

Class I - Innovation

Disruptive Innovation – Why Lawyers Matter

Introduction to innovation

Definitions

Dimensions

Drivers

Developments

Innovation - What is it?

Innovation - What is it?

- Innovation is the introduction of new ideas, goods, services, and practices which are intended to be useful (though a number of unsuccessful innovations can be found throughout history). The main driver for innovation is often the courage and energy to better the world. An essential element for innovation is its application in a commercially successful way. Innovation has punctuated and changed human history (consider the development of electricity, steam engines, motor vehicles, et al).

What is innovation?

- **Innovation** is the process and outcome of creating something new, which is also of value.
- Innovation involves the **whole process** from opportunity identification, ideation or invention to development, prototyping, production marketing and sales, while entrepreneurship only needs to involve commercialization (Schumpeter).

What is innovation?

- Today it is said to involve the **capacity to quickly adapt** by adopting new innovations (products, processes, strategies, organization, etc)
- Also, traditionally the focus has been on new products or processes, but recently new **business models** have come into focus, i.e. the way a firm delivers value and secures profits.

What is innovation?

Schumpeter argued that innovation comes about through new combinations made by an entrepreneur, resulting in:

- a new product,
- a new process,
- opening of new market,
- new way of organizing the business
- new sources of supply

Dimensions of innovation

There are several types of innovation

- Process, product/service, strategy,

which can vary in degree of newness:

- Incremental to radical,

and impact:

continuous to discontinuous

Types of innovation

Types of innovation

In business and economics, innovation is often divided into five types:

1. **Product innovation**, which involves the introduction of a new good or service that is substantially improved. This might include improvements in functional characteristics, technical abilities, ease of use, or any other dimension.
2. **Process innovation** involves the implementation of a new or significantly improved production or delivery method.
3. **Marketing innovation** is the development of new marketing methods with improvement in product design or packaging, product promotion or pricing.
4. **Organizational innovation** (also referred to as social innovation) involves the creation of new organizations, business practices, ways of running organizations or new organizational behavior.
5. **Business Model innovation** involves changing the way business is done in terms of capturing value e.g. Compaq vs. Dell.

Drivers for innovation

Drivers for innovation

- Financial pressures to reduce costs, increase efficiency, do more with less, etc
- Increased competition
- Shorter product life cycles
- Value migration
- Stricter regulation
- Industry and community needs for sustainable development
- Increased demand for accountability
- Demographic, social and market changes
- Rising customer expectations regarding service and quality
- Changing economy
- Greater availability of potentially useful technologies coupled with a need to exceed the competition in these technologies
- Protectionism / Job protections force companies to automate

New Conditions for Innovation

New Conditions for Innovation

- Gary Hamel argued that today's market place is **hostile to incumbents**, who now need to conduct **radical business innovation**:
 - Radically reconceiving products and services, not just developing new products and services
 - Redefining market space
 - Redrawing industry boundaries

New conditions for innovation

- Small start-up entrepreneurs increasingly depend on large firms:
 - as suppliers or customers
 - for venture finance,
 - for exit opportunities,
 - for knowledge (production, markets and R&D)
 - and for opening new markets.

New conditions for innovation

- Large firms increasingly depend on small start-ups
 - for New Product Development,
 - as suppliers of new knowledge (which they cannot develop themselves),
 - or organizational renewal, for experimentation with business models,
 - for opening new markets, etc

New developments in innovation raises new issues and problems

- Greater emphasis on **commercializing scientific discoveries**, particularly in IT and the bio-sciences
- Speed and potential value of scientific progress leads to emphasis on **solid and well-designed portfolios of research projects**
- Universities as **active** drivers of innovation: Academic entrepreneurship and the entrepreneurial university
- University-industry partnerships
- Increased search for **radical innovation** and top-line growth.

A Suggested Innovation Framework



Case Study: 3M – How do they manage innovation?

- The company presents a consistent picture in interviews and in publications – innovation success is a consequence of **creating the culture** in which it can take place – it becomes ‘the way we do things around here’ in a very real sense. This philosophy is born out in many anecdotes and case histories – the key to their success has been to create the conditions in which innovation can arise from any one of a number of directions, including lucky accidents, and there is a deliberate attempt to avoid putting too much structure in place since this would constrain innovation.
 - *The 3M way to innovation: Balancing people and profit.* New York, Kodansha International.

3M Innovation Strategy and Leadership

- Setting stretch targets – such as ‘x% of sales from products introduced during the past y years’ – provides a clear and consistent message and a focus for the whole organization.
- Allocating resources as ‘slack’ – space and time in which staff can explore and play with ideas, build on chance events or combinations, etc.
- Encouragement of ‘bootlegging’ employees working on innovation projects in their own time and often accessing resources in a non-formal way – the ‘benevolent blind eye’ effect.
- Provision of staged resource support for innovators who want to take an idea forward – effectively different levels of internal venture capital for which people can bid (against increasingly high hurdles) – this encourages ‘intrapreneurship’ (internal entrepreneurial behavior) rather than people feeling they have to leave the firm to take their good ideas forward.

Classical models of innovation

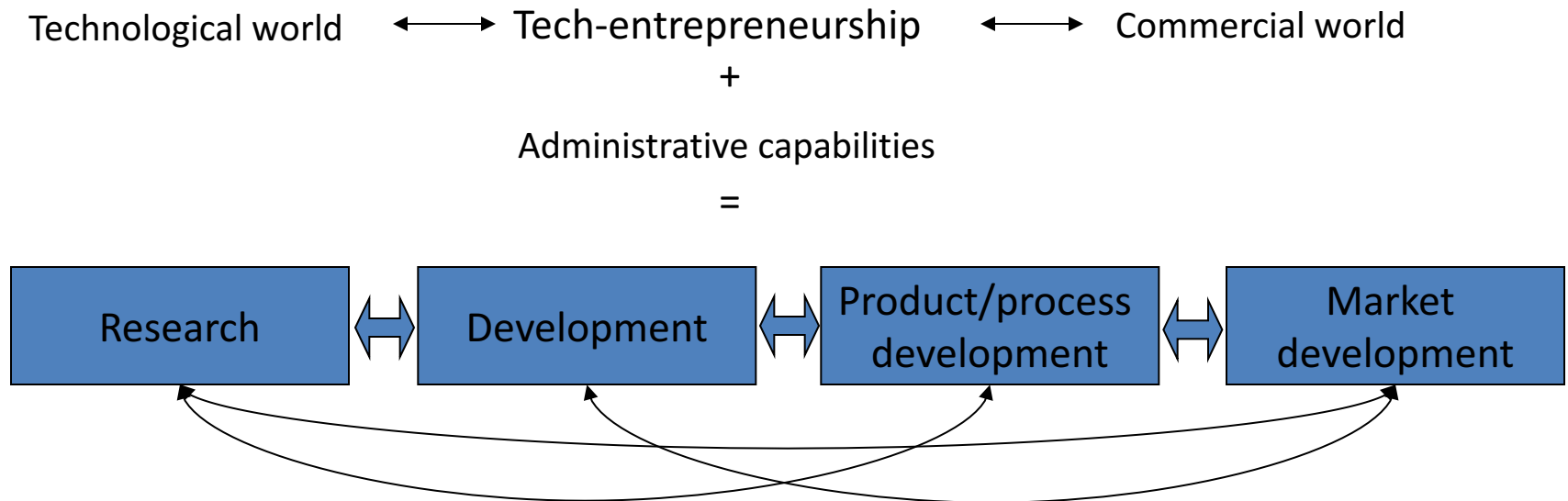
- *Science Push* approaches suggest that innovation proceeds linearly:

Scientific discovery → invention → manufacturing → marketing

- *Demand Pull* approaches argued that innovation originates with unmet customer need:

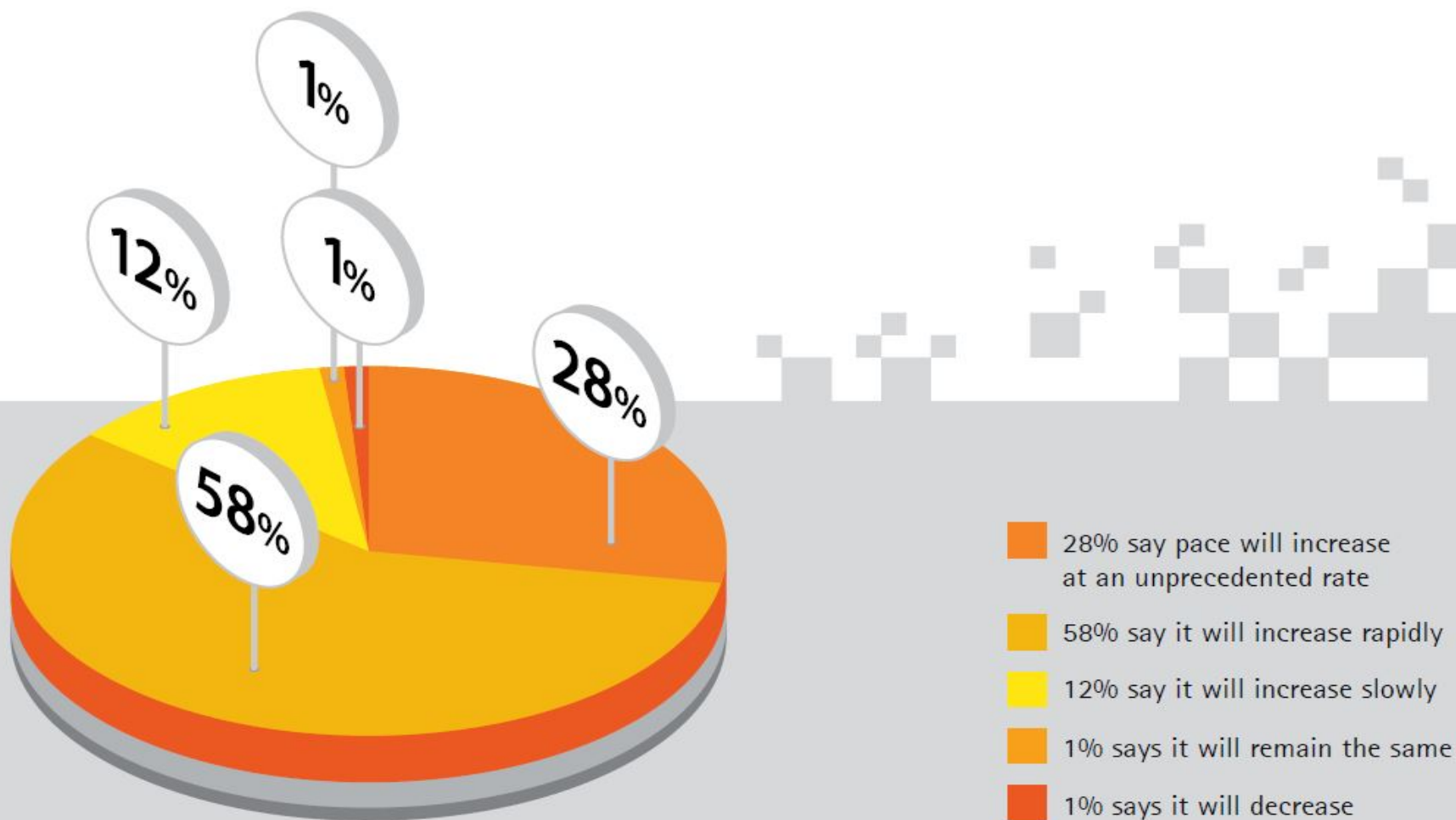
Customer suggestions → invention → manufacturing

Today's basic model for innovation management is interactive



How can we Measure the rate of Innovation?

How do you anticipate the pace of technology will change in your industry over the next three years?



Source: Accenture Technology Vision 2016 Survey

#techvision2016



70% of executives are making significantly more investments in Artificial Intelligence than in 2013.



*43% of the US workforce will be
freelancers in 2020.*

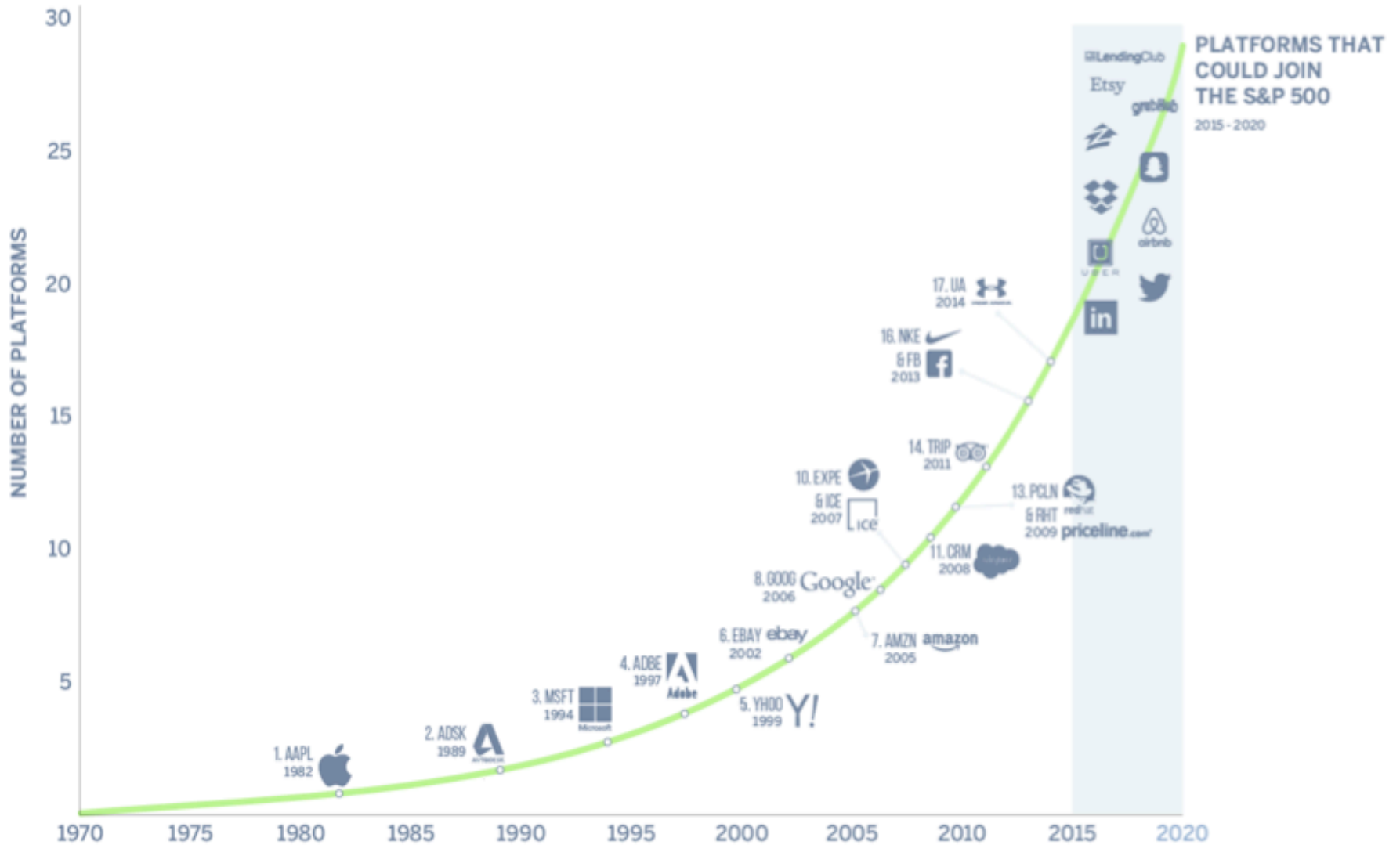
(Source: Intuit Forecast: 7.6 Million People in On-Demand Economy by 2020,[®] Intuit press release, August 13, 2015.)

Connecting Consumers and Producers



81% of executives say platform-based business models will be core to their growth strategy within three years.

TOTAL NUMBER OF PLATFORM BUSINESSES IN THE S&P 500 (BY YEAR)



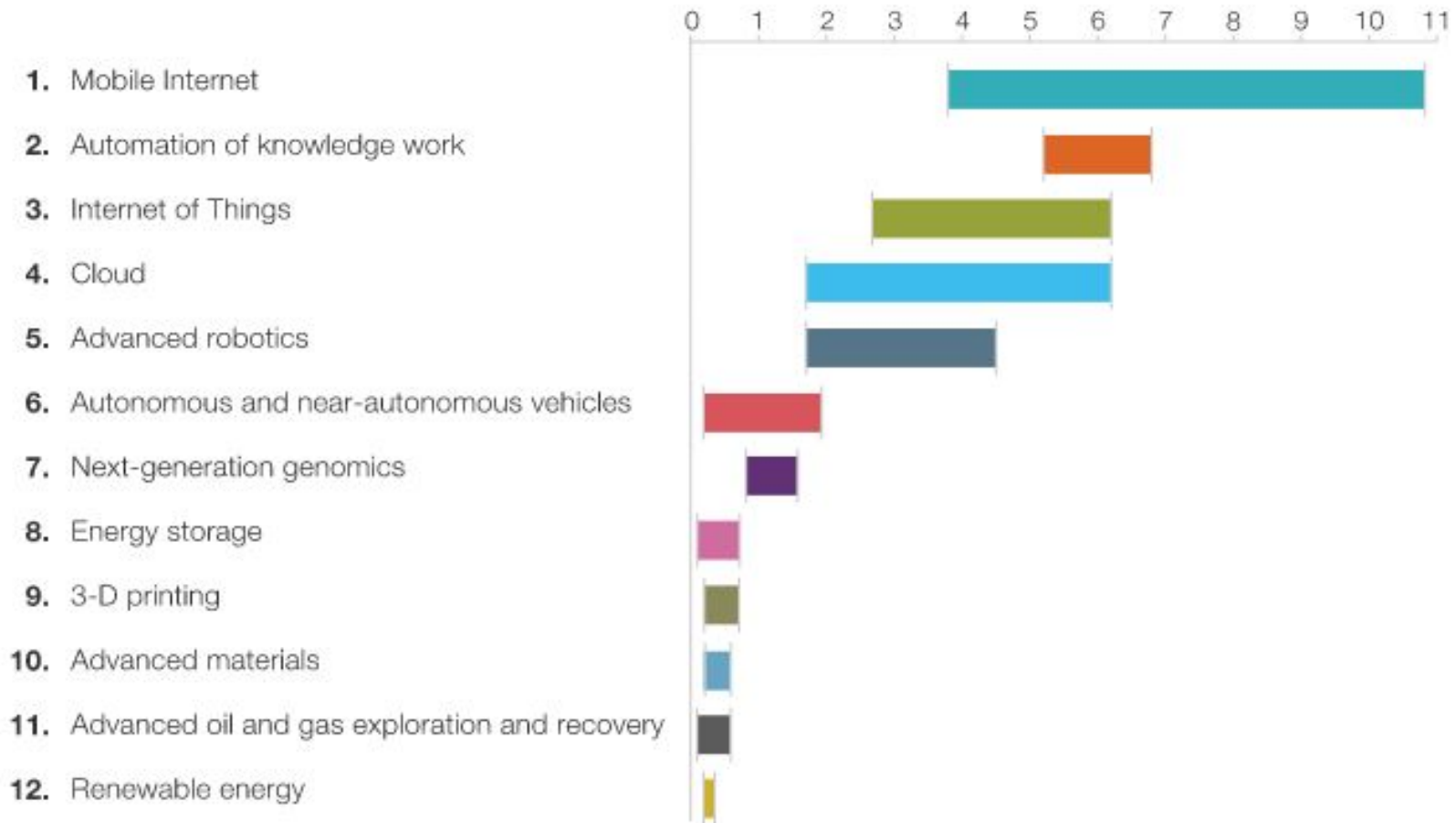


82% say industry boundaries are being erased and new paradigms are emerging for every industry.

-  SMAC platforms (Social, Mobile, Analytics, Cloud)
-  The Internet of Things
-  Real-time environments

A gallery of disruptive technologies

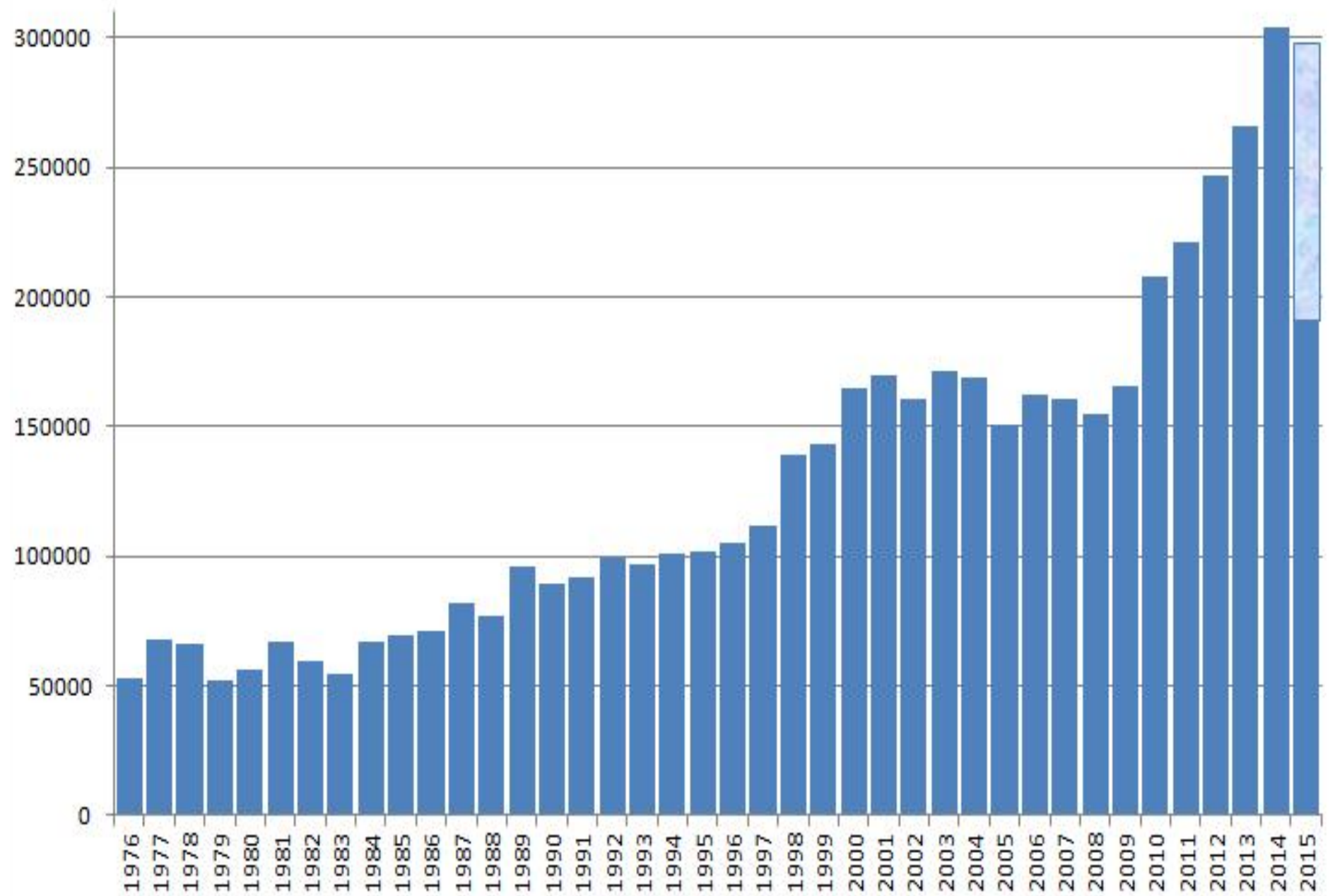
Estimated potential economic impact of technologies across sized applications in 2025, \$ trillion, annual



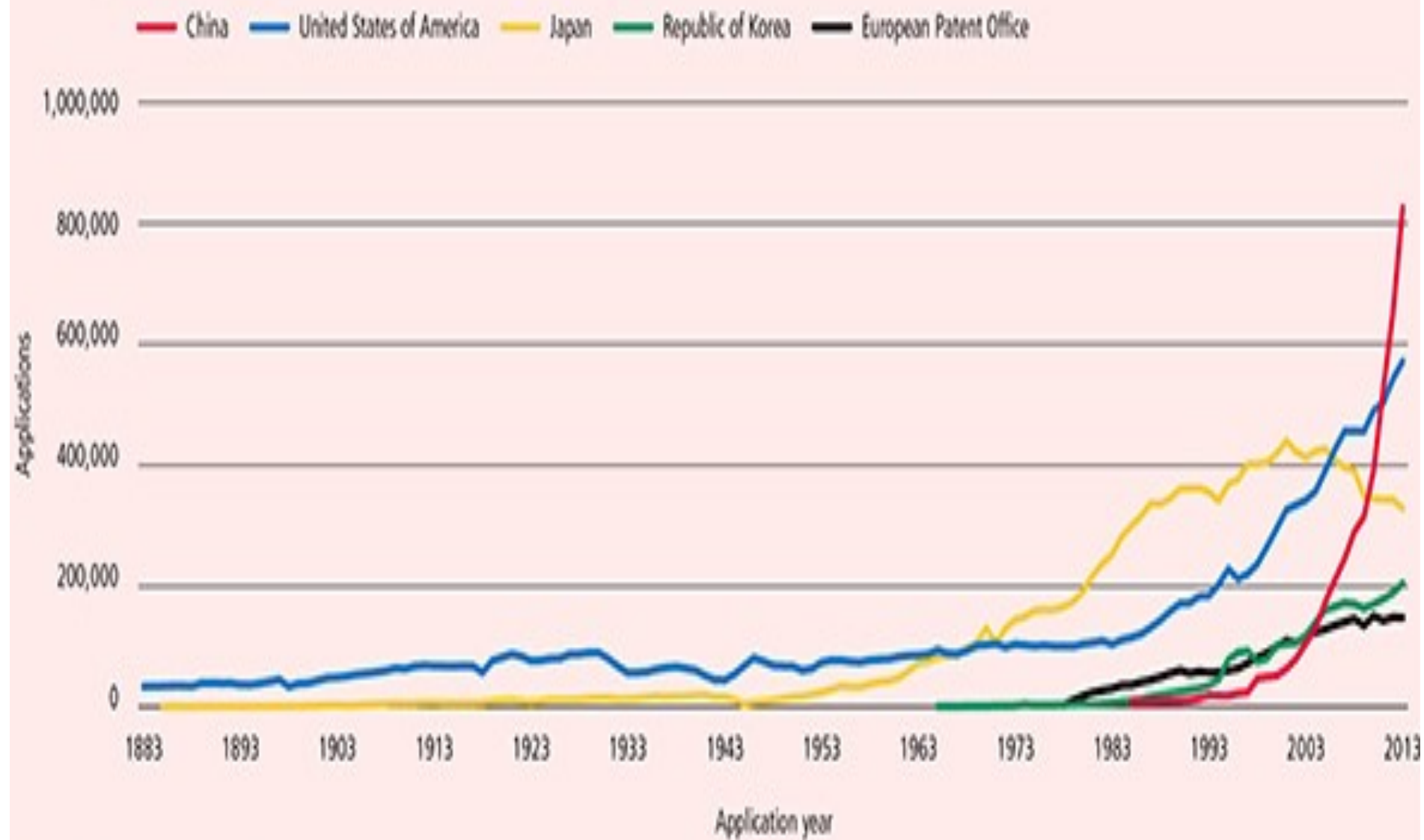
SOURCE: McKinsey Global Institute

Notes on sizing: These economic impact estimates are not comprehensive and include potential direct impact of sized applications only. They do not represent GDP or market size (revenue), but rather economic potential, including consumer surplus. The relative sizes of technology categories shown do not constitute a "ranking," since our sizing is not comprehensive. We do not quantify the split or transfer of surplus among or across companies or consumers, since this would depend on emerging competitive dynamics and business models. Moreover, the estimates are not directly additive, since some applications and/or value drivers are overlapping across technologies. Finally, they are not fully risk- or probability-adjusted.

Patent Applications



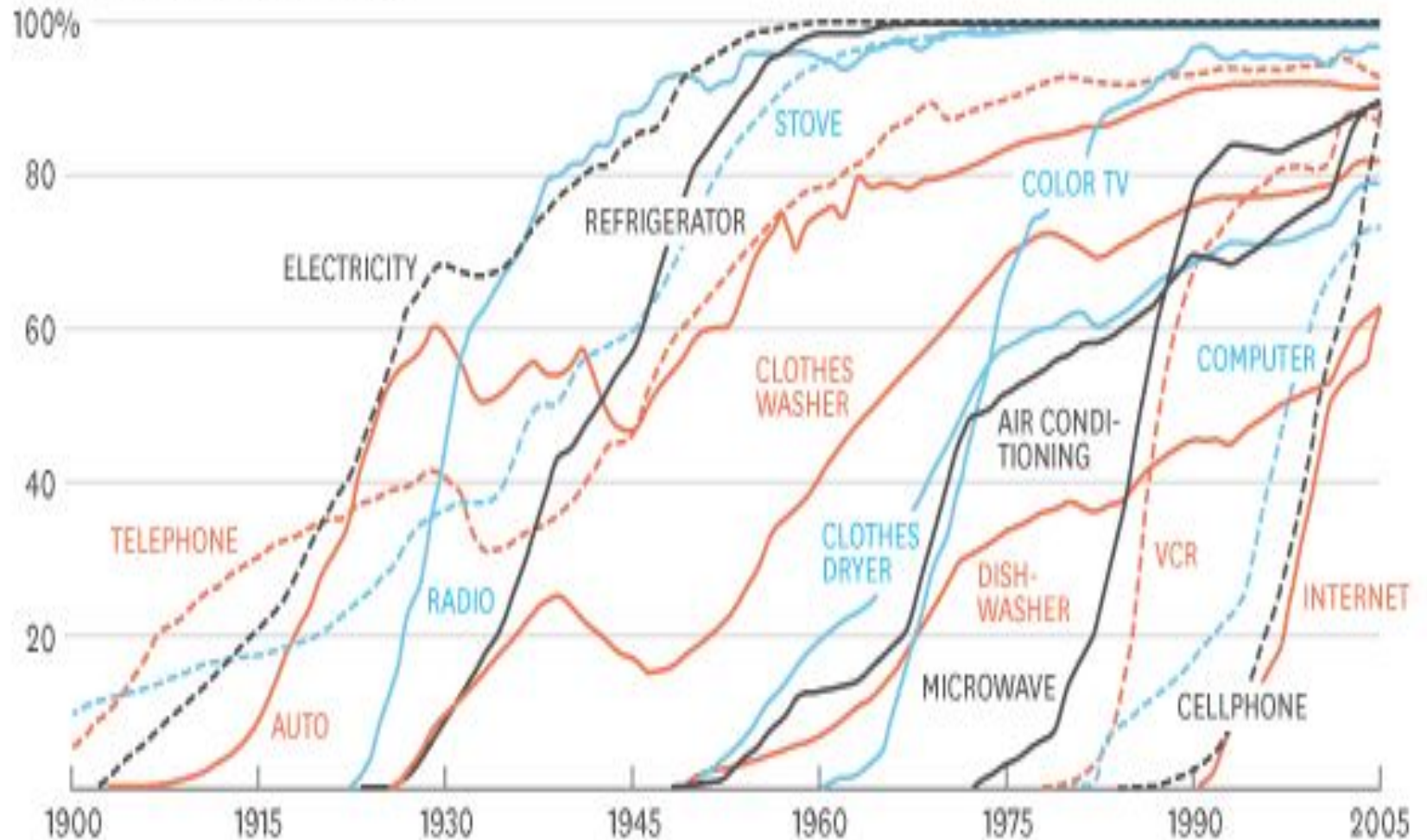
Trend in patent applications for the top five offices



Source: Standard figure A7.

CONSUMPTION SPREADS FASTER TODAY

PERCENT OF U.S. HOUSEHOLDS

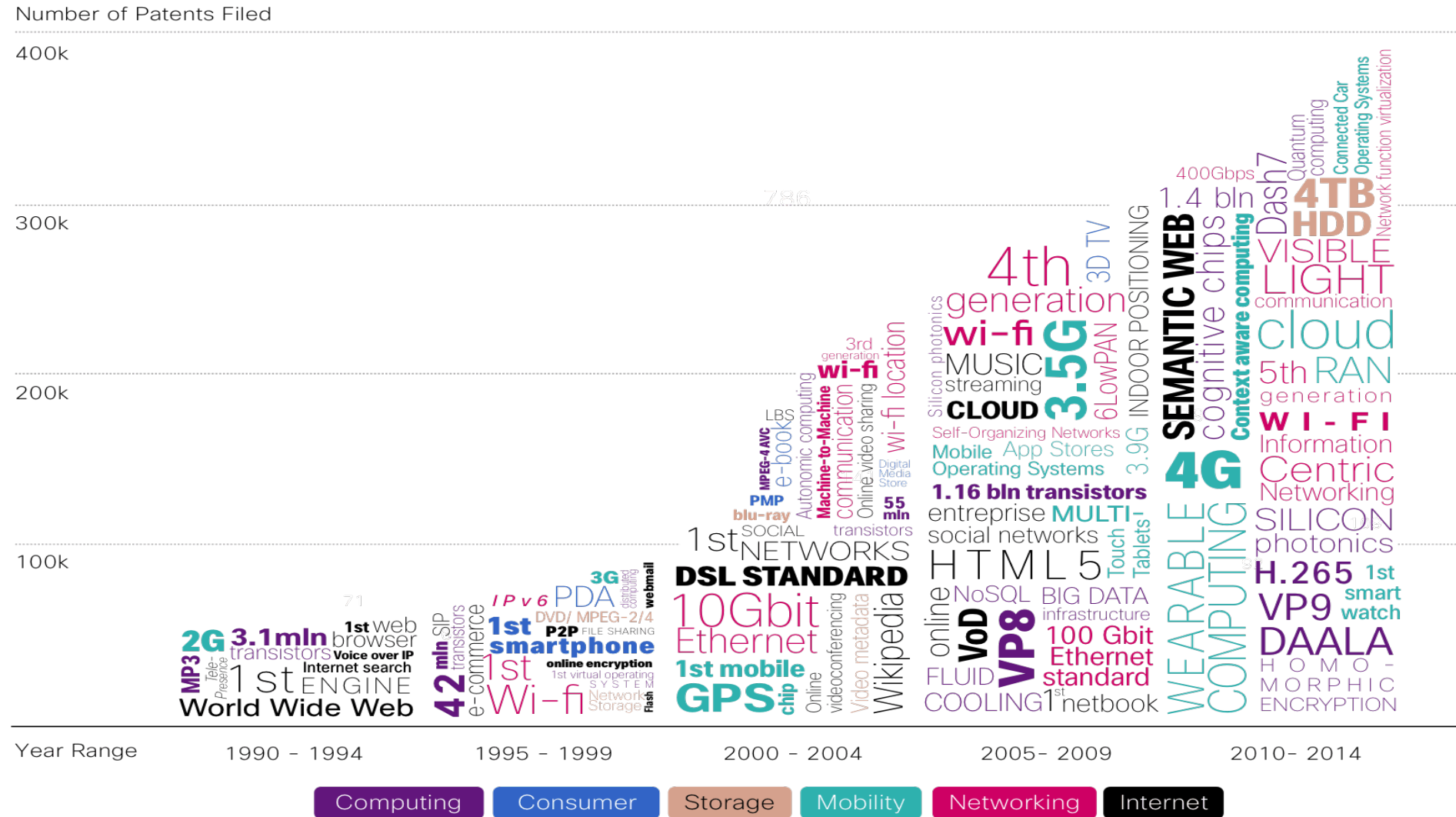


SOURCE MICHAEL FELTON, THE NEW YORK TIMES

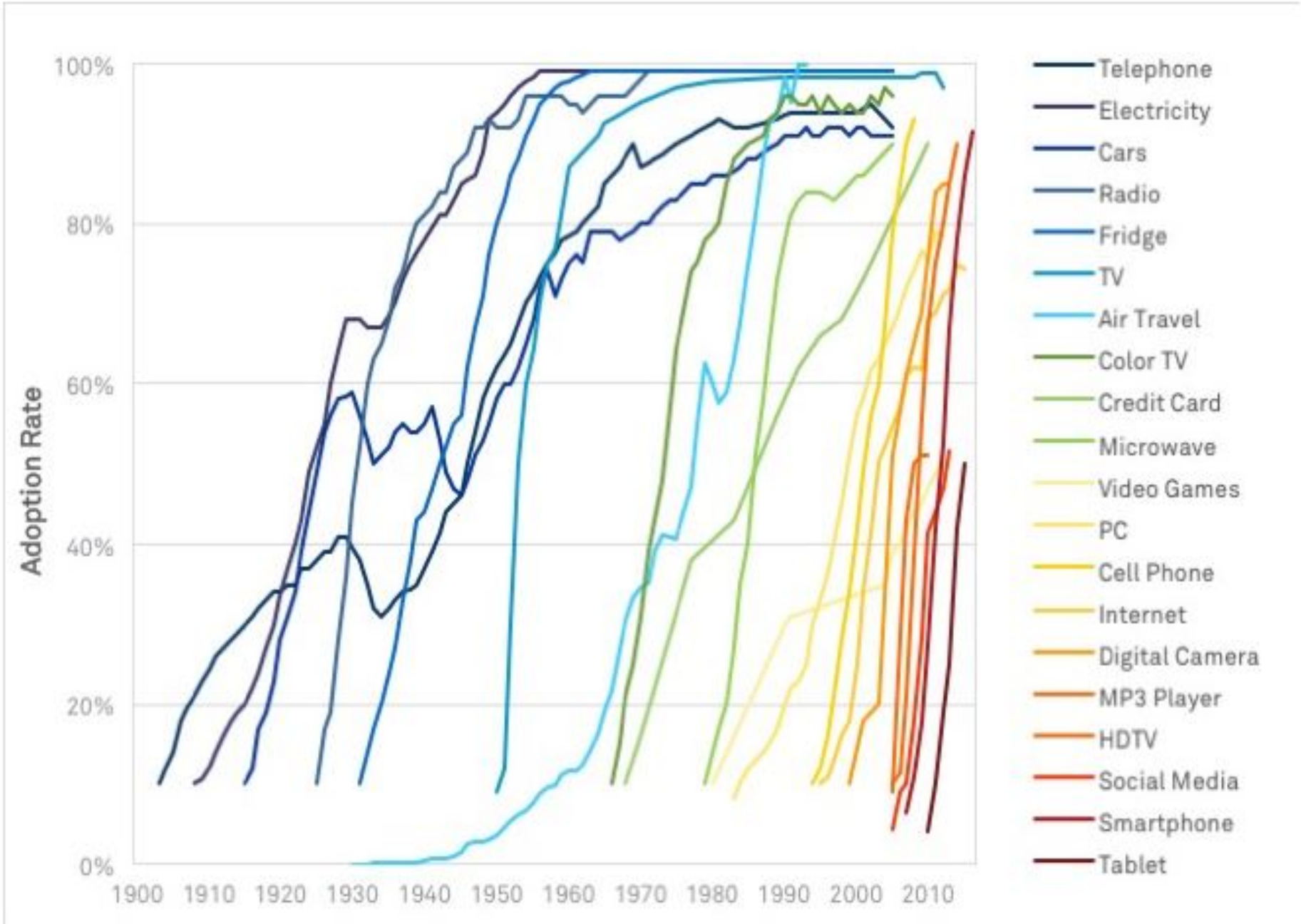
HBR.ORG

Innovation is Accelerating in IT

Timeline of New Technologies Introduction and Inventive Activity in the ICT Industry.

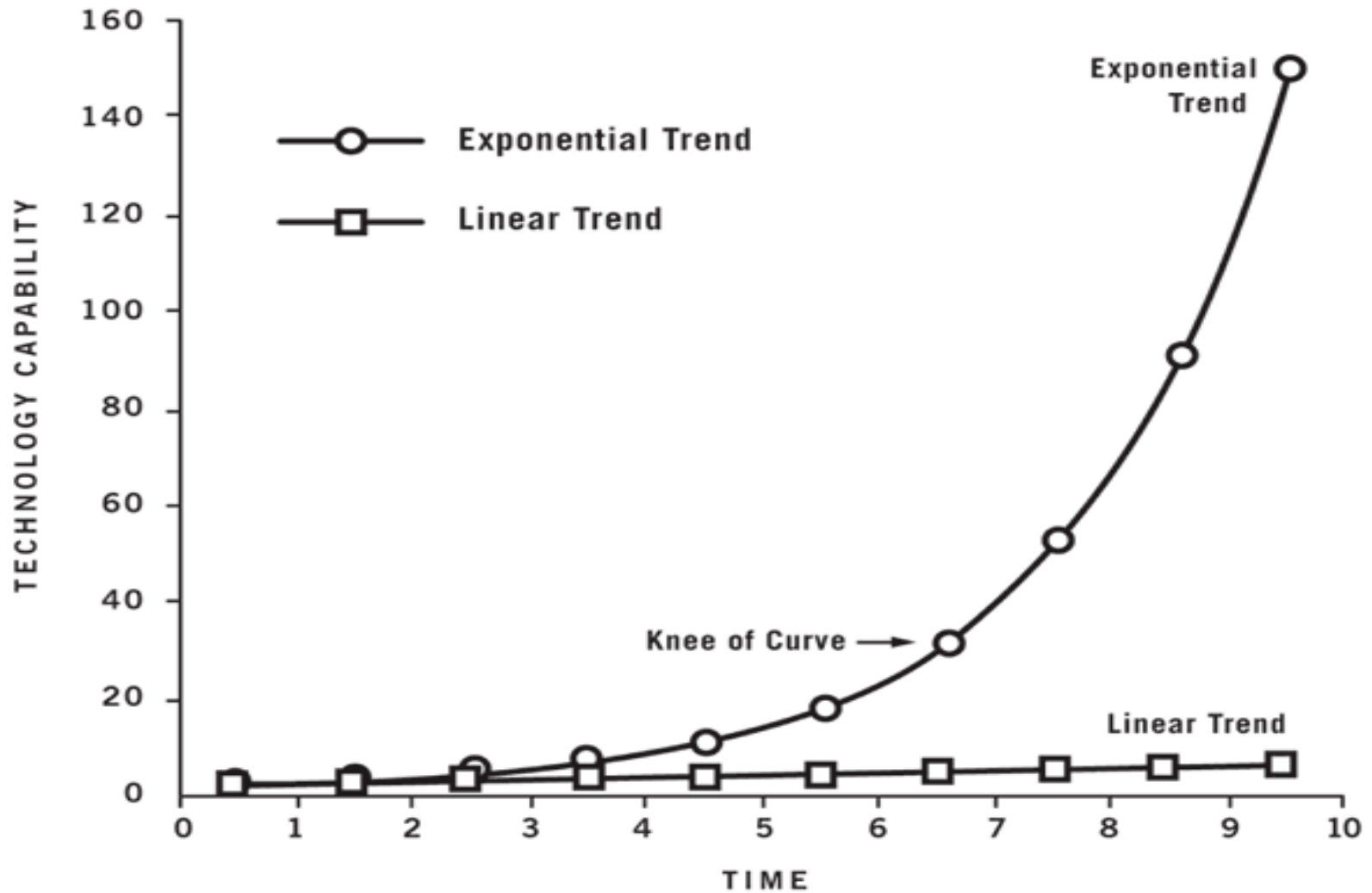


Note: The information is merely a general characterization for illustrative purposes



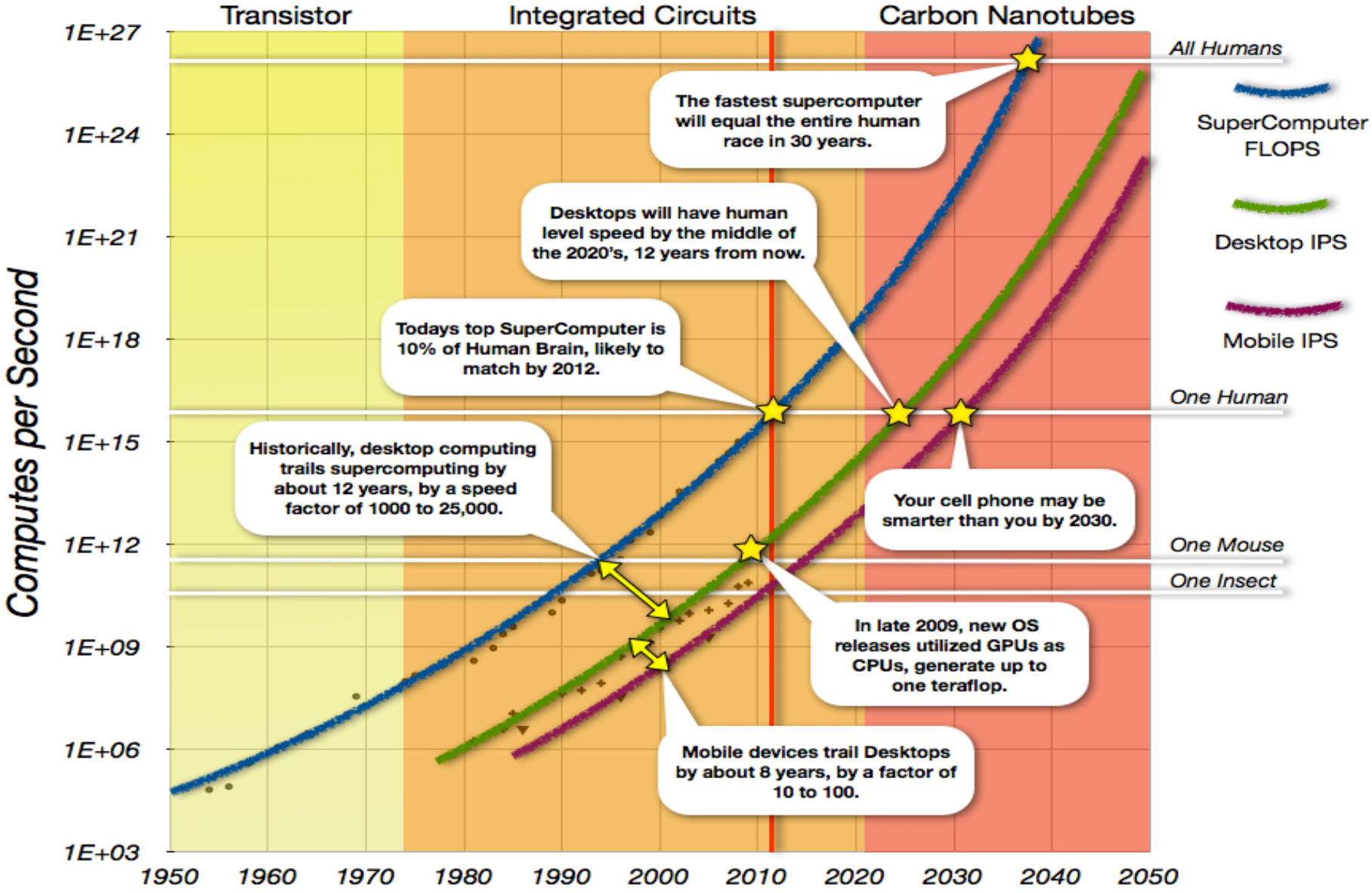
Source: Asymco

LINEAR VS. EXPONENTIAL GROWTH



Linear vs. Exponential: Linear growth is steady; exponential growth becomes explosive

Compute Power



Source: Think Exponential, <http://thinkexponential.com/2013/01/09/computing/>

1 The accelerating pace of change ...



2 ... and exponential growth in computing power ...

Computer technology, shown here climbing dramatically by powers of 10, is now progressing more each hour than it did in its entire first 90 years

COMPUTER RANKINGS

By calculations per second per \$1,000

Analytical engine
Never fully built, Charles Babbage's invention was designed to solve computational and logical problems



Colossus
The electronic computer, with 1,500 vacuum tubes, helped the British crack German codes during WW II



UNIVAC I
The first commercially marketed computer, used to tabulate the U.S. Census, occupied 943 cu. ft.



Apple II
At a price of \$1,298, the compact machine was one of the first massively popular personal computers



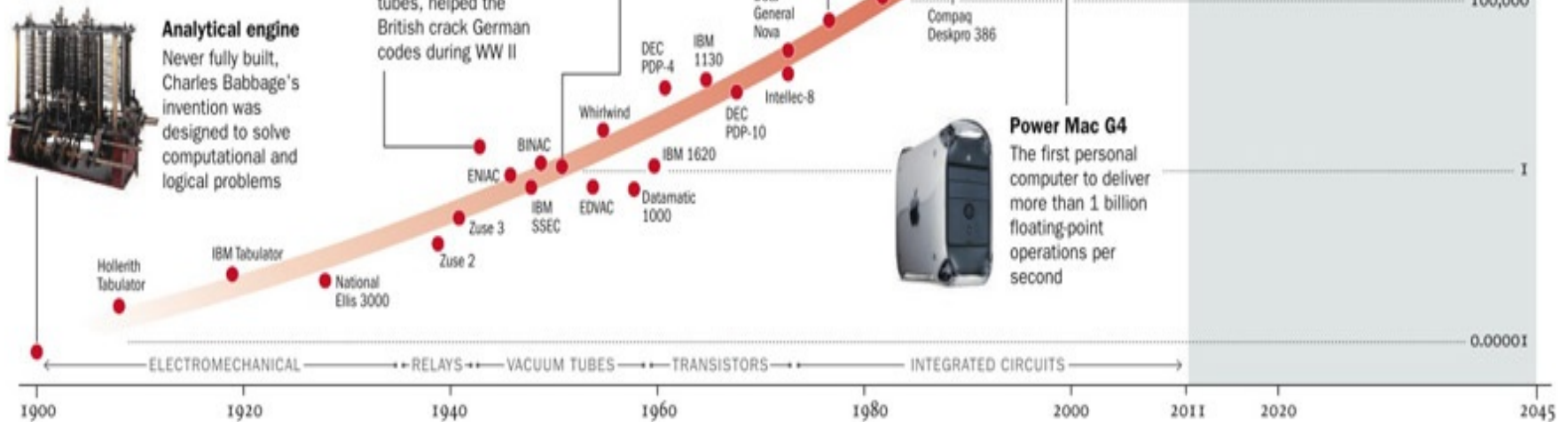
Power Mac G4
The first personal computer to deliver more than 1 billion floating-point operations per second

3 ... will lead to the Singularity

2045
Surpasses brainpower equivalent to that of all human brains combined

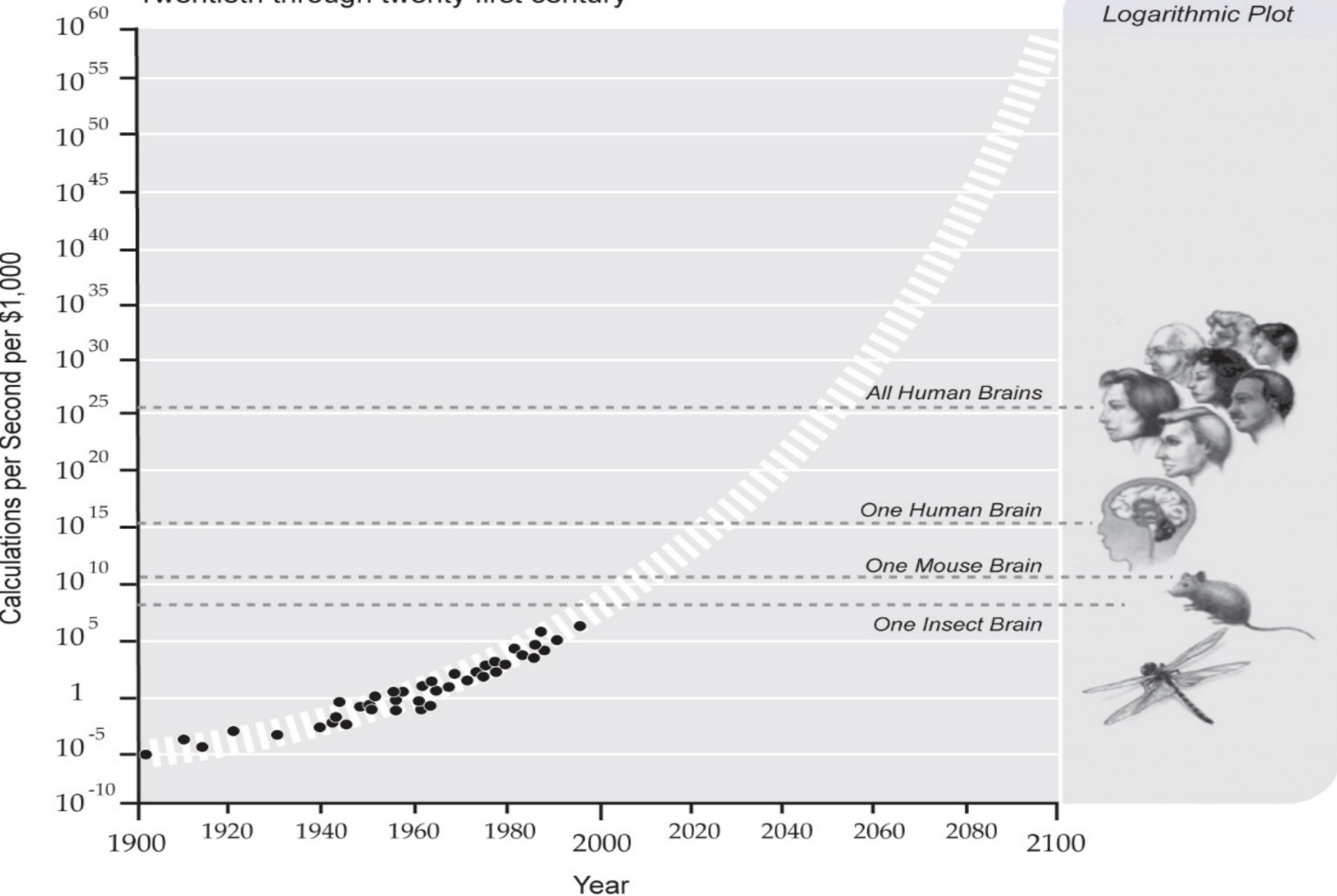
Surpasses brainpower of human in 2023

Surpasses brainpower of mouse in 2015



Exponential Growth of Computing

Twentieth through twenty first century



Source: Singularity.com <http://www.singularity.com/charts/page70.html>

Global population and Internet users, 2000-2020

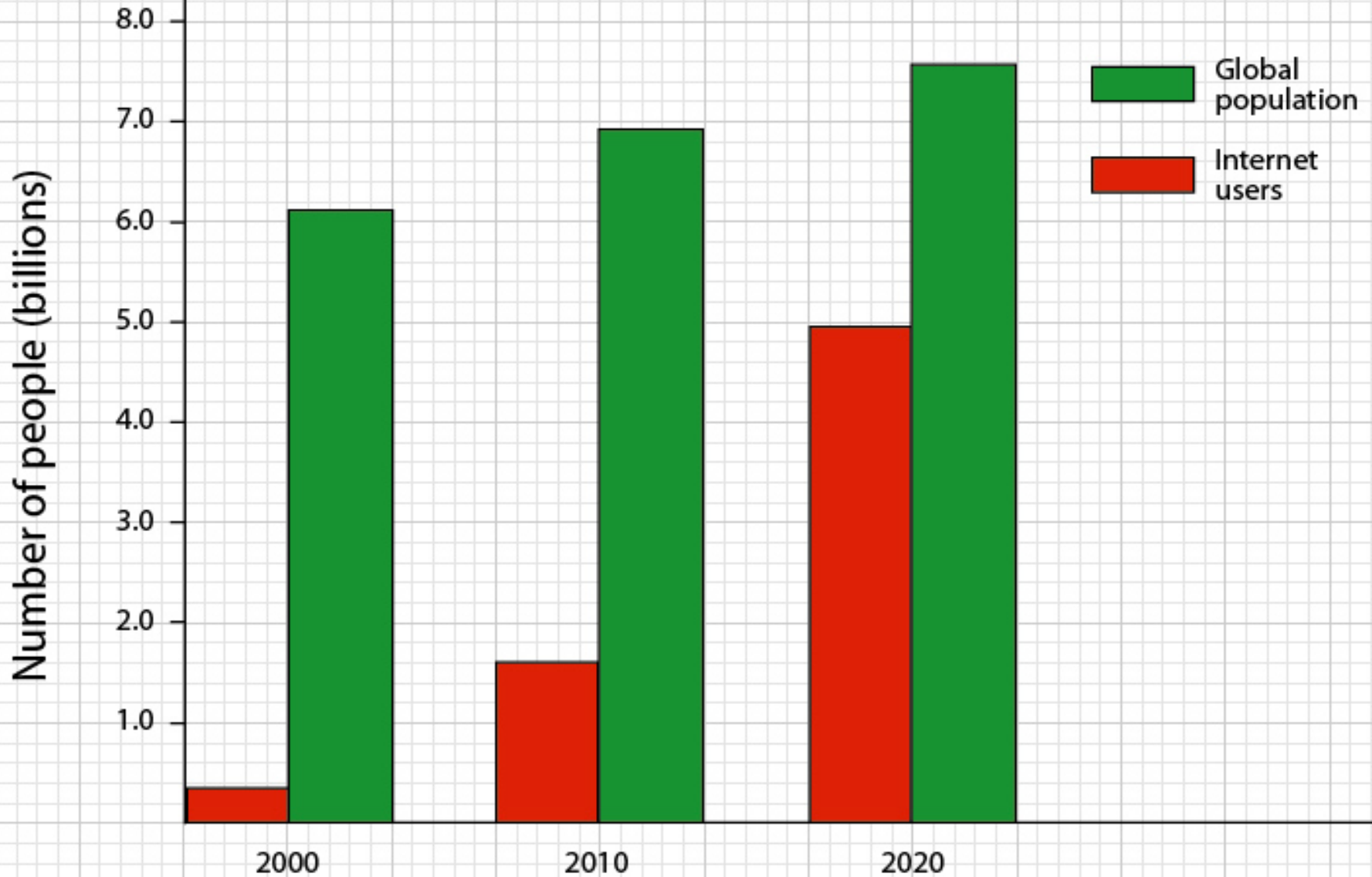
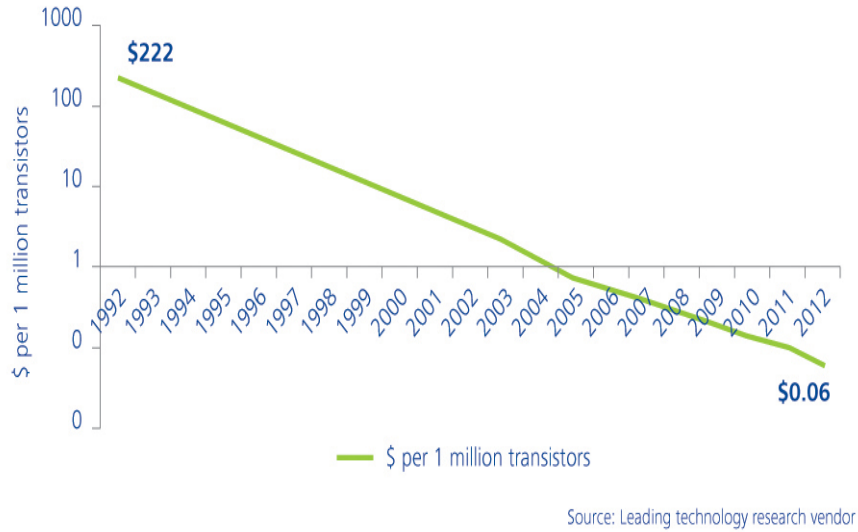
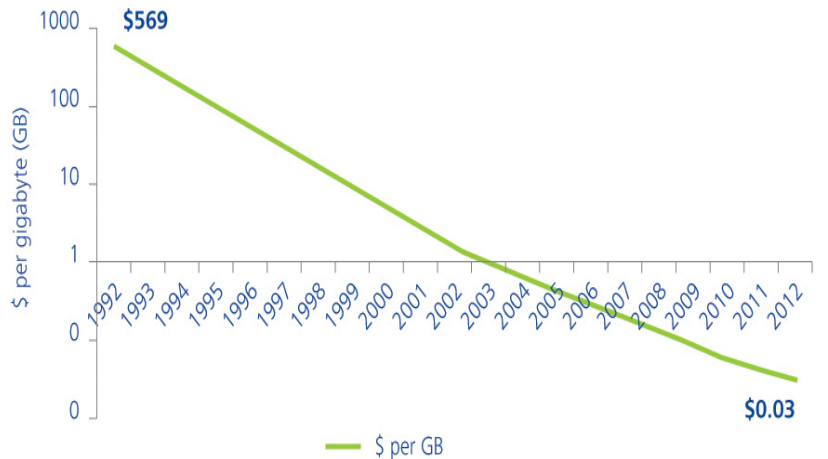


Figure 1. Computing cost-performance (1992–2012)



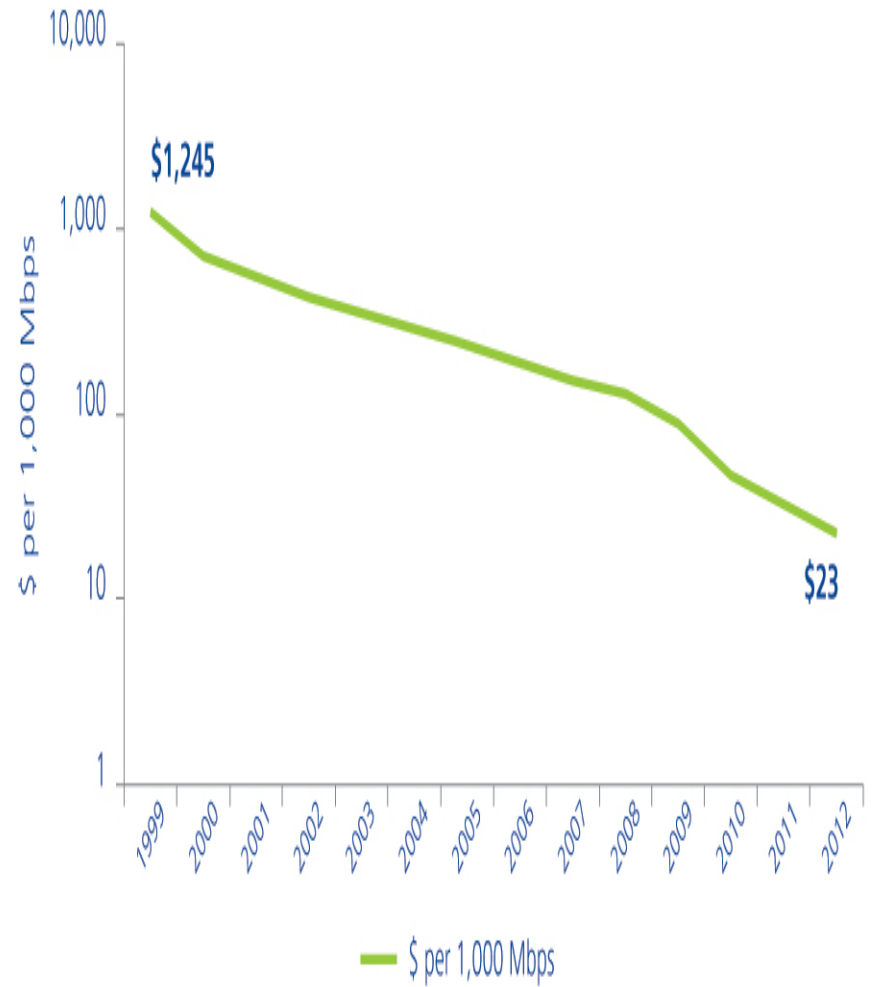
Graphic: Deloitte University Press | DUPress.com

Figure 2. Storage cost-performance (1992–2012)



Graphic: Deloitte University Press | DUPress.com

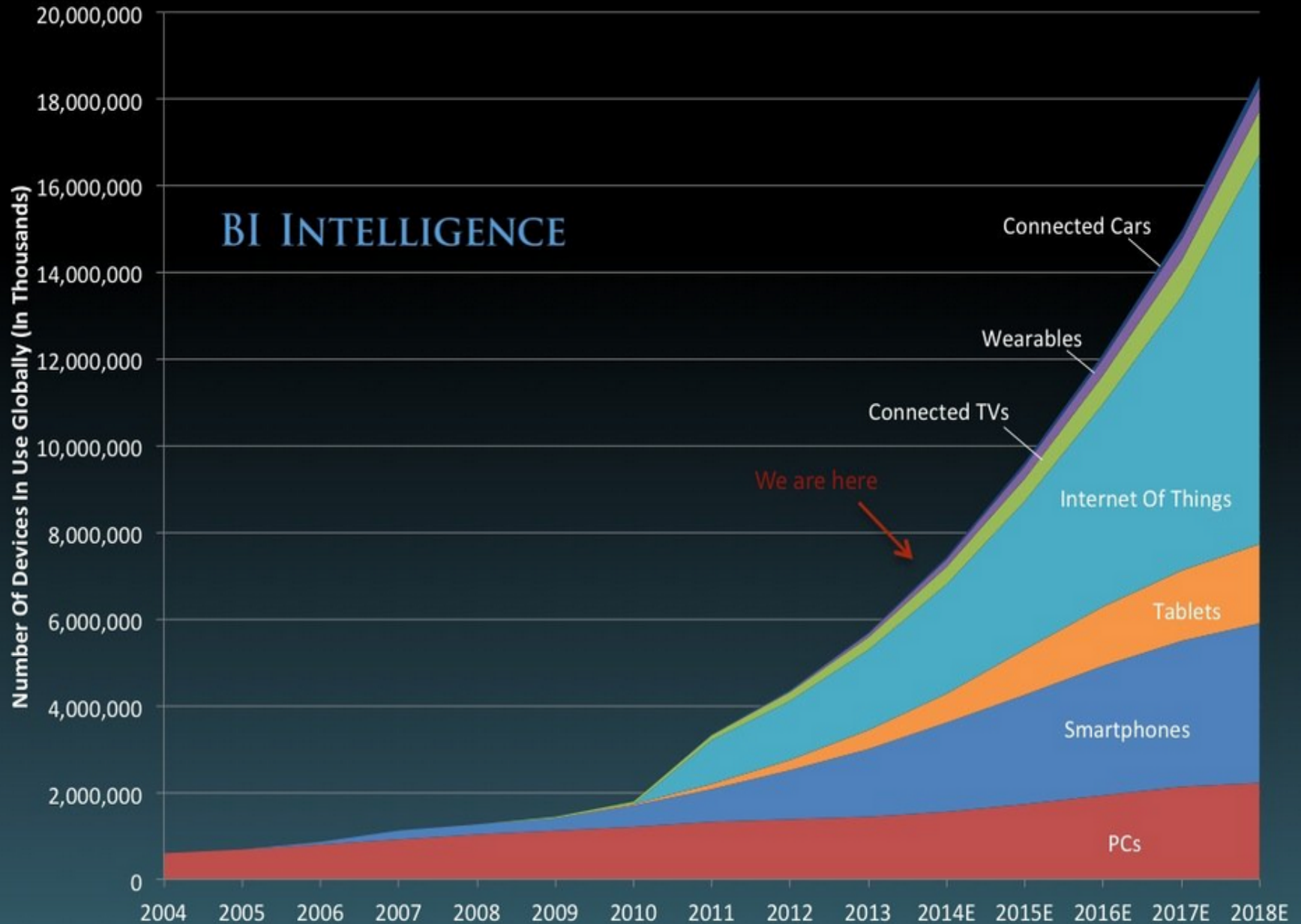
Figure 3. Bandwidth cost-performance (1999–2012)



Graphic: Deloitte University Press | DUPress.com

Internet of Things

The Internet Of Everything

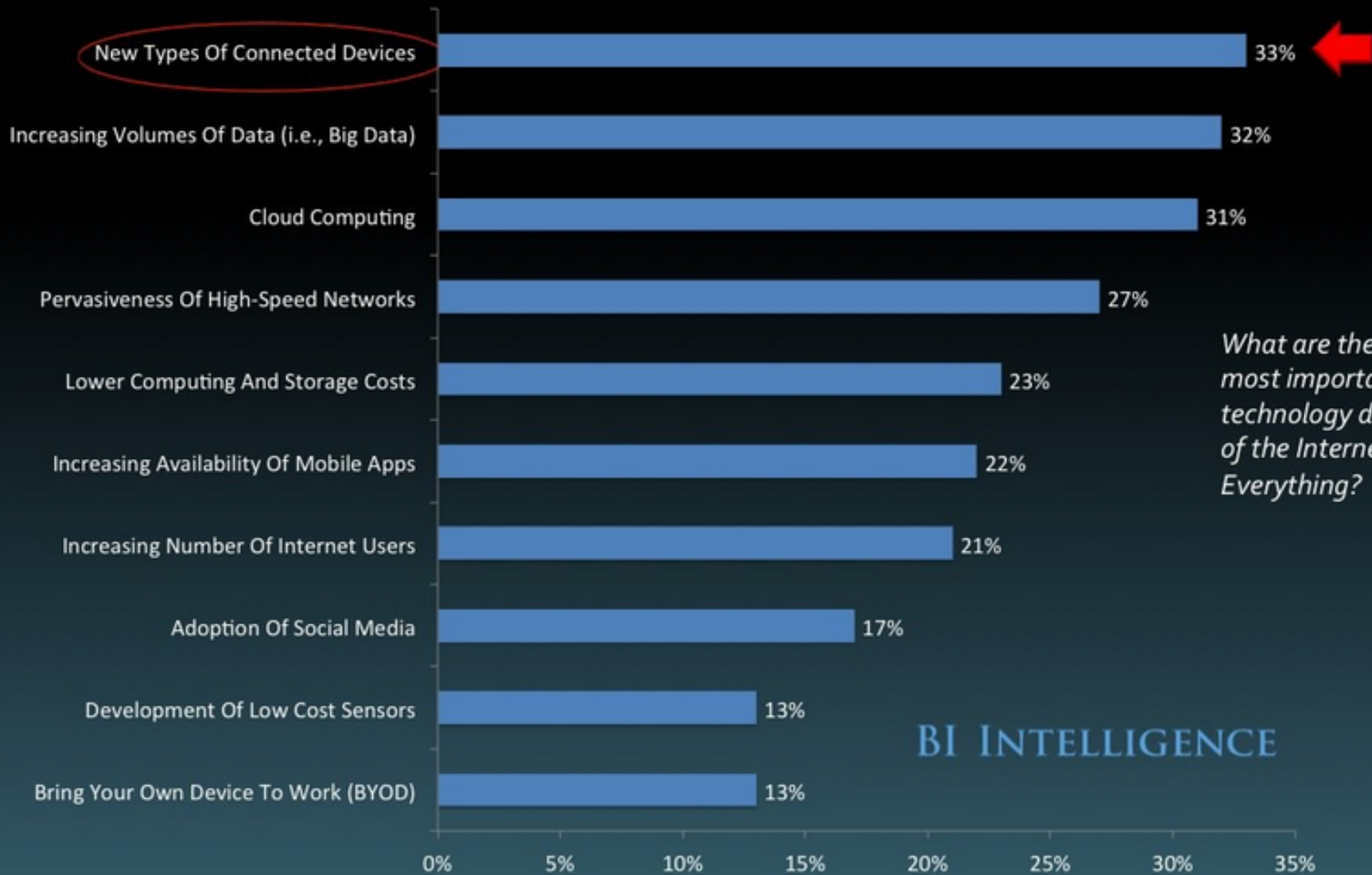


BI INTELLIGENCE

We are here

A New World Of 'Connected' Gadgets

Tech Trends Driving The Internet Of Everything



What are the most important technology drivers of the Internet of Everything?

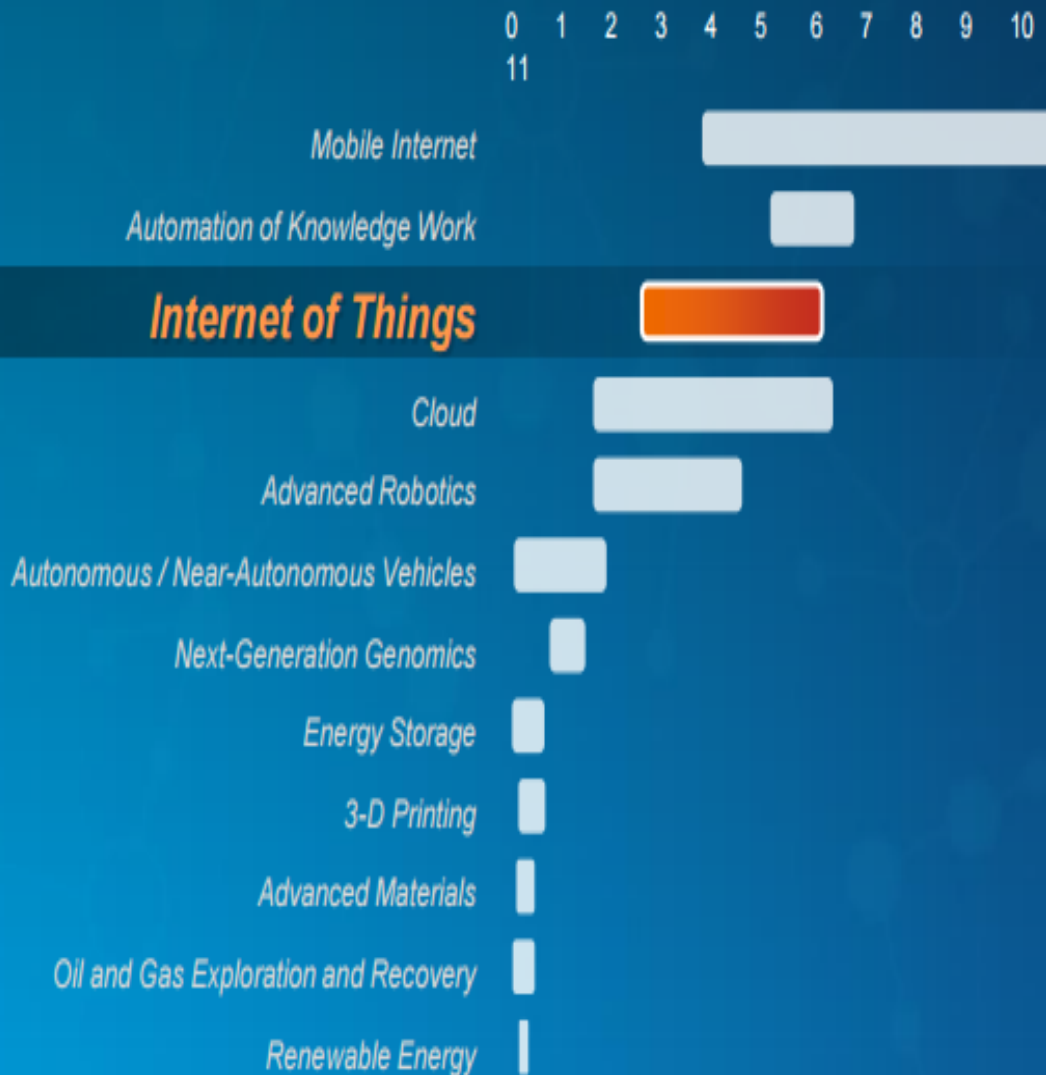
BI INTELLIGENCE

IoT Adoption Curve – Crossed the Credibility Gap



A Gallery of Disruptive Technologies

Estimated Potential Economic Impact of Technologies Across Sized Applications in 2025 (\$ Trillion, Annual)



“28 Billion reasons to care...

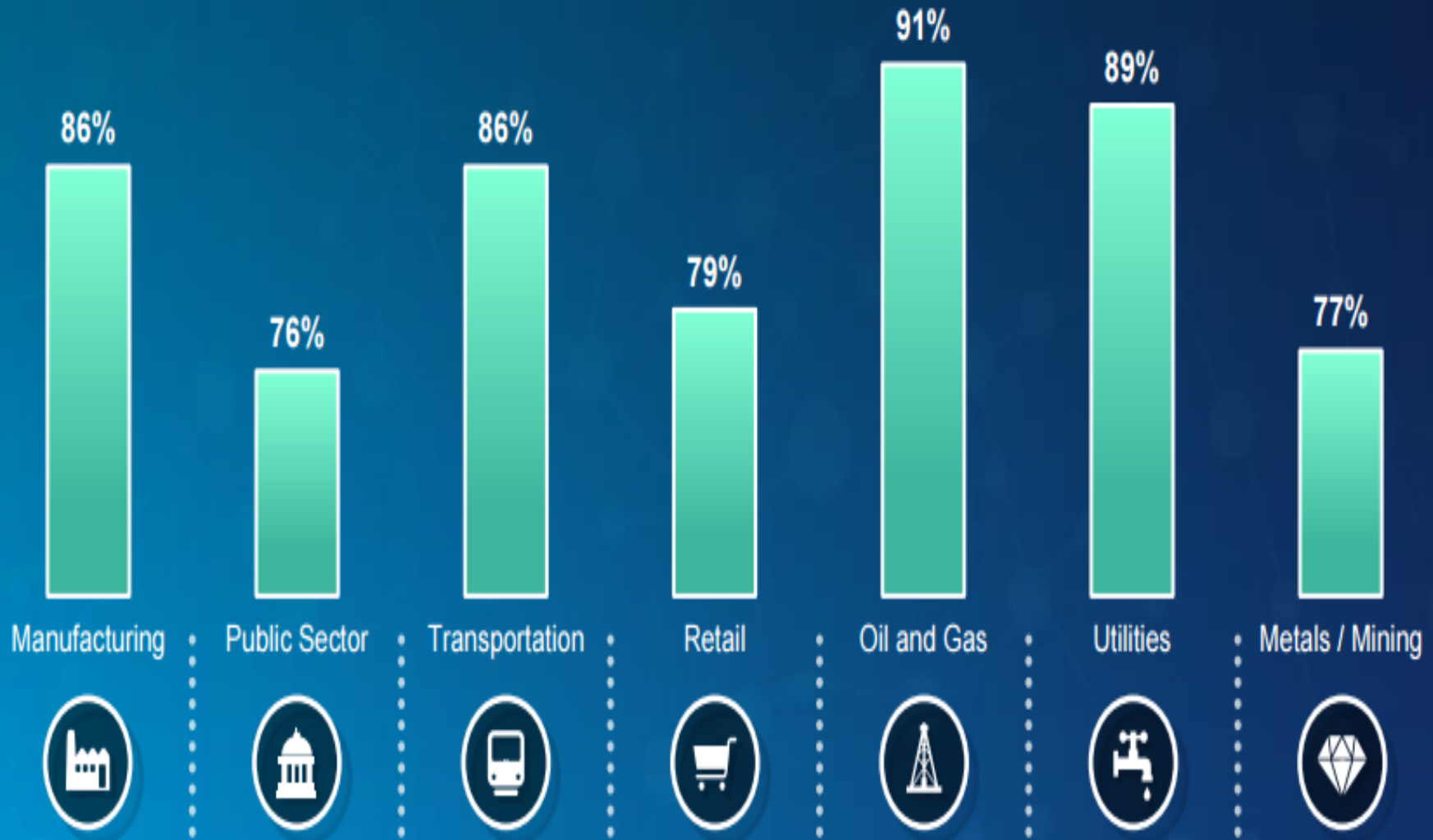
The Internet of Things (IoT) is emerging as the third wave in the development of the Internet... IoT has the potential to connect 10X as many (28 billion) “things” to the Internet by 2020....

and the train is leaving the station.”

**Goldman
Sachs**

September
2014

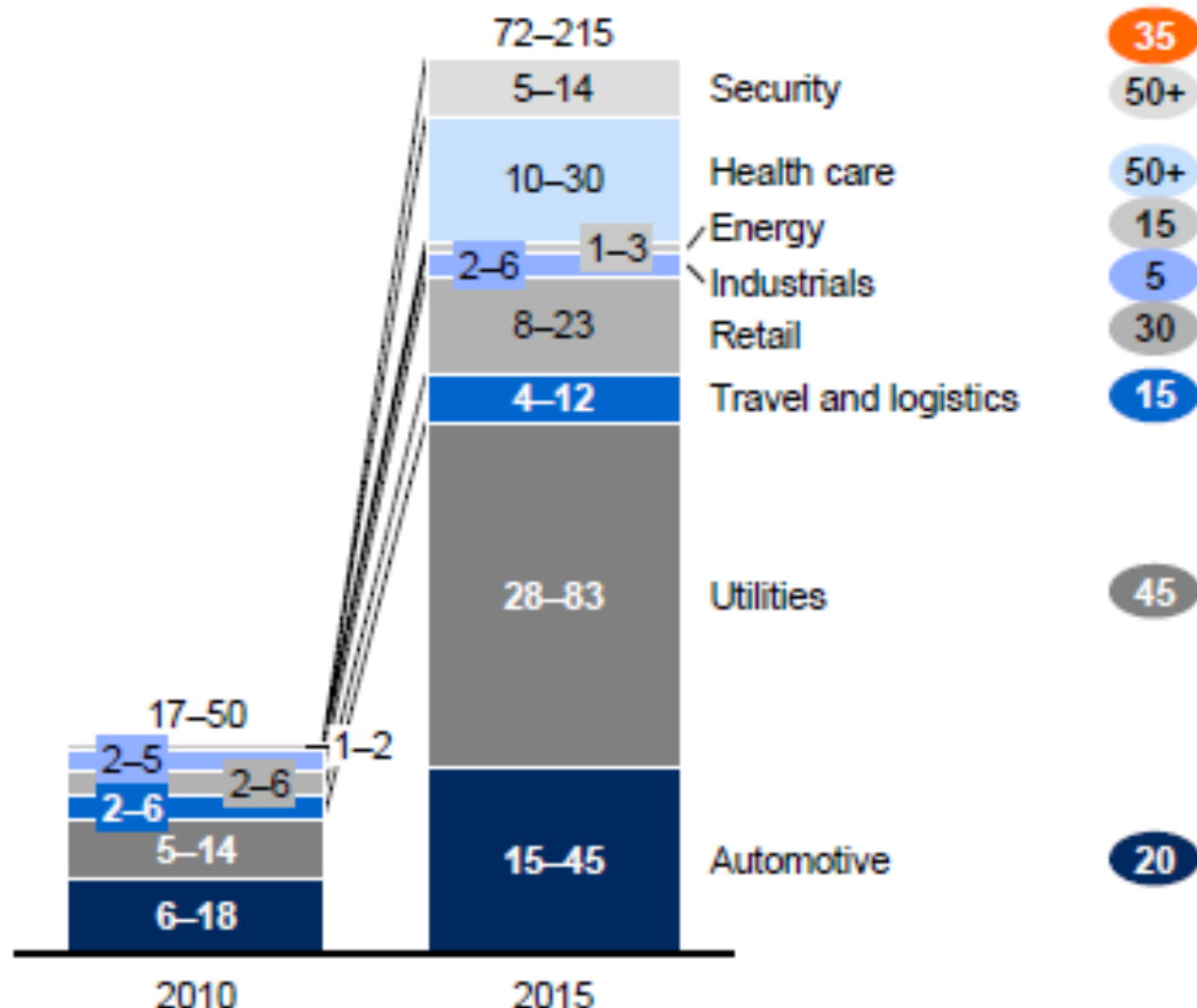
% of Respondents Increasing IoT Investments in the Next 3 Years



Data generated from the Internet of Things will grow exponentially as the number of connected nodes increases

Estimated number of connected nodes
Million

Compound annual
growth rate 2010–15, %

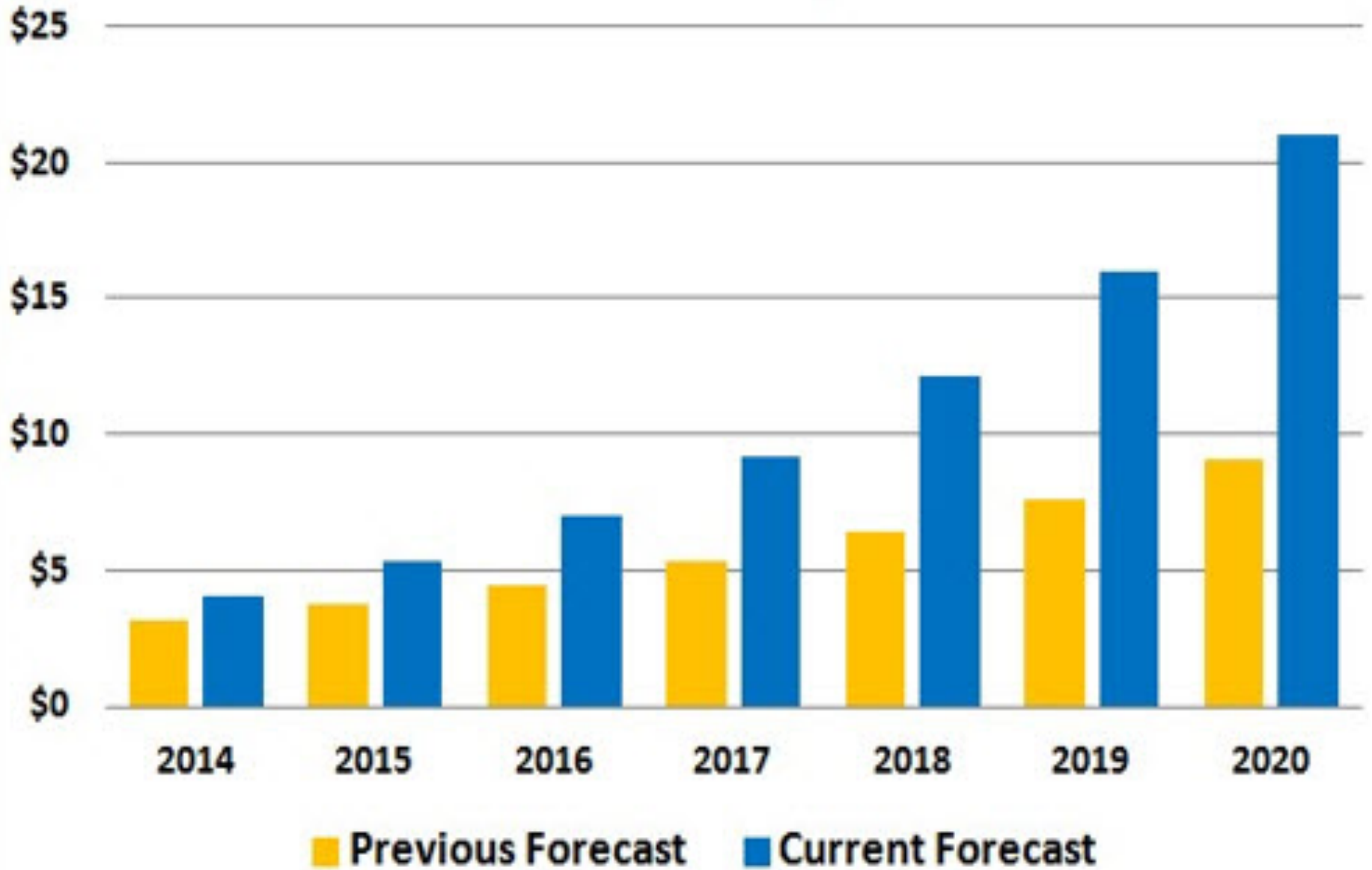


NOTE: Numbers may not sum due to rounding.

SOURCE: Analyst interviews; McKinsey Global Institute analysis

3D Printing

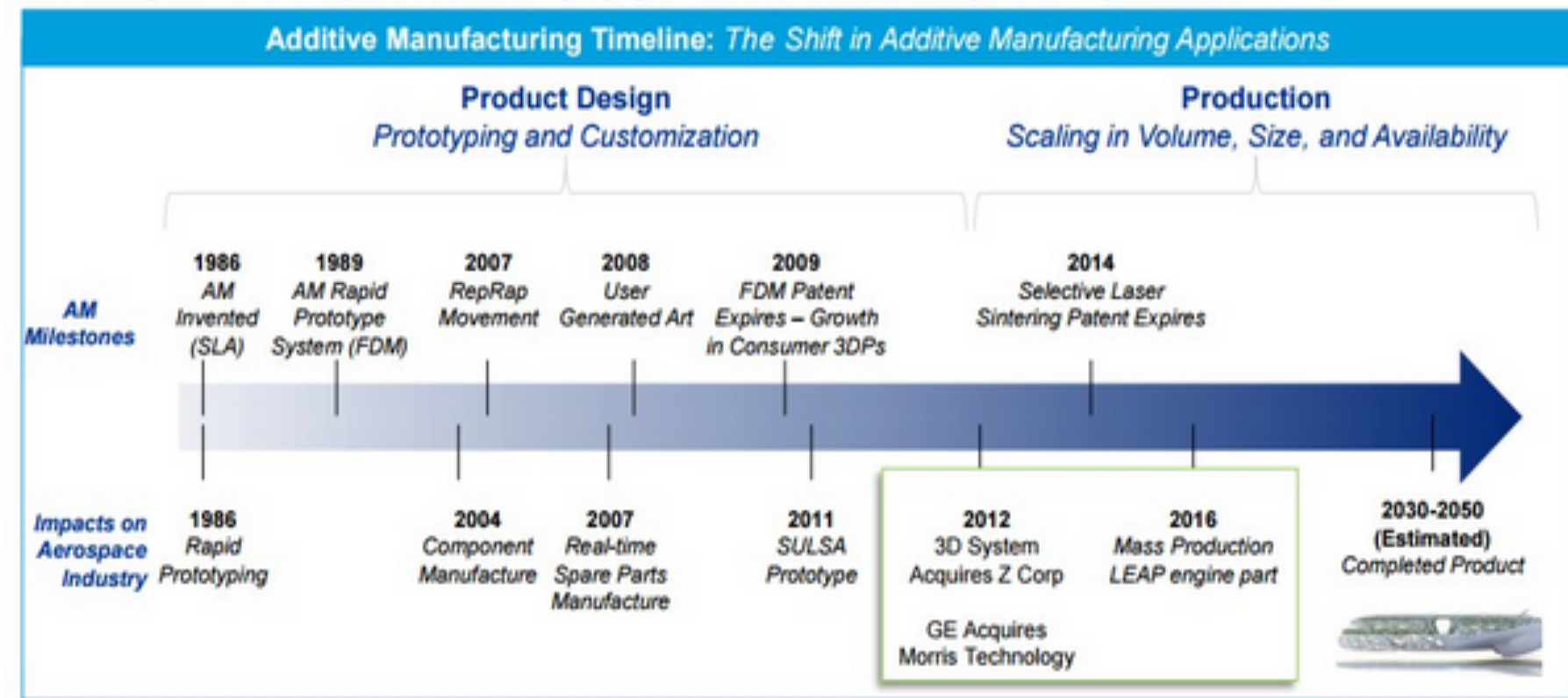
Worldwide 3D Printing Industry Forecast, Billions



Source: Forbes, 2015 Roundup Of 3D Printing Market Forecasts And Estimates

Additive Manufacturing Adoption Timeline

Additive Manufacturing has been slowly gaining traction, specifically within design, however, new technologies have the potential to amplify growth and extend usage within production



Main Applications 1986 - 2011:

- Product Design
- Product Part Production
- Rapid Prototyping
- Concept Modeling

Catalyst for Mass Production Adoption¹:

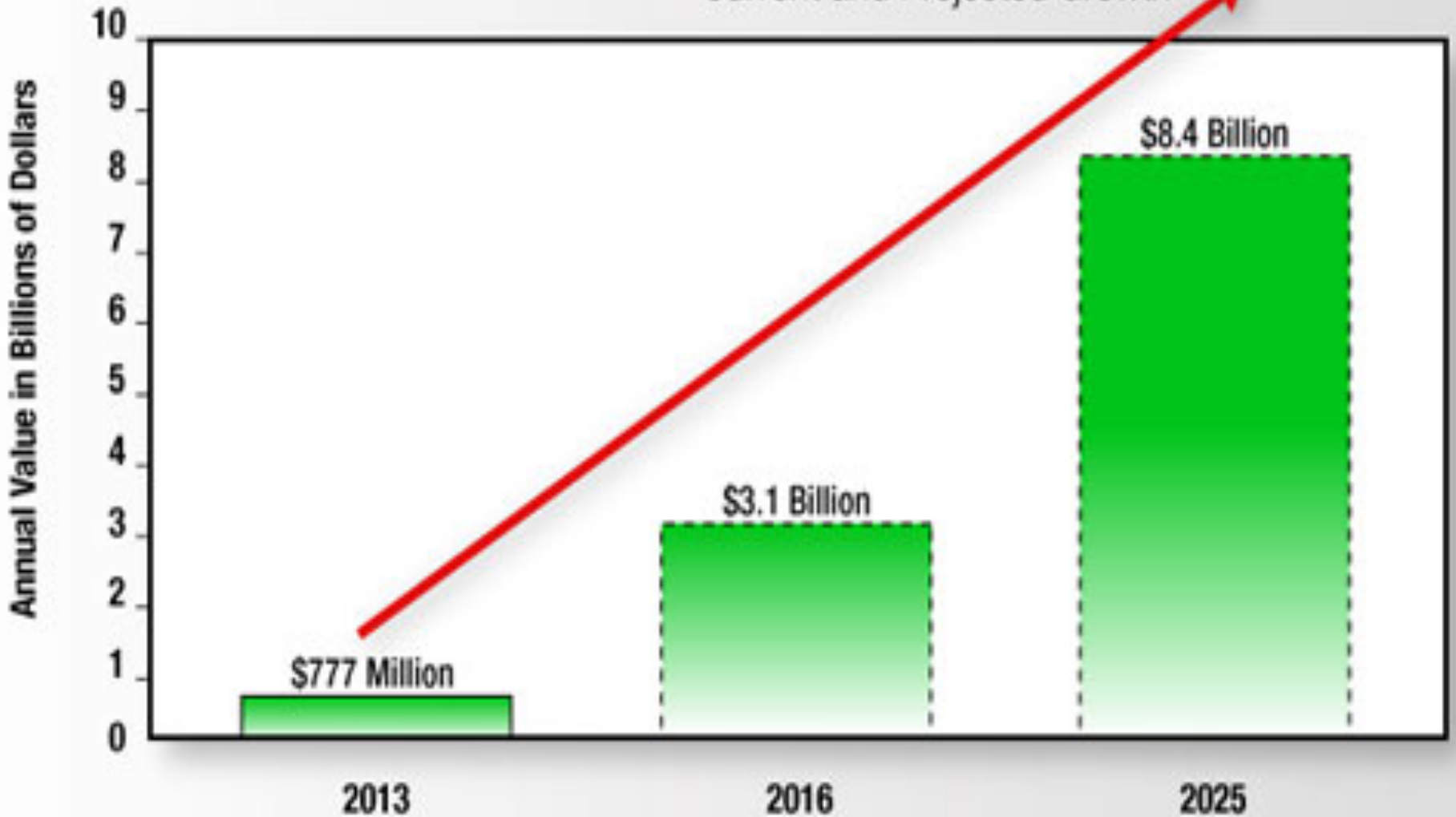
- GE plans to mass-produce 25,000 LEAP engine nozzles with AM – already have \$22B in commitments
- Parts will drive production and operational cost savings
- First test to see if AM can revolutionize production

Main Applications 2014 - Future:

- End Product Production
- Mass Production
- Democratized Consumer 3D Printing

3-D Printing Market Value

Current and Projected Growth



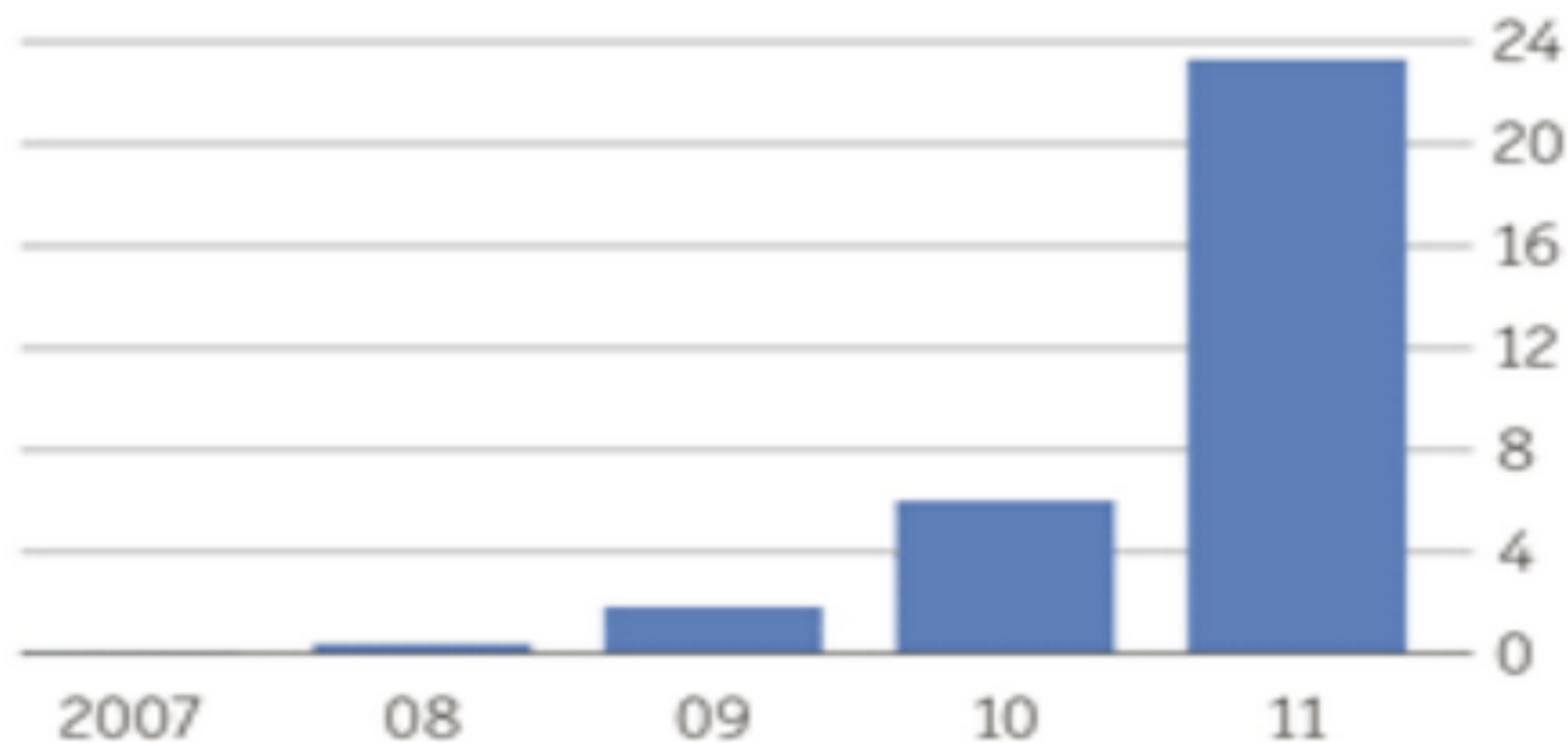
Source: Agora Financial,

http://research.agorafinancial.com/research/html/tek_clickprint_0713/?code=LTEKP802&ver=3

Home-making

Global sales of personal 3D-printers*

Units, '000

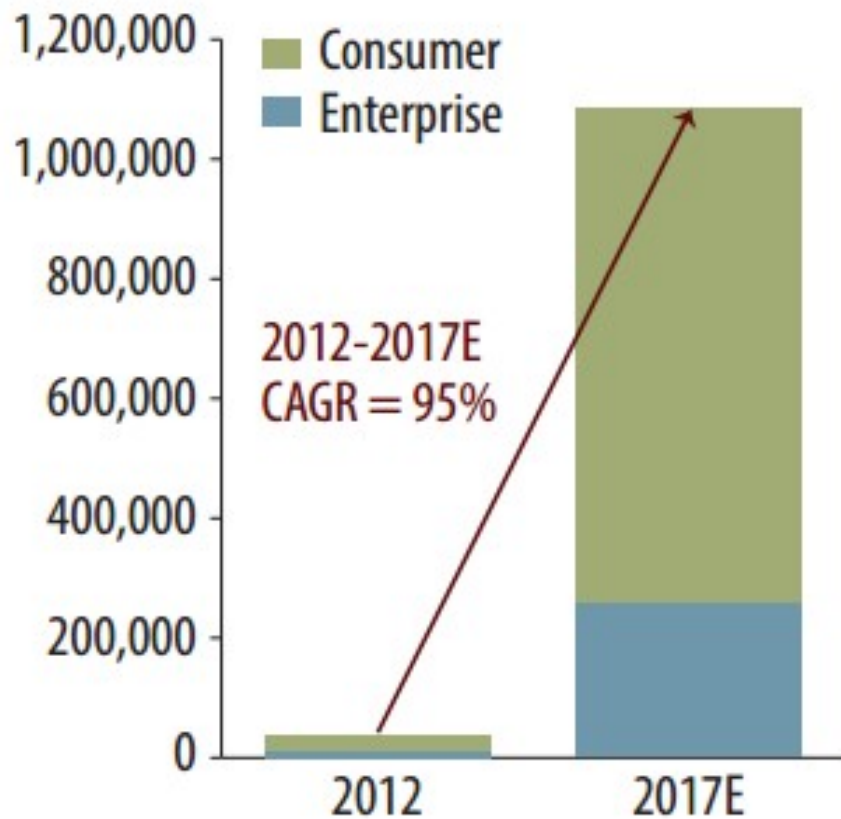


*Machines or kits priced \$500-4,000

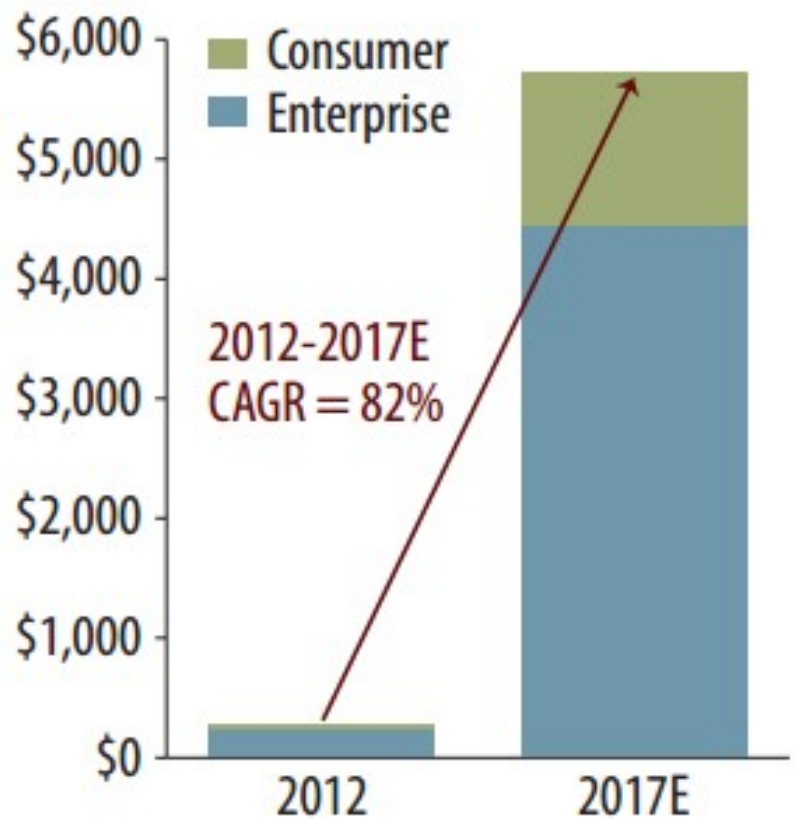
Source: Wohlers Associates

Chart 6: 3-D Printer Use is Migrating from Hobbyists to Commercial Manufacturers

3-D Printers Shipments (number of units)

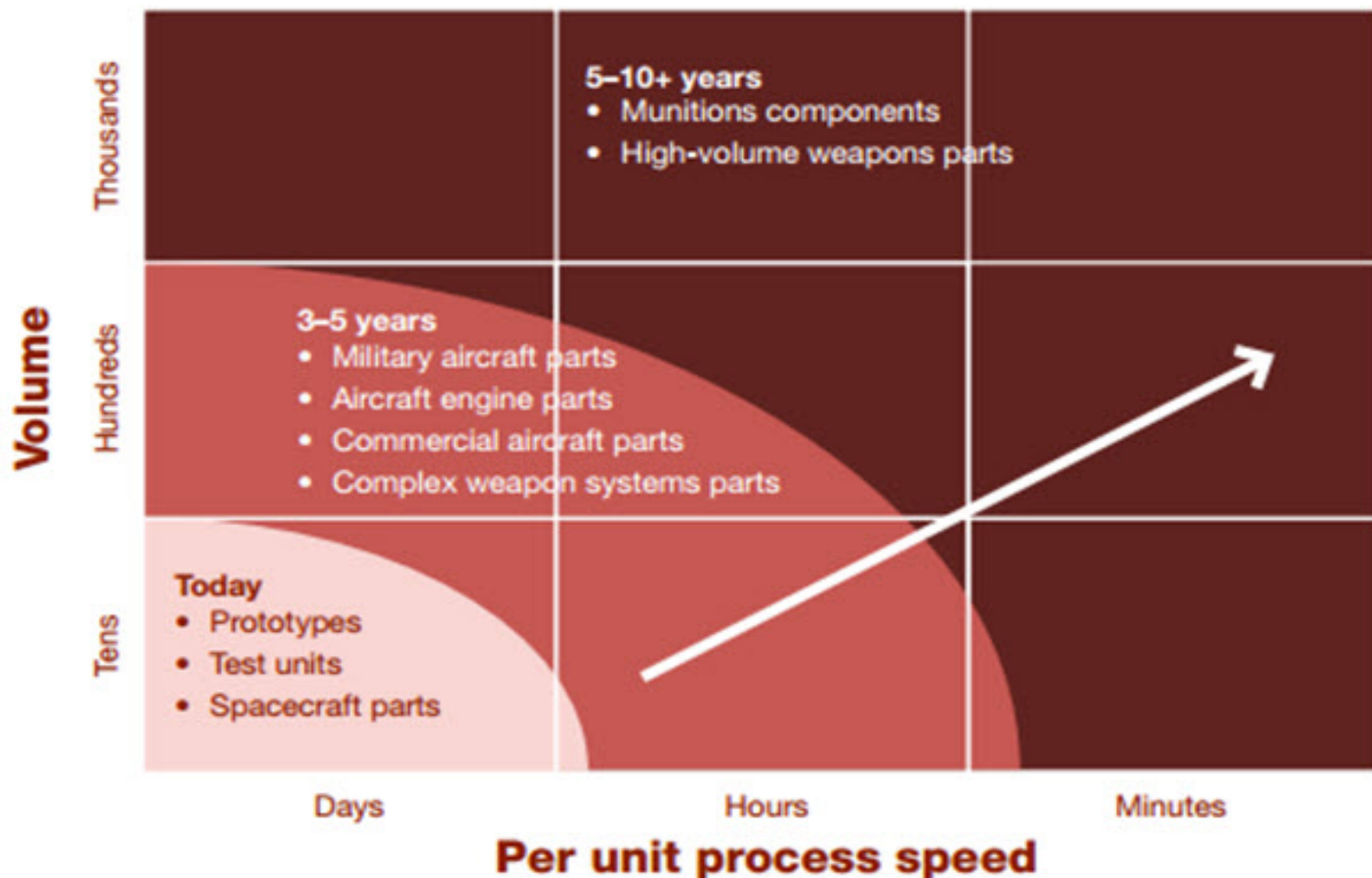


3-D Printers Revenue (\$ in millions)

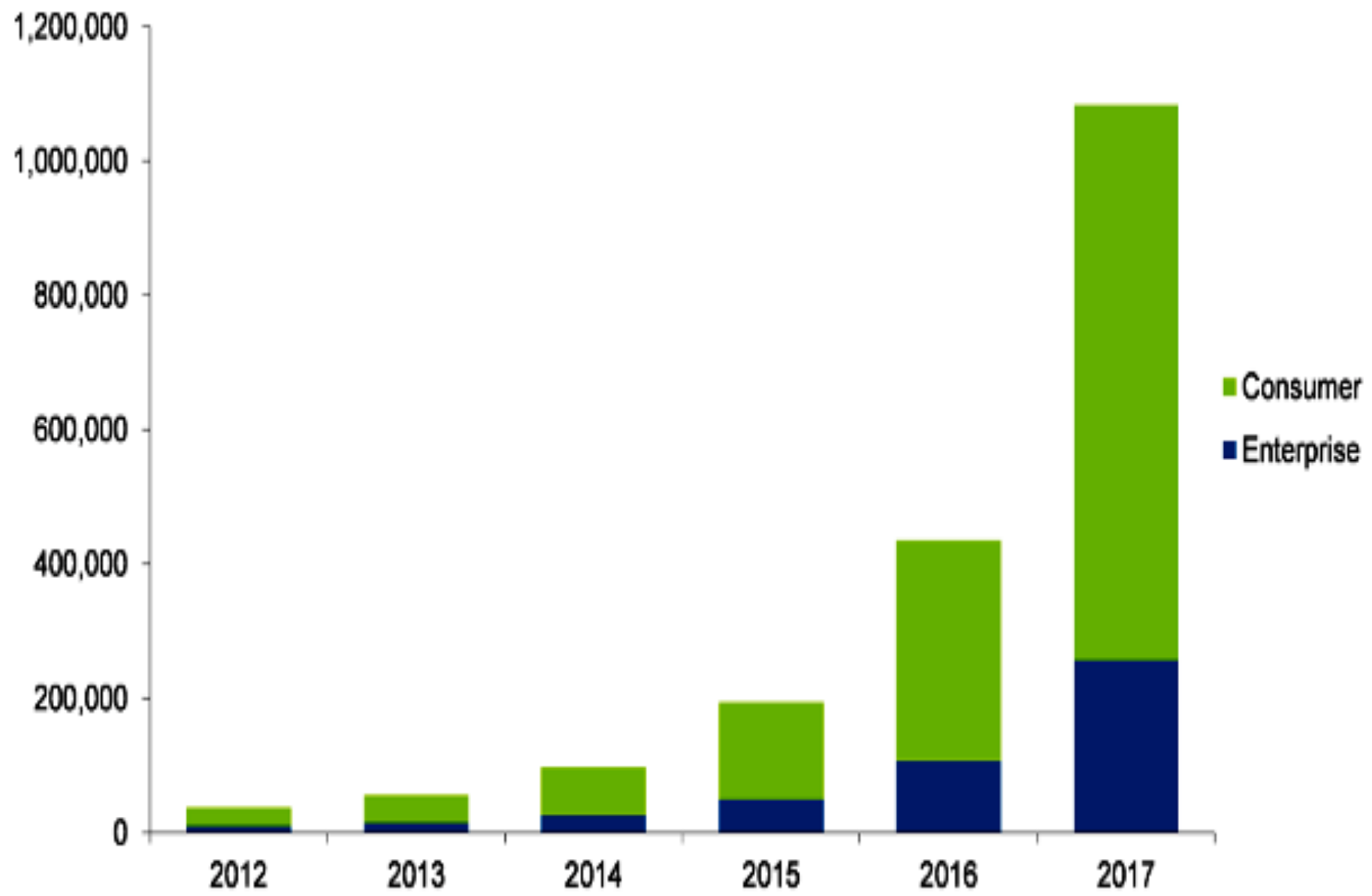


Source: "3-D Printers, Worldwide" Gartner, September, 2013, Wells Fargo Wealth Management, 2014

3D printing – adoption map



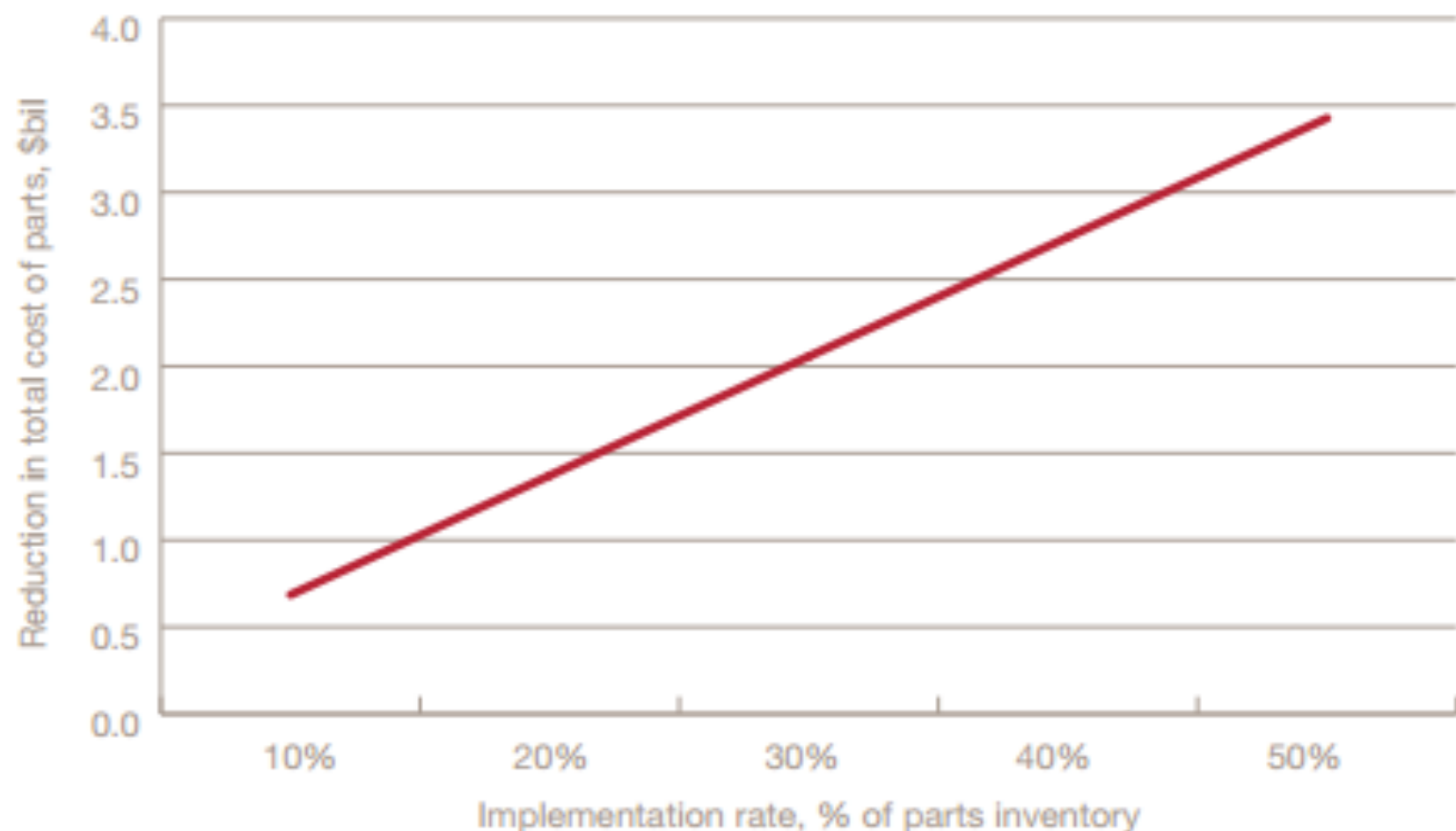
Shipments



Source: Gartner Research by Pete Basiliere - February 14, 2014

Aerospace + 3DP

How 3DP could save the global aerospace industry up to \$3.4 billion in MRO savings.



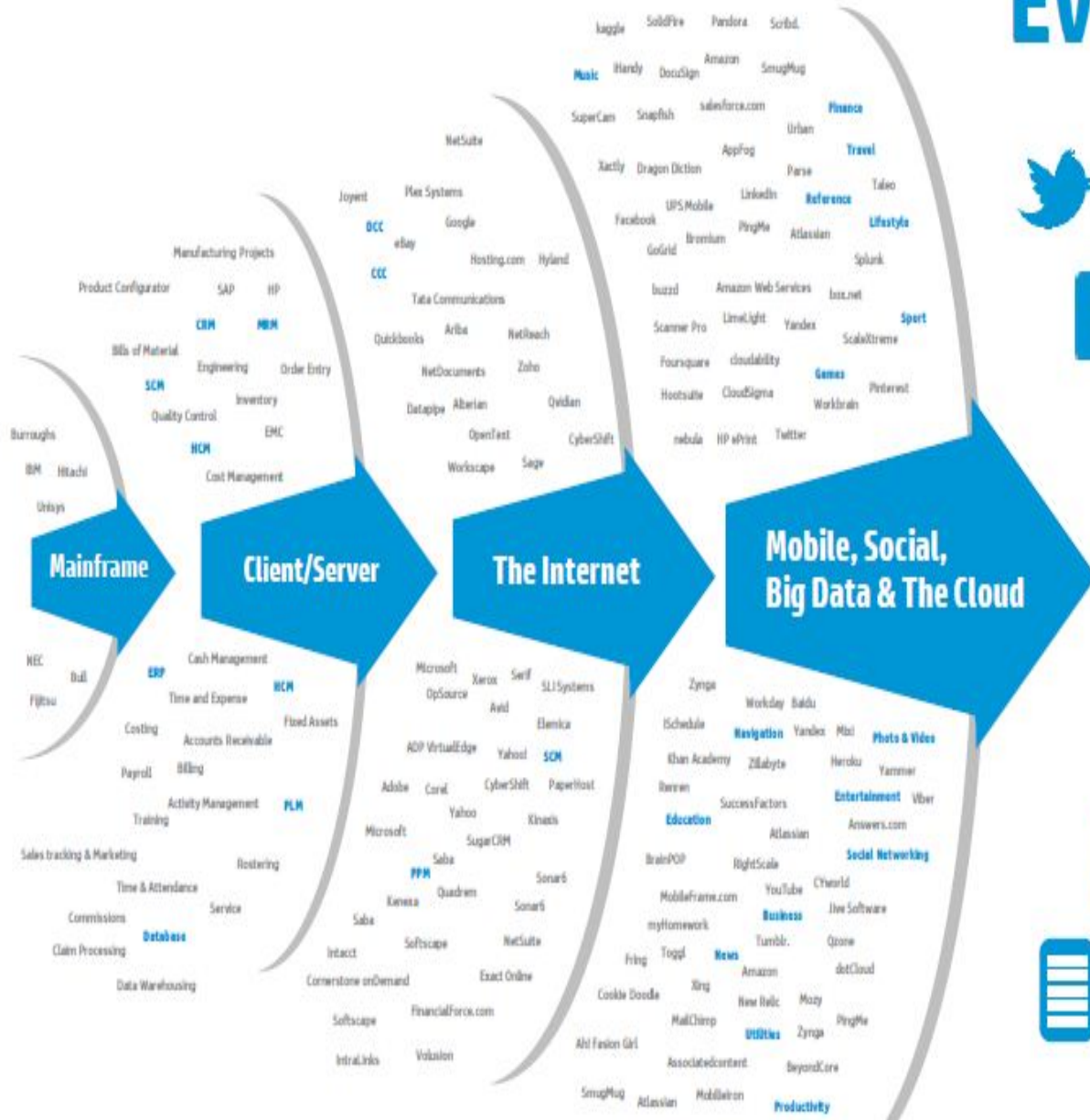
Source: PwC analysis conducted for this report

Note: Part cost savings were calculated using market size and a cost savings estimate across scenarios of various penetration rates. Transportation costs savings were derived from applying a benchmark of supply chain cost percentage to addressable market at these same penetration rates.

BIG Data

A new style of IT emerging

Every 60 seconds



98,000+ tweets



695,000 status updates



11 million instant messages



698,445 Google searches



168 million+ emails sent



1,820TB of data created



217 new mobile web users

Source: PracticalAnalytics, <https://practicalanalytics.wordpress.com/2012/10/>

THE SPHERES OF BIG DATA ARE CONVERGING

30



billion pieces
of data
are added to
Facebook
each month

72 hours of
video are
added to
YouTube
each minute



\$600

buys you a disk
that stores
all music
on Earth



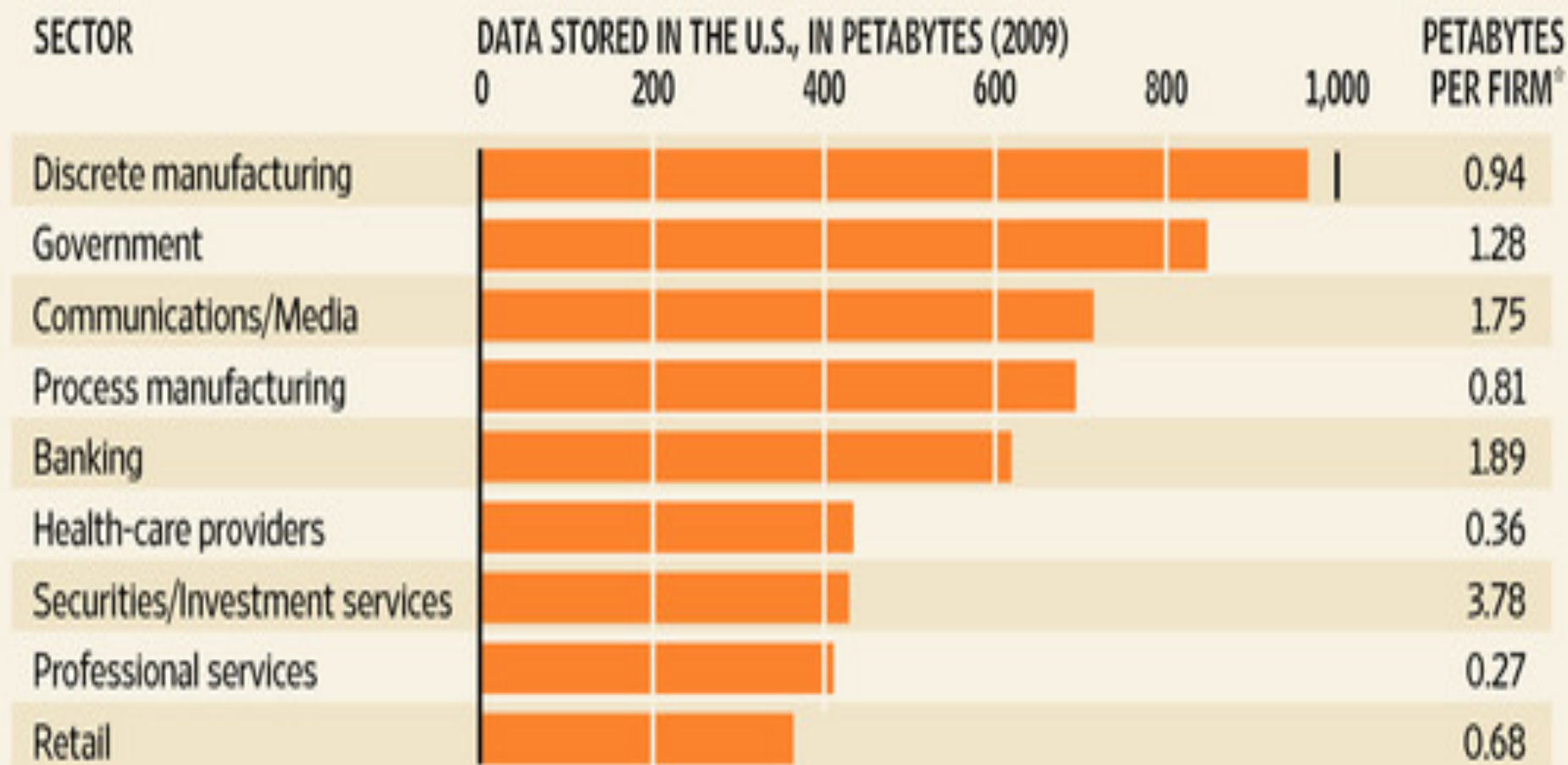
92%



of the world's
data was created
in the past 2 years

Big Data

As the amount of data used by businesses grows, there are new opportunities for analyzing it, which stands to change how we make day-to-day business decisions. One petabyte is equivalent to 1 million gigabytes. A large iPod has capacity of 160 gigabytes.



*For firms with more than 1,000 employees

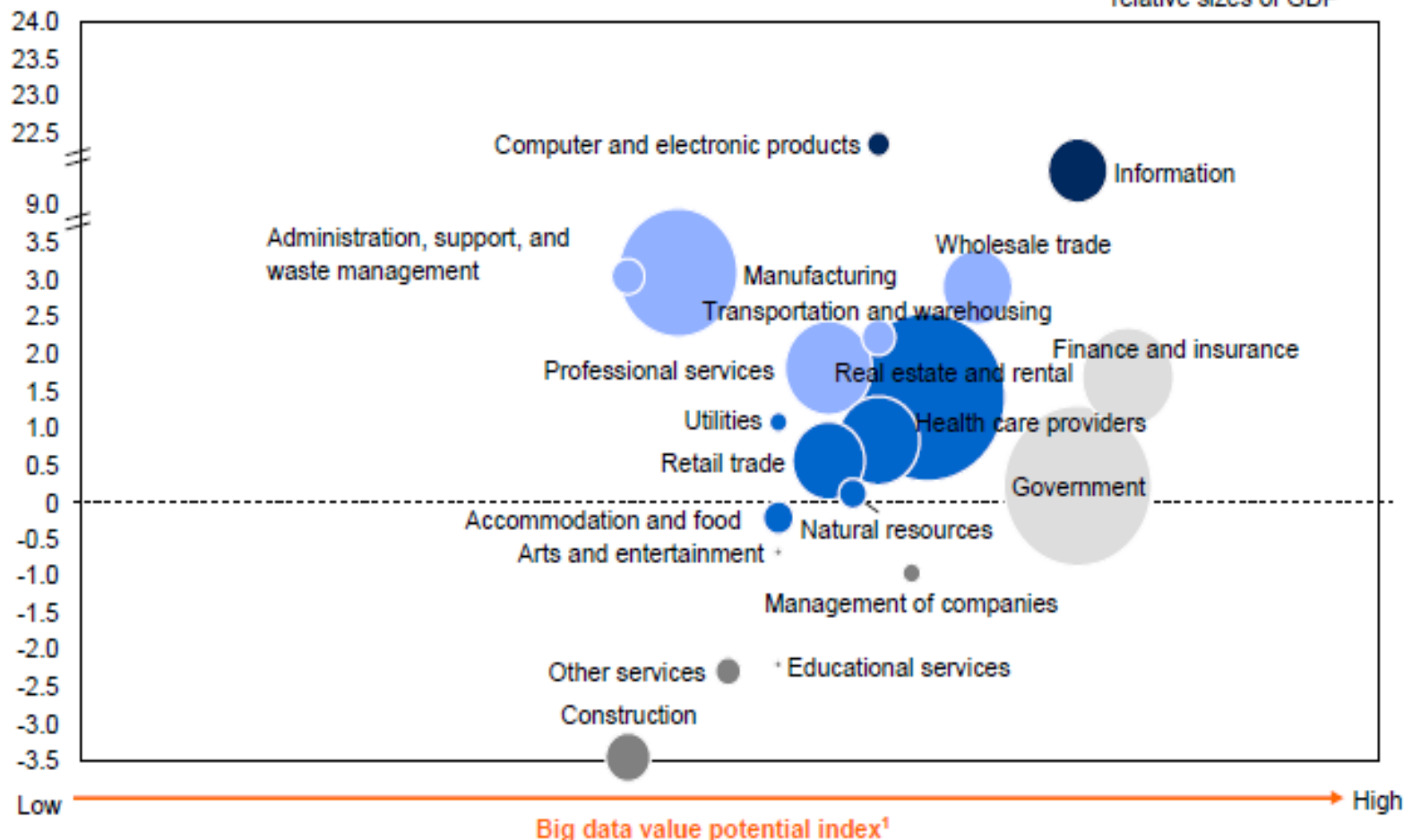
Source: McKinsey Global Institute analysis of data from IDC (data stored) and U.S. Dept. of Labor

Exhibit 2

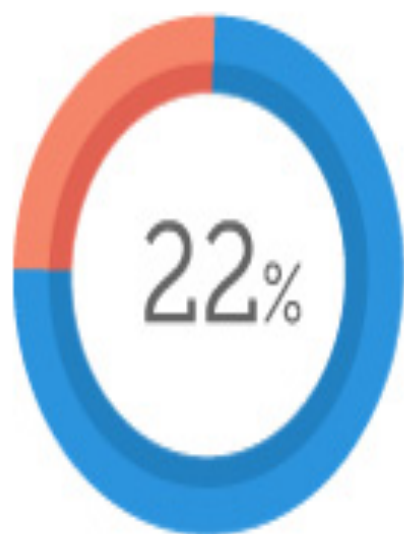
Some sectors are positioned for greater gains from the use of big data

Historical productivity growth in the United States, 2000–08

%

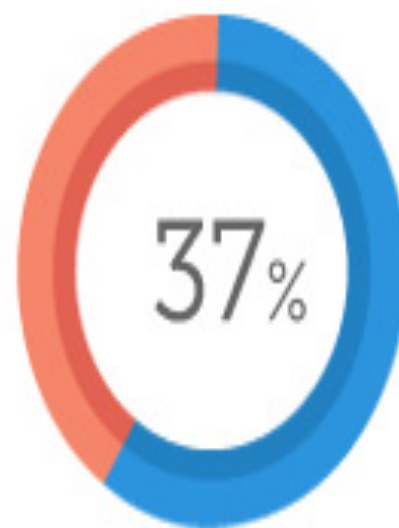


1 See appendix for detailed definitions and metrics used for value potential index.
SOURCE: US Bureau of Labor Statistics; McKinsey Global Institute analysis



22%

Data that is
Useful if
**Tagged &
Analyzed**



37%

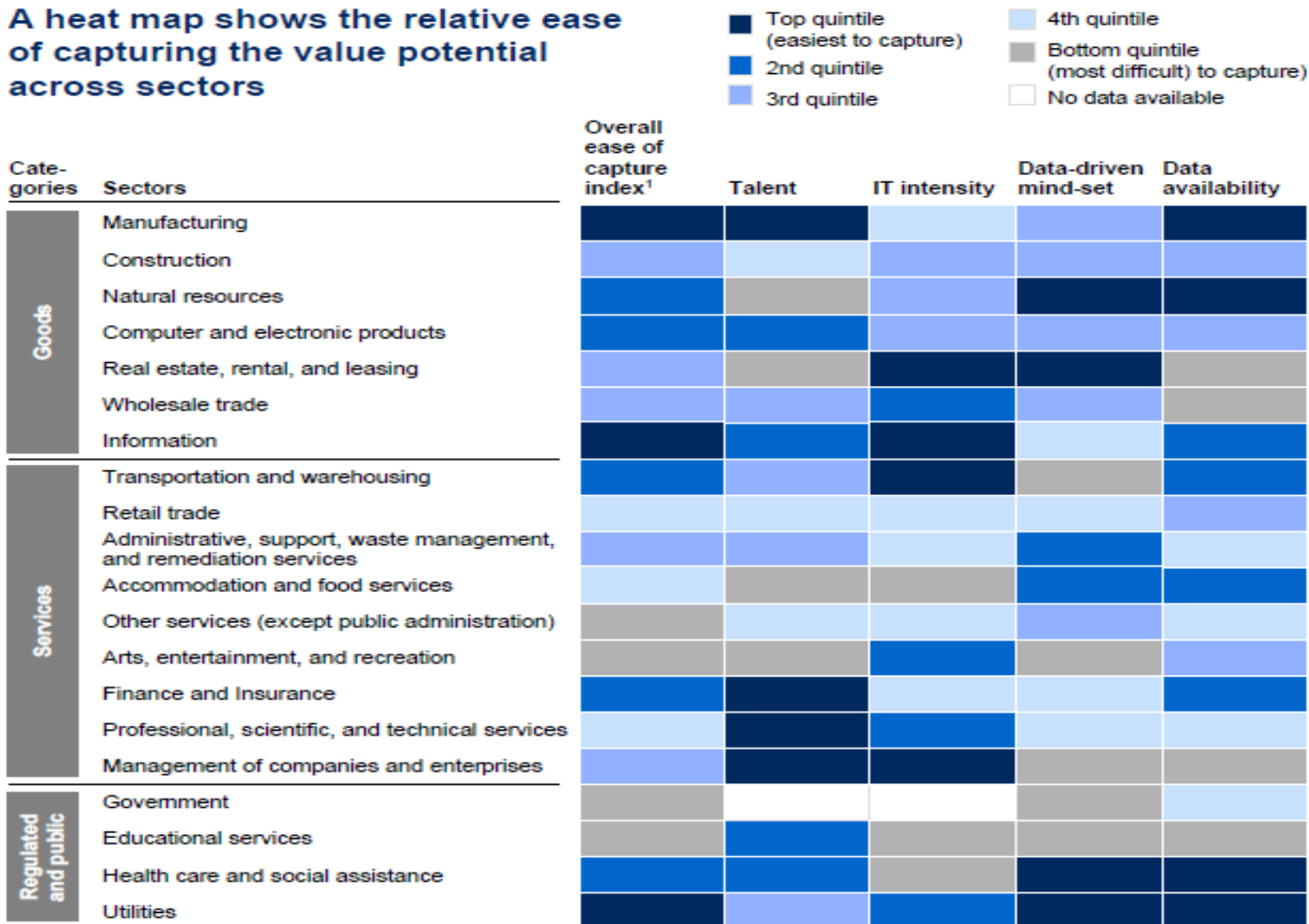
Source IDC, 2014

2013

2020

Exhibit 3

A heat map shows the relative ease of capturing the value potential across sectors



1 See appendix for detailed definitions and metrics used for each of the criteria.

SOURCE: McKinsey Global Institute analysis

1 THE RAPID GROWTH OF GLOBAL DATA



The production of data is expanding at an astonishing pace. Experts now point to a 4300% increase in annual data generation by 2020. Drivers include the switch from analog to digital technologies and the rapid increase in data generation by individuals and corporations alike.

2020: MORE THAN 1/3 OF THE DATA PRODUCED WILL LIVE IN OR PASS THROUGH THE CLOUD.

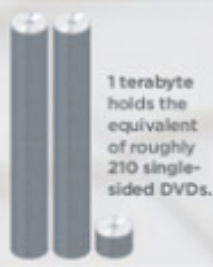


2012: CUSTOMERS WILL START STORING 1 EB OF INFORMATION.

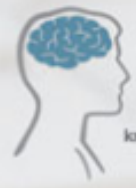


WHAT IS A ZETTABYTE?

- 1,000,000,000,000 gigabytes
- 1,000,000,000,000 terabytes
- 1,000,000,000,000 petabytes
- 1,000,000,000,000 exabytes
- 1,000,000,000,000 zettabyte



It took roughly 1 petabyte of local storage to render the 3D CGI effects in Avatar.



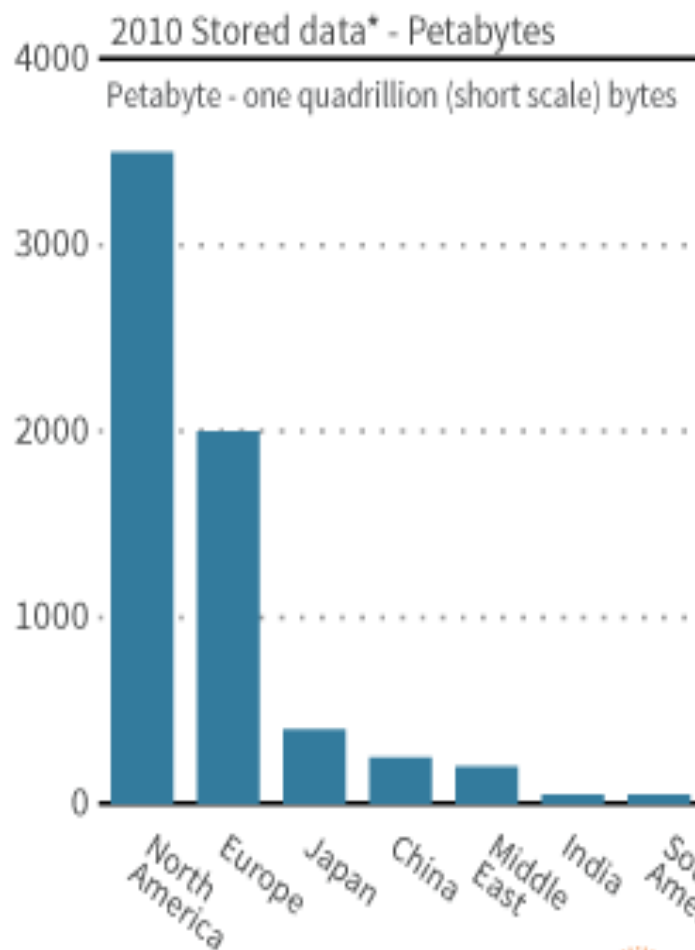
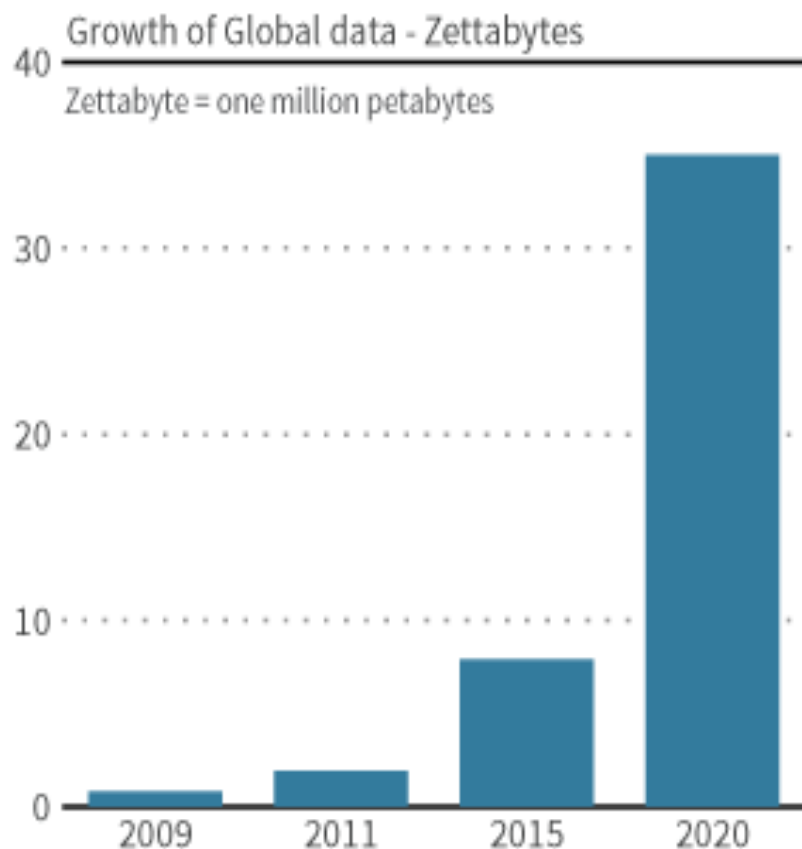
In 2007, the estimated information content of all human knowledge was 295 exabytes.

DATA PRODUCTION WILL BE 44 TIMES GREATER IN 2020 THAN IT WAS IN 2009

More than 70% of the digital universe is generated by individuals. But enterprises have responsibility for the storage, protection and management of 80% of it.*

Big data growth

Big data market is estimated to grow 45% annually to reach \$25 billion by 2015



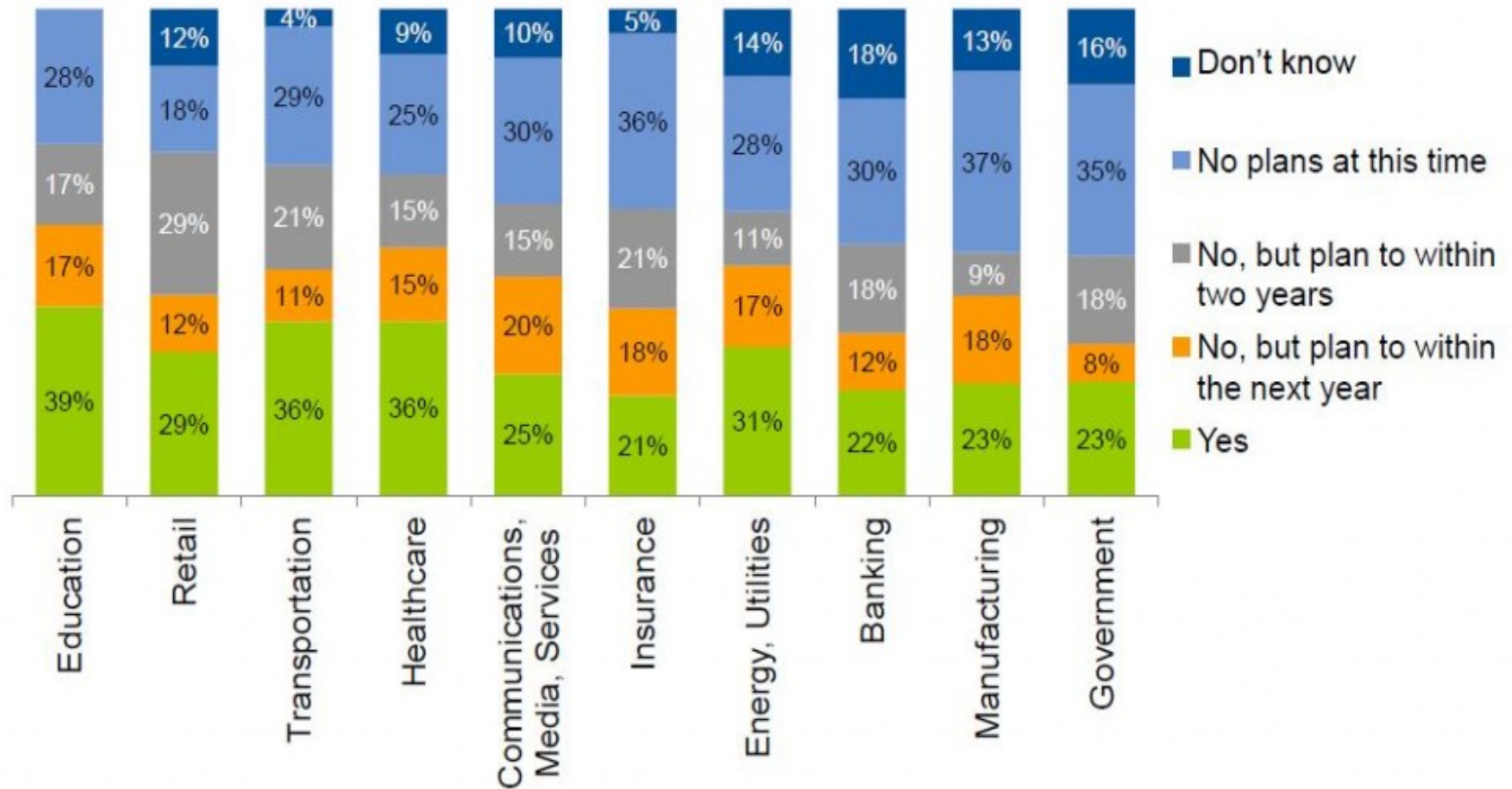
*greater than

Sources: Nasscom -CRISIL GR&A analysis



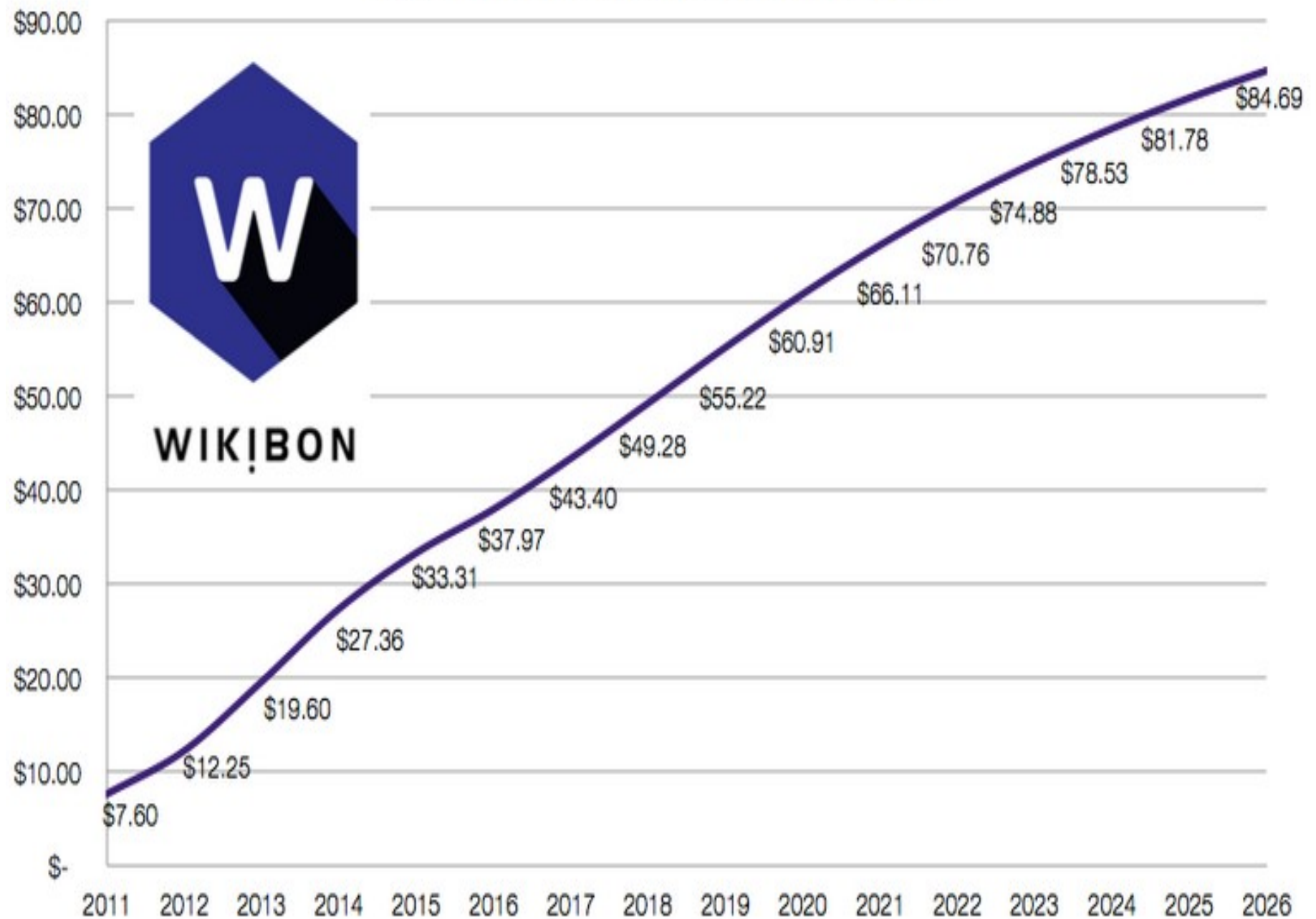
Big Data Investments by Industry

Has your organization already invested in technology specifically designed to address the big data challenge?



Source: Gartner (July 2012)

Big Data Market Forecast, 2011-2026 (\$US B)



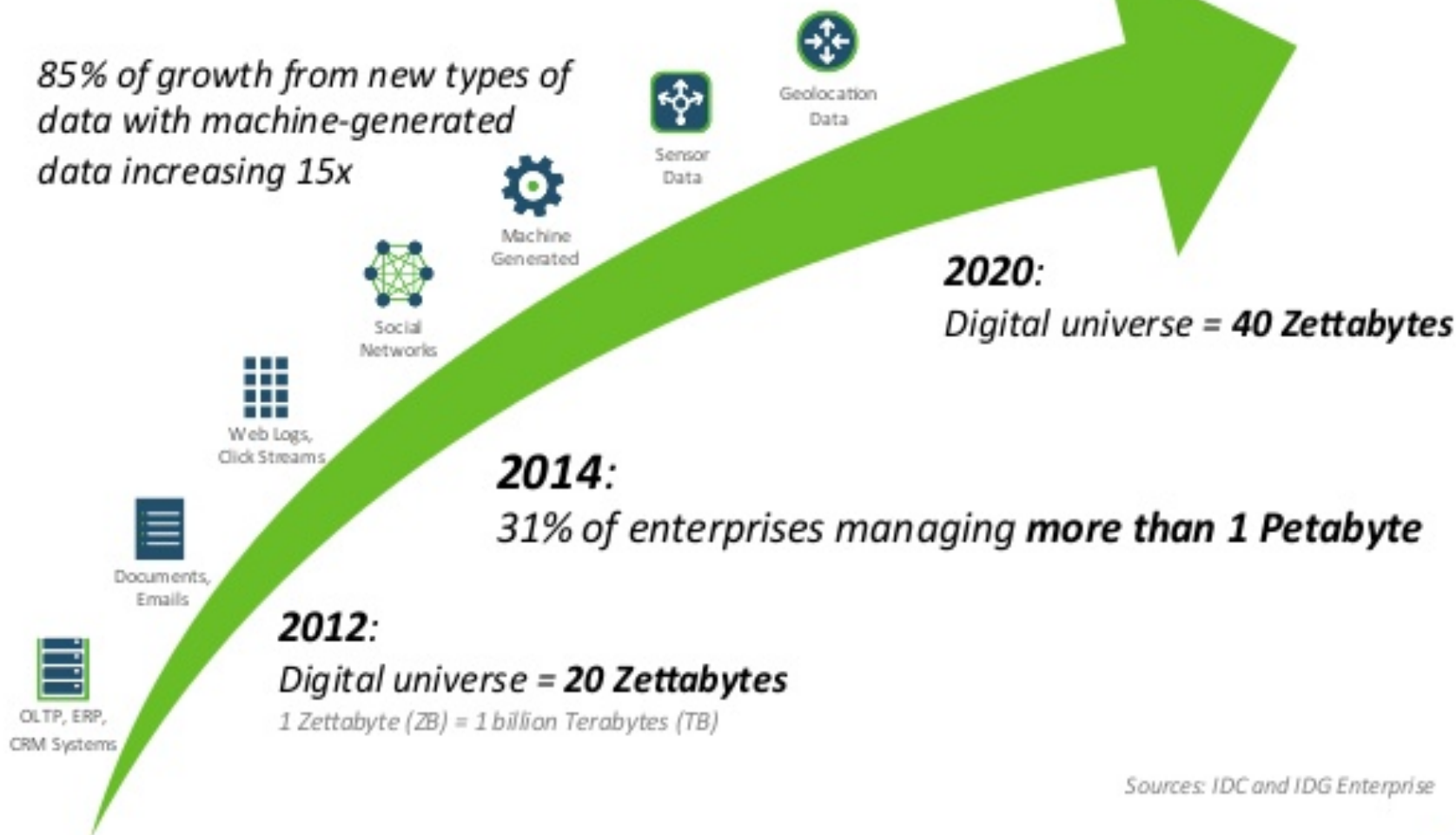


Determining relevant data is key to delivering value from massive amounts of data.

Source: SAS, Big Data Meets Big Dad Analytics: Three Key Technologies for Extracting Real-Time Business Value from the Big Data That Threatens to Overwhelm Traditional Computing Architectures

Data Continues to Grow Sharply

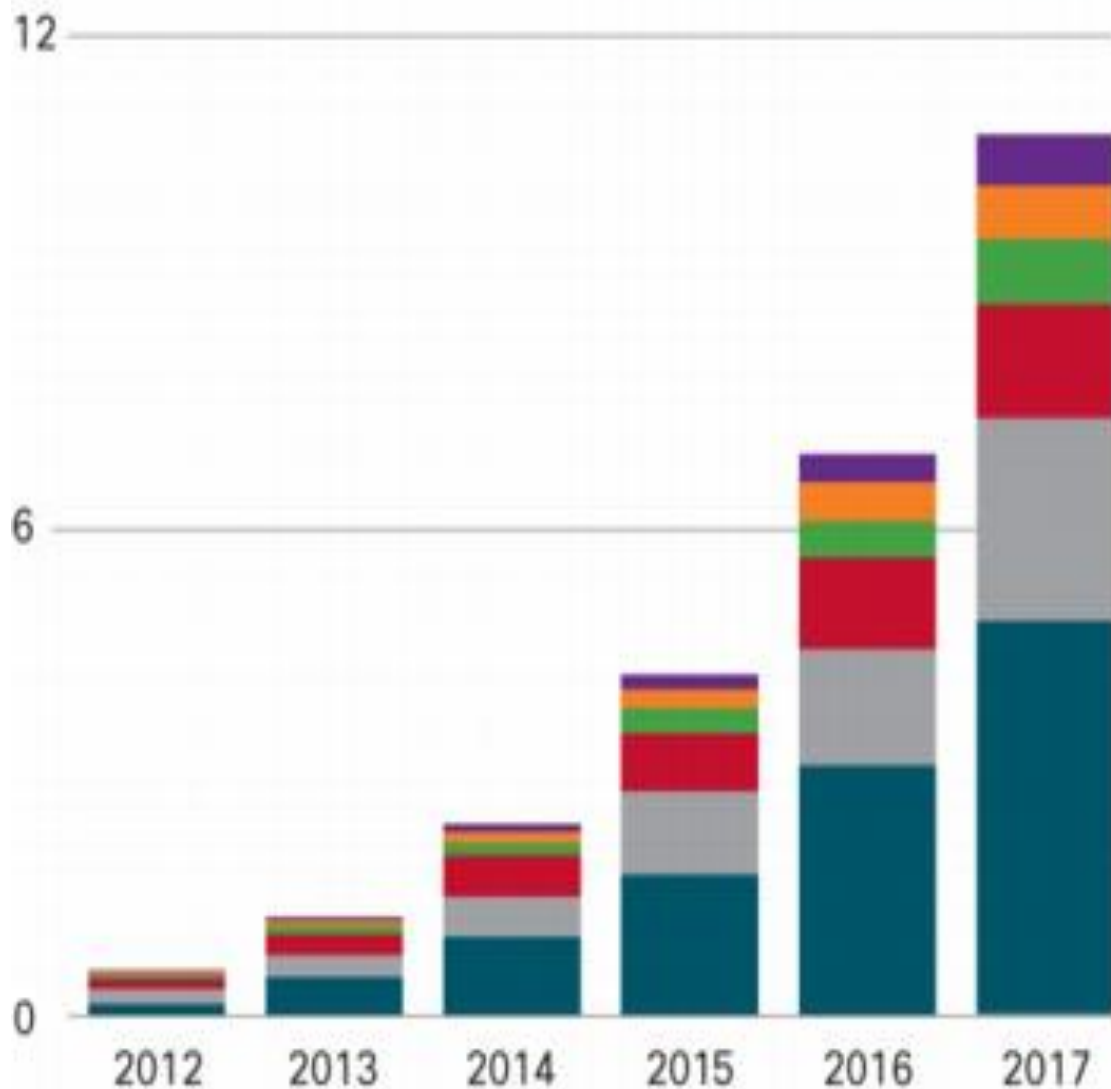
85% of growth from new types of data with machine-generated data increasing 15x



Sources: IDC and IDG Enterprise

Exabytes per Month

66% CAGR 2012-2017



- Latin America (LATAM) 6.5%
- Central and Eastern Europe (CEE) 7.6%
- Middle East and Africa (MEA) 7.7%
- Western Europe (WE) 12.4%
- North America (NA) 18.7%
- Asia Pacific (APAC) 47.1%

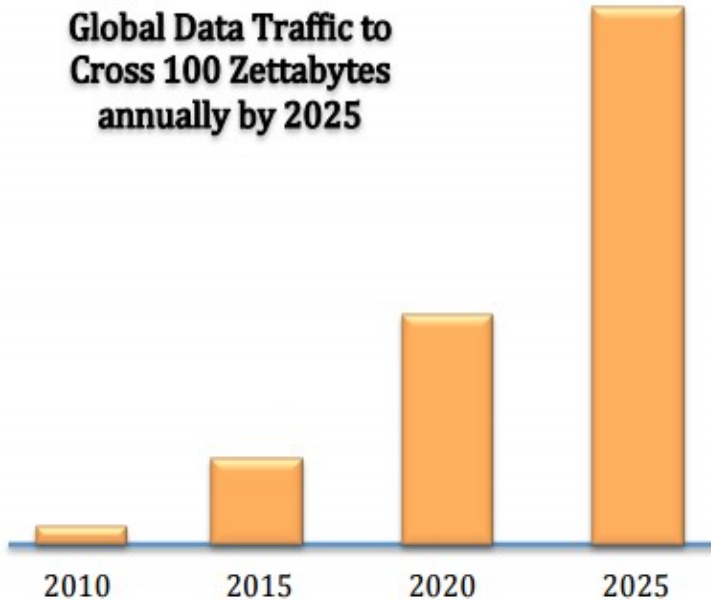
Figure 3 The Forrester Wave™: Big Data Predictive Analytics Solutions, Q2 '15



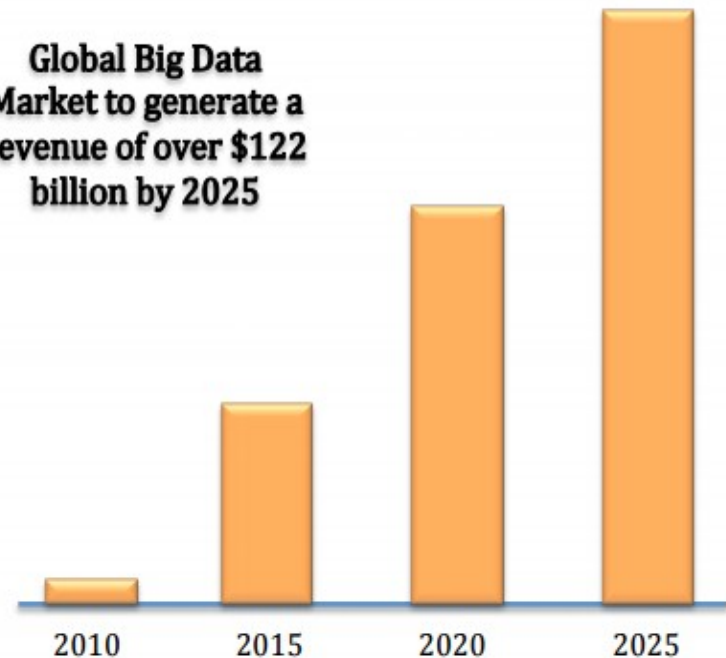
Sub Trend: Big Data Analytics

90% of the data in the world has been created in the last two years alone

Global Data Traffic to Cross 100 Zettabytes annually by 2025



Global Big Data Market to generate a revenue of over \$122 billion by 2025

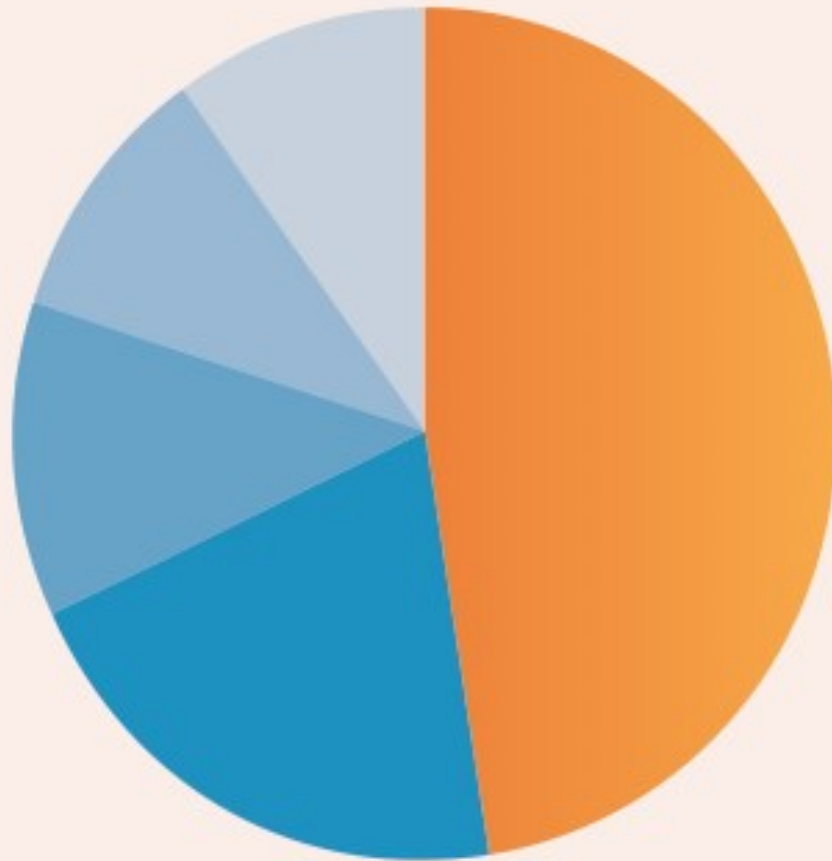


Source: IBM, Cisco, Frost & Sullivan Analysis

- The data volumes are exploding, [more data](#) has been created in the past two years than in the entire previous history of the human race.
- Data is growing faster than ever before and by the year 2020, about [1.7 megabytes](#) of new information will be created every second for every human being on the planet.
- By then, our accumulated digital universe of data will grow from 4.4 zettabytes today to around [44 zettabytes](#), or 44 *trillion* gigabytes.
- Every second we create new data. For example, humans perform 40,000 search queries every second (on [Google alone](#)), which makes it 3.5 searches per day and 1.2 trillion searches per year.

- For a typical Fortune 1000 company, just a 10% increase in data accessibility will result in more than \$65 million additional net income.
- Retailers who leverage the full power of big data could increase their operating margins by as much as 60%
- 73% of organizations have already invested or plan to invest in big data by 2016
- BUT, currently less than 0.5% of all data is ever analyzed and used - **Potential?**

BIG DATA "USE CASES" WITHIN BUSINESSES



48% Customer Analytics

21% Operational Analytics

12% Fraud & Compliance

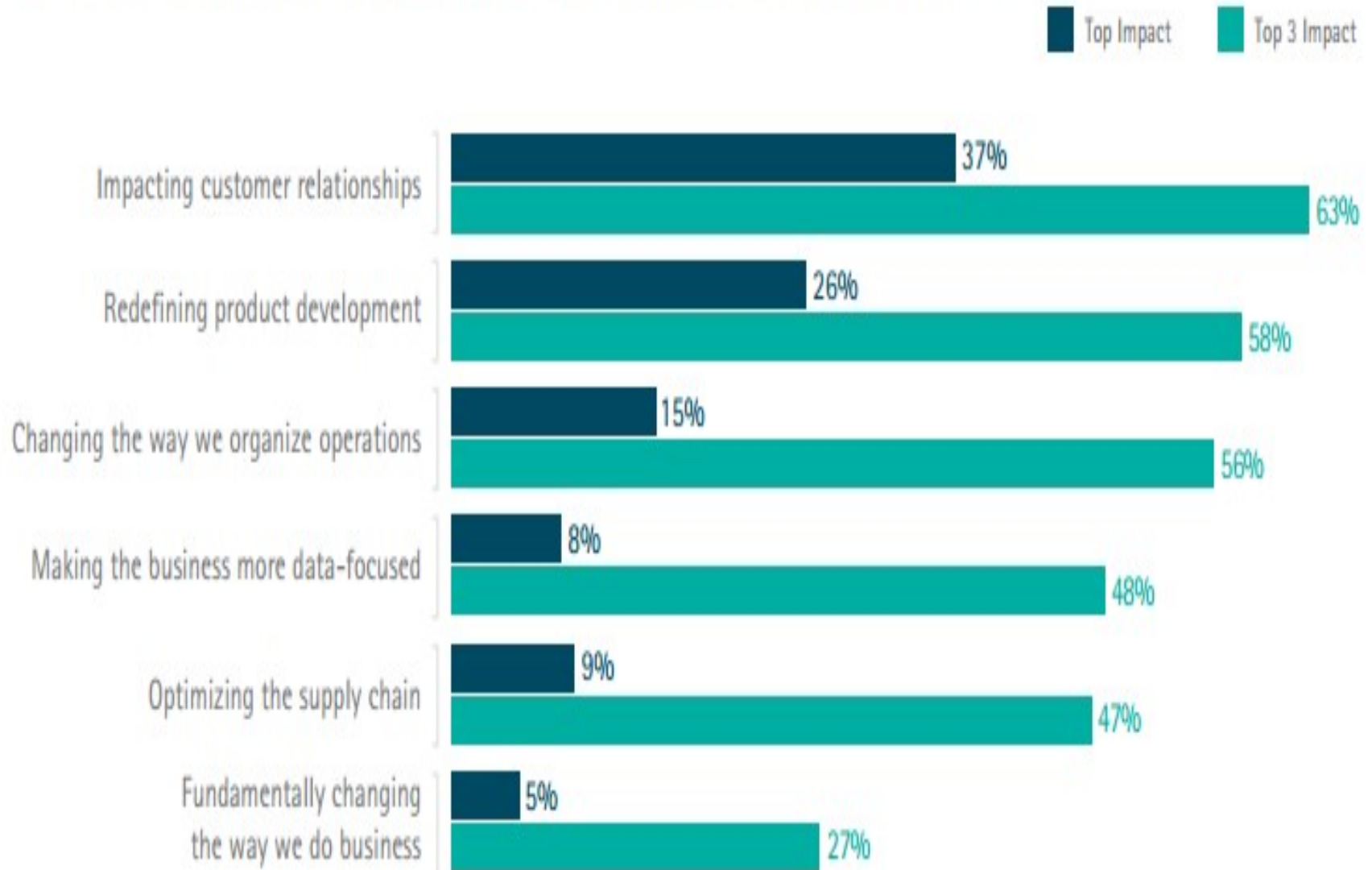
10% New Product & Service Innovation

10% Enterprise Data Warehouse Optimization

**Adds to 101% due to rounding*

<http://www.forbes.com/sites/louiscolombus/2015/05/25/roundup-of-analytics-big-data-business-intelligence-forecasts-and-market-estimates-2015/#69c8616f4869>

Where will big data have the biggest impact on your organization in the next five years?

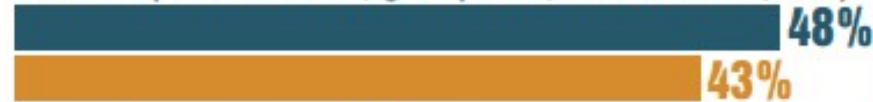


Factors Driving Interest in Big Data Analysis

What data sources or challenges are driving, or would drive, your organization's interest in doing big data analysis?

■ 2015 ■ 2014

Finding correlations across multiple, disparate data sources (clickstreams, geospatial, transactions, etc.)



Predicting customer behavior



Predicting product or service sales



Predicting fraud or financial risk



Analyzing social network comments for consumer sentiment



Analyzing high-scale machine data from sensors, web logs, etc.



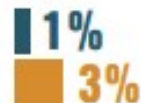
Identifying computer security risks



Analyzing web clickstreams



Other



Big data analytics is not of interest to my organization



Note: Multiple responses allowed

Base: 297 respondents in October 2014 and 248 in October 2013 at organizations using or planning to deploy data analytics, BI, or statistical analysis software

Data: InformationWeek Analytics, Business Intelligence, and Information Management Survey of business technology professionals

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Thank You