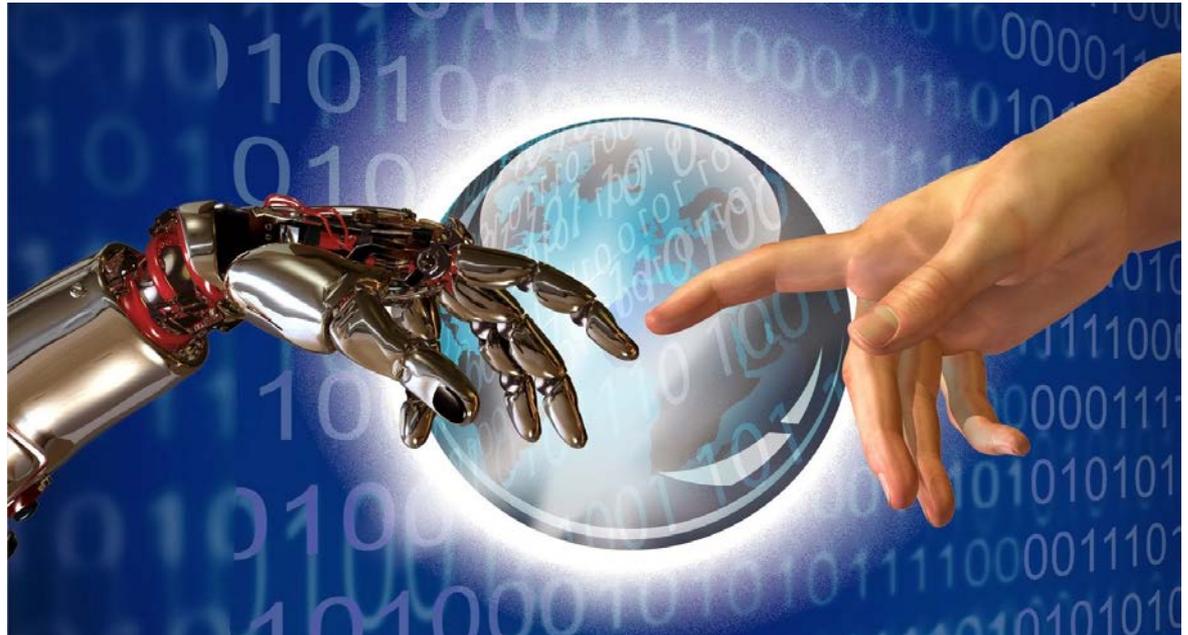


# The 4<sup>th</sup> Industrial Revolution

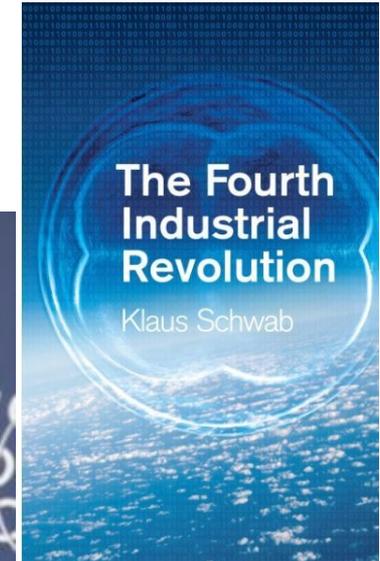
*Ready for the Disruption?*

# Agenda

- **Fourth Industrial Revolution**
- Disruptive Technologies



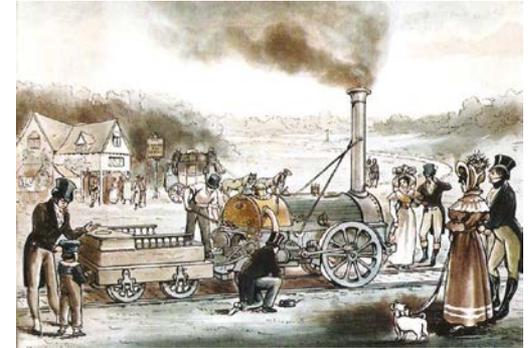
# 4<sup>th</sup> Industrial Revolution: Introduction



# Brief History in Time...

A wide-field photograph of the night sky, showing a dense field of stars. The Milky Way galaxy is visible as a bright, hazy band of light stretching across the right side of the image. The stars are of various colors, including white, yellow, orange, and blue. The background is a deep, dark black.

# The Revolution of Civilization



**Industrial  
Revolution  
18<sup>th</sup> Century**



**5,000 years ago**



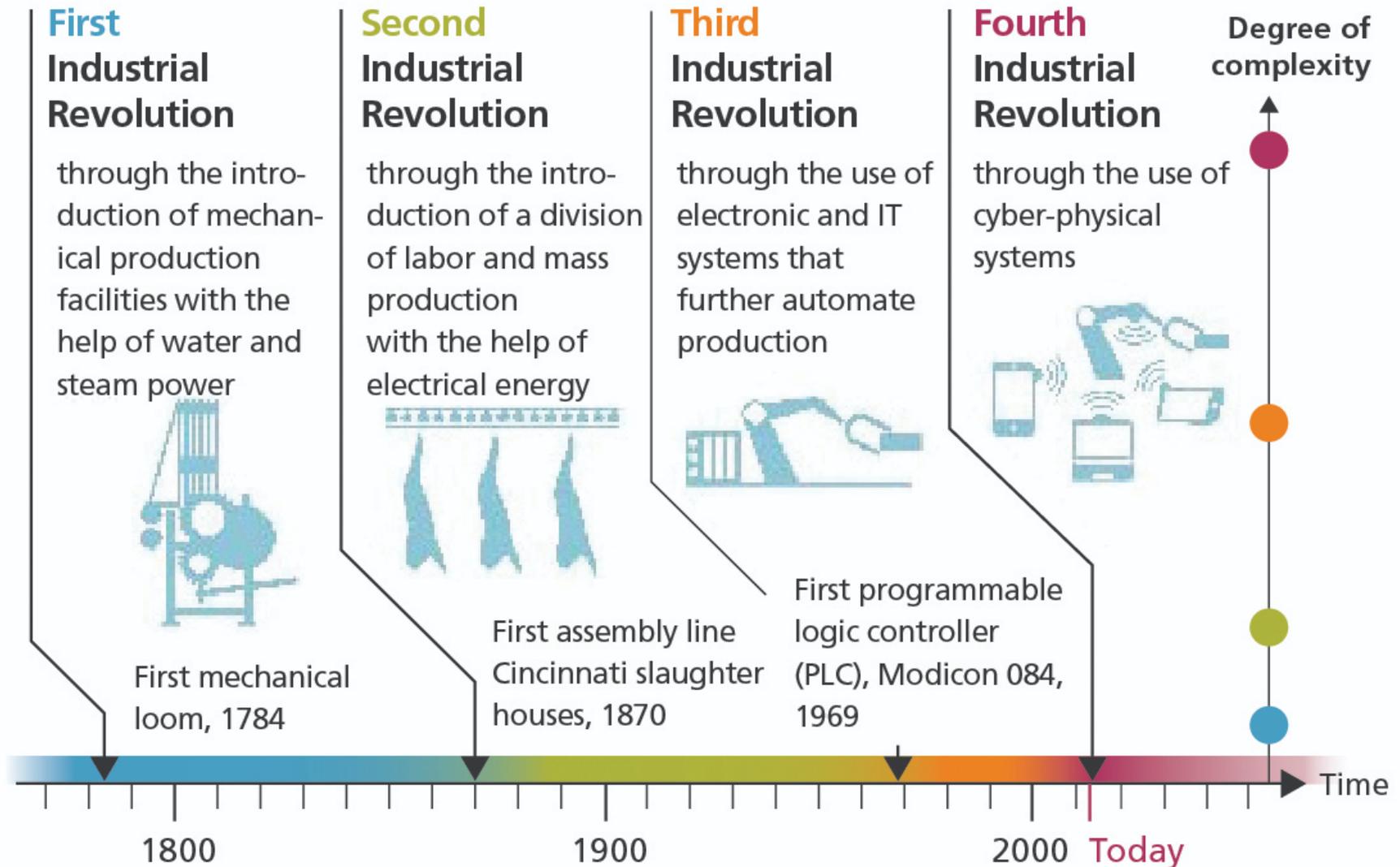
**10,000 years ago**



**A million years ago**

*Accumulation of knowledge*

# Overview of the Industrial Revolutions



# A Glimpse into the 4<sup>th</sup> Industrial Revolution



<https://www.youtube.com/watch?v=EO2fi9acHWc>

The following video provides you a glimpse into the opportunities and optimism that comes with the Fourth industrial Revolution.

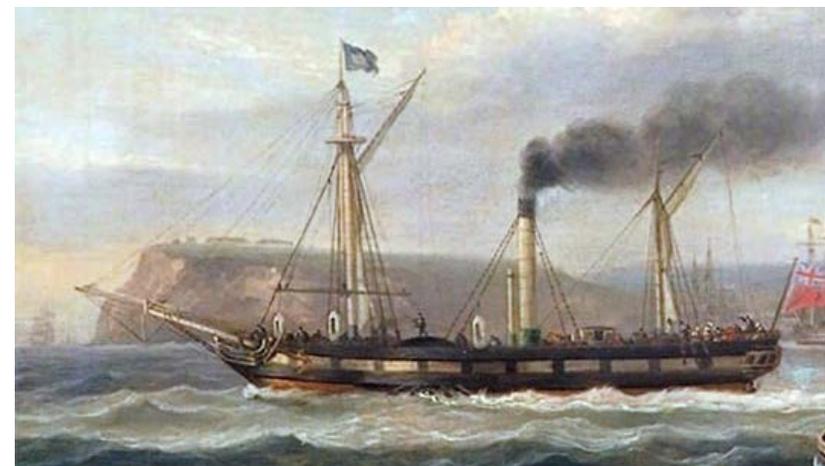
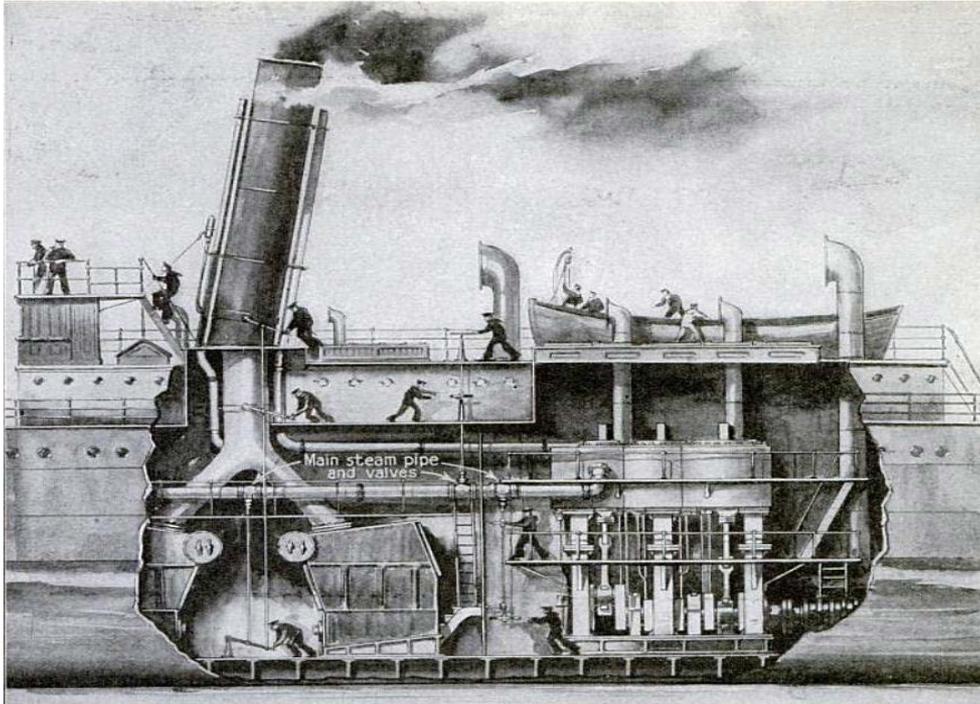
# Journey to the 4<sup>th</sup> Industrial Revolution

## First Industrial Revolution – Harnessing Water Power



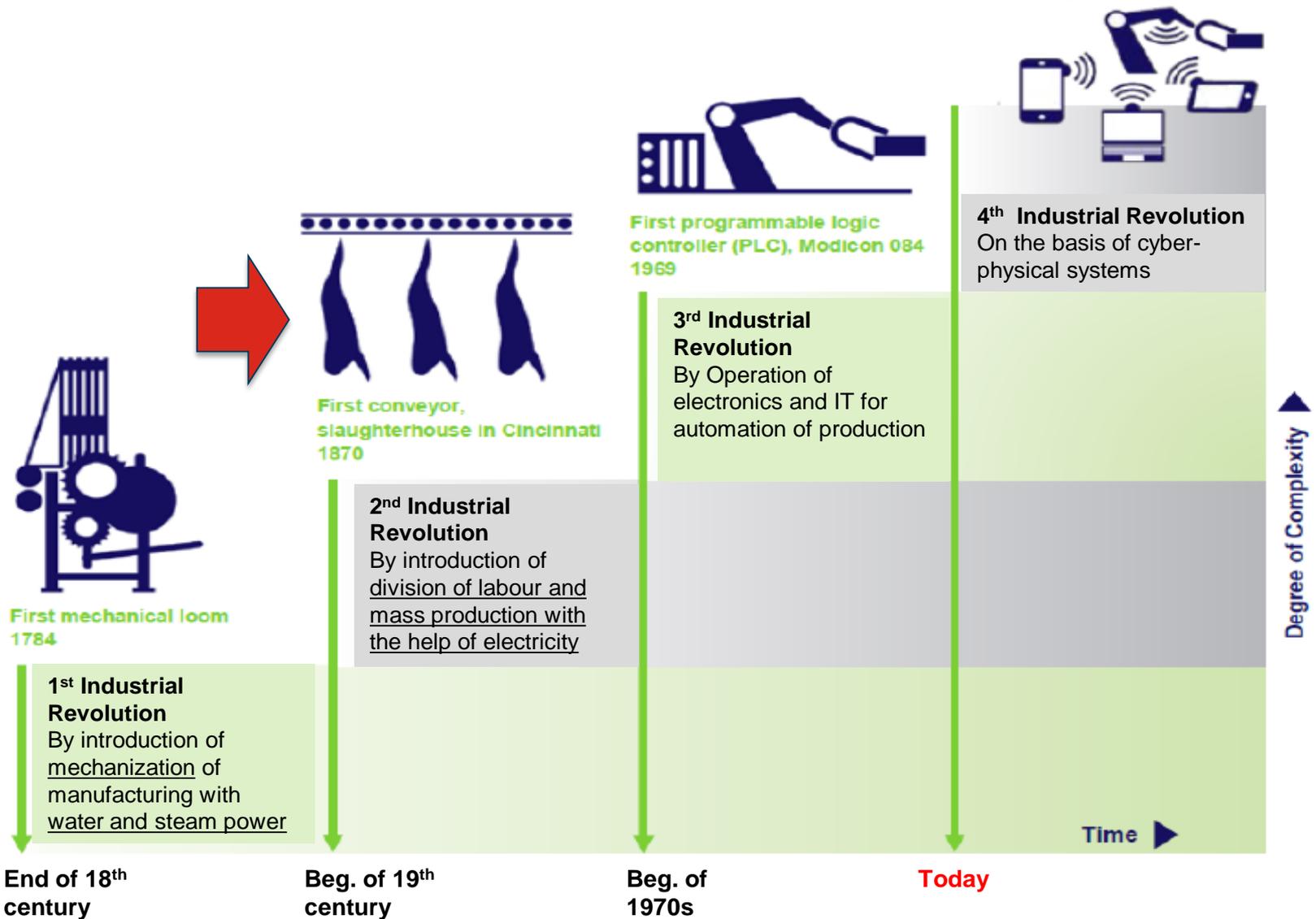
# Journey to the 4<sup>th</sup> Industrial Revolution

## First Industrial Revolution – Harnessing Steam Power



<https://www.youtube.com/watch?v=xLhNP0qp38Q>

# Journey to the 4<sup>th</sup> Industrial Revolution



# Journey to the 4<sup>th</sup> Industrial Revolution

## Second Industrial Revolution – Division of Labour & Mass Production via Electric Energy



*“A customer can have a car painted any colour that he wants so long as it is black”*

**Henry Ford**

# Journey to the 4<sup>th</sup> Industrial Revolution

## Second Industrial Revolution

- Concerns over dehumanization of human beings
  - Man becoming a factor of production
  - Man “becoming” machine
- Well-being of human being overshadowed by economic interests through the use of:
  - Division of Labour and mass production (death of the traditional craftsmen...think of cobblers and tailors)
  - Human labour being replaced or made more efficient and productive with machines.

# Journey to the 4<sup>th</sup> Industrial Revolution

## Second Industrial Revolution

*Check out this video to comprehend further*



Factory Work - <https://youtu.be/DfGs2Y5WJ14>

# Journey to the 4<sup>th</sup> Industrial Revolution

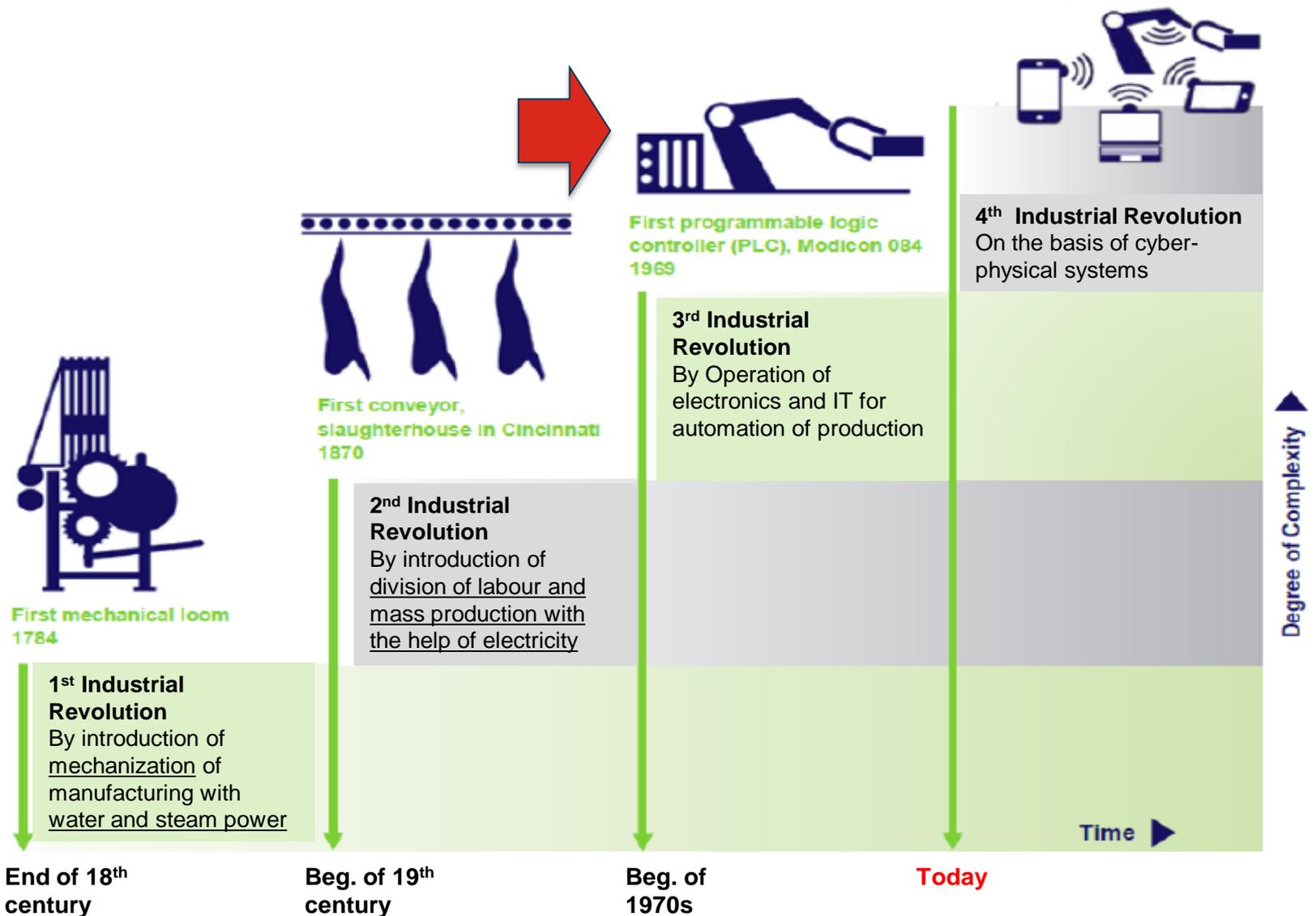
## Second Industrial Revolution

*Check out this video to comprehend further*



<https://www.youtube.com/watch?v=aLvJ8p9KIH8>

# Journey to the 4<sup>th</sup> Industrial Revolution



# Journey to the 4<sup>th</sup> Industrial Revolution

## Third Industrial Revolution – Automation and Computerisation



# Journey to the 4<sup>th</sup> Industrial Revolution

- The 3<sup>rd</sup> Industry Revolution involved electronics, computers and internet communications.
- This underlines the capability for automation that drives machinery and more machinery to be integrated with each other via internet/network communications.
- Automation not only drives machines, but also processes and planning such as Enterprise Resource Planning (ERP), Enterprise Research Management (ERM), Customer Relationship Management (CRM), etc.
- Even financial and banking systems were being computerised and automated to enhance efficiency of transactions.

# Overview of the 3<sup>rd</sup> Industrial Revolution

## Third Industrial Revolution – Automation and Computerisation

Some examples:

**FOOD  
PACKAGING**

<https://www.youtube.com/watch?v=vYZzMk0NkgM>

**BEVERAGE  
PACKAGING**

<https://www.youtube.com/watch?v=efkUP2UVD2w>

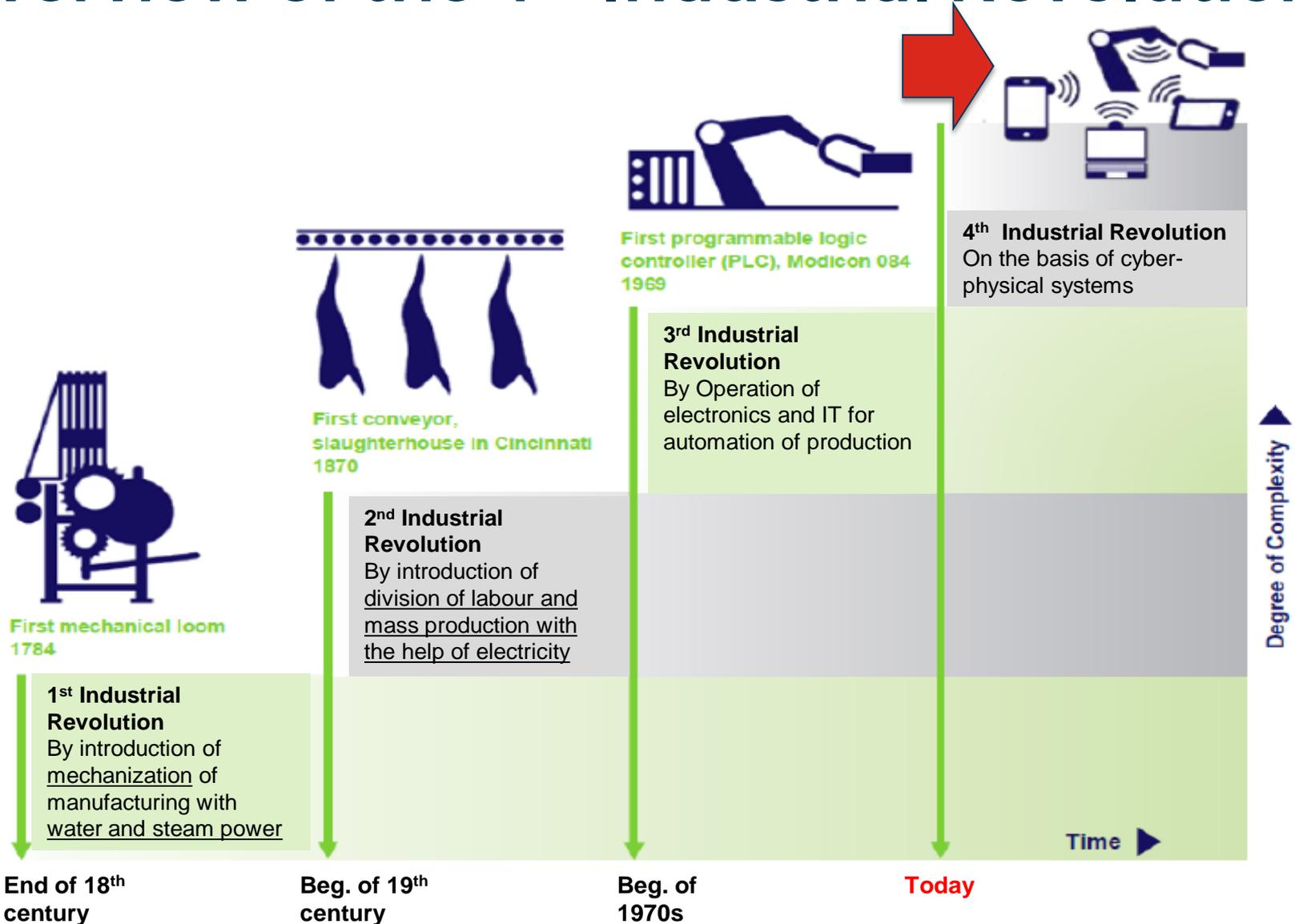
**MARINE  
INDUSTRY**

<https://www.youtube.com/watch?v=pBewnay3cjQ>

**BANKING  
INDUSTRY**

<https://www.youtube.com/watch?v=oADxUX4STjE>

# Overview of the 4<sup>th</sup> Industrial Revolution



# Dawn of the 4<sup>th</sup> Industrial Revolution

[https://www.youtube.com/watch?time\\_continue=93&v=SCGV1tNBoeU](https://www.youtube.com/watch?time_continue=93&v=SCGV1tNBoeU)

*How would our lives and  
business change?*



# Dawn of the 4<sup>th</sup> Industrial Revolution

## Anticipation or Anxiety?



*How would you approach the Fourth Industrial Revolution?*

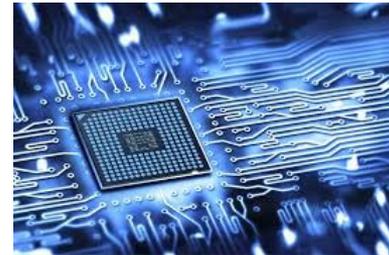
# 4<sup>th</sup> IR – What Will It Be Like?



# Impetus for the 4<sup>th</sup> Industrial Revolution

## *The Perfect Storm for Technological Transformational*

- Connectivity across computers and smart devices
- Low cost of communications

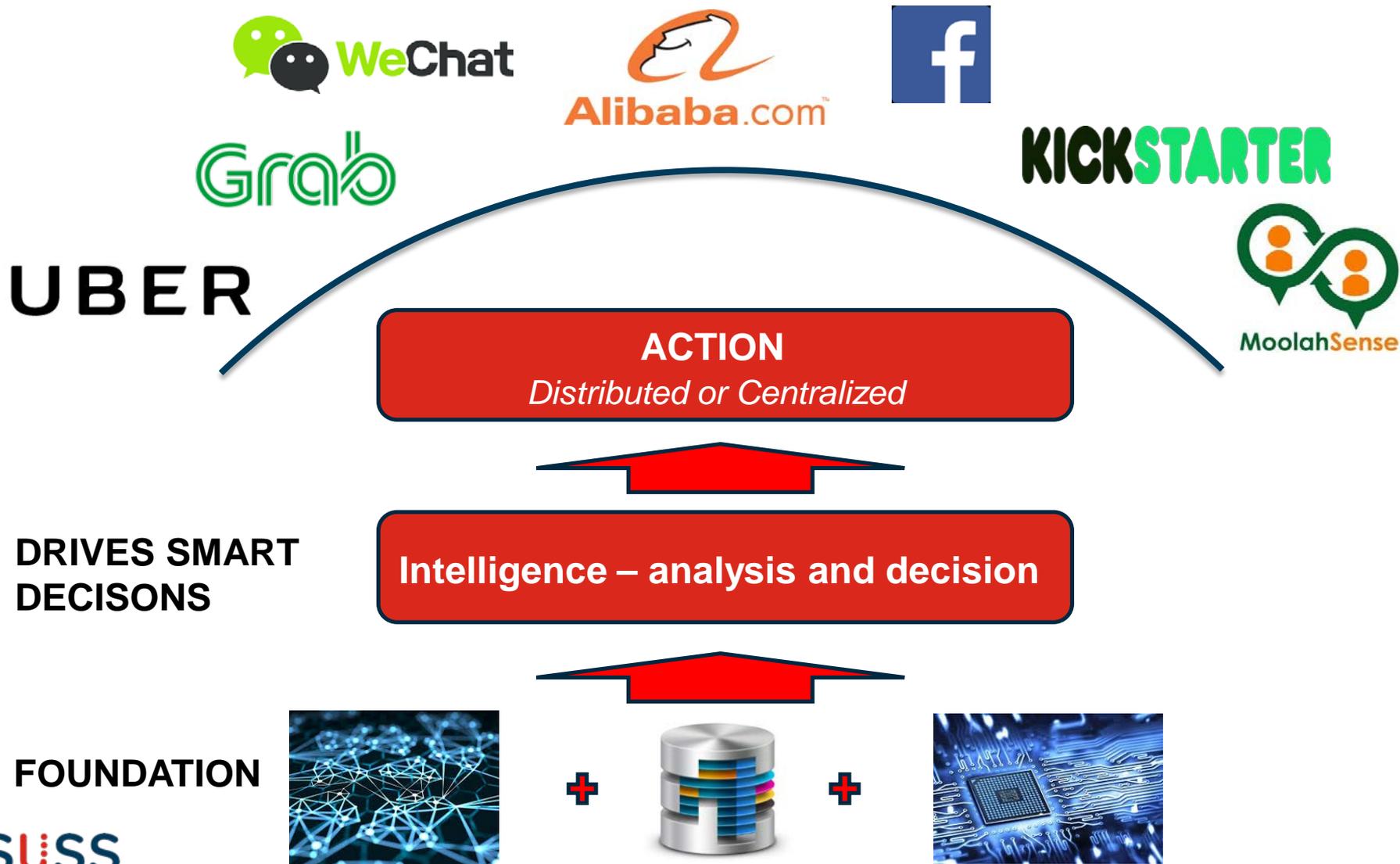


- Computing Processing Power has grown
- Explosion of computer usage (e.g. Notebooks, smart devices, electronics appliances, etc.)



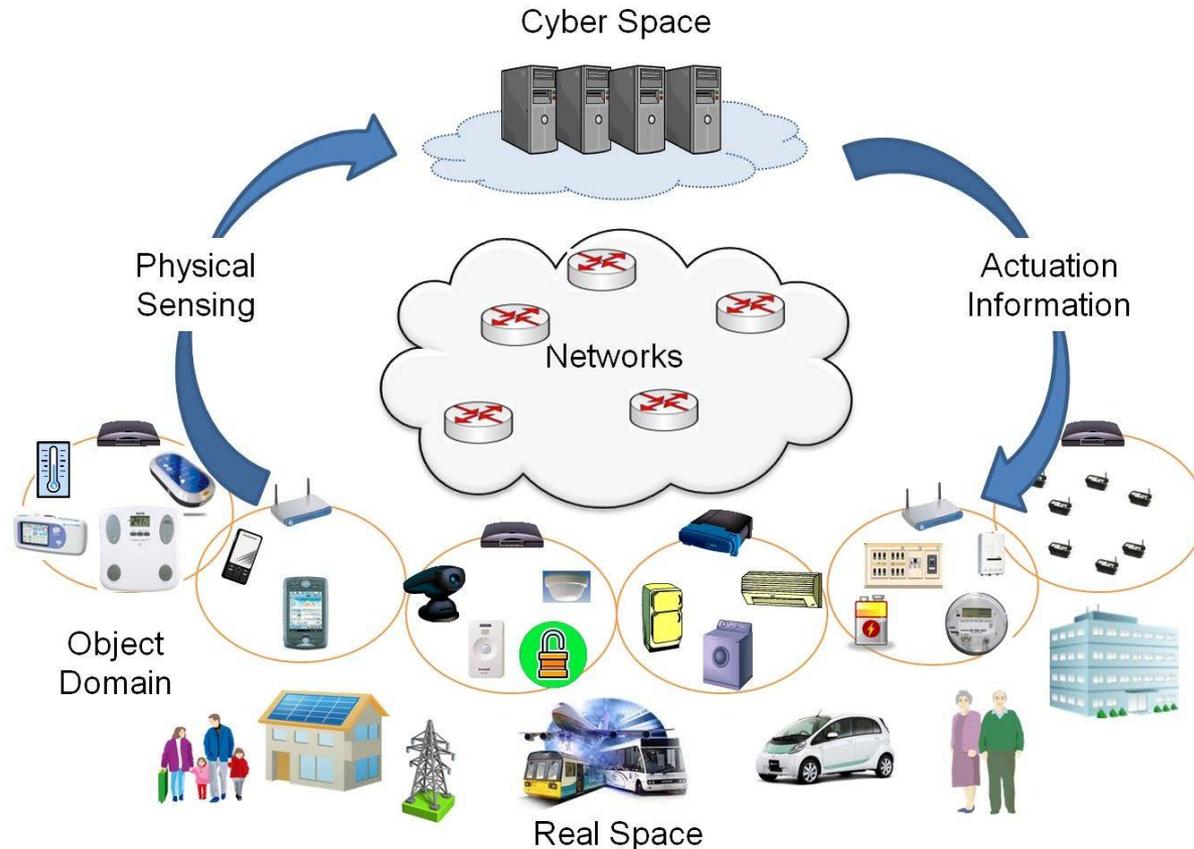
- Growth in data
- 90% of existing data generated in the 2012/2013

# Overview of the 4<sup>th</sup> Industrial Revolution



# Basis of the 4<sup>th</sup> Industrial Revolution

Emergence of **Cyber-Physical Systems (CPS)** are integrations of computation, networking, and physical processes. Embedded computers and networks monitor and control the physical processes, with feedback loops where physical processes affect computations and vice versa.





# Introducing the Cyber-Physical System in the 4<sup>th</sup> Industrial Revolution

# Cyber-Physical-Systems

In the 4<sup>th</sup> industrial revolution, we move from ‘just’ the Internet and the client-server model to ubiquitous mobility, the bridging of digital and physical environments (in manufacturing referred to as Cyber-Physical Systems), the convergence of IT and OT, and all the previously mentioned technologies (e.g. Internet of Things, Big Data, cloud, etc.)

Powered by additional accelerators such as advanced robotics and AI/cognitive that drives automation and optimization in entirely new ways. This leads to ample opportunities to innovate and truly fully automate and bring the industry to the next level.

Note:

*IT: Information Technology*

*OT: Operation Technology*

# Cyber-Physical-Systems – Examples

## Drones, AI & Delivery

Drones as autonomous flying machines (powered by AI) integrated with an inter-connected delivery system to offer logistics services that are efficient and less dependent on humans.

<https://www.youtube.com/watch?v=XFoLn-wHNTQ>

## Ride Hailing, AI & Driverless Cars

Ride hailing applications integrate with driverless cars that are powered by AI. This provides lesser dependence on human drivers in the operations of a transportation system within a city.

<https://www.youtube.com/watch?v=iPgHuk4vJgQ>

## Neuro Implants & Robotics

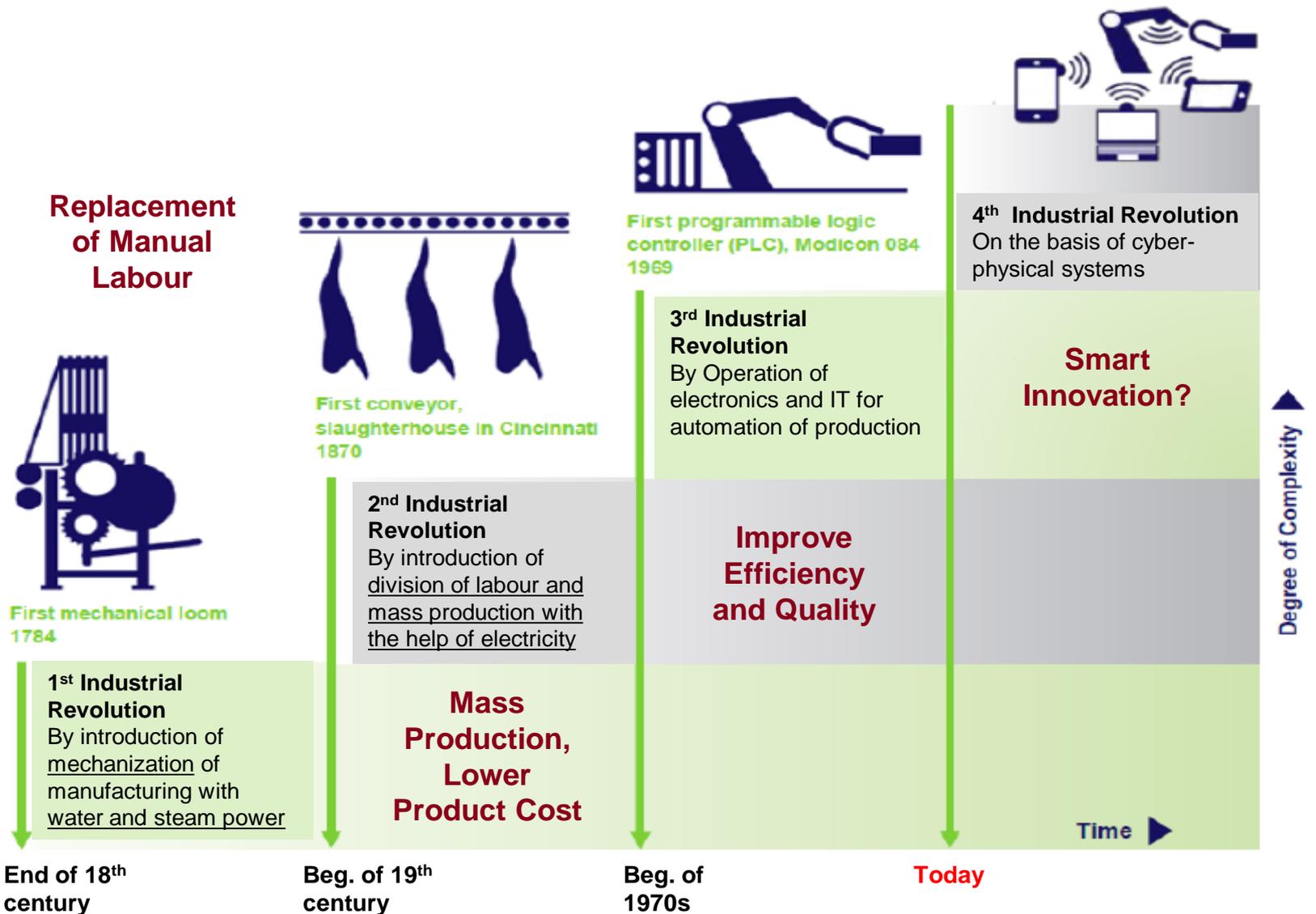
Neuro-science integration with robotics offers new capabilities to humans who have lost their physical ability to function.

<https://www.youtube.com/watch?v=mRgpovVV6j4>



# A Peek Into What The 4<sup>th</sup> Industrial Revolution Entails

# What Are The Implications?



# What Are The Implications?

- Fourth Industrial Revolution
- Disruptive Technologies





# Disruptive Technologies

Within the advent of the 4<sup>th</sup> Industrial Revolution, several new technologies have been introduced to drive innovative products and services underlined by the concept of Cyber-Security Systems. This will certainly disrupt many current process and generating new opportunities and breaking down existing limitations. We can evaluate disruptive technologies from 4 key perspectives:

Yourself	Business
What <u>OPPORTUNITIES</u> does it present to your work/profession?	What <u>OPPORTUNITIES</u> does it present to the industry?
What <u>THREATS</u> does it present to your job/profession?	What <u>THREATS</u> does it present to Industry?

# Disruptive Technology: Analytics

Analytics will be evolving from a retrospective to a predictive perspective.

## Analytics

- Descriptive Analytics (Reporting)
  - *What has happened?*
- Diagnostic Analytics
  - *Why did it happen?*
- Predictive Analytics
  - *What could happen?*
- Prescriptive Analytics
  - *What should we do?*

3<sup>rd</sup> Industrial Revolution



4<sup>th</sup> Industrial Revolution

## Diagnostics to Solutions

# Disruptive Technology: Analytics

Analytics are leveraging on the huge amount of data available today – a term used as big data. A recent report by research firm IDC predicted that the Big Data and business analytics market would grow globally from US\$130 billion (S\$182.4 billion) by the end of last year to US\$203 billion by 2020.

There is a wide array of possibilities in the usage of big data and analytics across different industries. The following slides will demonstrate some examples.

## Reference

<https://www.todayonline.com/singapore/business-big-data-singapore-has-built-cutting-edge>

# Disruptive Technology: Analytics

## F&B: Application in new product development

<https://www.youtube.com/watch?v=LuzwVNbguxM>

With access from big data sources and analytics, it becomes easier for new players to make penetrate the market

## Tourism: Drawing more visits

<https://www.todayonline.com/business/stb-partners-tencent-draw-chinese-tourists-here>

## Surveillance management

[https://www.youtube.com/watch?v=\\_yKga54tx6U](https://www.youtube.com/watch?v=_yKga54tx6U)

Imagine how such technology can be introduced to further innovation in other sectors for example:

- In retail, you could recognise your customer the moment he or she walks into the store.
- In hotel industry, you could recognise your guests and recall their names/preference when they return.

# Disruptive Technology: Analytics

## Healthcare Management

<https://www.youtube.com/watch?v=wOwept5WIWM>

In healthcare, doctors can better predict medical problems based on lifestyle of patients and to provide early intervention.

## Retail operations

<https://www.youtube.com/watch?v=bkcAmCqlaao>

In retail, analysis of purchase patterns will help improve management of operations and inventory.

# Disruptive Technology: Analytics

## Analytics and Implications

- Distributed and Disparate Information for decisions can be analysed.
- Smarter, faster, timely and informed decisions can be made businesses.
  - Cost savings in management with better anticipation of problems and minimise risks (e.g. predicting machine failure, human traffic, weather, etc.)
  - Opportunity for creating new products to target existing and new customers
  - Capture trends of business and consumers faster – competitive advantage.

# Disruptive Technology: AI

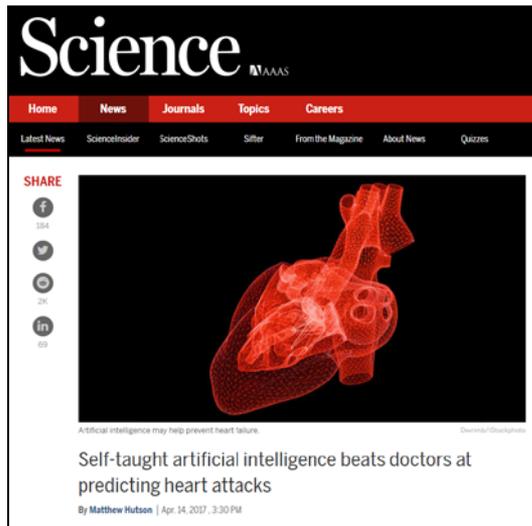
<https://www.youtube.com/watch?v=4pkwQoOepa4>



Jeopardy! 2011



Google DeepMind Challenge Match 2016



Google AlphaGo Beat World Champ 2017

# Disruptive Technology: AI

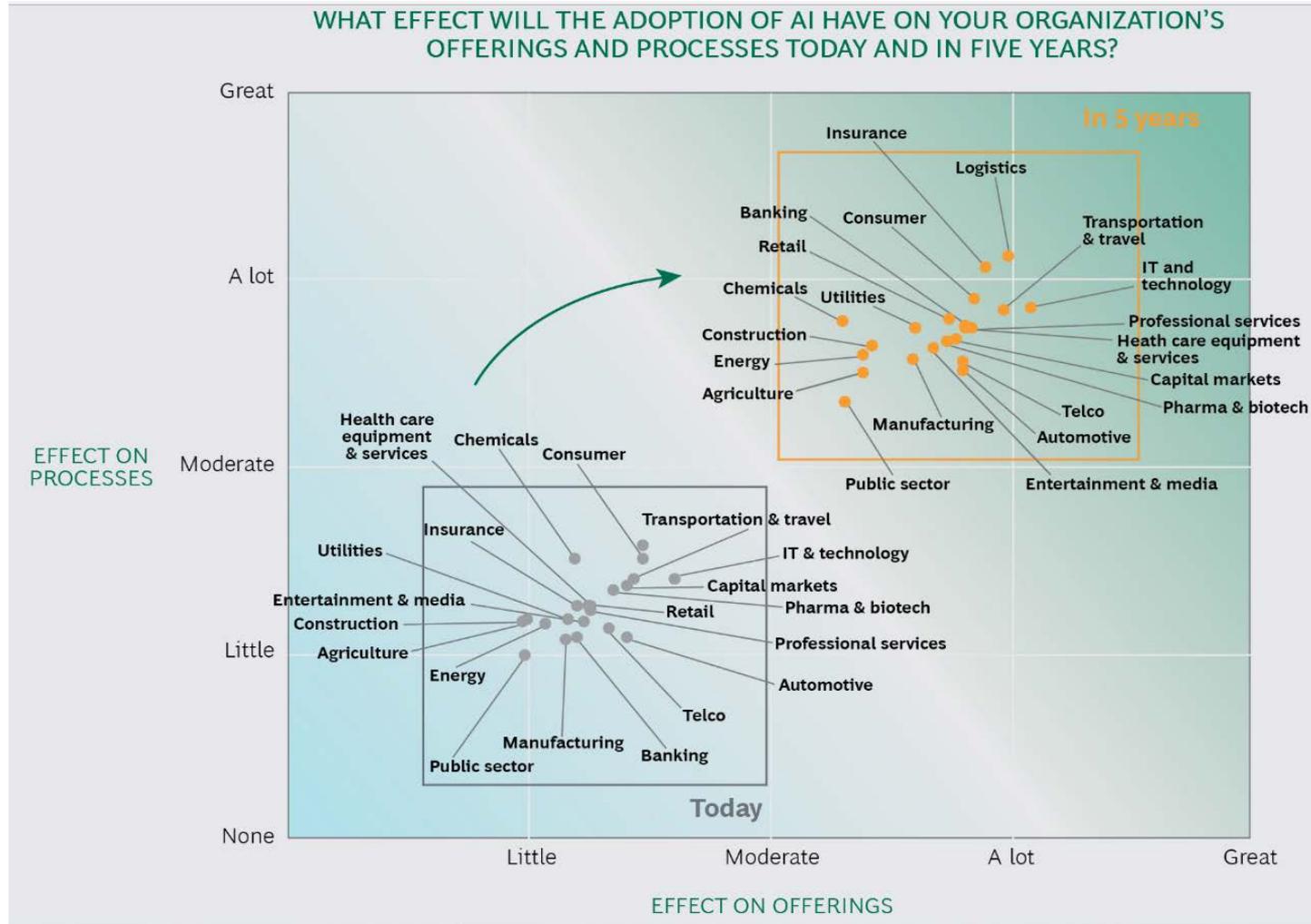
Some areas where AI will change processes and interactions in businesses, manufacturing, healthcare, logistics, defence and agriculture.

- Report generation
- Navigation
- Customer service
- Predictions
- Evaluating complex scenarios with big data
- Pattern recognition
- Decision making



BCG reported that many organisations has plans to use AI in the next 5 years to garner business competitive advantage and increase efficiency (refer to the next slide)

# Disruptive Technology: AI



Source: MIT Sloan Management Review

For further reading: <https://www.bcg.com/en-sea/publications/2017/strategy-technology-digital-is-your-business-ready-artificial-intelligence.aspx>

# Disruptive Technology: AI

## Artificial Intelligence (AI) in Business and Finance



- Invest in NLG to write financial reports.
- Uses natural language processing tools to extract and contextualise data.
- Gartner predicts machines will produce 1/5<sup>th</sup> of all business content by next year.



- Uses AI to score and evaluate credit worthiness of potential customers and approves a loan in 3 minutes.
- Applies AI in combination with image and voice recognition technology to identify the client and their past history.

# Disruptive Technology: AI

## Artificial Intelligence (AI) in Manufacturing



- Uses AI to improve production rate and efficiency.
- Predicts potential problems and recommends solutions before down time occurs.



- Uses AI to generate content on digital space to cope with the huge amount of digital content need in content marketing

# Disruptive Technology: AI

## Artificial Intelligence (AI) in Transportation

### Ride hailing with Uber

Uber's business is labour intensive as it requires a driver behind every car. With AI, it could one day manage a fleet without drivers – to scale, to enhance efficiency and safety.

<https://www.youtube.com/watch?v=27OuOCeZmwl>

### Public Transportation

Public transportation is also labour intensive. Singapore is in the midst of preparing a public transport system driven by AI. This will reduce dependence on bus drivers that are difficult to recruit and retain.

<https://youtu.be/zTVU4GCCIL8>

### Logistics Distribution

Logistics delivery across large countries are susceptible to accidents when drivers become tired. Introducing AI into driverless trucks will minimise accidents apart from improving efficiency in logistics transportation.

[https://www.youtube.com/watch?v=sIIcR4eG8\\_o](https://www.youtube.com/watch?v=sIIcR4eG8_o)

# Disruptive Technology: AI

## Artificial Intelligence (AI) in Autonomous Transportation

Based on the last few examples, AI has become the underlining foundation to support autonomous transportation. It provides a wide spectrum of benefits in terms of cost, speed, safety, reliability and efficiency.



Driverless Cars



Autonomous Ship



Driverless Bus



Autonomous Trucks

# Disruptive Technology: AI

## Artificial Intelligence (AI) in Autonomous Drones



AI is used to manoeuvre drones in dangerous locations to perform inspection. This minimise accidents and potential lost of lives in industries that are prone to danger such as in mining.

<https://www.youtube.com/watch?v=U-x5h-hLDHg>



AI coupled with drone technology is used in asset management such as buildings and various huge infrastructures for inspections. This reduces the tedious and dangerous task that is frequently required by a human.

<https://www.youtube.com/watch?v=-LOPGn7UFpk>

# Disruptive Technologies – Implications

## AI in Autonomous Mobility Machines: What are the Implications?

### Reflection

- Transportation can be carried out 24/7 – not dependent on human drivers
- Higher utilisation of vehicles, lower operational costs
- “Safer” transportation – human errors can be eliminated
- Reduce risk and dependency on humans to be drivers – Do people want such jobs in the future?
- High risk inspection work (e.g. mining, tall buildings, etc.) can be carried out using autonomous drones. Lower insurance costs and man-power.
- Fleet management not disrupted by staff issues – sick, leave, attrition, etc.

# Disruptive Technology: Blockchain

The next major disruptive technology is Blockchain



# Disruptive Technology: Blockchain

**Blockchain technology** has taken the world by storm in the last few years.

In short, it is a huge distributed ledger in a wide network, where every node is controlled by a different person or entity. It ensures security and authenticity of transactions. By storing data across its network, the blockchain eliminates the risks that come with data being held centrally.

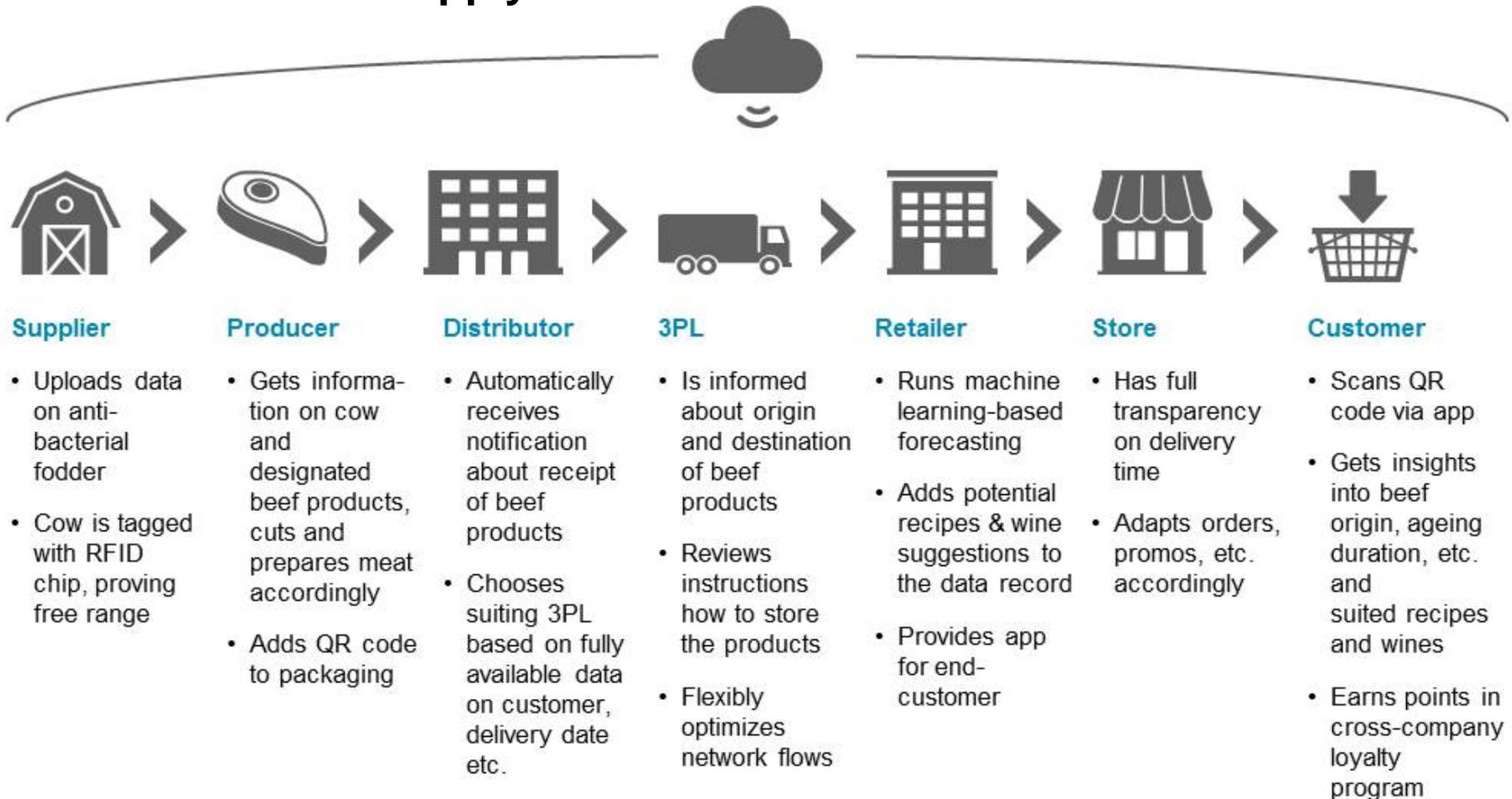
Blockchain technology has been popularly used in crypto currency such as in Bitcoin, but it is not just limited to crypto currency. It is used across many applications which will be shared later.

The following link provides a simple explanation of what block chain technology is all about:

**About Block Chain:** <https://www.youtube.com/watch?v=r43LhSUUGTQ>

# Disruptive Technology: Blockchain

## Blockchain and Supply Chain



# Disruptive Technology: Blockchain

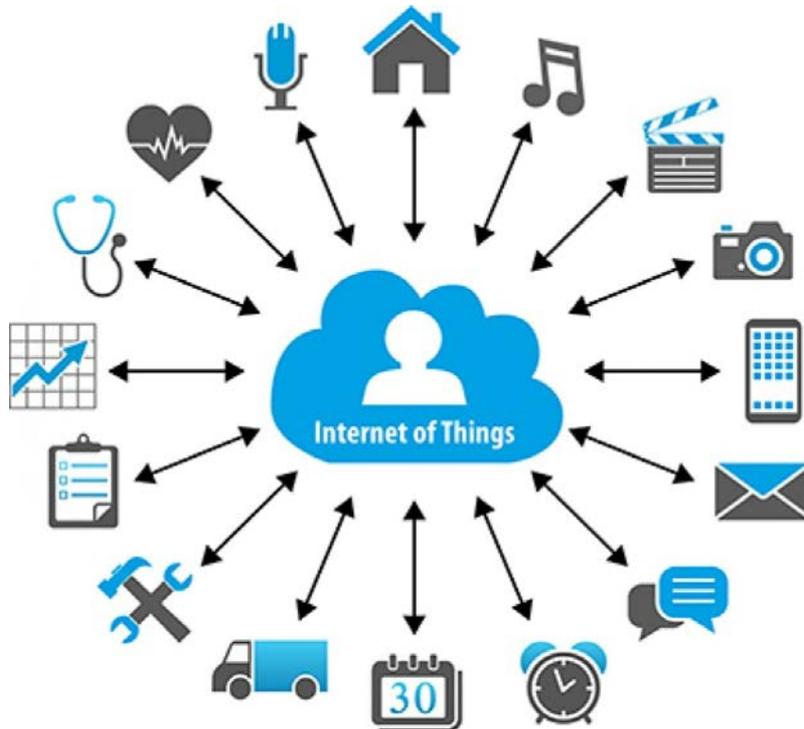
## Blockchain and Supply Chain

- Blockchain technology has been implemented rather extensively in the supply chain sector. This is because the technology facilitates independent control over data collected at each stage of the supply chain process, avoiding any tampering by unwanted parties. With this, the authenticity of the final product can be verified from the earliest stage where the raw material are produced.
- Examples
  1. **Diamond industry:** De Beers uses this technology to track and manage the diamonds used to produce its end products (e.g. diamond rings, necklaces, etc.). This gives the customers the assurance that the products they purchase are genuine.
  2. **Food industry:** Information on the Meat or Fruit source which are canned and sold in supermarkets by top brands (e.g. Unilever, Tyson, Nestle) are tracked using blockchain technology. The freshness and quality of the products are documented from the farm, transportation, processing plant, warehousing and distribution. This provides assurance of quality to the consumers.



# Disruptive Technology: Internet-of-Things

Information is captured and integrated across different channels and formats. There are different sensors and instruments to perform this task.



**For further understanding of IoT:**

<https://www.zdnet.com/article/what-is-the-internet-of-things-everything-you-need-to-know-about-the-iot-right-now/>

**Source:**

*Semiconductors: Sensors – The Lifeblood of the Internet of Things*

# Disruptive Technology: Internet-of-Things

Leveraging on the connected system of devices, IoT is also the basis of innovation in many different sectors. The following are some examples:

## Impact on Supply Chain

IoT will be extremely useful to logistics and supply chain management for tracking containers, items, vehicles and ships using different sensors embedded in different devices.

[https://www.youtube.com/watch?v=jKzw\\_-dS1jk](https://www.youtube.com/watch?v=jKzw_-dS1jk)

# Disruptive Technology: Internet-of-Things

Leveraging on the connected system of devices, IoT is also the basis of innovation in many different sectors. The following are some examples:

## Impact on Landscaping



In landscaping, IoT facilitates the activation of sprinklers based on temperature, weather, and humidity using different sensors that are linked to the sprinkler system.

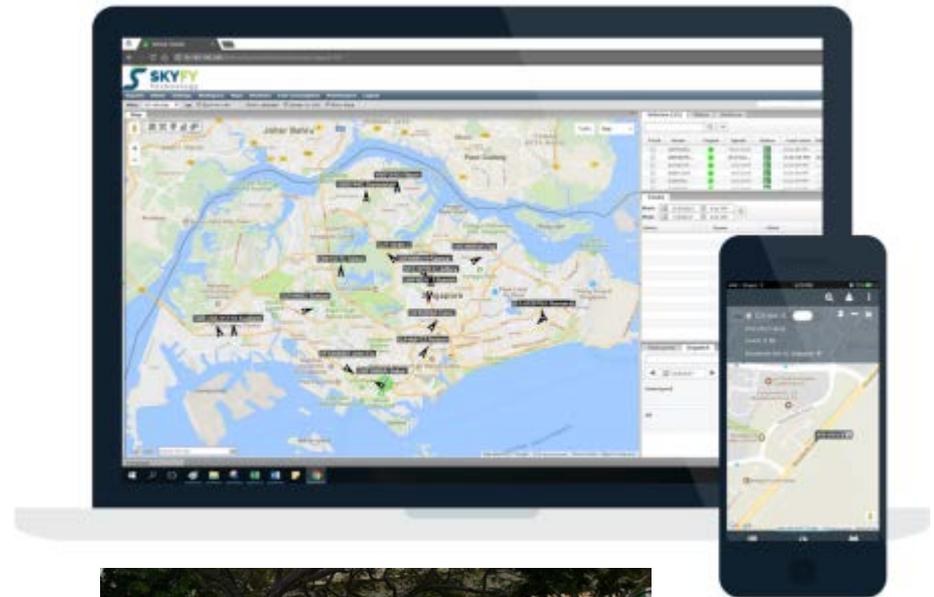


# Disruptive Technology: Internet-of-Things

Leveraging on the connected system of devices, IoT is also the basis of innovation in many different sectors. The following are some examples:

## IOT in Fleet and Human Resource Management

- Tracking of man-hours of truck drivers and remuneration.
- Tracking of truck utilisation, fuel consumption, and maintenance hours.



# Disruptive Technology: Internet-of-Things

Leveraging on the connected system of devices, IoT is also the basis of innovation in many different sectors. The following are some examples:

## Integrating IoT & Blockchain

As mentioned earlier, the 4<sup>th</sup> Industrial Revolution will leverage on the integration of technology. IoT coupled with Blockchain technology is another new frontier that will transform different industries as exhibited in the following video.

<https://www.youtube.com/watch?v=9WiB9Nv4IGY>

## IoT impact on Retail

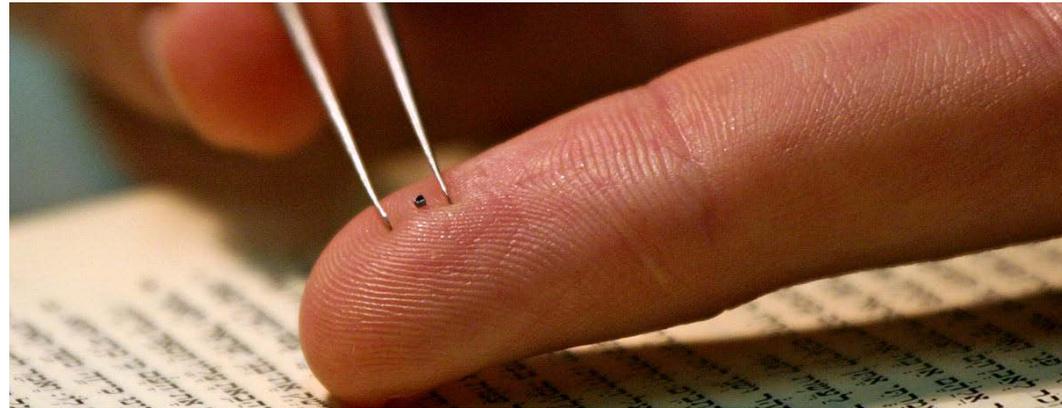
On the consumer retail end, IoT will impact how people shop with the integration of IoT into the ordering and distribution system. Alibaba has an example to demonstrate in the following video.

<https://www.youtube.com/watch?v=336YkwayCD4>



# Disruptive Technology: Nanotechnology

- The branch of technology that deals with dimensions and tolerances of less than 100 nanometres (nm).
- 100 nanometres =  $1 \times 10^{-7}$ m
- The following video provides a good introduction to nanotechnology:  
<https://www.youtube.com/watch?v=DAOFpgocfrg>



Source: American Technion Society

# Disruptive Technology: Nanotechnology

The scale of impact for nanotechnology is vast. By itself, this technology brings benefits to healthcare, retail, apparels, and many industry sectors. The following video demonstrates some implications of nanotechnology in the near future.

<https://www.youtube.com/watch?v=dQhhcgn8YZo>



Nano Medicine



Solar Cells



# Disruptive Technology: Robotics

Can you imagine that one day, you may have a “person” speaking to you that is actually a robot? This may not be too far away. The following is a prototype created at NTU.



**Source:**

<http://www.asiaone.com/world/ntus-newest-receptionist-robot-moods-and-emotions>

# Disruptive Technology: Robotics

- Robotics used to be employed for factory automation in the 3<sup>rd</sup> Industrial Revolution
- In the 4<sup>th</sup> Industrial Revolution, robotics will take a quantum leap to become more sophisticated, becoming integrated machines that not only work with each other, but also to work side by side with humans on the factory floor.
- Robots will also be introduced to other consumer based industries such as F&B, Retail, Hospitality, Entertainment and at Home.
- The following slides will demonstrate how robotics will evolve to impact the lives of businesses and society.

# Disruptive Technology: Robotics

## Robotics in Commerce and Manufacturing

Labour intensive and routine processes have become less labour intensive thanks to the new generation of robotics. Processes have become much more efficient and produces faster output.

**Manufacturing**

<https://www.youtube.com/watch?v=HX6M4QunVmA>

**Warehousing  
and Distribution**

[https://www.youtube.com/watch?v=4DKrcpa8Z\\_E](https://www.youtube.com/watch?v=4DKrcpa8Z_E)

# Disruptive Technology: Robotics

In the consumer space, robotics is performing functions that one could hardly imagine. There is definitely much more to come in the 4<sup>th</sup> Industrial Revolution.

## Robo Chef

Robots are used to prepare food in the kitchen without needing a chef

<https://www.cnet.com/videos/these-robotic-arms-put-a-five-star-chef-in-your-kitchen/>

## Spice Restaurant

Robotics are used to create consistency, speed and manage man power in a restaurant called Spice.

<https://www.youtube.com/watch?v=rfMZfxgbuCW>

## Robotics in Hotels

Hotels use robots to interact and serve customers to enhance interaction, engagement and elevate service.

<https://www.youtube.com/watch?v=C6bQHUIq664>

# Disruptive Technology: Robotics

Robotics technology comes in different forms. One big part it will play is in exoskeletons. It will aid and enhance human capabilities to carry out strength intensive activities or to compensate some of the physical abilities that are lost.

## Healthcare

Exoskeleton can compensate for lost of physical abilities through old age, accidents or illness.

[https://www.youtube.com/watch?v=tTBoYt8Pz\\_w](https://www.youtube.com/watch?v=tTBoYt8Pz_w)

## Military

New generations of soldiers can be made stronger and more resilient in the battle field with help of robotics technology in exoskeletons.

<https://www.youtube.com/watch?v=RWnXOh4r6Dw>

## Assist in “heavy lifting”

Strenuous activities will be assisted by new technologies to reduce workplace injuries, enhance the ability for people to work more effectively.

[https://www.youtube.com/watch?v=VRS0E9LjC\\_g](https://www.youtube.com/watch?v=VRS0E9LjC_g)

# Disruptive Technology: Robotics

## Robots in Singapore

Hospitality, F&B crew, Cleaning



Cleaning robots in Changi Airport: <https://www.youtube.com/watch?v=1jZ4UKbCWsQ>

# Disruptive Technology: 3D Printing

Yet another exciting disruptive technology fuelling the 4<sup>th</sup> Industrial Revolution is 3D Printing technology.

The speed and cost of deployment of this technology coupled with the underlying foundation of the cyber-physical system has enabled many new innovations in services, businesses and product development.

The following is a TedEx talk on the impact of 3D printing on the 4<sup>th</sup> Industrial Revolution.

<https://www.youtube.com/watch?v=lsJLZ1UYxGc>

## 3D Printing

# Disruptive Technology: 3D Printing

## Impact on the Health and Pharmaceutical Industry

One of the greatest impact from 3D printing is that of tablets in the pharmaceutical and health industry. This technology is also known as additive manufacturing and is projected to reach a market value of \$2.13 Billion by 2020 according to some market research.

Where tablets used to be manufactured in centralised locations, the new technology allows distributed manufacturing. This reduces the cost of distribution and increase efficiency.

Not only that, drugs can be produced on demand, without having over production leading to unwanted disposal due to expiration.

<https://www.youtube.com/watch?v=FGpbiJxkkak>

# Disruptive Technology: 3D Printing

## Mass Customisation with the aid of Robotics

The power of customisation of 3D printing coupled with the efficiency of robotics will give rise to mass customisation!

### Mass Customisation

3D printing has and will continue to transform manufacturing – mass production to mass customisation. This will better cater to individualised needs of customers.

[https://www.youtube.com/watch?v=DpUn-TuJ\\_a0](https://www.youtube.com/watch?v=DpUn-TuJ_a0)

### Mass Prototyping

With 3D printing technologies, new businesses can be set up to produce parts at low costs and be distributed. They gave birth to new entrepreneurs. The following example is a business set up in China that manufactures parts using 3D printing technology.

<https://www.youtube.com/watch?v=BFqNP8VqoPs>

# Disruptive Technology: 3D Printing

## Drive Entrepreneurship

### Social Enterprise

Entrepreneurs can design and share their ideas so that others can produce items for themselves at lower cost. This makes accessibility to predominantly high cost items like prosthetics be more affordable to the less fortunate.

<https://www.youtube.com/watch?v=LAFuSwDvm4g>

### Innovative Business

Businesses can immediately produce products the moment they think of a great idea. They can prototype and product them at much faster speed and thus change the entire retail experience.

[https://www.youtube.com/watch?v=LCiry4\\_4-w4](https://www.youtube.com/watch?v=LCiry4_4-w4)

# Disruptive Technology: AR & VR

Augmented Reality (AR) and Virtual Reality (VR) have been recognised as disruptive technologies by the World Economic Forum.

According to a recent estimate by Goldman Sachs, AR and VR are expected to grow into a \$95 Billion market by 2025.



*What are they?*



# Disruptive Technology: AR & VR

**VR:** Immerses users in a fully artificial digital environment.

**AR:** Overlays virtual objects on the real-world environment.



(MANJUNATH KIRAN/AFP/Getty Images)

The following link provides a brief explanation of the two concepts.

<https://www.forbes.com/sites/quora/2018/02/02/the-difference-between-virtual-reality-augmented-reality-and-mixed-reality/#7fc154a32d07>

# Disruptive Technology: AR & VR

Both of these technologies could exist individually or together.

According to the World Economic Forum, AR and VR technologies will have strong impact to a wide spectrum of industries such as the creative economy – particularly pertaining to gaming, live events, video entertainment and retail.

Apart from that, it will find wider applications in industries as diverse as healthcare, education, military and real estate over time.

Please read the following link for more details:

<https://www.weforum.org/agenda/2017/09/augmented-and-virtual-reality-will-change-how-we-create-and-consume-and-bring-new-risks/>



# Disruptive Technology: AR & VR

## Marketing Engagement

Virtual and Augmented Reality has so much potential to enhance potential customers' experience in tourism, hospitality, real estate, retail and automotive. It helps to invoke interest, attention and excitement to purchase a product.

<https://www.youtube.com/watch?v=ntYILGTLrDE>

<https://www.youtube.com/watch?v=6kn9-SB27cA>

## Gaming & Entertainment

Virtual Reality will bring the entire gaming experience to the next level. Gamers will be truly immersed into the game than ever before which includes a combination of real movement coupled with extraordinary visual sensations.

<https://www.youtube.com/watch?v=lj6tVqbp9bk>

# Disruptive Technology: AR & VR

## Logistics Management

Augmented reality technology will be a massive game changer in enhancing efficiency in logistics operations in sorting and picking products in huge warehouse facilities. The following video illustrates this.

<https://www.youtube.com/watch?v=I8vYrAUb0BQ>

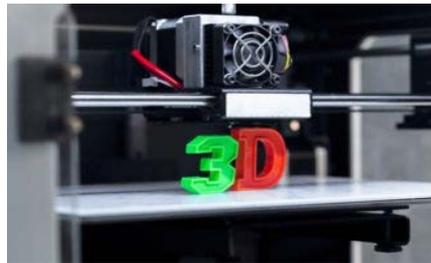
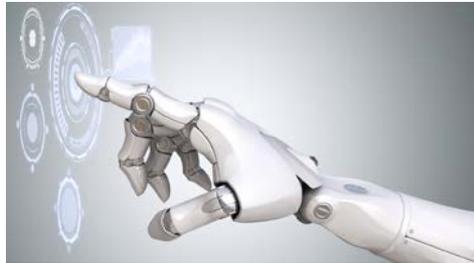


# Disruptive Technologies: Implications

## Implications from Robotics, 3-D Printing & Virtual Reality (VR)

- Repetitive and health hazard tasks can be replaced by **robots**.
  - Impact on human reliance and intensive occupation such as drivers, production operators, cleaning, customer service and cooking.
  - Reduce business cost on staffing (e.g. training, compensation, etc.).
- Distributed customisation of products could be carried out by **3-D printing**. Products can be created on demand – reduce storage, eliminate inventory overstocking, and asset management.
  - Reduce cost of consumption – e.g. self printed robotic/prosthetic arm
- VR will add the dimension of entertainment to the customer experience, introduction of novel marketing concepts, precision and efficiency in operations, and impactful engagement on education/teaching.

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



**What does it mean  
to you.....**

**Yourself**

**Society**

**Business**

# 4<sup>th</sup> Industrial Revolution: Reflection

## What does it mean to:

**Yourself**

Society

Your  
Business

- Personal privacy – sense of intrusion?
- Personal insurance and protection – is the legal system ready?
- Financial payments & investments – convenience, opportunity and risks?
- Communications – making the world smaller?
- Transportation and travel options – convenience and safety or more risk?
- Lifestyle – combination of payment, transport, shopping, communication, healthcare, etc.

# What will the 4<sup>th</sup> IR mean to you soon ...

**Daily Shopping and Retail Experience will be transformed drastically.**

**What types of technology are involved?**

*Think about it and then check out this video for answers*



<https://www.youtube.com/watch?v=iRvaWHk3A8k>

# 4<sup>th</sup> Industrial Revolution: Reflection

**What does it mean to:**

Society

**Society**

Your  
Business

- Accessibility to more products – lower cost of living?
- Payment and commerce – adjusting to new formats.
- Communications – making the world smaller?
- Transportation – convenience and safety or more risk?
- Jobs/Careers – Skills to developed, learning styles and re-inventing career over time
- Lifestyle – combination of payment, transport, shopping, communication, healthcare, etc.
- Security – safer place to live Or more danger?
  - Technology falls into wrong hands – killer drones, digital frauds, ethical decisions, etc.

# 4<sup>th</sup> Industrial Revolution: Reflection

What does it mean to:

Society

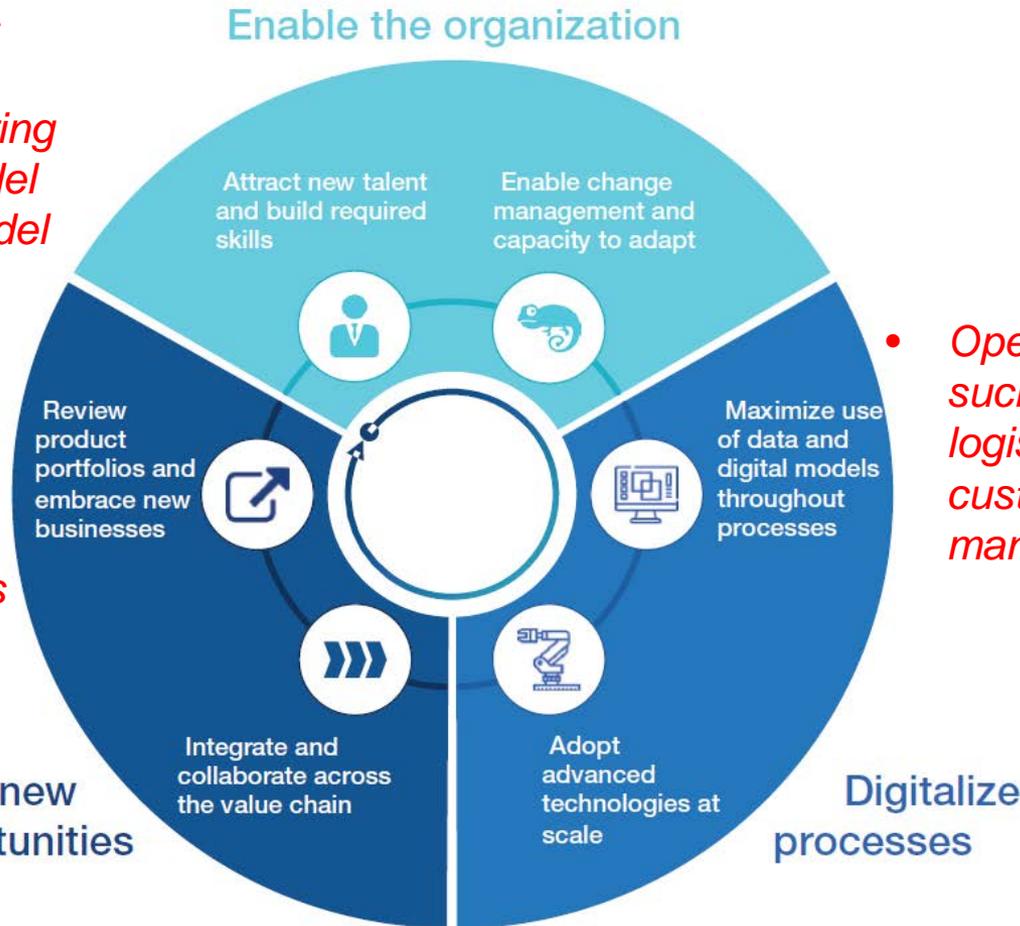
Economy

Your Business



# Areas of Implications to Consider

- *Hiring of skills*
- *Training*
- *Job restructuring*
- *Business model*
- *Financing model*



- *Operations of business such as sourcing, logistics, workflow, customer service and manufacturing*

- *Exploring new business opportunities in products and services*
- *Customer engagement*

# Different Industries, Different Soft Spots

## FUNCTIONAL AREA

INDUSTRY	RANK 1	RANK 2	RANK 3
Technology, Media, Telecom	 Information Technology	 Customer Service	 Marketing
Consumer	 Supply Chain Management	 Sales	 Marketing
Financial Services	 Customer Service	 Finance/Accounting	 Information Technology
Professional Services	 Strategy	 Information Technology	 Marketing
Health Care	 R&D	 Operations/Manufacturing	 Information Technology
Industrial	 Operations/Manufacturing	 Supply Chain Management	 Information Technology
Energy	 Operations/Manufacturing	 Information Technology	 Supply Chain Management
Public Sector	 Information Technology	 Customer Service	 Operations/Manufacturing
<b>OVERALL</b>	 Information Technology	 Customer Service	 Operations/Manufacturing

 Operations, including Manufacturing, SCM, and R&D
  Information Technology
  Customer-facing Functions
  Corporate Center Functions

- Which industry are you at now?
- Which industry are you expanding into?

Functional areas that were not in the top three of any industry: communications, human resources, legal or compliance, procurement

# Self Evaluation: Business You Are In

Where is your focus going to be?

Are there any pain points to address?

## Inputs

- *Is hiring an issue?*
- *Is retention of staff an issue?*
- *Is job too repetitive, risky, unattractive?*
- *Is sourcing of materials challenging?*
- *Is external supply chain and storage an issue?*
- *Can collaboration with eco-system improve?*

## Operations & Processes

- *Is efficiency and speed a challenge?*
- *Can robotics or IOT be introduced?*
- *Is insights and information difficult to obtain?*
- *Is operations cost increasing due to human resource, errors, handling, idle time?*
- *Is there a lot of repetitive reporting and documentation?*
- *Can financing model be improved?*

## Front End – Customer & Market Engagement

- *Are there customers demanding for faster and better service?*
- *Are competitors offering better service?*
- *Is product facing accessibility challenges?*
- *Are there new markets to explore with new business models?*

# Conclusion

With the advent of the 4<sup>th</sup> Industrial Revolution,

Every Senior Management and Business Owner needs to keep in mind of the following:

***“Be the first to disrupt your own business,  
the eco-system and your competition....***

***before your business is disrupted by others!”***



# Thank You!