Digital Transformations

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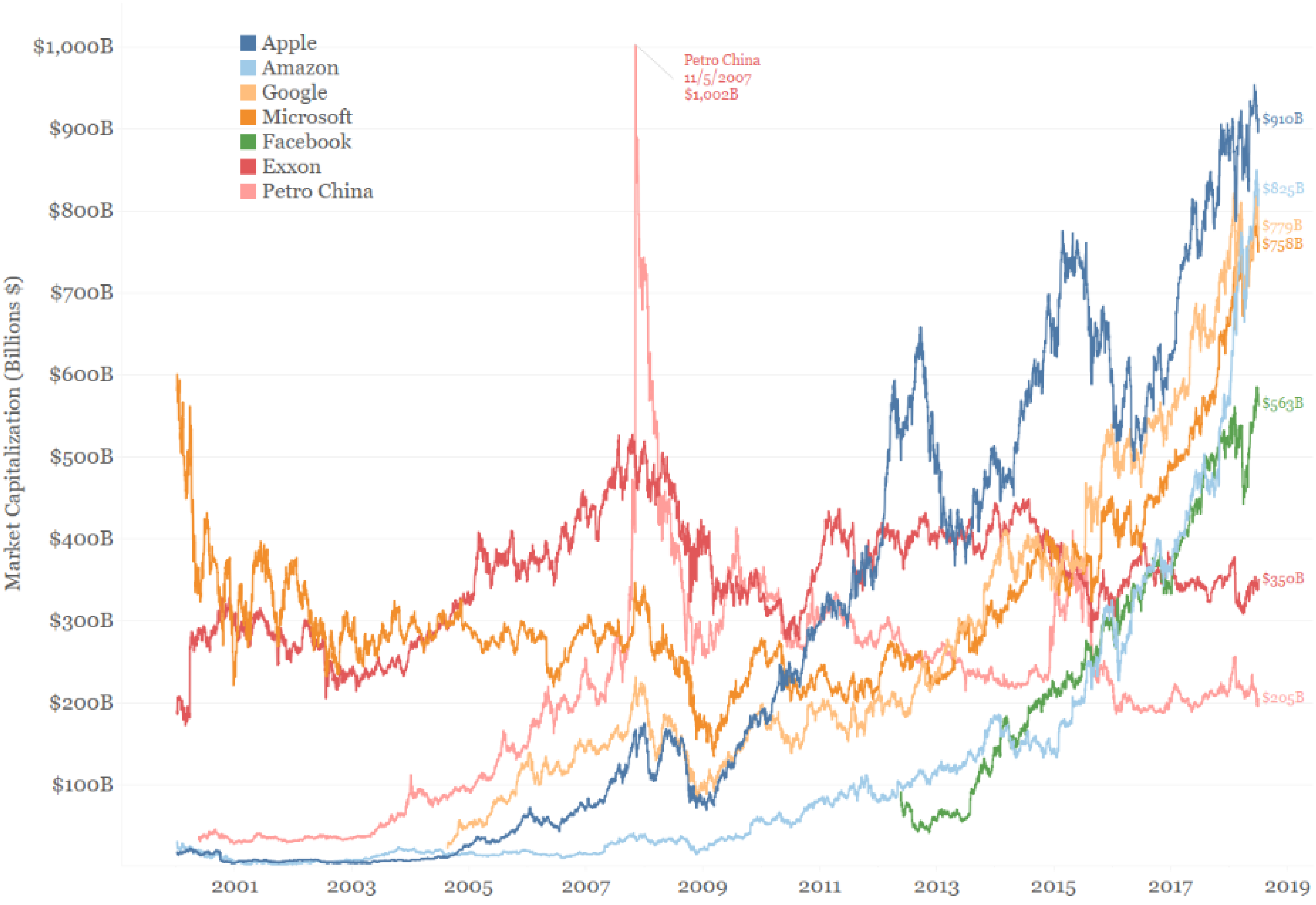
Singularity University Ambassador

Largest Global companies in 2018 vs 2008

2018				2008			
Rank	**Company**	**Founded**	**USbn**	**Rank**	**Company**	**Founded**	**USbn**
1.	Apple	1976	890	**1.**	PetroChina	1999	728
2.	Google	1998	768	**2.**	Exxon	1870	492
3.	Microsoft	1975	680	**3.**	General Electric	1892	358
4.	Amazon	1994	592	**4.**	China Mobile	1997	344
5.	Facebook	2004	545	**5.**	ICBC (China)	1984	336
6.	Tencent (China)	1998	526	**6.**	Gazprom(Russia)	1989	332
7.	Berkshire	1955	496	**7.**	Microsoft	1975	313
8.	Alibaba (China)	1999	488	**8.**	Royal Dutch Shell	1907	266
9.	J&J	1886	380	**9.**	Sinopec (China)	2000	257
10.	JP Morgan	1871	375	**10.**	AT&T	1885	238

Source: Bloomberg, Google

The Race To $1 Trillion



Source: Bloomberg

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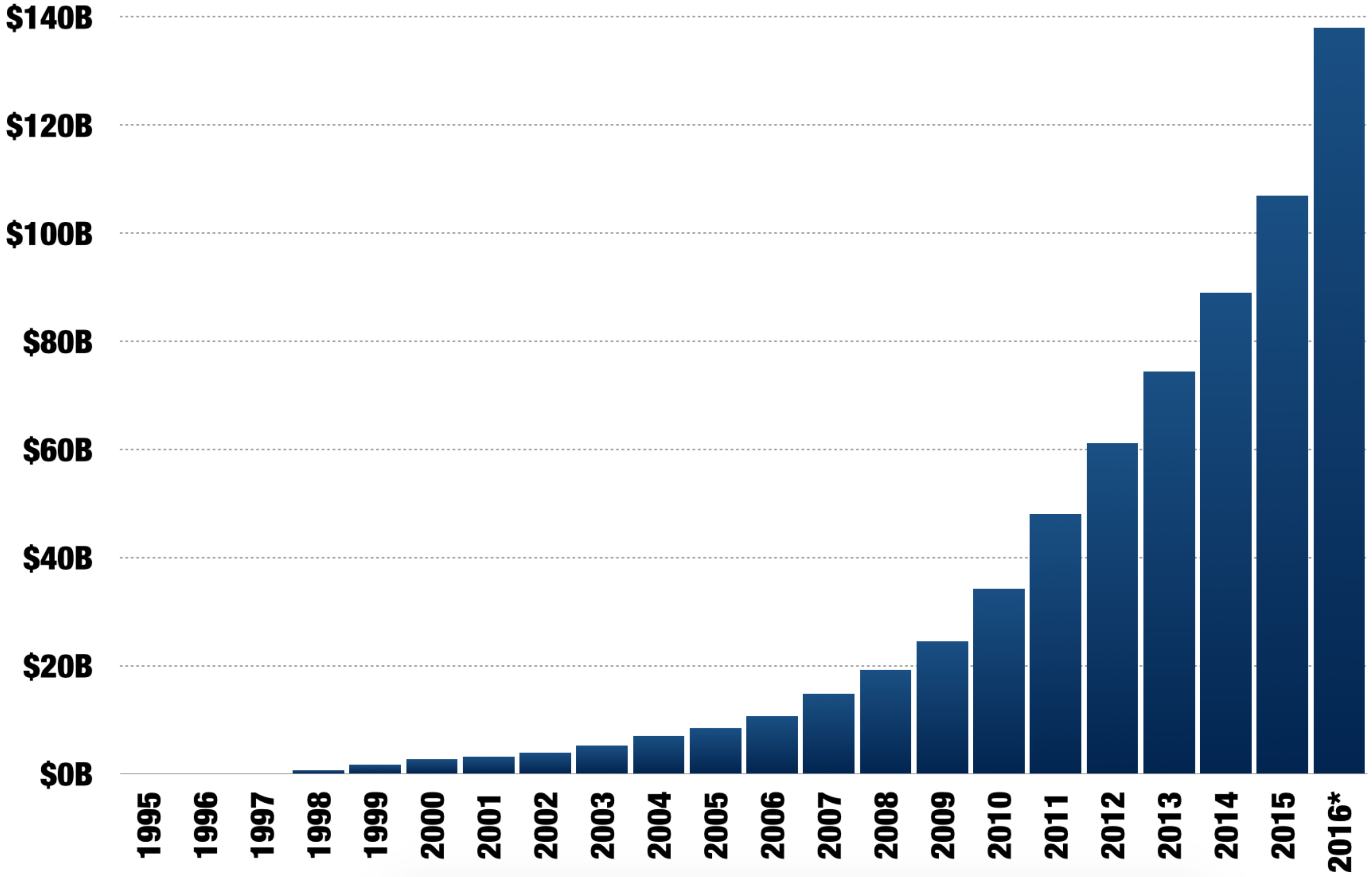
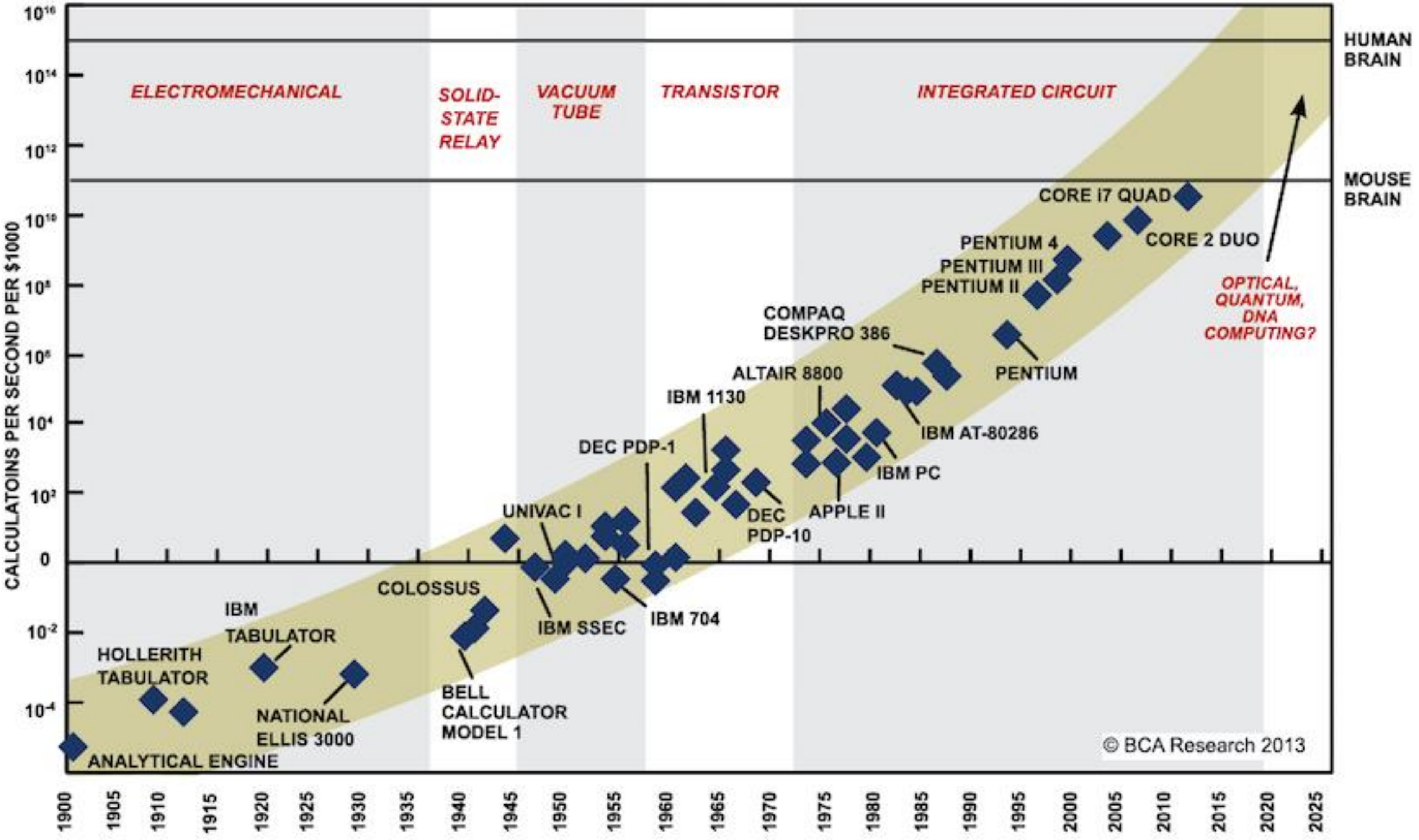
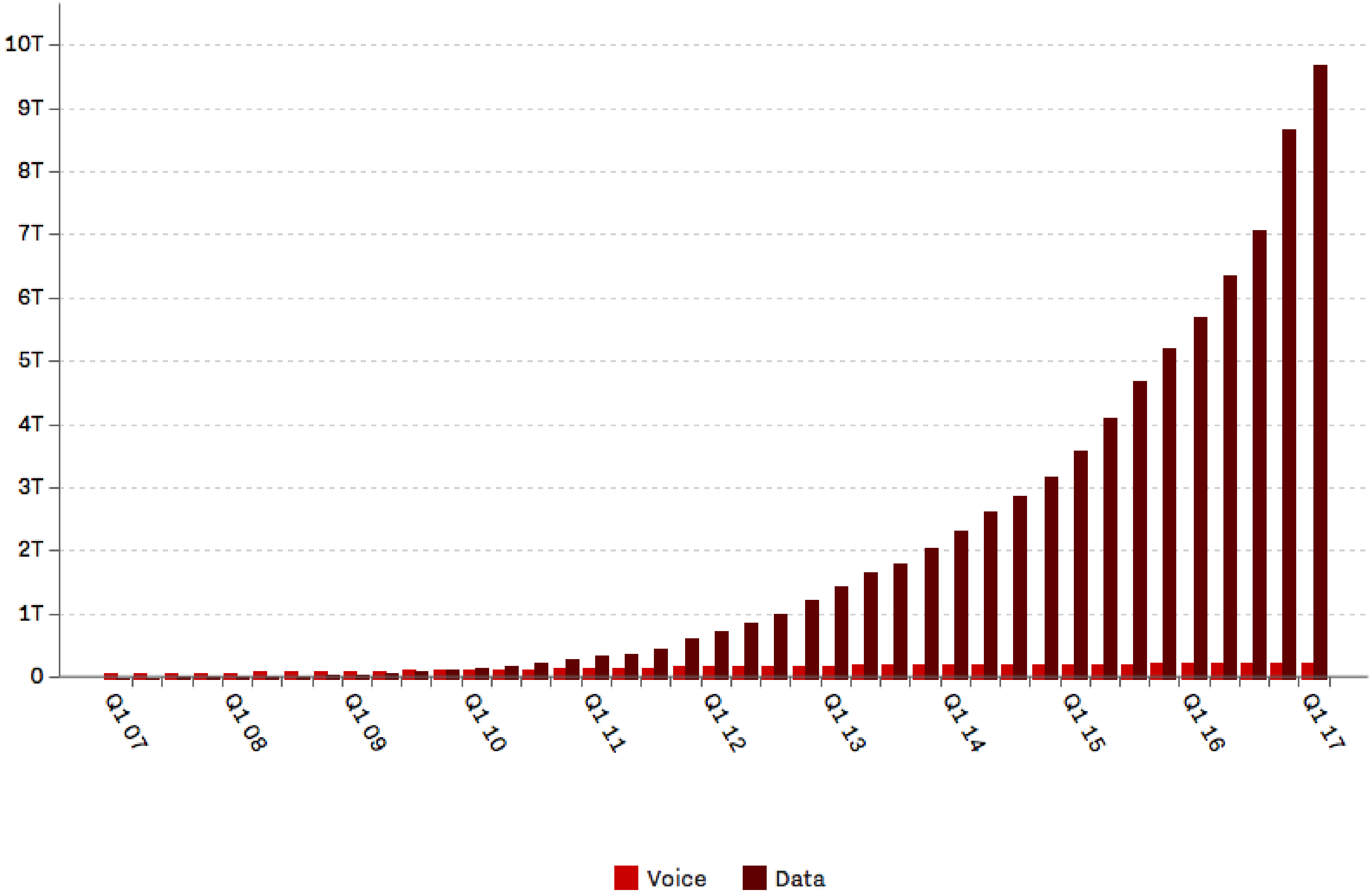
Amazon Revenue

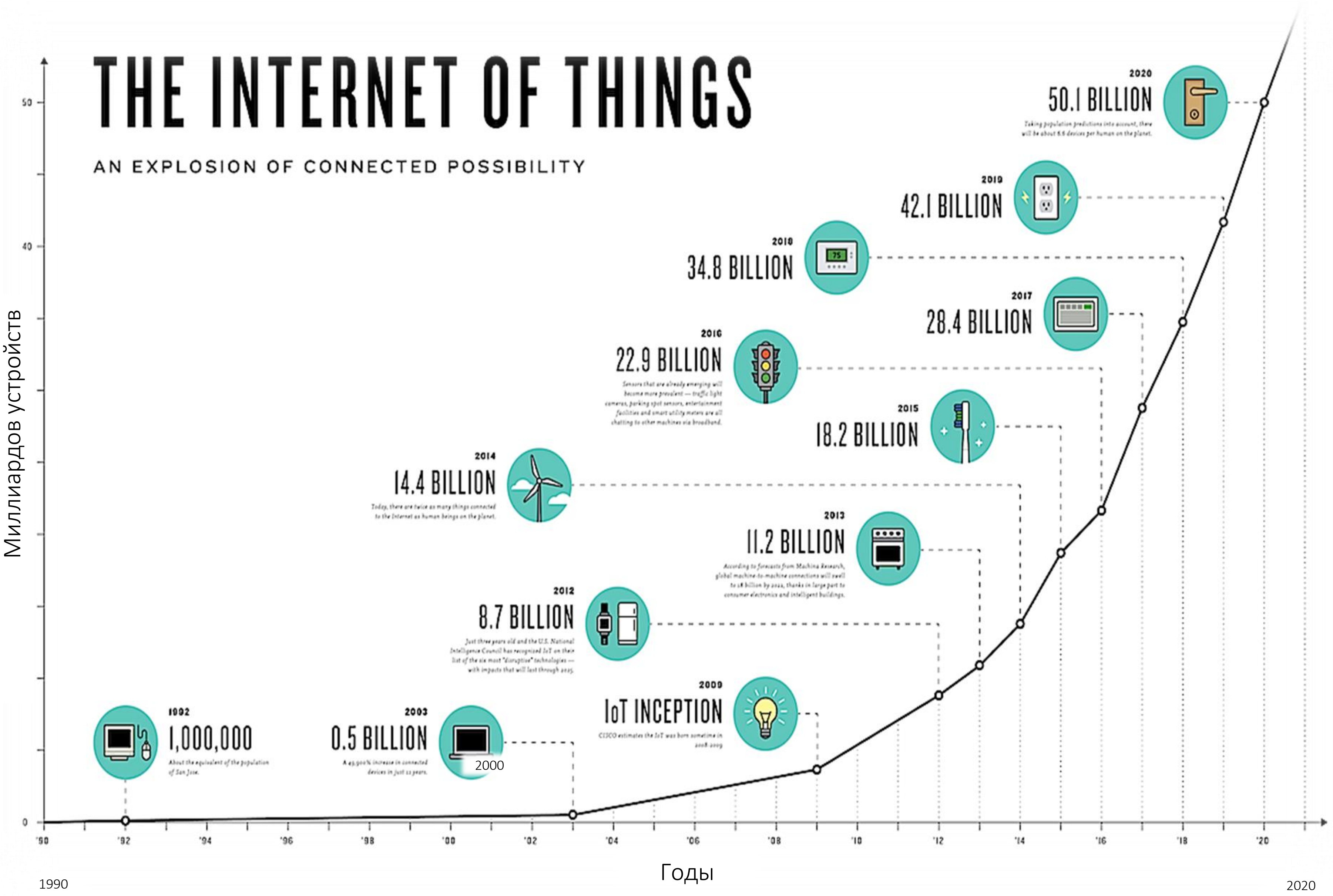




SOURCE: RAY KURZWEIL, "THE SINGULARITY IS NEAR: WHEN HUMANS TRANSCEND BIOLOGY", P.67, *THE VIKING PRESS*, 2006. DATAPOINTS BETWEEN 2000 AND 2012 REPRESENT BCA ESTIMATES.

Voice versus data traffic in monthly bytes





About the equivalent of the population of San Jose.

A 49,900% increase in connected devices in just 11 years.

CISCO estimates the IoT was born sometime in 2008-2009

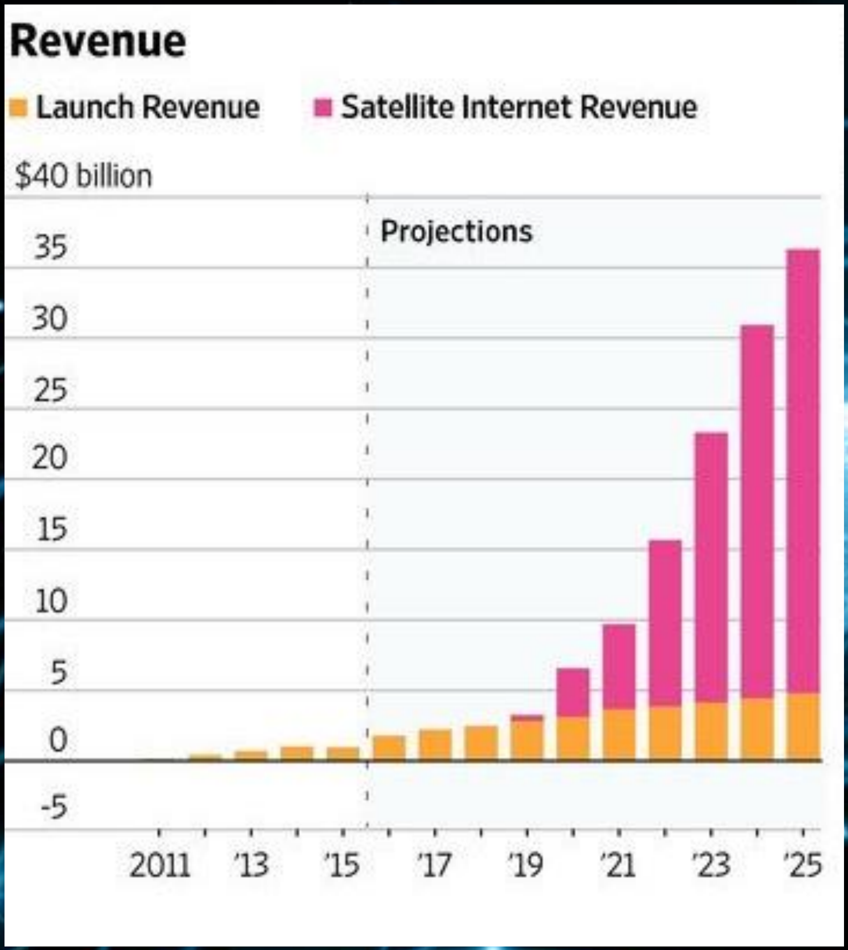
Just three years old and the U.S. National Intelligence Council has recognized IoT on their list of the six most "disruptive" technologies — with impacts that will last through 2025.

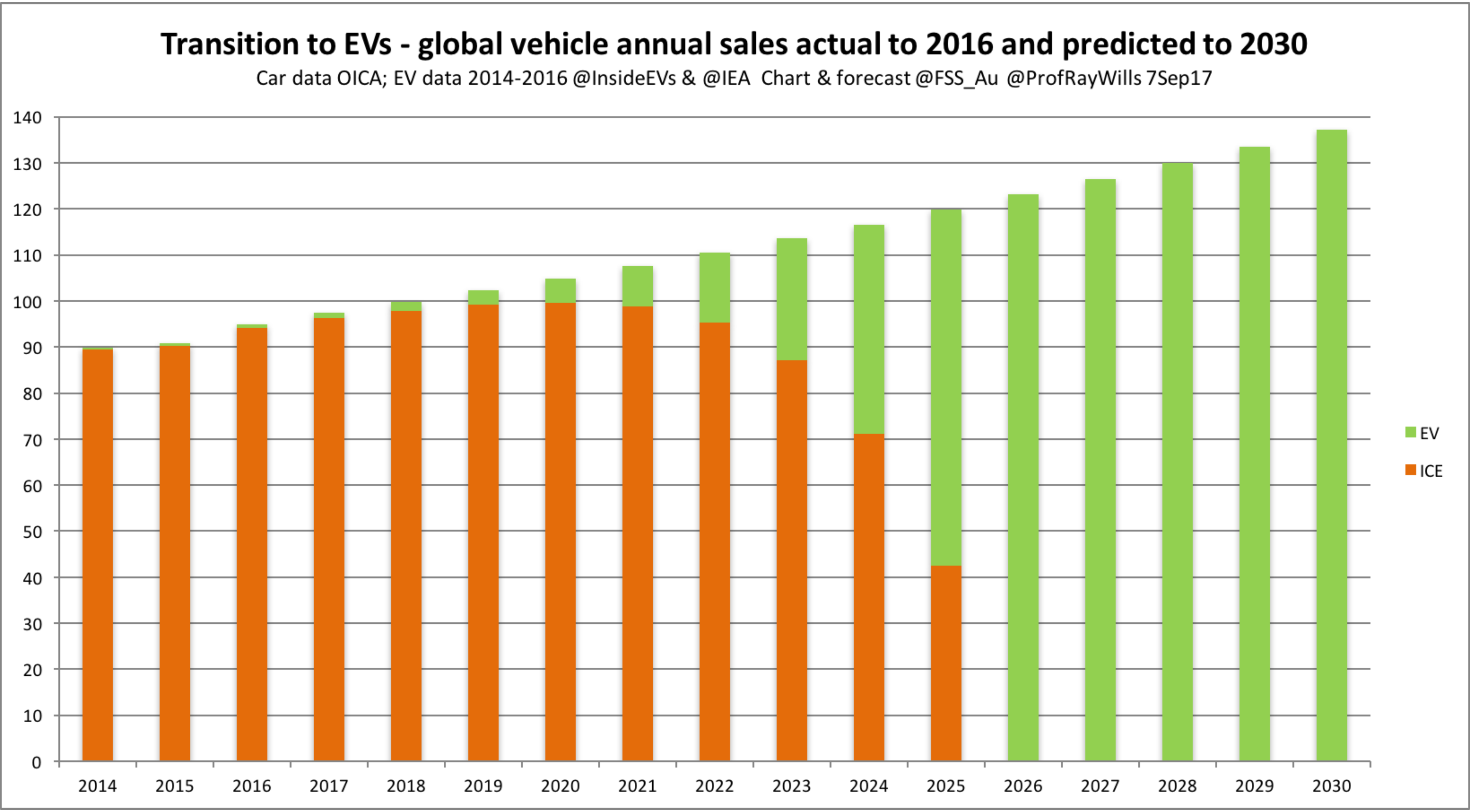
According to forecasts from Machina Research, global machine-to-machine connections will swell to 18 billion by 2022, thanks in large part to consumer electronics and intelligent buildings.

Today, there are twice as many things connected to the Internet as human beings on the planet.

Sensors that are already emerging will become more prevalent — traffic light cameras, parking spot sensors, entertainment facilities and smart utility meters are all chatting to other machines via broadband.

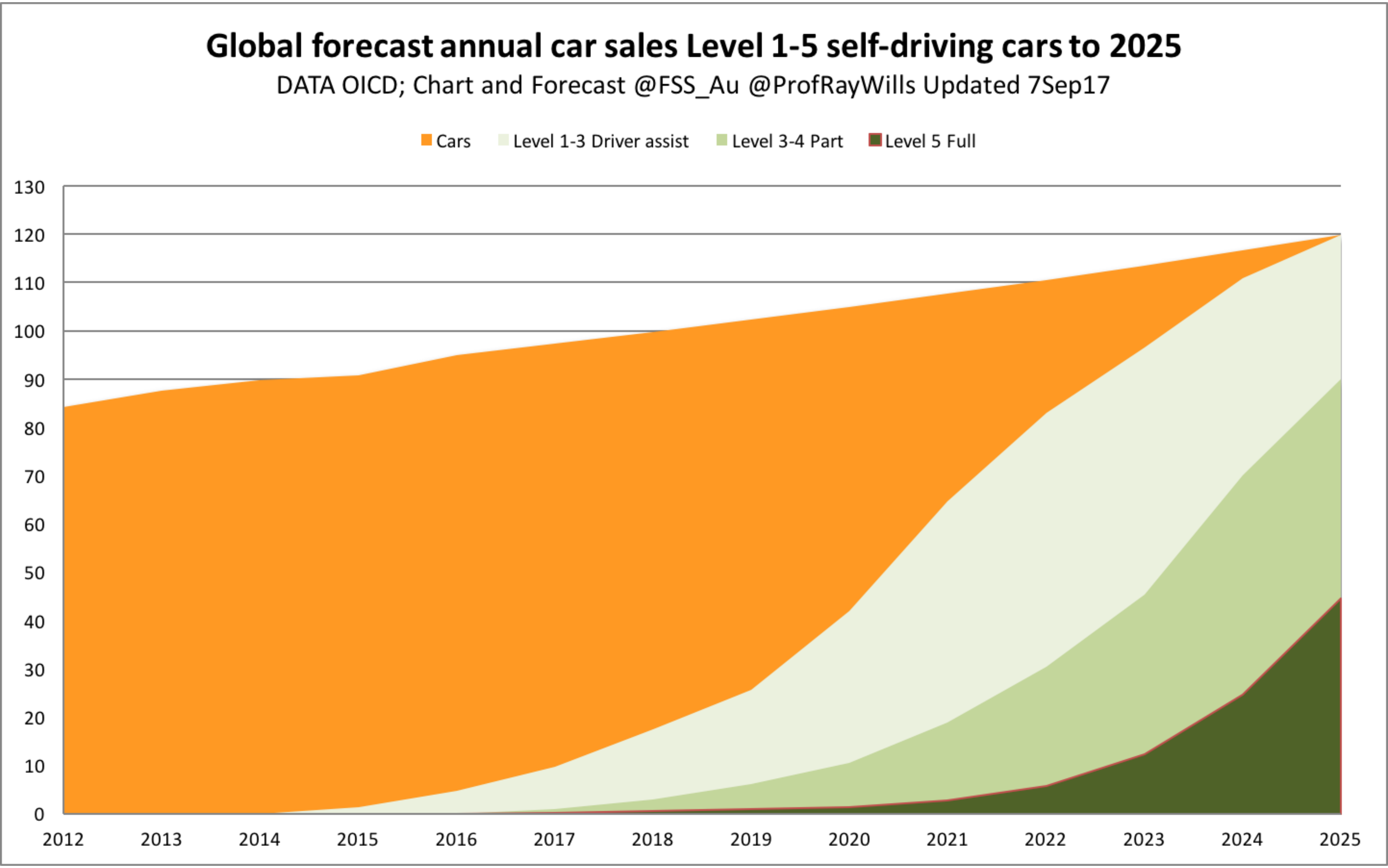
Taking population predictions into account, there will be about 6.6 devices per human on the planet.


Revenue
Launch Revenue
Satellite Internet Revenue
$40 billion
35
30
25
20
15
10
5
0
-5
Projections
2011
'13
'15
'17
'19
'21
'23
'25



Transition to EVs - global vehicle annual sales actual to 2016 and predicted to 2030

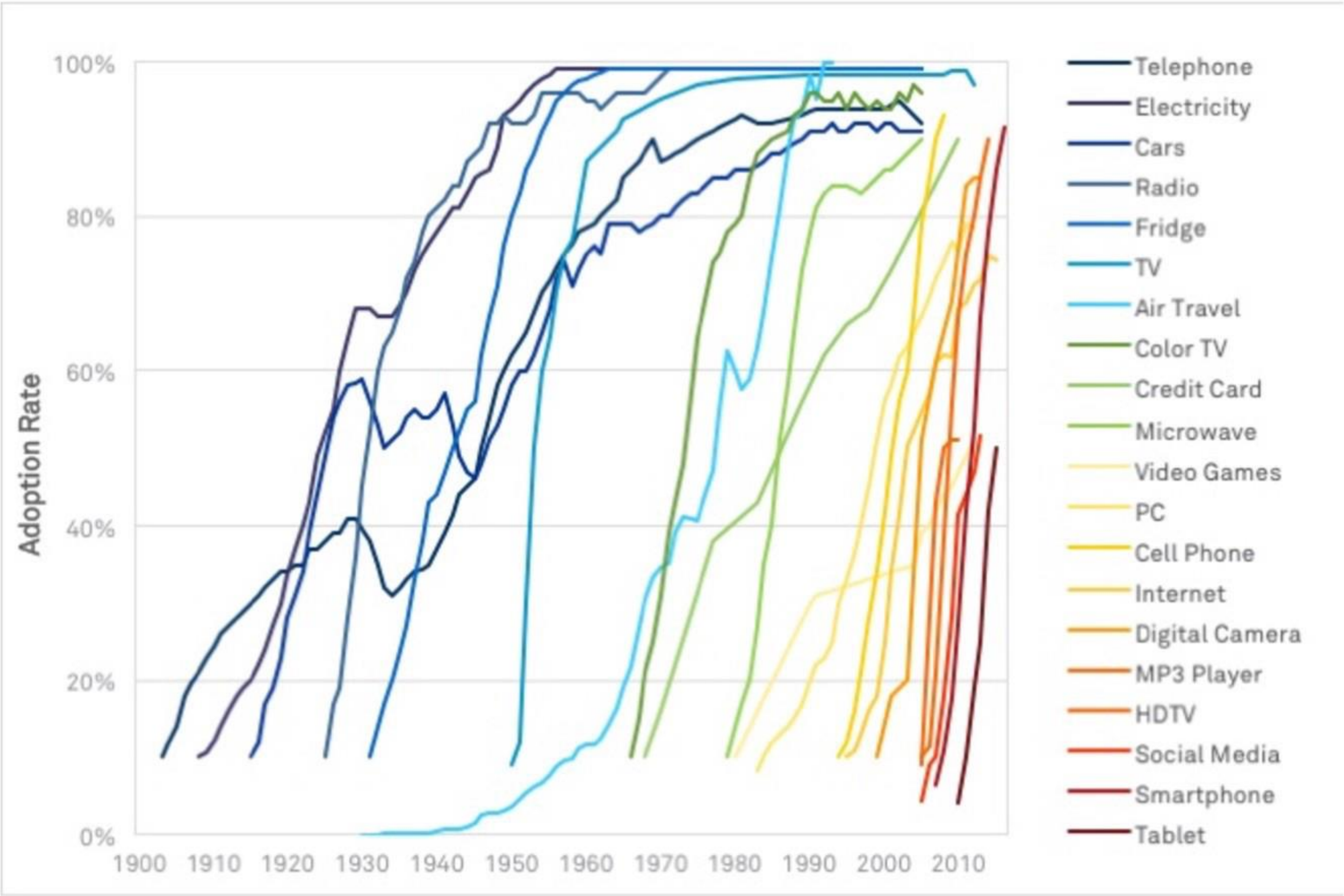
Car data OICA; EV data 2014-2016 @InsideEVs & @IEA Chart & forecast @FSS_Au @ProfRayWills 7Sep17



Global forecast annual car sales Level 1-5 self-driving cars to 2025

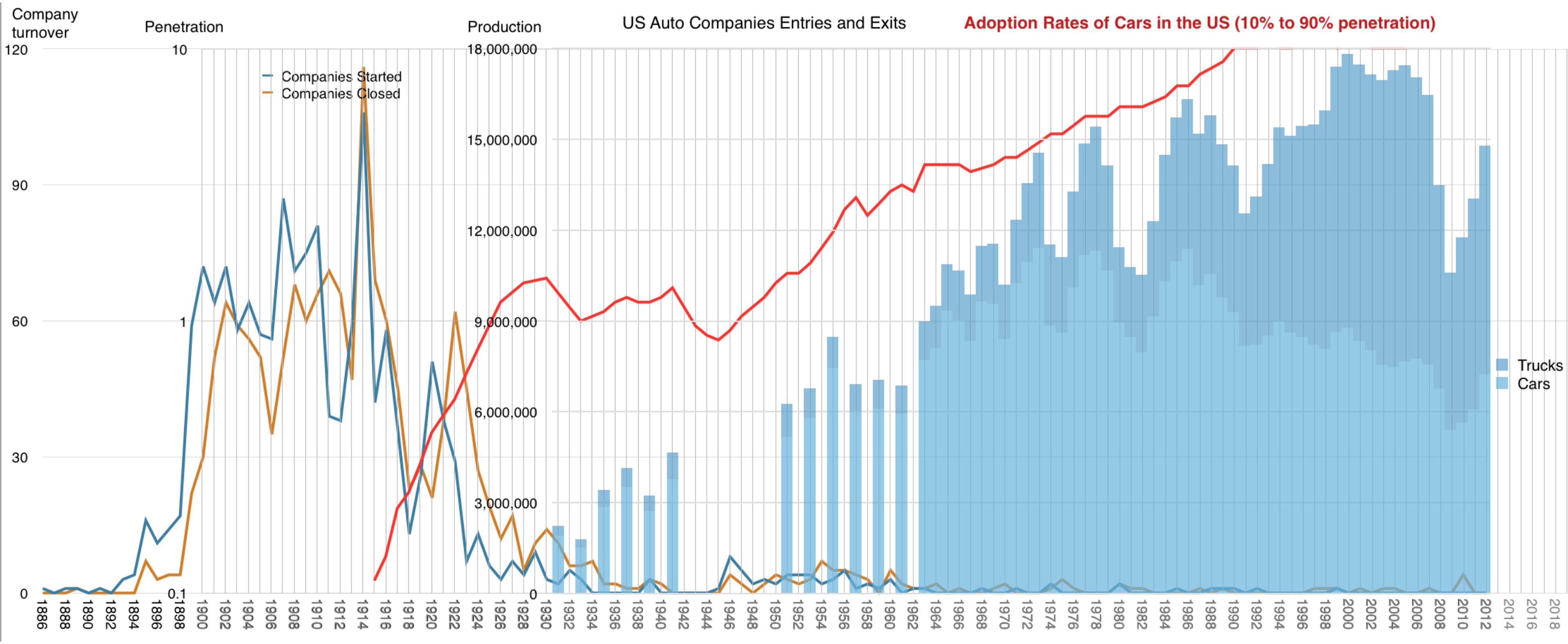
DATA OICD; Chart and Forecast @FSS_Au @ProfRayWills Updated 7Sep17

Adoption rate of Technology

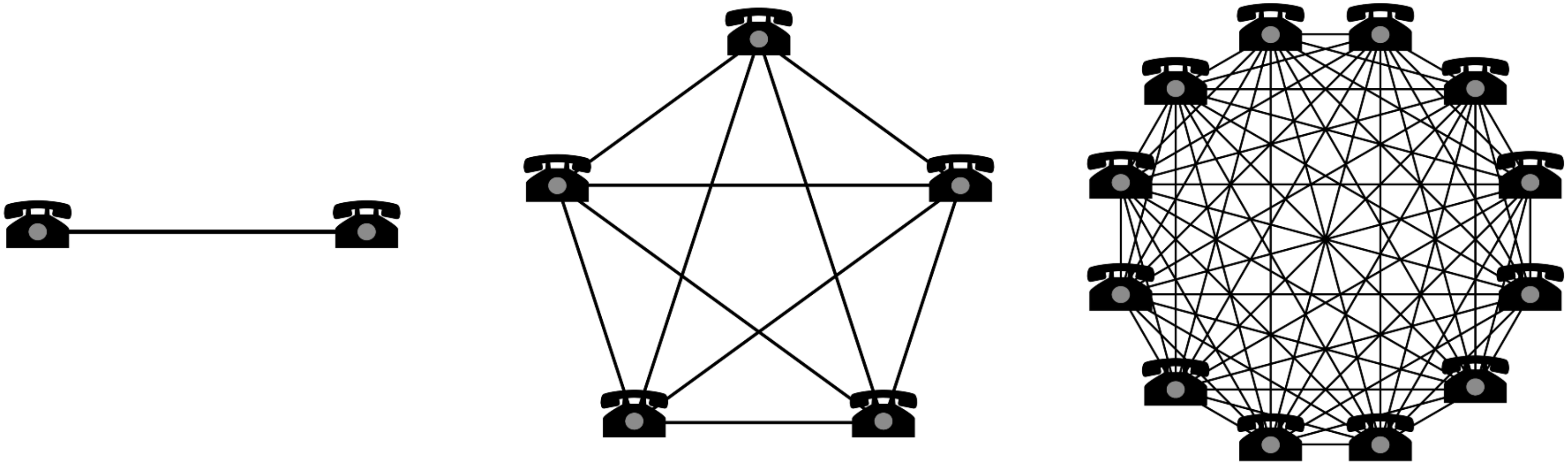


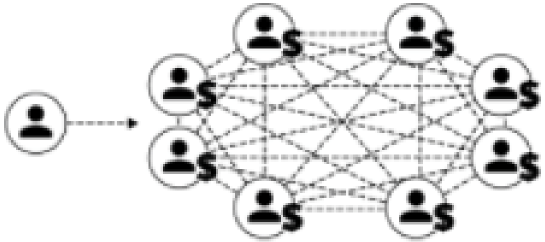
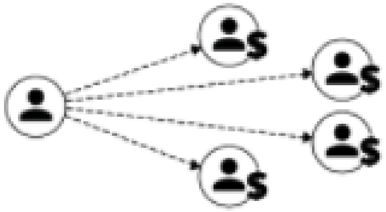
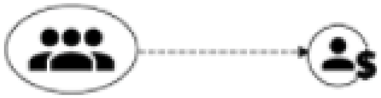
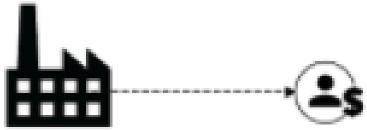
Source: Asymco

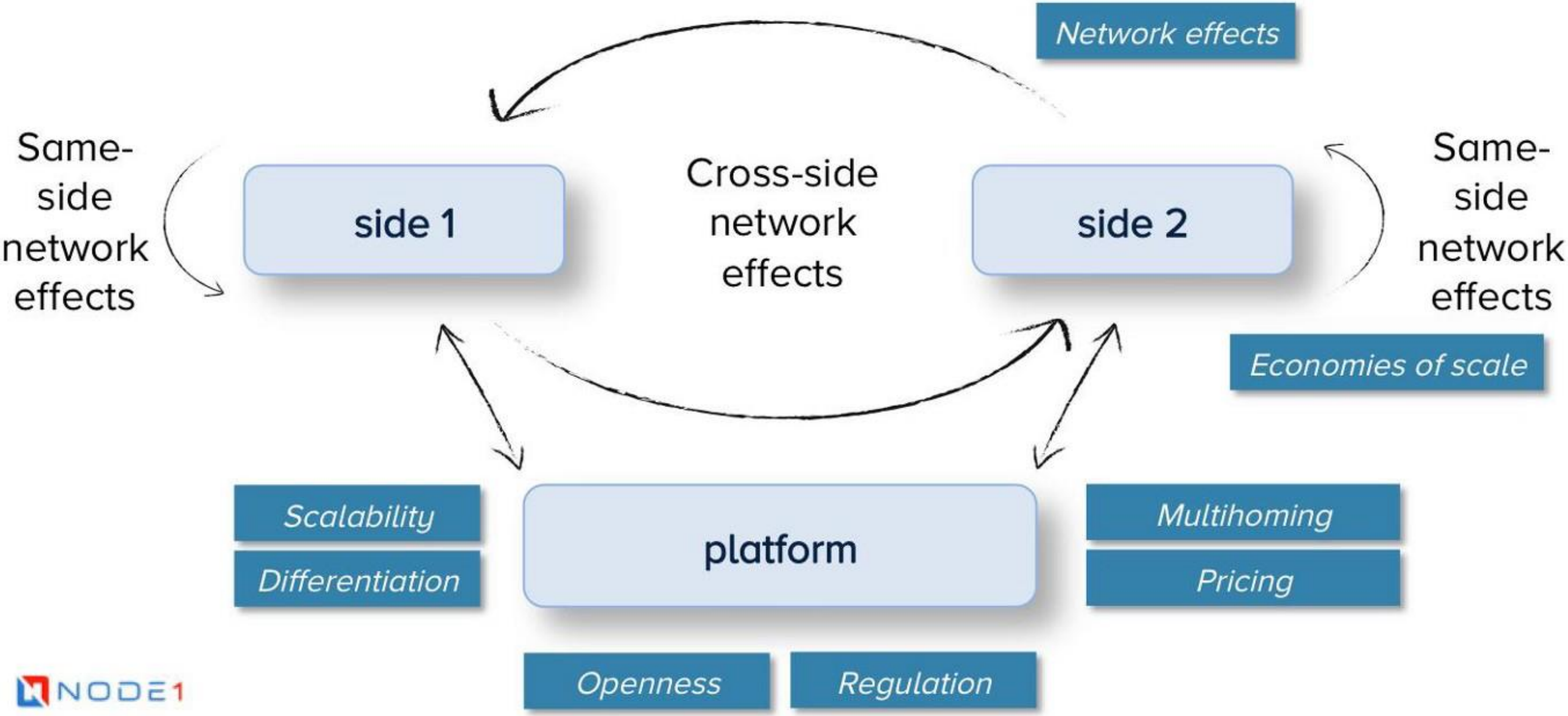
New Market Evolution



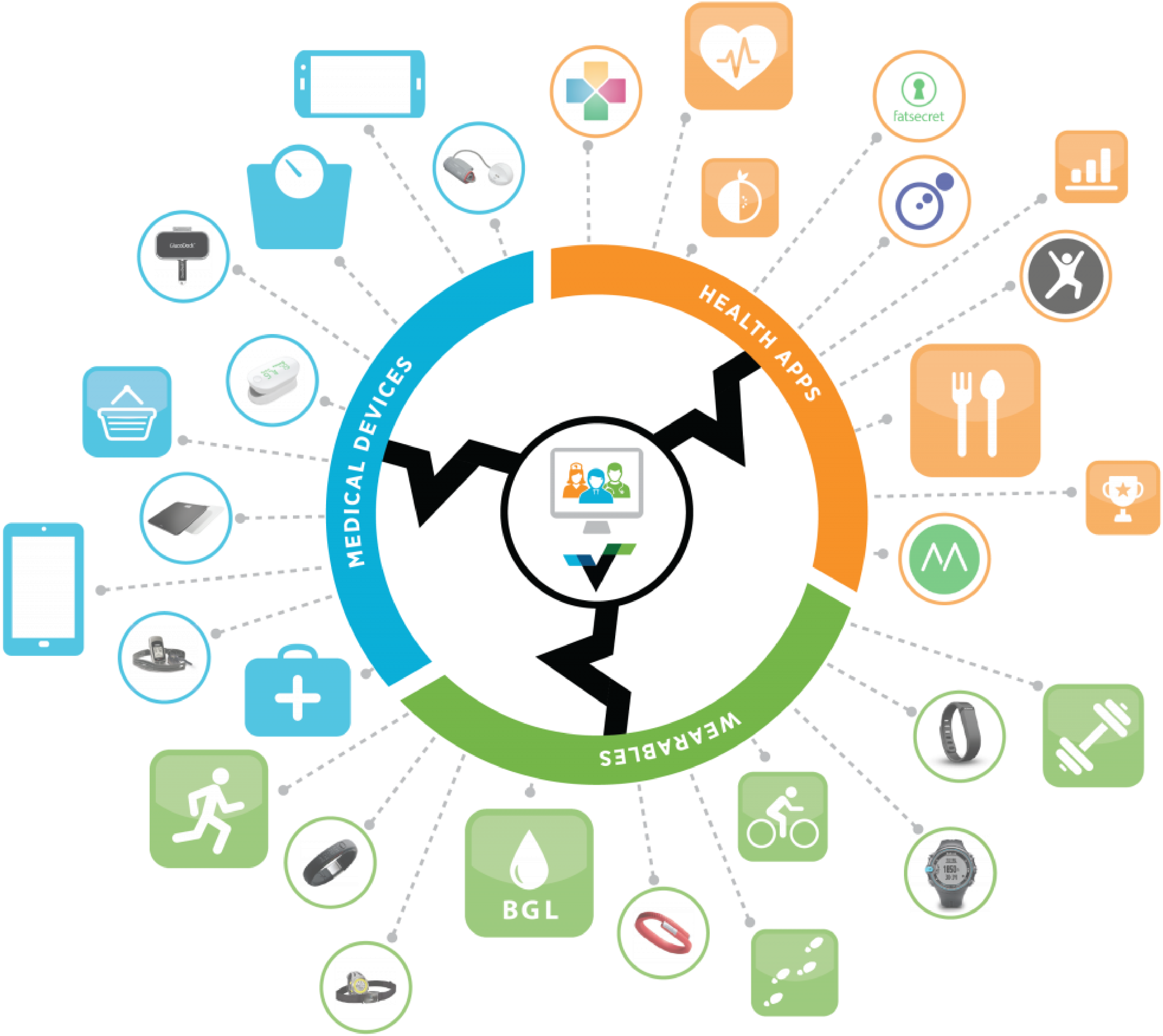
Network effect



Platform		Many make, many sell
Software Company		Make one, sell many
Service Provider		Hire one, sell one
Product Company		Make one, sell one

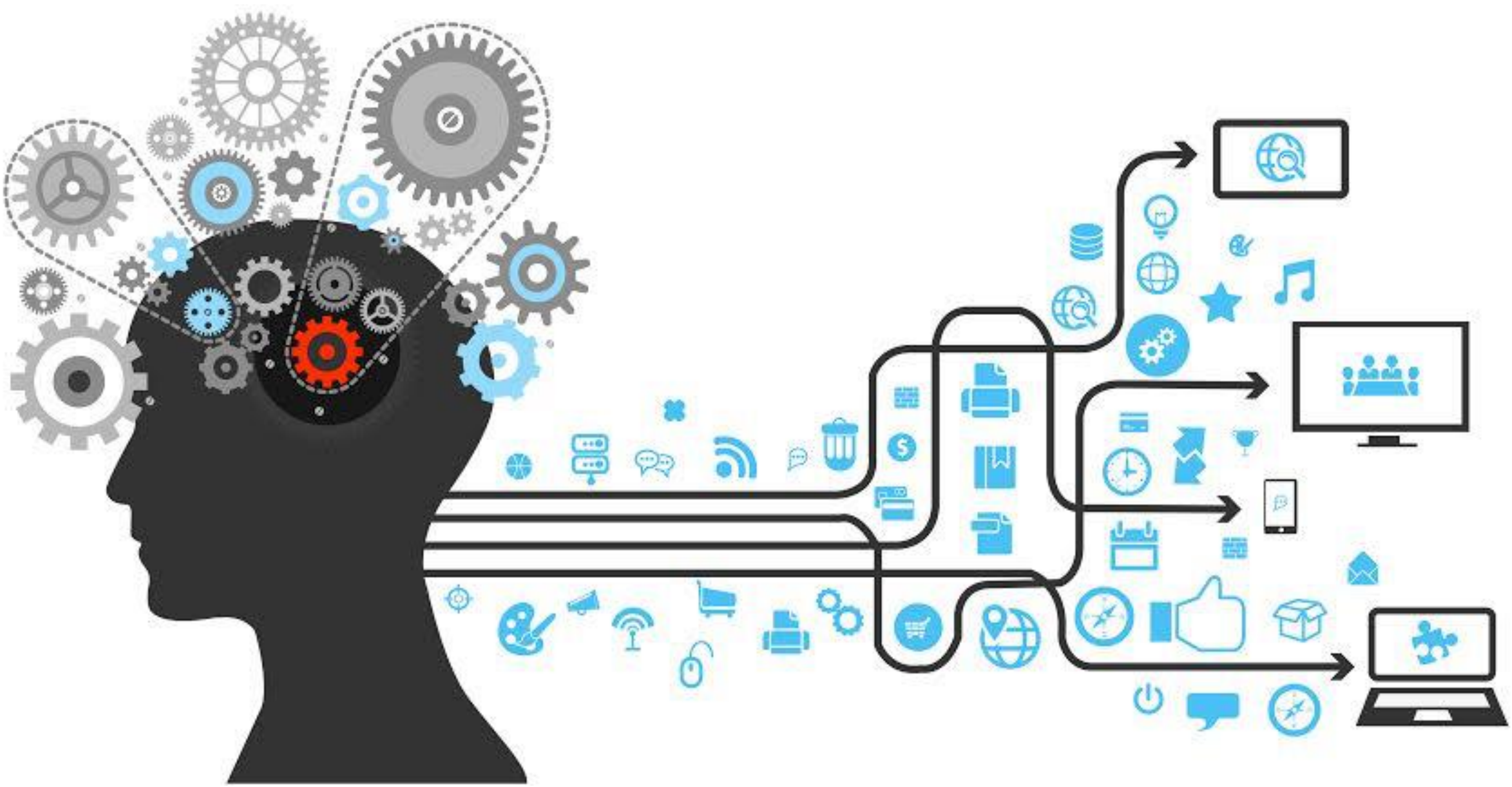


Network effects
Same-side network effects
side 1
Cross-side network effects
side 2
Same-side network effects
Economies of scale
Scalability
Differentiation
platform
Multihoming
Pricing
Openness
Regulation


MEDICAL DEVICES
HEALTH APPS
WEARABLES
fatsecret
BGL

Big Data

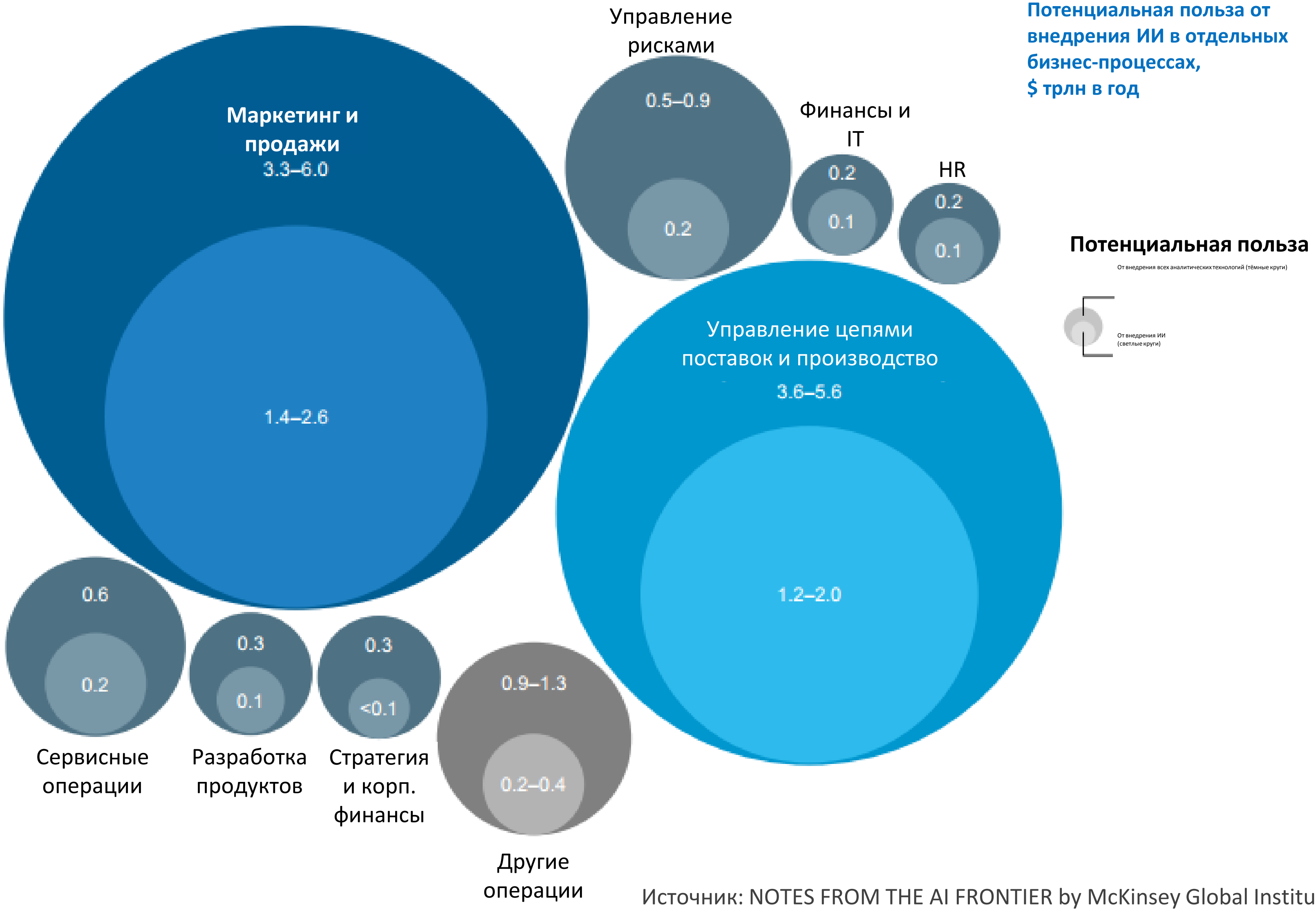
Artificial Intelligence



Customer Experience

1#DATA
75%
2#DATA
25%
3#DATA
25%
4#DATA
50%
5#DATA
75%
DATA # 1
DATA # 2
DATA # 3
DATA # 4
DATA # 5

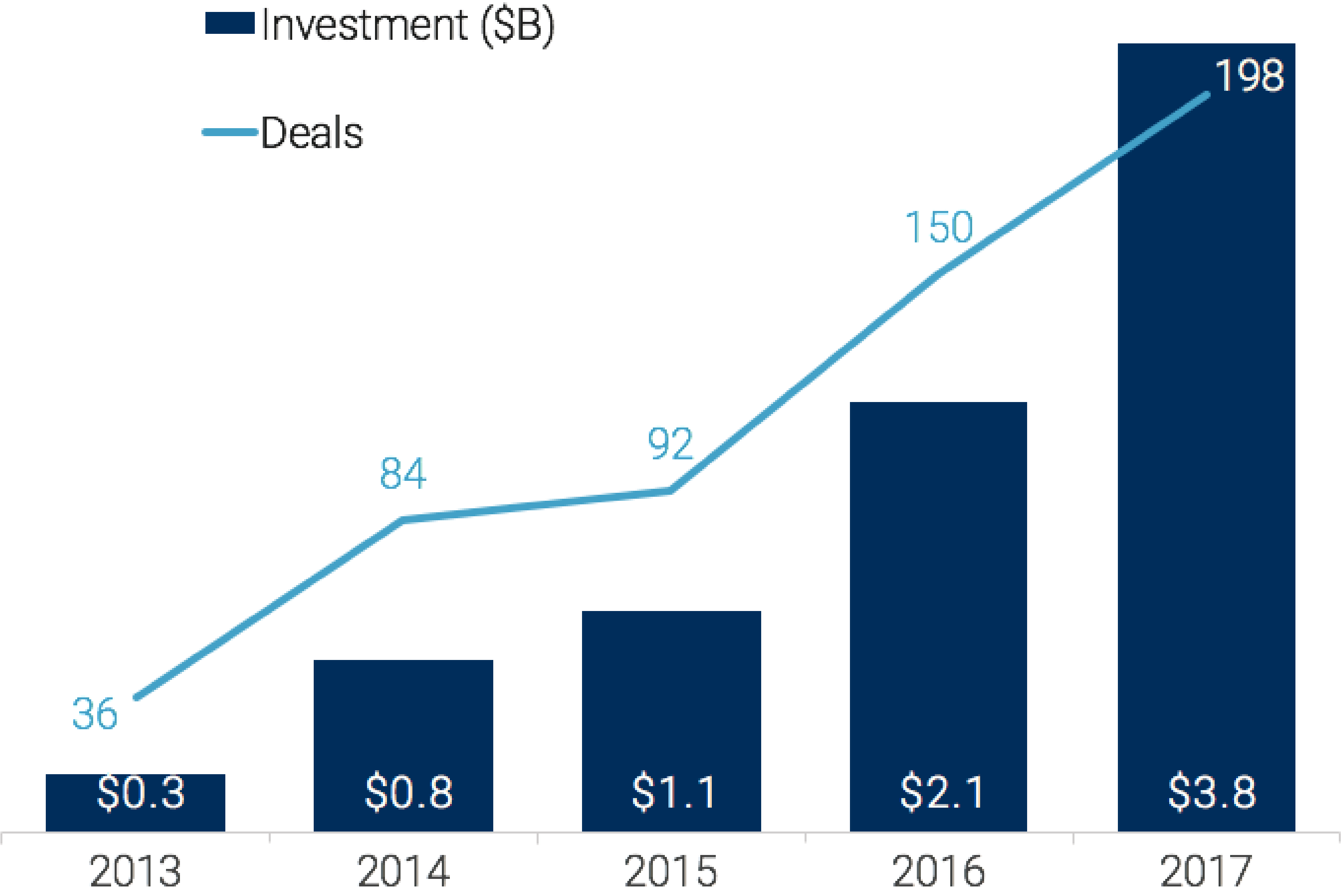
Потенциальная польза от внедрения ИИ в отдельных бизнес-процессах, $ трлн в год



Источник: NOTES FROM THE AI FRONTIER by McKinsey Global Institute

CVC funding to AI companies nearly doubles

2013 - 2017



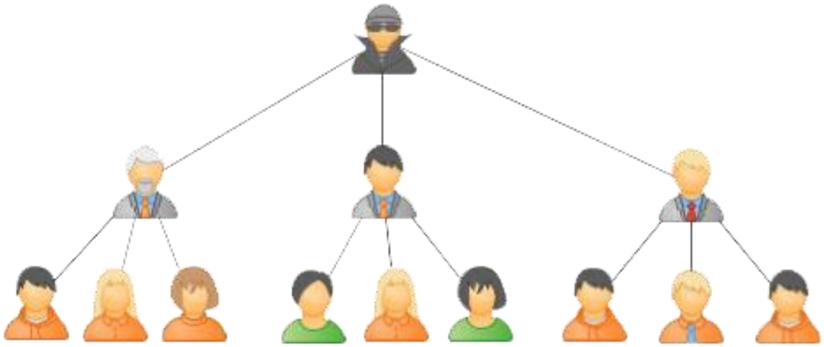
Трансформация

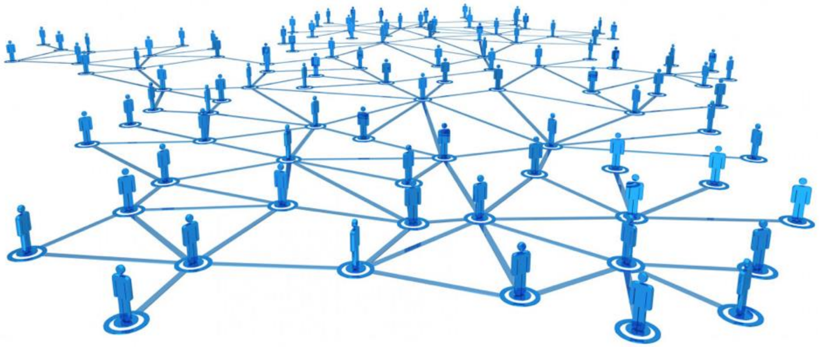
Вертикальный мир

- Традиционные инструменты работы с информацией *(библиотеки, эксперты, трансляция)*
- Иерархия как управленческая адаптация к росту информации

Горизонтальный мир

- Новые инструменты работы с информацией *(теги, большие данные, искусственный интеллект, вики, поисковые машины)*
- Цифровая среда, распределенное знание





Трансформация продукта

Три стадии развития устройства продукта

1. **Доиндустриальная**:
   каждый товар уникален, каждая деталь уникальна, все подогнано и согласовано непосредственно в устройстве.
   Качество = совершенство + индивидуальность товара и всех компонент

藤原是一精鍛
文久二年八月日

Трансформация продукта

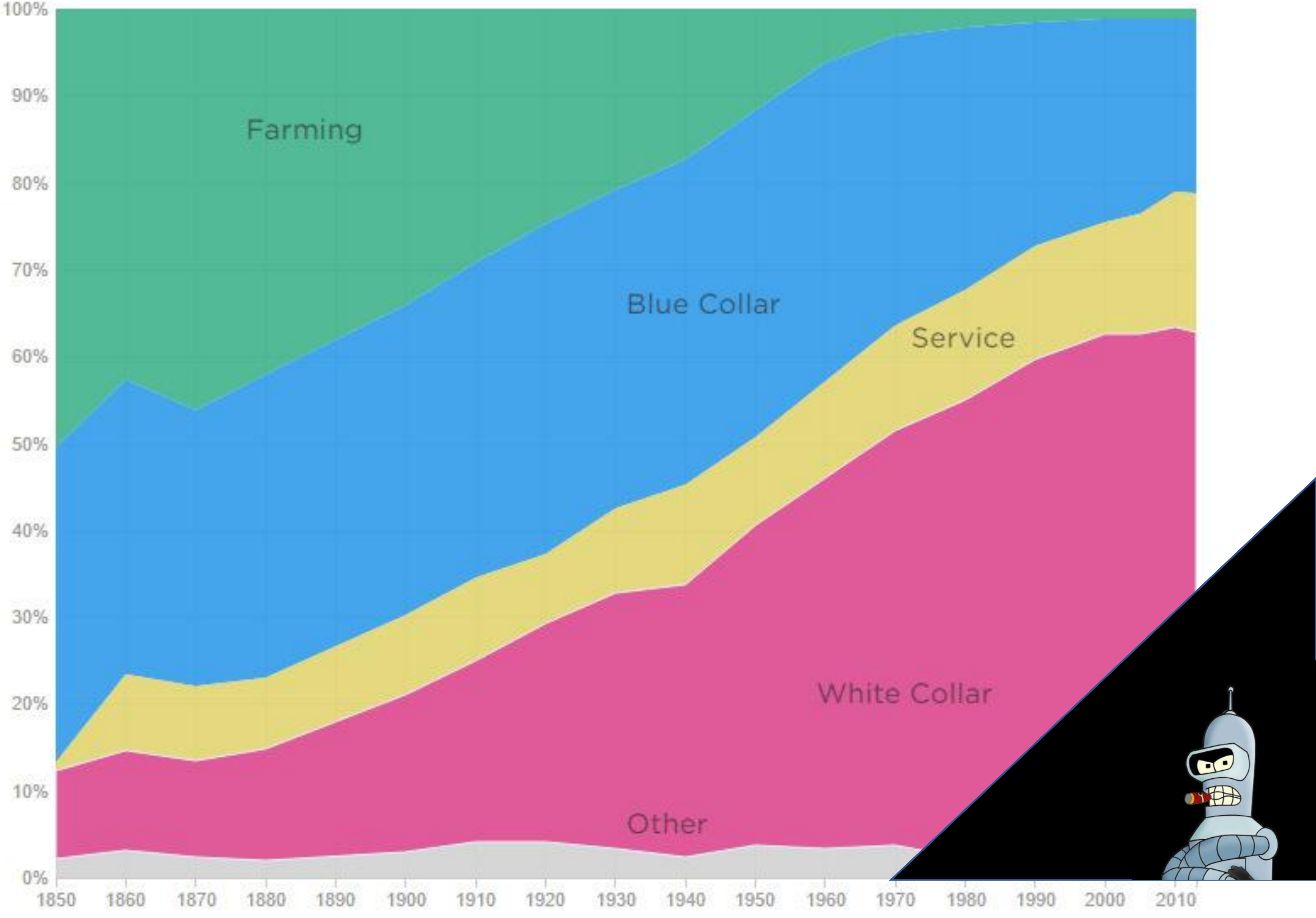
Три стадии развития устройства продукта

1. **Индустриальная**:
   каждый продукт конкретного товара идентичен другому, различия между товарами в фокусировке на тех или иных свойствах, детали взаимозаменяемые, но стандартизованы внутри supply chain, метод обеспечения идентичность – стандартизация.
   Качество = надежность + ремонтопригодность

Трансформация продукта

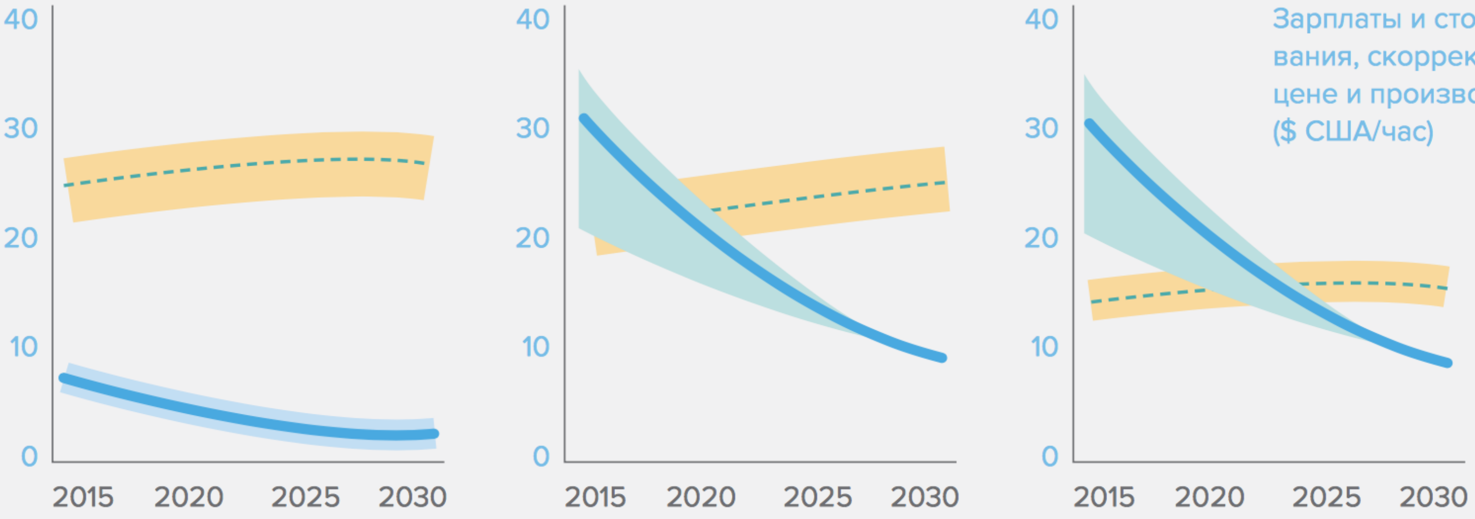
Три стадии развития устройства продукта

1. **Цифровая стадия**:
   каждый продукт индивидуален, но создан на типовой платформе из типовых деталей, детали и компоненты индивидуальны, но сопряжены через стандарты и протоколы.
   Качество = уникальность + обновляемость и дополняемость фичами


100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Farming
Blue Collar
Service
White Collar
Other
1850
1860
1870
1880
1890
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010

Роботы стали экономически оправданной альтернативой человеческому труду во многих секторах промышленности США.

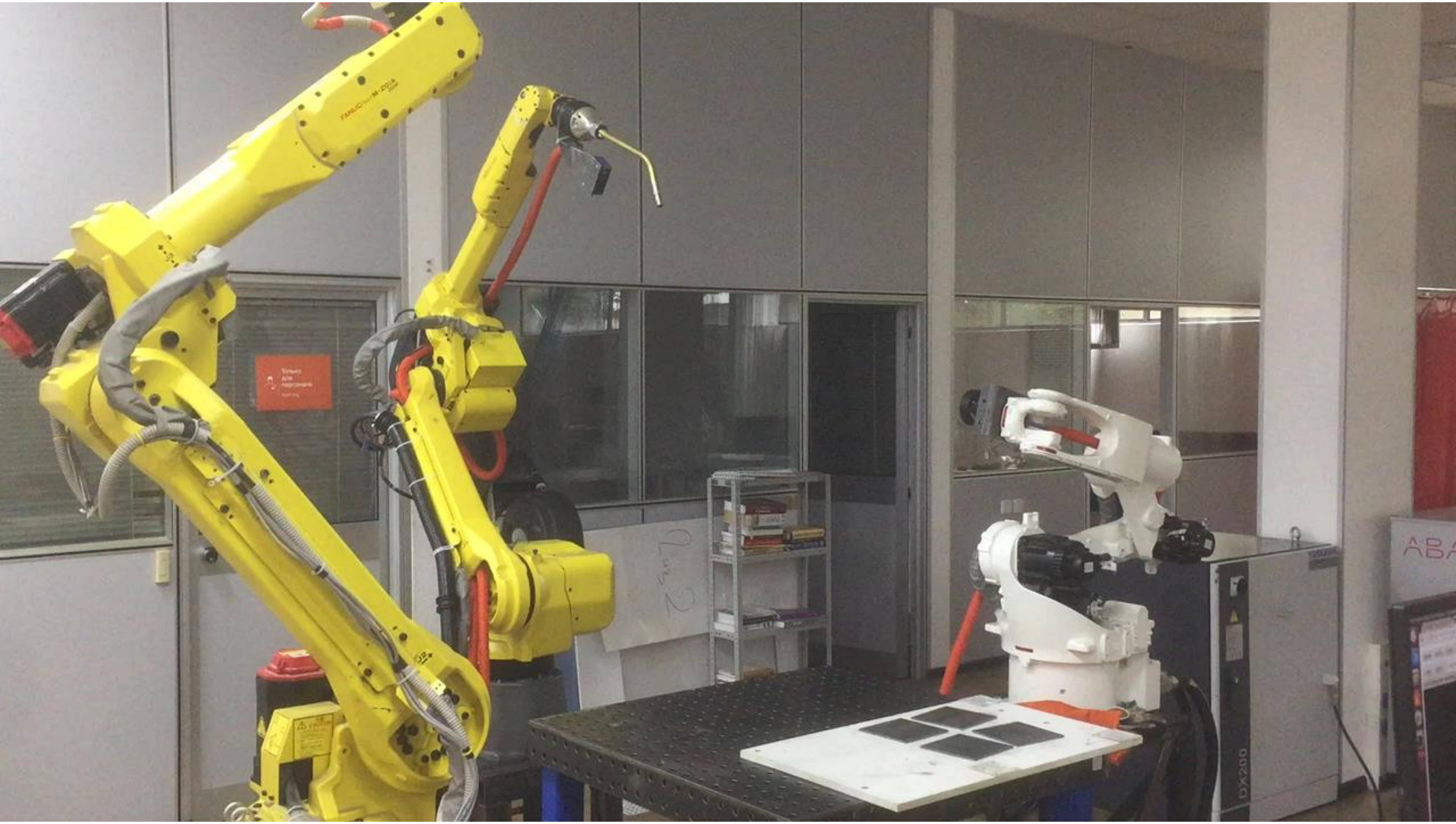
АВТОМОБИЛЬНАЯ ПРОМЫШЛЕННОСТЬ	ЭЛЕКТРИЧЕСКОЕ ОБОРУДОВАНИЕ	ПРОИЗВОДСТВО МЕБЕЛИ	
10 320	3 328	23	Количество промышленных роботов, поставленных в 2013 году

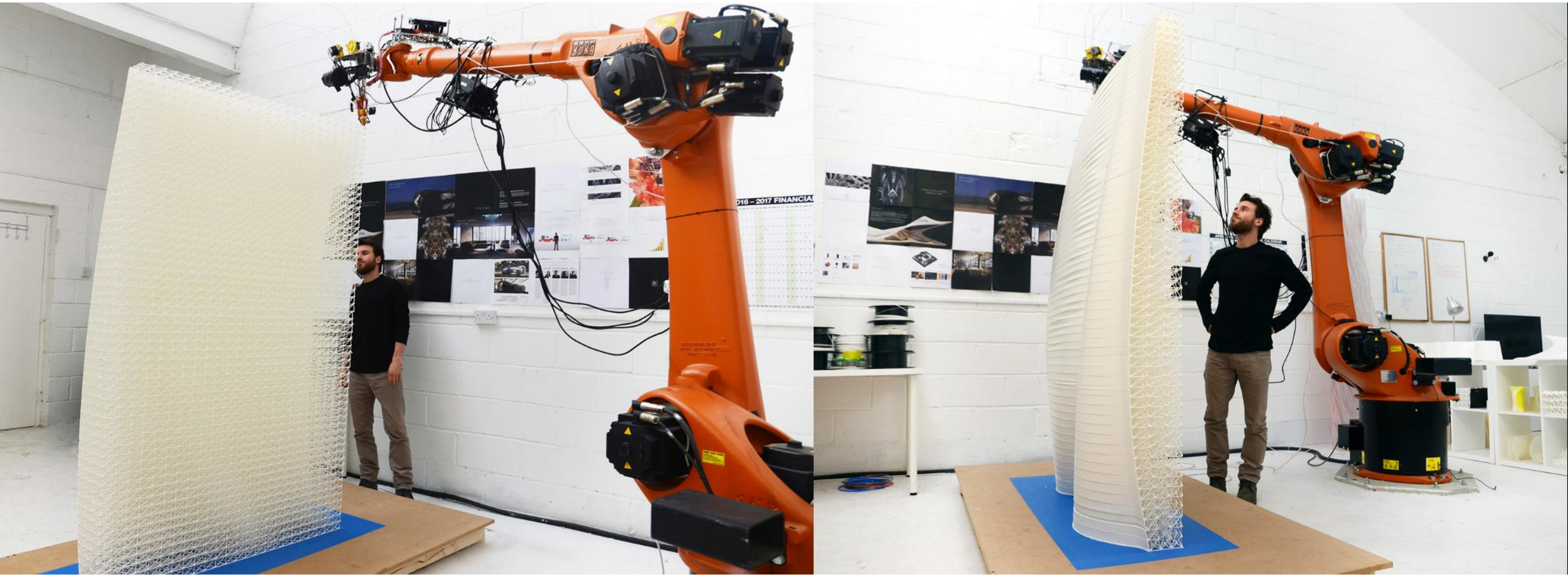


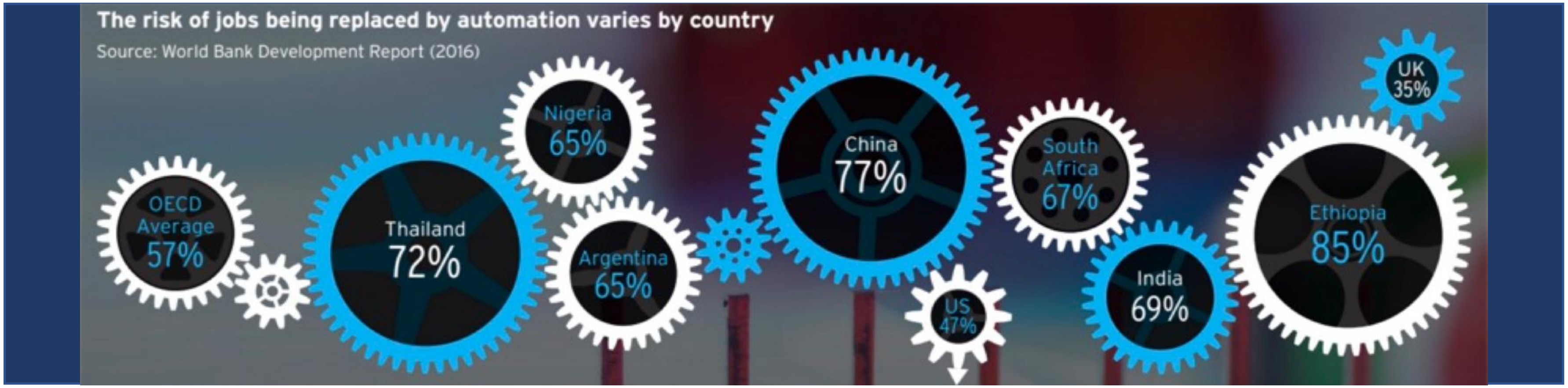
Зарплаты и стоимость обслуживания, скорректированные по цене и производительнсти ($ США/час)

- - - - Зарплаты рабочих в соответствующем производстве

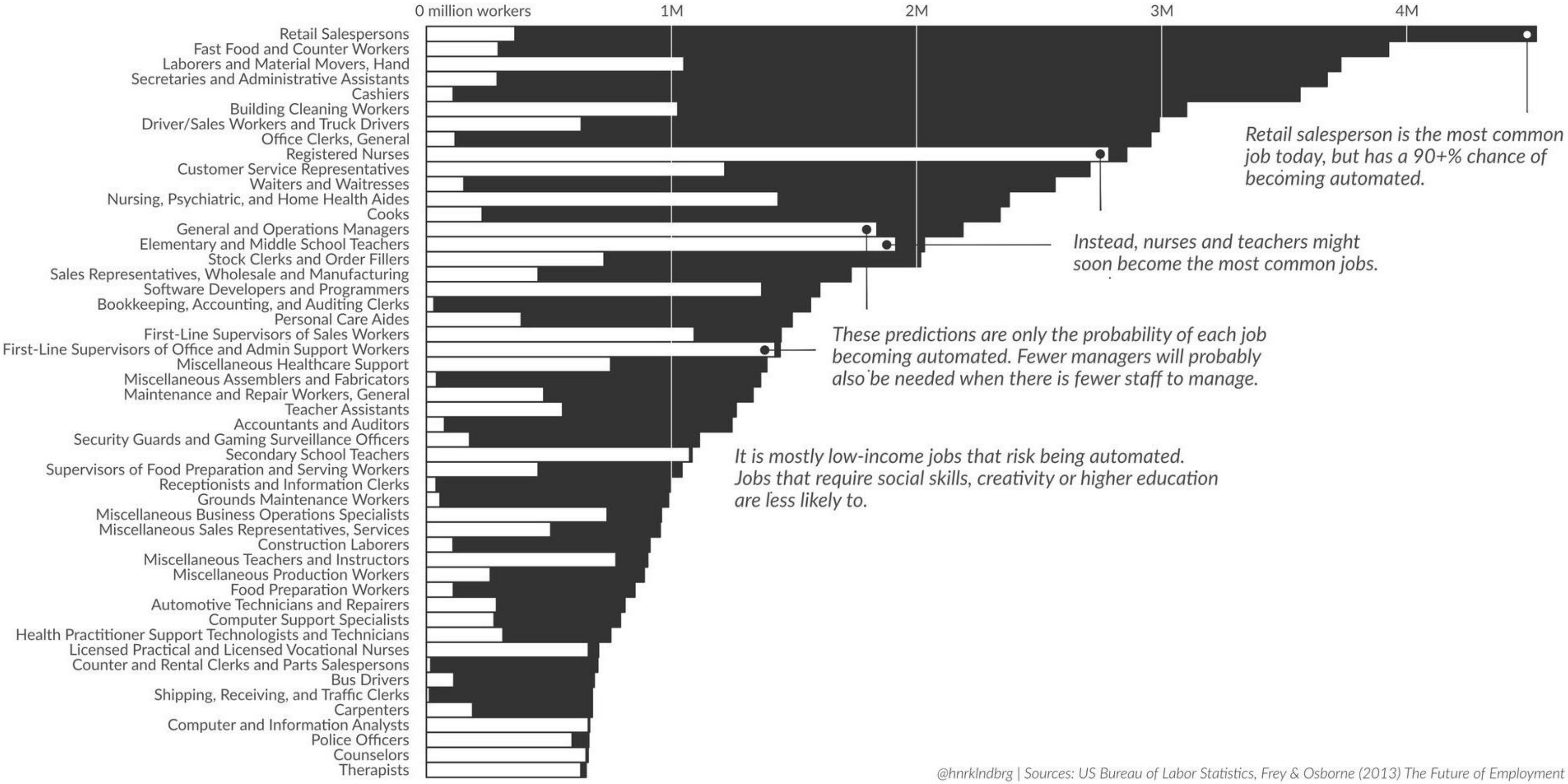
▬ Стоимость обслуживания роботов


FANUC M-20iA
DX200
ABA




The risk of jobs being replaced by automation varies by country

Source: World Bank Development Report (2016)



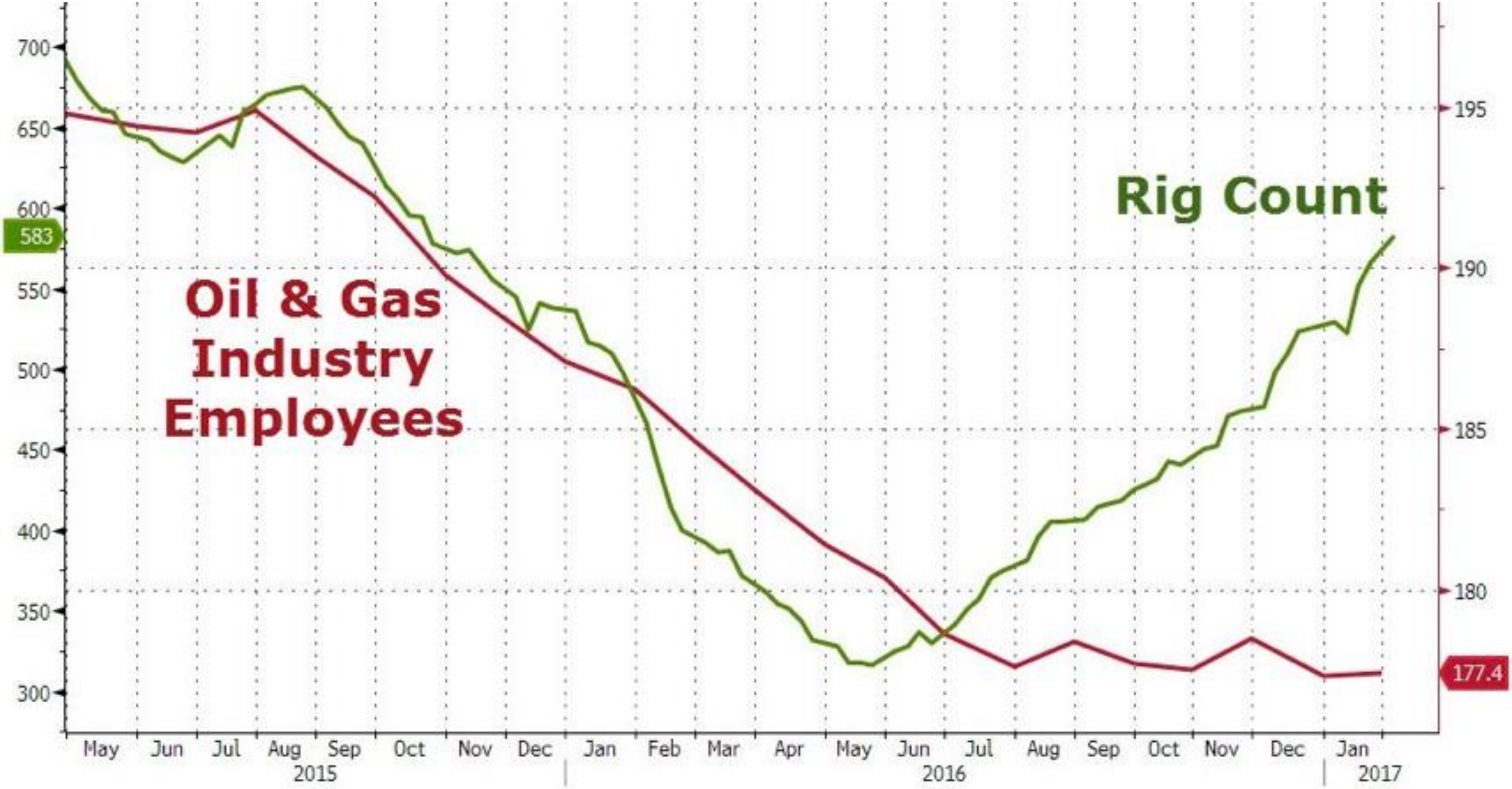
Retail salesperson is the most common job today, but has a 90+% chance of becoming automated.

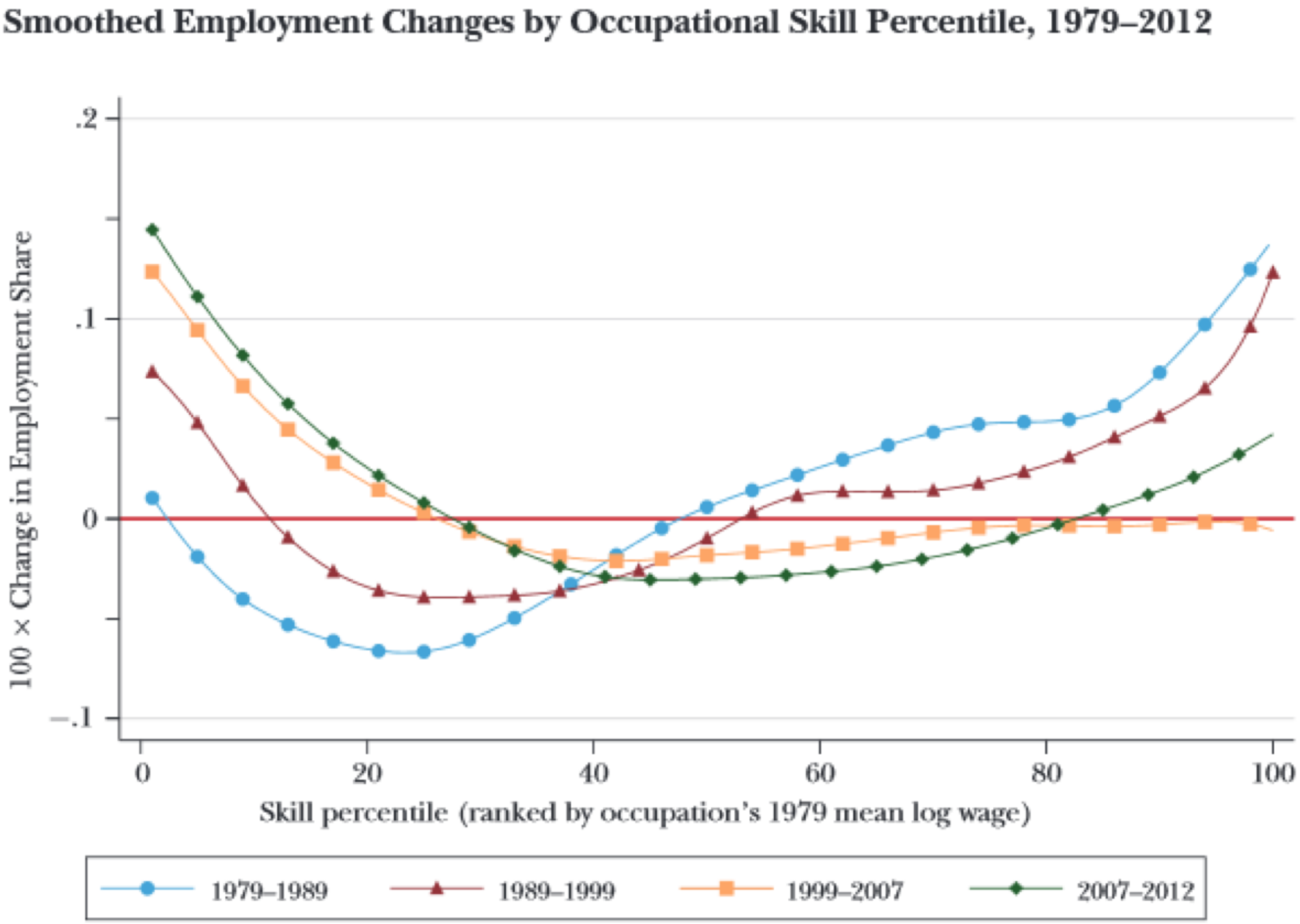
Instead, nurses and teachers might soon become the most common jobs.

These predictions are only the probability of each job becoming automated. Fewer managers will probably also be needed when there is fewer staff to manage.

It is mostly low-income jobs that risk being automated. Jobs that require social skills, creativity or higher education are less likely to.

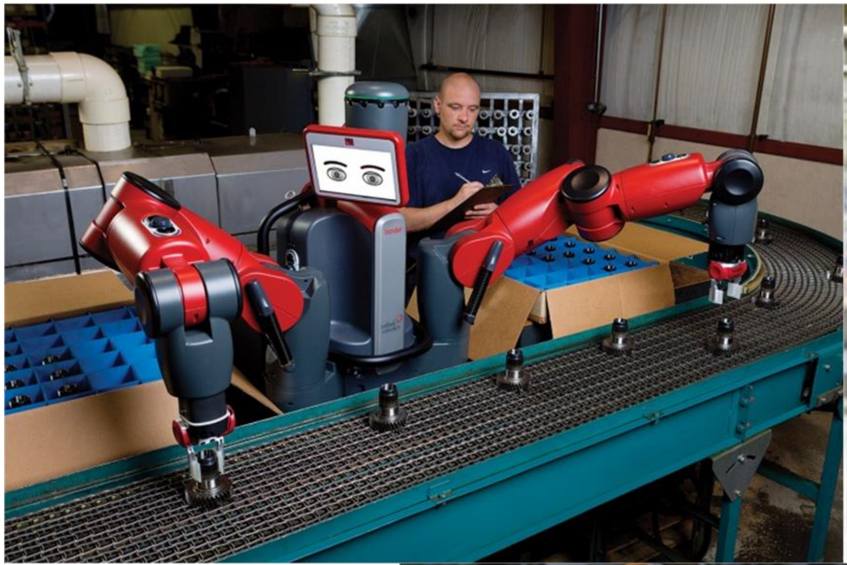
@hnrklndbrg | Sources: US Bureau of Labor Statistics, Frey & Osborne (2013) The Future of Employment


Rig Count
Oil & Gas Industry Employees
700
650
600
583
550
500
450
400
350
300
195
190
185
180
177.4
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
2015
2016
2017



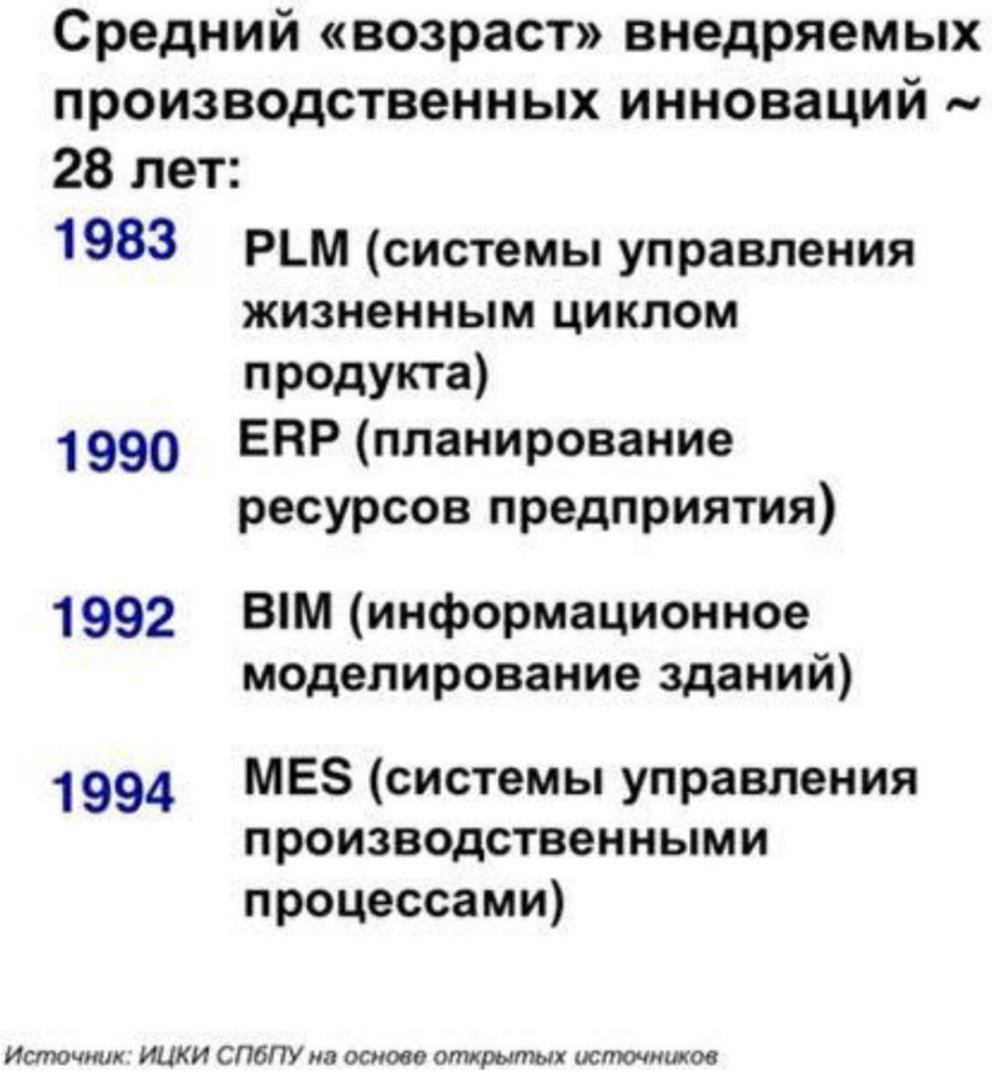
Smoothed Employment Changes by Occupational Skill Percentile, 1979–2012

CO-bots



www.faude.de

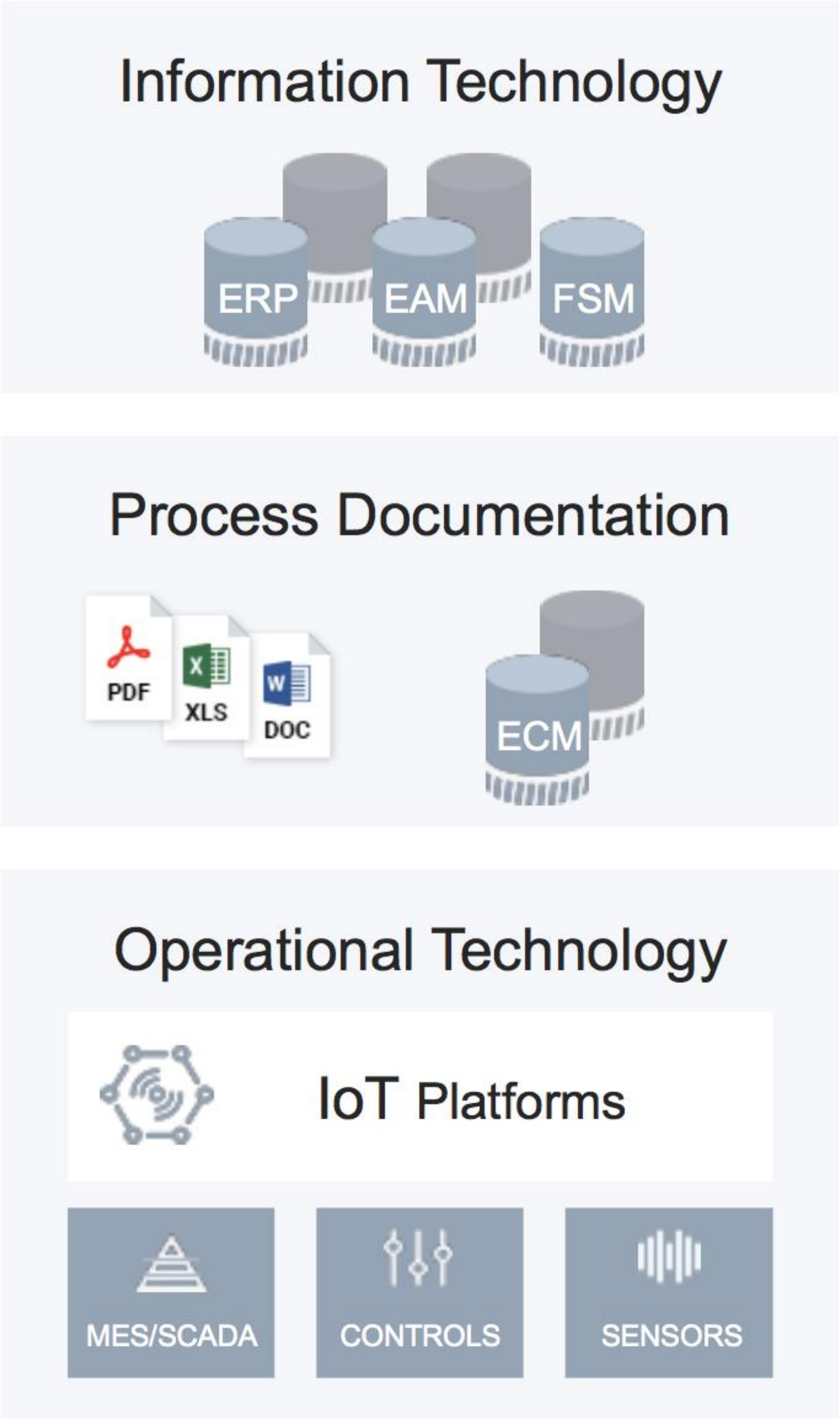
MIT: Team with cooperating humans and robots effectively about **85 percent** more than the teams of people or robots alone



Средний «возраст» внедряемых производственных инноваций ~ 28 лет:

1983	PLM (системы управления жизненным циклом продукта)
1990	ERP (планирование ресурсов предприятия)
1992	BIM (информационное моделирование зданий)
1994	MES (системы управления производственными процессами)

Источник: ИЦКИ СПбПУ на основе открытых источников



Information Technology

ERP
EAM
FSM

Process Documentation

PDF
XLS
DOC
ECM

Operational Technology

IoT Platforms

MES/SCADA
CONTROLS
SENSORS

Датчики

- Сырые данные
- Умные данные

Интеграция данных

- Data Warehouse
- Data Lakes

Обработка данных

- Очистка
- Гипотезы
- Инициативы

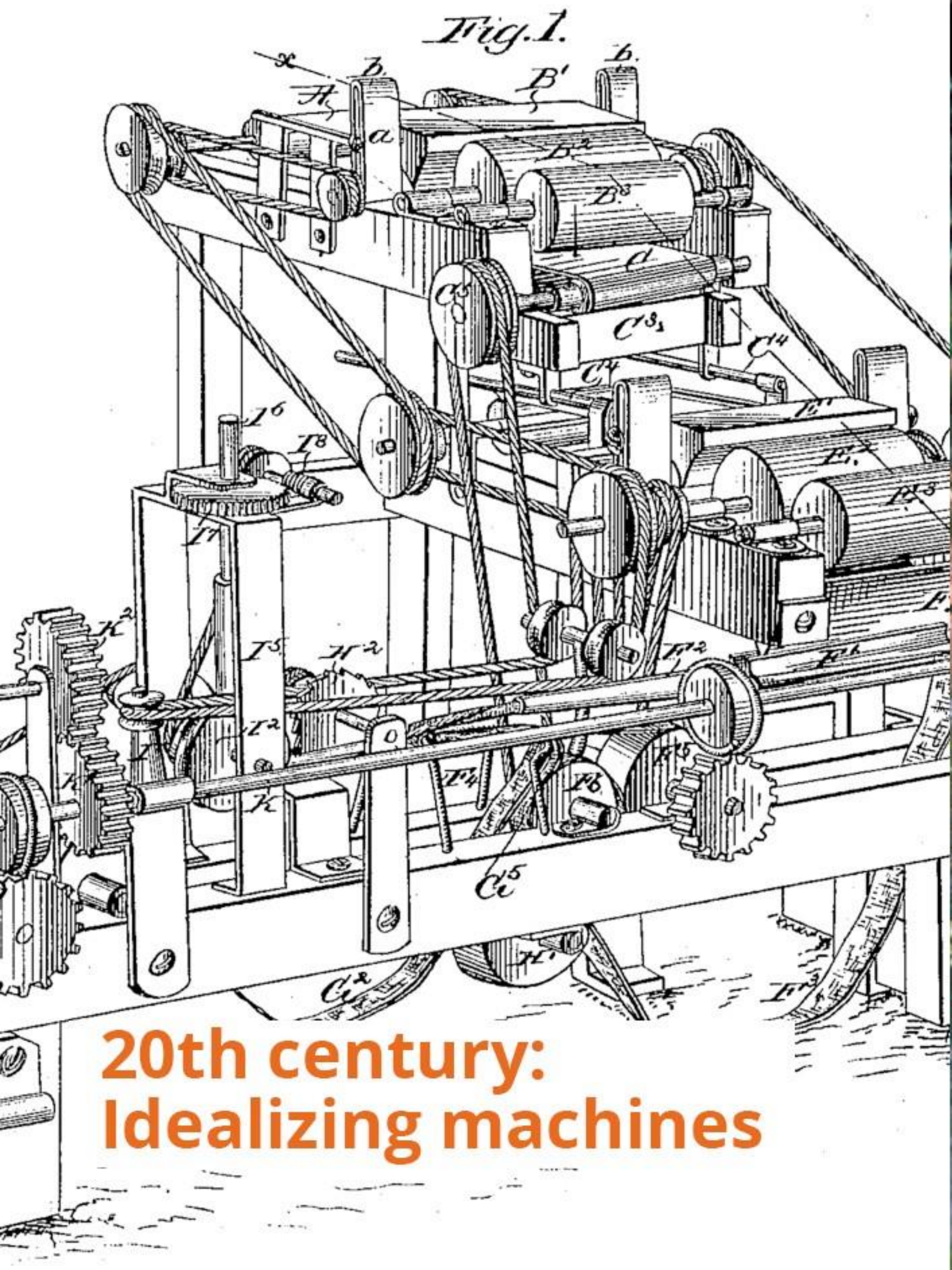
Предиктивные модели

- Цифровой двойник
- Нейросети
- Моделирование

Визуализация

- Дешборды

Принятие решений



20th century:
Idealizing machines

21st century:
Idealizing natural systems