Global Technology Outlook 2015 – Data Transforming Industries

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Executive Briefing Consultant FSS

IBM Research THINKLab Zurich

The World is Our Lab

World's largest information technology research organization

More than 3,000 scientists and engineers

IBM invested $5.2B on R&D in 2015

IBM Research - Zurich

- Established in 1956

- 45+ different nationalities

- Open Collaboration:
  - Horizon2020: 30 funded projects and +200 partners

- Two Nobel Prizes (1986 and 1987)

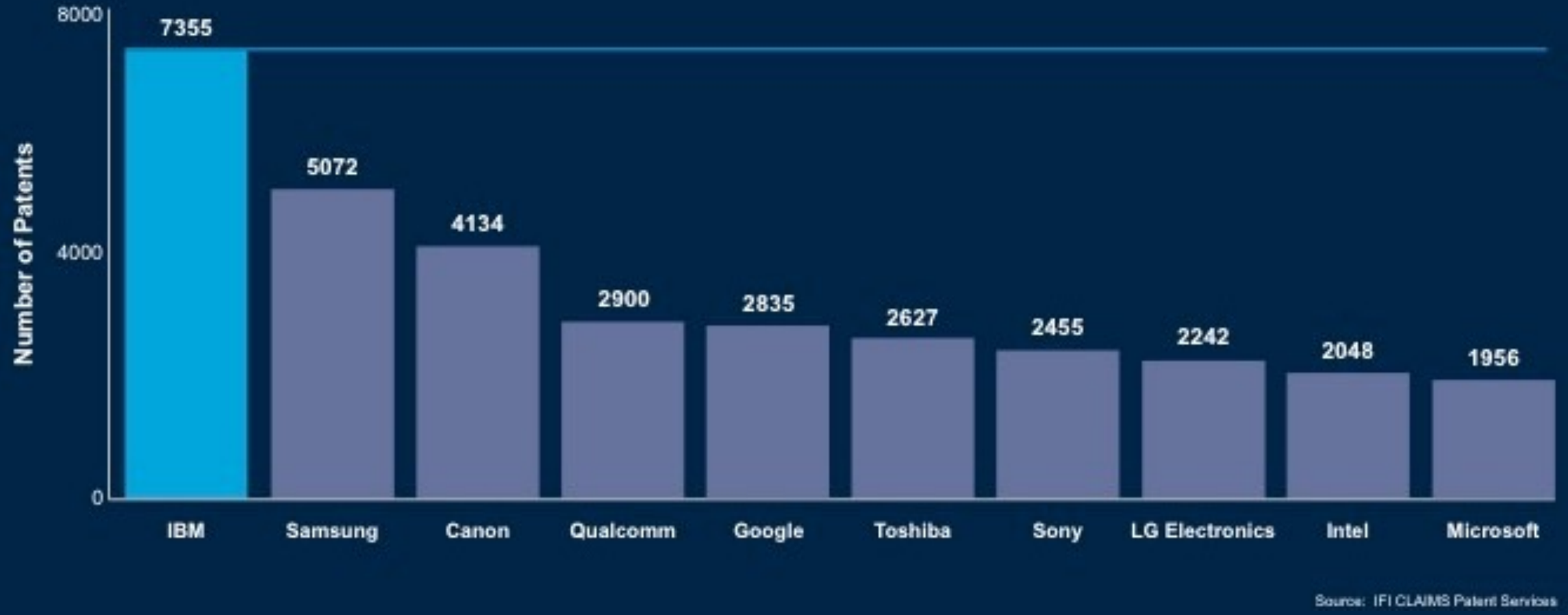
- Binnig and Rohrer Nanotechnology Centre opened in 2011 (Public Private Partnership with ETH Zürich and EMPA)

- 9 European Research Council Grants

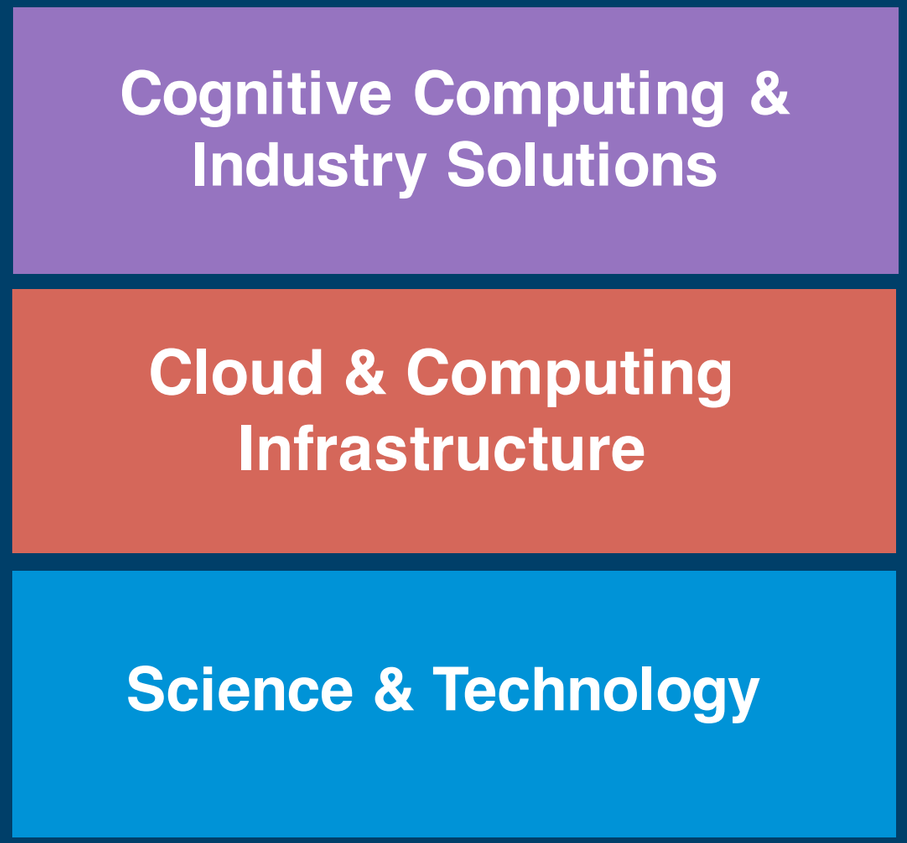
Major Historic Accomplishments

Token Ring	Scanning Tunneling Microscope	High Temperature Superconductivity	Noise-Predictive Maximum-Likelihood	JavaCard (JCOP)	OLED	Millipede

2015 US Patent Leadership: 26 Years and Counting



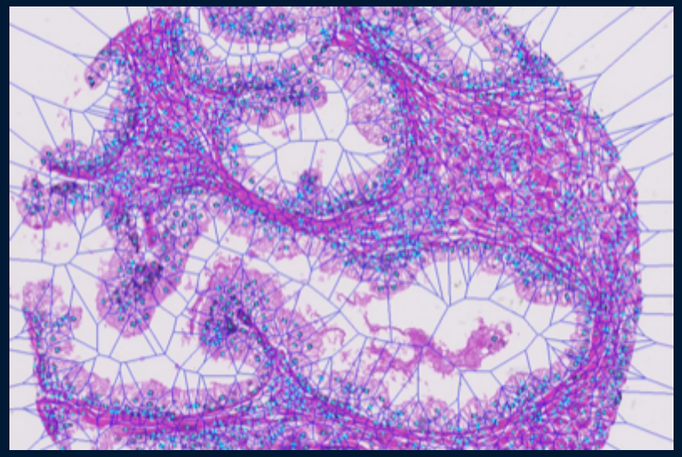
Scientific Departments



Big Data Analytics

Atoms

New Areas of Focus in Zurich



Systems Biology

Quantum Computing and Neuromorphic Computing

Cloud Delivery

Blockchain for the Enterprise, Cold Storage, PowerCeph, I3: I/O for Instant Insights, Z2C, RASIR, TSS

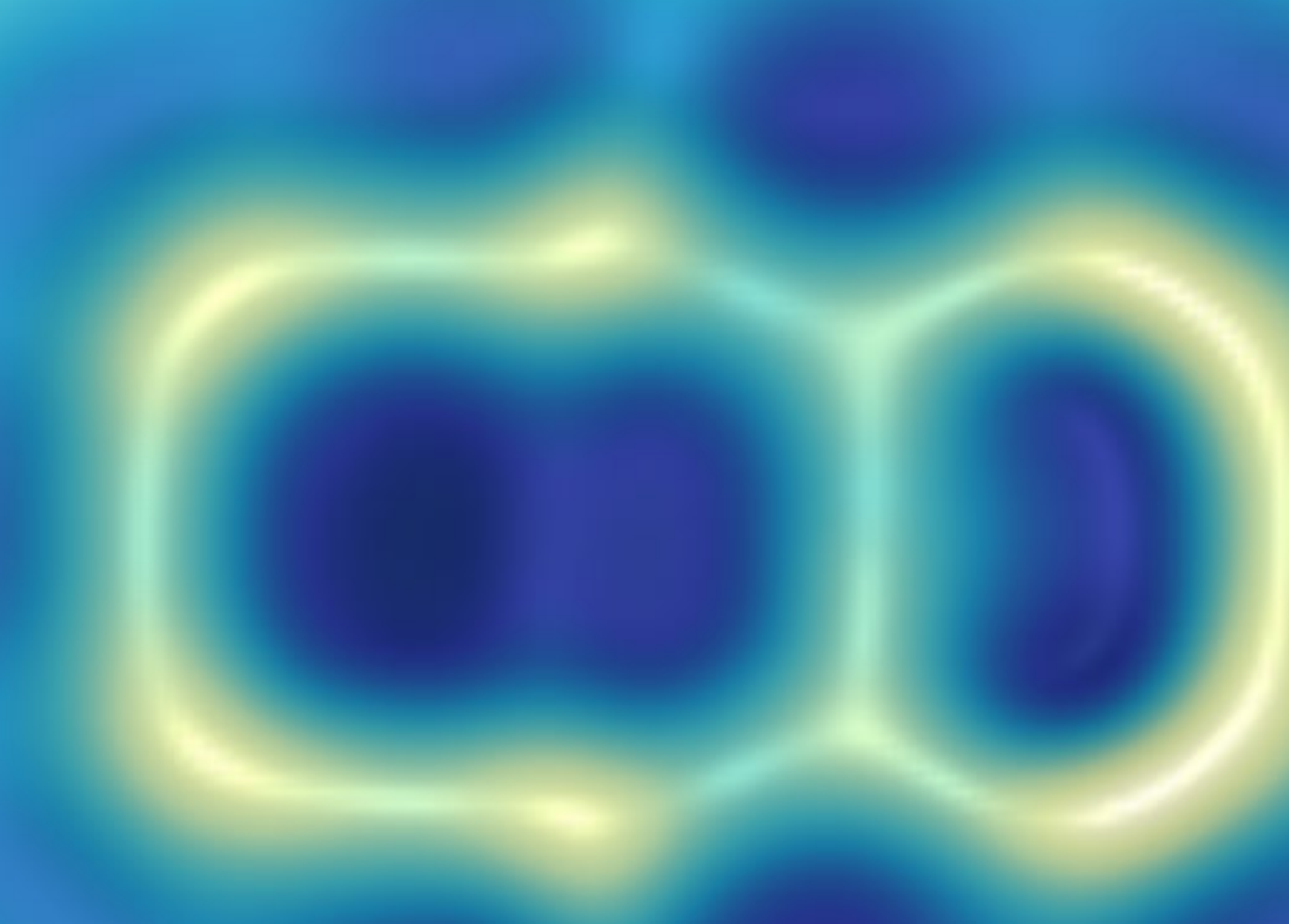
Internet of Things

Edge Computing, Wearables, Cognitive

WATSON COMPANY ANALYZER

360 degree view of B2B clients using analytics and industry specific Key Performance Indicator (KPI) in real time. Combines internal sales data with external data services like Hoovers, Reuters and Yahoo/Google Finance.

CC&IS



ATOMIC FORCE MICROSCOPY

IBM scientists first to distinguish individual molecular bonds. Recently, , they have observed a fascinating molecular rearrangement reaction known as a Bergman cyclisation.

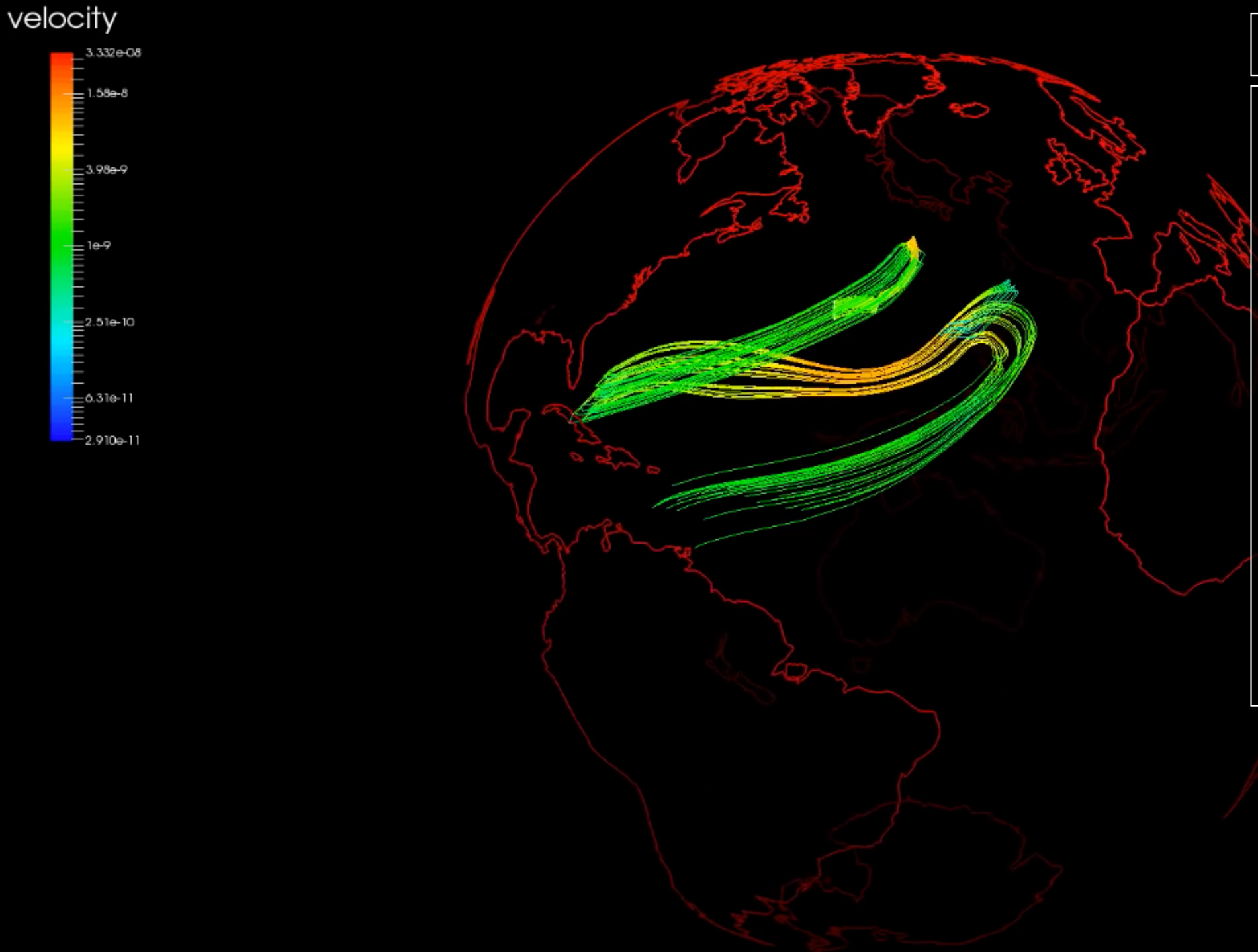
SQUARE KILOMETER ARRAY (DOME)

Five-year collaboration with ASTRON to research extremely fast, but low-power exascale computer systems targeted for the international Square Kilometre Array (SKA), the world's largest and most sensitive radio telescope.

C&CI

CLOUD OF CLOUDS TOOLKIT

Can be configured to connect to one or more clouds (public, private, or hybrid), adds enterprise features, including; encryption, integrity, and resiliency, it's transparent to General Parallel File System (GPFS) and manages keys/metadata.

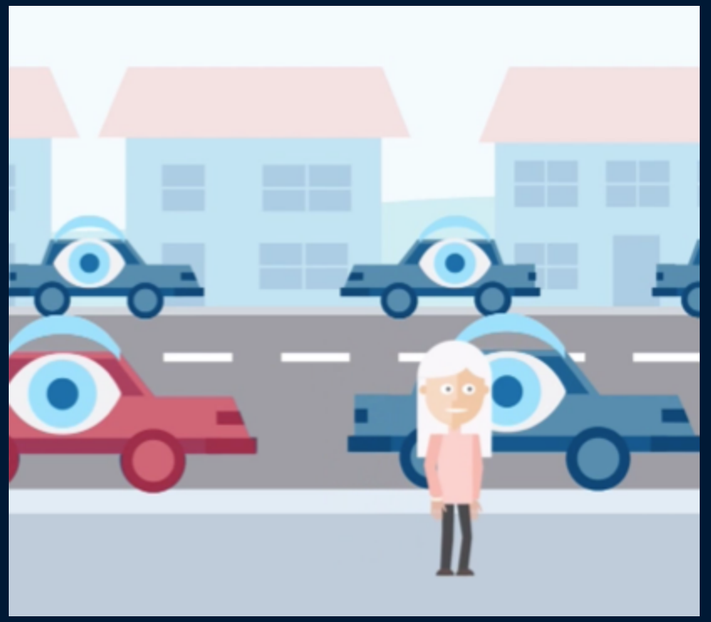


GORDON BELL 2015

Scientists at the University of Texas at Austin, IBM Research, New York University and the California Institute of Technology have been awarded the 2015 Gordon Bell Prize for realistically simulating the dynamics of Earth's interior. The team's work could herald a major step toward better understanding of earthquakes and volcanic activity.

Parked Cars as a Service

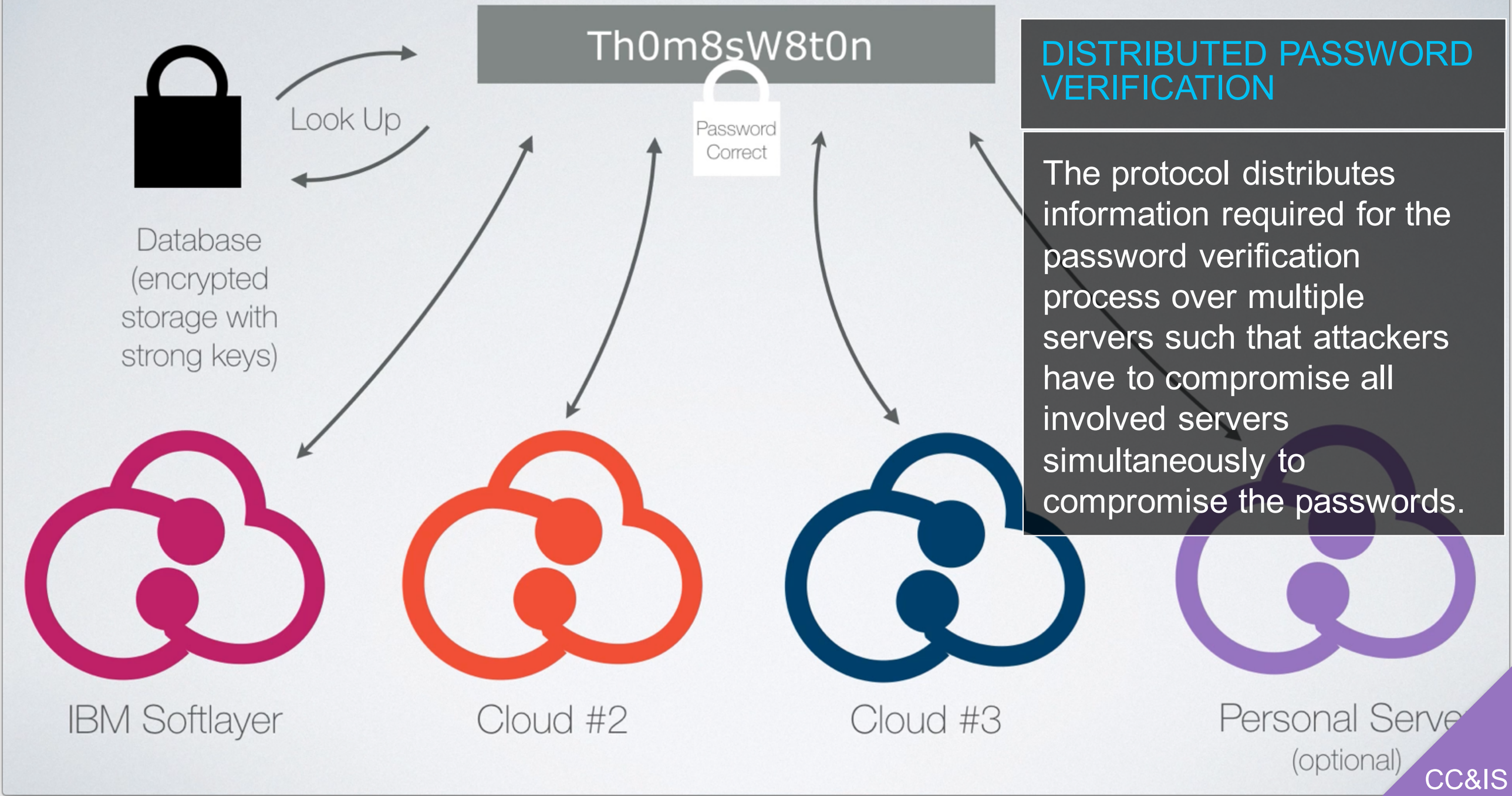
Parked cars with sensors and cameras can help with security



Parked cars in large cities can provide more eyes to find Alzheimer's patients

Parked cars with sensors can detect gas leaks before humans

Password Verification is Distributed Across Several Clouds



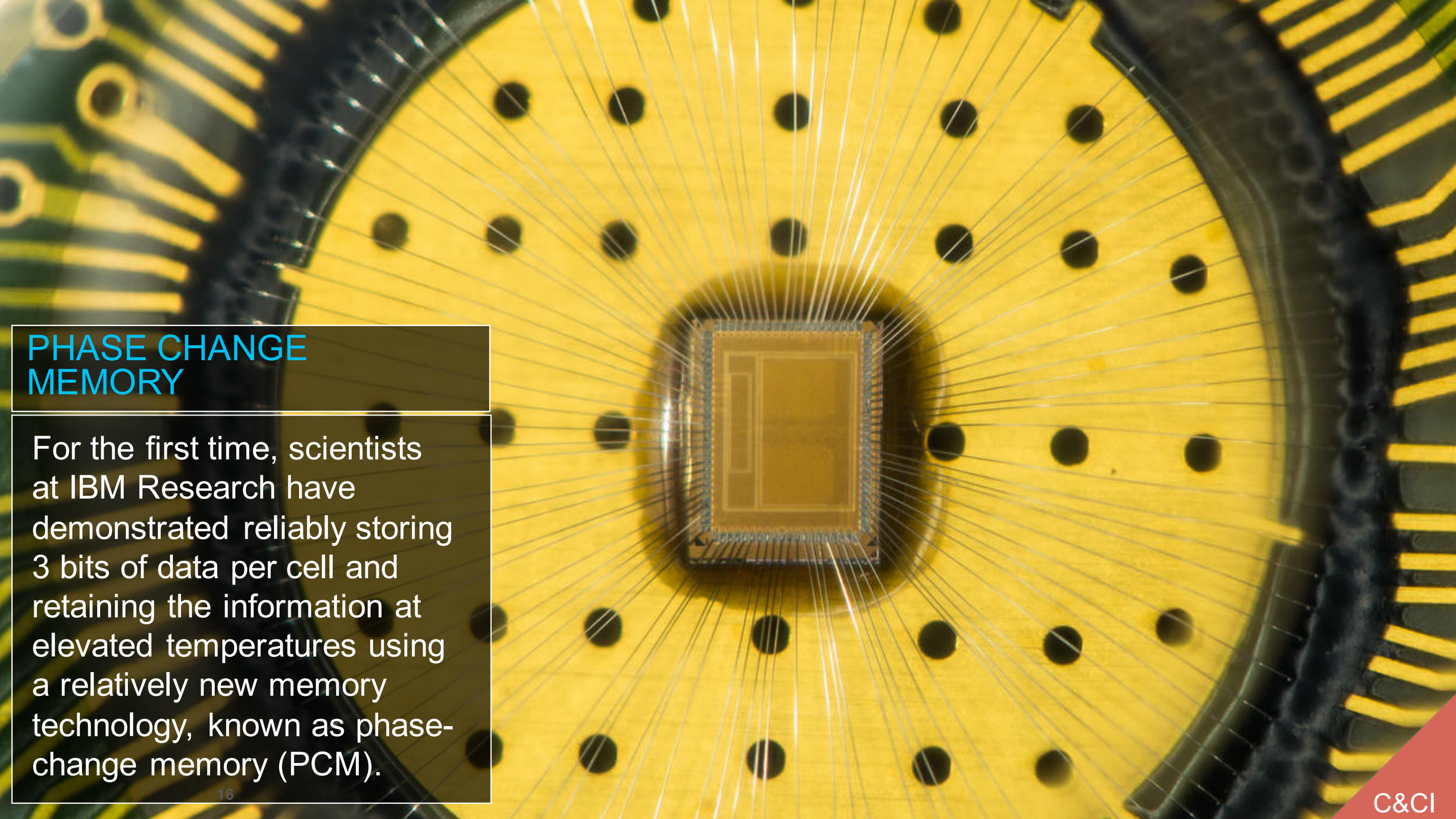
DISTRIBUTED PASSWORD VERIFICATION

The protocol distributes information required for the password verification process over multiple servers such that attackers have to compromise all involved servers simultaneously to compromise the passwords.

THRIVE PROJECT

Collaboration to develop a thermally powered adsorption heat pump to relieve the strain on the power grid on the one hand and harness heat from factories, power stations and cloud data centres centers.

S&T

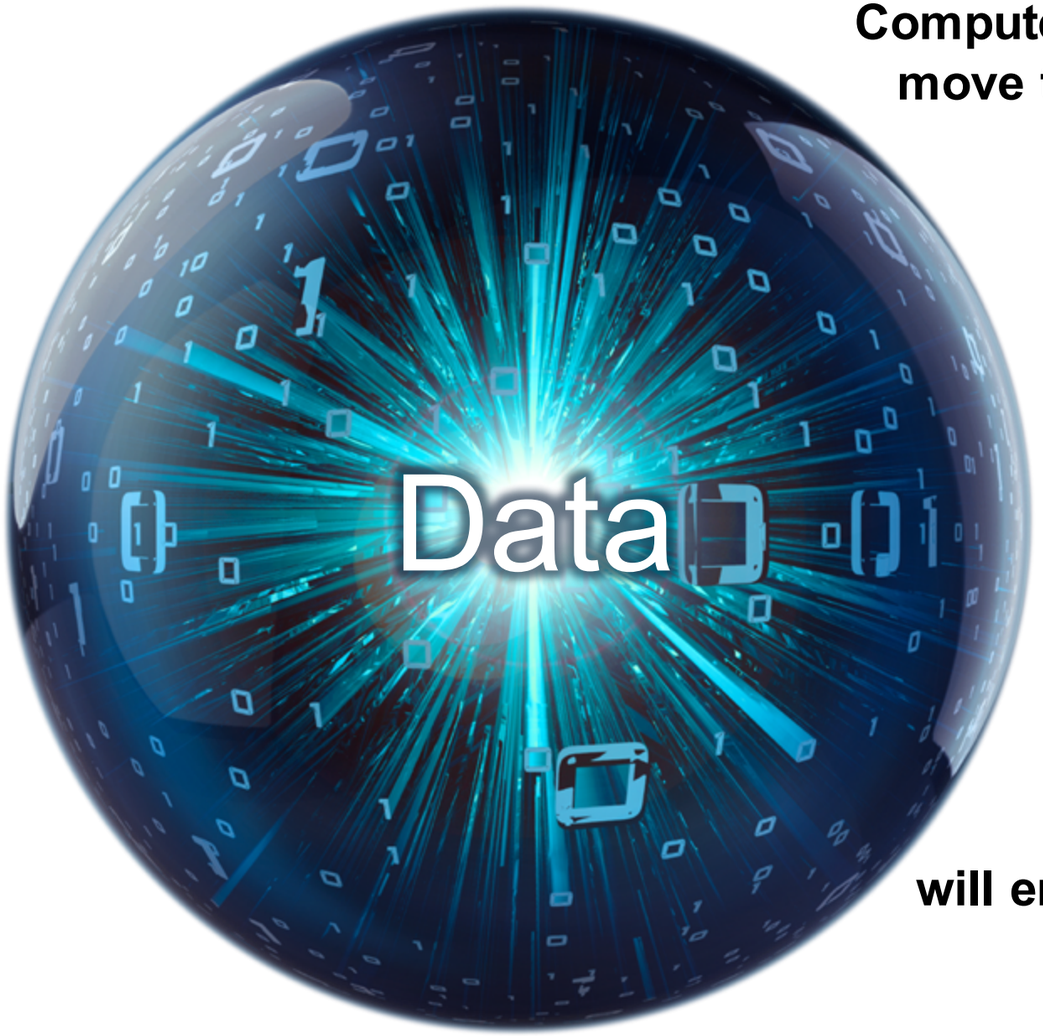


PHASE CHANGE MEMORY

For the first time, scientists at IBM Research have demonstrated reliably storing 3 bits of data per cell and retaining the information at elevated temperatures using a relatively new memory technology, known as phase-change memory (PCM).

Daten bilden die Basis der neuen Industrien
– angetrieben durch Technologien in der Cloud

Compute must move to data

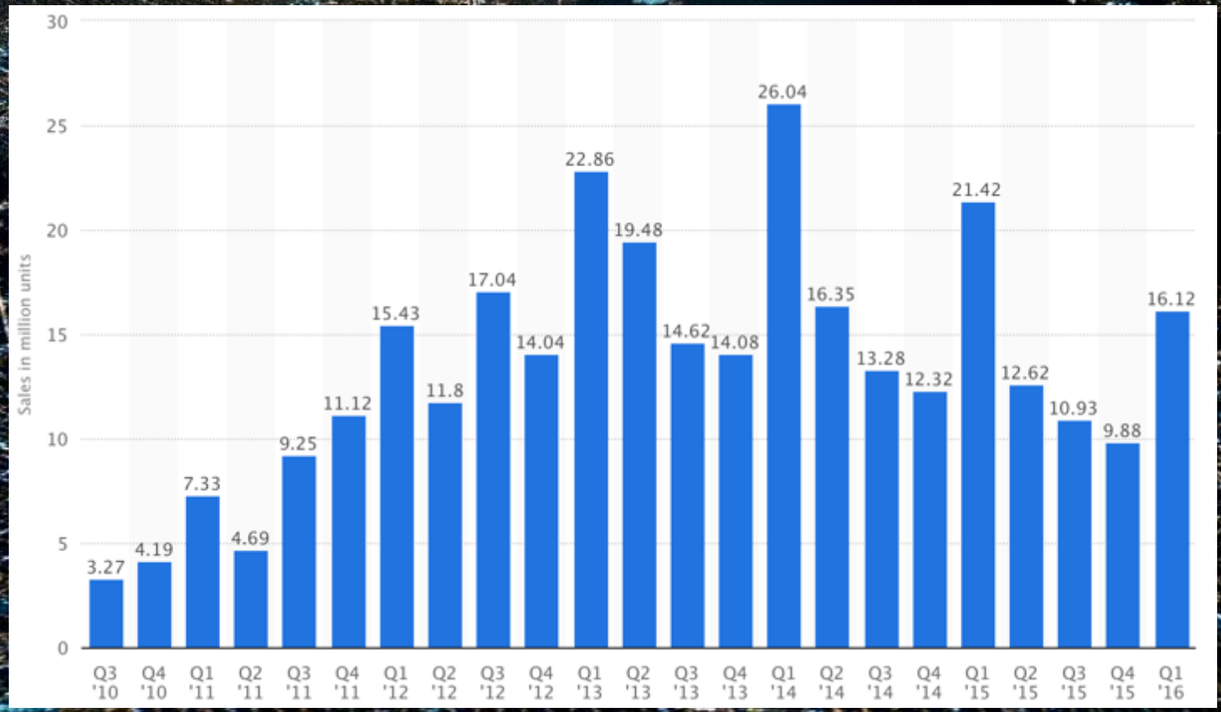


Data curation leads to optimal value

New IT platforms will emerge at the edge

Data is growing exponentially and demands new approaches (technology and strategy)

44 Zetabyte = 44 x 10^{21}
128 Gigabyte= 128 x 10^{9}
~350‘000‘000‘000 iPads
iPad : 0.24 x 0.0061 m



Neue Teilnehmer drängen in den Markt mit den Kundendaten

Firma lockt mit Gratis-Steuererklärungen

von K. Wolfensberger - Eine Schweizer Firma füllt Kunden kostenlos die Steuererklärung aus. Schliesslich bezahlen diese aber doch: mit ihren Daten.

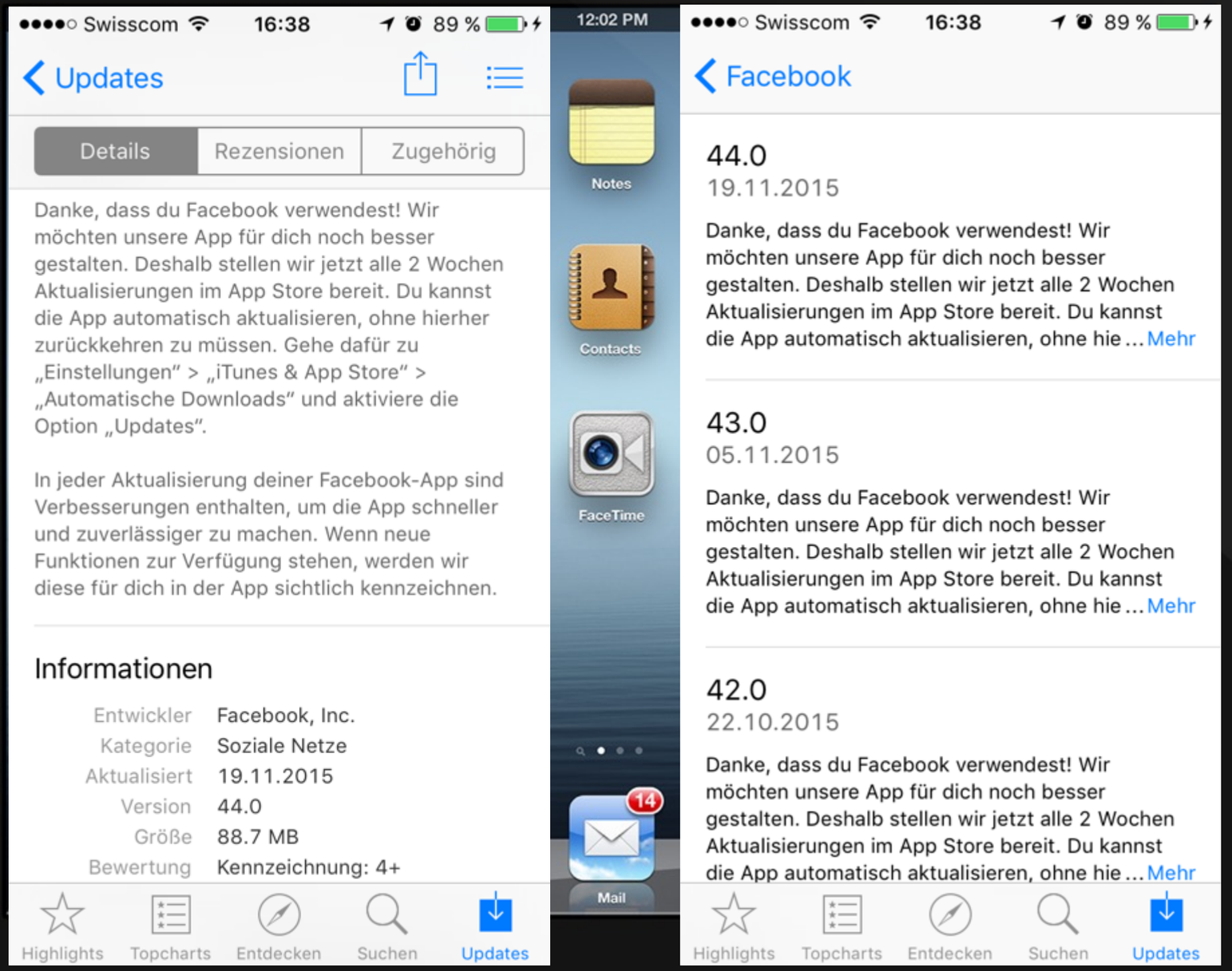

How many apps do you have installed?
iPad
12:02 PM
53%
Notes
Reminders
Maps
Contacts
Game Center
iTunes
App Store
10
Newsstand
FaceTime
Camera
Photo Booth
Settings
Personal Choice
Chrome
Safari
Mail
14
Photos
Music


How many apps do you have installed?
>100
iPad
12:02 PM
53%
Notes
Reminders
Maps
Contacts
Game Center
iTunes
App Store
10
Newsstand
FaceTime
Camera
Photo Booth
Settings
Personal Choice
Chrome
Safari
Mail
14
Photos
Music


How many apps do you have installed? >100
How many apps do you use daily?
iPad
12:02 PM
53%
Notes
Contacts
App Store
10
Newsstand
FaceTime
Camera
Photo Booth
Settings
Personal Choice
Chrome
Safari
Mail
14
Photos
Music


How many apps do you have installed? >100
How many apps do you use daily? <10%
iPad
12:02 PM
53%
Notes
Contacts
App Store
Newsstand
FaceTime
Camera
Photo Booth
Settings
Personal Choice
Chrome
Safari
Mail
Photos
Music


How many apps do you have installed?
>100
How many apps do you use daily?
<10%
How often do you update them?
iPad
12:02 PM
53%
Notes
Contacts
App Store
Newsstand
FaceTime
Camera
Photo Booth
Mail
Photos
Music


Swisscom 16:38 89 %
Updates
Details
Rezensionen
Zugehörig
Danke, dass du Facebook verwendest! Wir möchten unsere App für dich noch besser gestalten. Deshalb stellen wir jetzt alle 2 Wochen Aktualisierungen im App Store bereit. Du kannst die App automatisch aktualisieren, ohne hierher zurückkehren zu müssen. Gehe dafür zu „Einstellungen" > „iTunes & App Store" > „Automatische Downloads" und aktiviere die Option „Updates".
In jeder Aktualisierung deiner Facebook-App sind Verbesserungen enthalten, um die App schneller und zuverlässiger zu machen. Wenn neue Funktionen zur Verfügung stehen, werden wir diese für dich in der App sichtlich kennzeichnen.
Informationen
Entwickler Facebook, Inc.
Kategorie Soziale Netze
Aktualisiert 19.11.2015
Version 44.0
Größe 88.7 MB
Bewertung Kennzeichnung: 4+
Highlights
Topcharts
Entdecken
Suchen
Updates
12:02 PM
Notes
Contacts
FaceTime
14
Mail
Swisscom 16:38 89 %
Facebook
44.0
19.11.2015
Danke, dass du Facebook verwendest! Wir möchten unsere App für dich noch besser gestalten. Deshalb stellen wir jetzt alle 2 Wochen Aktualisierungen im App Store bereit. Du kannst die App automatisch aktualisieren, ohne hie ... Mehr
43.0
05.11.2015
Danke, dass du Facebook verwendest! Wir möchten unsere App für dich noch besser gestalten. Deshalb stellen wir jetzt alle 2 Wochen Aktualisierungen im App Store bereit. Du kannst die App automatisch aktualisieren, ohne hie ... Mehr
42.0
22.10.2015
Danke, dass du Facebook verwendest! Wir möchten unsere App für dich noch besser gestalten. Deshalb stellen wir jetzt alle 2 Wochen Aktualisierungen im App Store bereit. Du kannst die App automatisch aktualisieren, ohne hie ... Mehr
Highlights
Topcharts
Entdecken
Suchen
Updates


How many apps do you have installed?
>100
How many apps do you use daily?
<10%
How often do you update them?
weekly
automated
iPad
12:02 PM
53%
Notes
Contacts
App Store
Newsstand
FaceTime
Camera
Photo Booth
Mail
Photos
Music

IBM WATSON


How many apps do you have installed?
>100
How many apps do you use daily?
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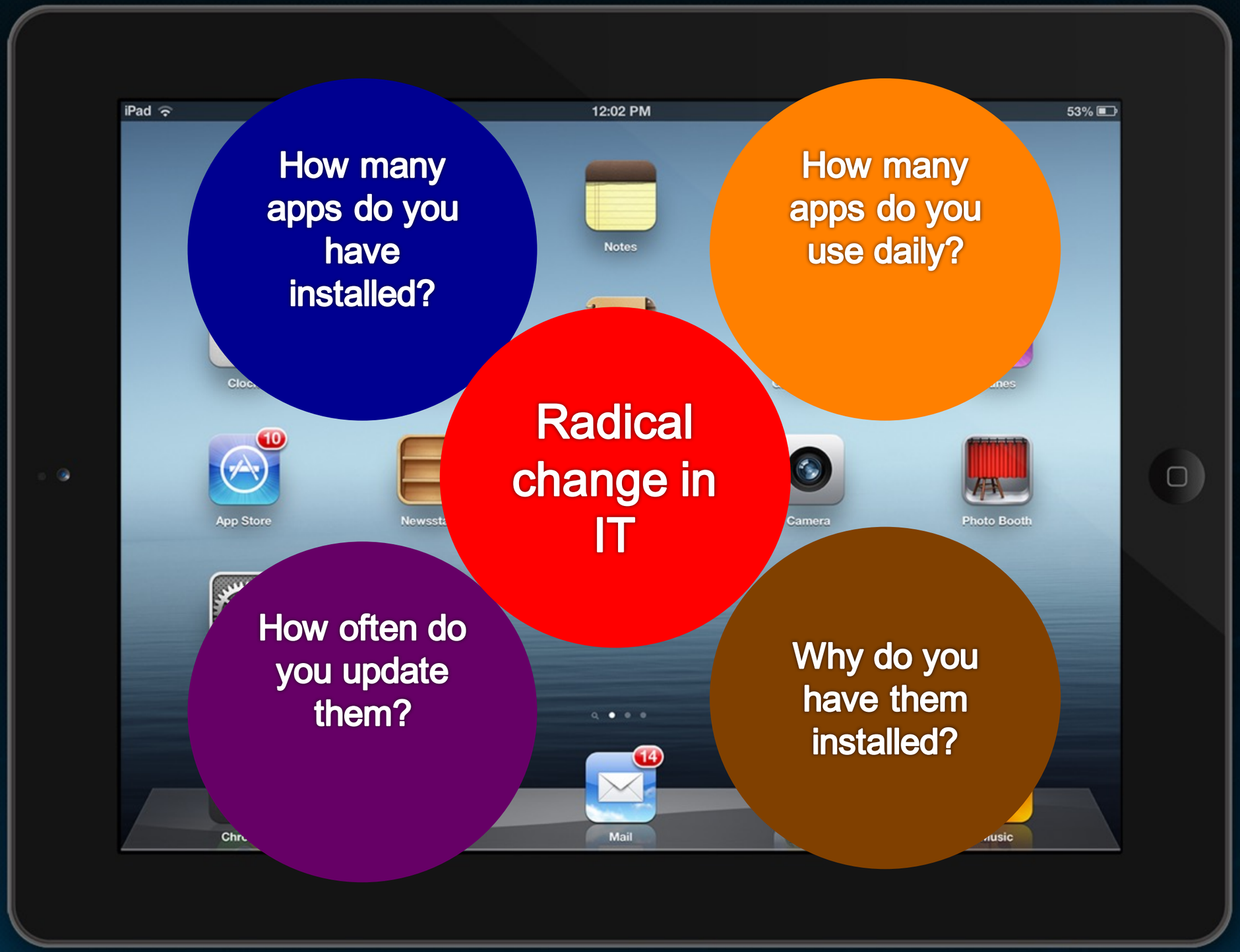
How often do you update them?
weekly
automated
Why do you have them installed?
iPad
12:02 PM
53%
Notes
Contacts
App Store
Newsstand
FaceTime
Camera
Photo Booth
Mail


How many apps do you have installed?
How many apps do you use daily?
Radical change in IT
How often do you update them?
Why do you have them installed?
iPad
12:02 PM
53%
Notes
App Store
Camera
Photo Booth
Mail


Swisscom 16:44 92 %
Speicher
Info
FACEBOOK
Version 44.0
App-Größe: 83.1 MB
Dokumente & Daten 126 MB
12:02 PM
Notes
Contacts
Swisscom 16:45 93 %
Speicher
Info
WHATSAPP
Version 2.12.11
App-Größe: 57.8 MB
Dokumente & Daten 671 MB
App Store
Photo Booth
Settings
Musik 2.9 GB
Fotos & Kamera 13.1 GB
Nachrichten 749 MB
WhatsApp 729 MB
Chrome
Safari
Mail
Photos
Music

Data at the Edge

90% of data created over the last 10 years was ABANDONED

Smartphones already possess more storage capacity than all servers combined. Over 5000 Exabytes of data generated at the “edge” of the network by these and other devices stayed there or was thrown away in 2014.

To process the valuable data at the edge, a new computing platform is needed, one that can tap into the growing storage and compute of these devices. This platform will create a marketplace for connecting producers and consumers – of infrastructure and data – at the edge.

Data at the edge is changing how we look at data

90%

Of data created over the last 10 years was never captured or analyzed

2X

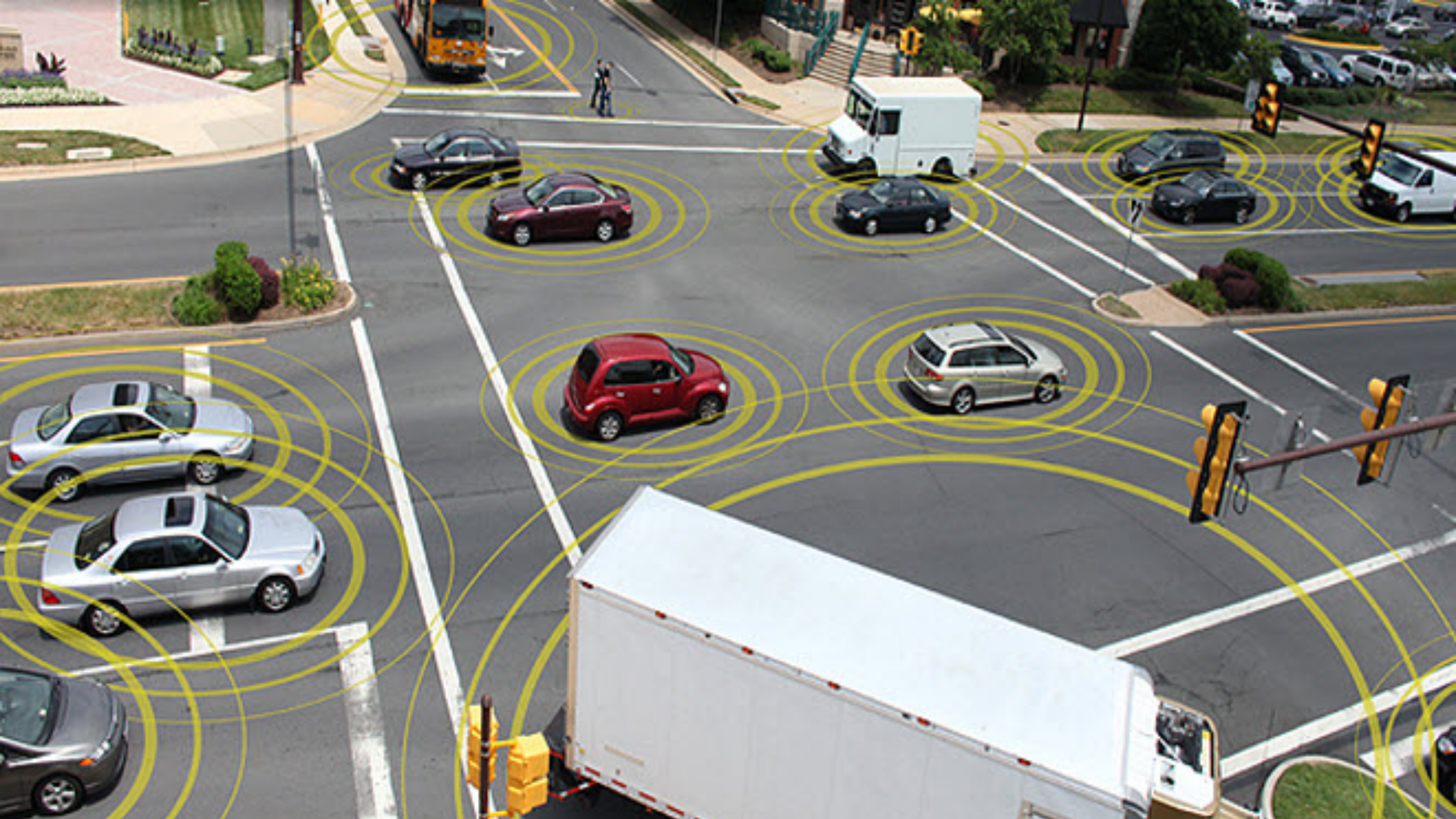
Rate of data creation compared to the expansion of bandwidth over the past decade

60%

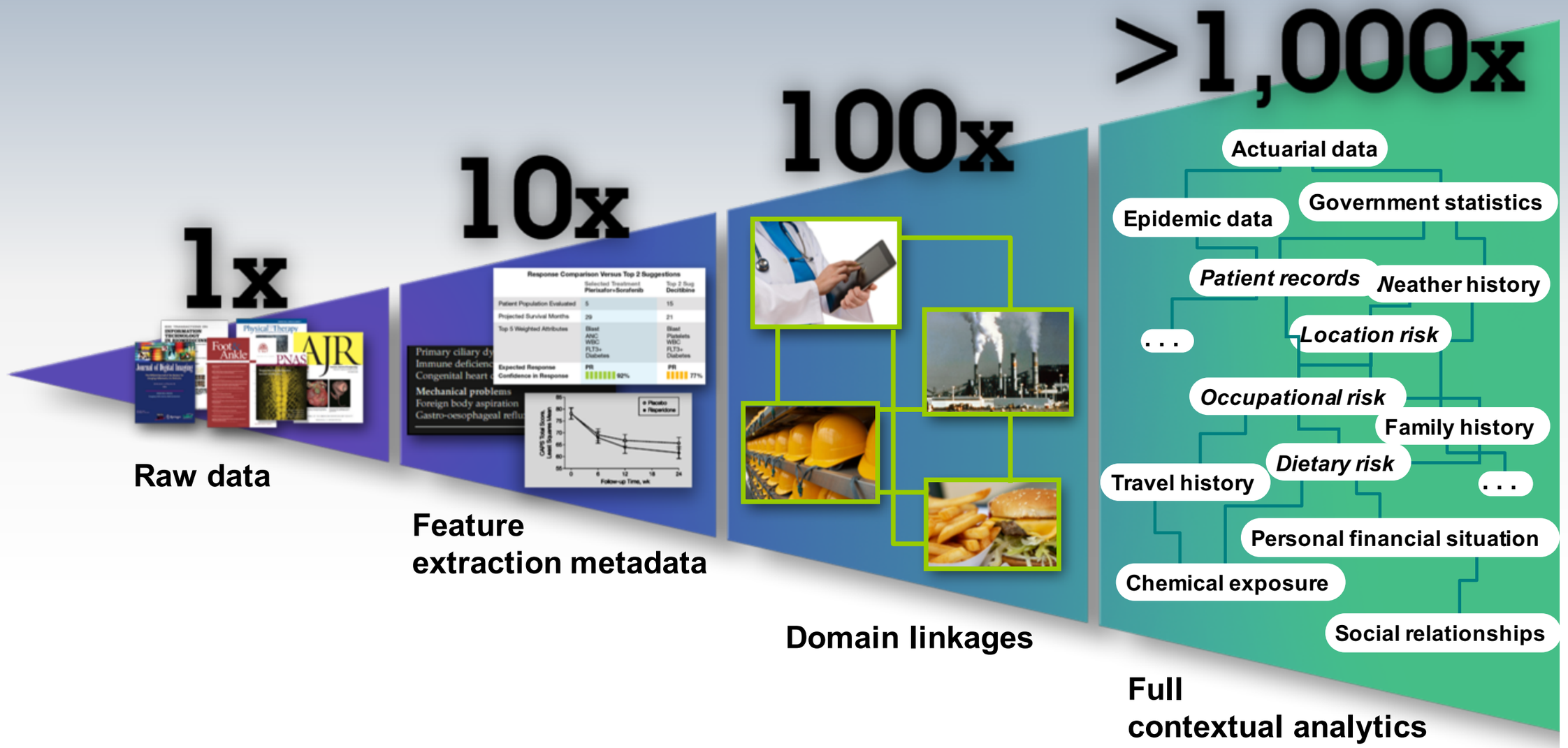
Of valuable sensory data loses value in milliseconds

By 2017

The collective computing and storage capacity of smartphones will surpass all worldwide servers



Context Multiplier Effect

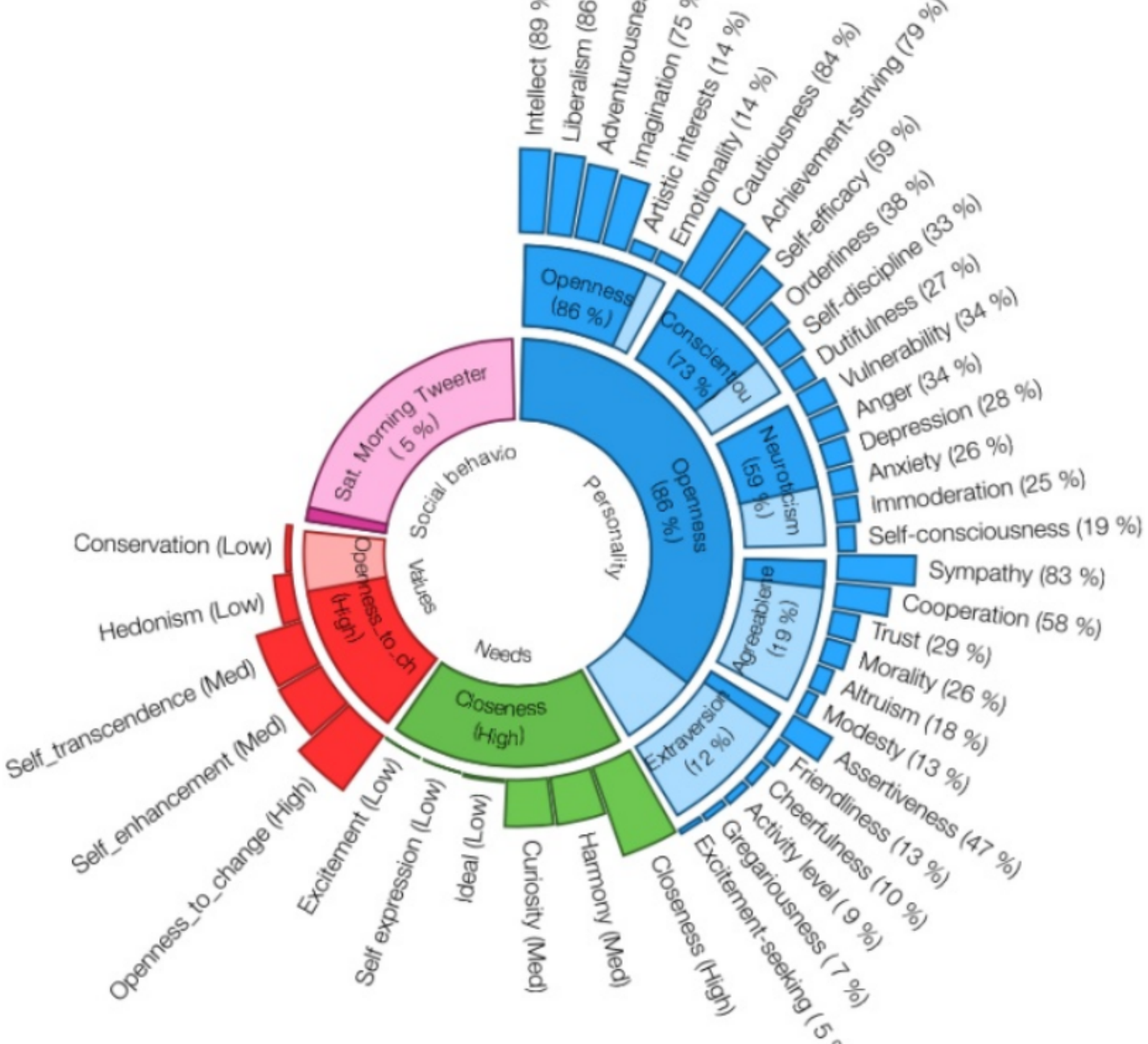


IBM

Market

IBM

Marketing - Pers



oration

Transforming Healthcare Consumption

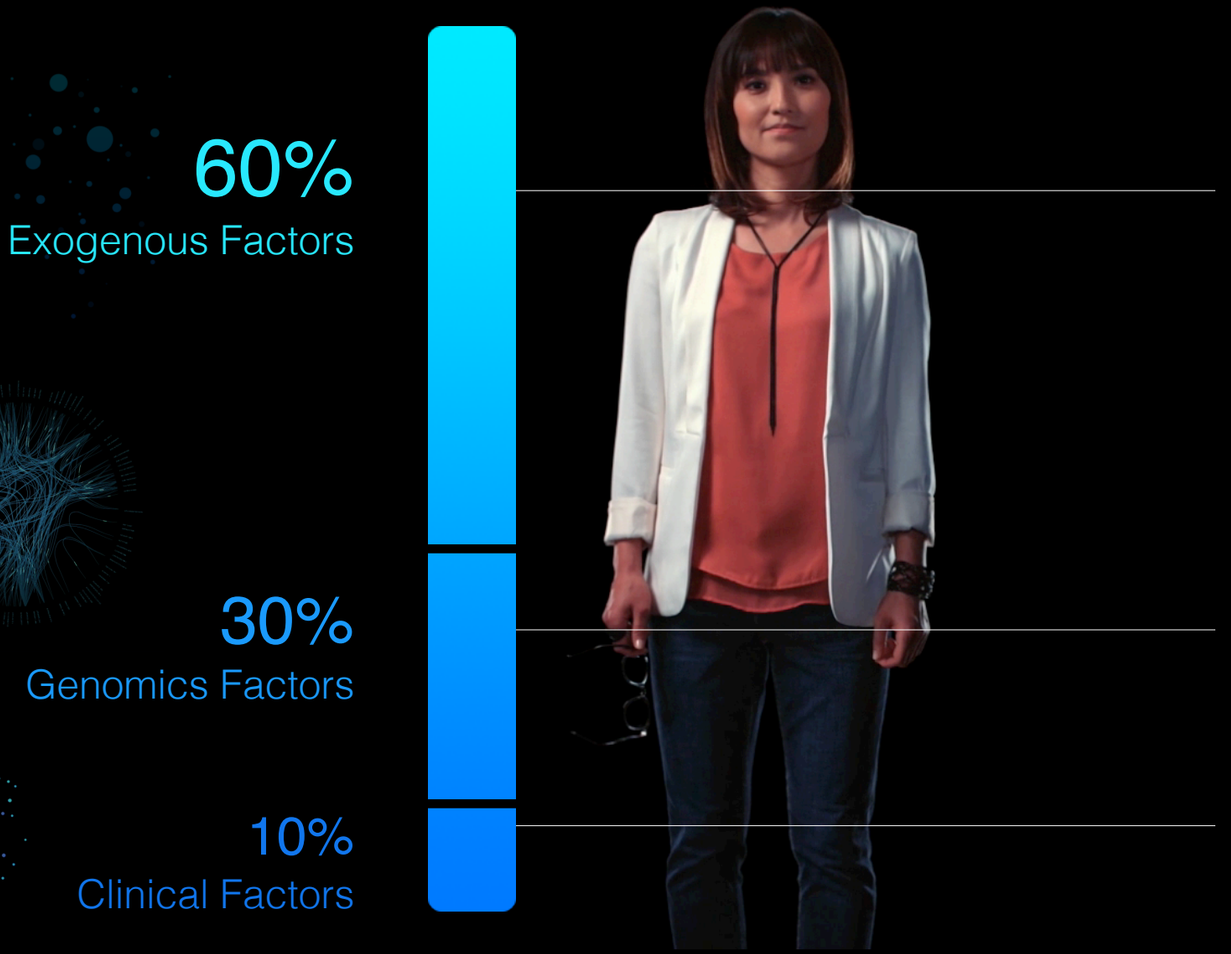
In a lifetime, an average human* will generate 0.4 TB of clinical data, 6 TB of genomic data, and 1100 TB of exogenous data

* in developed world

Exogenous data is the behavior, socio-economic and environmental data that is generated by the individual, fueled by the rapid adoption of smartphones and patient-controlled medical devices.

Accelerating the curation and integration of this mass of patient-generated data can lead to improvements in the accuracy of health assessments, monitoring, and self-treatment and strengthen health outcomes. These activities will also serve as the catalyst for new service models that will shape and influence the healthcare market

A vast amount of untapped data could have a great impact on our health - yet it exists outside medical systems.



60%
Exogenous Factors

30%
Genomics Factors

10%
Clinical Factors

1100 Terabytes
Generated per lifetime

Volume, Variety, Velocity, Veracity

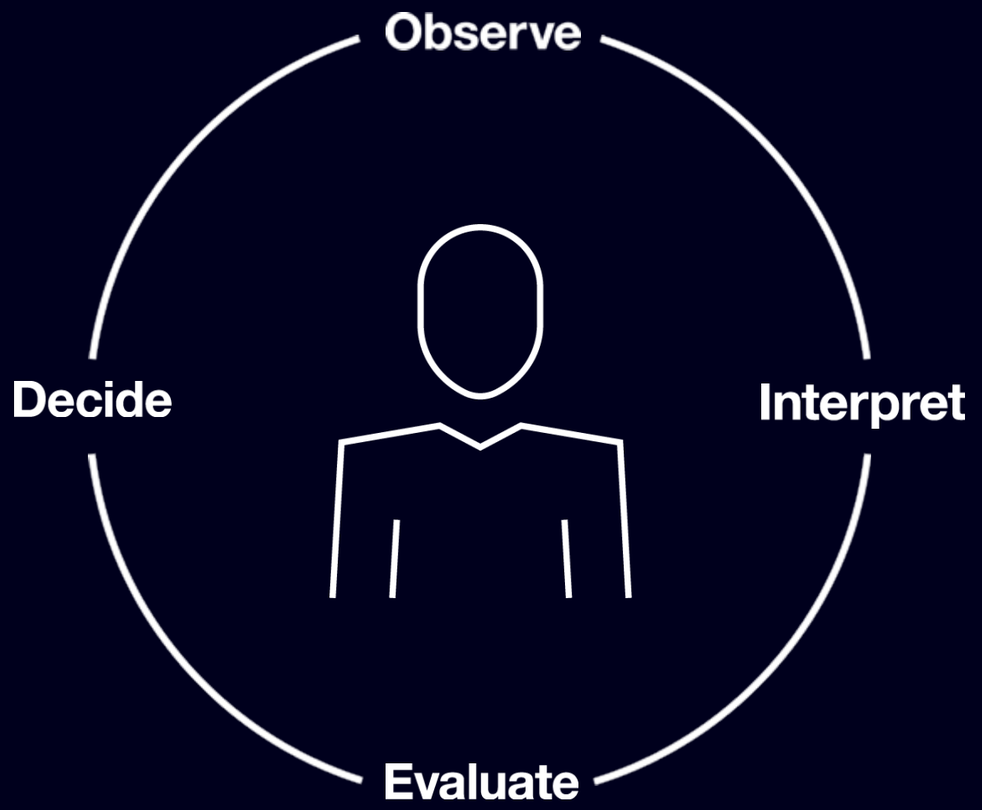
6 Terabytes
Per lifetime

0.4 Terabytes
Per lifetime

IBM **Watson Health** // SOURCE: ©2015 J.M. McGinnis et al., "The Case for More Active Policy Attention to Health Promotion," Health Affairs 21, no. 2 (2002):78–93


IBM Watson
Expertise matters more
today than ever before.
IBM

This is how cognition works.



Putting Watson to work to address the world's pressing issues

IBM Research Project *(2006 –)*

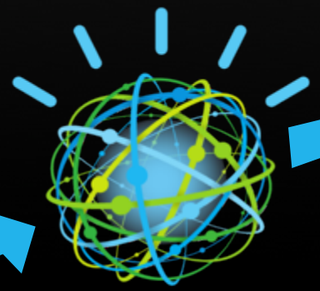
Jeopardy! Grand Challenge (Feb 2011)

Watson for Healthcare (Aug 2011 –)

Watson for Financial Services (Mar 2012 –)

Watson Industry Solutions (2014 –)

R&D



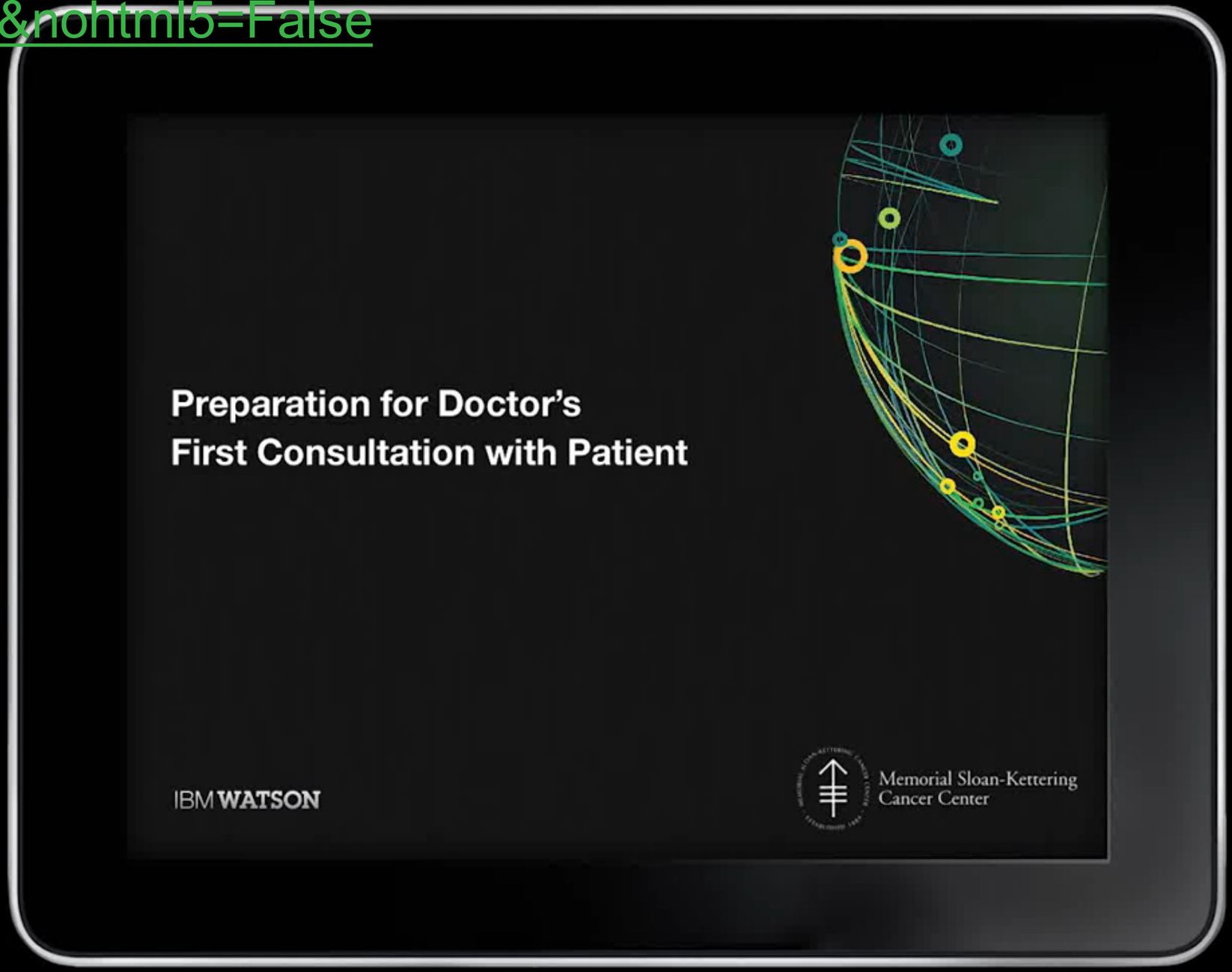
Cross-industry Applications

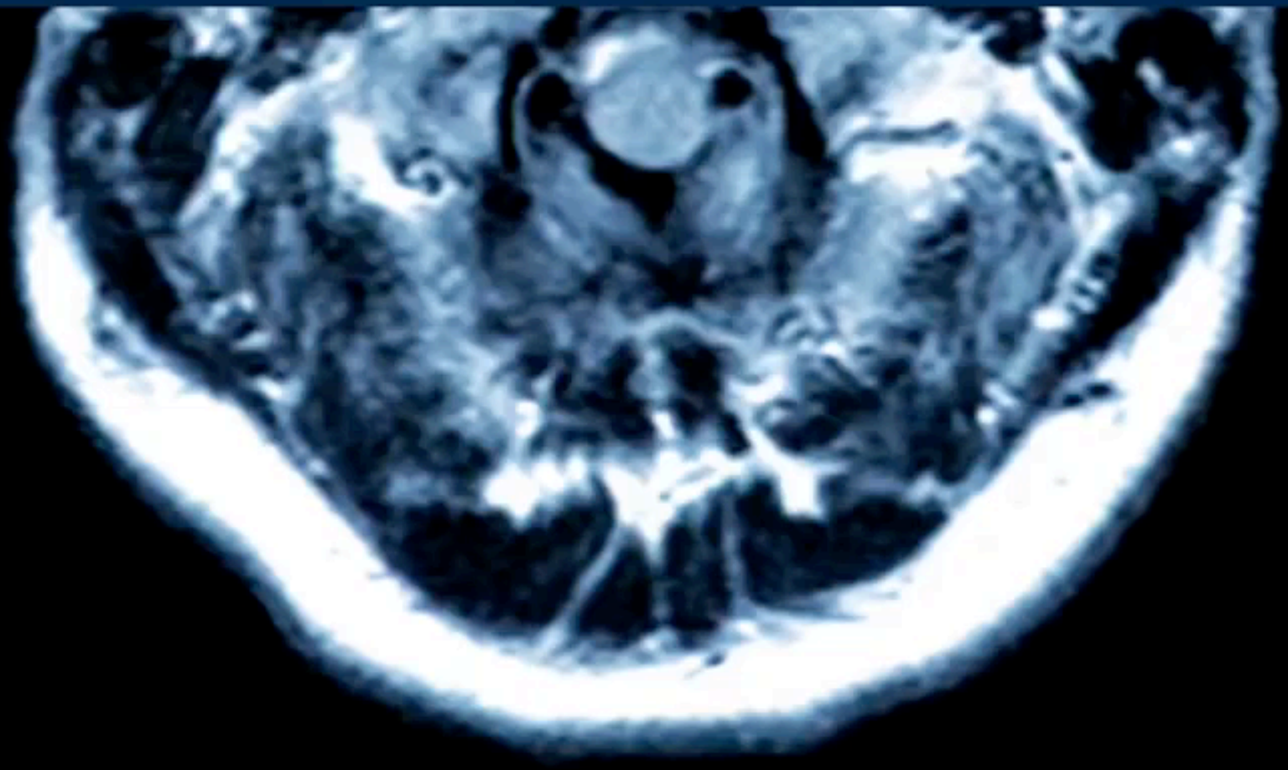
The Watson that competed on *Jeopardy!* in **2011** comprised what is now a single API—**Q&A**—built on **five underlying technologies**.

Since then, Watson has grown to a family of **28 APIs**.

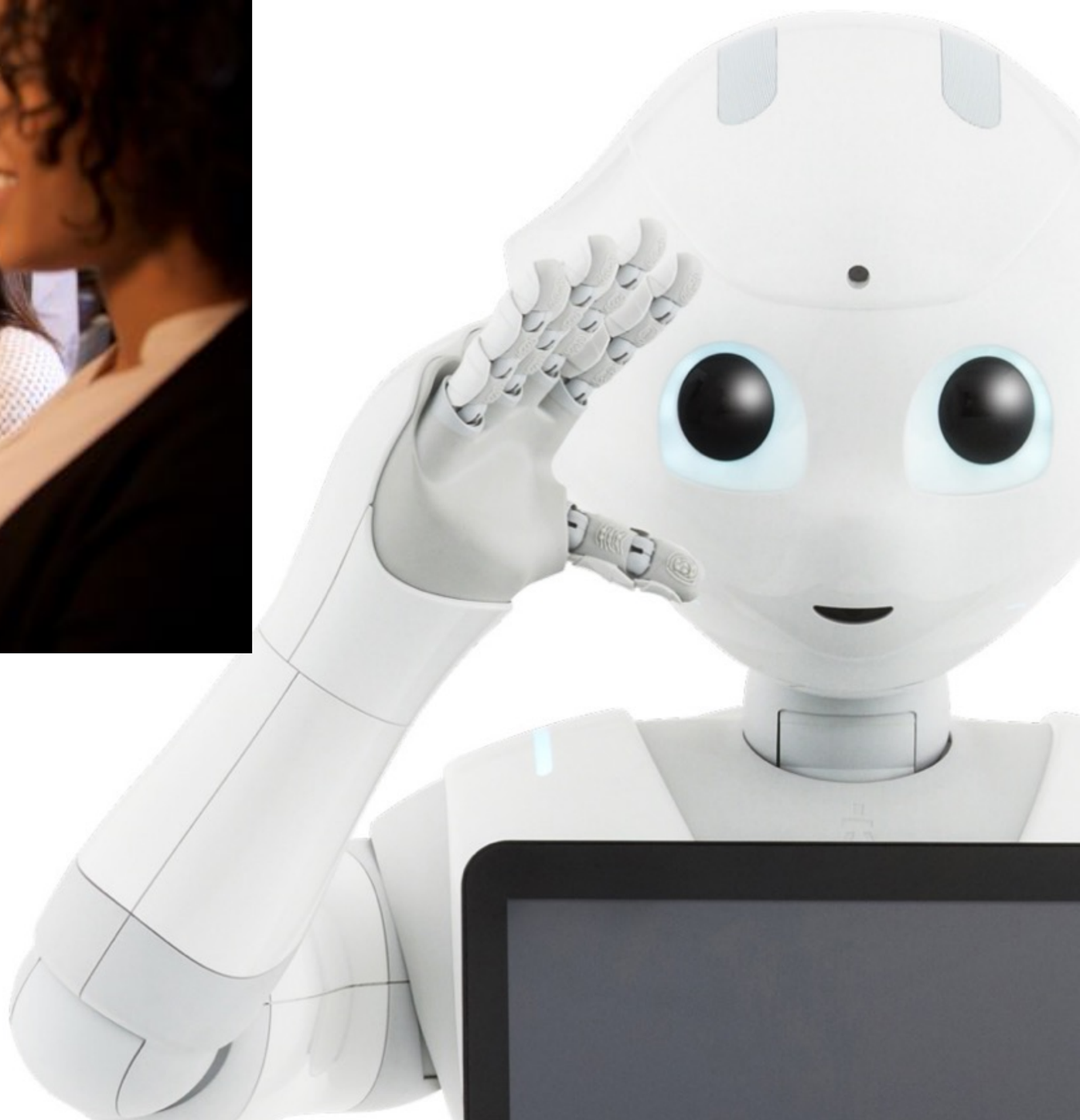
By the end of 2016, there will be nearly **50 Watson APIs**—with more added every year.

https://www.youtube.com/watch?v=hbqDknMc_Bo&nohtml5=False





https://www.youtube.com/watch?v=d-umbokNLGQ

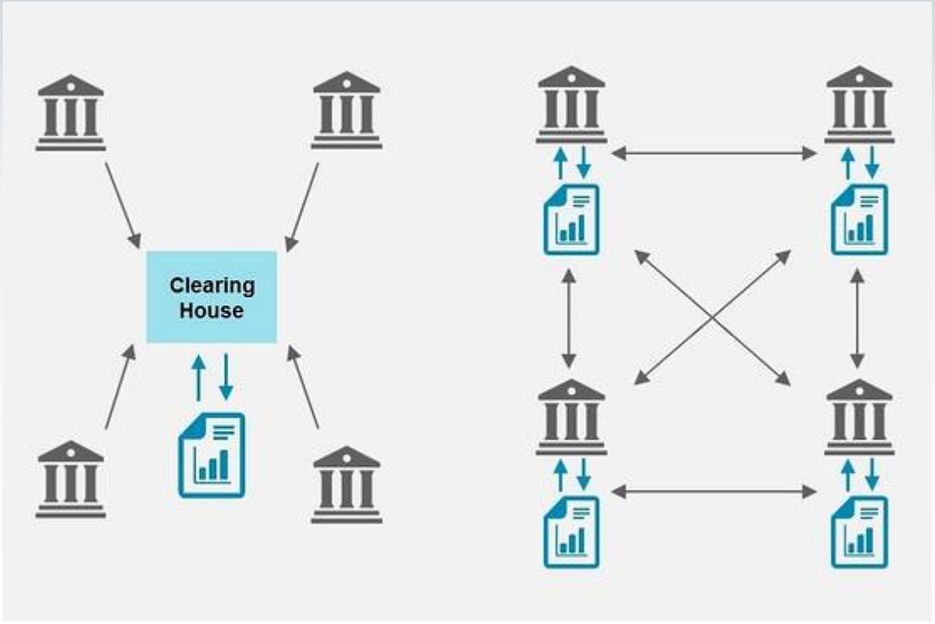


BLOCKCHAIN

BLOCKCHAIN

BLOCKCHAIN

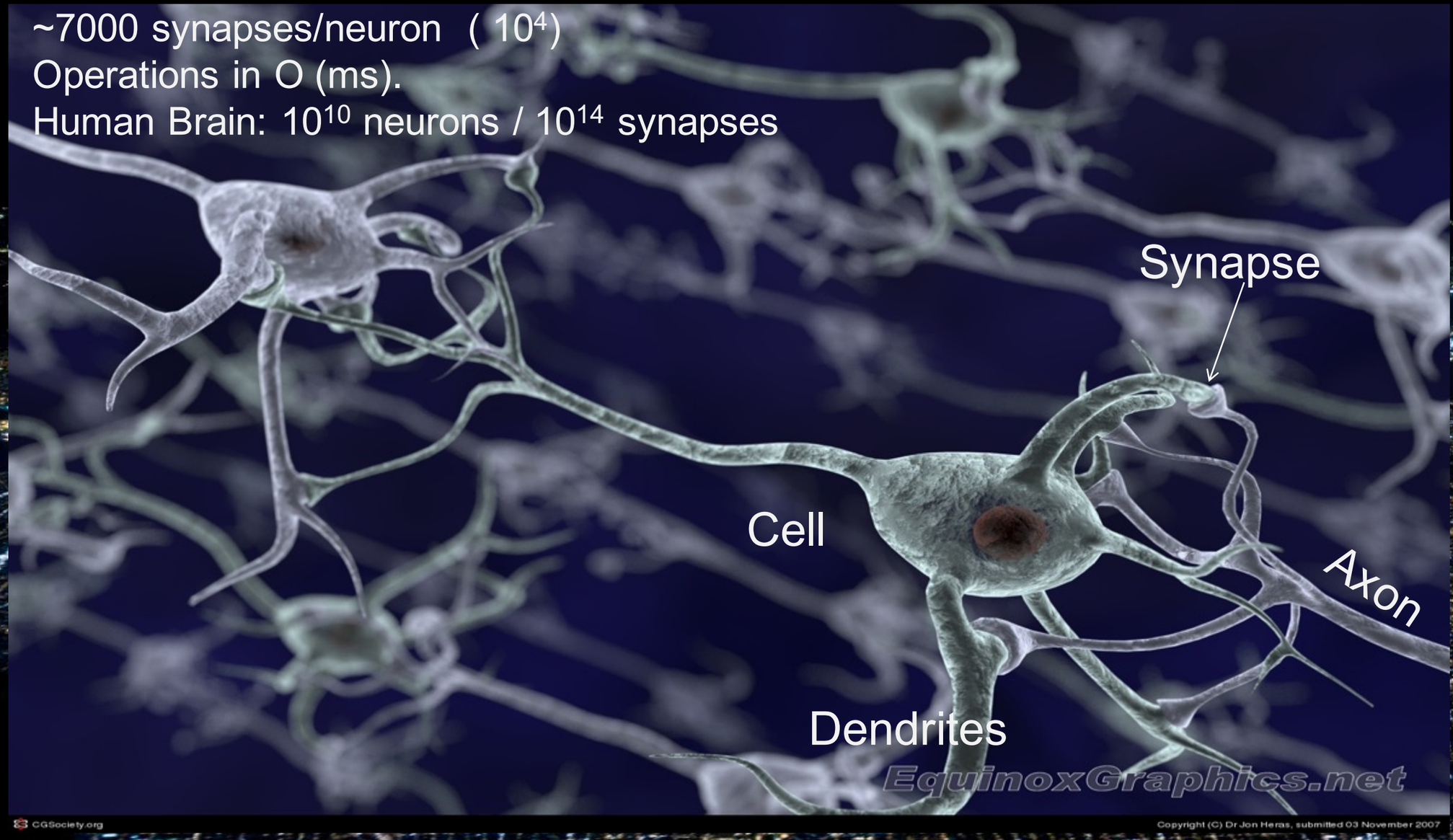
Economic transactions on a distributed ledger can be programmed to record virtually anything of value: your identity, a will, a deed, a title, a license, intellectual property, and also almost any type of financial instrument.



"How seriously should we take this? I would take it as seriously as we should have taken the concept of the Internet in the 1990s."
—Blythe Masters, DAH http://bit.ly/1JENgb4

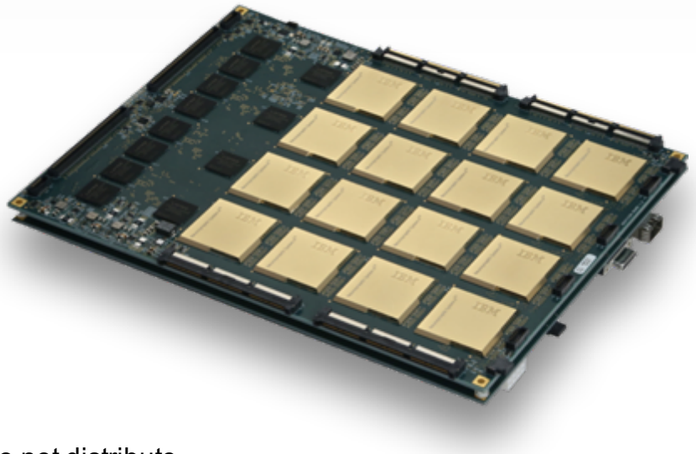
BLOCKCHAIN

The Synapse Project: Short Introduction



IBM SyNAPSE chip

	2011	2014
Programmable neurons	256	1 million
Programmable synapses	262,144	256 million
Neurosynaptic cores	1	4,096



Board:

16 million neurons

4 billion synapese
(deutsch 4 Milliarden)

100 billion neurons
(deutsch 100 Milliarden)

100 trillion synapses
(deutsch 100 Billionen)