



BE BRAVE

BE BOLD

FINANCIAL ADVICE NEW ZEALAND CONFERENCE 2019

Disruption, innovation & transformation

How exponential technologies are changing *everything*

Brett Roberts

Datacom NZ





SAE1



km/h

180

200

220

240

260

contains:

0%

rocket science





CHANGE

AHEAD

massive technological change

infinite and free

but first, a quick maths recap...

100



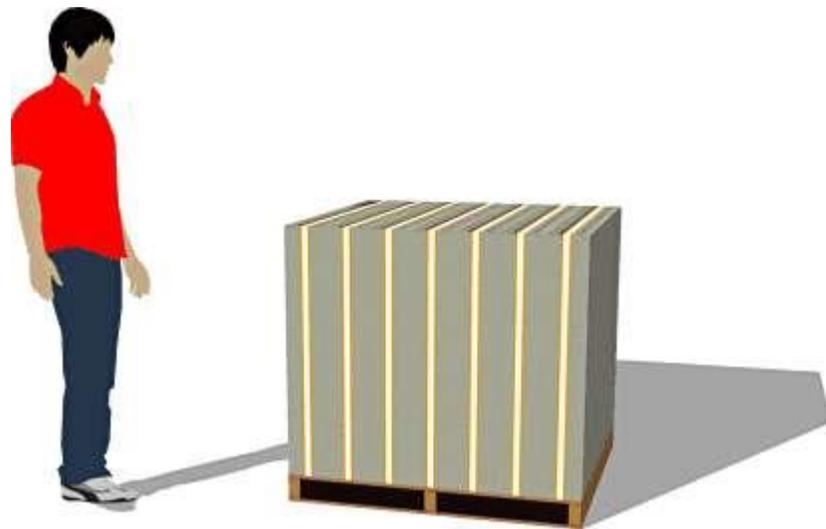
10,000



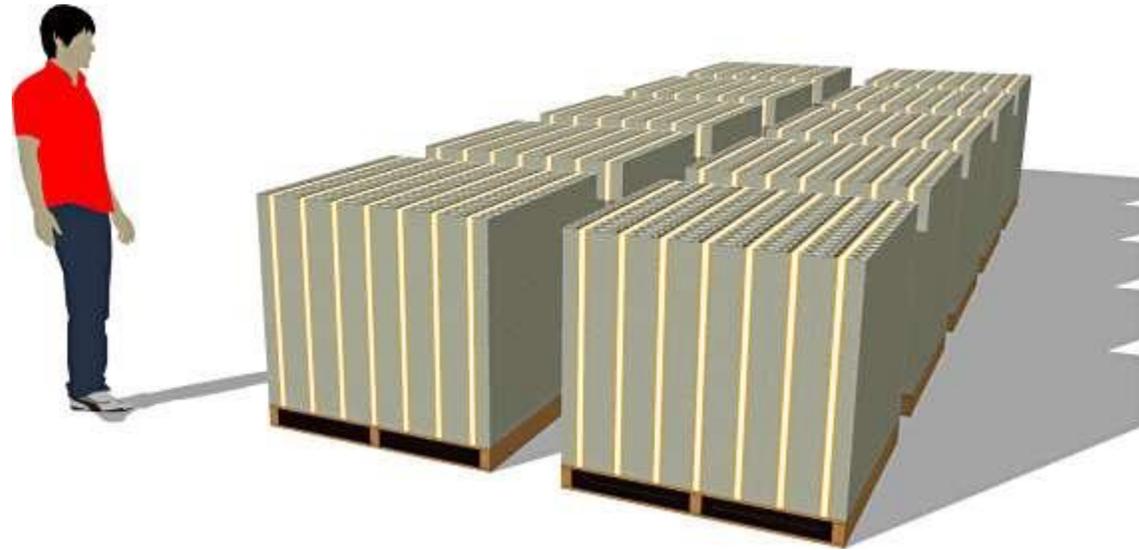
1 million



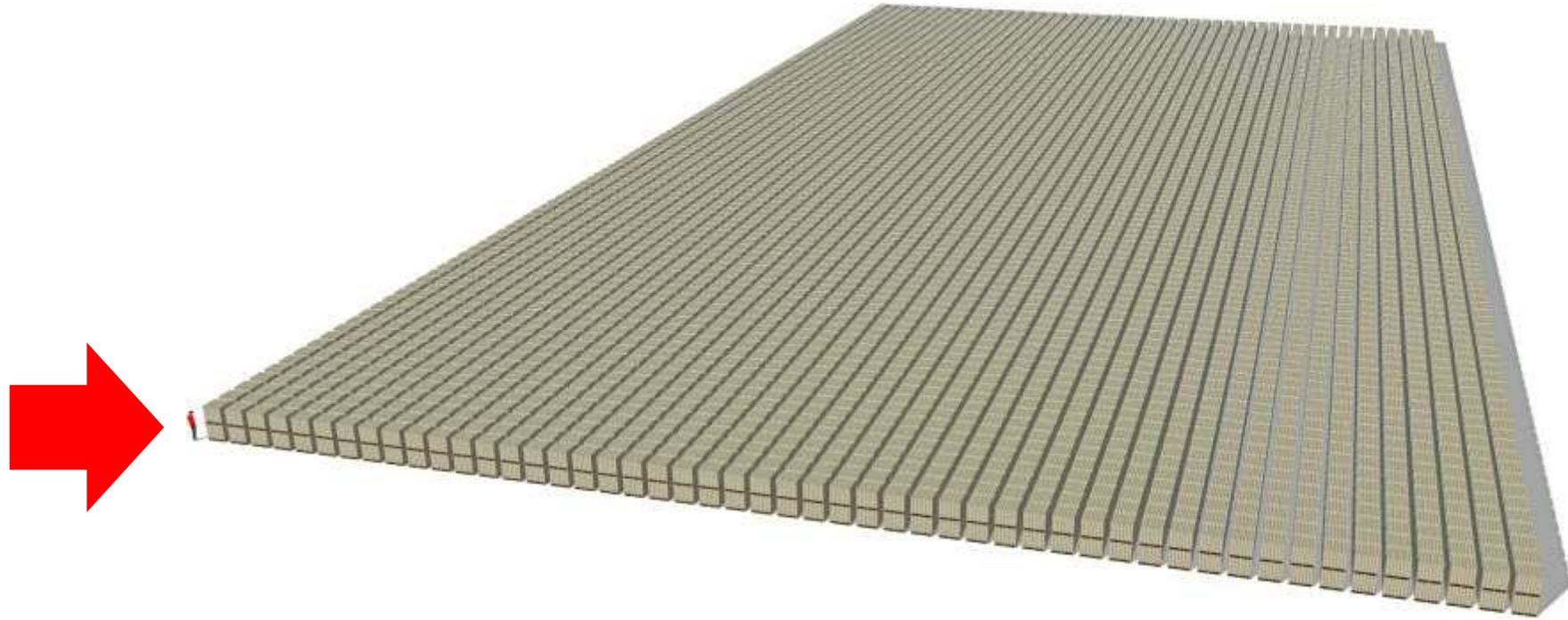
100 million



1 billion



1 trillion



20+ trillion

transistors will be manufactured in 2019
per second

that's

630,720,000,000,000,000,000,000

transistors per year

or

84

transistors for every grain of sand on Earth

12

Apple A12 processors
for every person
on Earth

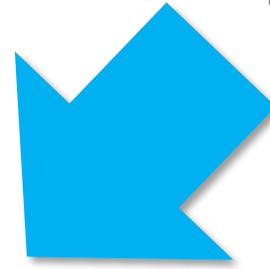




÷ 1000's

1 mm² =

171.3 million transistors*



* 5nm gate technology

2019: \$379

1982:



2019: \$379

1982: \$22,813



2019: \$379

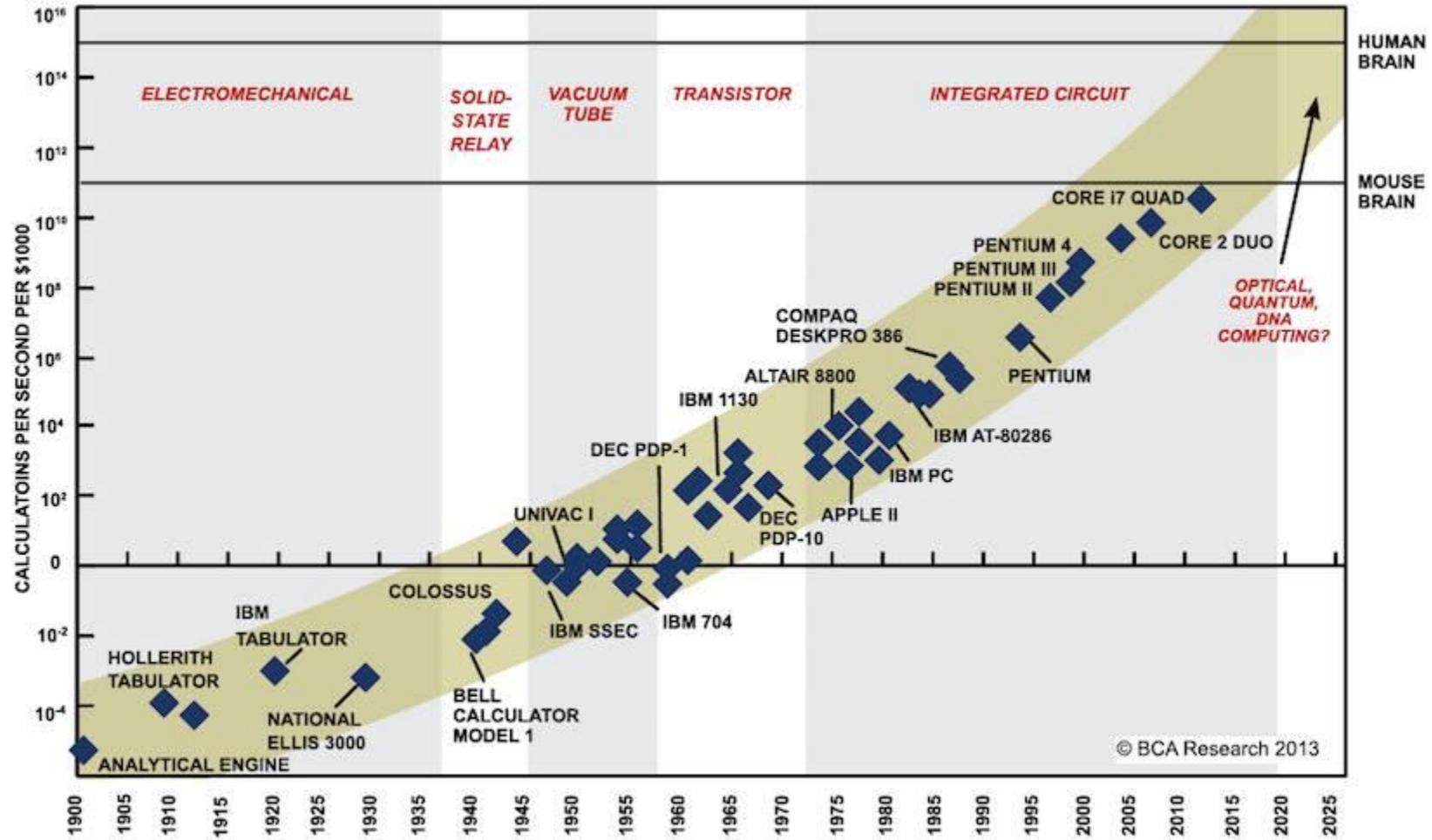
1982: \$22,813,000



2019: \$379

1982: \$22,813,000,000

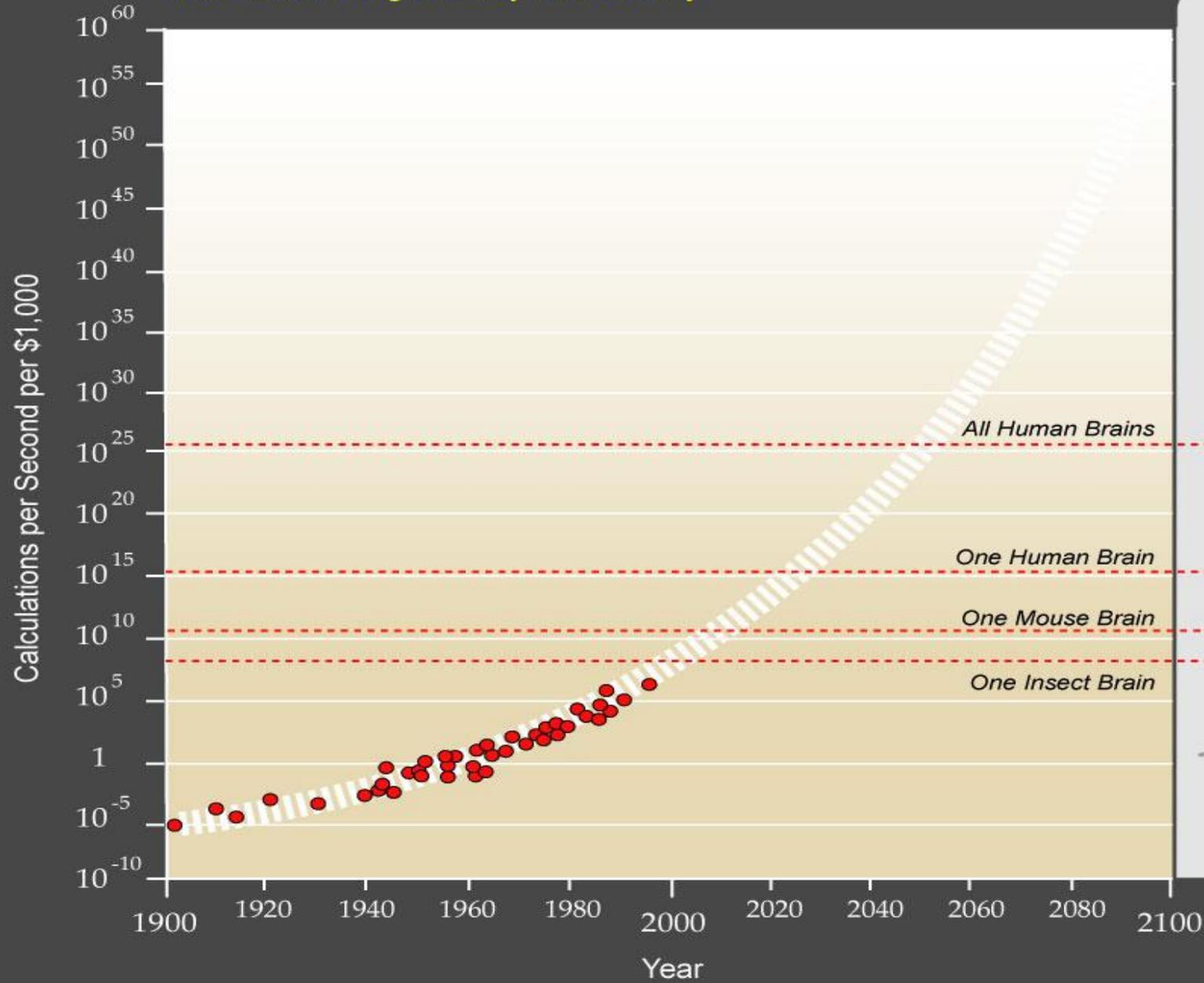




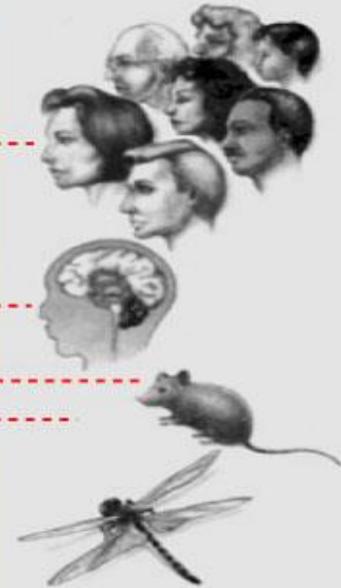
SOURCE: RAY KURZWEIL, "THE SINGULARITY IS NEAR: WHEN HUMANS TRANSCEND BIOLOGY", P.67, THE VIKING PRESS, 2006. DATAPPOINTS BETWEEN 2000 AND 2012 REPRESENT BCA ESTIMATES.

Exponential Growth of Computing

Twentieth through twenty first century



Logarithmic Plot



All Human Brains

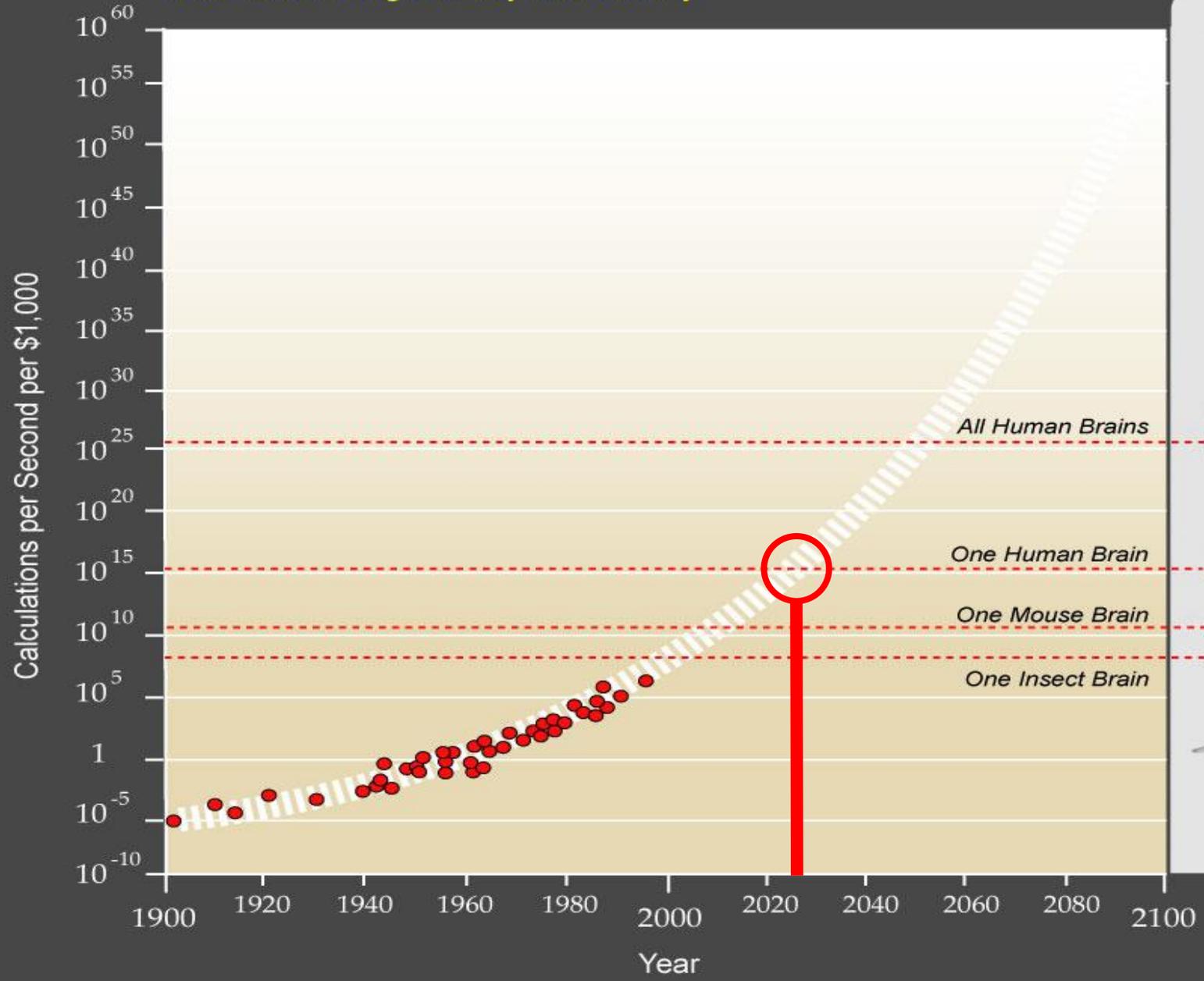
One Human Brain

One Mouse Brain

One Insect Brain

Exponential Growth of Computing

Twentieth through twenty first century



Logarithmic Plot

All Human Brains

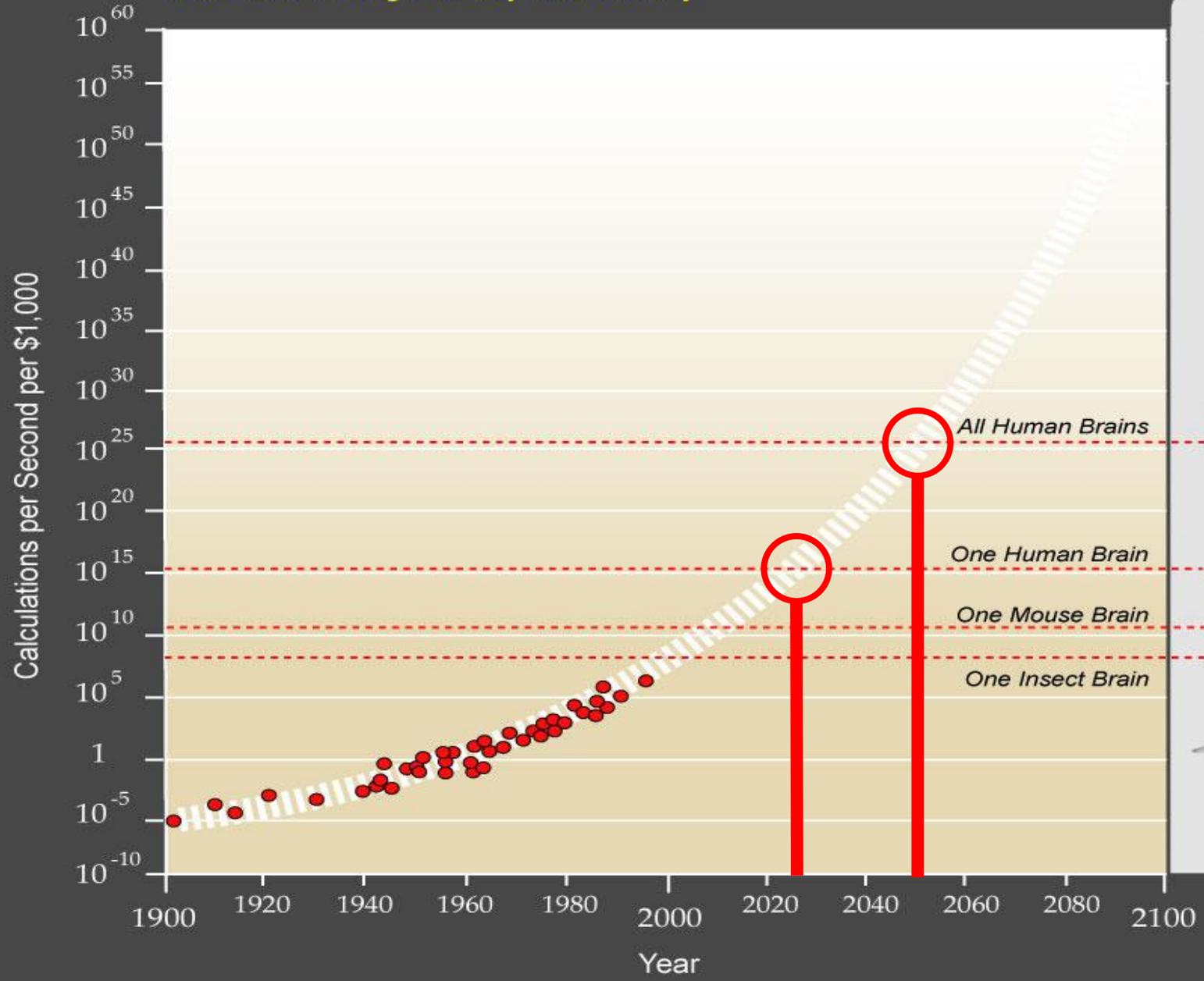
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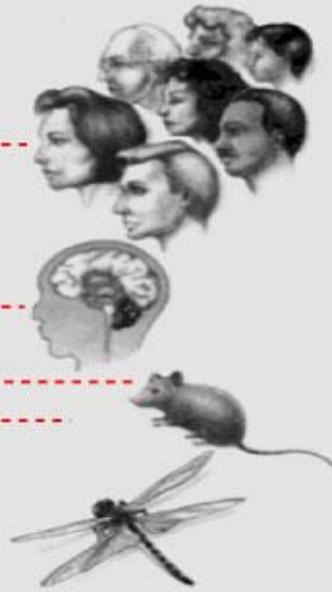
One Insect Brain

Exponential Growth of Computing

Twentieth through twenty first century



Logarithmic Plot



All Human Brains

One Human Brain

One Mouse Brain

One Insect Brain

the impact of digital technologies...





- accelerometer
- gyroscope
- magnetometer
- front and rear cameras
- NFC
- barometer
- speaker
- microphone
- proximity
- light sensor
- Bluetooth
- GPS
- WiFi + cellular
- humidity
- temperature

internet of things

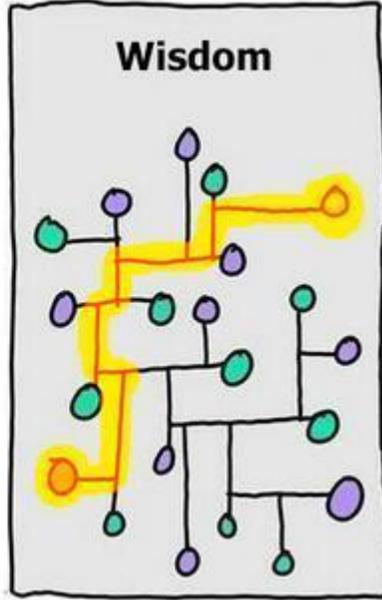
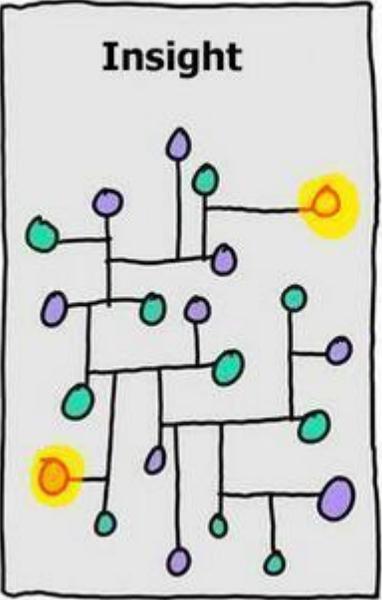
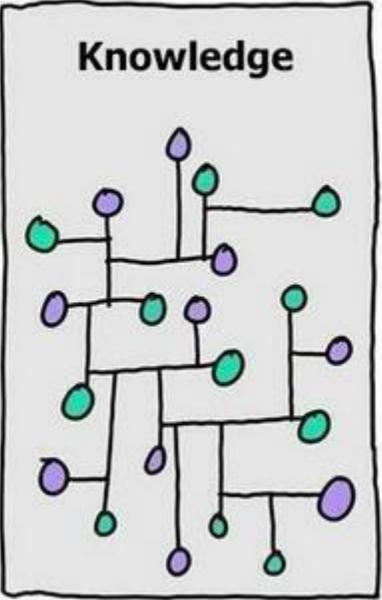
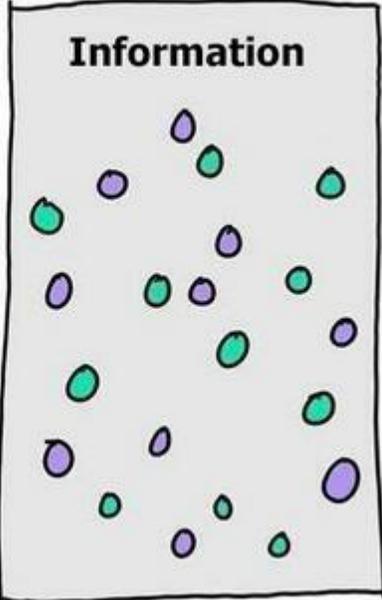
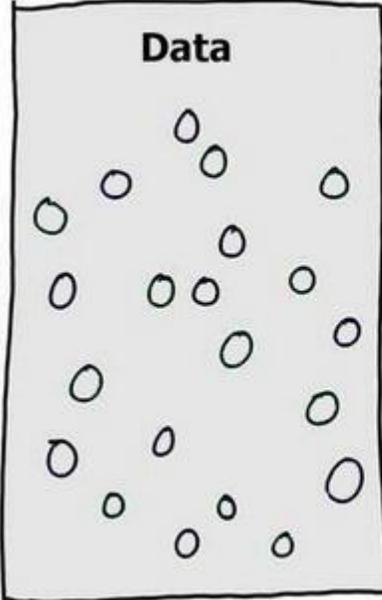


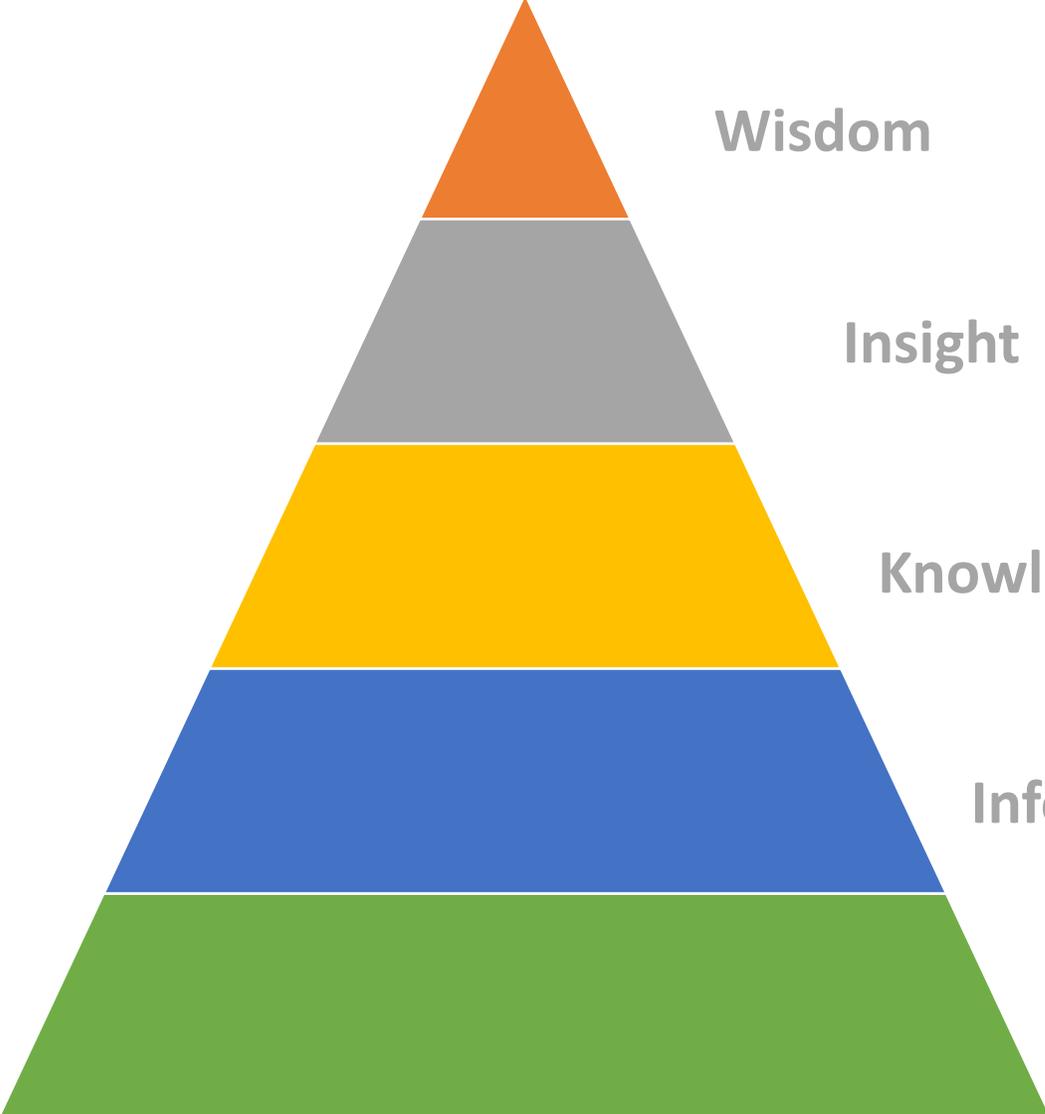






'big data' & analytics





Wisdom

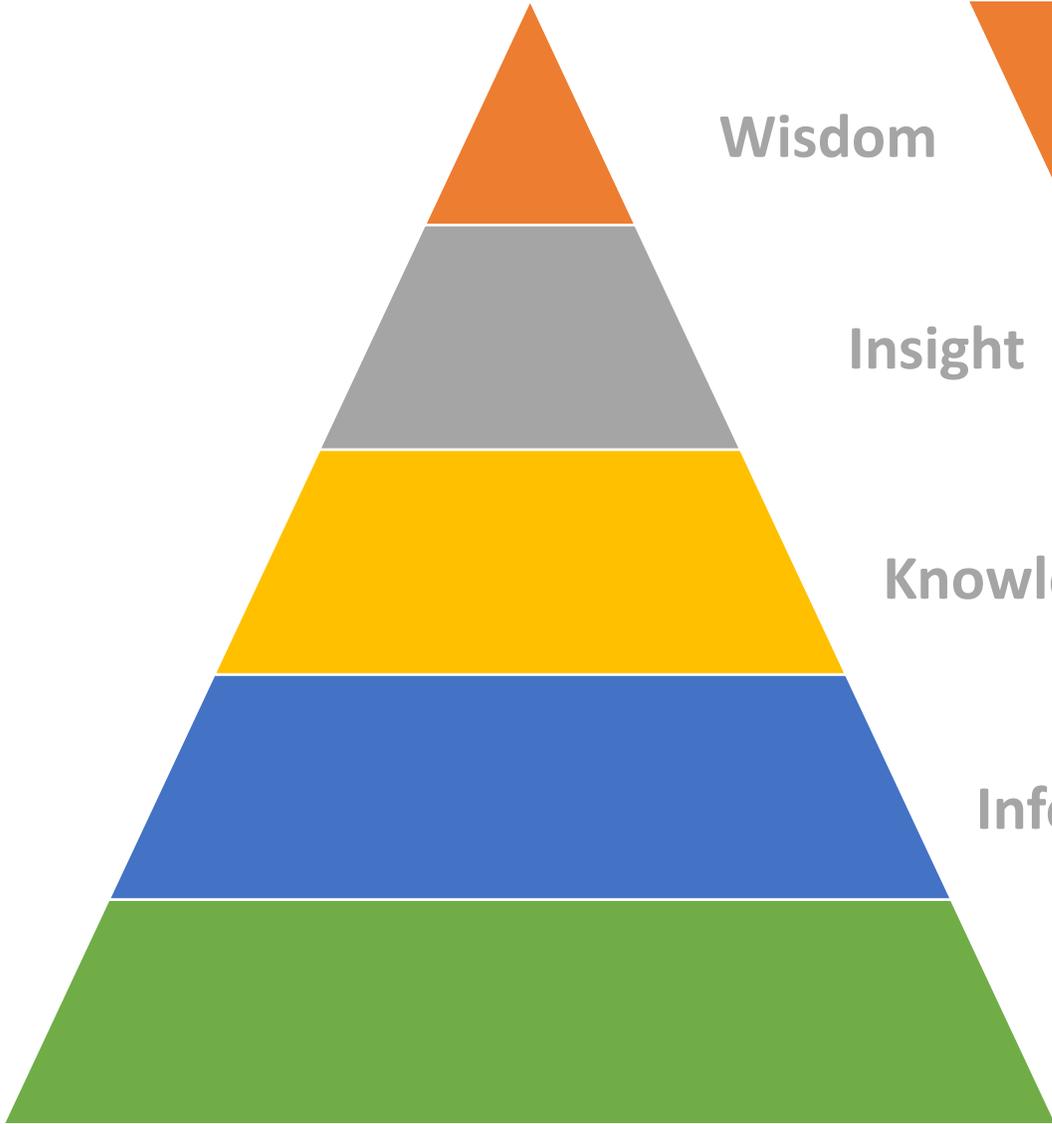
Insight

Knowledge

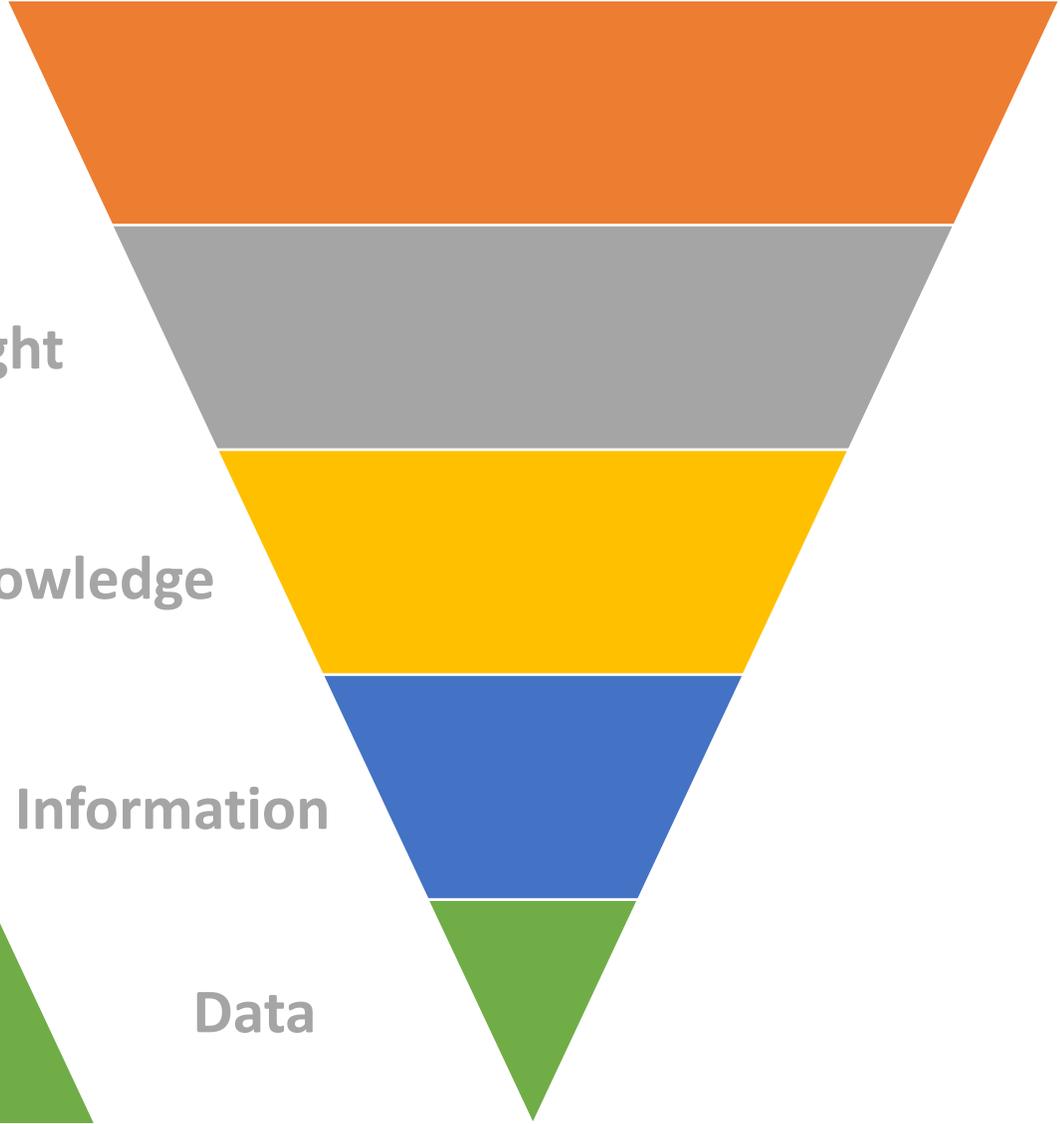
Information

Data

Volume



Volume



Value





3D printing

















SCIENCE \ HEALTH \

Mouse with 3D-printed ovaries gives birth to healthy pups

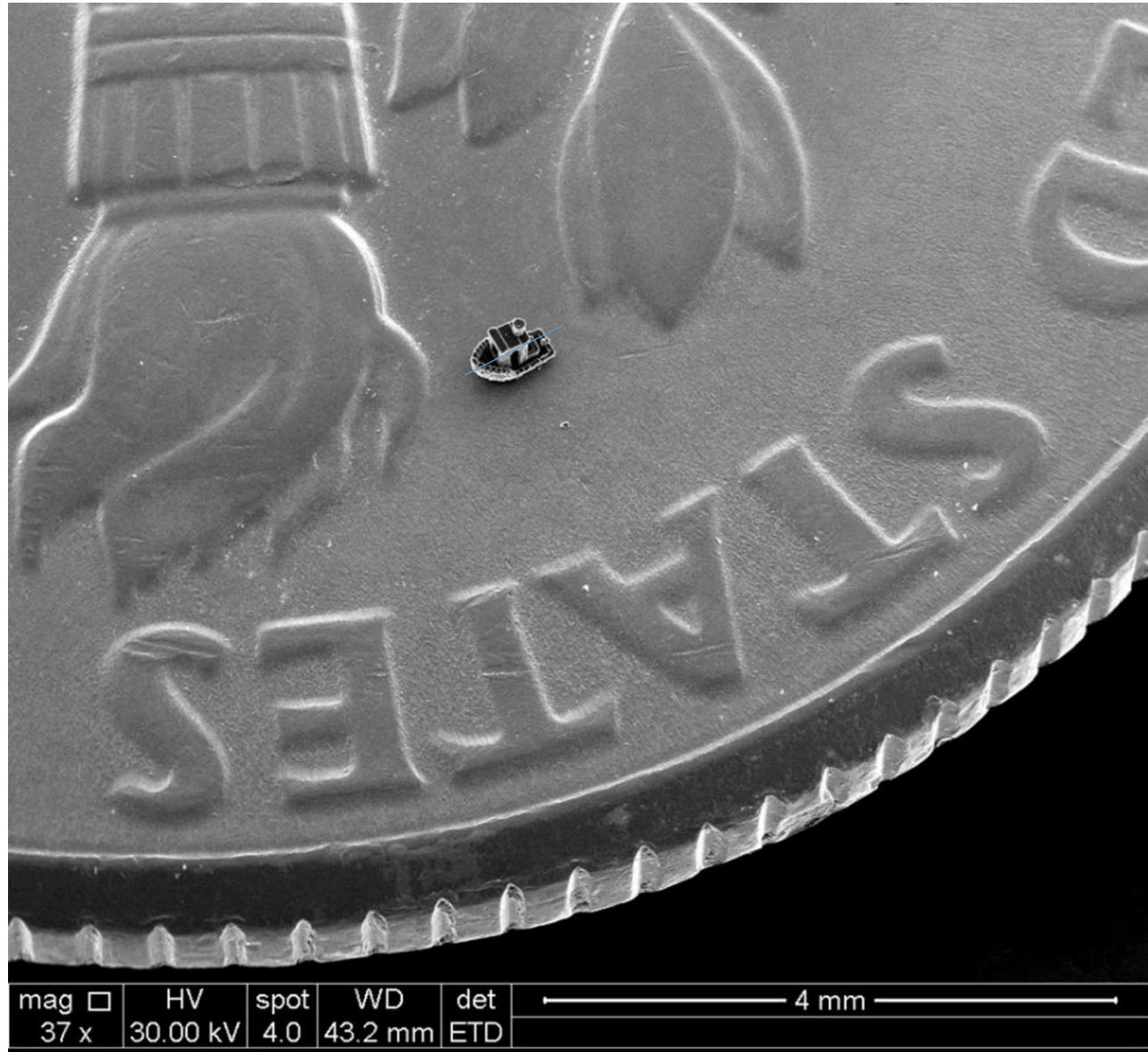
4 🗨️

It could one day help women struggling with fertility

by [Angela Chen](#) | [@chengela](#) | May 16, 2017, 11:31am EDT



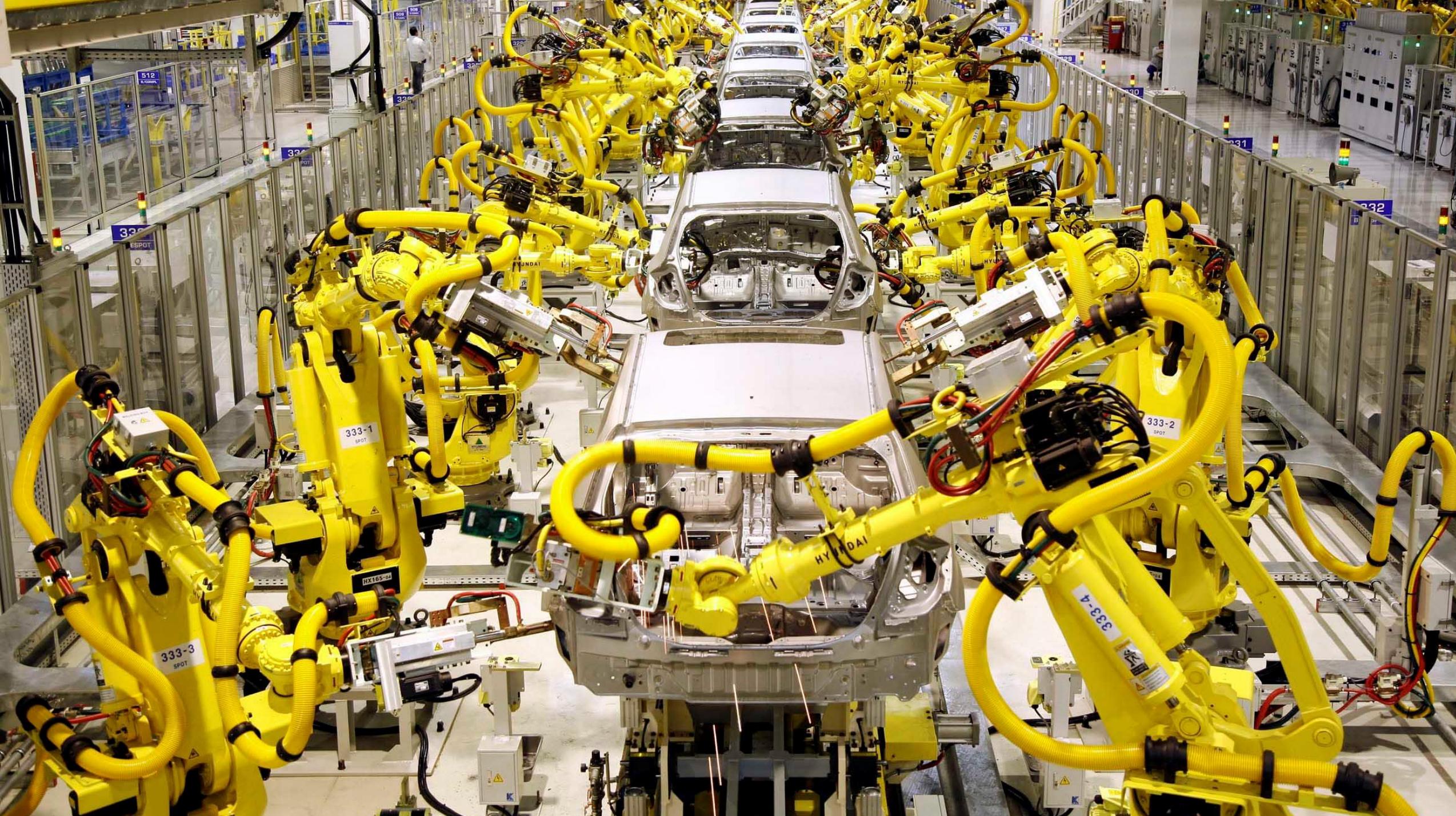


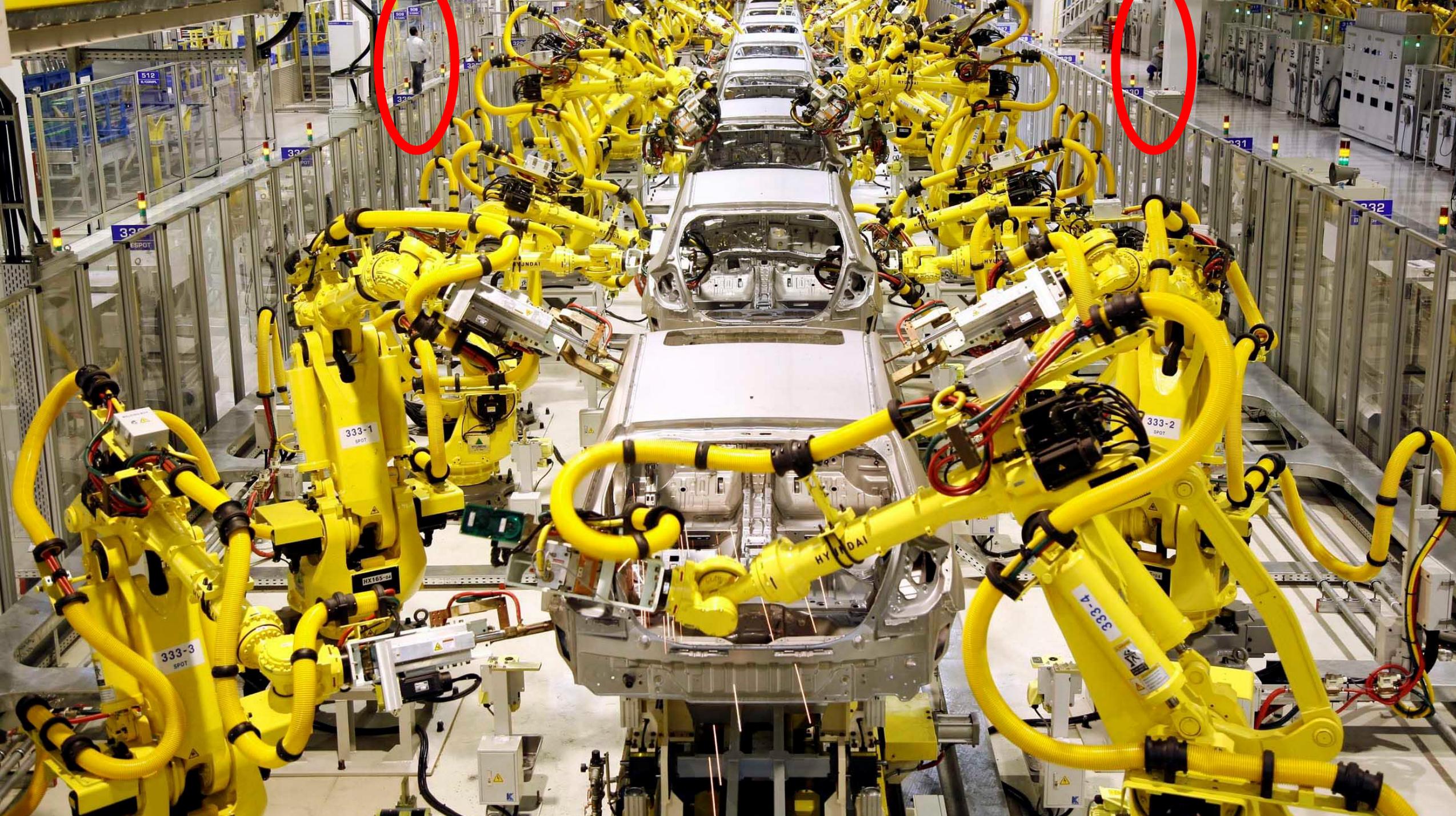


mag	□	HV	spot	WD	det
37 x		30.00 kV	4.0	43.2 mm	ETD

4 mm

robotics





KIVA PICKING



KIVA PICKING



A person in a purple shirt is standing near a workstation, highlighted by a red oval.

KIVA PICKING





KIVA Systems
1611

1611

1A↑

2A↑

3A↑

4A↑

468 149

468 149

750 lbs. BASE CAPACITY
DO NOT EXCEED LIMIT

750 lbs. BASE CAPACITY
DO NOT EXCEED LIMIT

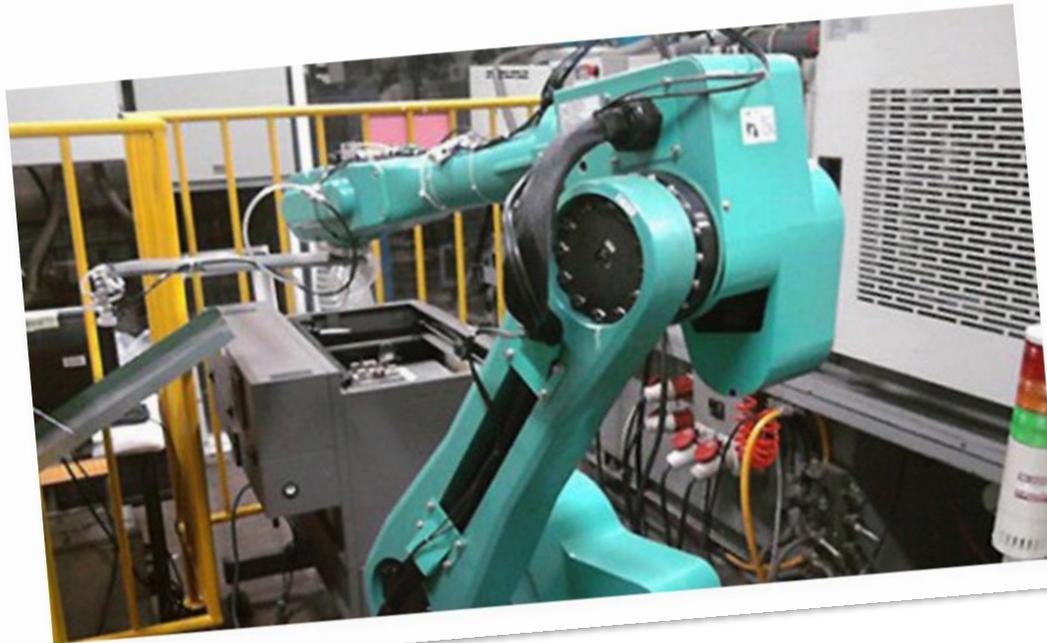




Apple supplier Foxconn so far up to 40,000 'Foxbots' in China

By Roger Fingas
Wednesday, October 05, 2016, 01:22 pm PT (04:22 pm ET)

Apple's main assembly partner, Foxconn, has so far installed 40,000 production robots across China as it looks to minimize the number of people it employs, reports noted on Wednesday.



Tesco makes UK's first delivery by ROBOT which could make hundreds redundant

IS THIS proof that robots are soon to be taking over the world?

By **Christine Younan** / Published 1st June 2017



GETTY IMAGES • STARSHIP TECHNOLOGIES/DOMINO'S



Microsoft

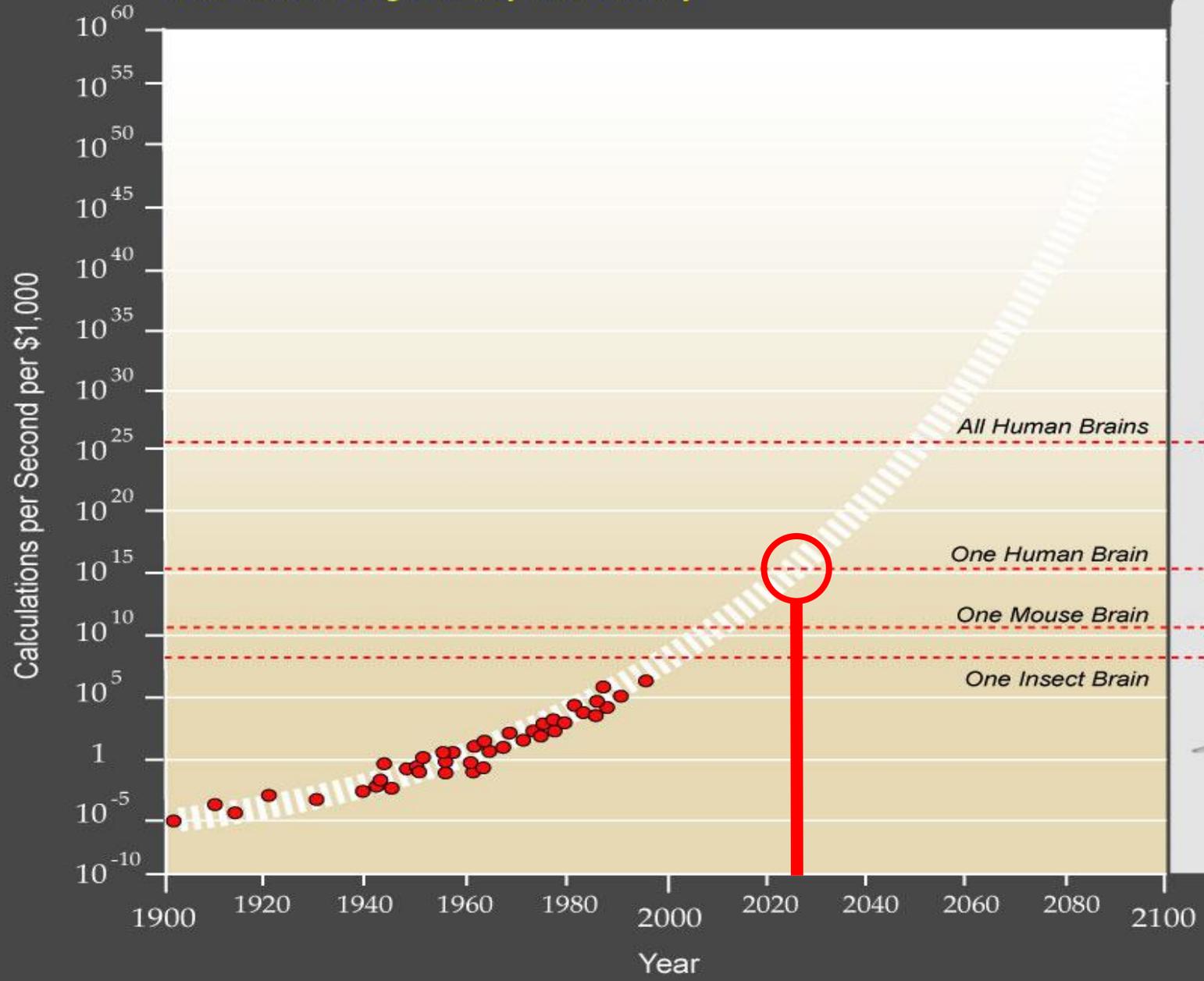




artificial intelligence

Exponential Growth of Computing

Twentieth through twenty first century



Logarithmic Plot

All Human Brains

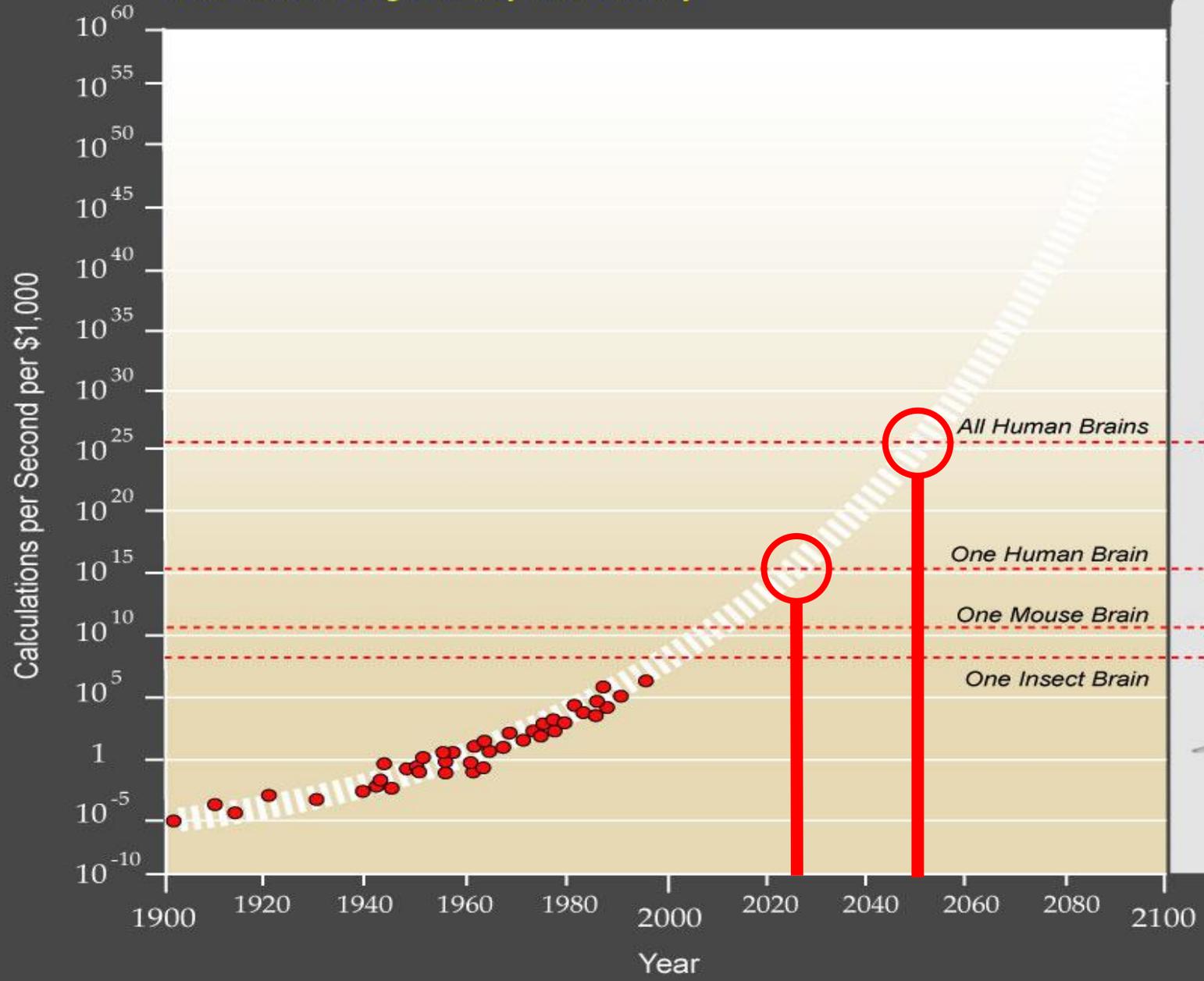
One Human Brain

One Mouse Brain

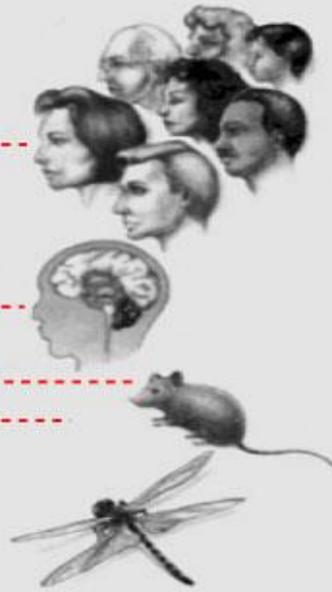
One Insect Brain

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All Human Brains

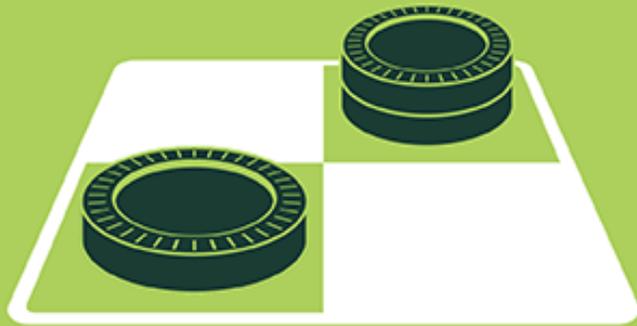
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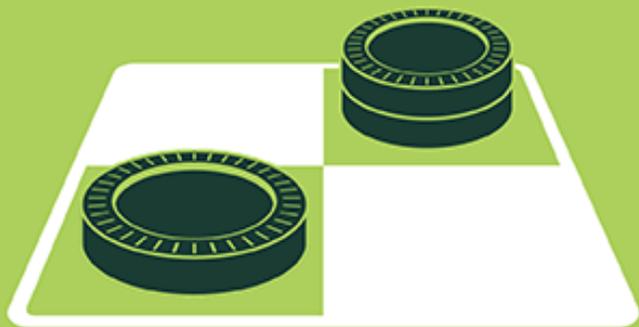
ARTIFICIAL INTELLIGENCE

Early artificial intelligence stirs excitement.



ARTIFICIAL INTELLIGENCE

Early artificial intelligence stirs excitement.



MACHINE LEARNING

Machine learning begins to flourish.



1950's

1960's

1970's

1980's

1990's

2000's

2010's

ARTIFICIAL INTELLIGENCE

Early artificial intelligence stirs excitement.



MACHINE LEARNING

Machine learning begins to flourish.



DEEP LEARNING

Deep learning breakthroughs drive AI boom.



1950's

1960's

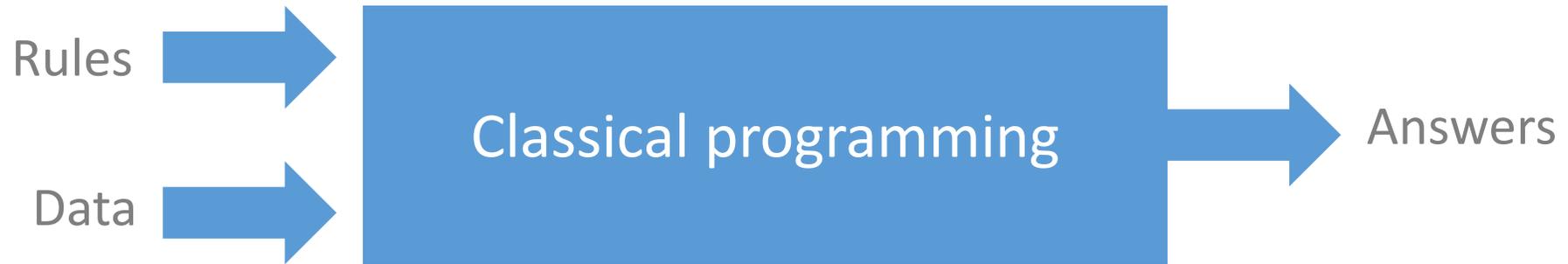
1970's

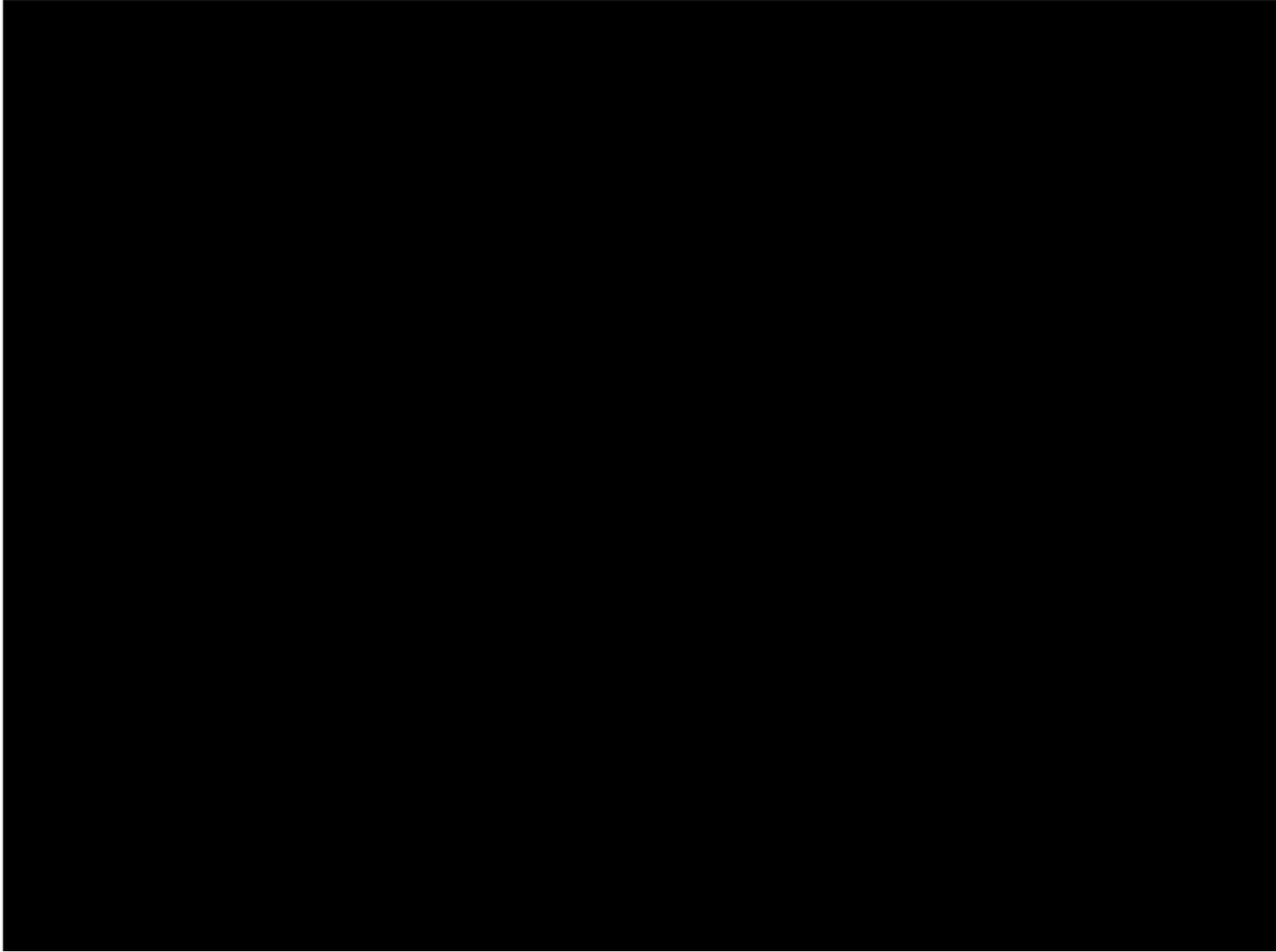
1980's

1990's

2000's

2010's





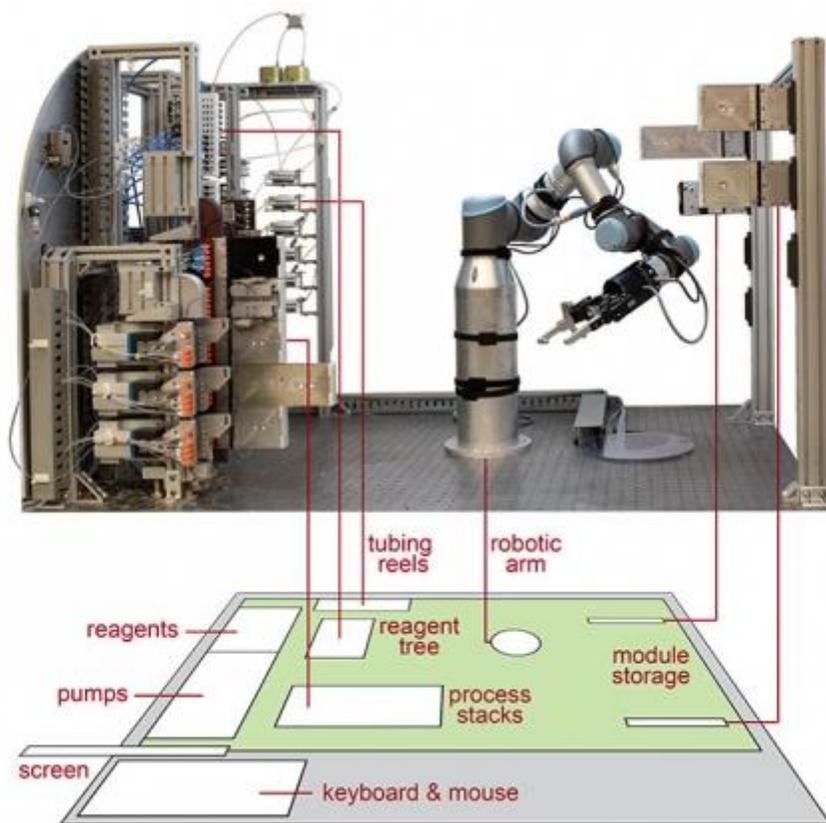
AI: the good, the bad and the ugly

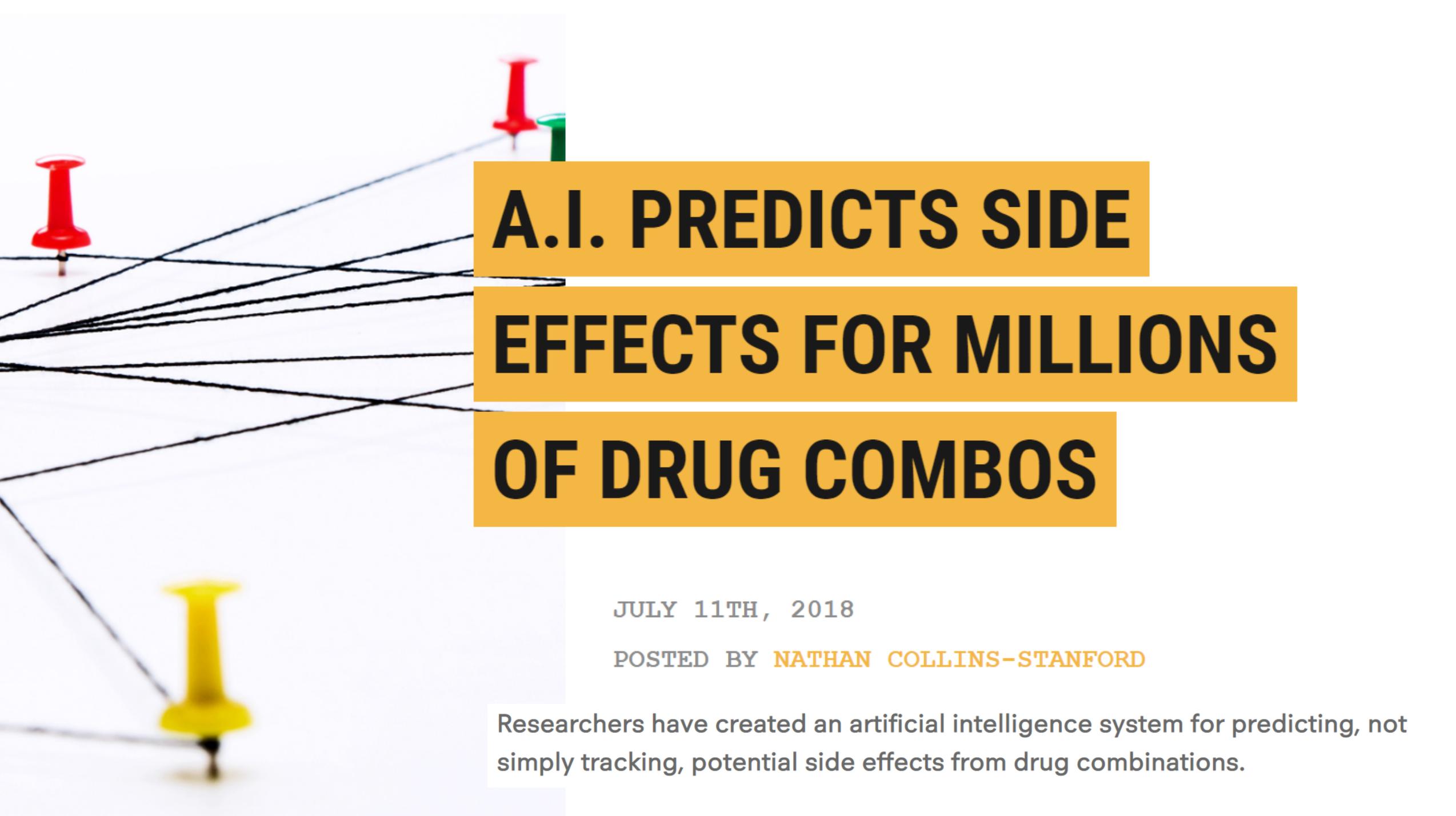
drug development & testing

Guided by AI, robotic platform automates molecule manufacture

New system could free bench chemists from time-consuming tasks, may help inspire new molecules.

Becky Ham | MIT News correspondent
August 8, 2019





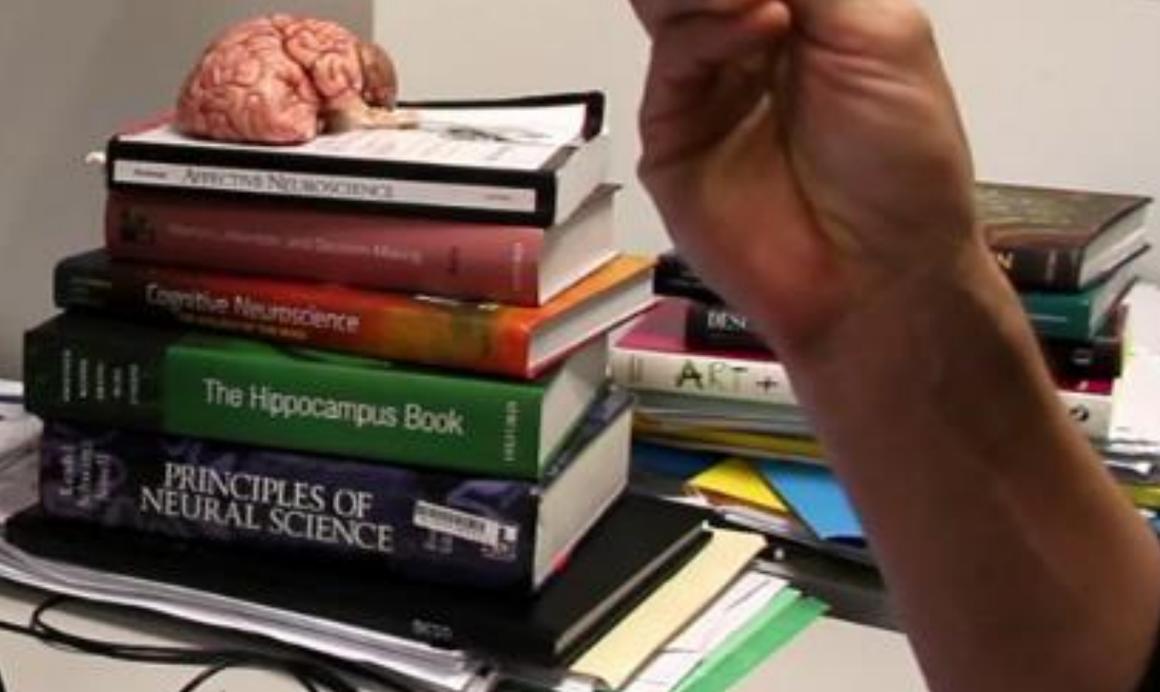
A.I. PREDICTS SIDE EFFECTS FOR MILLIONS OF DRUG COMBOS

JULY 11TH, 2018

POSTED BY [NATHAN COLLINS-STANFORD](#)

Researchers have created an artificial intelligence system for predicting, not simply tracking, potential side effects from drug combinations.

'digital humans'





computer vision

Head1
NCT98558

HEAD
Feb 7, 2017

Suspicious Lesions

number	nature	location	volume (ml)	ventricle Compressed	inVentricle
1	Bleeding	Left hemisphere:the basal ganglion and part of the frontal lobe,the temporal lobe	28	Doubtful	Not found



R

Infervision - Google Chrome
0.0.0.0:3100/report

Scan Report

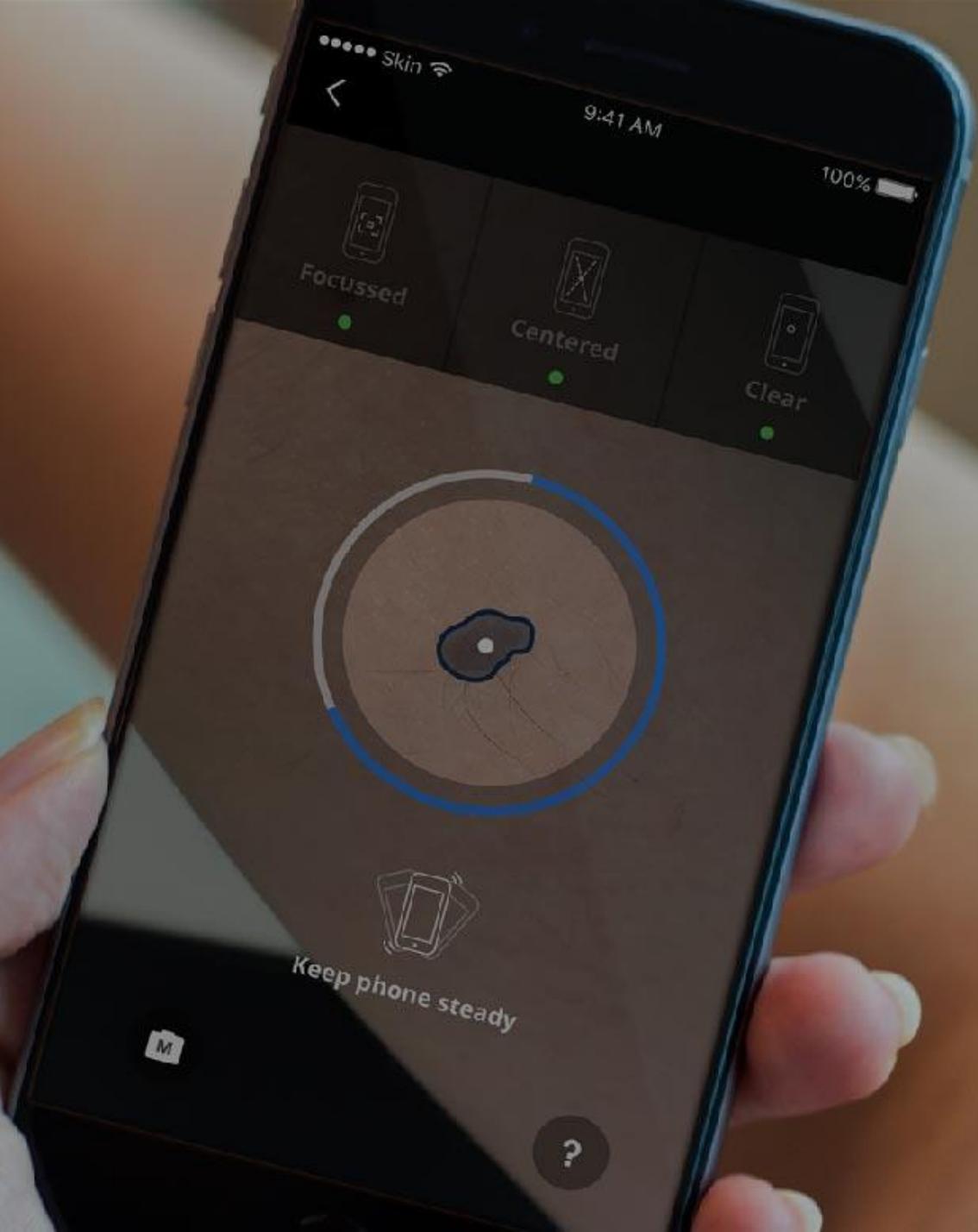
Patient Info

Patient Name: Head1
Patient Sex: Unknown
Study Date: 20170207

Analysis Result

Large area of high density is present in head CT scan, primarily in Left hemisphere including the basal ganglion and part of the frontal lobe,the temporal lobe. The largest shadow measured 5.9cm×3.5cm on single slice (total volume: 28ml). The average CT value in the lesion is 59HU. Surrounding brain tissue is significantly compressed. Ipsilateral ventricular deformation is present due to compression. Brain fissures visible / no high density shadow. Midline structure shifts to the right. / is at the center.

Ser: 2
Img: 13 (13/28)
512 x 512
Loc: -90.70 mm Thick: 4.50 mm
BaseSeq 4.5 H31s





US\$89.99

Vision Kit

Do-it-yourself intelligent camera. Experiment with image recognition using neural networks.

NEW ZEALAND / TECHNOLOGY

Police open to using facial recognition from Auckland Transport CCTV cameras

GOOGLE TECH ARTIFICIAL INTELLIGENCE

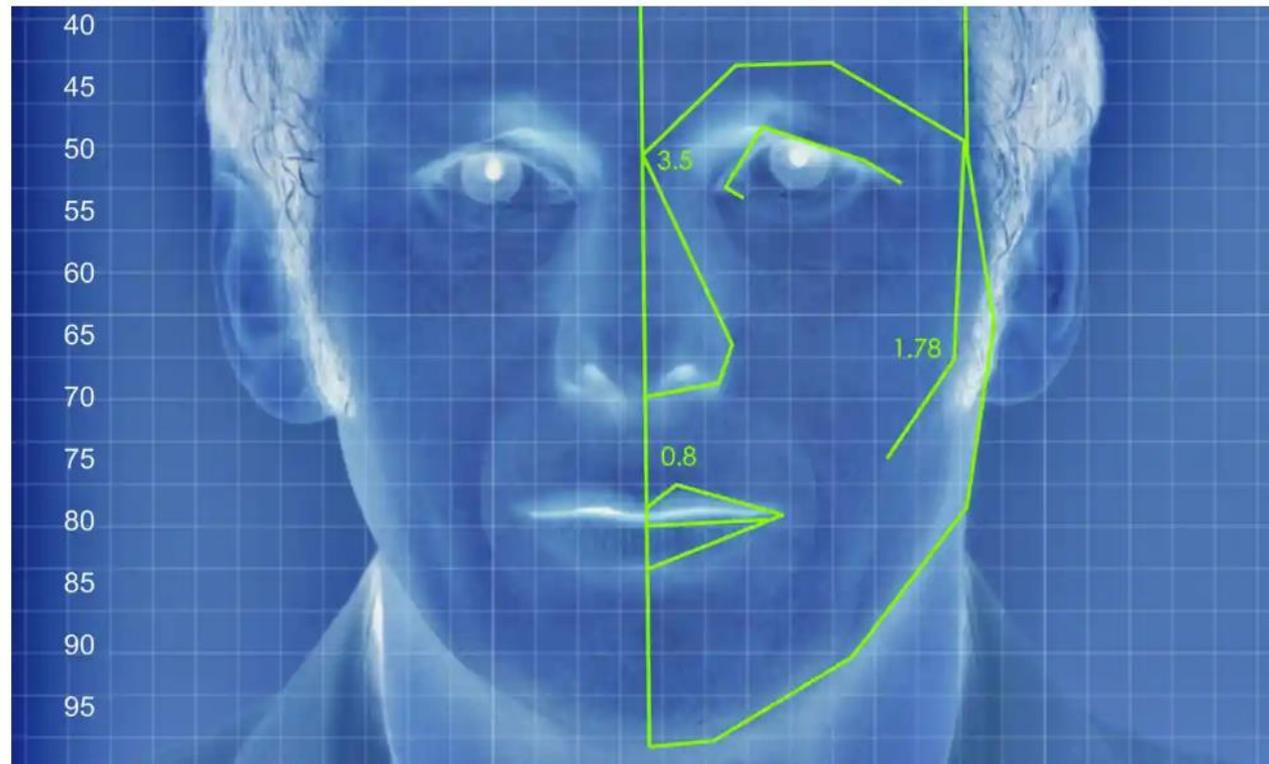
Google's AI can now lip read better than humans after watching thousands of hours of TV

The AI system annotated TV footage with 46.8 percent accuracy

By [James Vincent](#) | Nov 24, 2016, 5:06am EST

New AI can guess whether you're gay or straight from a photograph

An algorithm deduced the sexuality of people on a dating site with up to 91% accuracy, raising tricky ethical questions



▲ An illustrated depiction of facial analysis technology similar to that used in the experiment. Illustration: Alamy

Artificial intelligence can accurately guess whether people are gay or straight based on photos of their faces, according to new research that suggests machines can have significantly better “gaydar” than humans.

self-driving vehicles



MOTION FLOW

LANE LINES

LANE LINES

ROAD FLOW

IN-PATH OBJECTS

ROAD LIGHTS

OBJECTS

ROAD SIGNS

RIGHT REARWARD VEHICLE CAMERA



FREIGHTLINER

INSPIRATION

American Postal Service Has Been Delivering Cargo In Self-Driving Trucks For Months And No One Knew

Jennings Brown

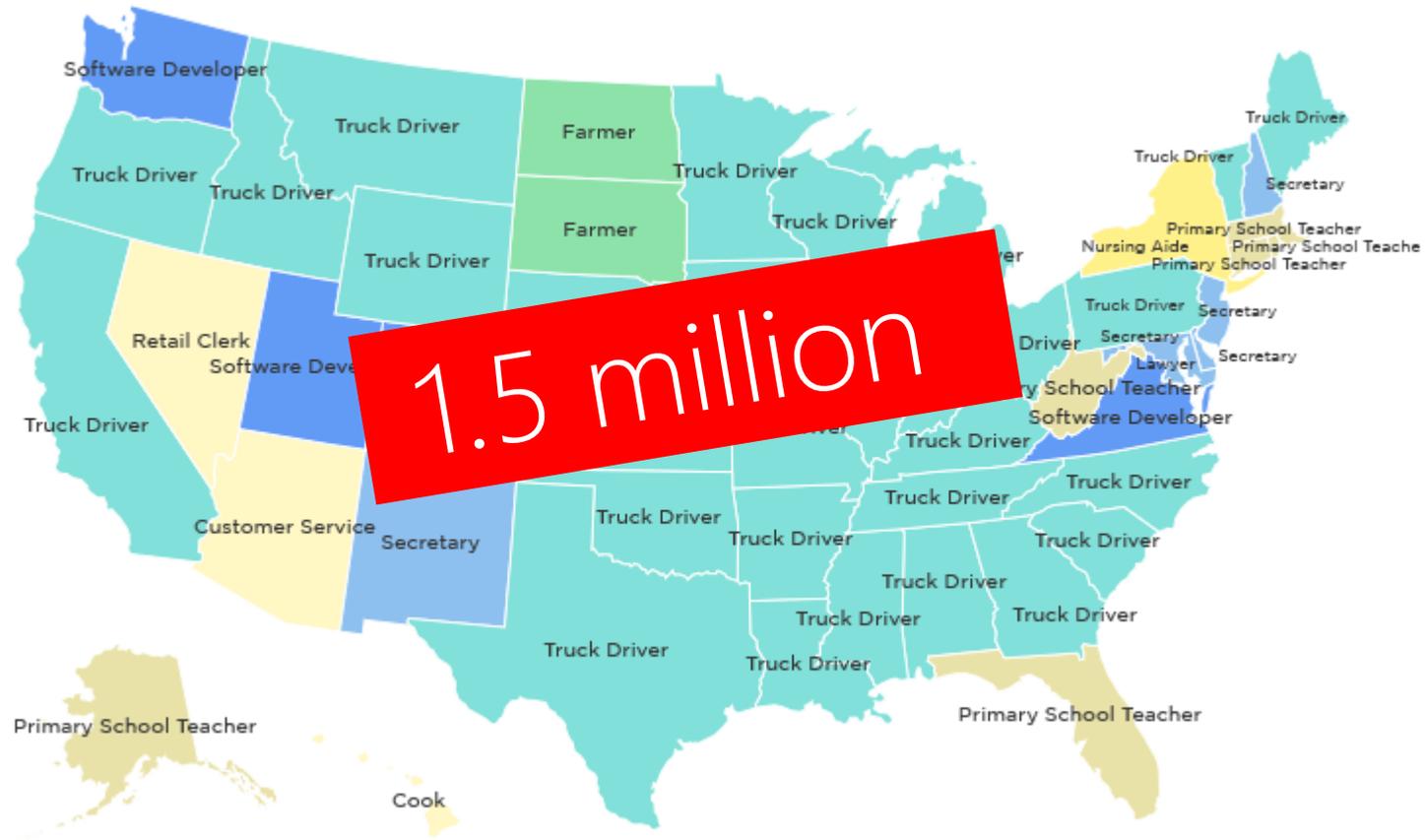
Aug 16, 2019, 8:30pm · Filed to:

Share [f](#) [t](#) [in](#) [s](#) [r](#)



Photo: TuSimple

most common jobs by state





LNG

 Rolls-Royce

Powered by  Rolls-Royce

Powered by  Rolls-Royce

smart devices

What can I help you with?



// Accidental activations led to the receipt of the most sensitive data that was sent to Apple. Although Siri is included on most Apple devices, the contractor highlighted the Apple Watch and the company's HomePod smart speaker as the most frequent sources of mistaken recordings. "The regularity of accidental triggers on the watch is incredibly high," they said. "The watch can record some snippets that will be 30 seconds – not that long but you can gather a good idea of what's going on."

Sometimes, "you can definitely hear a doctor and patient, talking about the medical history of the patient. Or you'd hear someone, maybe with car engine background noise – you can't say definitely, but it's a drug deal ... you can definitely hear it happening. And you'd hear, like, people engaging in sexual acts that are accidentally recorded on the pod or the watch."



Samsung

SMART TV

Samsung

in 2015

Recognition features to you. In addition, Samsung may collect and your device may capture voice commands and associated texts so that we can provide you with Voice Recognition features and evaluate and improve the features. Please be aware that if your spoken words include personal or other sensitive information, that information will be among the data captured and transmitted to a third party through your use of Voice Recognition.

If you do not enable Voice Recognition, you will not be able to use interactive voice recognition features, although you may be able to control your TV using certain predefined voice commands. While Samsung will not collect your spoken word, Samsung may still collect associated texts and other usage data so that

1984

in 1949

Behind Winston's back the voice from the telescreen was still babbling away about pig-iron and the overfulfilment of the Ninth Three-Year Plan. The telescreen received and transmitted simultaneously. Any sound that Winston made, above the level of a very low whisper, would be picked up by it, moreover, so long as he remained within the field of vision which the metal plaque commanded, he could be seen as well as heard. There was of course no way of knowing whether you were being watched at any given moment. How often, or on what system, the Thought Police plugged in on any individual wire was guesswork. It was even conceivable that they watched everybody all the time. But at any rate they could plug in your wire whenever they wanted to. You had to live--did live, from habit that became instinct--in the assumption that every sound you made was overheard, and, except in darkness, every movement scrutinized.



13,942 views | Apr 12, 2019, 05:00pm

Amazon Admits Listening To Alexa Conversations: Why It Matters

Bloomberg recently spoke with seven people who participated in Amazon's audio review process. Each worker was tasked with listening to, transcribing, and annotating voice recordings with the goal of improving the ability of Amazon's Alexa smart assistant to understand and respond to human speech.

But sometimes, according to *Bloomberg*, they share private recordings in a disrespectful way.

“I think we've been conditioned to the [assumption] that these machines are just doing magic machine learning” University of Michigan professor Florian Schaub told *Bloomberg*. “But the fact is there is still manual processing involved.”



News ▶ World news ▶ Amazon Alexa

Amazon staff 'overhear sex attack on Alexa - but aren't allowed to intervene'

Reports say two Amazon staff who suspected they overheard sexual assaults over Amazon were told they were not to intervene

altering reality

David Letterman interviews Bill Hader, Tom Cruise and Seth Rogen...

ctrl shift face





“

“The danger of AI is much greater than the danger of nuclear warheads by a lot...Mark my words. AI is far more dangerous than nukes.”

Elon Musk, SXSW Conference, 2018

btw, it's not just **digital** technologies...

84% less greenhouse emissions

91% less land usage

98% less water consumption

65% less energy consumption





MEMPHIS
M E A T S

**THE
IMPOSSIBLE
BURGER**

It's here. A delicious burger made entirely from plants for people who love meat. No more compromises. Ready for an introduction?





Sunfed[®]

CHICKEN FREE
CHICKEN
WILD MEATY CHUNKS
ORIGINAL

CLEAN LEAN PLANT PROTEIN

MADE FROM
PEAS

NATURALLY PACKED WITH
PROTEIN, IRON & ZINC

NET
300g

GLUTEN
FREE

SOY
FREE



LIGHTER



VEGAN



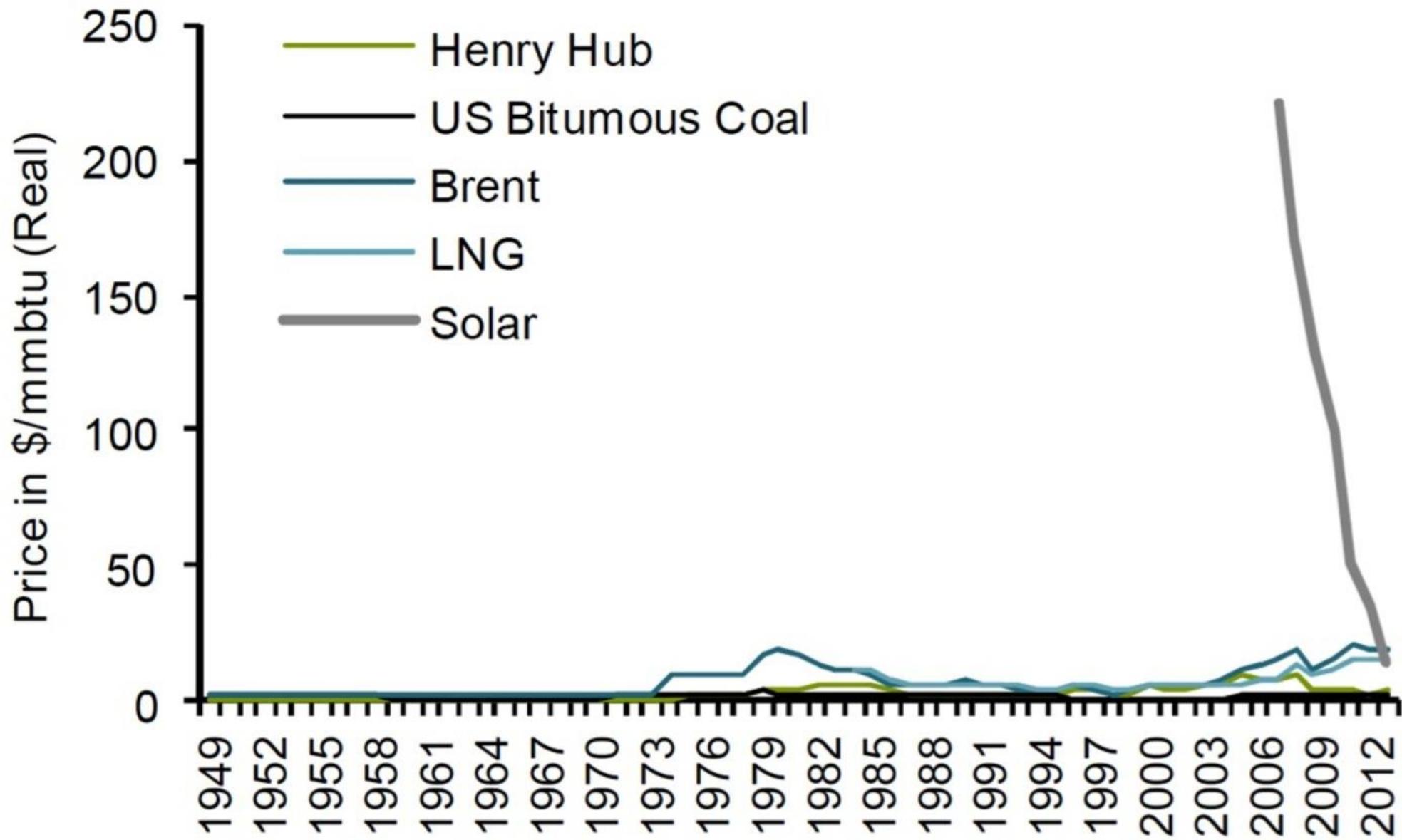
NZ MADE



GOOD

CHICKEN FREE CHICKEN
PREMIUM GLUTEN FREE

Sunfed[®]

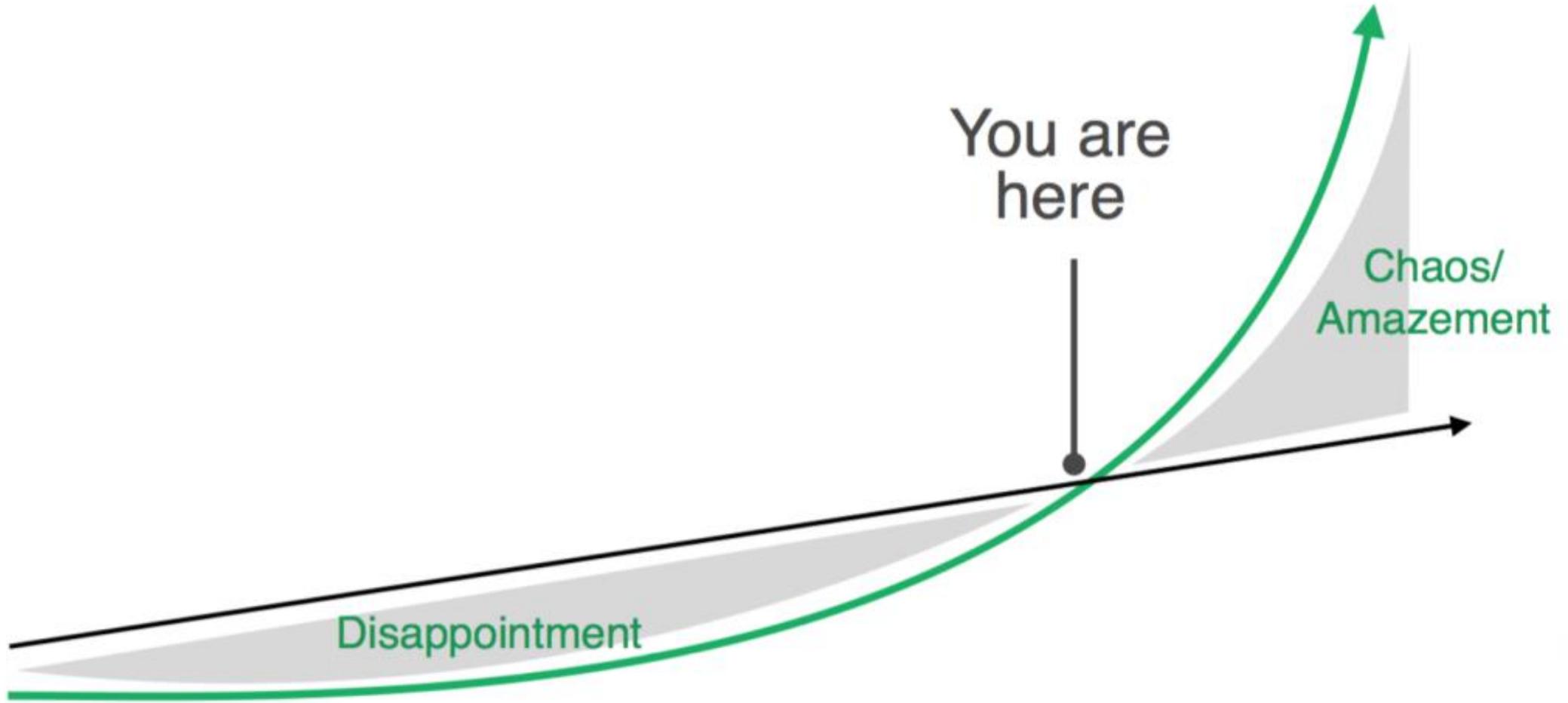


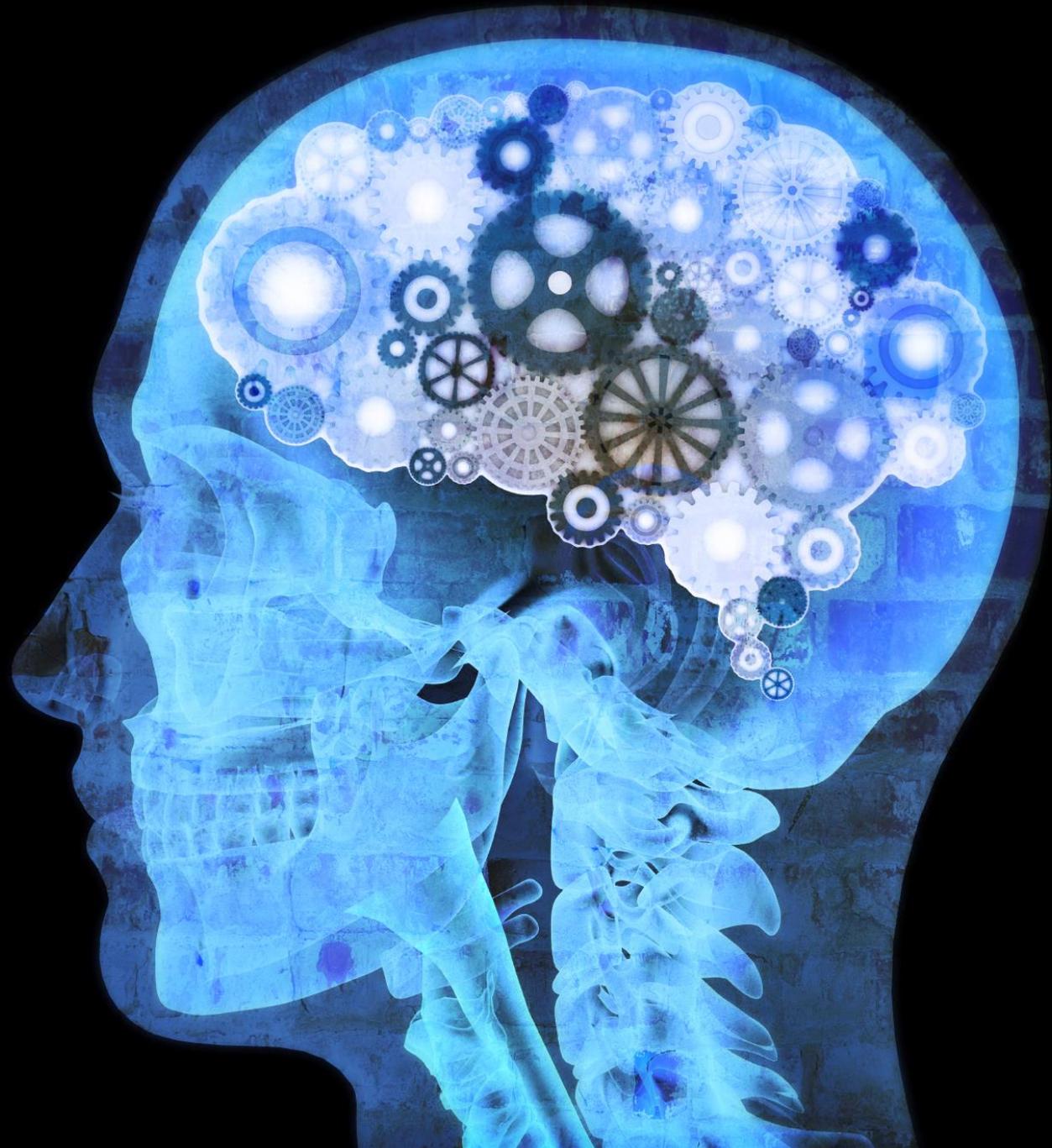
GENOME SEQUENCING

 COST OF SEQUENCING A FULL HUMAN GENOME [1]

 /2: 10 MONTHS





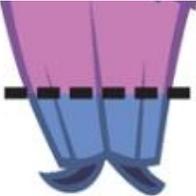


1900-1960

Age of manufacturing

*Mass manufacturing
makes industrial
powerhouses successful*

Sources of Dominance



Ford, RCA,
GE, Boeing,
P&G, Sony

Successful Companies

1960-1990

Age of distribution
Global connection and transportation systems make distribution key.

Walmart,
Toyota,
UPS, CSX

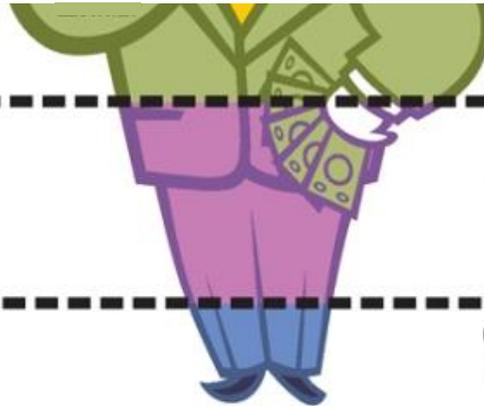
1900-1960

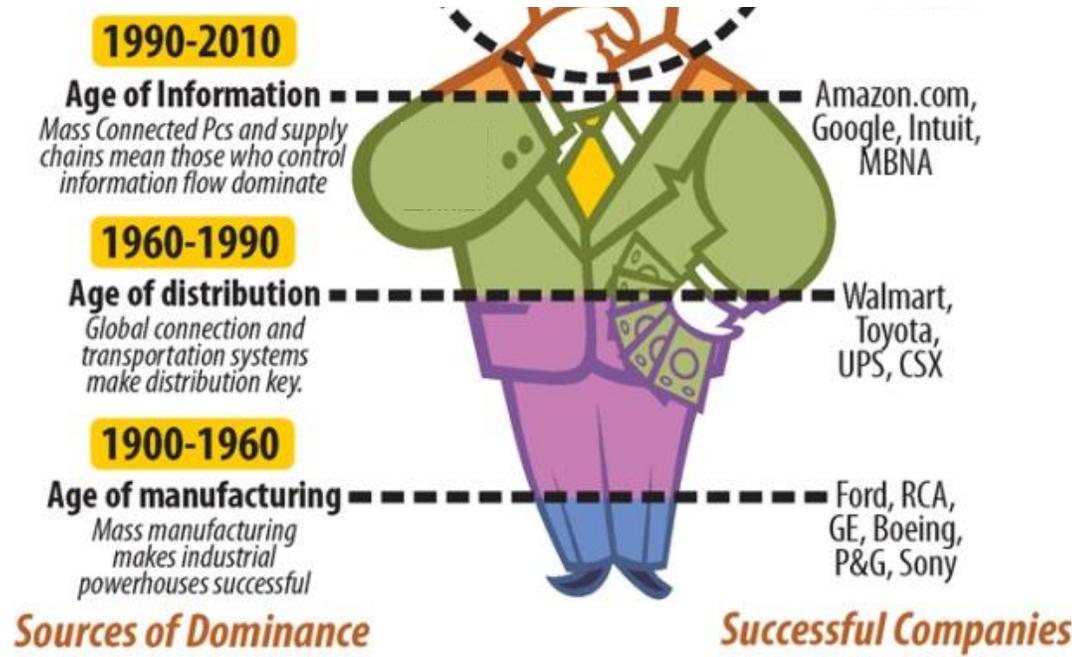
Age of manufacturing
Mass manufacturing makes industrial powerhouses successful

Ford, RCA,
GE, Boeing,
P&G, Sony

Sources of Dominance

Successful Companies





Sources of Dominance

Successful Companies

We have entered the age of the customer.

2010-???

Age of the customer

Empowered buyers demand a new level of customer obsession

Contenders include Facebook, Zappo's, Southwest Airlines, and Apple

1990-2010

Age of Information

Mass Connected Pcs and supply chains mean those who control information flow dominate

Amazon.com, Google, Intuit, MBNA

1960-1990

Age of distribution

Global connection and transportation systems make distribution key.

Walmart, Toyota, UPS, CSX

1900-1960

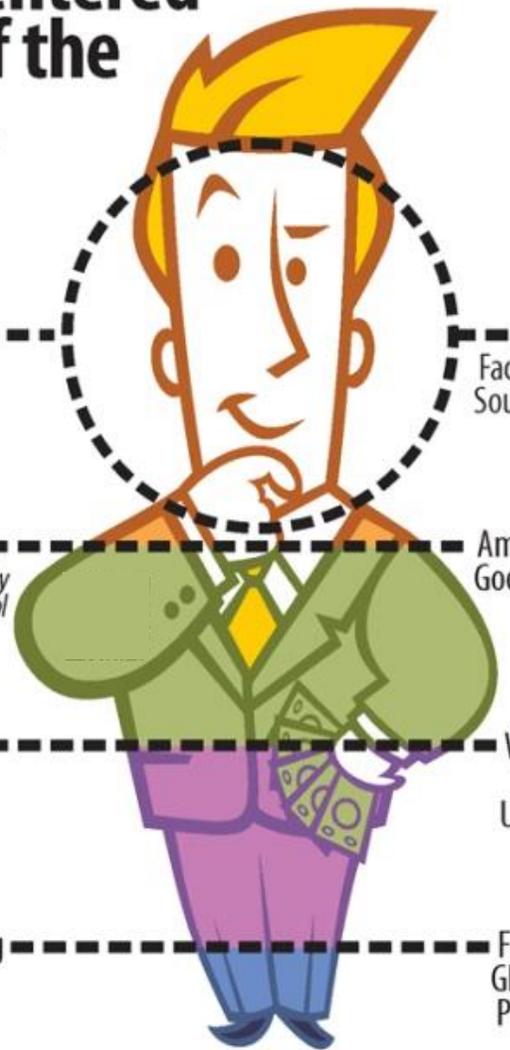
Age of manufacturing

Mass manufacturing makes industrial powerhouses successful

Ford, RCA, GE, Boeing, P&G, Sony

Sources of Dominance

Successful Companies





amazon

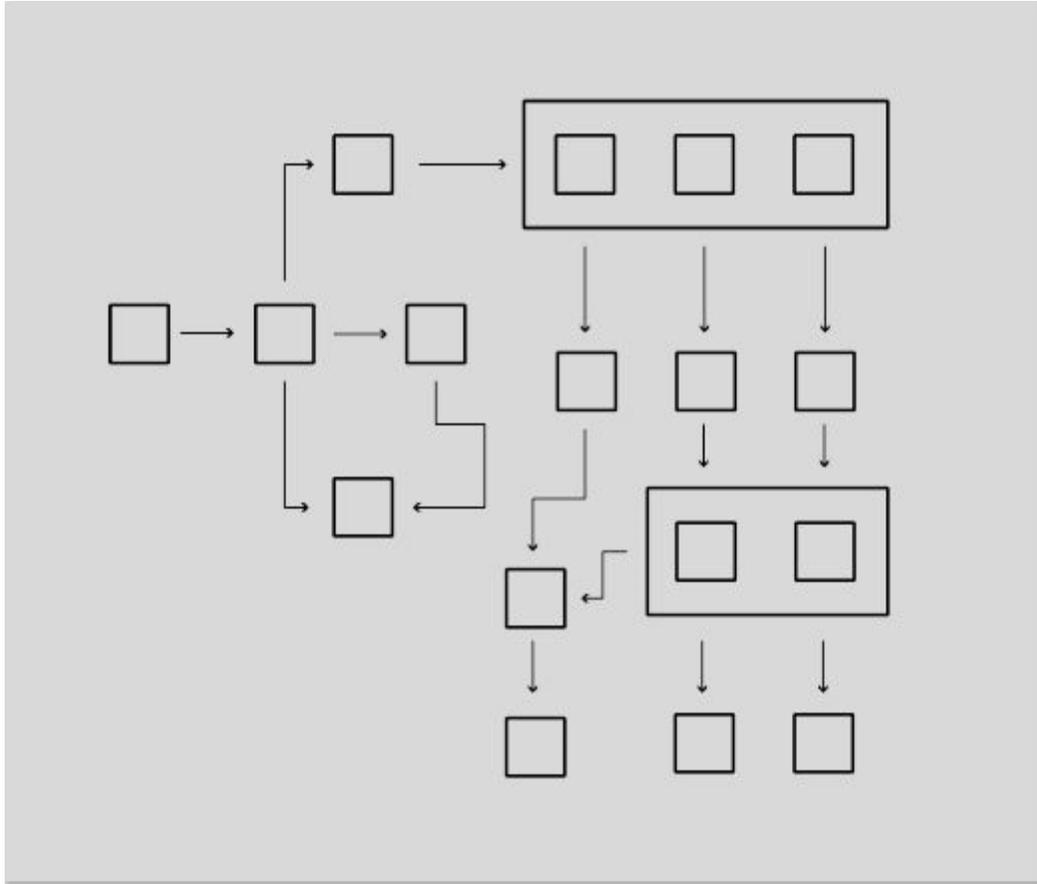
The Amazon logo consists of the word "amazon" in a bold, lowercase, sans-serif font. Below the word is a curved orange arrow that starts under the letter 'a' and ends under the letter 'n', pointing to the right.

NETFLIX



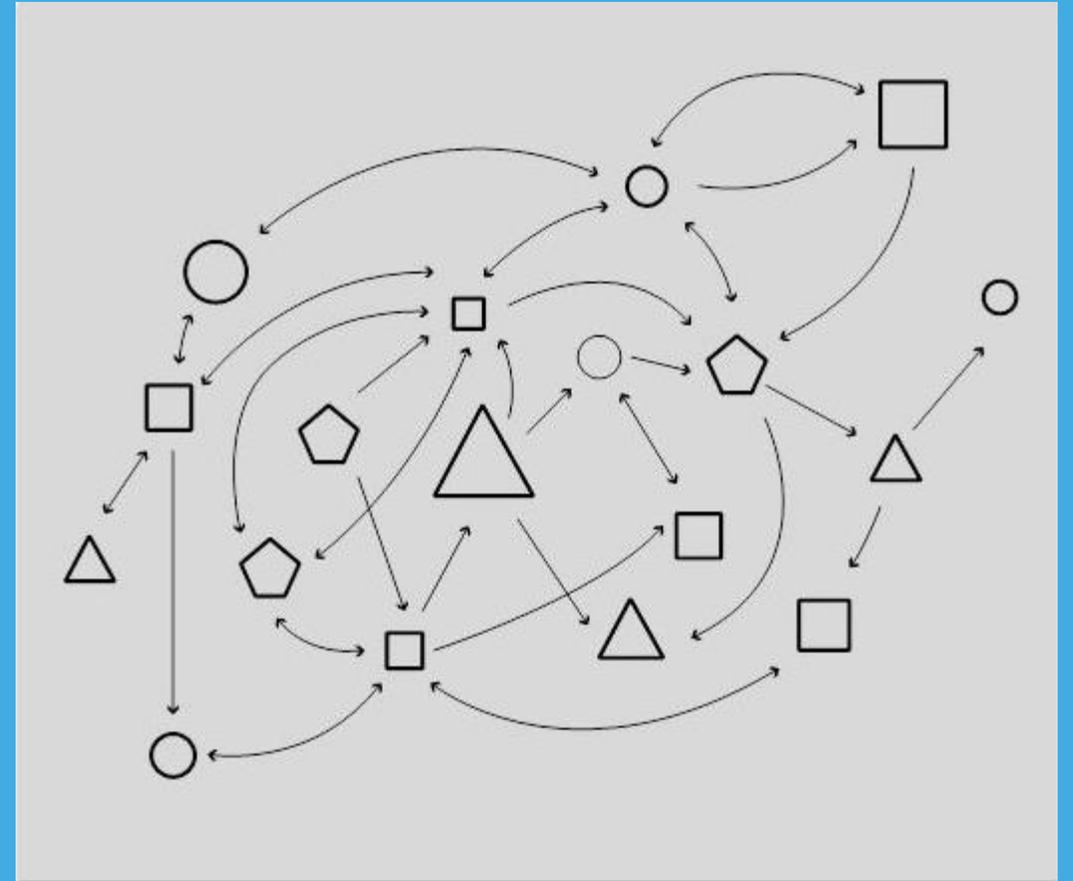
NZ examples ?

That was **then**



COMPLICATED

This is **now**



COMPLEX

disruption

“72% of 1,300 CEOs (from 11 industries and 10 countries) believe that the next three years will be more critical for their industry than the last 50 years”

~ KPMG Global Survey, 2016

TECH INSIDER

Retiring Cisco CEO delivers dire prediction: 40% of companies will be dead in 10 years

JULIE BORT

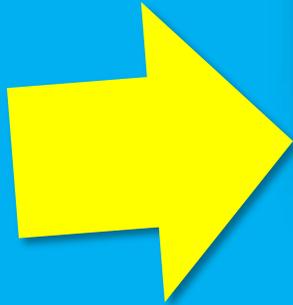
JUN 9, 2015, 11:51 AM

TECH INSIDER

Retiring Cisco CEO delivers dire prediction: 40% of companies will be dead in 10 years

JULIE BORT

JUN 9, 2015, 11:51 AM



Forbes / CMO Network

FEB 8, 2012 @ 09:18 AM

Five Years From Now, CMOs Will Spend More on IT Than CIOs Do

what now ?

transformation

innovation

leadership

“Business Transformation is a change management strategy which aims to align the **people, process** and **technology** initiatives of a company more closely with its business strategy and vision.”



NC90423

NC90423

American Airlines System

FLAGSHIP WASHINGTON
AMERICAN AIRLINES INC.





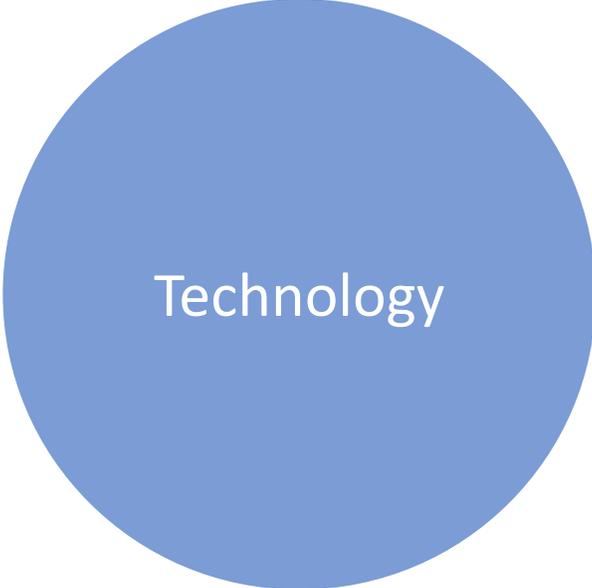
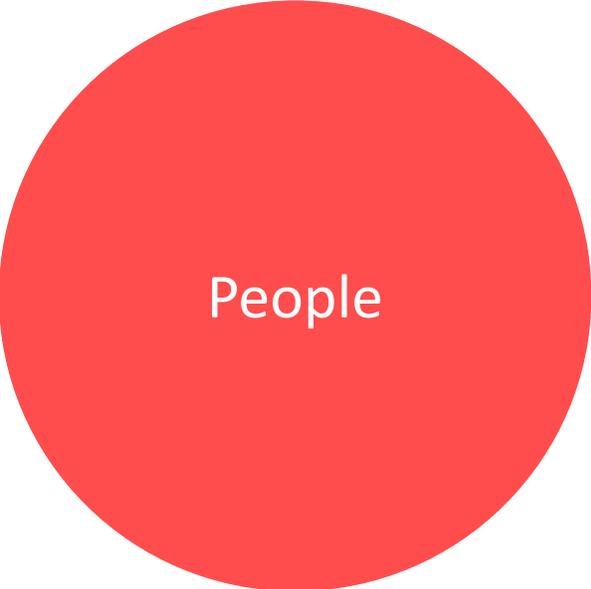
787

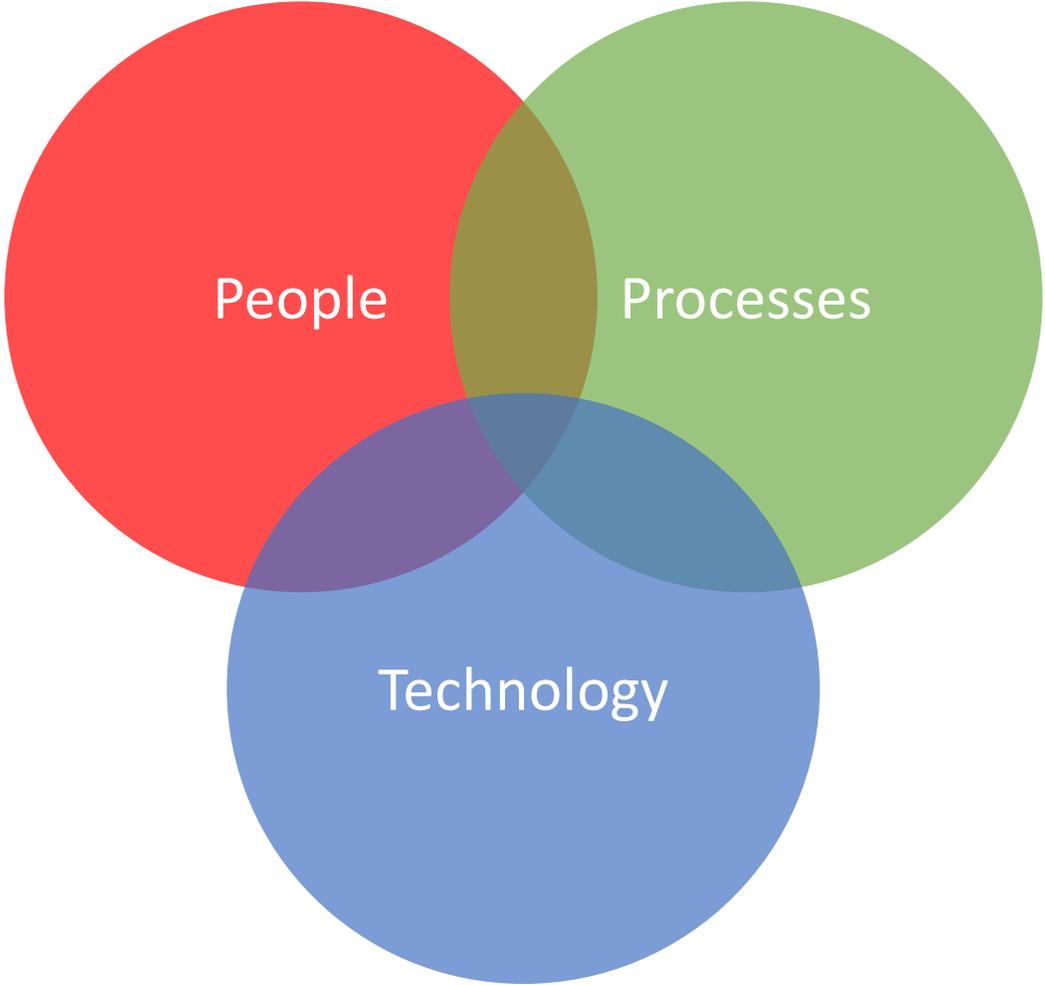
BOEING

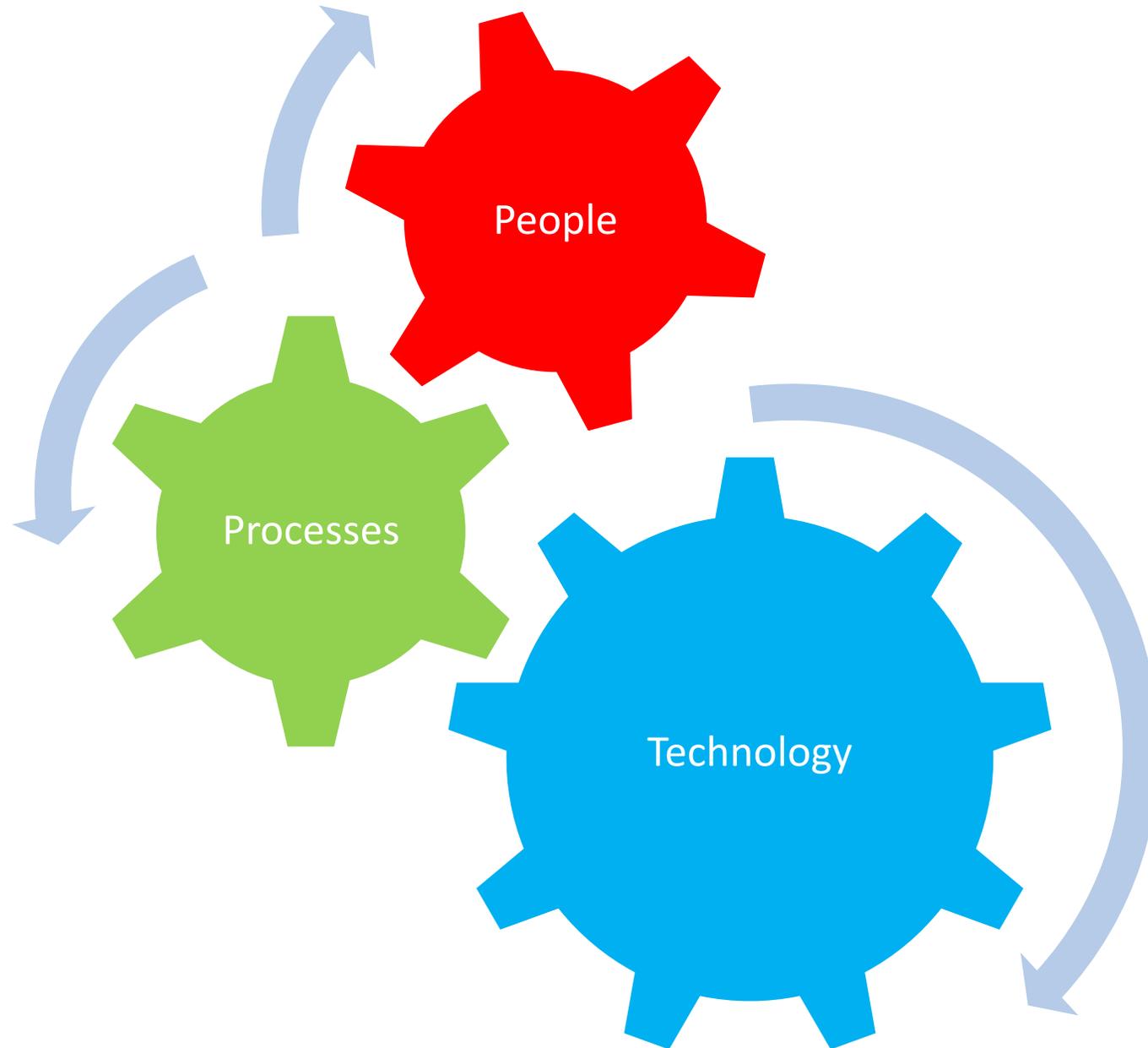
DREAMLINER

N787BA









innovation

innovation

/ɪnəˈveɪʃ(ə)n/ 

noun

the action or process of innovating.

"innovation is crucial to the continuing success of any organization"

synonyms: [change](#), [alteration](#), [revolution](#), [upheaval](#), [transformation](#), [metamorphosis](#),
[reorganization](#), [restructuring](#), [rearrangement](#), [recasting](#), [remodelling](#),
[renovation](#), [restyling](#), [variation](#); [More](#)

- a new method, idea, product, etc.

plural noun: **innovations**

"technological innovations designed to save energy"

bastardize

/ˈbɑːstədɪz, ˈbɑːst-/ 

verb

1. corrupt or debase (a language, art form, etc.), typically by adding new elements.

"a strange, bastardized form of French"

synonyms: adulterate, corrupt, contaminate, weaken, dilute, spoil, taint, pollute, foul, defile, debase, degrade, devalue, depreciate, distort; *formal* vitiate

"he spoke franglais, bastardizing both languages"

invention = 0 to 1
innovation = 1 to 1000

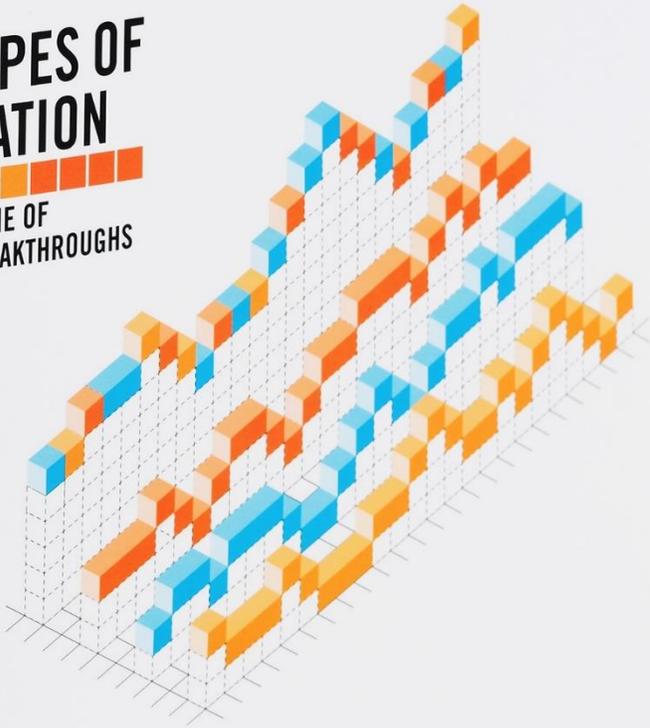
“Innovation is not the result of thinking differently.
It is the result of thinking deliberately (in specific ways)
about existing problems and unmet needs”

~ Andrew Razeghi

TEN TYPES OF INNOVATION
KEELEY

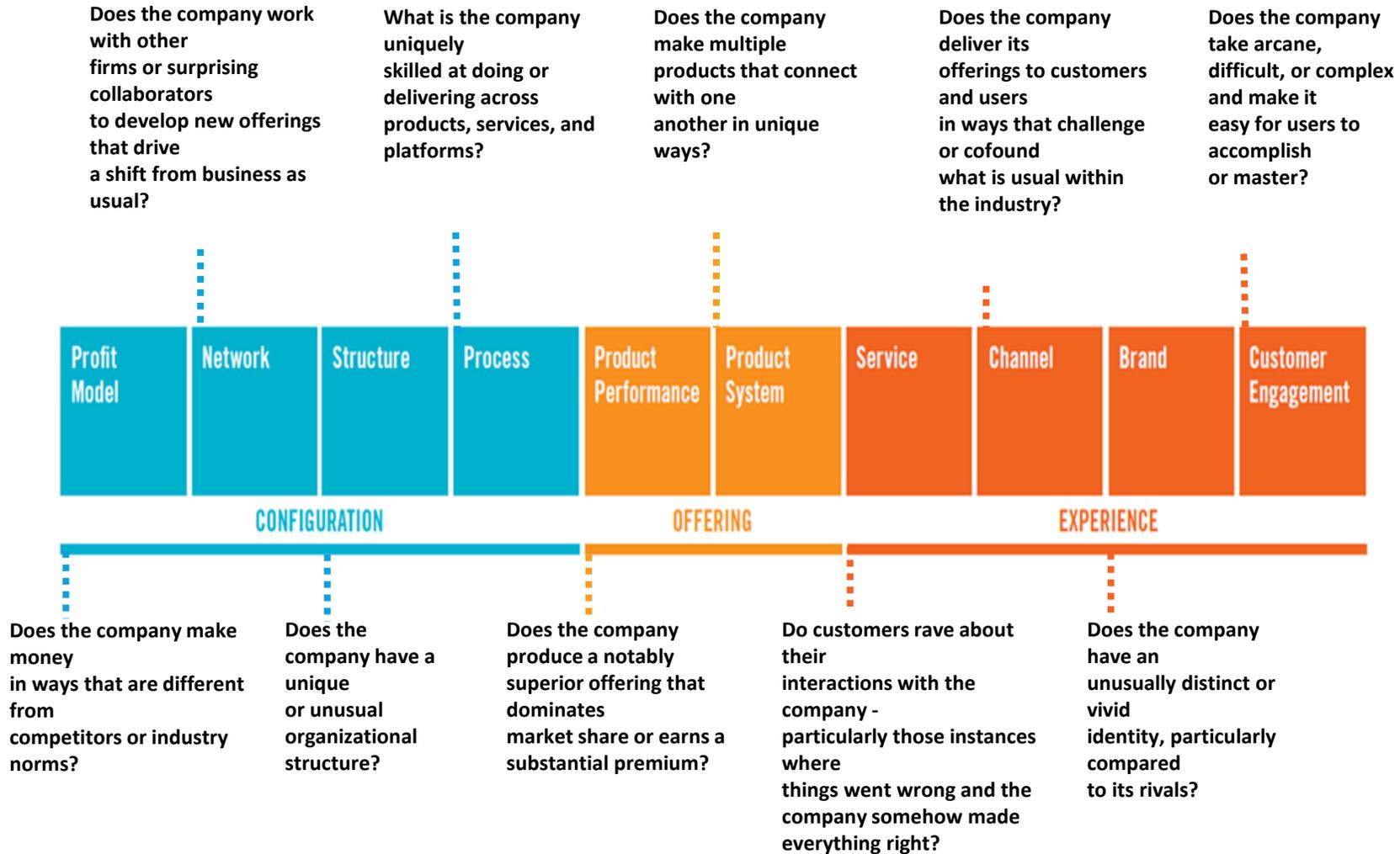
TEN TYPES OF INNOVATION

THE DISCIPLINE OF BUILDING BREAKTHROUGHS



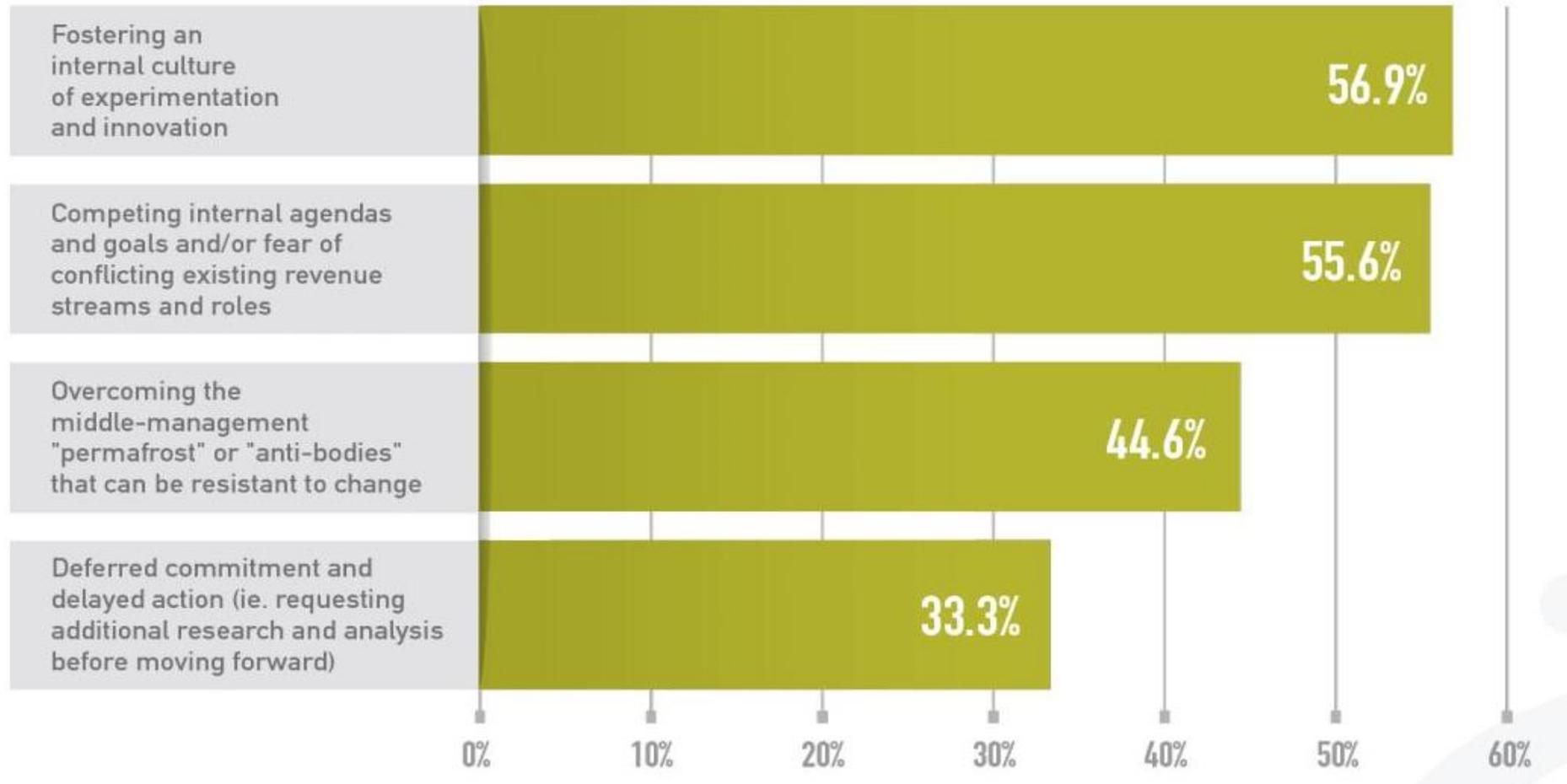
LARRY KEELEY
RYAN PIKKEL, BRIAN QUINN, HELEN WALTERS

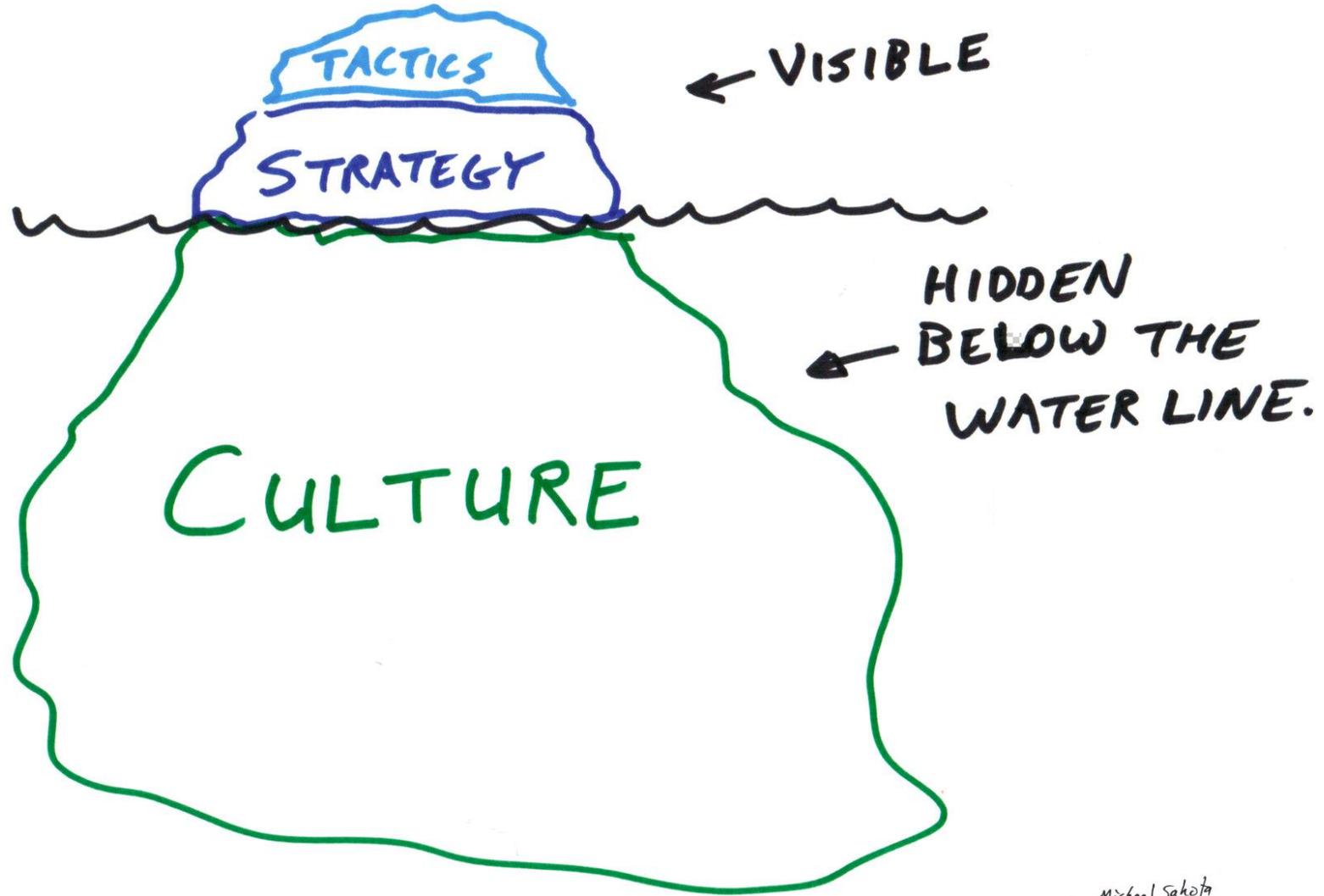
WILEY



leadership

top innovation challenges







“Never ever, ever, ever, ever, ever, ever,
ever, EVER compromise your hiring.”

~ Me

autonomy

embrace failure

embrace ~~failure~~

embrace *experimentation*



5,271
prototypes

Sir James Dyson

trust

foster creativity



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“No battle plan ever survives first contact with the enemy”

~ Helmuth von Moltke

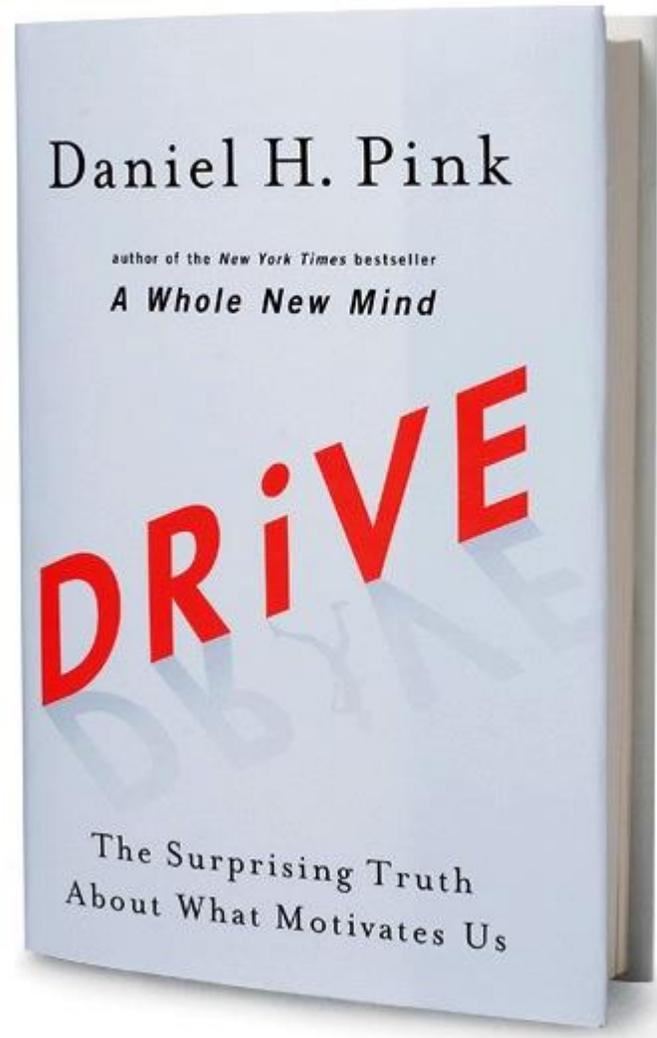
“Everybody has a plan until they
get punched in the mouth”

~ Mike Tyson (supposedly)

uncertainty is a certainty







re-learning how to learn

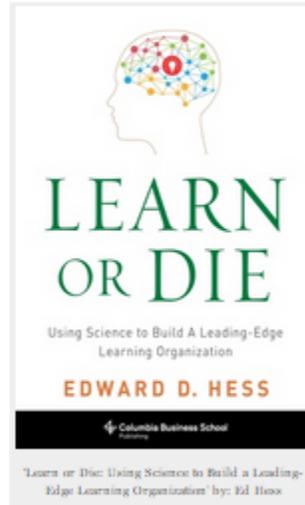


smart people podcast

Conversations that satisfy your curious mind.

Episode 161 – Ed Hess

1 October 13, 2014 by [smartpeoplepodcast](#)



Ed Hess – Learn or Die. That is the message this week! In order to stay competitive in today's fast paced environment, you must continue to learn and grow. Those that refuse to do so will find that their jobs and skills have been replaced by a cheaper and more efficient technology. So how do you become a better and faster learner? How do you stay ahead of the curve? These are the questions we discuss this week as we talk with author and professor, Edward Hess.

Ed is the author of the brand new best selling book, *Learn or Die: Using Science to Build a Leading-Edge Learning Organization*. In this interview, Ed uses his 25 years of research in the fields of behavioral economics, neuroscience and

psychology to reveal advances in our understanding of the individual human learner and type of work environment that best enables those capabilities. We talk with Ed about the recent developments in the understanding of how people learn, the role of emotions in the learning process, and the environmental factors that can affect our ability to learn.

ponder this...

it is predicted that the next 5 years will see the same amount of technological progress as the **entire 20th century**

what made your organisation successful in
the past might be what kills it in the future

evolution → irrelevance

An illustration of several raised fists in various shades of red and orange against a black background. The fists are stylized with thick black outlines. The word "revolution" is written in white lowercase letters across the center of the image.

revolution

who's leading *yours* ?



Disruption, innovation & transformation

How exponential technologies are changing *everything*

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