



“REVOLUTIONS: THE TECHNOLOGY FACTOR”

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I WANT TO OFFER YOU SOME IDEAS, ON WHICH TO THINK, DEBATE, AND APPLY IN DISCUSSIONS

This presentation is INTENTIONALLY **not** focused on consumer or
business products, **nor** specific companies

My goal is to *provoke thought* and topics for discussion



ABOUT ME

- ❑ Born 11th of 11 children in Minneapolis, MN (after the jingle)
- ❑ Started in technology pre-internet with CAD programming
 - ❑ Self-taught computer networks (MCSE, CCNA) with Windows 3.11 because the files were just too large to move around on floppy disks
 - ❑ Remember, there was no such thing as a “network” with the regular **version 3.1**, so that was a minor software release by Microsoft?
- ❑ Moved to CO and started @ Level(3) before moving to WA and joining Juniper Networks and a startup, ExtraHop.
- ❑ Four year courting with Fortinet before I joined in early 2013
- ❑ B.S. in Business, M.S. in Cybersecurity (underway)



BEFORE LOOKING FORWARD... LET'S LOOK BACK

OUR PLANET, IF VIEWED AS A DAY

00:00 (MIDNIGHT) – EARTH FORMS

02:08-03:44– BIG STORMS

09:04-10:41AM – OXYGEN/ATMOSPHERE

6:40PM – FIRST PLANT LIFE (ALGAE)

9:20PM – WE HAVE FISH!

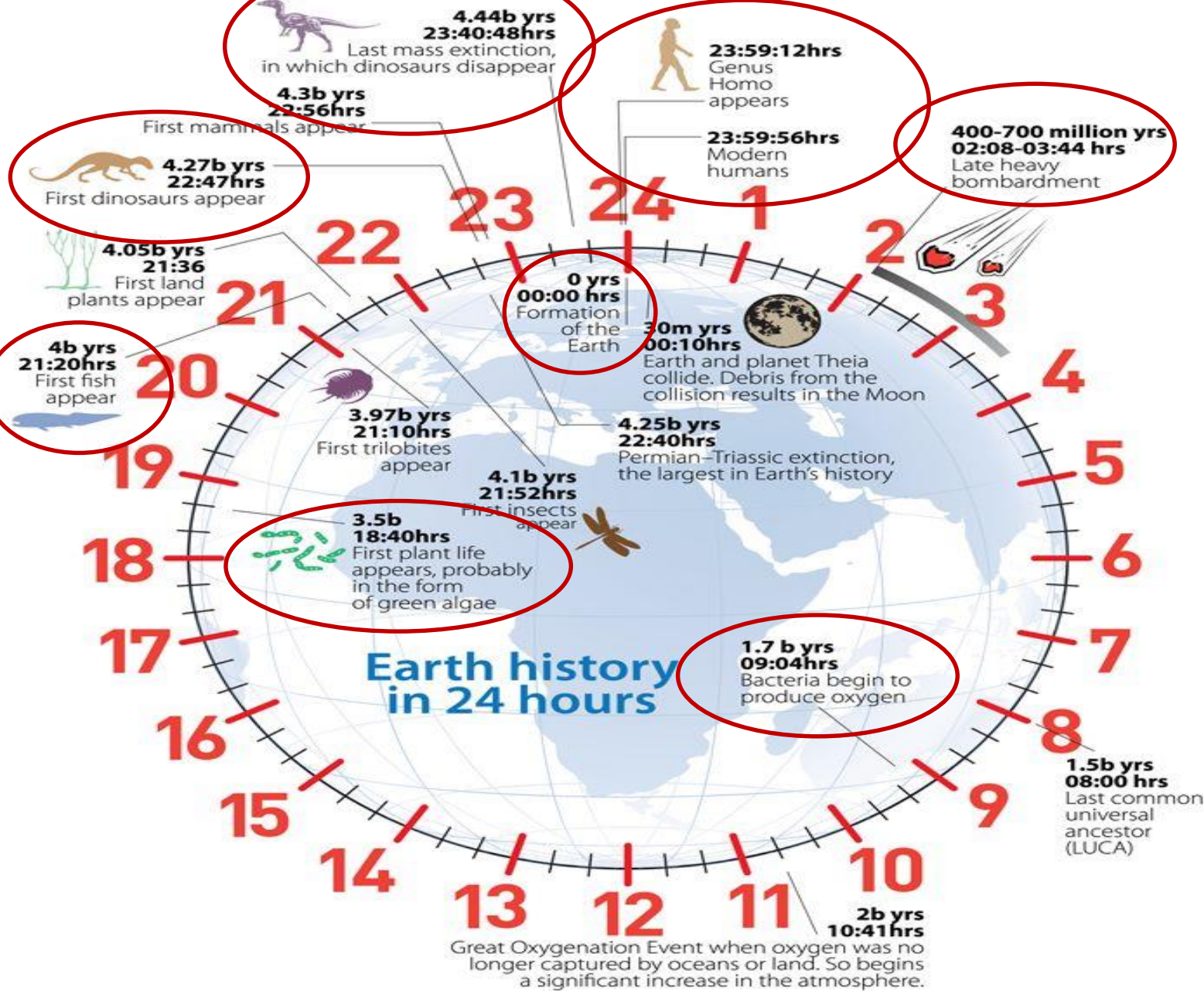
10:47PM – DINOSAURS APPEAR

11:40PM – DOH! DINOSAURS EXTINCT

11:59:12 – GENUS HOMO (EARLY MAN)

11:59:56 – MODERN HUMANS

RECORDED HUMAN HISTORY: 115MS



The image features a light gray background with several realistic water droplets of various sizes scattered in the corners. The droplets have highlights and shadows, giving them a three-dimensional appearance. The text is centered in the middle of the page.

SO, WHY DOES THIS FEEL LIKE A HISTORY
LESSON?!

FIRST, LET'S EXPLORE OUR WHOPPING 115 MILLISECONDS OF EXISTENCE...

This is generally agreed to be ~10,000 years (written human history)

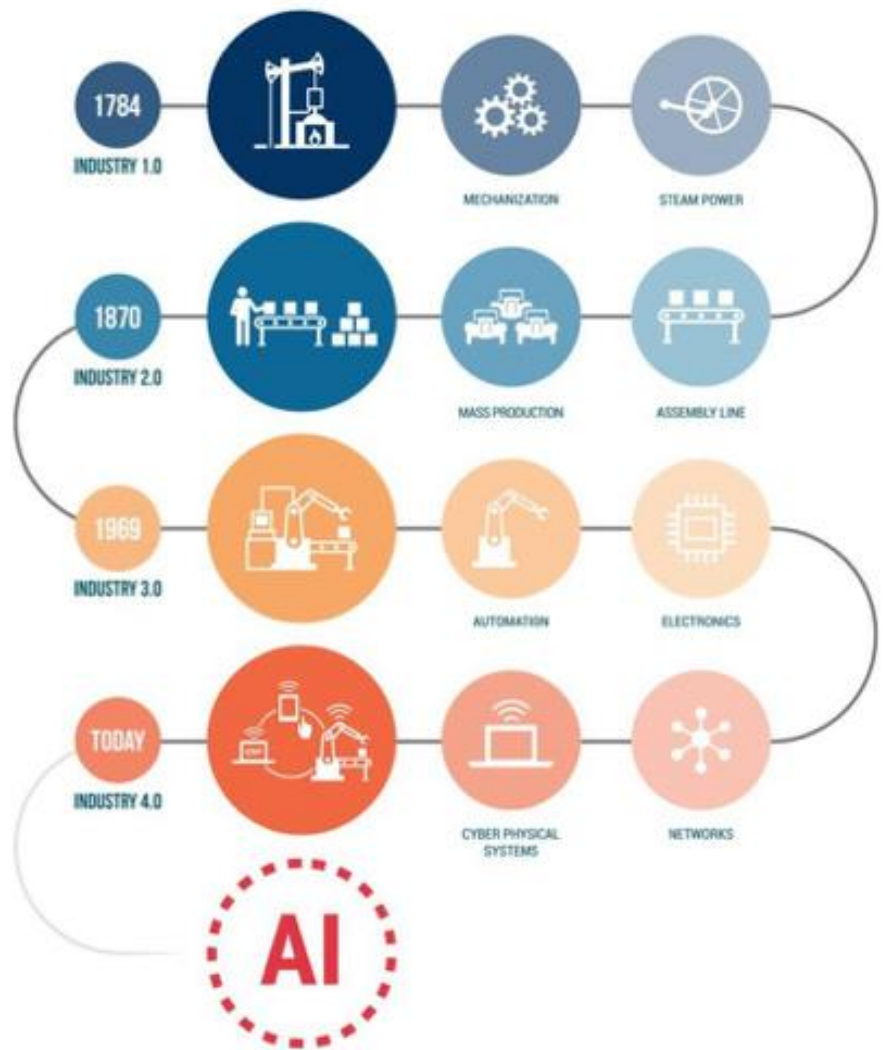
It took ~9,700 of those to reach the **era** we consider “modern society”

Within this era, there have been incredible advancements, or *revolutions*

Each of these has brought about significant societal disruption

Within that disruption, there are gains, losses AND tremendous opportunities

VIVA LA REVOLUTION(S)!



~ 250 years ago – basic power and mechanization

+ 100 years later – automation and assembly

+ 100 years later – the power of silicon

+ 50 years later – humans are always connected

Within the next 25 years, life is **really** going to change

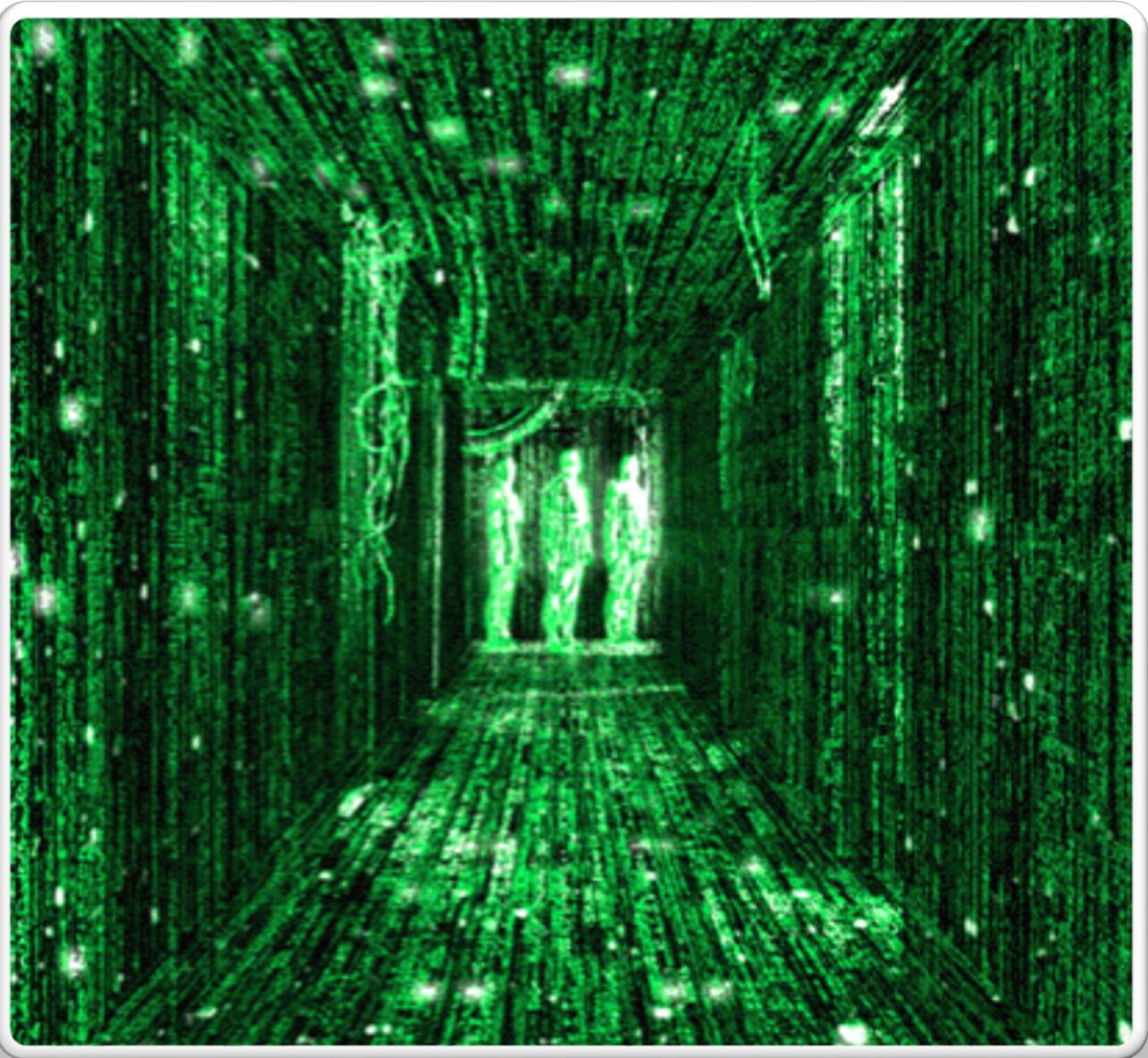
WHY IS IT DIFFERENT THIS TIME?

- THE TIMEFRAME IS COMPRESSING (100, 50, 25...)
- EVERY OTHER REVOLUTION HAS CHANGED **WHAT** WE DO, OR **HOW** WE DO IT
 - PLANT/HARVEST CROPS
 - USE OF FOSSIL FUELS
 - BUILD AND USE MACHINES
 - REMOTE COMMUNICATION

• THIS TIME, WE ARE CHANGING OURSELVES

CYBER-PHYSICAL BOUNDARY

- HUMANS HAVE BEEN THOUGHT TO BE SO COMPLEX THAT WE COULD NEVER BE RIVALED
- IT IS NOW CLEAR: SOON COMPUTERS WILL SURPASS THE PROCESSING CAPACITY OF HUMANS
- IN PARALLEL, CAMBRIDGE ANALYTICA (FACEBOOK) SITUATION ILLUSTRATED THAT **HUMANS CAN BE HACKED**



[This Photo](#) by Unknown Author is licensed under [CC BY-SA](#)

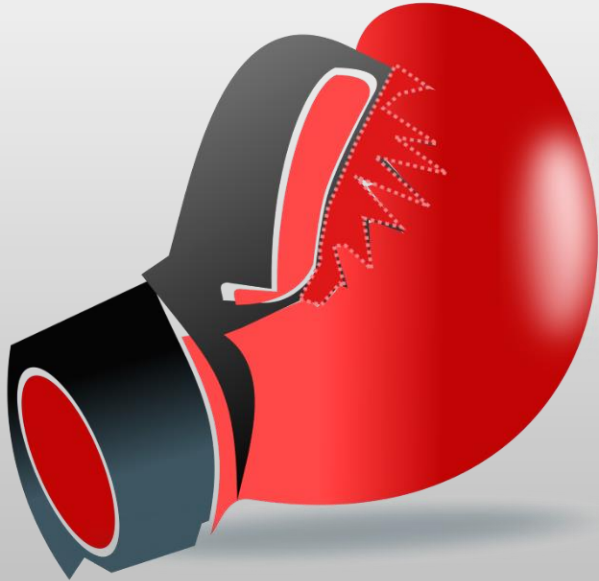
CRIME=CRIME, RIGHT?

- SIMPLY PUT, YES.
- THE TRANSFER OF VALUE OUTSIDE OF THE CONSTRUCT OF LAW/CONTRACT/AGREEMENT
- HOWEVER, DURING PREVIOUS REVOLUTIONS, THE GOAL OF CRIMINALS HAS BEEN TO STEAL OR OBTAIN:
 - RESOURCES (LAND, MINERALS)
 - INFORMATION (PATENTS, IP)
- THE BAR IS NOW MOVING SO THAT...

WE ARE THE TARGET



THE ONE-TWO THREAT PUNCH



- HUMAN “DATA”
 - BIOMETRIC, SUCH AS FINGERPRINTS
 - REMEMBER: WE ARE ESSENTIALLY A COLLECTION OF ATTRIBUTES (DATA)
 - SSN#, DOB, ADDRESS
- HUMAN “INFORMATION” (DATA APPLIED IN CONTEXT)
 - OUR OPINIONS
 - OUR VIEWS/BELIEFS
 - OUR WANTS/DESIRES



“
BECAUSE THAT IS WHERE
THE *MONEY* IS.
”

- WILLIE SUTTON, (WHEN ASKED WHY HE ROBBED BANKS)

“**THE MONEY**”... IS NO LONGER JUST DIRTY PAPER *SITTING IN BANKS.*

DATA/INFORMATION IS THE NEW CURRENCY





LET'S LOOK @ THE NEW CURRENCY

#BIGDATA

LARGEST COMPANIES IN THE WORLD

Company	Market Cap (in \$B 2018)	Era	Industry
Apple	990	Now - >	Consumer Data
Amazon	876	Now - >	Retail (Data)
Microsoft	815	Now - >	Software (Data)
PetroChina	1700	Modern	Oil/Gas
Saudi Aramco	1200*	Modern	Oil/Gas
Standard Oil	1100**	20 th Century	Oil Production
Dutch East India Company	8200	19 th Century	Trade
South Sea Co.	4000	18 th Century	Trade

Key Evolutionary Changes



Source: Money Magazine - August 2018

* Not public figures/disclosed, so these are market estimates

**adjusted for inflation

WHO WANTS TO TALK ABOUT DATA?

- Once self-driving cars are fully capable (YE 2019 is a *conservative* estimate!), the average car driven for one hour per day could churn out 4,000 GB (4TB) of data
- One can compare that to an average person's video, chat and other Internet use, which is about 650 MB per day and will escalate to 1.5 GB per day (essentially double) by 2020.
- There is little debate about the growth of sensors and smart devices. All of them will generate data, so what do we do with it?
 - **More importantly, can we protect it?!**

SO WHERE IS MY SELF-DRIVING CAR, SMART FRIDGE AND VR POD?

- Pokeman Go was an early pioneer of augmented reality, but there is no clear winner out front... yet!
- The key wireless infrastructure is not quite here, but 5G (starting deployments now and ready for Mobile World 2019) will be the prime catalyst
 - As low as 1ms latency
 - Up to 20Gbps download bandwidth
 - 1 million connected devices per km²
- As with the Internet once it hit maturity in the 90s, this platform will enable an explosion of new technology advancements

SERVICES LIKE FACEBOOK, GOOGLE AND INSTAGRAM ARE FREE, RIGHT?!

- These organizations spend **hundreds of millions of dollars** to offer these services and they are paid by YOUR information (\$74B for Google in 2017)
- This includes location, interests, shopping habits, tastes (and as we have learned recently, political preference)
- There are new methods in the works to **reverse** the payment curve
- Basic Attention Token (BAT) can be used to PAY users to view or watch ads, so that we can then use them to pay for services that are not really free
 - This will create a TON of transactions and storage

ENTER MACHINE LEARNING

- Machine learning is a form of AI that is enhanced with a programmable dataset that makes it teachable. Instead of being told what to do, or how to process information, the computer “learns” the more it performs a function or analyzes data
 - Each time this self-teaching process takes place, the system can improve its performance/accuracy.
- Machine learning has become prevalent in consumer goods and is moving to business applications
- Algorithms detect patterns and learn how to make predictions and recommendations by processing data and experiences.

MACHINE LEARNING - APPLIED

- The more accurate a system is, the more data it can process with less errors (aka effort)
- The term “feature” is often used and can be best explained by consumer products, like Spotify:
 - Music has multiple features – artist, genre, tempo
 - Through simple matching and sampling of these features, the application can build an accurate projection of your likes and dislikes
 - Now, simply extrapolate this concept!

ADVANCED MACHINE LEARNING

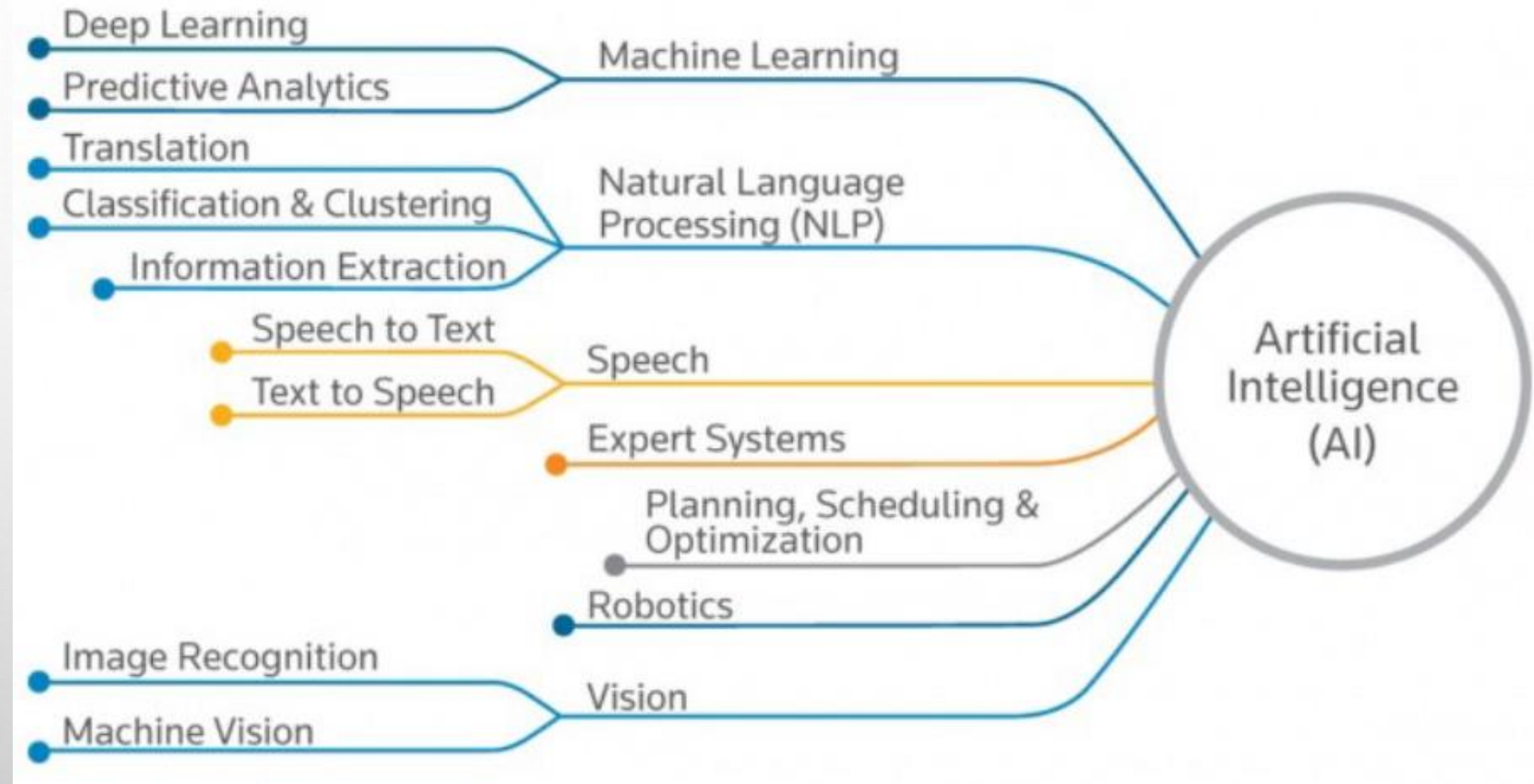
- With layers of feature detection, the process becomes what is known as “deep learning”
- An easy example to differentiate:
 - *Machine* Learning can be applied to **American football** plays
 - Run them repeatedly and measure the results against variations to determine the best results as they are fixed patterns
 - *Deep* Learning can better relate to **American soccer**
 - No fixed plays, but a dynamic platform with almost no relational ties
 - Layers of learning are overlaid to adapt to the environment on its own

SO JUST WHAT IS ARTIFICIAL INTELLIGENCE?

AI is typically defined as the ability of a machine to perform cognitive functions that we often associate with the “human mind”

Examples:

- Perception
- Reasoning
- Learning
- Fluid environmental interaction
- Complex problem solving
- Even creativity?



HOW DOES THIS CIRCLE BACK TO SECURITY?

- Technology will **never again** be static
- Only through the use of machine learning can we stay ahead of the criminals
 - Hopefully, AI will raise the bar enough to eliminate low-level criminals
- It takes **everyone** to be aware that they are vulnerable in some form
 - I am trying to get a TED talk for preschool cybersecurity awareness)
- Thought leaders NEED to stay engaged
- Remember that **new solutions** may look to relate very little to **existing problems**

STILL THE BIGGEST TARGET FOR CYBERCRIMINALS? EMAIL



Every year IDC reports that more than **\$2 billion** is spent on email security

Why? Because cybercriminals continue to change their techniques to beat traditional defenses as evidenced by the fact that in the past year (2017):

- **49%** of installed malware was delivered via email (Verizon DBIR, April 2018)
- **\$675m** was lost due to business email compromise (FBI Internet Crime Report, May 2018)
- **31 Terabytes** of data (that cost \$3.4B to procure) was stolen by one phishing campaign (US DoJ Filing, March 2018)

WINNERS AND LOSERS DIFFERENT VECTORS


- Businesses will adapt
 - Those that do, will profit
 - Those that do not, will go extinct
- Individuals will, as well
 - Those that embrace changes will stand to lead
 - Those that fight it are destined to defeat (faster than previous iterations)

YOUR HOMEWORK (END USERS)

- SLOW DOWN! Look, hover on links before clicking
- Pay for what you use/consume
 - piracy is a crime, and crime attracts criminals
- Default opt-out of data collection and accounts
 - “Clear the cache”, delete/close old accounts, “forgot password” works great
- Your identity is unique. Protect and monitor it
 - Be available, but not open in online interfaces
- Remember: nothing is free (tools, systems, apps)

YOUR HOMEWORK (ADMINISTRATORS)

- Remember, identity is CRITICAL
 - Implement two-factor authentication everywhere possible
- Education is key. Users are still the weakest link in the chain
 - Make security training a priority, and keep it going, and going, and going...
- Write it down! Documentation solve ambiguity of processes/procedures
- Tackle the biggest challenges early to avoid being stagnated by data overload
 - Done is better than perfect, and the starting of a plan whips *just a plan*



STAY CURIOUS
BE INTERESTED
REMAIN INTERESTING

REMEMBER: THERE HAS BEEN
NO BETTER TIME TO BE ALIVE



