

# Optum Summit

Visionary View of  
Data and Analytics

Mark Sexton, SVP of  
Data Science &  
Transformation

# The 4<sup>th</sup> Industrial Revolution

A technology driven revolution is upon us, so unprecedented in the magnitude of its velocity, scope and complexity that it is blurring the lines between the physical, digital and biological spheres.

## Physical

Billions of devices, people and information sources are connected to create an internet of things (IoT)

## Digital

Artificial Intelligence (Virtual Assistants, NLP, Deep Learning, Insights Engines), Blockchain, Big Data

## Social

Democratization of information and ubiquitous access to social networks are making markets consumer-driven

## Cybersecurity

An explosion of new vectors of attack on systems and private data is driving huge investments in cyber security and privacy technologies

Mechanization,  
water power,  
steam power

1<sup>st</sup>

Mass production,  
assembly line,  
electricity

2<sup>nd</sup>

Computer and  
automation

3<sup>rd</sup>

Cyber Physical  
Systems

4<sup>th</sup>



# Technology Transformation

**Big  
Data**



**Cloud**



**Social,  
Mobile**



**IOT**



**Artificial  
Intelligence**



# Explosion of mobile applications

2007



2015



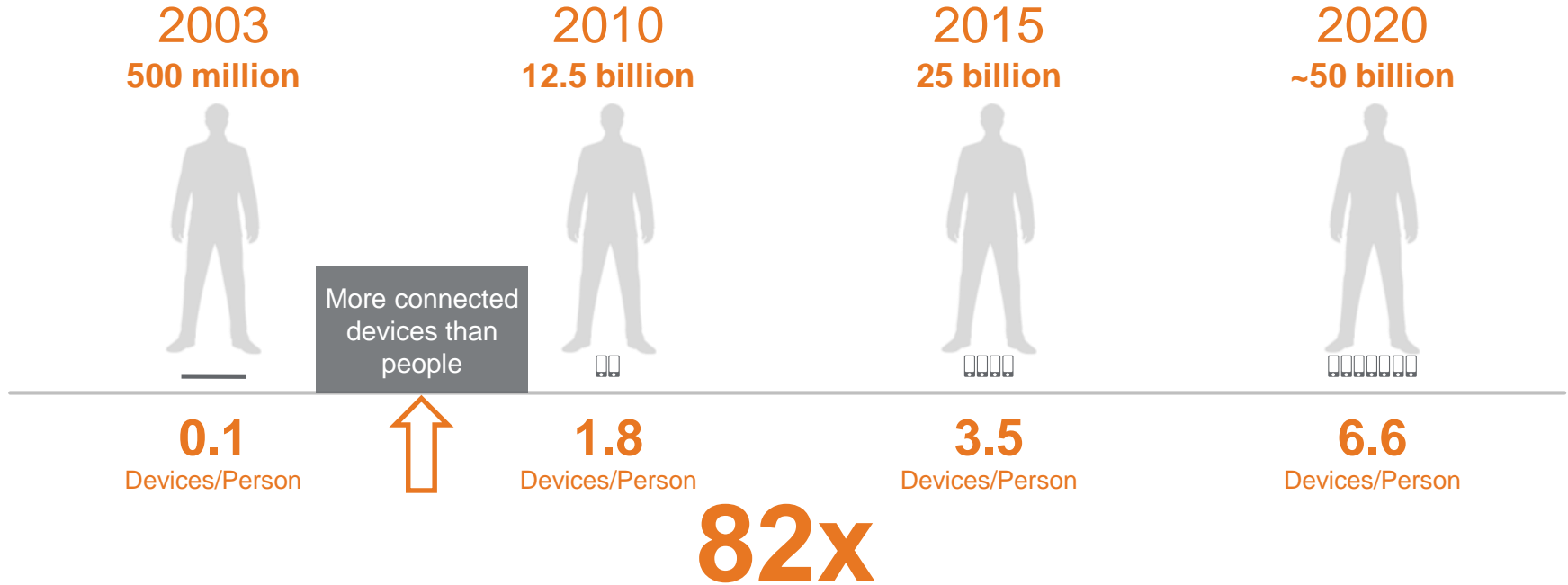
2020



1633x

Source: Apple, Windows Mobile, Cisco Analysis (Forecast of 2013 assuming consistent growth trends)

# Explosion in connected devices



Source: Forrester Research, Cisco IBSG

# Explosion of Internet information flow

2007



2015



2020



**41x**

Source: Cisco Visual Networking Index

# Cloud computing: The next step in the evolution

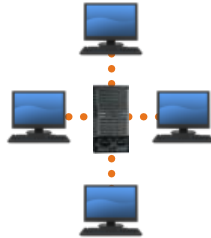
Mainframe



Minicomputer



Client Server



Web



Virtualization



Cloud



1960

1970

1980

1990

2000

2010

# Big Data is here

---

**25**  
**BILLION**  
Connected Devices

**5**  
**MILLION**  
Applications

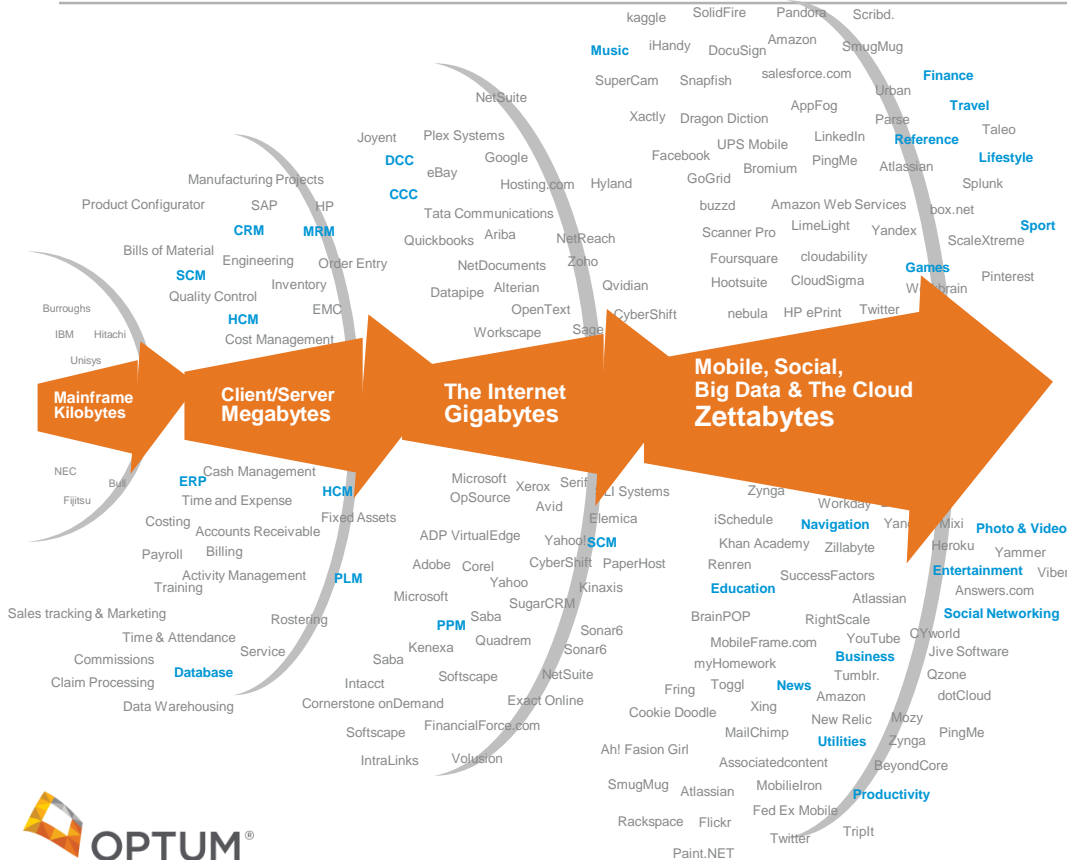
**1**  
**ZETTABYTE**  
1B Terabytes of Content

---





# Data is a new form of currency



## 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

## What's next? Yottabytes

# Health Care Data Evolution



**Administrative**



**Administrative Plus**



**Electronic Medical Records**



**Big Data**



**Devices**



**Genomics**

Static  
Structured

Broader & Deeper  
Structured & Unstructured

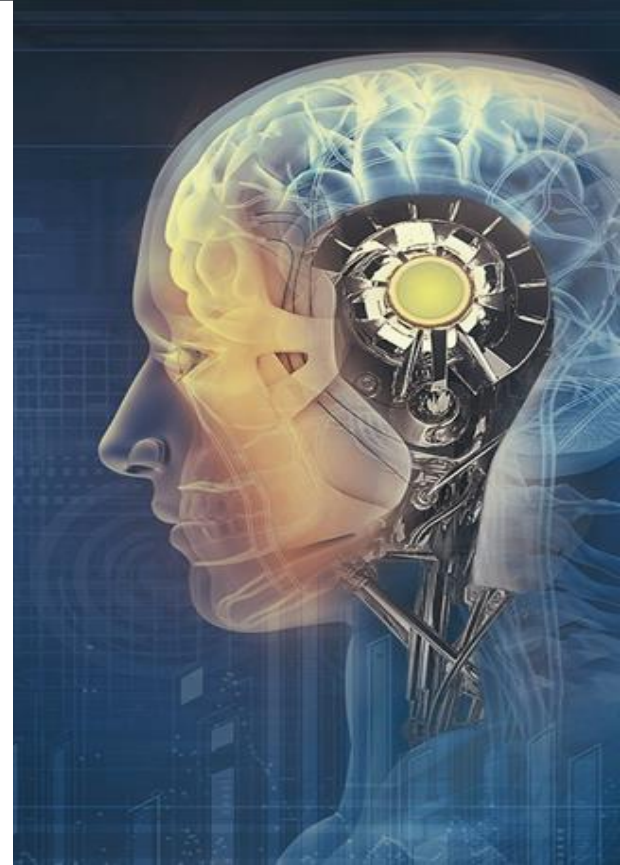
Real-time  
Streaming

# Artificial Intelligence

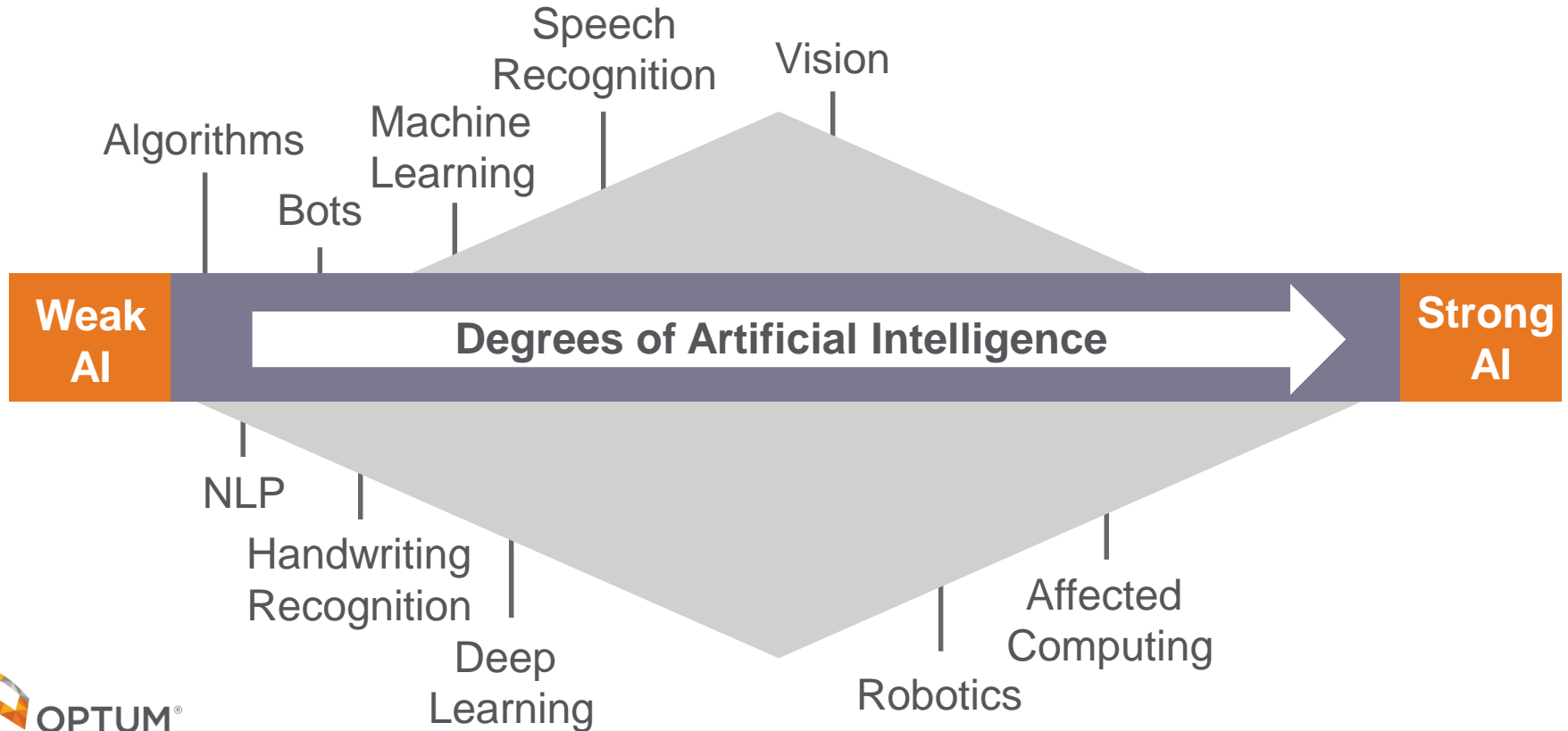
# What is Artificial Intelligence?

## **One Working Definition:**

The theory and development of computer systems able to perform tasks that normally require human intelligence, such as visual perception, speech recognition, decision-making, prediction, and translation between languages.



# Artificial Intelligence or Cognitive Computing



# Artificial Intelligence Advancements

Machine learning/  
deep learning

Natural language processing

Expert systems

Speech recognition

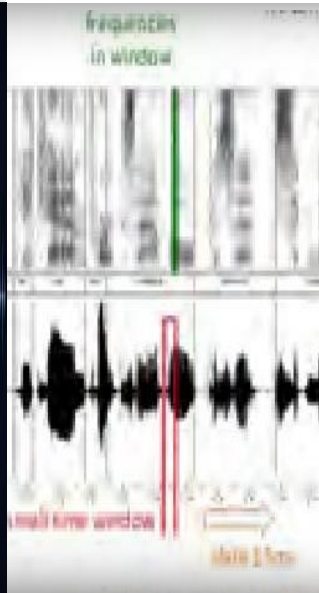
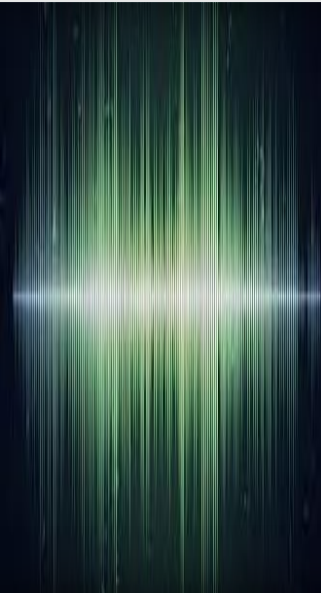
Vision systems

Handwriting recognition



Deep Pattern  
Representation  
Future of  
Electronics

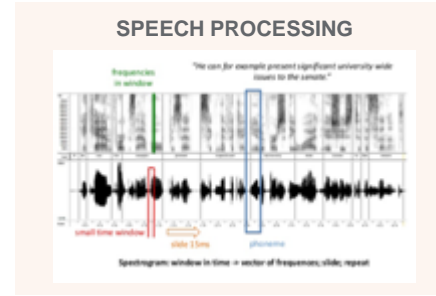
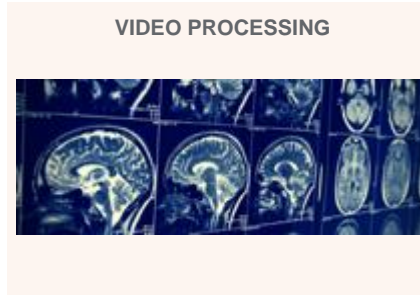
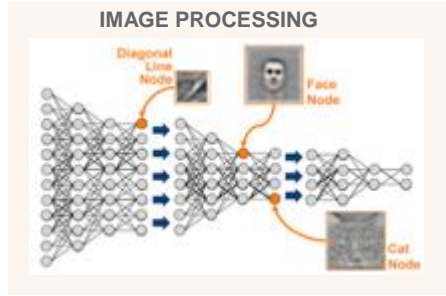
Riccardo Miotto<sup>1,2,3</sup>, Li Li



is results of a  
I have never  
biology and look  
and conclusions.  
It intrigues me in  
like develop  
then their handwriting  
that this was  
is change in

# Deep Learning: An Exponential AI Technology

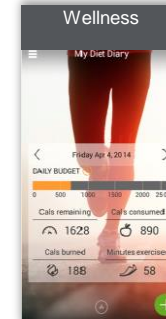
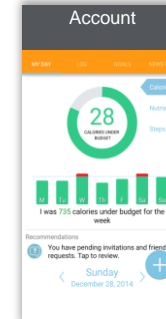
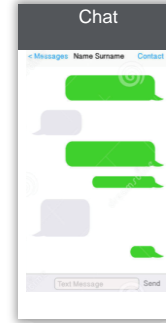
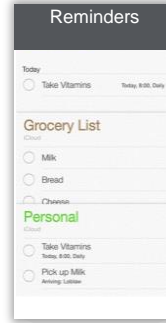
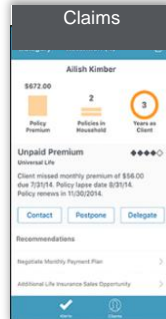
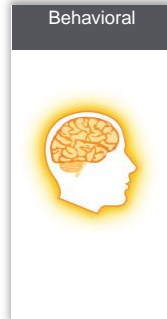
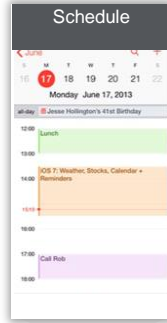
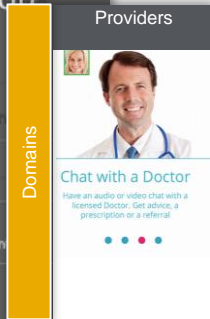
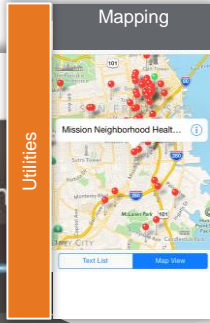
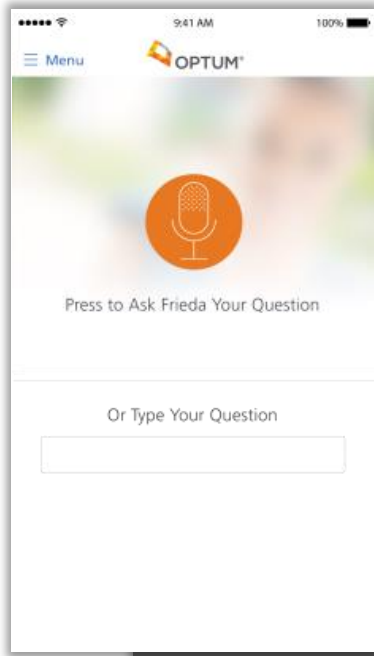
## Applications of Deep Learning



## Deep Learning Use Cases (Reduce costs, improve quality)

- Reduce unnecessary **ER visits**
- Reduce **re-admissions**
- Improve **prior-authorization** experience
- Identify **under-diagnosed conditions** in unstructured clinical notes
- Improve **referral processing** for providers
- Reduce false negatives in **rejected claims**
- Improve **speech** recognition context in Optum voice based applications

# Consumer Health Care Apps





# Internet of Things



## Mobile

Natural language interface to access benefits and eligibility, provider search, and other info



## Smart Glasses

Transcription of doctors' spoken notes to structured, codified data for EMRs and analytics



## Home and Office

One-stop-shop for health-focused and other personalized 360 view of the consumer



## Devices

Devices and sensors to monitor health conditions real time

# Future Ecosystems of Healthcare

