Emerging Technologies for the Digital World

Prof. Indranil Bose
Indian institute of Management Calcutta

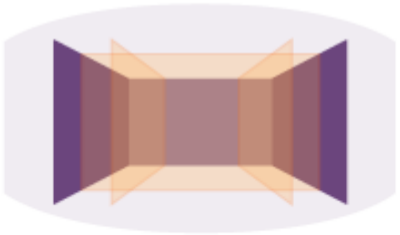
Technologies for the Financial World

- Augmented reality / Virtual reality
- IoT
- Chatbots
- Robotic process automation and Robotics

Types of Synthetic Environments

VIRTUAL REALITY (VR)

Fully artificial environment



Full immersion in virtual environment

AUGMENTED REALITY (AR)

Virtual objects overlaid on real-world environment

The real world enhanced with digital objects

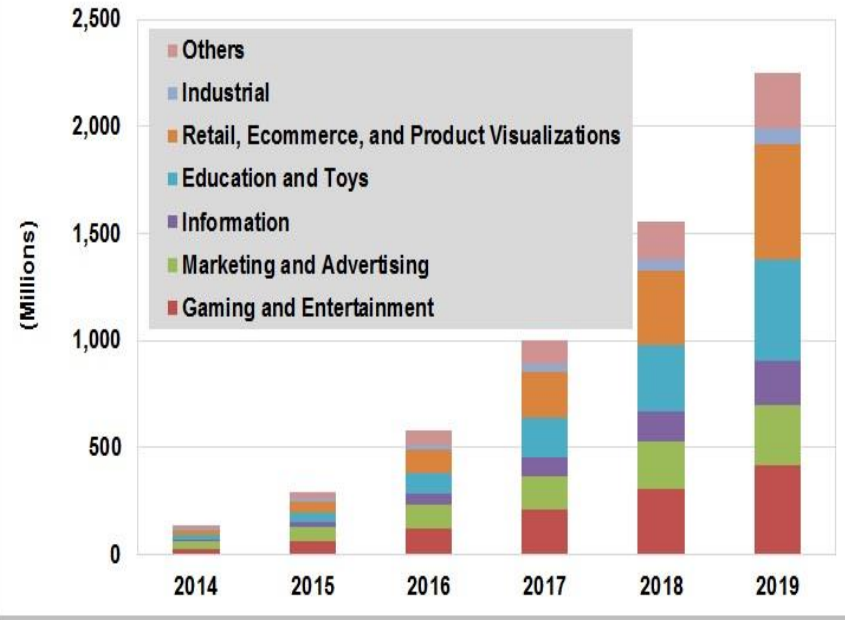
MIXED REALITY (MR)

Virtual environment combined with real world

Interact with both the real world and the virtual environment

Tractica

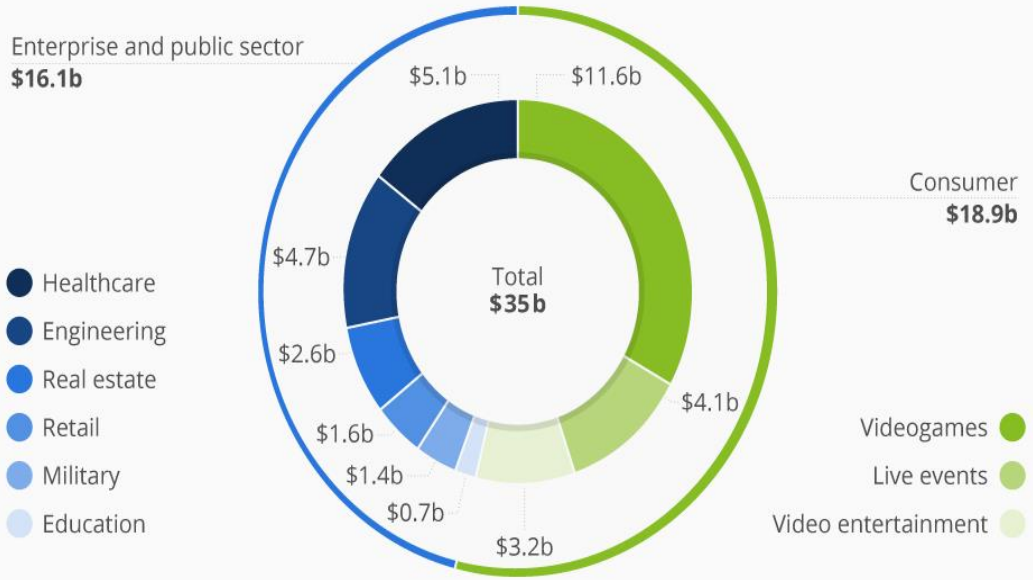
Installed Base of Actively Used Mobile AR Apps by Application Type, World Markets: 2014-2019



Source: Tractica

The Diverse Potential of VR & AR Applications

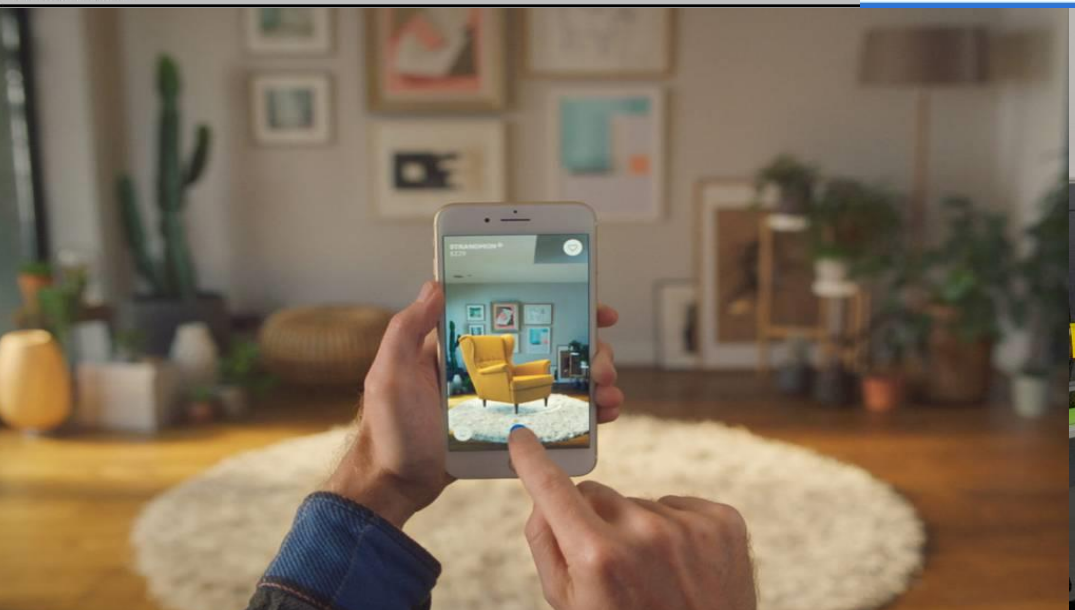
Predicted market size of VR/AR software for different use cases in 2025*



* Base case scenario

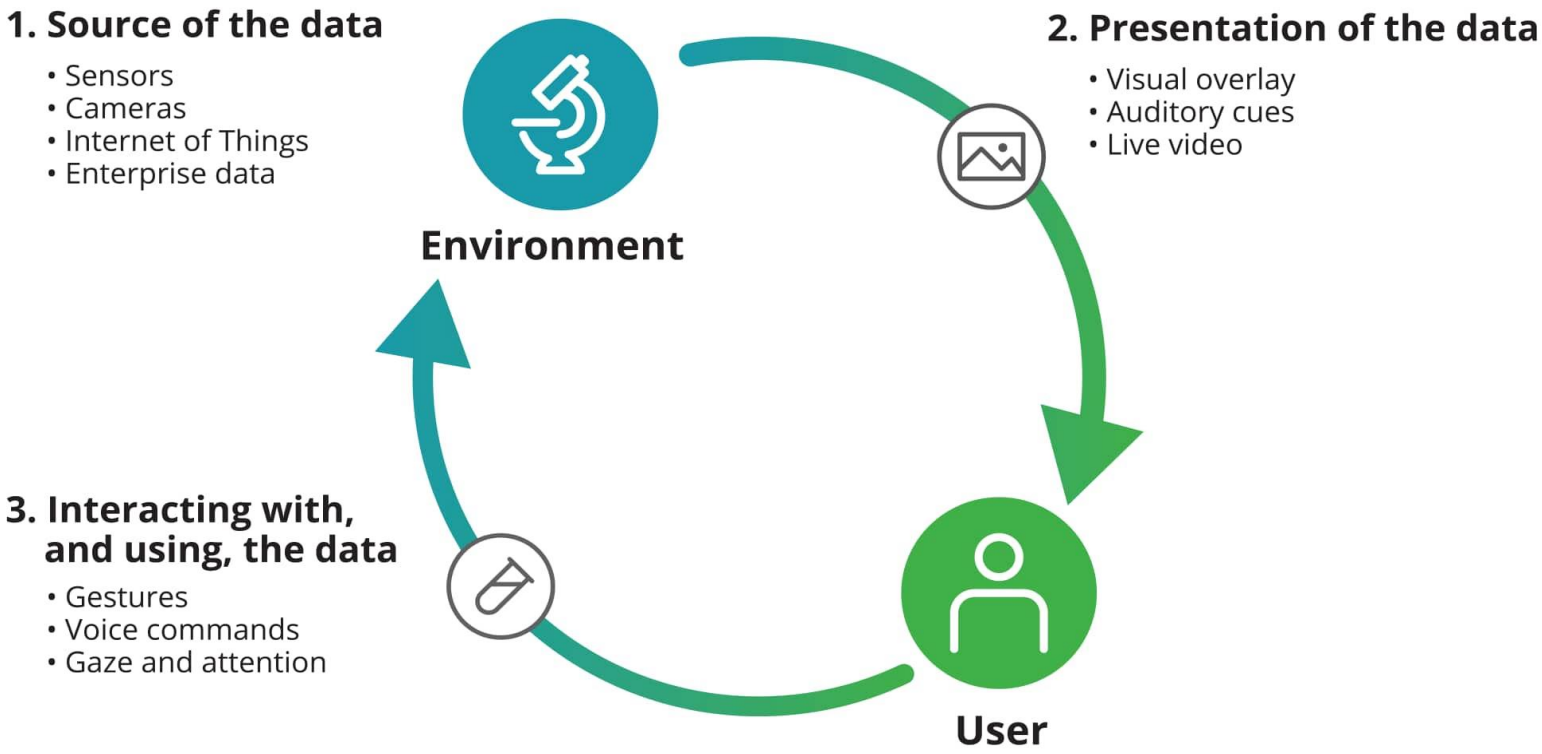
@StatistaCharts Source: Goldman Sachs Global Investment Research

statista



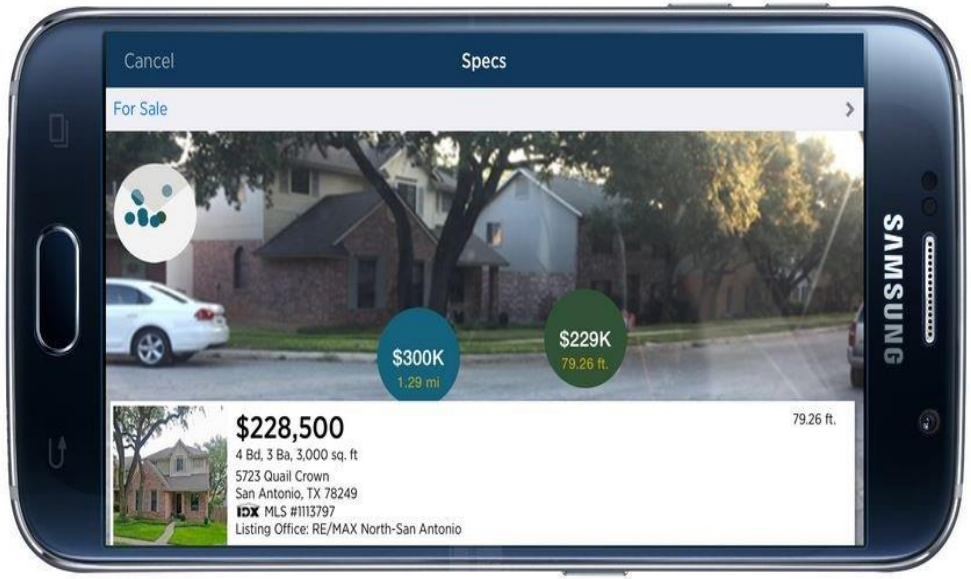
Understanding Digital Reality

Figure 2. The core elements and technologies of digital reality



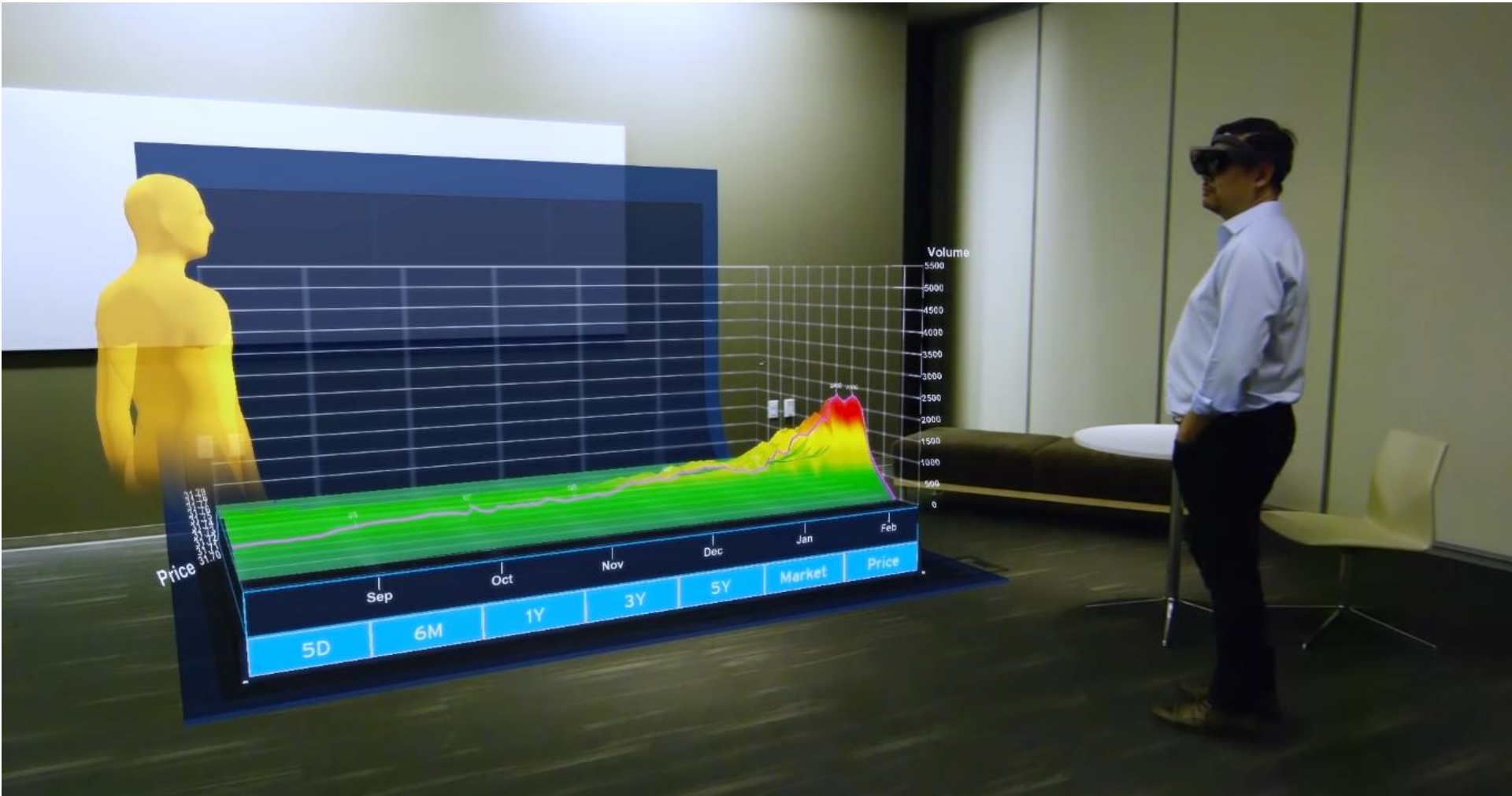
Source: Joe Mariani, Brenna Sniderman, and Cary Harr, "*More real than reality: Transforming work through augmented reality,*" Deloitte University Press, July 31, 2017; adapted from the core elements and technologies of AR.

Use Cases for AR in BFSI



Trading of the Future

https://www.youtube.com/watch?v=oNogltmewmQ



IoT is top-of-mind with CEO's, CIO's, and VC's

WORLD ECONOMIC FORUM

2015 Tech Predictions

1. **Digital transformation**
2. **Internet of Things**
3. **Convergence of big data with consumer data**
4. Hybrid cloud
5. Collaboration
6. **Predictive analytics will lead big data**
7. **Mobile wearable technology**
8. A Platform and orchestration is needed
9. Networked Economy
10. The end of apps

Gartner SYMPOSIUM ITXPO 2014

Top 10 Strategic Technology Trends for 2015

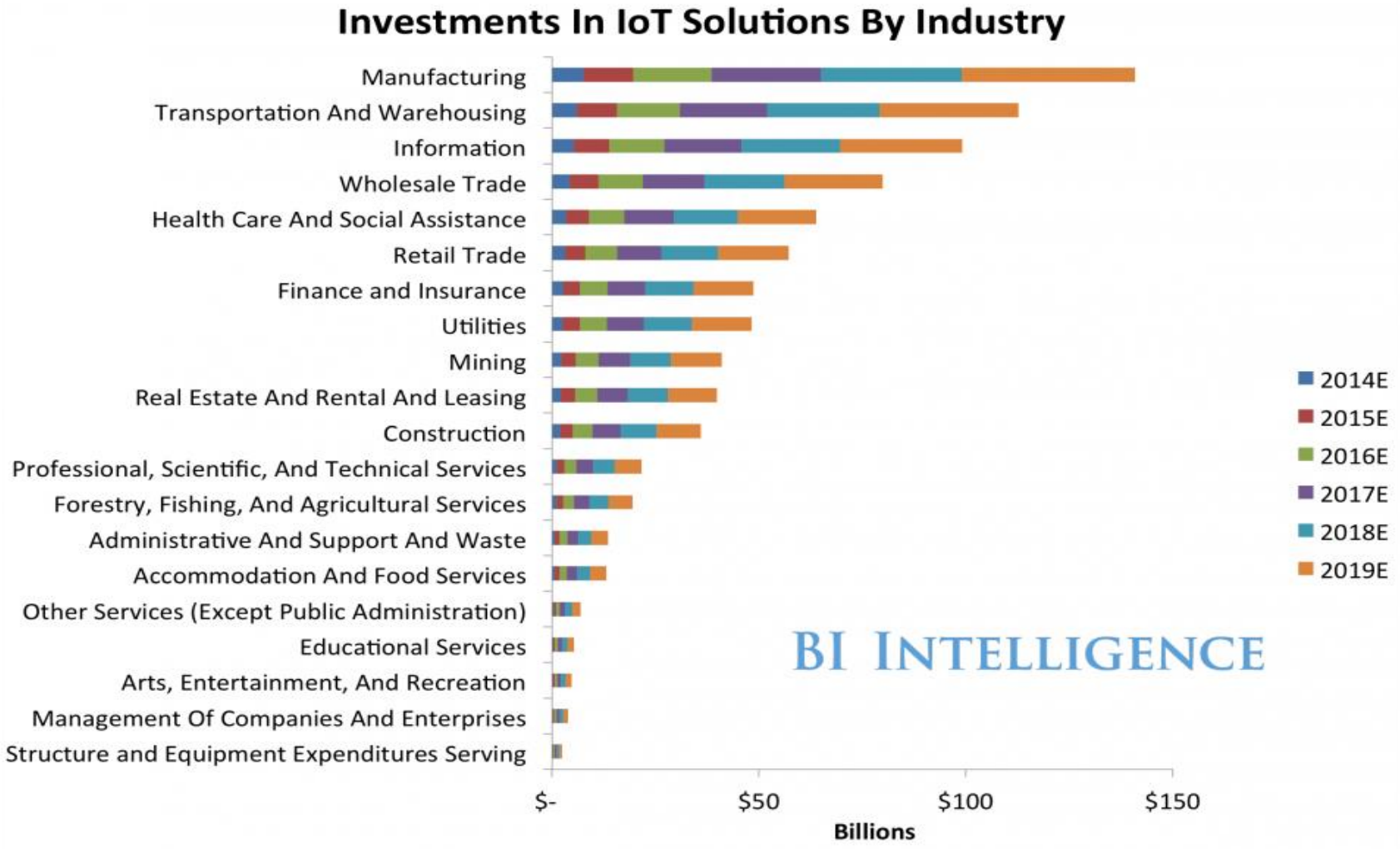
1. Computing Everywhere
2. **Internet of Things**
3. 3-D Printing
4. **Advance, Pervasive Analytics**
5. Context-Rich Systems
6. **Smart Machines**
7. Cloud Computing
8. Software Defined Infrastructure
9. Web-scale IT
10. Risk-Based Security

TechCrunch

VCs Look To The Future As IoT Investments Soar

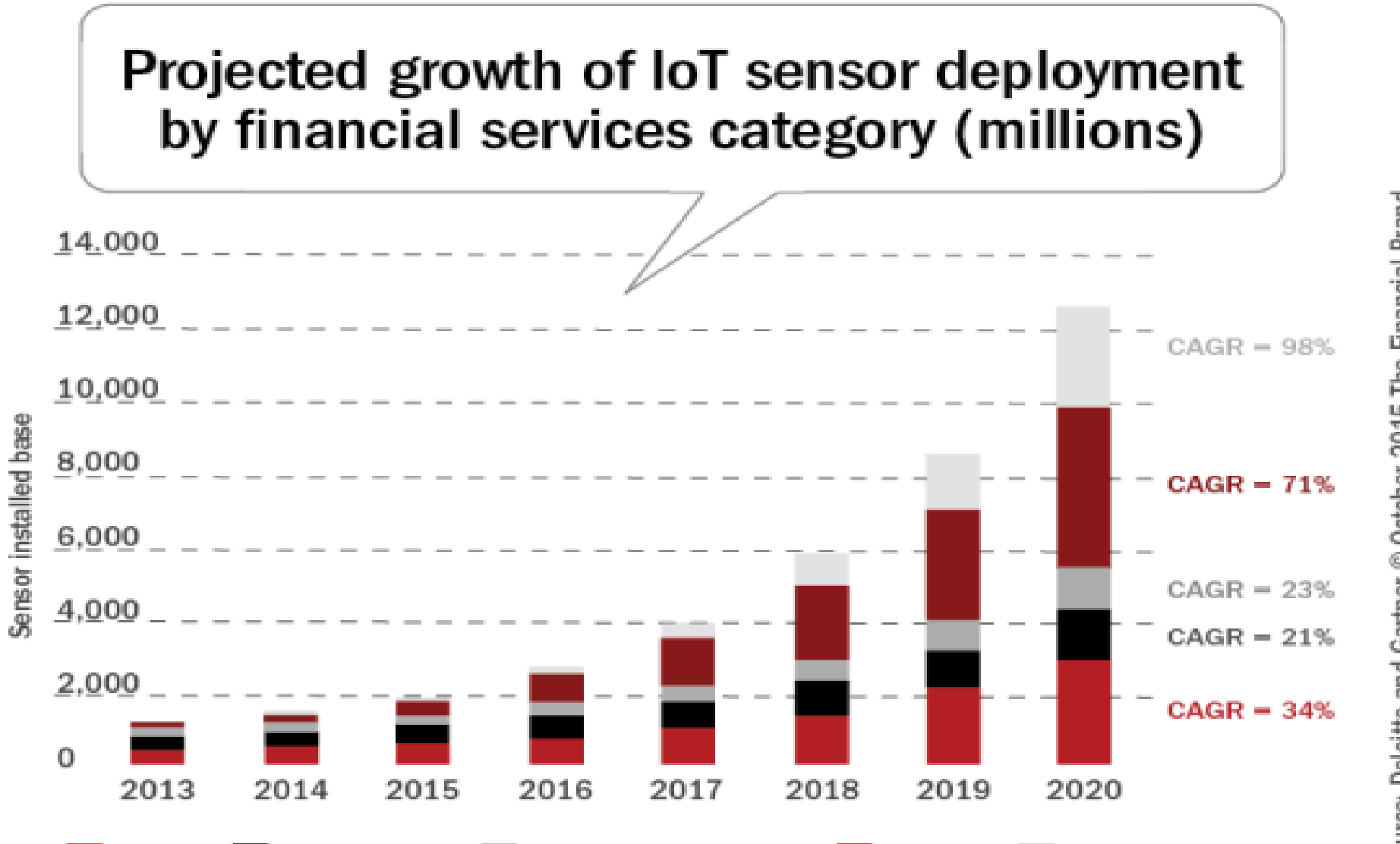
In 2014, investors contributed over $300 million in 97 venture rounds for IoT startups

Growth of IoT



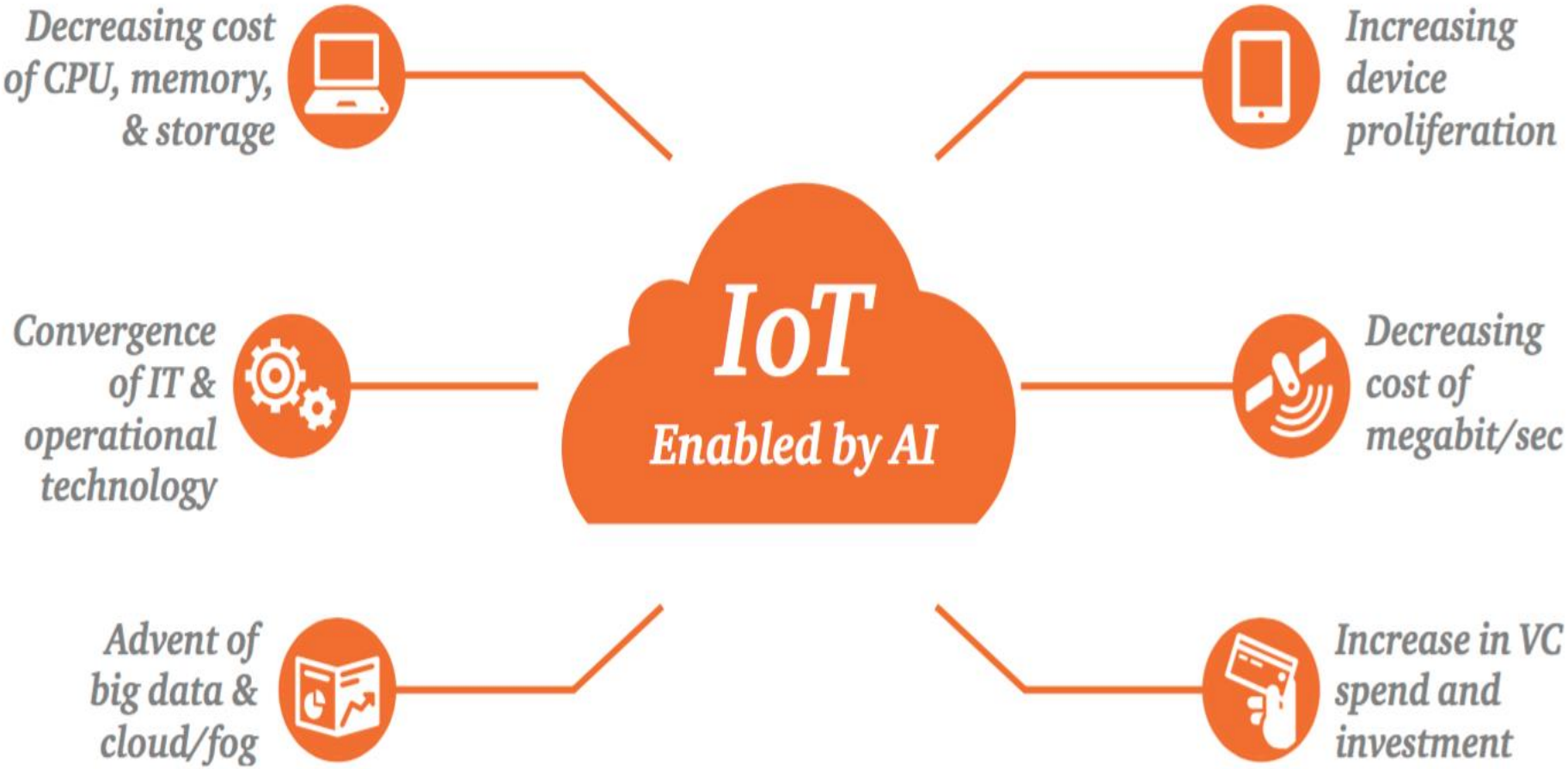
Source: BI Intelligence Estimates

Growth of IoT Deployment



Drivers for IoT

Figure 4: Drivers of IoT growth



source pwc via @mikequindazzi

How does IoT work?

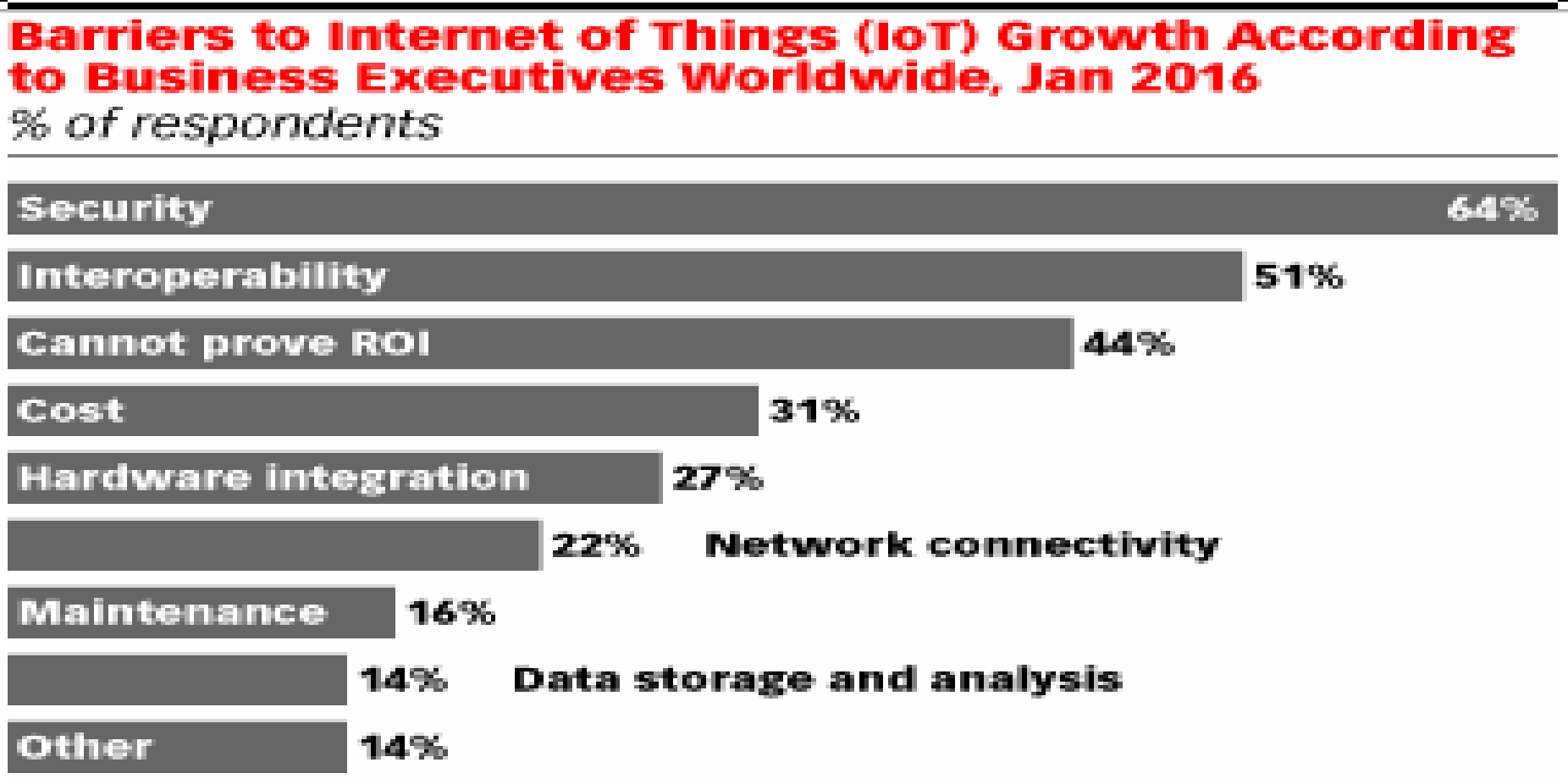
Sensors can monitor (24/7/365)...

- Temperature
- Orientation
- Postural and Activity Behavior

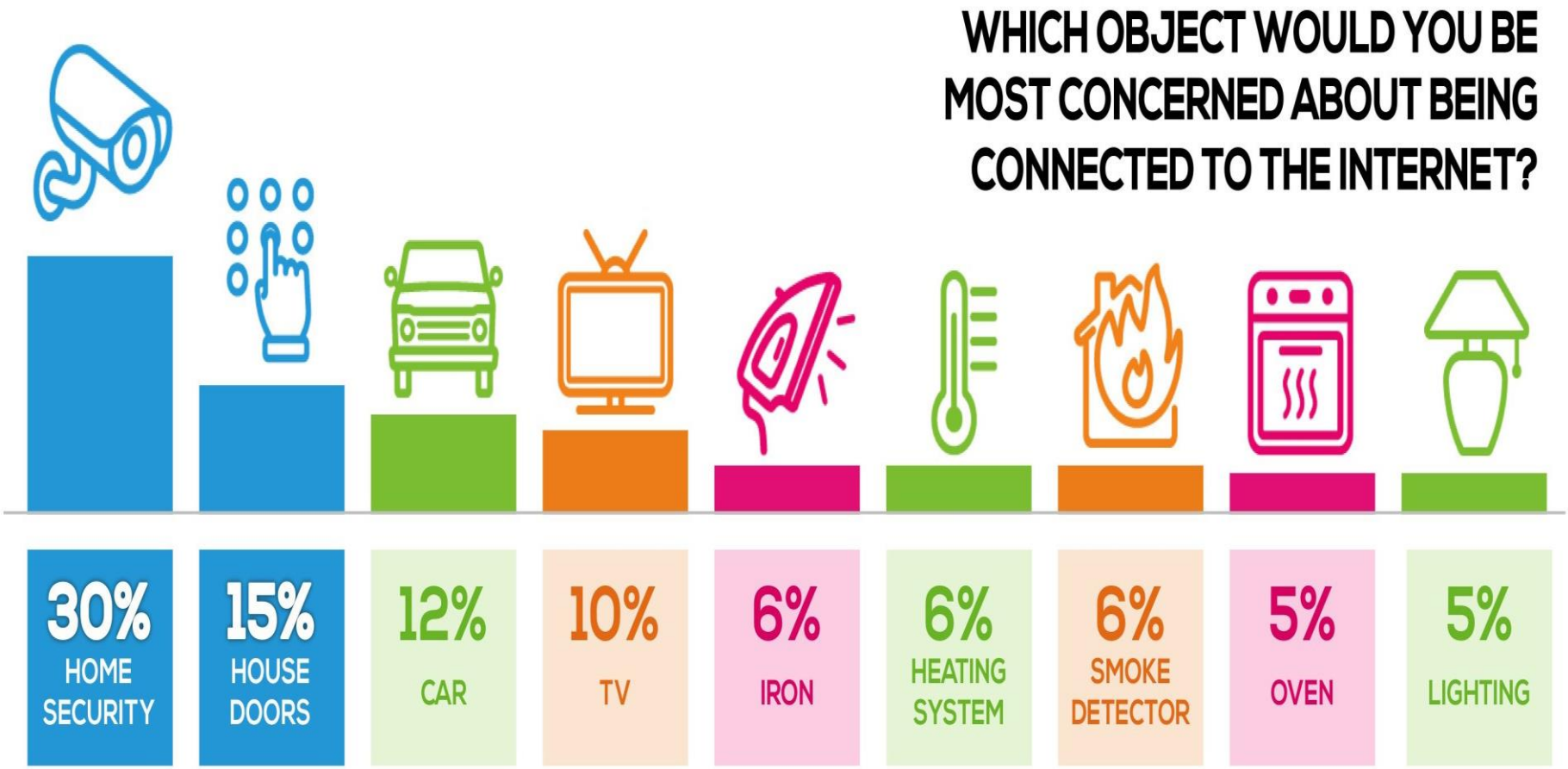
Data transferred to cloud dashboard

Data available real-time to your team via computer, smartphone or tablet

Challenges for Adoption of IoT



Challenges of IoT



IoT and Analytics

What Makes IoT Analytics Different?

High volume, continuous "data in motion" from multiple sensors

Store, blend and manage time-series data

Use of multiple analytics techniques

Distributed analytics (edge)

Integration with operation systems and BPMS

Bidirectional communication and control of endpoints

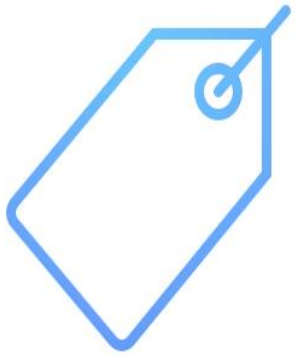
More data | **More complexity** | **More automation**

Source: Gartner

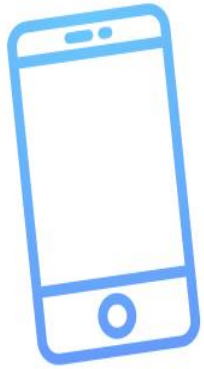
Gartner

How IoT can be used in FinTech

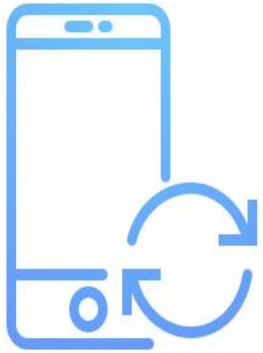
IoT helps fight fraud



Invisible payments



Payment from any device



Autonomous wearables

GOOD BOTS

Unfold Labs

CHATBOTS

Understand and converse with humans, perform tasks as required

CRAWLERS

Background execution, fetching data from other APIs and Web sites

TRANSACTIONAL BOTS

Acting as agents to interact with external systems and carry out specific transactions

INFORMATIONAL BOTS

Push information or news as notifications, and broadcast data whenever needed

BAD BOTS

HACKERS

Leave behind malware on victim sites

SCRAPER

Steal content from various websites to edit and republish

SPAMMERS

Post promotional content to drive visits to the spammer website

IMPERSONATORS

Mimic humans to lead unsuspecting victims to befriend them and give out information

Predicted Use Cases for Chatbots

What do you predict you would use a chatbot for?

Drift Audience salesforce myclever

Top Chatbot Use Cases

E-Commerce

- Product Discovery
- Quick Reviews
- Quick Payments
- In-chat Purchase
- Personalized Recommendations

SEPHORA

***Sephora**'s chatbot on Kik seeks more information about users through a quiz, and then offers personalized beauty tips, reviews and product recommendations with an option of purchasing them within chat itself*

Customer Service

- Customer Support
- Assistance
- Information On-the-go
- FAQs
- Updates
- Complaints

KLM Royal Dutch Airlines

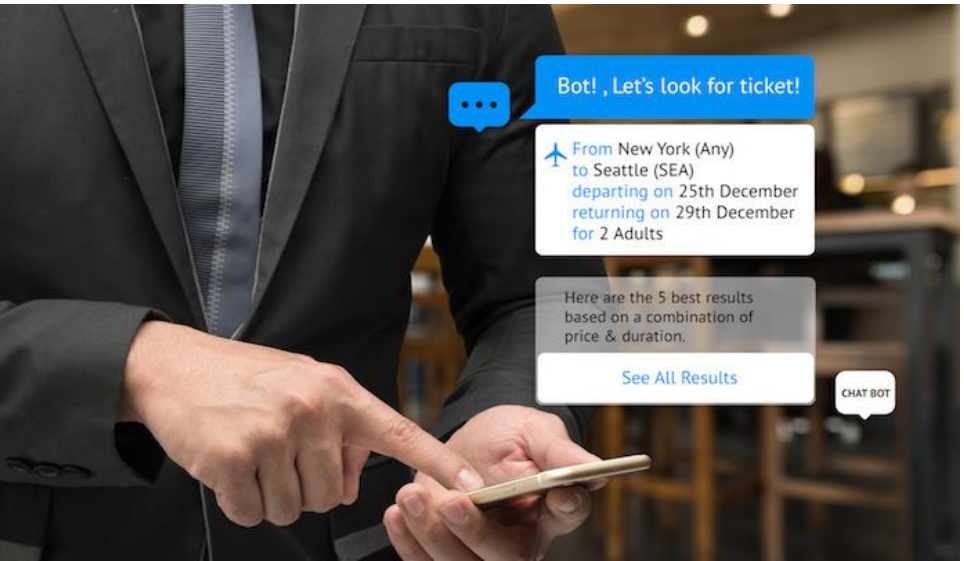
***KLM Royal Dutch Airlines**' Messenger chatbot helps users with flight information, check-in notifications, boarding pass, flight status updates and for complicated questions, seamlessly connects them with agents*

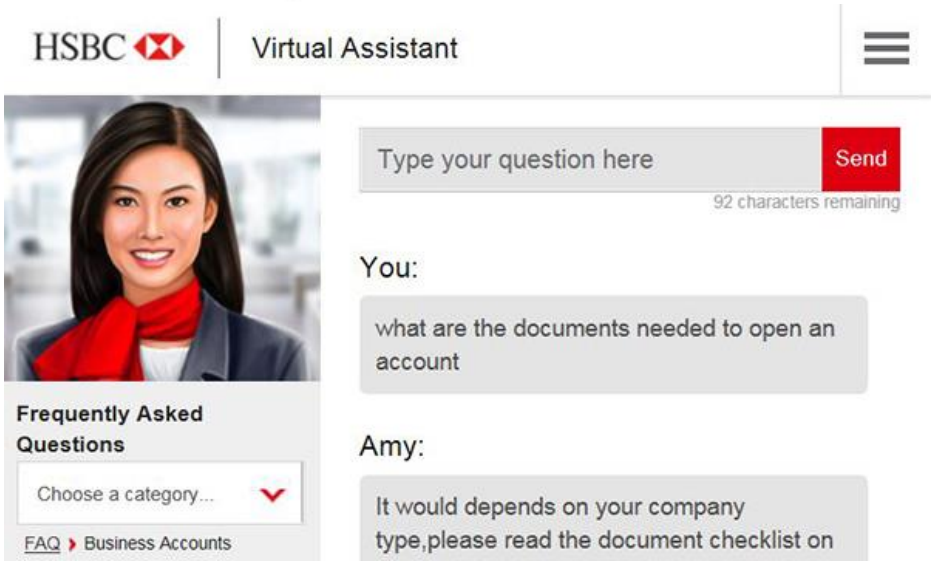
Content Delivery

- Rich Content Delivery
- Personalized Stream
- Real-time Stream
- On-demand Content

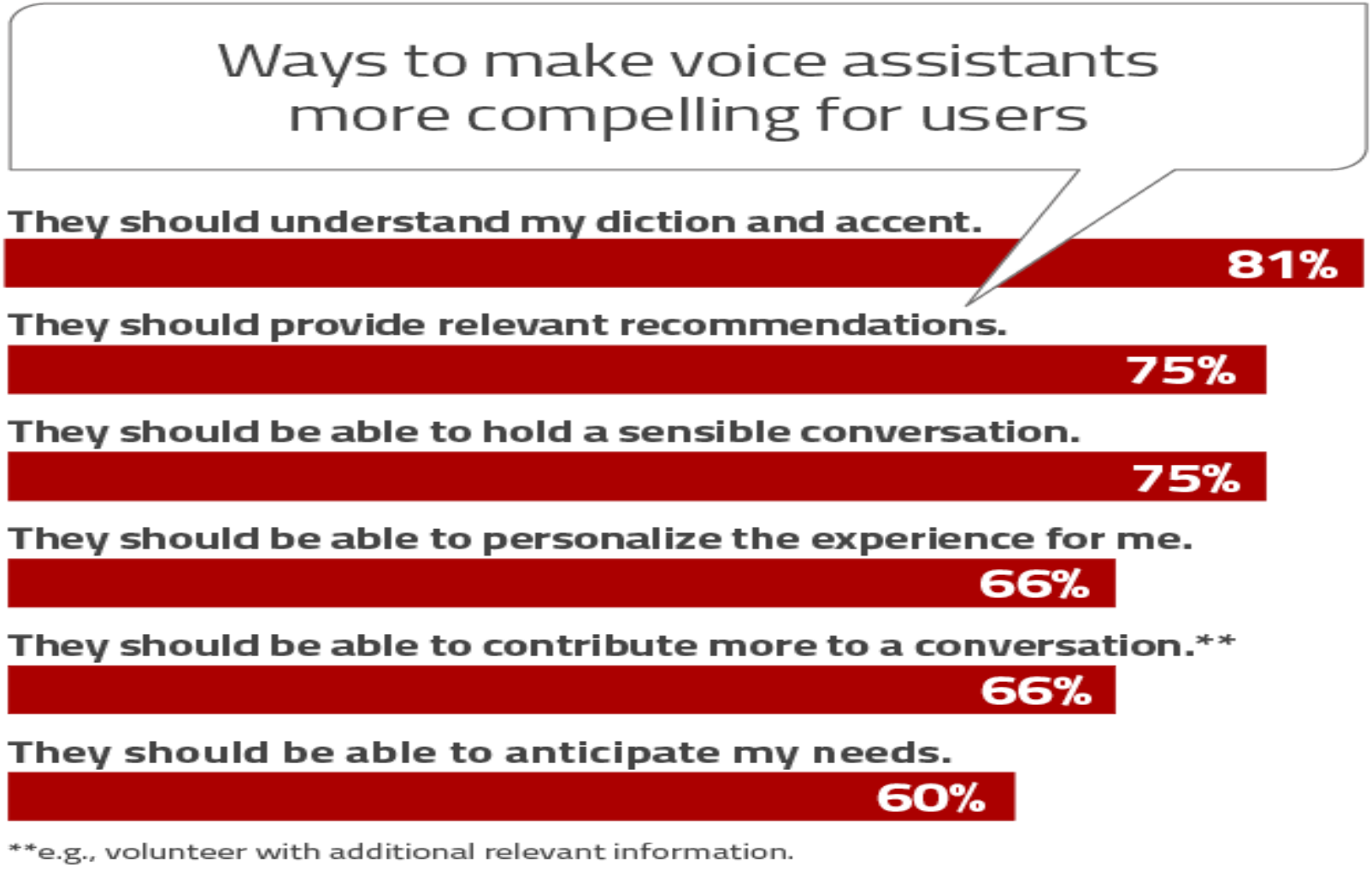
CNN

***CNN**'s Messenger chatbot sends personalized breaking news or specific stories daily, where users can either read full stories or get summaries*





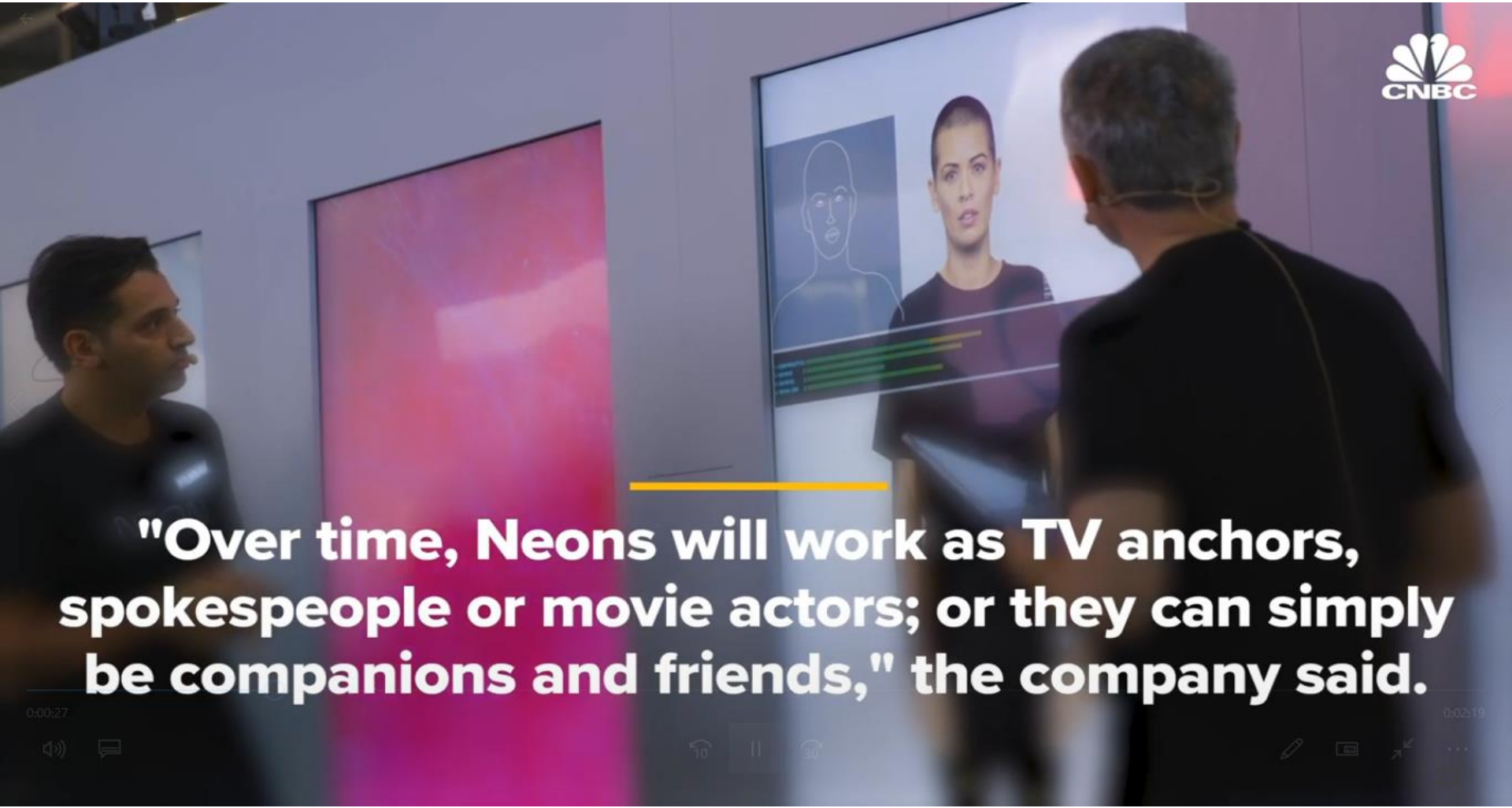
Voice Assistants in Future



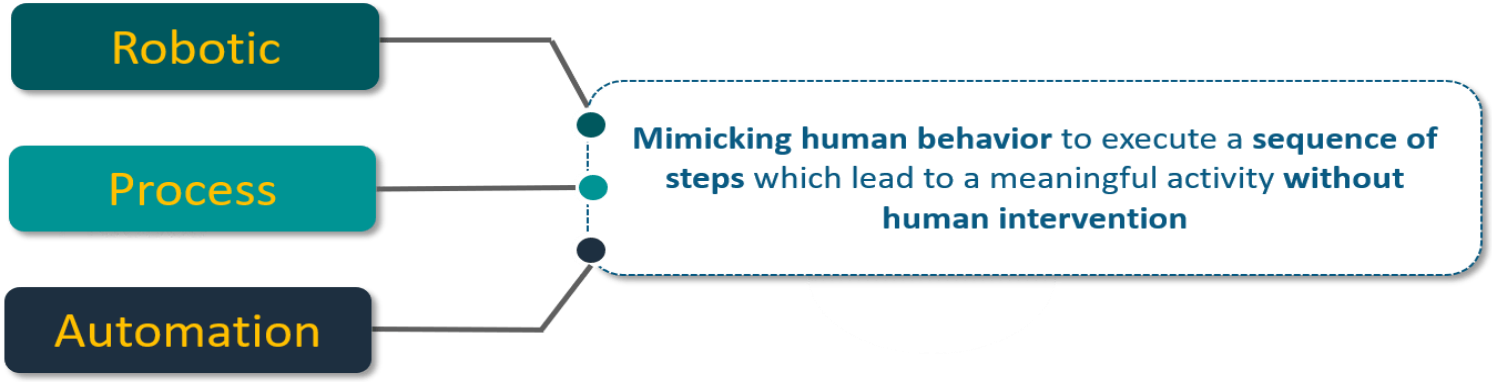
SOURCE: Capgemini © January 2018 The Financial Brand

Virtual Avatar Neon

https://www.youtube.com/watch?v=kWTwV8AUFtg



Robotic Process Automation



Robotic process automation is:

Configurations that automate manual, repeatable tasks

Algorithms that solve specific problems

Software 'robots' that plug into, and access, existing business software

Workflow enabled interaction

ROBOTIC PROCESS AUTOMATION BENEFITS

24x7

Increase Throughput

Robots work nights, weekends and don't take breaks

Efficient

Reduce Cost

10 Robots will do the work of 100 people

Fast

Reduce Workload

Robots handle tasks 4-5 times faster than people

Flawless

Eliminate Errors

Robots deliver results with 100% accuracy

Focus

Increase Employee Engagement

Let employees focus on the value-add activities

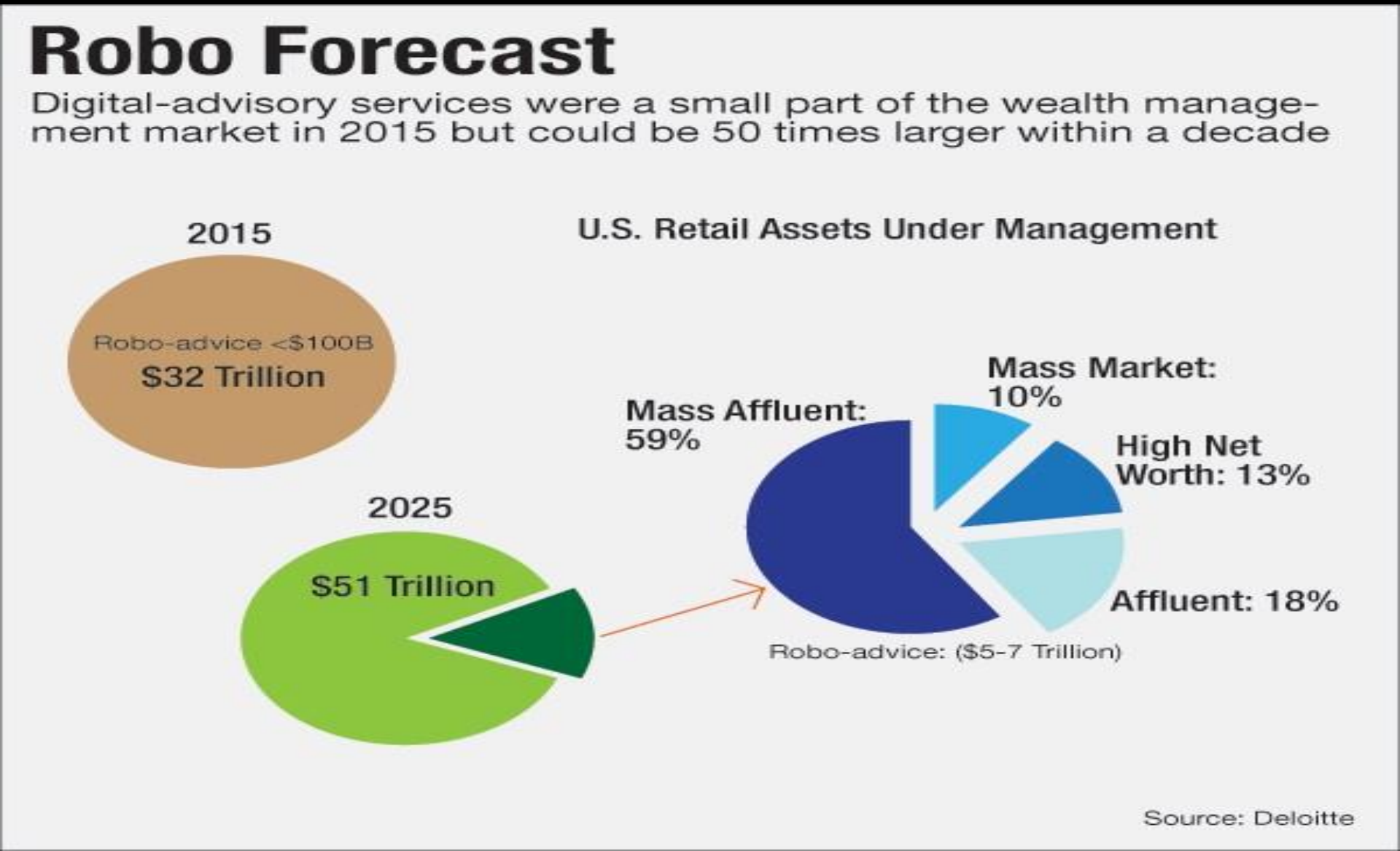
"The robots gathered and analyzed customer data in just 15-20 seconds – data that would have previously taken an experienced agent 90 seconds and an inexperienced agent three minutes to collect".

RPA User, Banking

"We were able to significantly reduce agent handling time for each customer address change request, from an average of 11 minutes per case to one minute.

RPA User, Utilities

Growth of Robo Advisory



Robo to Bionic

Find the best human-robot mix for the job-to-be-done

No Robots	Attended, Interval	Attended, In Tandem	Hybrid	Partially Unattended	Fully Unattended
100% human	Human involves robot at defined intervals	Human on computer with robot process in background	Attended process uses human computer to kick-off unattended background process.	Human sets the stage for the unattended process to work	**100% automation**

Human Attended Robot Unattended Robot

The Outcome: Time Back for Humans

Challenges in RPA implementation

A Clear Understanding of what RPA Can Accomplish

Potential resistance from the IT teams

Defining & measurement of benefits

Define and Measure ROI

Concerns with Governance, Audit & Security

Hidden costs, such as implementation, hosting and maintenance

Selection of right solution / technology partner

DATAMATICS
Data to Intelligence

Robots in action

Tactile sensors:
Menu to interact non-verbally with NAO

Speakers (x2):
NAO talks, prompts, shares his story, plays music...

Battery:
NAO is free to navigate without being connected to a power source.

Prehensile hands with sensors:
To grasp small items and to work on object exchange and turn-taking

Foot bumpers:
Another way to interact with NAO.

Microphones (x4):
NAO detects the origin of sounds and understands what you say.

Eyeleds:
NAO uses color code to express emotions and even play edutaining color games with your children!

Cameras (x2):
NAO recognizes pre-recorded faces, pictures , reads books, imitates.

Sonars (x4):
NAO detects whether something stands closely in front of him.

Wifi Connection:
NAO can use information from the web

Robots in BFSI

Robot Bank Manager

https://www.youtube.com/watch?v=btVwqEs8-nQ

The Humanoid Banker

Questions for RxPrism

- What problems does the Repbots solution address? Do you think it will be commercially successful?
- How does Rxprism use analytics in Repbots? What insights can it generate?
- What challenges does RxPrism face at this time? What should it do to grow its business?