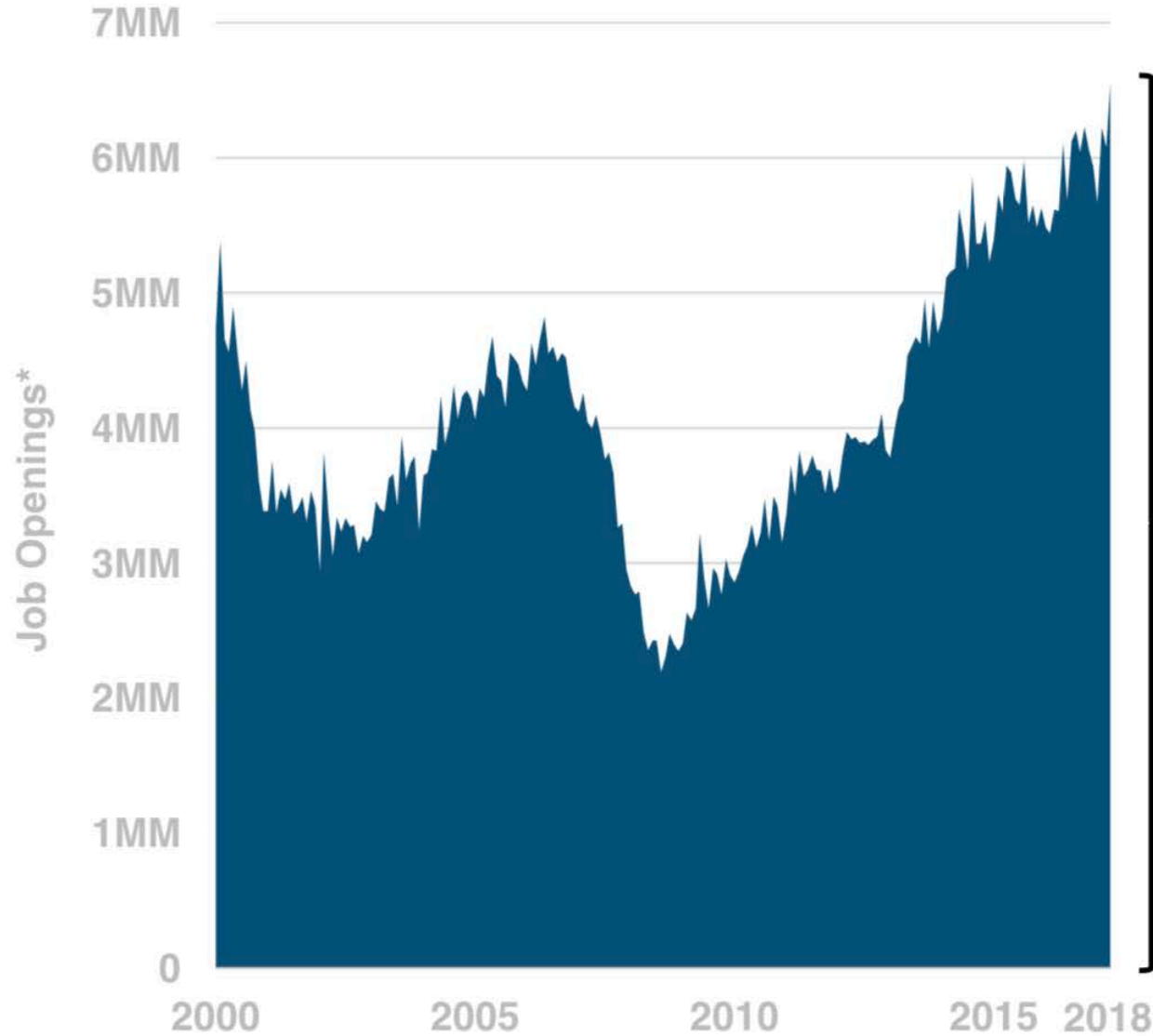
## Upwork @ 16MM Freelancers



## Airbnb @ 5MM Listings



# Job Openings\* – USA



**6.6MM Job Openings (3/18)**

1.4MM = Professional Services + Finance

1.3MM = Healthcare + Education

1.2MM = Trade / Transportation / Utilities

879K = Leisure / Hospitality

661K = Mining / Construction / Manufacturing

622K = Government

486K = Other

# From Coal To Code: A New Path For Laid-Off Miners In Kentucky

Listen · 3:54

Queue

Download

Transcript

## Short term

May 6, 2016 · 4:00 PM ET

Heard on All Things Considered

ERICA PETERSON

FROM



7/18/2018

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BitSource, new startup in Pikeville, Kentucky

## Long Term

thinkingcas.blogspot.co.uk

# Thinking Computing At Schools: Computational Thinking

# Americans Are Largely Optimistic About AI

8 in 10

Nearly eight in 10 Americans (79%) say AI has had a “mostly positive” or “very positive” impact on their lives so far.

3/4

More than three-quarters of Americans (76%) say AI will fundamentally change the way people live and work over the next decade.

77%

Among those Americans, 77% believe this impact will be “mostly positive” or “very positive”.



# Americans Look to Employers to Provide the Training They Would Require

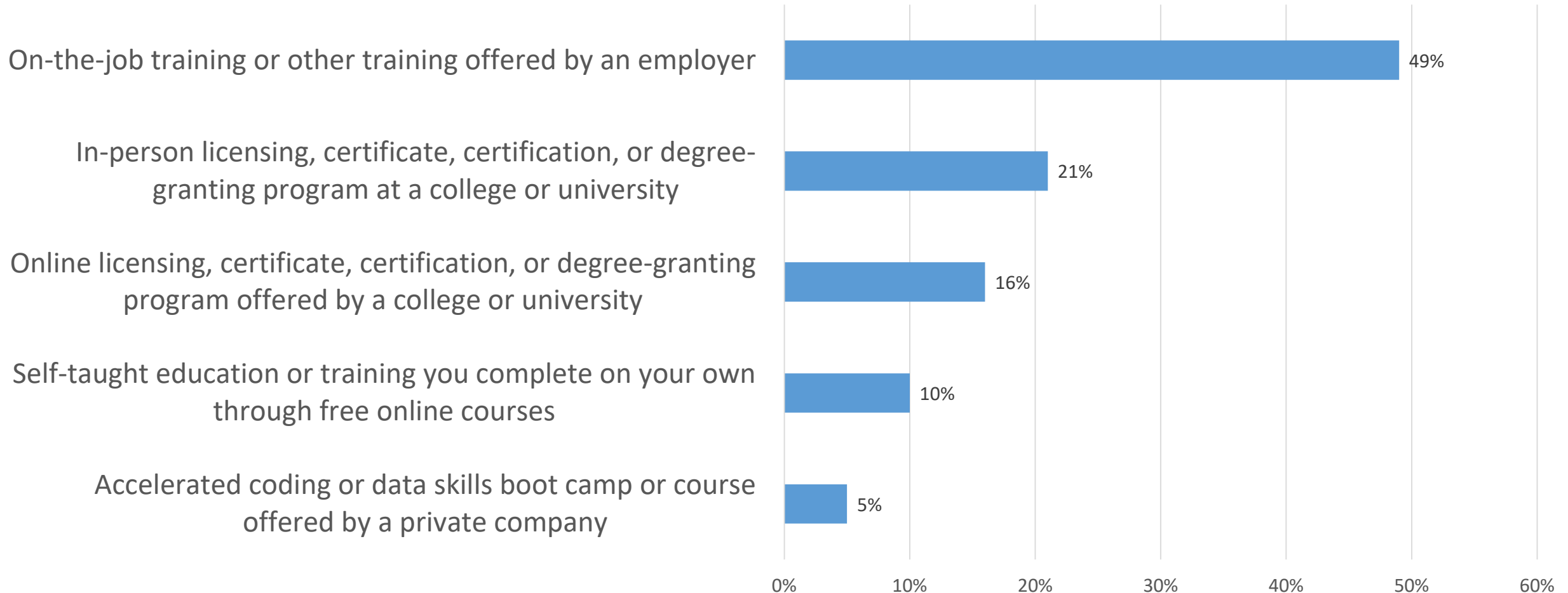
49%

Almost half of respondents (49%) would prefer to get on-the-job training from an employer if they lost their job to AI.

61%

A clear majority of U.S. adults overall (61%) say employers should fund these on-the-job training programs.

# Sources of Education U.S. Workers Would Look to If They Lost Their Jobs to New Technology



# Americans Have Mixed Views on the Role of Government with AI

70%

A clear majority of Americans (70%) “agree” or “strongly agree” that the federal government should do more to regulate companies that use AI, to protect consumers’ personal information and privacy.

52%

A slight majority (52%) disapprove of universal basic income programs. Under a UBI program, the federal government would provide every adult below a certain income threshold with a specific amount of money each year, as a response to job loss from AI.

80%

When it comes to paying for a UBI program, 46% of supporters would be willing to pay higher taxes for the program, while 80% “agree” or “strongly agree” companies benefiting from AI should pay.

# Summary

- AI will help people with cognitive tasks
- Robotics will help people physical tasks
- Machines and People Collaborating not Competing
- Jobs will change
  
- Need science of autonomy and intelligence
- Computational Thinking & Making as part of literacy