



## DANIEL K. INOUE ASIA-PACIFIC CENTER FOR SECURITY STUDIES

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# 5G: THE “WONDER” TECHNOLOGY?

August 19, 2020  
Dr John Hemmings

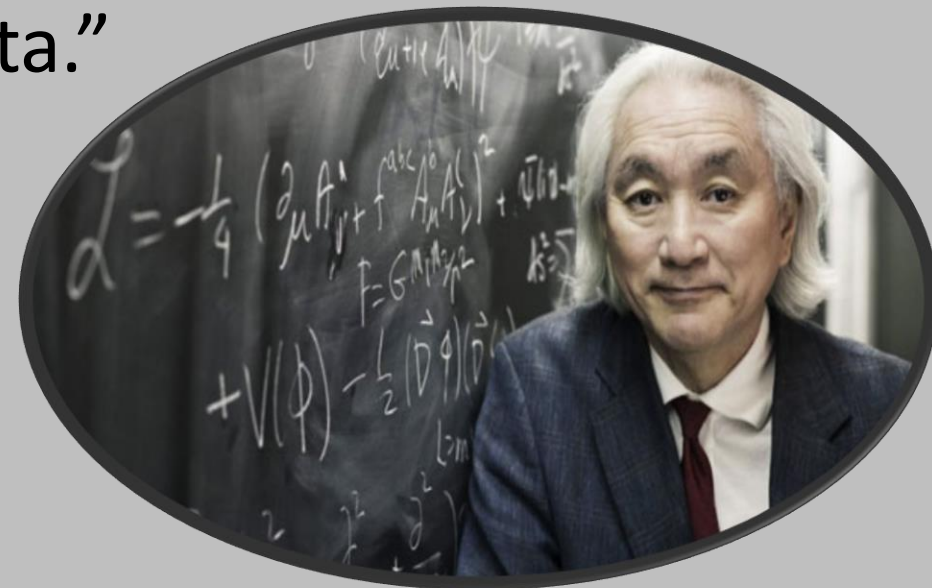
*Educate    Connect    Empower*

“All human activity will eventually be digitized, our love life, our personal finances, our education, our dreams...we’re going to be overwhelmed with data, so what is the key? The key is the network. The network has to be able to understand and digest vast oceans of information...

5G technology is up to a 100 times faster than 4G technology. It can handle this ocean of data.”

~ *Michio Kaku*

*Theoretical Physicist and Futurist*





# Bottom Line up Front

- The coming age is the Age of Data or the Information Age
- 5G is a new generation of information & communications technology (ICT) approaching that will take us from the current internet telephony to new levels of handling data.
- It can provide the **backbone** of **machine-to-machine networks**, the **4<sup>th</sup> Industrial Revolution**, and the **Internet of Things**.
- The industry will generate **\$12.3 trillion** to global economic output & **22mn jobs** worldwide.
- US and PRC Trade War rapidly becoming what FT calls a new **Technology Cold War**
  - Competition for **economic rewards** – **geo-economic**
  - Competition in **state powers over data** – **ideological**
  - Competition over **future of the internet** – **geopolitical**
  - Competition over **PRC ICT in US allies** – **geostrategic**



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# In the Data Age, how countries regulate and legislate data is of importance

### **PRC – various acts in different sectors under various agencies:**

- The Constitution, Arts 39, 40
- General Principles of the Civil Law, Art 252
- Tort Liability Law
- The 2012 NPC Decision
- The Cyber Security Law
- The National Intelligence Law
- Personal Information Security Specification
- The Data Law (pending)

### **US – various acts in different sectors under various agencies:**

- The Privacy Act
- Electronic Communications Privacy Act
- Truth in Lending Act
- Children's Online Protection Act
- Fair Credit Reporting Act
- Telemarketing Sales Rule
- Fair Debt Collection Practices Act
- CAN-SPAM

### **Council of Europe – Convention 108**















### **European Union – General Data Protection Regulation (GDPR)**

- E-Privacy Directive
- E-Privacy Regulation

### **UK – Data Protection Act**

### **California Consumer Privacy Act**

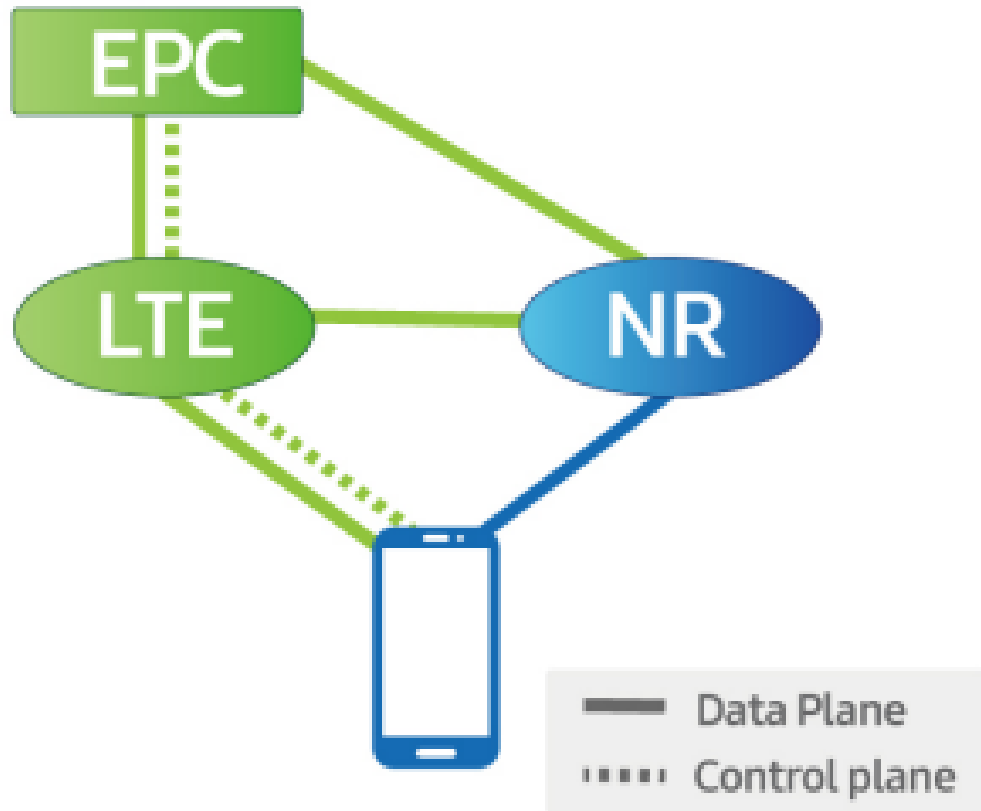
# What is 5G? Why has it become so much a part of the news?

 1991 <b>2G</b>	 1998 <b>3G</b>	 2008 <b>4G</b>	 2020? <b>5G</b>
 Texting	  Texting Internet access	  Texting Internet access  Video	  Texting Internet access   Ultra HD & 3-D video Smart home
<b>2G Frequencies</b>	<b>3G Frequencies</b>	<b>4G Frequencies</b>	<b>5G Frequencies</b>
<b>GSM 2G Upto 1.9 Ghz</b>	<b>HSDPA 3G Upto 2.1 Ghz</b>	<b>LTE 4G Upto 2.5 Ghz</b>	<b>IoT 5G Upto 95 Ghz</b>

CHROMONEY

5G allows for much larger amounts of data to be processed at faster speeds with almost perfect reliability.

## Non Standalone



## Standalone

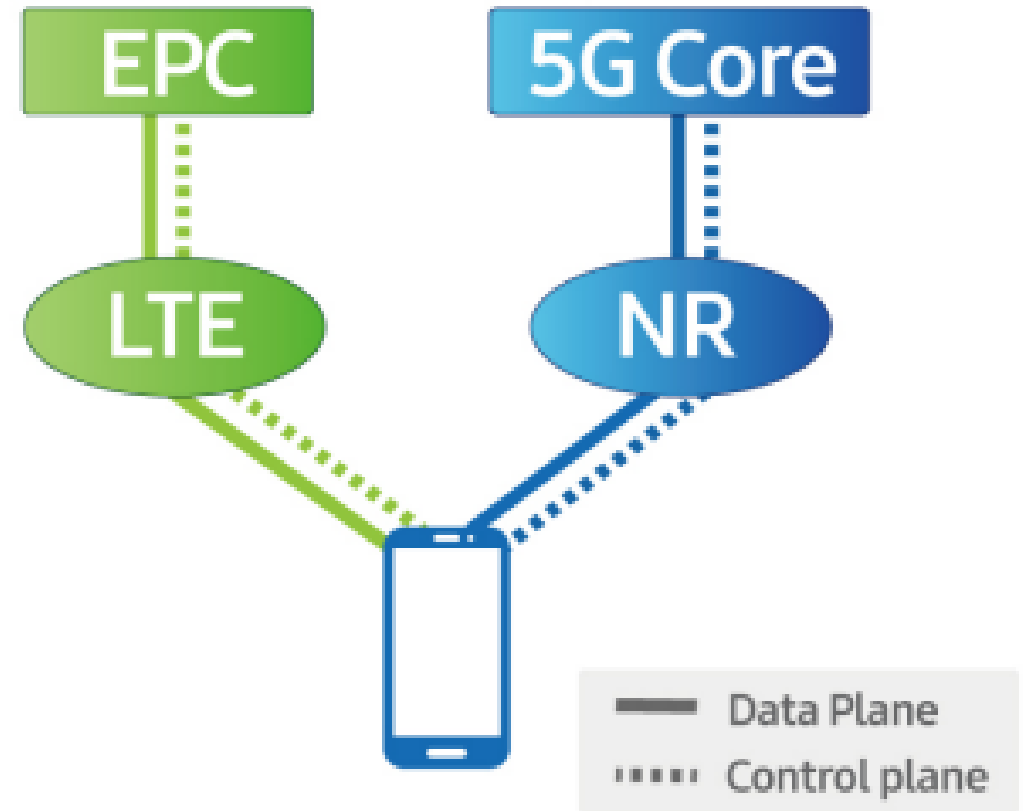
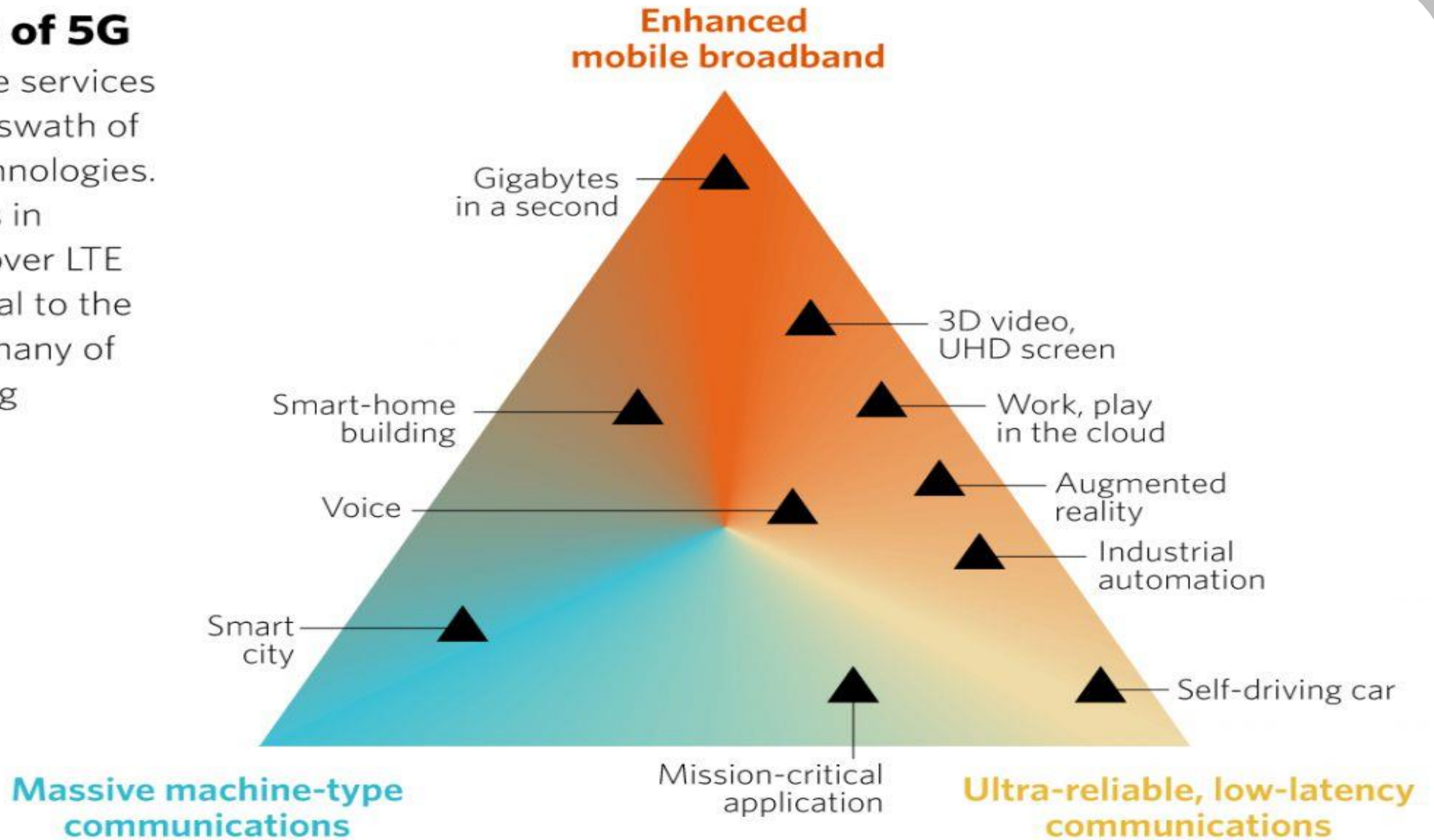


Figure 11 : How NSA and SA work

## Future Use of 5G

5G will provide services across a wide swath of disruptive technologies. Improvements in performance over LTE will be essential to the future use of many of these emerging applications.



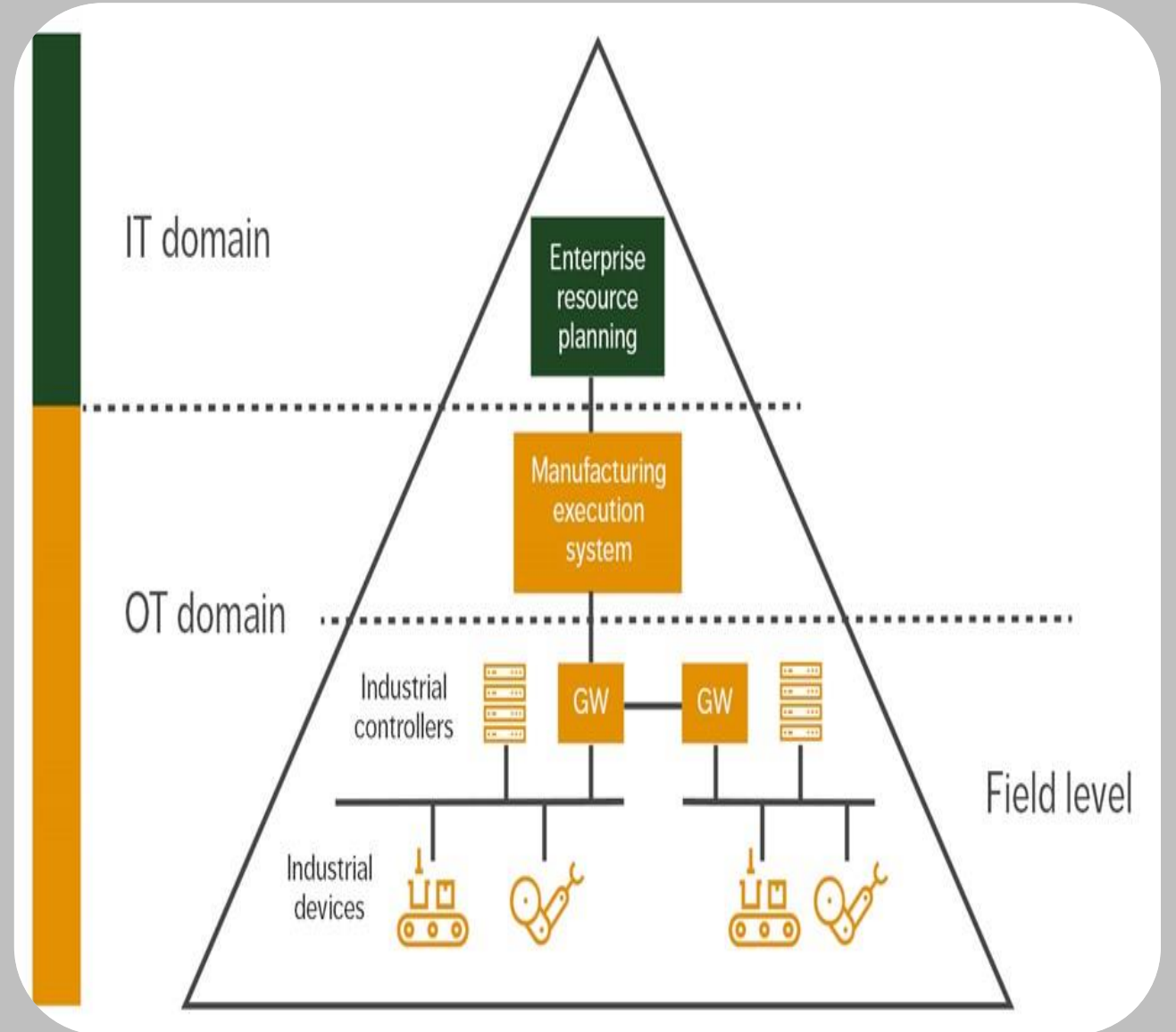


# SMART FACTORIES – 4<sup>th</sup> Industrial Revolution

Smart factories involve breaking down barriers between the current model of information technology and operations technologies.

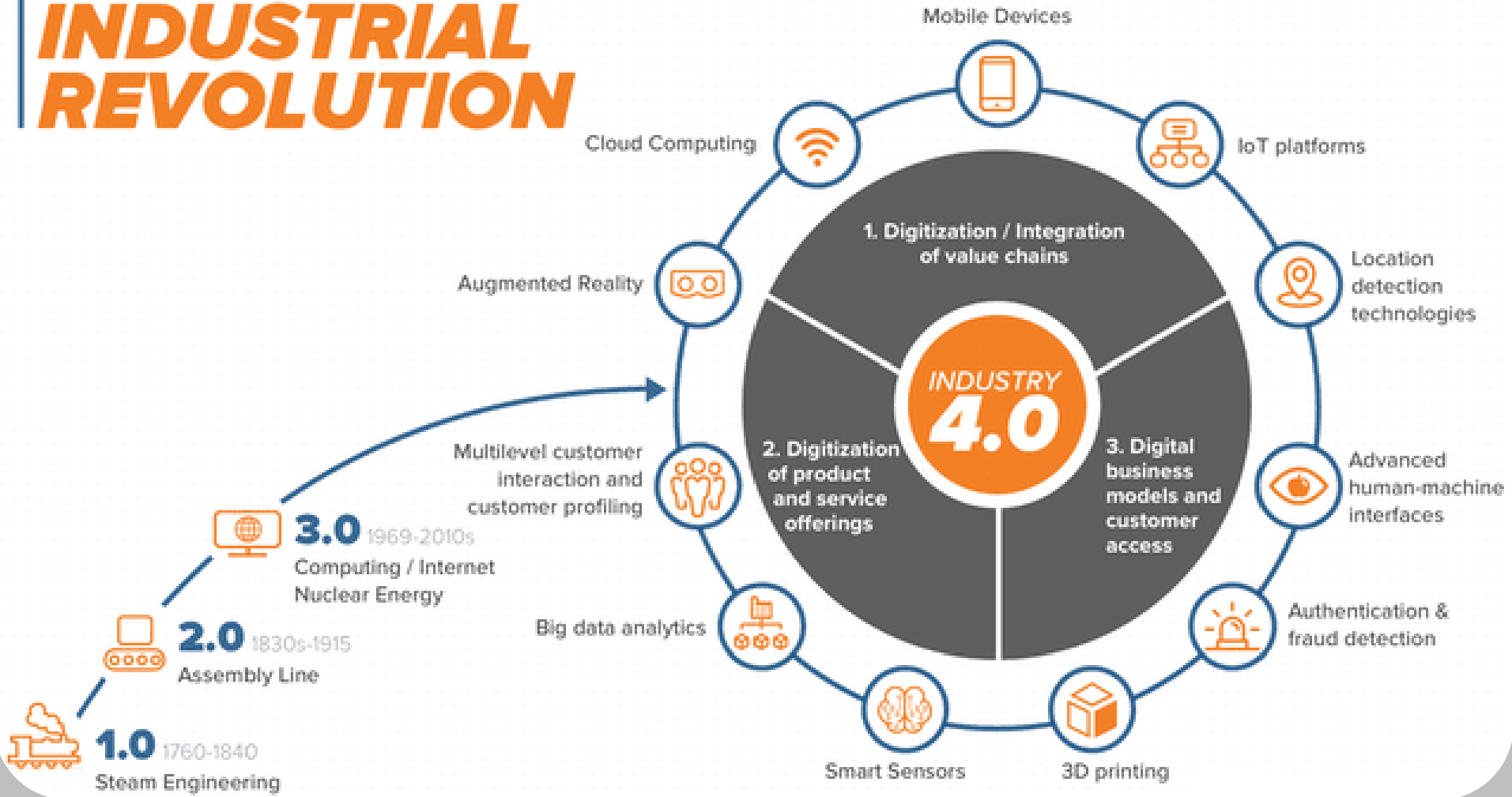
Data and systems at both the enterprise level and the operational level are connected, giving planners a perfect real-time of manufacturing and requirements.

5G reliability means greater reliability and precision by automated systems, both in terms of physical operations and time-related operations.





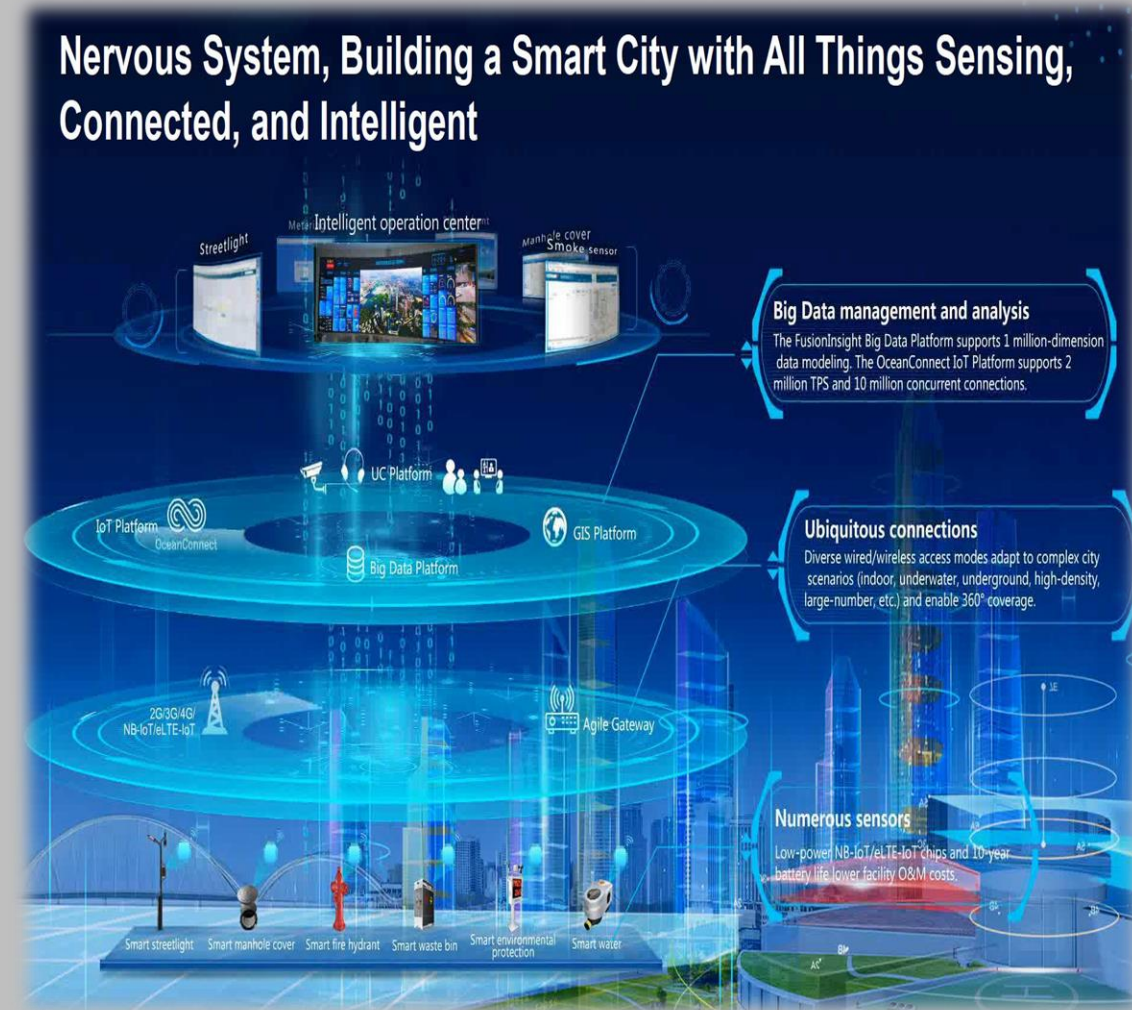
# FOURTH INDUSTRIAL REVOLUTION





# SMART CITIES & SAFE CITIES

- Smart Cities and Safe Cities have been built in 200 cities across 60 countries
- These build an array of sensor systems across the backbone of 5G, which brings large amounts of analyzable data to city planners and security officials at centralized points.
- Sensors on streets can tell when certain areas of a given city experience increased or decreased traffic, energy usage, or can warn about the breakdown of automated systems, thus allowing for a more efficient and streamlined provision of public goods.

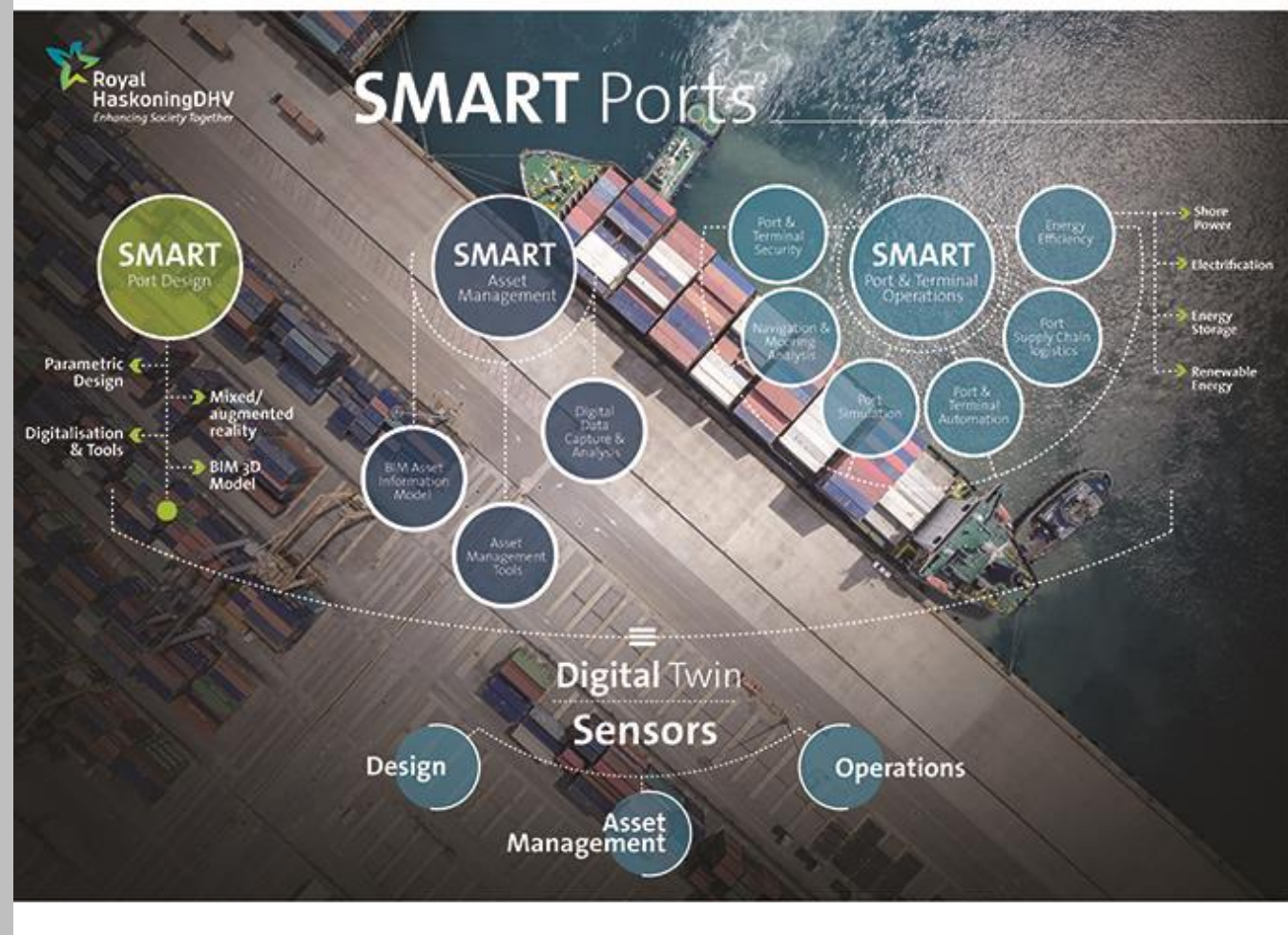




## SMART PORTS & SHIPPING

Smart Ports offer

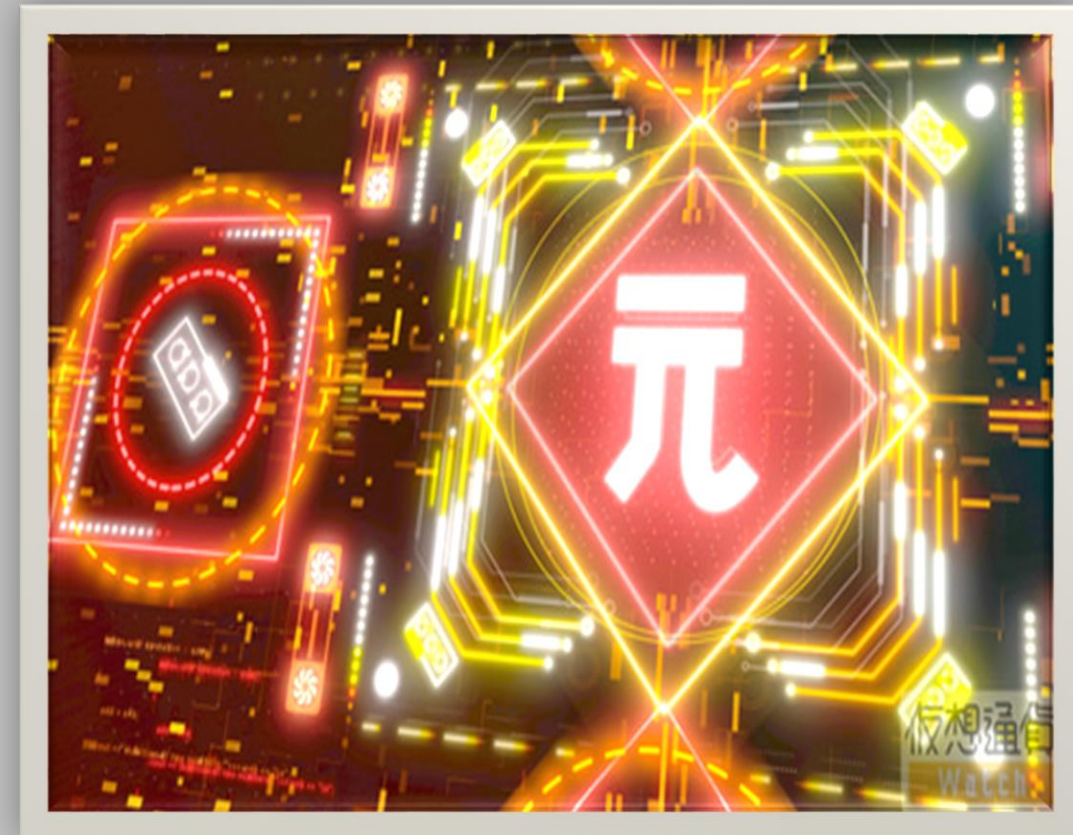
- Centralized data programs
- Smart-lifts and cranes, increasing productivity and lessening loading and unloading times
- Big data monitors to adhere to regulatory requirements
- Smart energy usage for power





## Whither security? At Black Hat 2019, 5G Security Flaws were as follows:

- **Mobile Network Mapping:** setting up a fake base station, hackers could map a network and receive all capabilities of devices inside that network. This is because devices must tell the base station their capabilities before encryption of data. A car is not a phone, a watch is not a smart home.
- **Capability Modification:** Hackers can take this data and modify capabilities, such as change the device category, risking data, usage, and safety. These attacks are also persistent since networks save capabilities across the devices.
- **On the other hand,** 5G network architecture gives good oversight, so anomalies or hacks can be detected and the encryption of data is better than 3G and 4G..
- Network-slicing adds another layer of buffer between one part of the network and the other.



## Discussion Points

- What is the connection between politics and technology?
- How do new technological breakthroughs impact national power among states in the international system?
- What is the primary driver for the new information age?
- How should we regulate safety in 5G?
- Why is 5G making so many waves as compared to previous ICT standards?



Maikalo