
Seizing the AI opportunity

*Brazilian American Chamber of Commerce
October 24, 2017, Miami*

Raman Chitkara
Global Technology Industry Leader



My first experience with computers

Release date: March 1983

Cost: \$3,590



30 years later





Artificial Intelligence today

Google Home

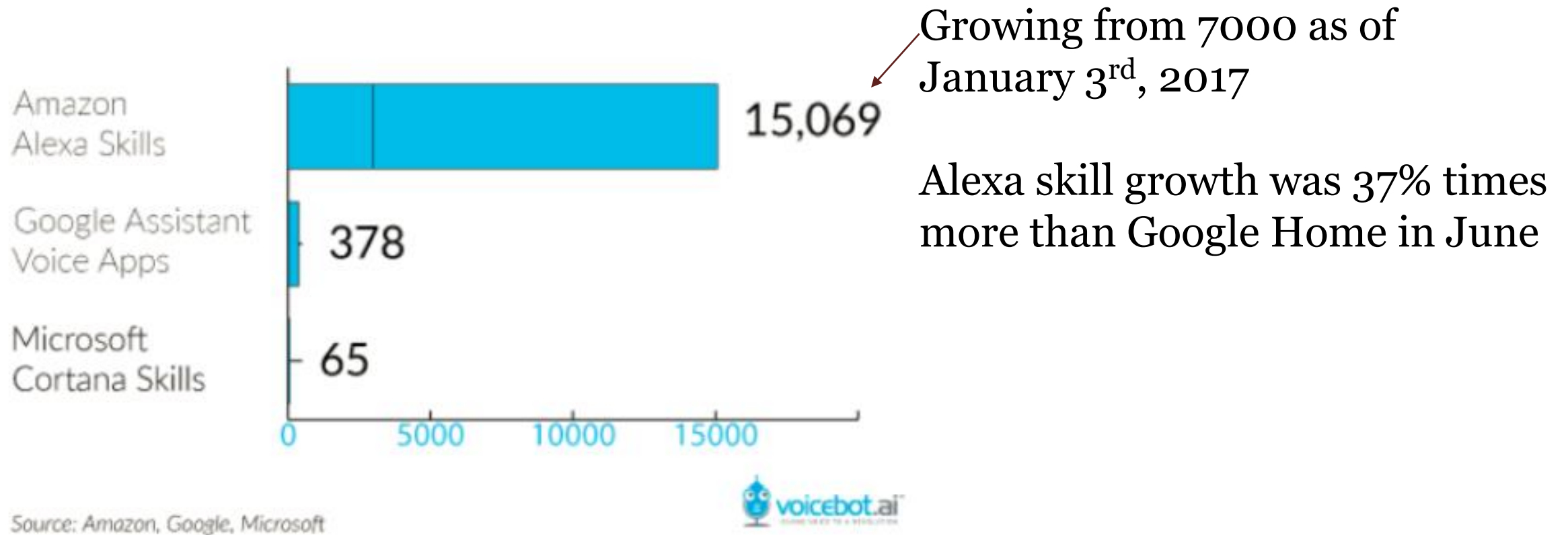
Amazon Echo

LingLong DingDong

Apple HomePod



Total skills / Voice apps June 30, 2017



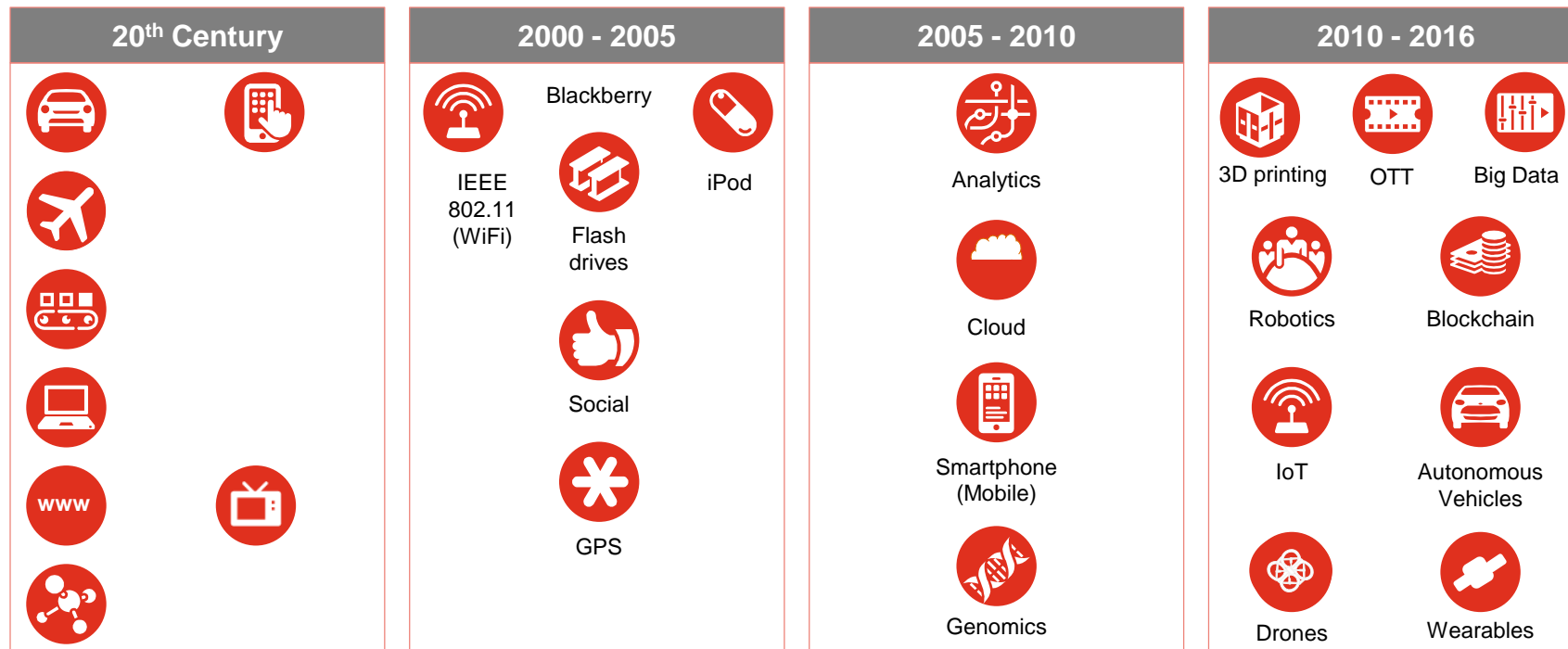
Artificial intelligence tomorrow

2025/

2035

?

Technological breakthroughs are advancing at an accelerating pace...



*...and are manifesting as a proliferation of technologies;
we track over 150 of them*

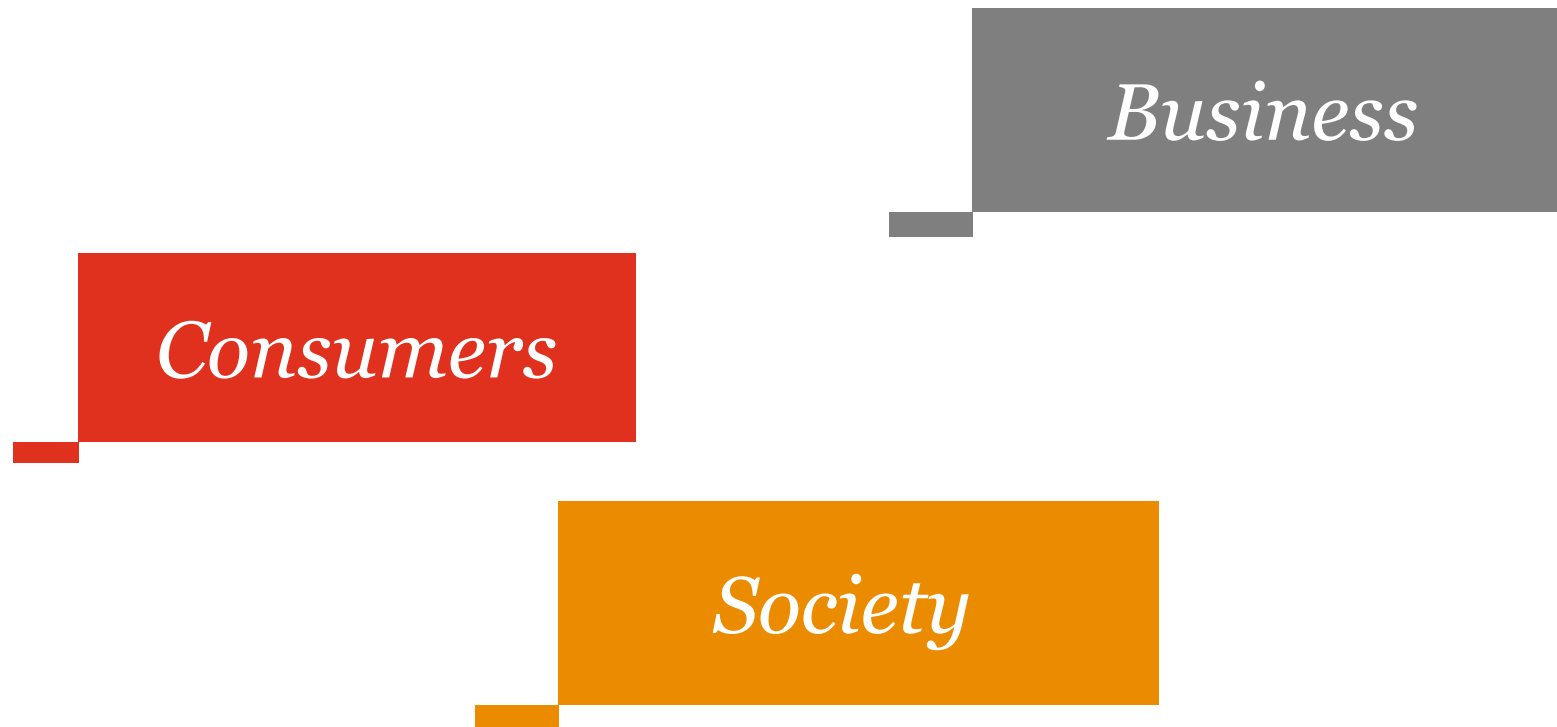


Key attributes of disruptive innovations

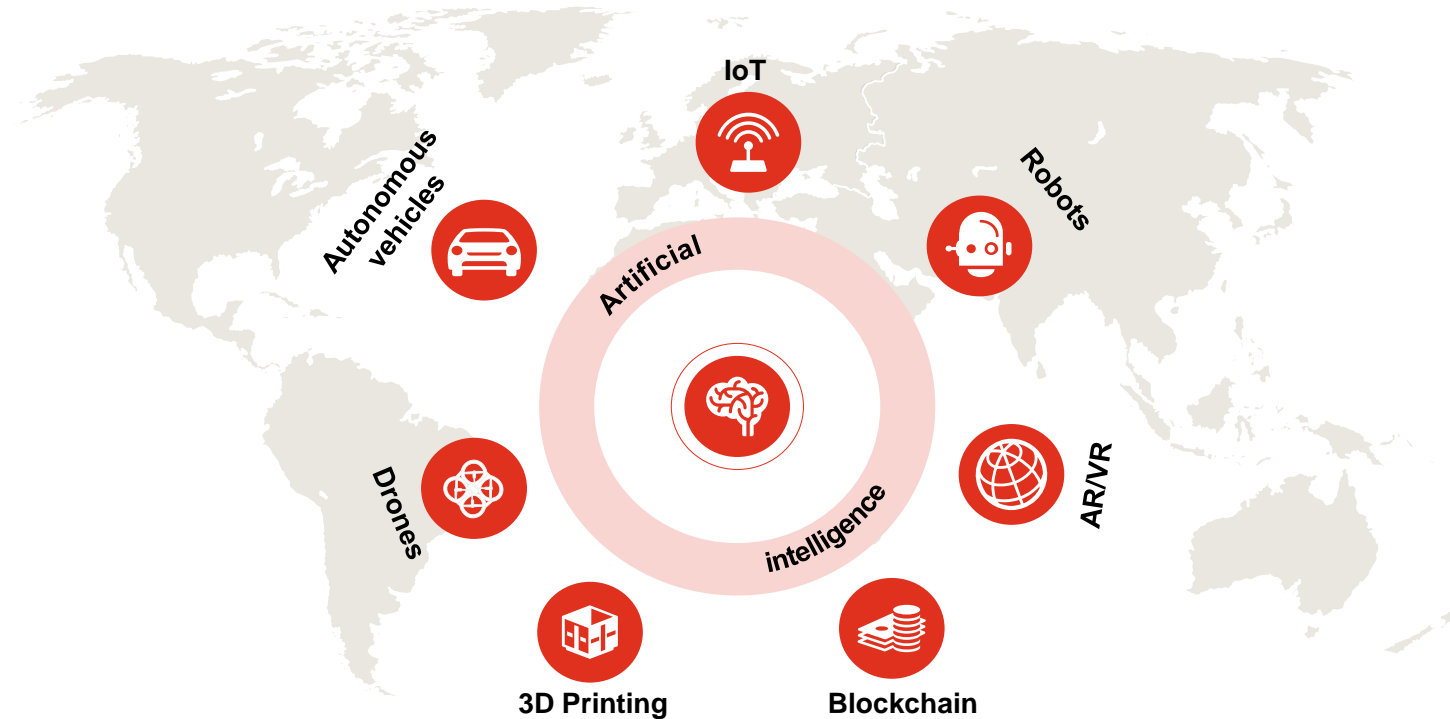
Every disruptive innovation has a broader impact than the previous one...

...and resulting changes happen faster

Which disruptions will have the greatest impact on...



We believe these eight disruptive technologies will have the greatest near-term impact



Key attributes of a titanic disruption

*It creates
value
where
none
existed*



*It changes
the user's
worldview
and
behaviour*



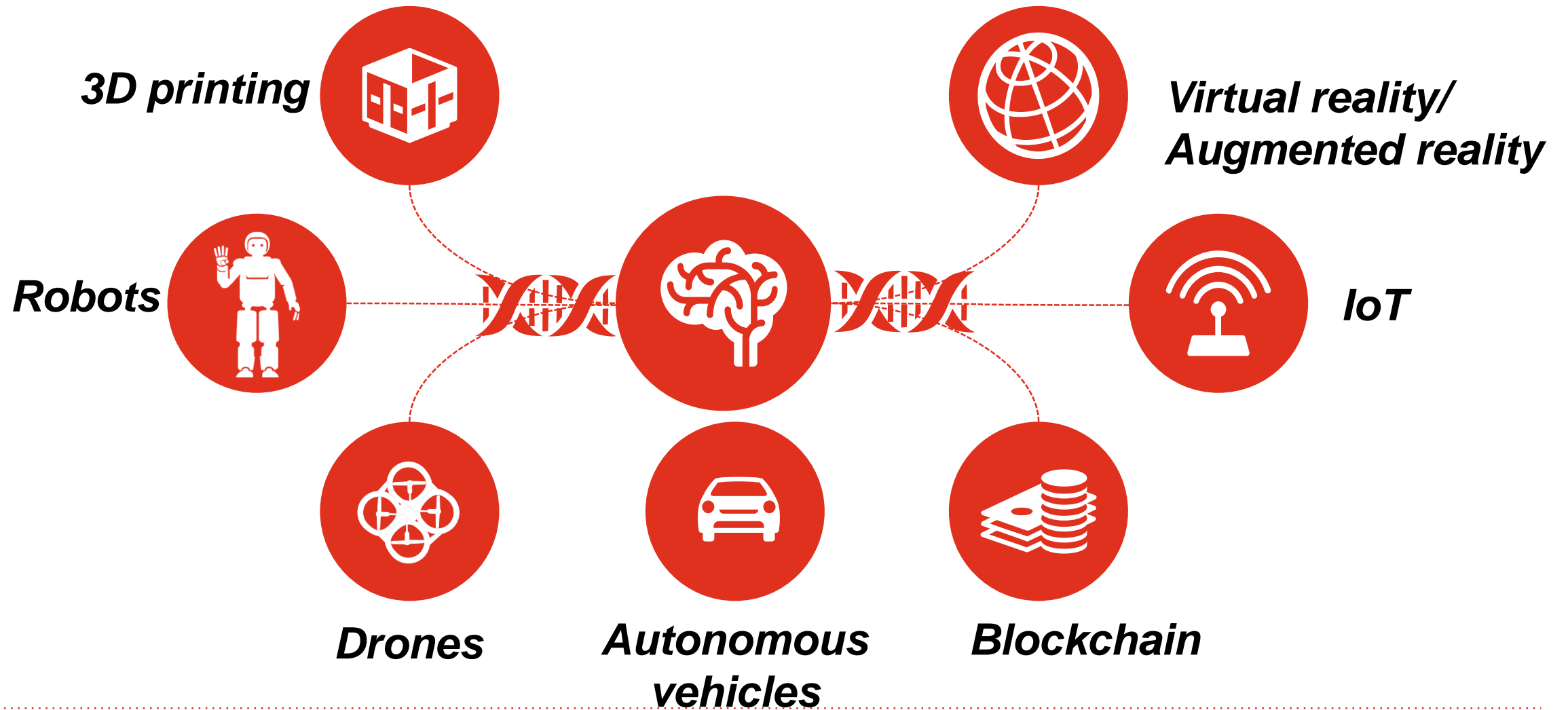
*It alters
who and
what is
connected*



*Its impact
is described
as a **new**
era for
civilisation*



Artificial intelligence



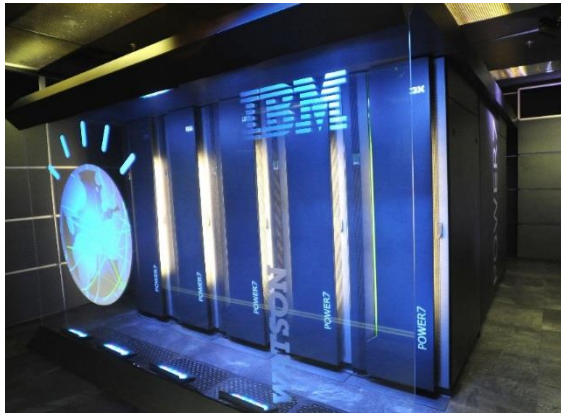
Artificial intelligence (AI) – the titanic disruption

AI will shape our lives more than any other technology in the next three decades and beyond

AI will Extend the boundaries of human intelligence that is not fully imaginable

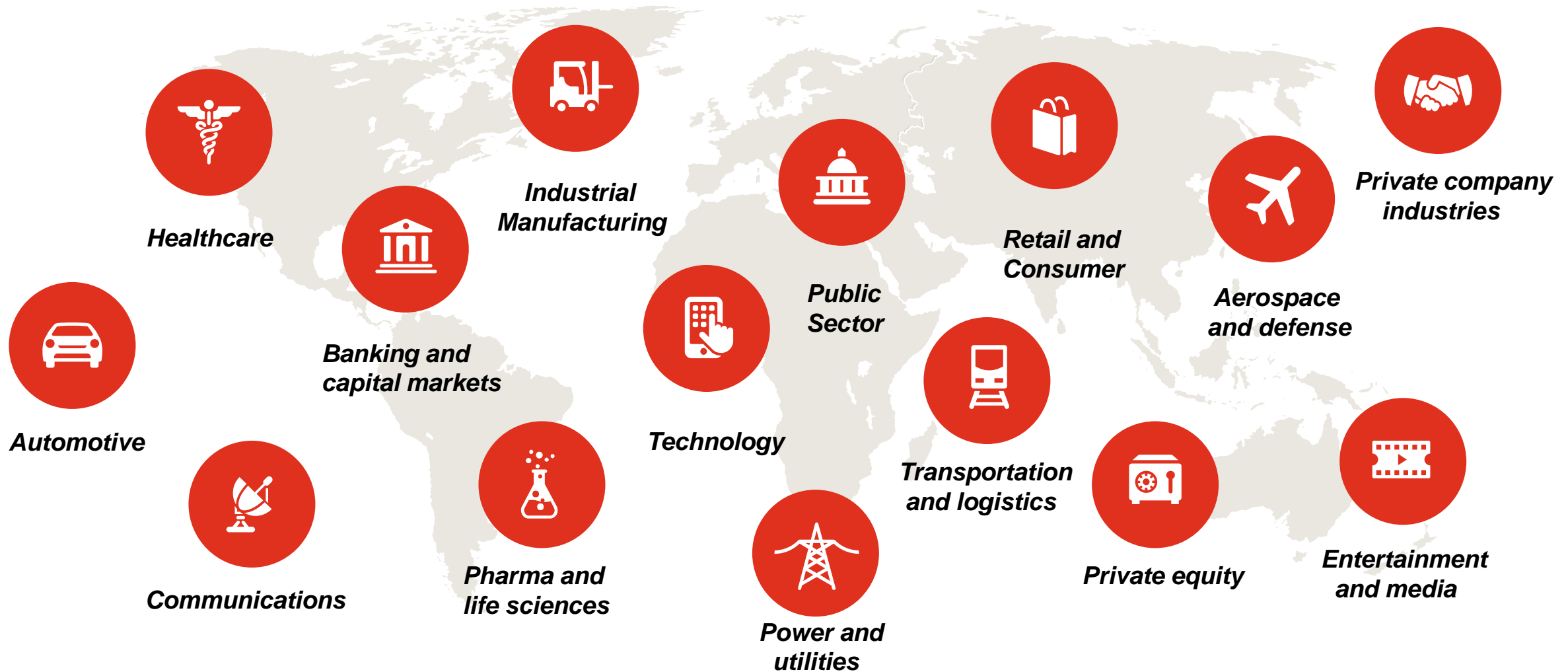
AI will create new challenges of cyber security, cyber wars, hacking & privacy

AI products today

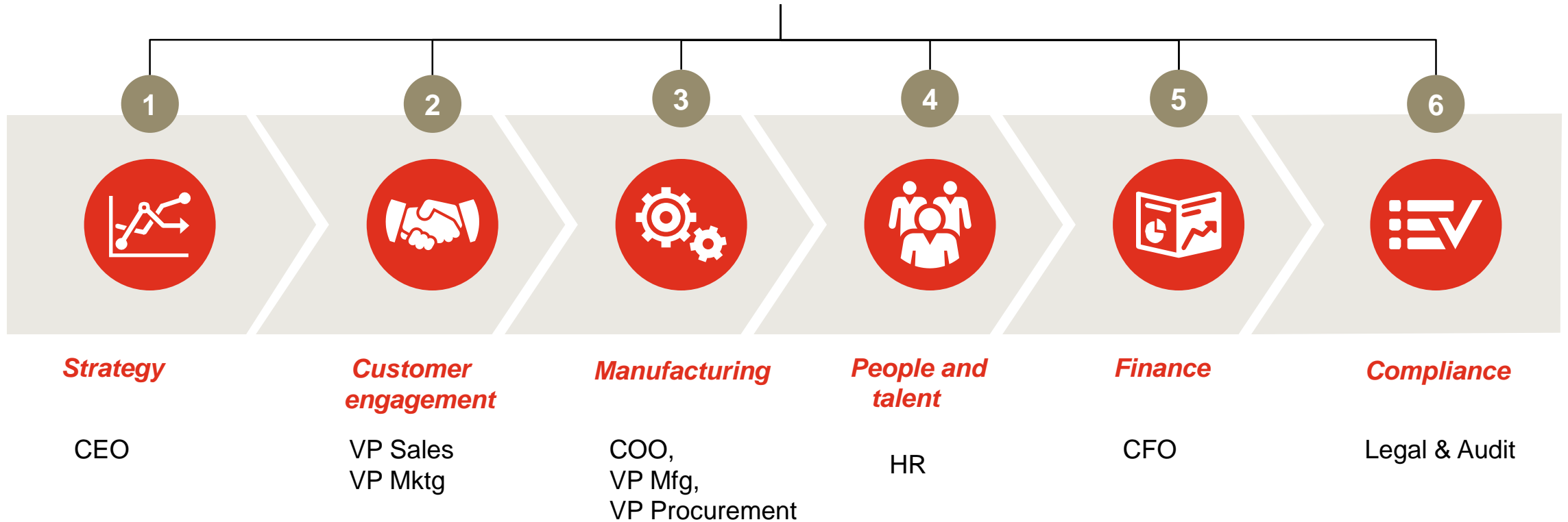


Impact on business

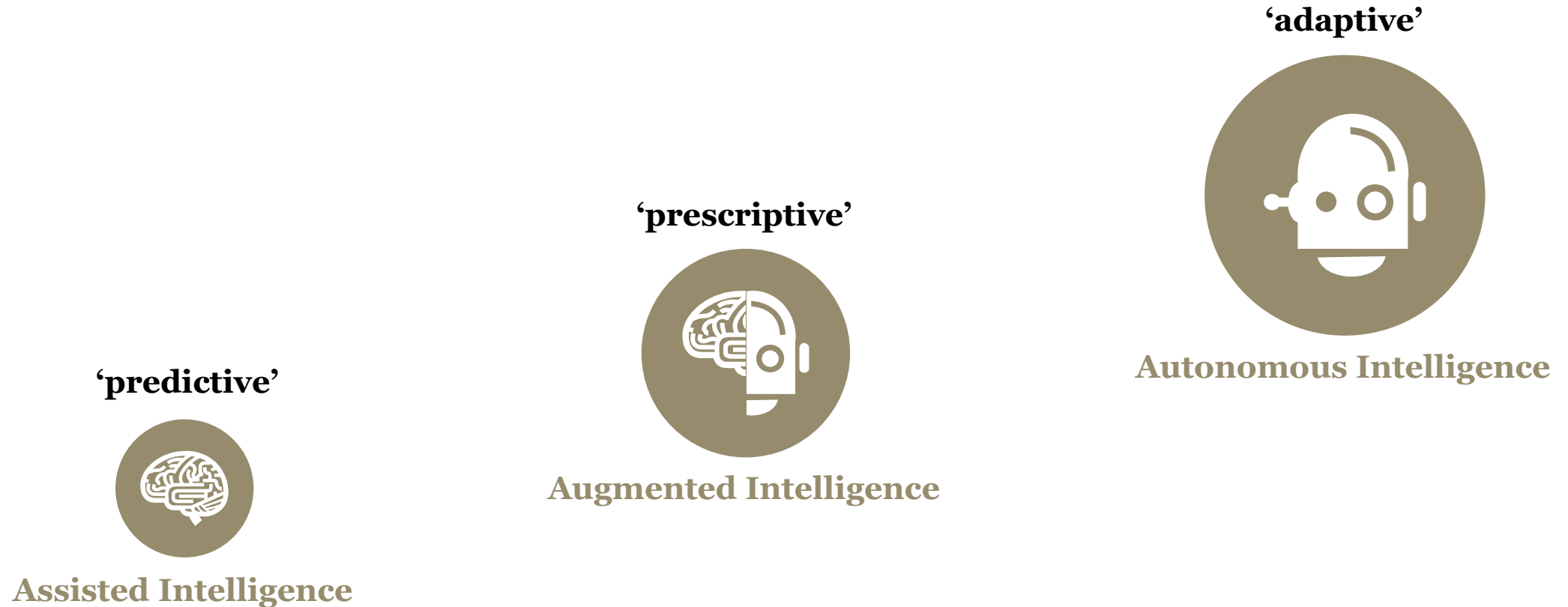
AI will impact all industries and businesses...



...as well as all elements of business



AI man-machine continuum



Sources: PwC "Leveraging the upcoming disruptions from AI and IoT"

Impact of AI

Disruptions

Regulations

Crisis

Nature of transformations resulting from AI disruptions

Disruption led transformations will be multiple...

...and their impact and focus will be global

Likely impacts?

Disruption driven transformations will initially contribute to high value-high margin products which will eventually mature into low margin commodity products.

Companies will be constantly challenged to manage the transition from high value to commoditization of the products at a pace not seen historically and which they may not see coming.

AI disruptions-led refocus

*Profit
maximization*

*Human capital
development/
optimisation*

*IP
protection*

*Crisis
management*

*Customer
engagement/experience
and revenue
optimization*

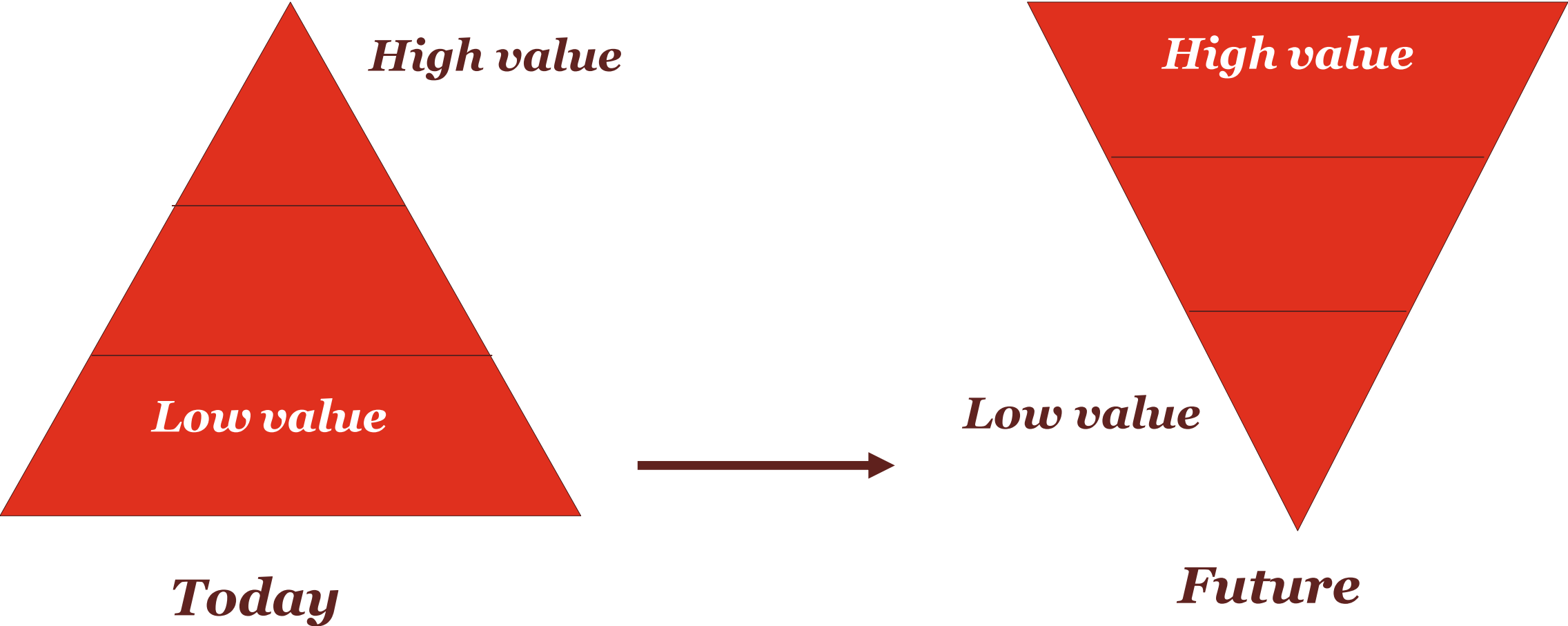
*Cyber/Digital
security*

What are other likely impacts?

Greater use of AI in every job and service

Reduced demand for low-value, high-volume skills

Shift in work from low-value to high-value



Changing workforce needs

*Reduced head count
and higher
productivity*

*Automation of low
skilled jobs*

Changing workforce hiring & development

Greater focus on human capital development

Rapidly changing skill sets – different hiring strategies

Dilemmas and Open Issues Associated with AI

Morality

*Potential
Misuse of AI
for Terrorism*

*Impact of AI on
Future Human
Development*

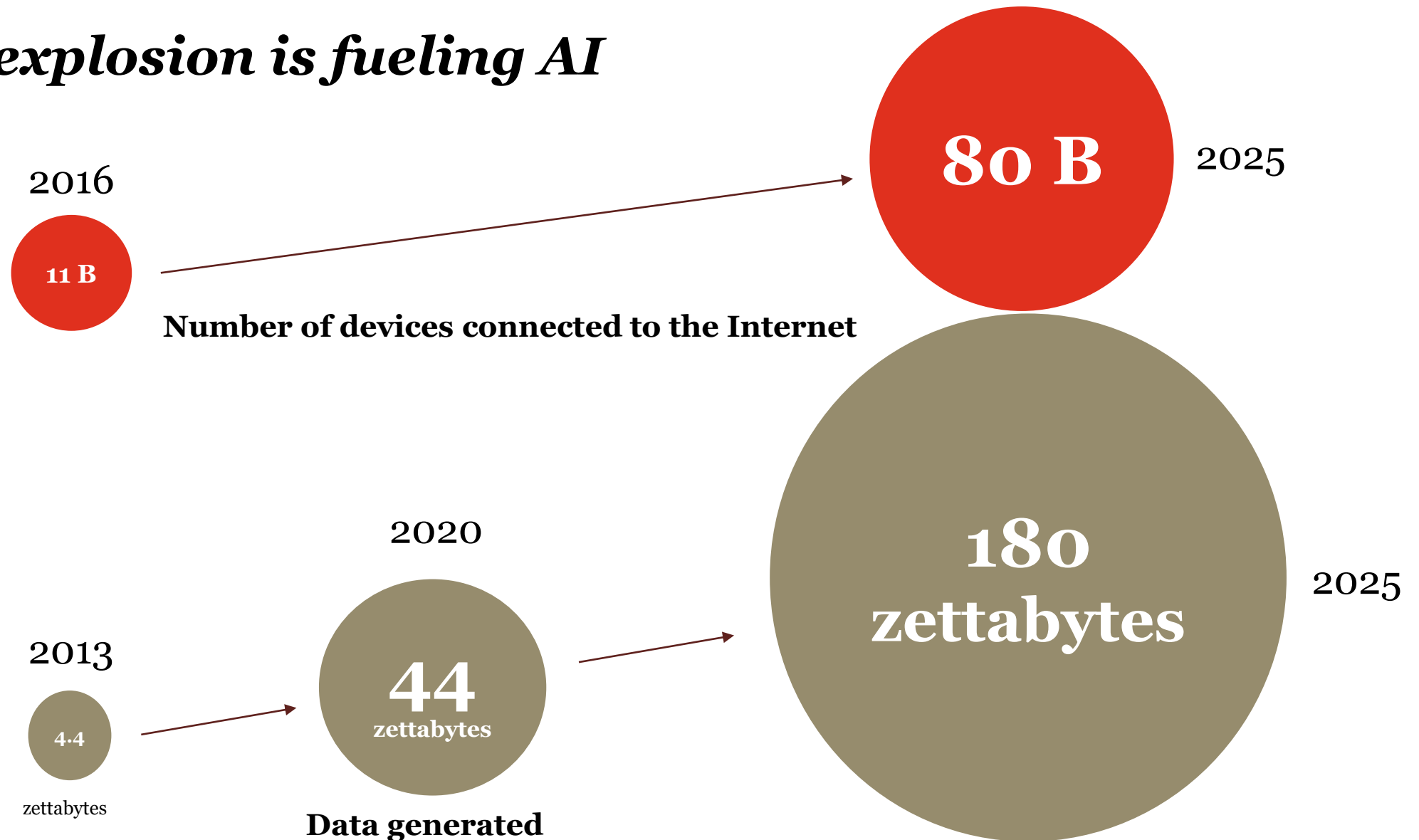
Man vs Machine debate

*AI and Social
Values*

*Human Toll
from Use of
AI in Wars*

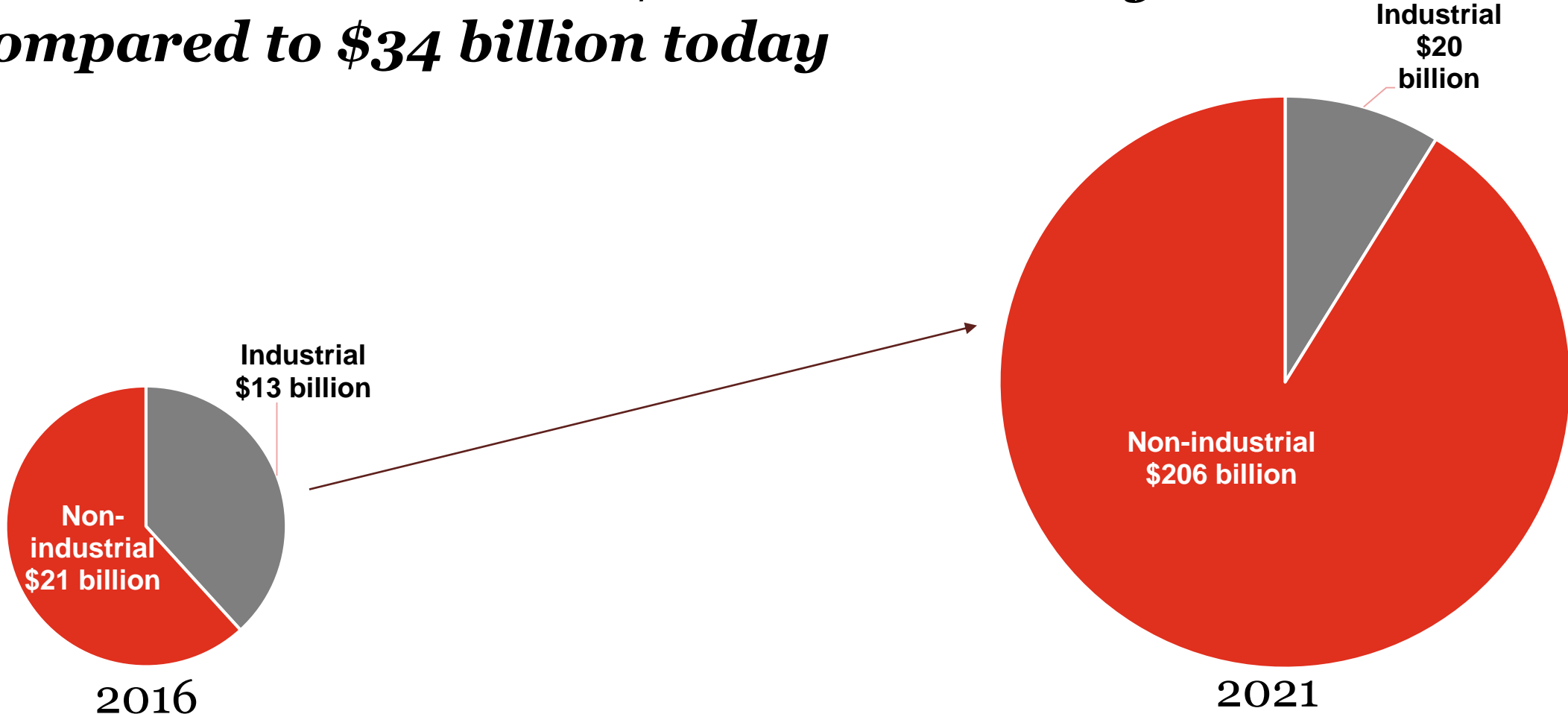
What's happening now and in the not so distant future?

Data explosion is fueling AI



Source: IDC

Robot market to reach \$226 billion by 2021 compared to \$34 billion today



Source: Tractica, 2016, The Global Robotics Industry is at a critical turning point as Non-Industrial Robots overtake industrial robots in market size for the first time in 2016 (<https://www.tractica.com/newsroom/press-releases/the-global-robotics-industry-is-at-a-critical-turning-point-as-non-industrial-robots-overtake-industrial-robots-in-market-size-for-the-first-time-in-2016/>)

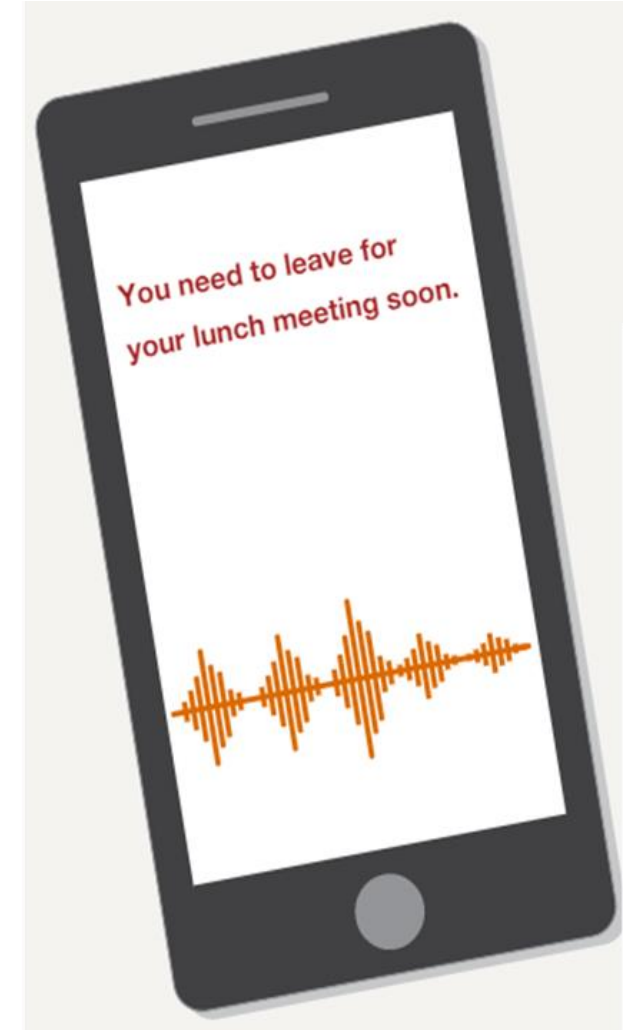
Digital assistants are driving the first wave of AI adoption

Percentage already using digital assistants:

42% of consumers

53% of millennials

72% of business decision makers



Source: PwC consumer intelligence series "How AI is pushing man and machine closer together"

Robotics and AI impacts

30% the increase
in productivity in many
industries in 10 years
due to Robots
and AI



18-33% the reduction
in manufacturing labor
costs over the same
period



Source: Bank of America Merrill Lynch, 2015, Allied market Research, Robotics Technology Market by Type and Application-Global Opportunity Analysis and industry Forecast. (<https://www.alliedmarketresearch.com/robotics-technology-market?robotics-technology-market>)

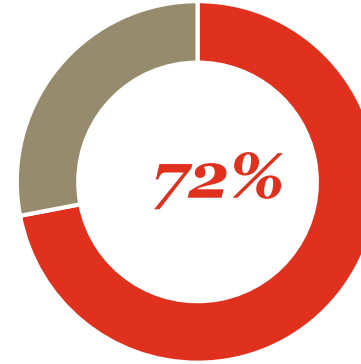
Majority of business executives see AI as business advantage of the future

67% agree AI will **help humans and machines work together and combine both digital and human.**

67% agree AI will **augment decisions leading to new levels and types of roles.**

62% agree AI will **automatically augment decisions, leading to more effective decision-making.**

67% agree AI will **help businesses automate processes, resulting in increased efficiencies and labor productivity.**



of business execs believe AI will be the business advantage of the future.



Source: PwC Digital IQ Survey 2016

Potential use of Robots/AI is endless

Auto piloted cars

Auto piloted ships

*Robot security
guards*

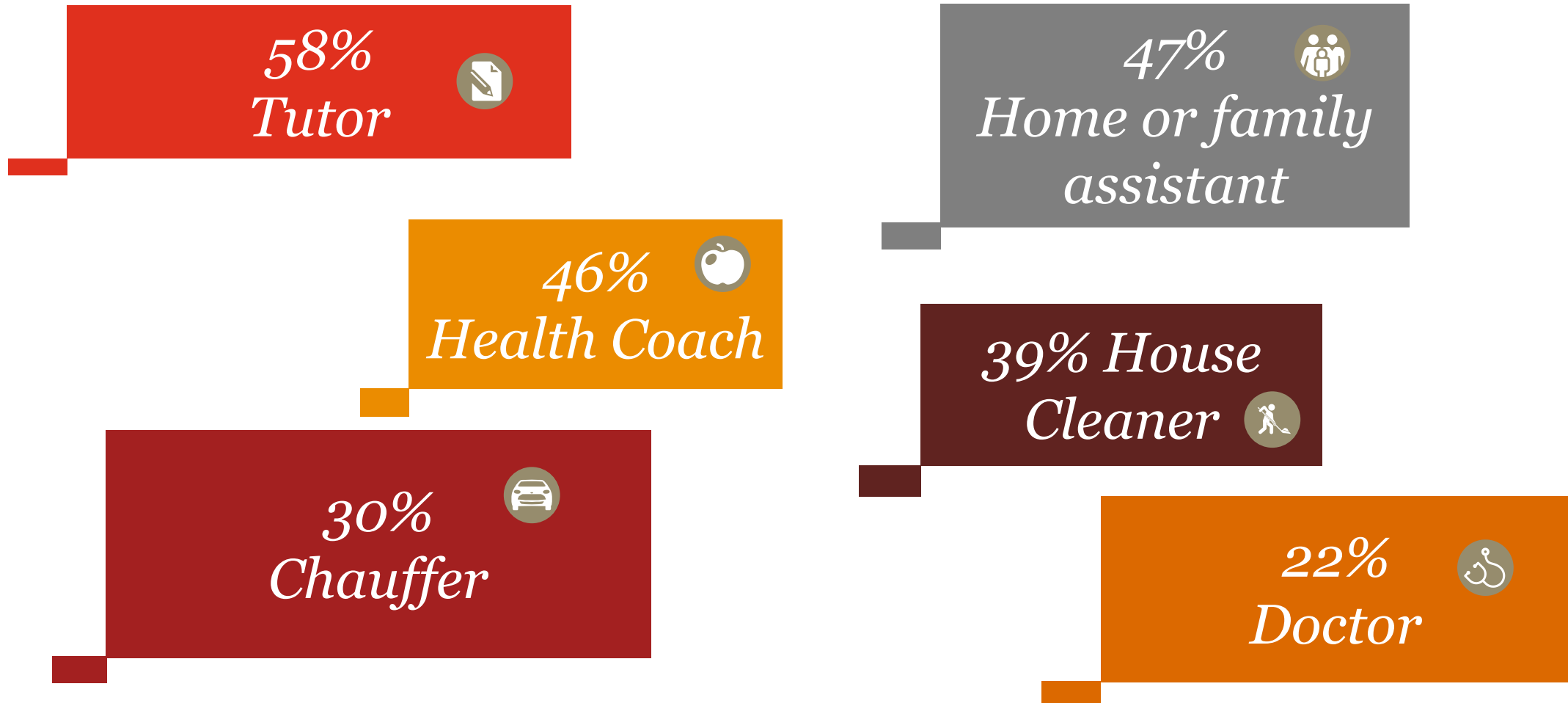
*Robot
mailmen*

*Robot health
care workers*

Robot firemen

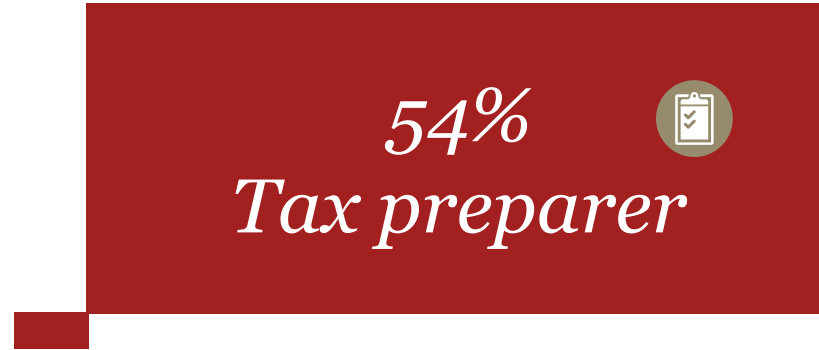
*Robots in
army*

In the next five years, in my personal life, I can see AI replacing humans as a...



Source: PwC consumer intelligence series “How AI is pushing man and machine closer together”

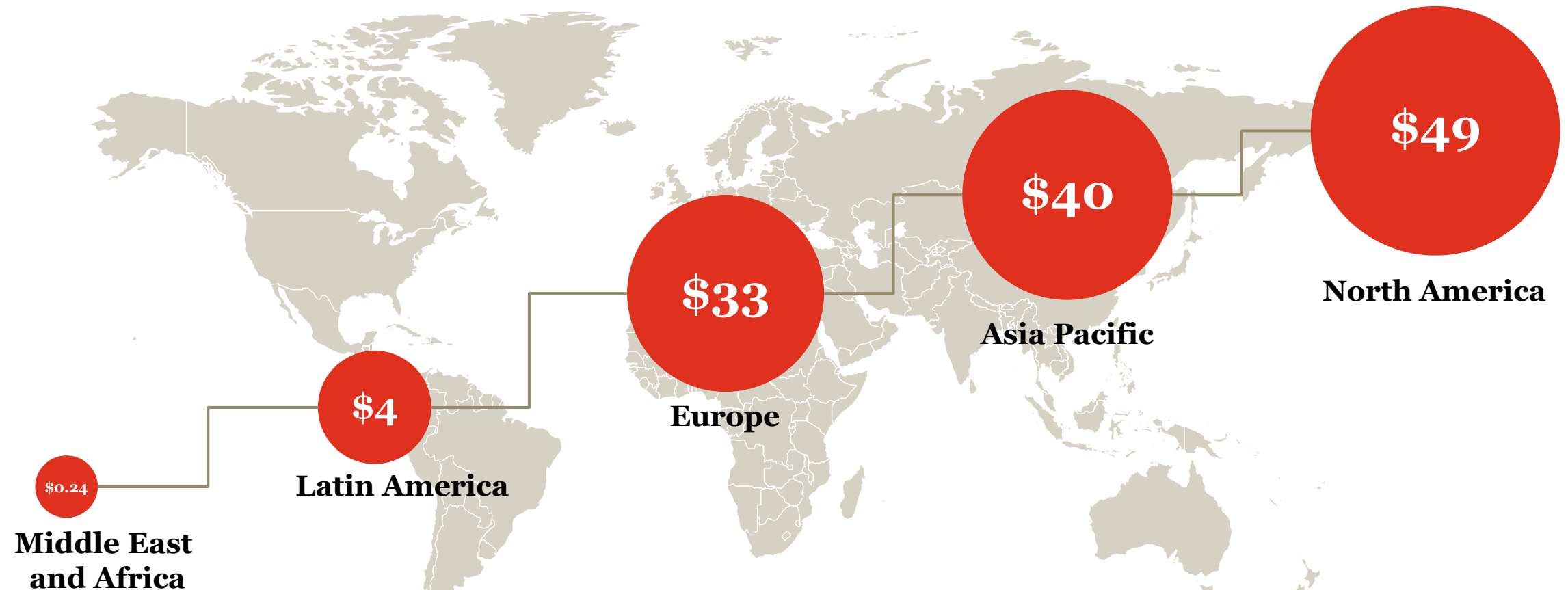
In the next five years, I can see AI replacing humans in business as a...



Source: PwC consumer intelligence series "How AI is pushing man and machine closer together"

Key regions/countries focused on AI

Revenues from the Artificial Intelligence (AI) market worldwide in 2015, by region (US\$ Billions)

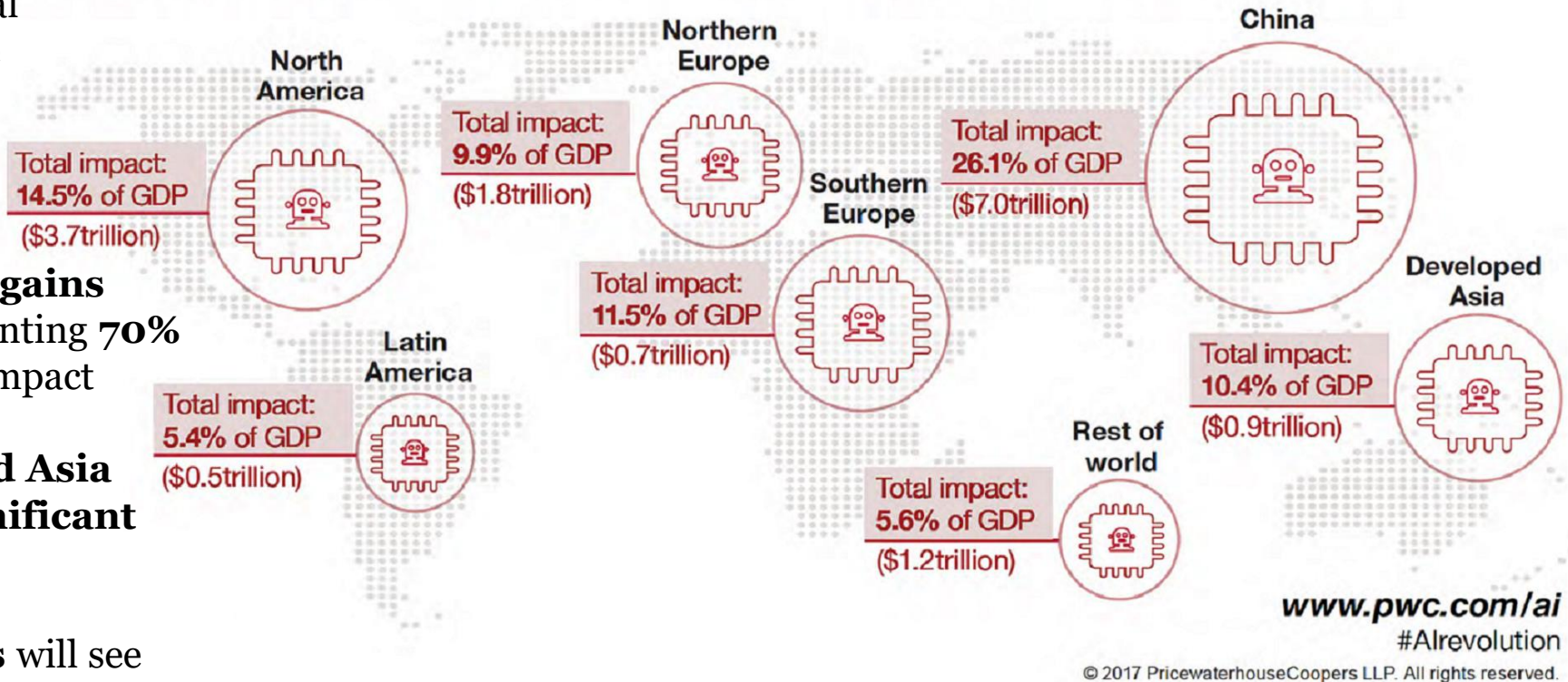


Note: Worldwide; 2015

Source: Statista estimates; Transparency Market Research

Projected AI GDP impact by region

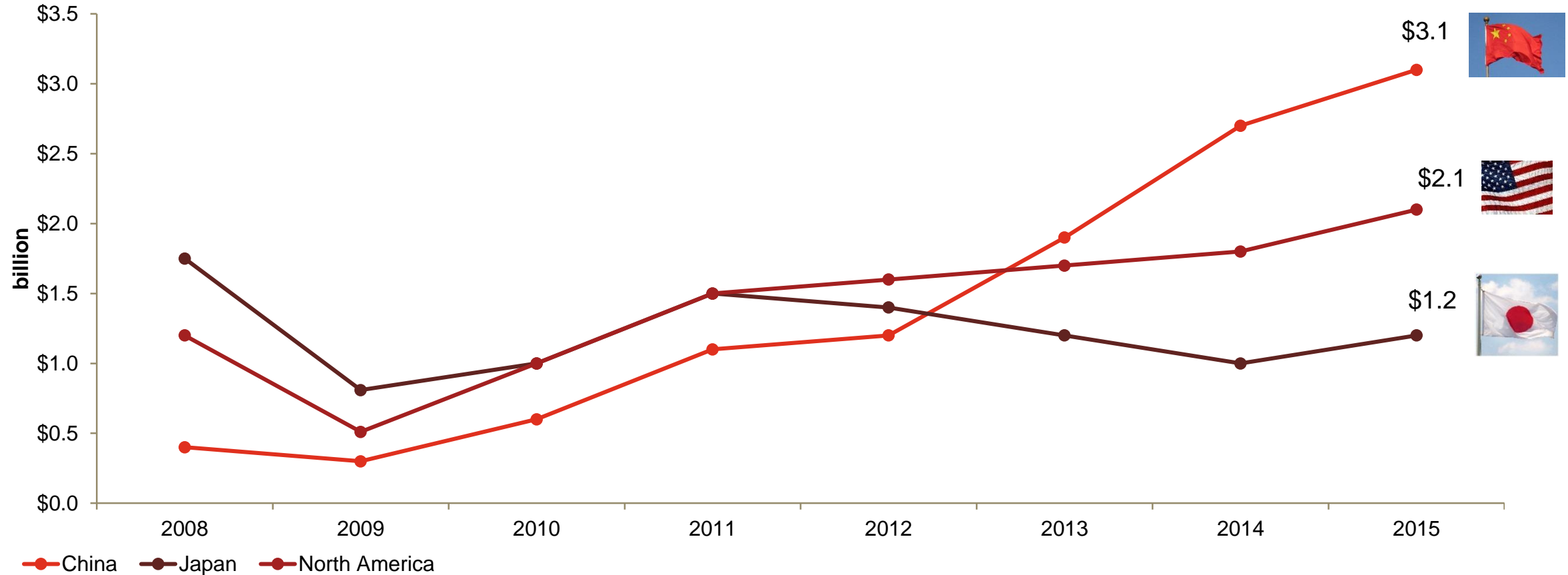
- All regions of the global economy will experience **benefits from AI**
- **North America** and **China** stand to see the **biggest economic gains** - **\$10.7 trillion** representing **70%** of the global economic impact
- **Europe** and **developed Asia** will also experience **significant economic gains**
- **Developing countries** will see **modest increases in GDP** due to lower rates of adoption of AI technologies



Source: Sizing the prize: What's the real value of AI for your business and how can you capitalize?, PwC June 2017

2016 GDP baseline based on Market Exchange Rate Basis; total impact as of 2030

China is the largest buyer of robots...



Source: <https://qz.com/922742/china-is-rapidly-making-robots-that-will-one-day-manufacture-everything-you-buy/>

...but still purchases 69% of its robots from overseas as well as relying heavily on foreign components

ABB

Power and productivity
for a better world™



China is closing the robot tech gap with acquisitions

TECHNOLOGY NEWS | Fri Dec 30, 2016 | 6:13am EST

China's Midea receives U.S. green light for Kuka takeover



Zhejiang Wanfeng acquires US robotics maker

Paslin

Updated: 2016-04-21 09:43

By Fan Feifei in Beijing and Shi Xiaofeng in Zhejiang(China Daily)

Print Mail Large Medium Small

Share 0



And soon China will be the largest producer











72,000 robots produced in 2016 with 100,000 to be produced by 2020

3000 industrial robot manufacturers have surfaced in China in past 5 years

Market valuations and AI











Top 10 most highly valued companies

1995

	Market cap \$B	Revenue per employee \$000		CAGR % ^e
		1995	2016	
	\$123	\$314	\$419	1.4%
	\$101	\$1,316	\$3,110	4.2%
	\$56	\$229	\$569	4.4%
	\$52	\$334	\$752	3.9%
	\$38	\$199	\$607	5.5%
	\$15	\$363	\$395	0.4%
	\$145	\$725	\$2,625	6.3%
	\$34	\$366	\$610	2.5%
	\$57	\$338	\$621	2.9%
	\$34	\$728	\$1,872	4.6%











Top 10 most highly valued companies

2016

	Market cap \$B	Revenue per employee \$000		CAGR %
		1995*	2016	
 Microsoft	\$489	\$334	\$752	3.9%
 BERKSHIRE HATHAWAY	\$407	\$199	\$607	5.5%
 EXXON Mobil	\$376	\$1,316	\$3,110	4.2%
 Johnson & Johnson	\$315	\$229	\$569	4.4%
 JPMorganChase	\$312	\$363	\$395	0.4%
	\$280	\$314	\$419	1.4%
	\$602	\$839	\$1,883	3.9%
	\$532	\$1,056	\$1,253	1.4%
 amazon	\$367	\$244	\$398	2.6%
	\$339	\$1,159	\$2,178	13.5%











Top 10 most highly valued companies

1995

	Market cap \$B	Net income per employee \$000		CAGR % ^e
		1995	2016	
	\$123	\$30	\$30	0%
	\$101	\$79	\$108	1.5%
	\$56	\$29	\$131	7.4%
	\$52	\$82	\$147	2.8%
	\$38	\$36	\$65	2.9%
	\$15	\$76	\$102	1.4%
	\$145	\$46	\$51	0.5%
	\$34	(\$52)	\$48	-
	\$57	\$27	\$100	6.4%
	\$34	\$22	(\$9)	-

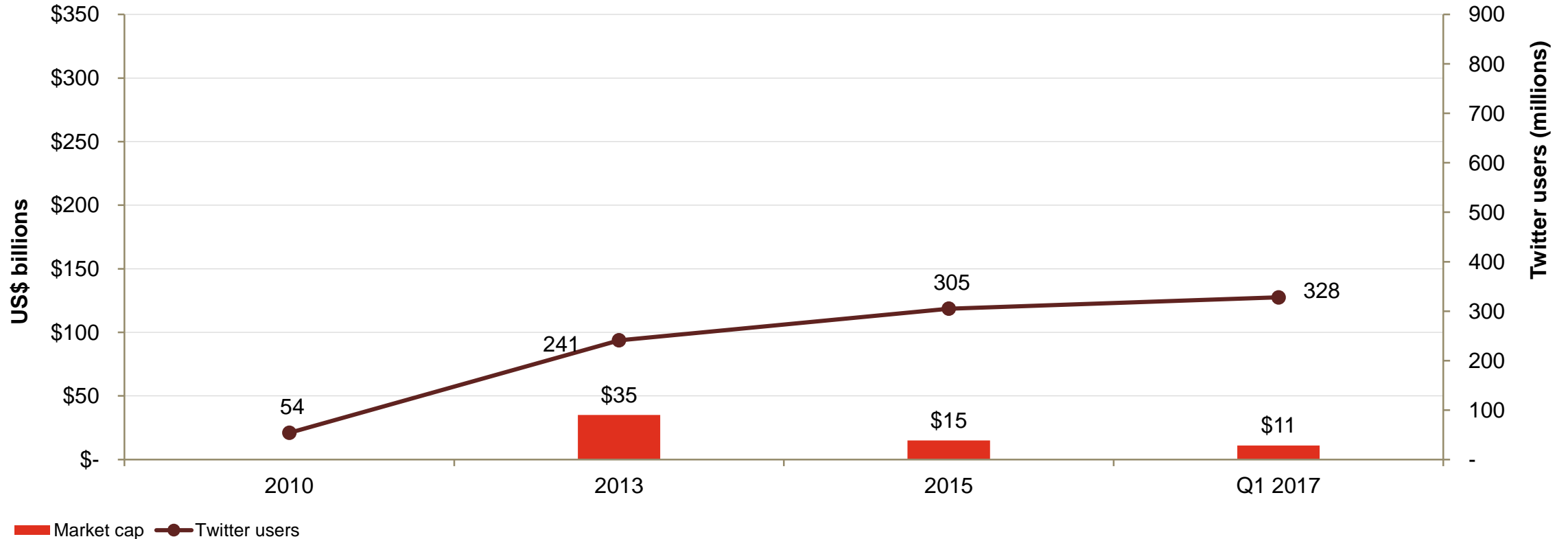
Top 10 most highly valued companies

2016

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		1995*	2016	
	\$489	\$82	\$147	2.8%
	\$407	\$36	\$65	2.9%
	\$376	\$79	\$108	1.5%
	\$315	\$29	\$131	7.4%
	\$312	\$76	\$102	1.4%
	\$280	\$30	\$30	0%
	\$602	\$32	\$390	12.6%
	\$532	\$132	\$270	6.1%
	\$367	\$(46)	\$7	-
	\$339	\$313	\$823	21.3%

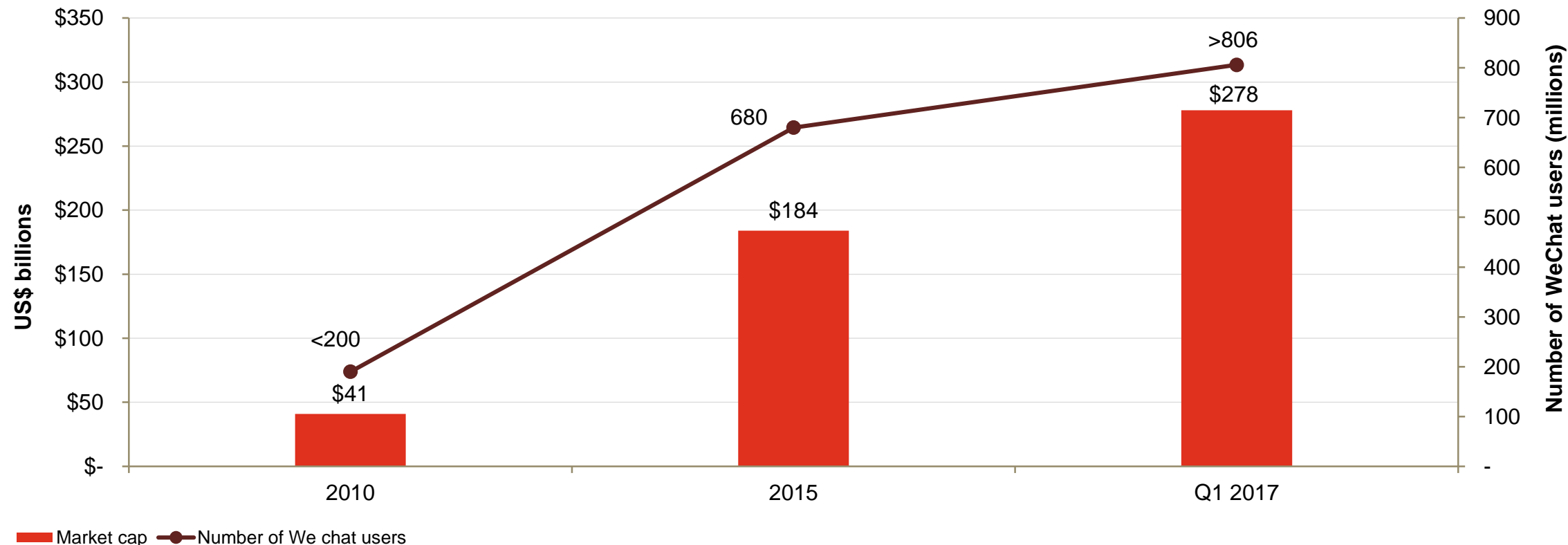


market cap (billions) and active users (millions)



Source: Strategist's guide to AI, Strategy&
<https://www.tencent.com/en-us/abouttencent.html>
<http://www.businessinsider.com/wechat-breaks-700-million-monthly-active-users-2016-4>
<https://www.statista.com/statistics/282087/number-of-monthly-active-twitter-users/>

Tencent 腾讯 *market cap (billions) and active users (millions)*



Source: Strategist's guide to AI, Strategy&

<https://www.tencent.com/en-us/abouttencent.html>

<http://www.businessinsider.com/wechat-breaks-700-million-monthly-active-users-2016-4>

<https://www.statista.com/statistics/282087/number-of-monthly-active-twitter-users/>

Why is *Tencent* 腾讯 winning?

*Sophisticated
voice recognition*

*Chinese to English
language
translation*

*Facial
recognition*

*Virtual bot
friends*

*Virtual guessing
game opponents*

AI deals

Acquisitions of AI companies are accelerating – over 30 in Q1 2017 and 200 since 2012



\$1 billion investment over 5 years.
Argo AI tasked to develop virtual driver system

Ford acquires SAIPS for self-driving machine learning and computer vision tech



Monsanto Buys Climate Corp For \$930 Million



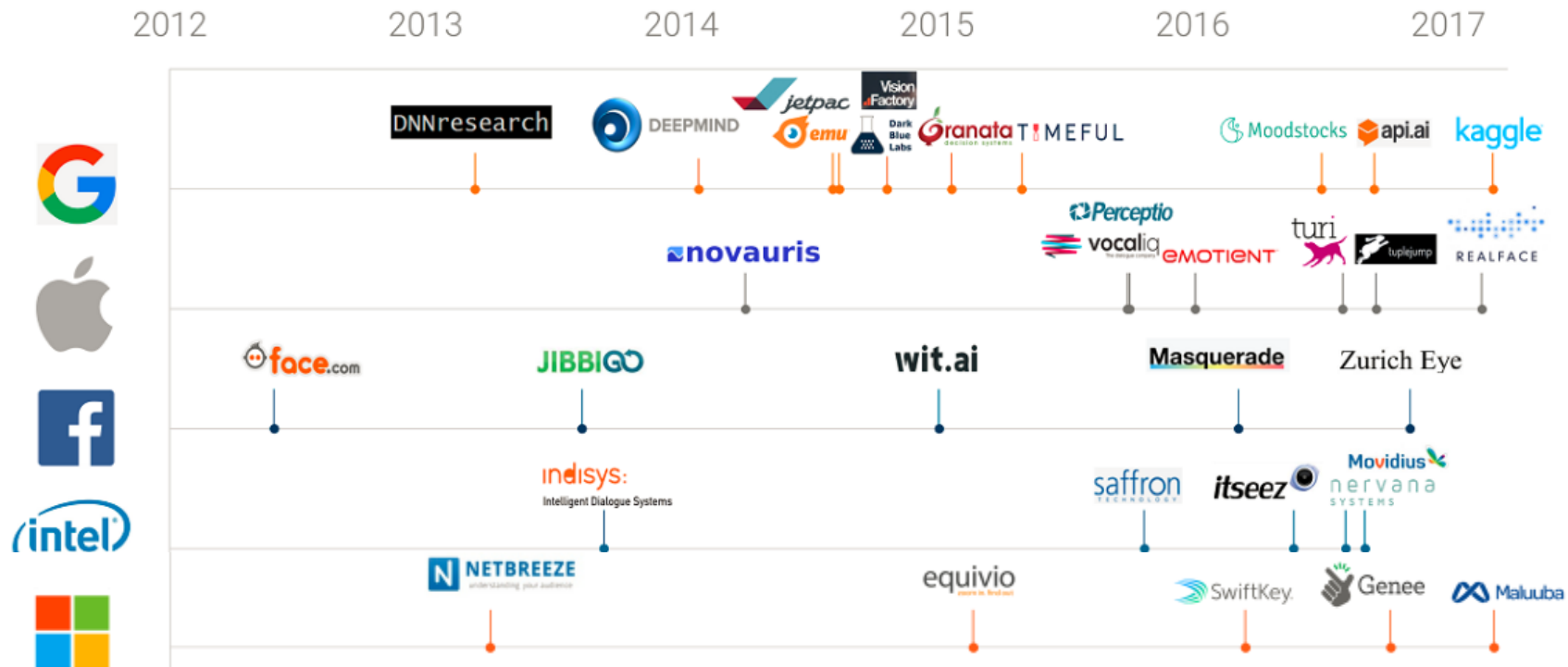
GE Buys Bit Stew for \$153M to Beef Up Its Industrial Internet Software



GE acquires Wise.io to deepen its machine learning stack

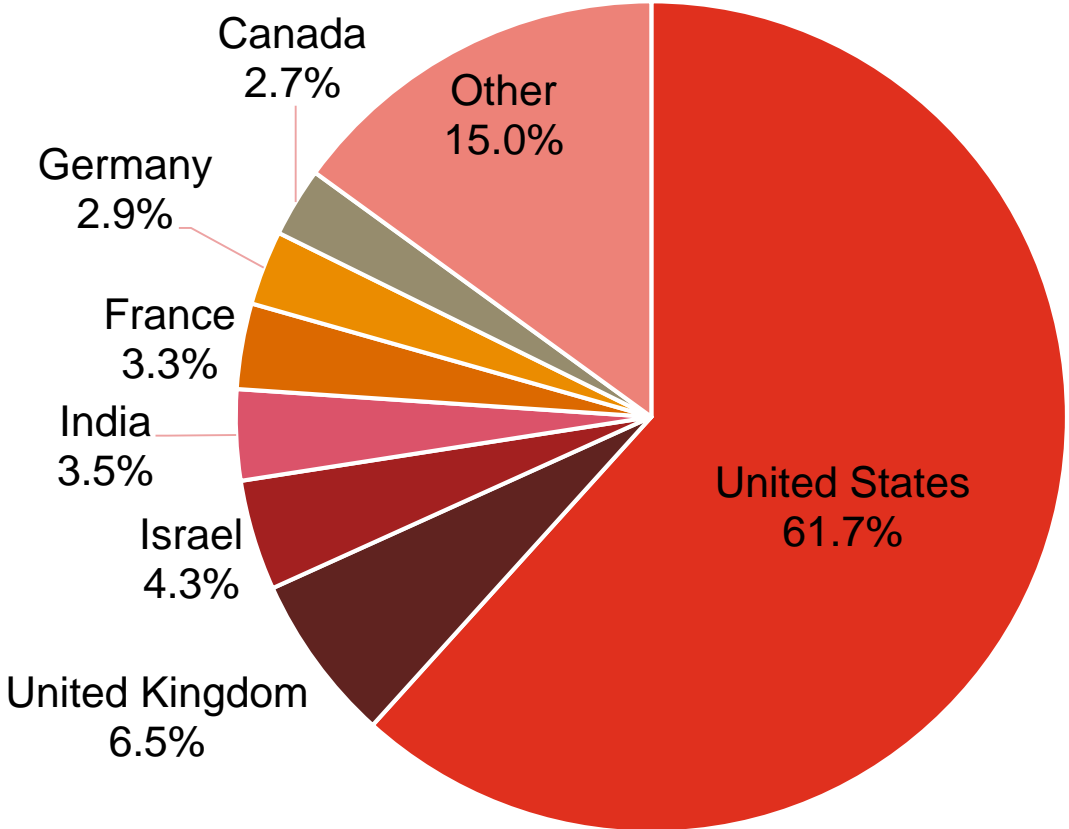


AI startup acquirers: Google #1, Apple #2, Facebook, Intel and Microsoft #3



Source: https://cbi-blog.s3.amazonaws.com/blog/wp-content/uploads/2017/03/race_for_ai_new_4.png

2016 AI venture investment by geography



Source: CBInsights

Non-tech companies have become major tech acquirers

682 the number of tech companies bought by non-tech acquirers

2016 the first year the number of tech companies bought by non-tech surpassed those acquired by tech

15% the number of tech deals in 2016 – more than any other sector

\$80B the 2016 deal value of US tech deals by non-digital buyers, second year in a row

Sources: Bloomberg, Thomson Reuters, PwC Deal Insights Year End 2016

AI across industries

Telecommunications

Telecoms are looking for new markets...

Verizon acquires Skyward, aims to manage drone operations, connections



Verizon's purchase of Skyward signals how the telecom giant sees drones as a key part of its fast-growing Internet of things business unit.

AT&T to launch network for Internet of Things

New cellular technology able to reach farther, use less power



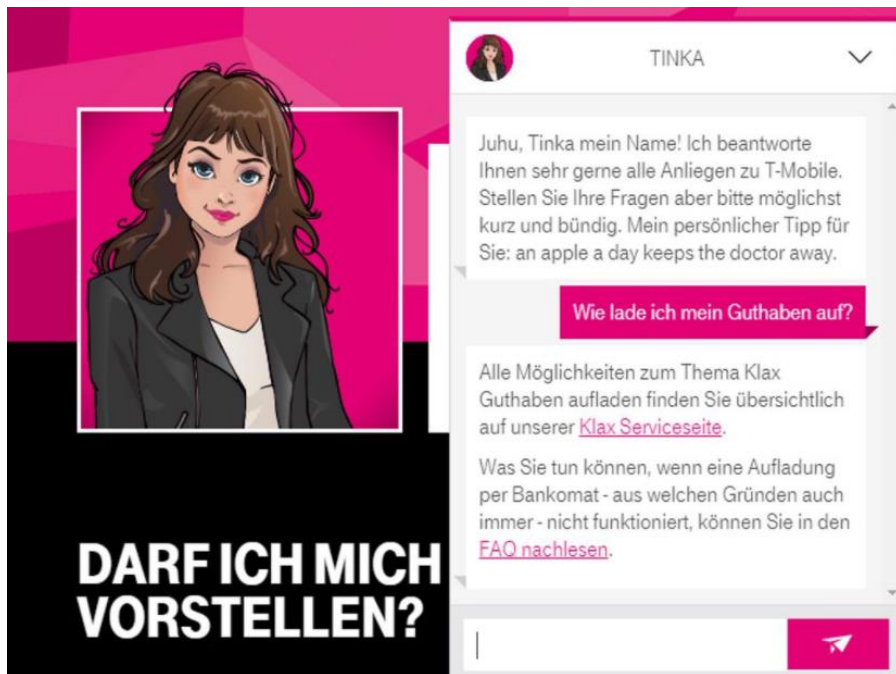
Pepsico exec explains how smart soda machine uses AT&T LTE-M network

...with AI dependent on data and connectivity, telecoms are at the core of AI development



A number of telecoms have introduced virtual assistants, a key enabler for the success of smart home applications

Deutsche Telekom



Telefónica presents AURA, a pioneering way in the industry to interact with customers based on cognitive intelligence

Telefónica shows its transformative 4th Platform project for the first time at the MWC

SK Telecom launches AI-based voice assistant service

The first to understand the Korean language, SK Telecom's NUGU virtual assistant service is armed with advanced voice recognition, natural language processing, and deep learning technology to help your way around the home.

Orange unchained with Djingo smart home launch



Written by [Jamie Davies](#) | 20 April 2017 @ 16:03



Telecoms are also using AI to leverage infrastructure assets and offer cloud computing and network services

AT&T Network 3.0 Indigo Redefining
Connectivity Through Software Control, Big
Data & Blazing Speed



Drive your cloud with flexibility and security

Verizon Exponent Brings AI, IoT, Cloud and
Digital Transformation Services to Carrier
Community

2/24/17 at 8:11 AM by Joan Engebretson



On the cost side, telecoms are also realizing cost-optimization benefits from AI

*Network
Planning*

*Self-optimizing
Networks*

*Network
Maintenance*



*Vodafone's
Customer Service
Chatbot TOBi*

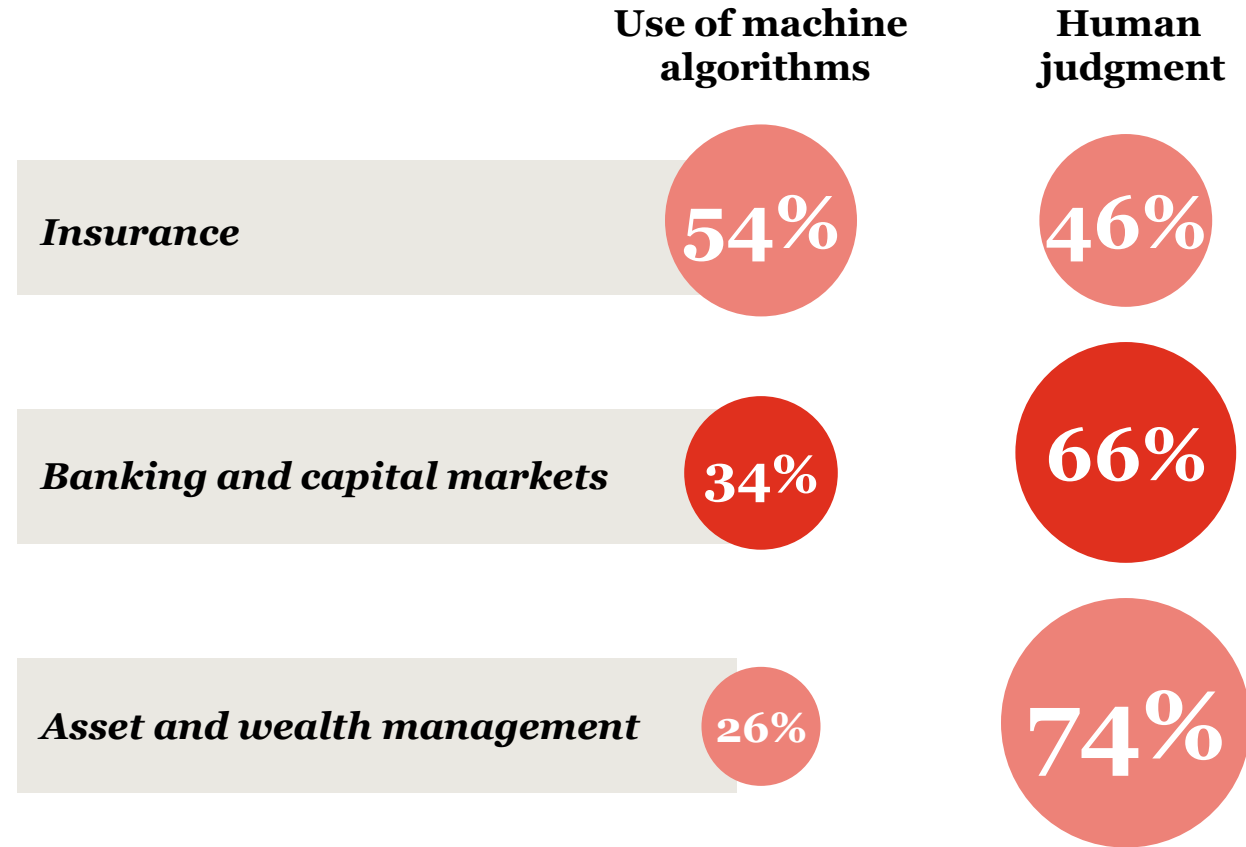
Sales-agent Support

*Customer
Analytics*

AI across industries

Financials

Opportunity abounds for AI in financial services



Source: PwC's 2016 Global Data and Analytics Survey™. Big Decisions™, US financial services respondents.

Use of artificial intelligence technology in financial services to grow

Firms are increasing productivity and personalizing the client experience with AI

Financial Product Trading Platform Artificial Intelligence R&D Tax Credits



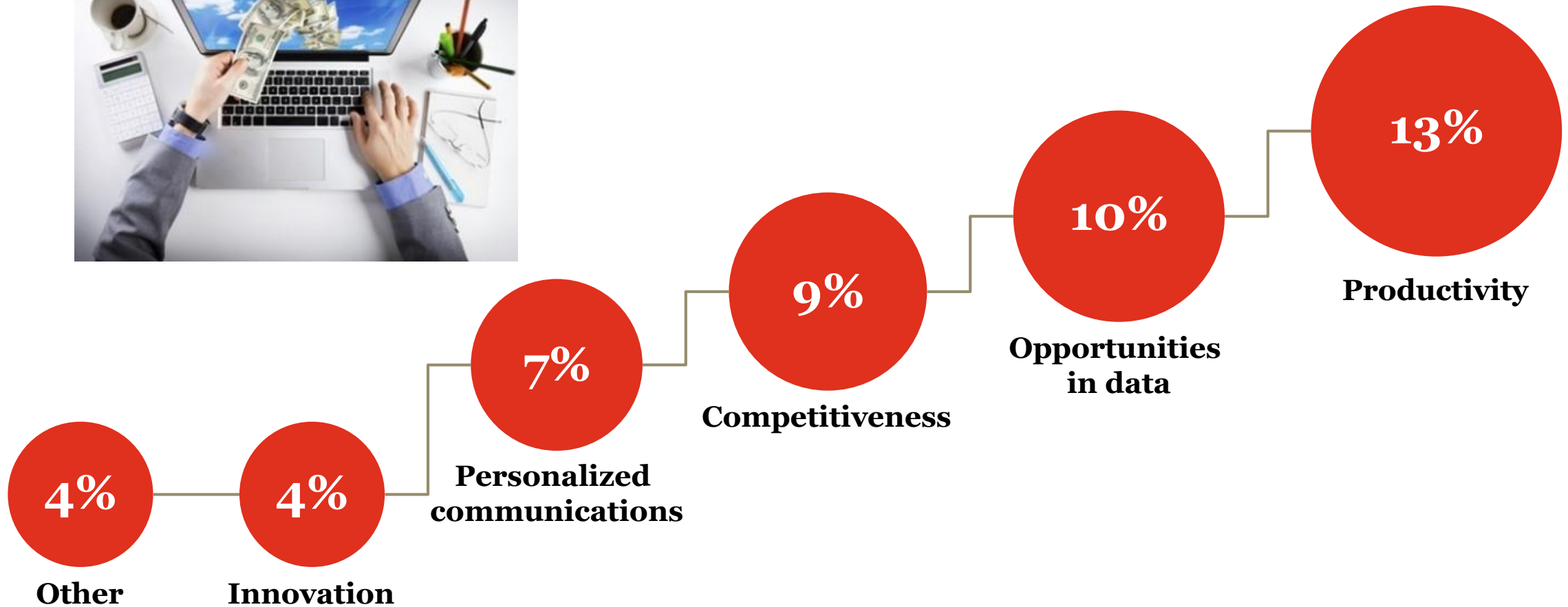
Financial advisers must adapt quickly to competition from robos to stay in business: CFP Board

The CFP Board's research is the result of a gathering of more than two dozen fintech and other industry experts, who pondered how the advice business will change by 2021

Tools financial technology companies plan to bring advisers in 2017

Many of the tools will be inspired by today's customer, who wants the same efficiency and ease they find with Amazon

Why financial services is using AI solutions



Source: The Rise of AI in Financial Services, Narrative Science, Dec.2016

AI across industries

AutoTech

AI is powering Auto Tech

Hello, OnStar -- Meet Watson

- IBM and GM introduce new cognitive mobility platform to improve the driving experience for millions of consumers
- Watson to connect consumers with such brands as ExxonMobil, Glympse, iHeartRadio, Mastercard and Parkopedia



Toyota Research Institute puts \$35M into AI-powered materials research

Posted Mar 30, 2017 by [Darrell Etherington \(@etherington\)](#)

By 2020, consultancy Gartner estimates that nearly 250 million cars will be connected to the Internet, and PriceWaterhouseCooper forecasts that the connected car market will be worth \$149 billion by that year.

GM buys self-driving car kit startup Cruise, plans to use tech to make driverless cars

And it's turning carmakers into technology companies

*Over-the-air
(OTA) software
updates*

*Connected vehicles send
performance data directly to
dealer*

*IoT systems will
diagnose issues, some of
which can be corrected
remotely*

*Vehicle-to-vehicle
technology will allow
cars to communicate
with each other,
reducing accidents*

*New features can be delivered OTA –
providing new revenue streams*

33 Corporations working on autonomous vehicles



Autonomous car leaders



Tesla is loaded with German components: Chipmaker Infineon, sensors from Bosch



WAYMO

2.5 million miles self-driven

We've accumulated the equivalent of over 400 years of human driving experience, largely on complex city streets. That's on top of 1 billion simulated miles we drove just in 2016.

TechCrunch Disrupt: Ford open to talks with Waymo

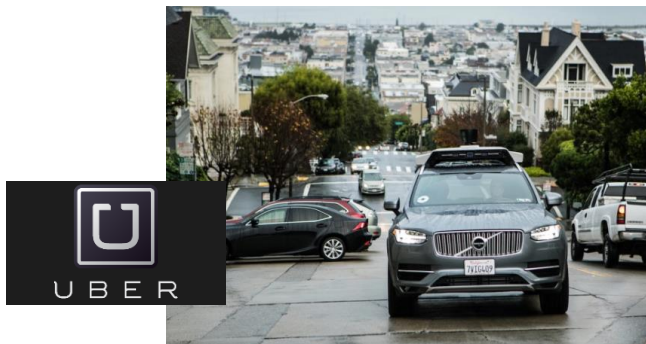
Apple gets permit to test autonomous cars in California

Posted Apr 14, 2017 by Romain Dillet (@romaindillet)

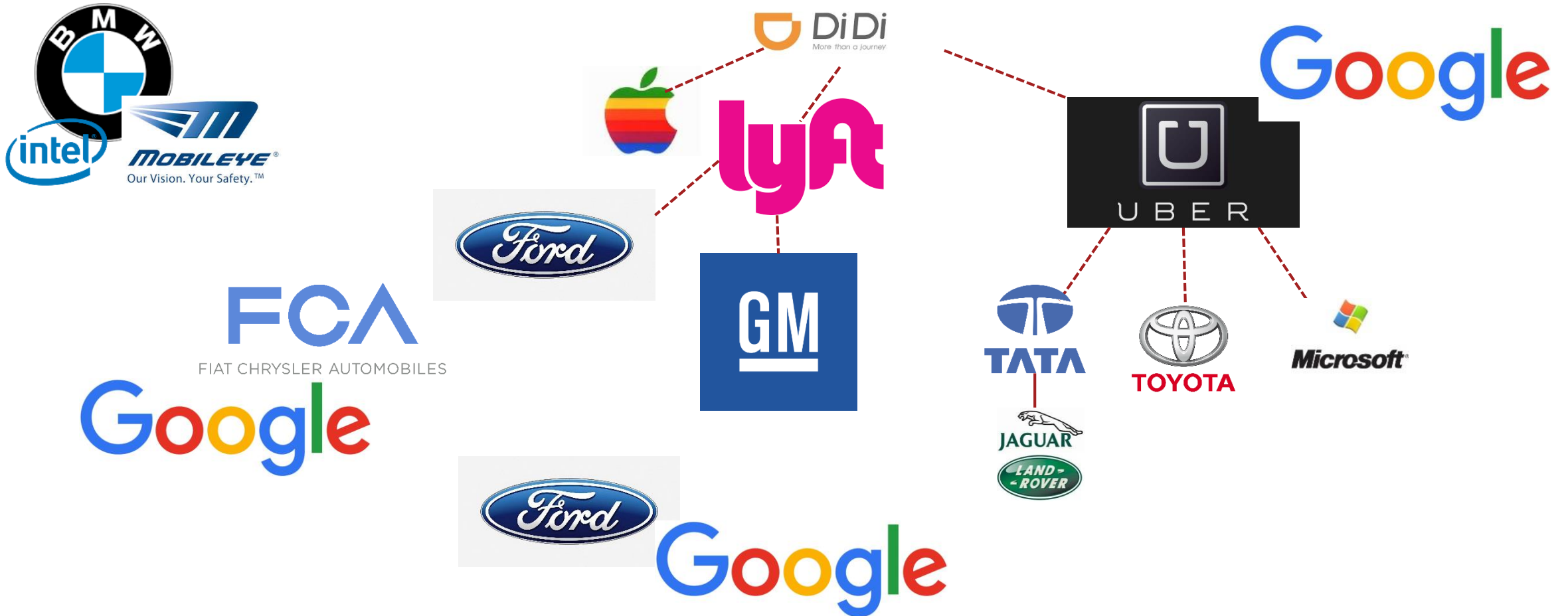


Apple Car

Apple's vehicle project, focused on building an autonomous driving system.



New joint ventures and alliances



Ford-Google alliance leading coalition of companies advocating federal approval of driverless cars

AI across industries

Healthcare

AI and Healthcare – top 3 applications

*1. Personal genetics:
Google’s “Deep
Mind” and IBM’s
“Watson”*

*2. Hyper targeted
drugs*

*3. Discovering and
managing new
diseases*

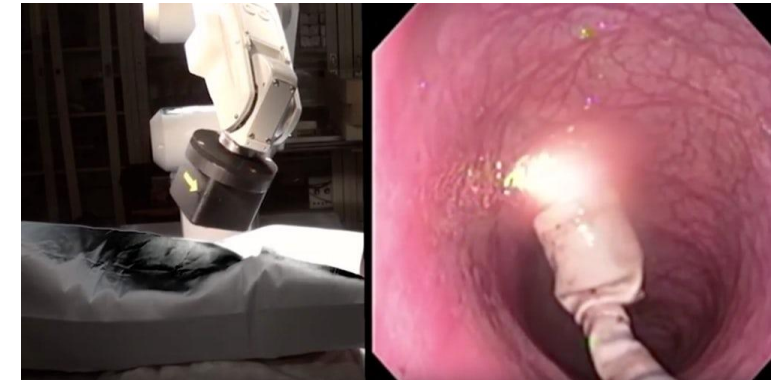
“At the University of North Carolina School of Medicine, Watson (IBM’s AI product) was tested on 1,000 cancer diagnoses made by human experts. In 99% of them, Watson recommended the same treatment as the oncologists. In 30% cases Watson found treatments which humans missed.”

Amazing new capabilities today

First-ever autonomously controlled 'capsule robot' explores colon

Researchers cite future role in improving acceptance, accuracy of colonoscopy

Date: May 8, 2017



Click-on arm prosthesis controlled by patient's thoughts

Date: April 25, 2017

Source: Radboud University Nijmegen Medical Centre, Netherlands

Emerging AI-enabled capabilities

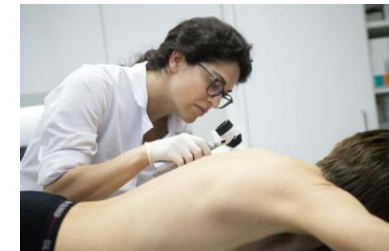
AI can predict autism through babies' brain scans



University of North Carolina researchers developed deep learning algorithm – 81% accuracy

AI is nearly as good as humans at identifying skin cancer

The deep learning algorithm could eventually give you a diagnosis at home.



<https://www.engadget.com/2017/01/26/ai-rivals-humans-in-identifying-skin-cancer/> <https://www.engadget.com/2017/02/20/ai-can-predict-autism-in-babies/>

And like AutoTech, there are both health and tech players working on solutions



Alphabet starts collecting health info to better predict disease

Verily's study will use its health-tracking watch to spot early signs of illness.

Will AI and Robots really mean fewer jobs?

AI's impact on jobs and skills

By 2030 AI will automate...

*70% of jobs in
energy sector*

*65% of jobs in
consumer staples*

And AI will deliver...

*An EBITDA uplift
of \$33 billion in
energy*

*And \$29 billion
in consumer
staples*

Sources: S&P Capital IQ Sector Revenue & EBITDA (LTM 6/30/2016, Global Public Companies & companies with public debt, avg. 96% coverage), US Bureau of Labor Statistics, Future of Employment (Frey & Osborne 2013).

AI introduces new workflows to legal profession

“Cheap, accurate artificial intelligence closes in on the work of junior lawyers”

– FT May 5, 2017

80% of consumers says it's more important to have **access to more affordable legal advice** than to preserve the jobs of **lawyers**.

In 2016, 67 US “lawtech” startup investments totaling

\$155 million



AI improves customer service

92% percent of senior executives believe that **customer experience is a key competitive differentiator**

*“AI is powering nearly every experience we have— making it smarter, seamless and personalized— and as a result **our expectations as consumers are at an all-time high.**”*



64% of consumers says it's more important to have **instant access to quality customer service** than to preserve the jobs of **customer service reps.**

Sources: Huffington Post, 3/7/2017 (http://www.huffingtonpost.com/entry/ai-powered-customer-service-needs-the-human-touch_us_58b88046e4b0ffd61787bd3d), Salesforce Research

But there's an opposing view – why AI is not a job killer

Computerization has led to new, well-paying careers in areas that didn't exist before

ATMs resulted in a 10% increase in bank tellers between 1980 and 2010 as banks refocused on loans, investments and other relationship-based services

When IT is not automated, IT staff are consumed by fixing network issues. With these tasks automated, IT can spend time on innovative business solutions

Source: State of Work survey – ServiceNow 2017 – and ZEW Study, Study of Mannheim Centre for European Economic Research and the University of Utrecht, 2016

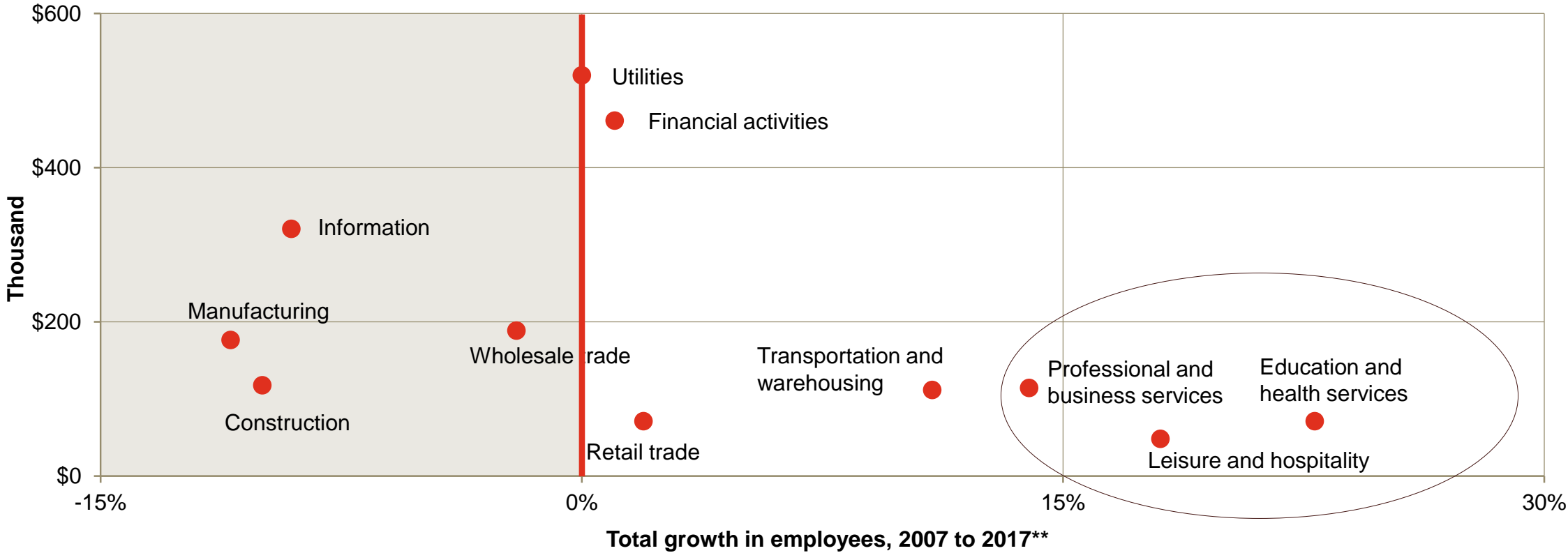
Automation drives employment

- **Automation reduces production costs**
- **Reduced product costs reduce product prices**
- **Reduced product prices increases demand for products**
- **Increased demand for products drives increased employment**

Source: State of Work survey – ServiceNow 2017 – and ZEW Study, Study of Mannheim Centre for European Economic Research and the University of Utrecht, 2016

Robots aren't destroying enough jobs – the fastest growing sectors are the least productive

Value added per employee, 2016



** Through the first four months of 2017
 Source: WSJ, May 10 2017

*“Computers are really good at an increasingly sophisticated range of things, but they're **still quite bad at being people.**”*

Lisa Kahn, Labor Economist at Yale University

AI implications

Key elements of AI worth considering

*Unknown
Regulations*

*Globally Diverse
Players*

*Competing
Standards/
Technologies*

No Clear Leaders

*Multiple Sets of
Diverse
Regulations*

*A Broad Range of
Products and
Platforms*

Likely impact of AI

New Opportunity to Redefine the Risk Reward Equation

Greater Real-time Reliance on Cognitive Computing

Higher Complexity

Opportunities for New Product/Service Offerings

Growing Power of Secured Connections

Renewed Focus on Quality with Zero Tolerance for Errors

Likely impact of AI (cont.)

*Change in
Leading Players
??*

*Continuing
Consolidations*

*New Partnerships
and Alliances*

*Reshuffle in
Geographical
Dominations?*

*Increasing Cross
Border Partnerships,
Mergers and Alliances*

*AI-empowered Companies
and Products become Clear
Differentiators*

*A Relook at Vertical
Integration?*

Likely impact of AI (cont.)

*TAM Expansion beyond
Traditional Markets*

*New Opportunities for
Margin Expansion*

*Newer
Disruptions
not
Experienced
before*

*Maturing of BRIC
Players*

*Business Opportunities
beyond Traditional
Opportunities*

*Interest in TMT
Sector by
Industrial & Other
Sectors*

Keys to success in a disruptive world

Agility

*Lowest Cost
Base*

Scale

*Digital Security with
Transparency*

*Diverse
Workforce*

*Global Mindset
and Global
Presence*

*Commitment
to Partnering
with Others*

*Managed
Risk Taking*

AI Implications

- *Pragmatic companies are engaging the C-suite and Boards of Directors in strategic discussions and analysis of upcoming AI-led disruptions to the market place and their business*
- *Companies need to pursue this as a “**Strategic Opportunity**”*
- *If companies do not pursue this as a “Strategic Opportunity” today, they will have to tackle this as a “Major Challenge” in the not too distant future*
- *“Missed opportunities” of today will become the “Chronic Headaches” of tomorrow*

AI Implications

- *You know your business and your company the best.*
- *Indulge your management teams in a **brainstorming** session of both*
 - *How you **are going to be disrupted by AI** and*
 - *what **opportunities you have to disrupt others***
- *This should be **both an offensive and a defensive strategy** discussion*
- *The right **time is now***
- ***Start the dialogue starting today***

“We always overestimate the change that will occur in the next two years and underestimate the change that will occur in the next ten. Don’t let yourself be lulled into inaction.”

Bill Gates, Founder, Chairman Microsoft



Thank you

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