ITU Regional Standardization Forum (RSF)

Convergence of Technologies between Telecommunication and other Industry Sectors
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Roadmap of the Presentation

- Overview of Telecommunications sector
- Factors of Productions and its impact by technology
- Fourth Industrial Revolution
- Telecom technologies – the drivers of the Future
  - 5G
  - AI
  - IoT
  - Big Data
  - EDGE
  - Block chain
  - Cloud
- Intelligent Connectivity
- Financial Sector
- E-Healthcare
- Industry 4.0
- Smart Transport
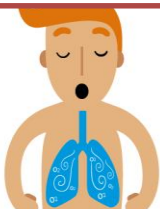- Smart Cities & Villages
- SWOT Analysis

TELECOMMUNICATIONS – The Vital Organ

Universal Basic Service
- Mobiles are used by 2/3rd of global population
- Bedrock of many sectors

Economic multiplier
- From changing individual's life to Country's economy
- Enormous impact on GDP as well as Social indicators

Spectrum is the new Oxygen
- Wireless connectivity, a new norm
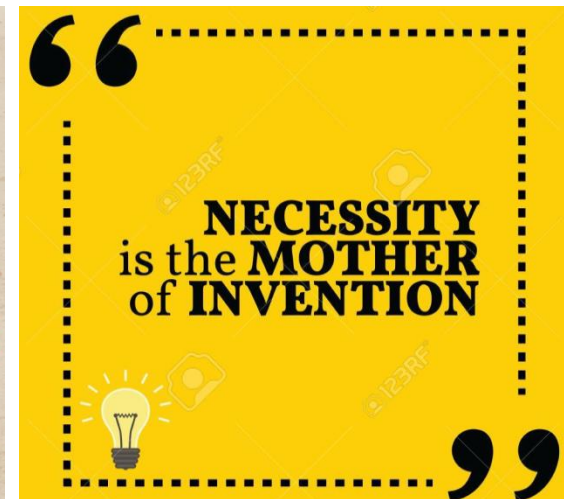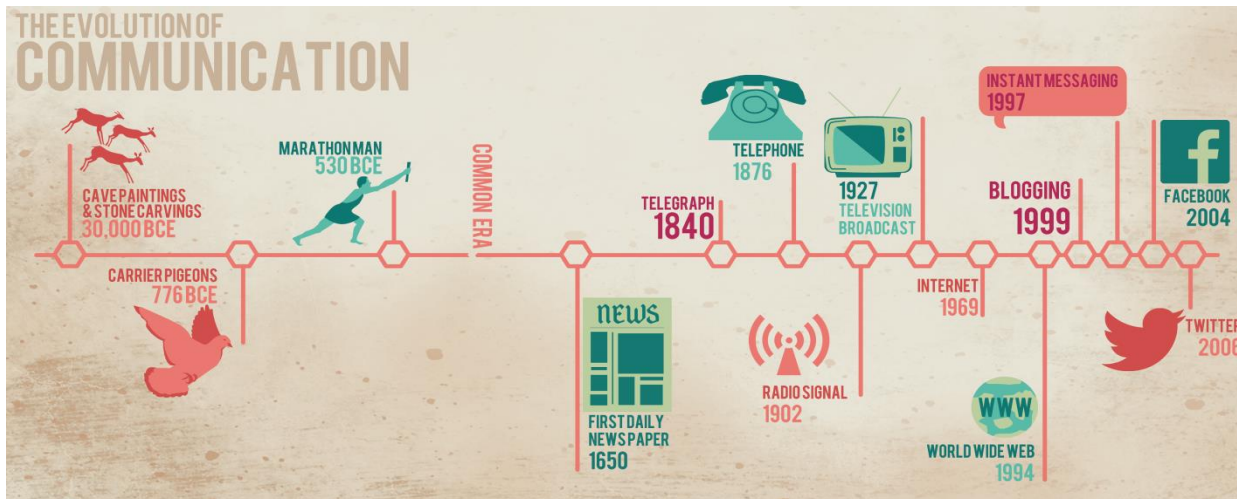- Citizens to Netizens - All walks of Life – e.g. IOT

Mobile is the new vital organ
- From Luxury to most Basic
- One stop shop – Start and end a day with Mobile

TECHNOLOGY is the Necessity of Future

- There were times when technology was used only as an **Enabler**. But we are in the times of disruption where lack of technological up gradation is leading to non-existence of businesses

- Technology has become a core necessity and in fact all the factors of production are being altered in unbelievable ways by the latest inventions

- The evolution of Technology is relentless and is changing at a rapid pace. The Telecom/ICT domain is the pioneer in this technological evolution and has become a base for all the sectors welcoming all of us to this Disruptive world

- If Necessity is the Mother of Invention then *Technology is the Necessity of the Future*

THE EVOLUTION OF COMMUNICATION

CAVE PAINTINGS & STONE CARVINGS 30,000 BCE
CARRIER PIGEONS 776 BCE
MARATHON MAN 530 BCE
COMMON ERA
TELEGRAPH 1840
FIRST DAILY NEWSPAPER 1650
TELEPHONE 1876
RADIO SIGNAL 1902
1927 TELEVISION BROADCAST
INTERNET 1969
WORLD WIDE WEB 1994
INSTANT MESSAGING 1997
BLOGGING 1999
FACEBOOK 2004
TWITTER 2006

NECESSITY is the MOTHER of INVENTION

"Uber, the world's largest taxi company, owns no vehicles. Facebook, the world's most popular media owner, creates no content. Alibaba, the most valuable retailer, has no inventory. And Airbnb, the world's largest accommodation provider, owns no real estate. Something interesting is happening."

Tom Goodwin Senior VP of Strategy & Innovation Havas Media

भारत दूरसंचार
INDIA TELECOM

"*Convergence is a deep integration of knowledge, tools, and all relevant activities of human activity for a common goal, to allow society to answer new questions to change the respective physical or social ecosystem.*


Technological convergence, in general, refers to the trend or phenomenon where two or more independent technologies integrate and form a new outcome

One example is the Smartphone. A smartphone integrated several independent technologies—such as telephone, computer, camera, music player, television (TV), and geolocation and navigation tool—into a single device. The smartphone has become its own, identifiable category of technology

Example of Convergence

MEDIA & PLATFORM CONVERGENCE
© Gary Hayes 2006
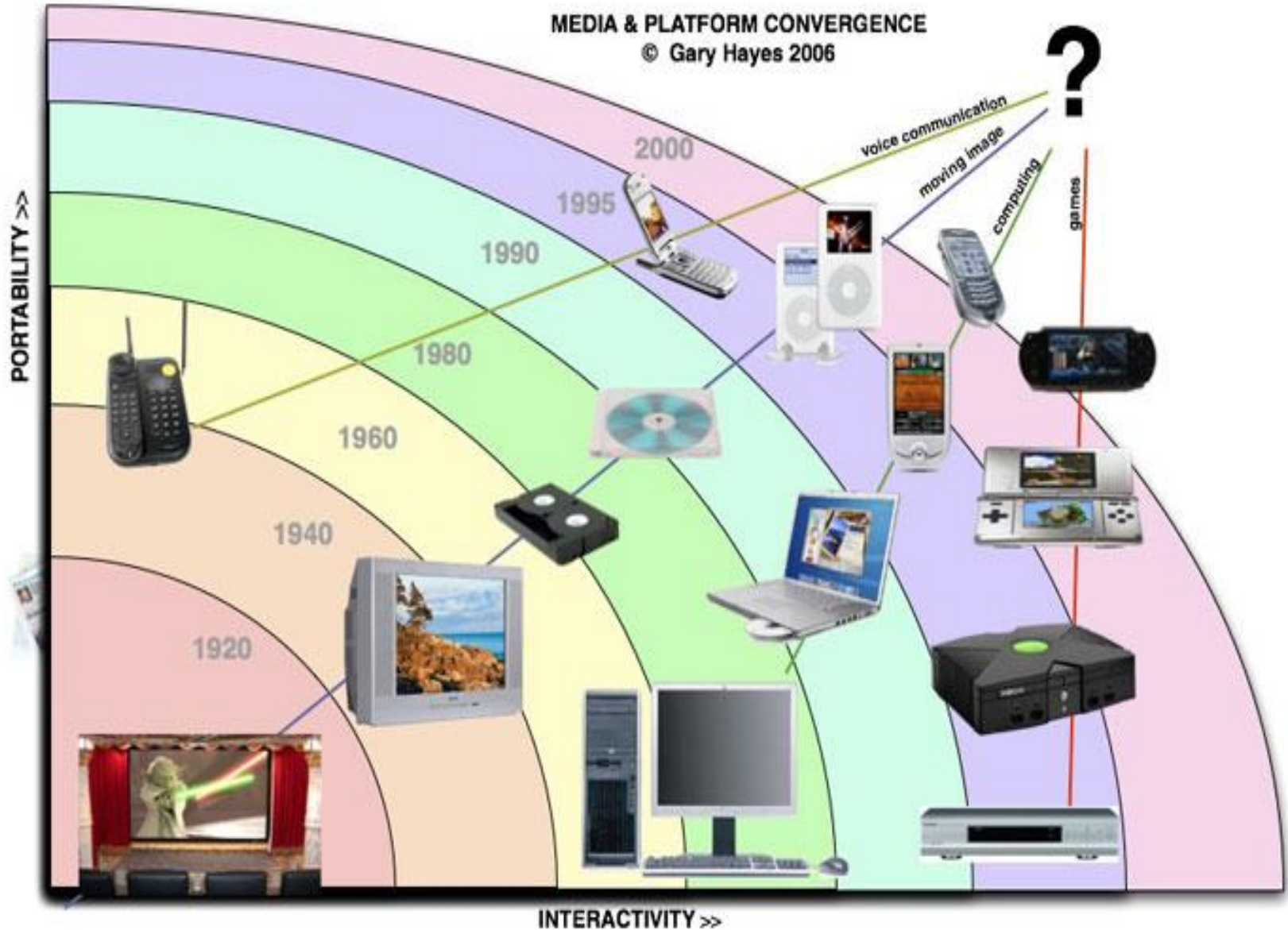
Factors of Production and Technology

- Factors of production is an 'economic term' that describes the inputs used in the production of goods or services in order to make an economic profit.

- These include any resource needed for the creation of a good or service.

- The factors of production typically include land, labour, capital, entrepreneurship, and the state of technological progress
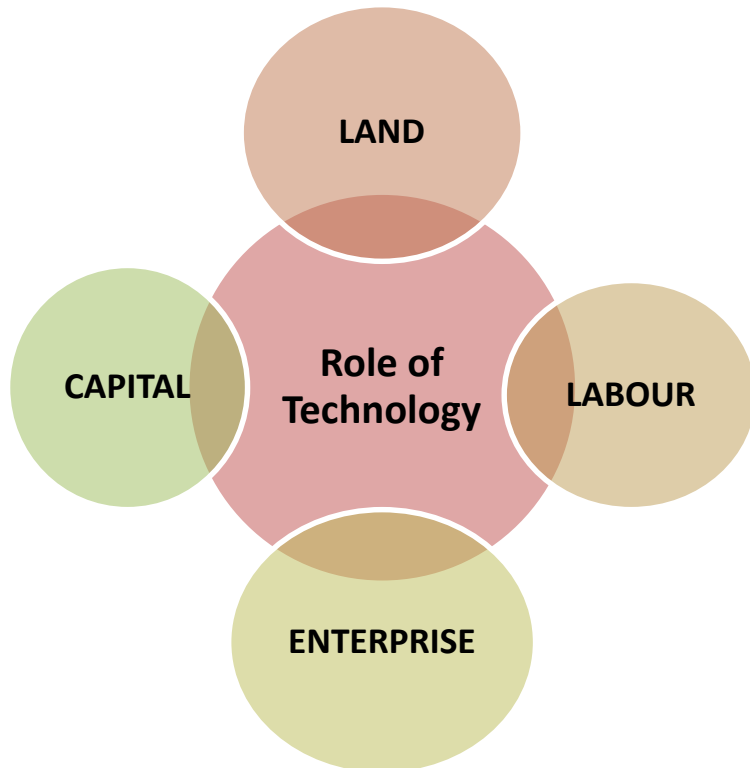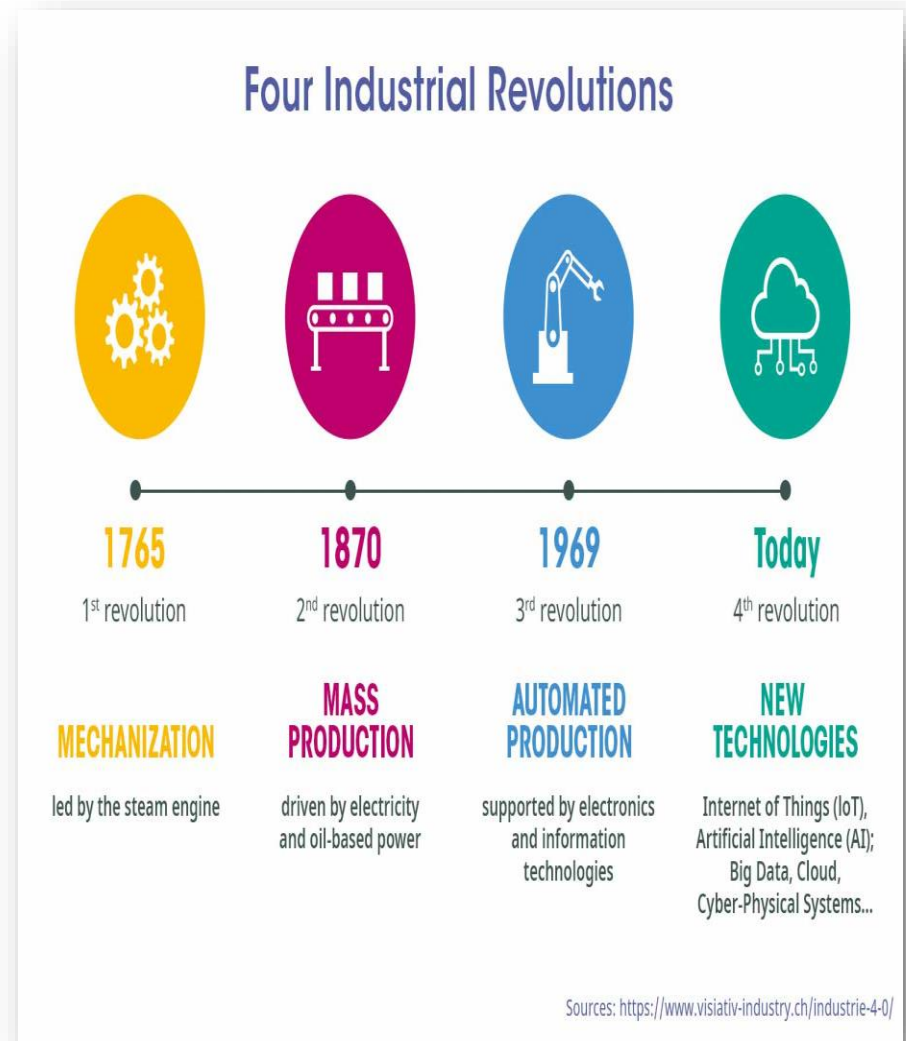

In this digital era, the ecosystem of the entire economy is being transformed at every possible layer, thereby constantly changing the dynamics of the Factors of Production

More than the Factors of Production such as Land, Capital, Labour & Enterprise, the Technology of Production is playing a vital role as a catalyst in bring newer efficient ecosystem

- Building on the widespread availability of digital technologies that were the result of the Third Industrial, or Digital Revolution, the Fourth Industrial Revolution will be driven largely by the convergence of digital, biological, and physical innovations

- This is the first industrial revolution rooted in a new technological phenomenon—digitalization—rather than in the emergence of a new type of energy

- This digitalization enables us to build a new **virtual world** from which we can steer the physical world

- It's important to appreciate that the Fourth Industrial Revolution involves a systemic change across many sectors and aspects of human life: the crosscutting impacts of emerging technologies are even more important than the exciting capabilities they represent

Four Industrial Revolutions

1765	1870	1969	Today
1st revolution	2nd revolution	3rd revolution	4th revolution
MECHANIZATION	**MASS PRODUCTION**	**AUTOMATED PRODUCTION**	**NEW TECHNOLOGIES**
led by the steam engine	driven by electricity and oil-based power	supported by electronics and information technologies	Internet of Things (IoT), Artificial Intelligence (AI); Big Data, Cloud, Cyber-Physical Systems...

Sources: https://www.visiativ-industry.ch/industrie-4-0/

Telecom Technologies - The Drivers of the Future

Latest technological phenomenon that have the potential to totally transform the real:

1. 5G Technology
2. Artificial Intelligence (AI)
3. Internet of Things (IoT)
4. Big Data & Analytics
5. EDGE Computing
6. Block chain technology
7. Cloud Computing
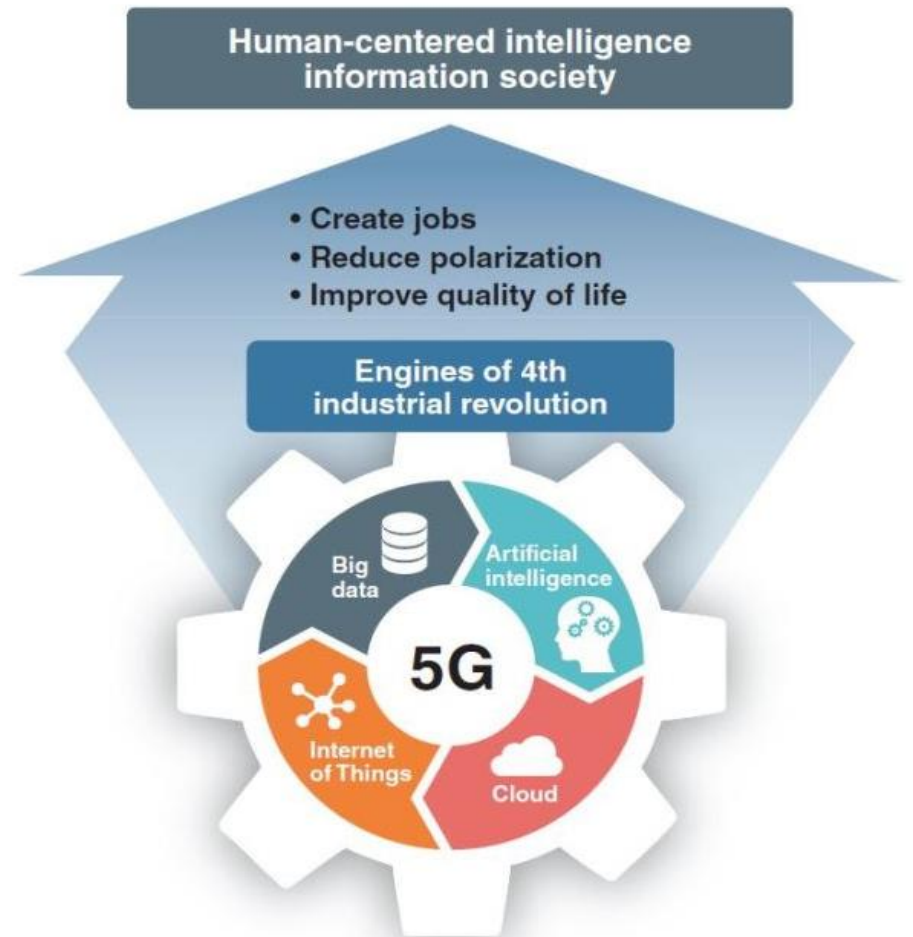
5G-interconnect people as well as interconnect and control machines, objects, and devices. 5G will deliver Ultra Reliable low Latency Connectivity (URLLC)

- **Enhanced Mobile Broadband:**

  5G will usher in new immersive experiences, such as VR and AR, with faster, more uniform data rates, lower latency, and cost-per-bit

- **Mission-Critical communications:**

  5G will enable new services that can transform industries with ultra-reliable/available, low latency links—such as remote control of critical infrastructure, vehicles, and medical procedures

- **Massive Internet of Things:**

  5G seamlessly connect a massive number of embedded sensors in virtually everything through the ability to scale down in data rates, power and mobility to provide extremely lean/low-cost solutions

5G will differentiate itself by delivering various improvements:

10x Decrease in latency: Delivering latency as low as 1 ms.

10x Connection density: Enabling more efficient signaling for IoT connectivity.

3x Spectrum efficiency: Achieving even more bits per Hz with advanced antenna techniques.

100x Traffic capacity: Driving network hyper-densification with more small cells everywhere.

10x Experienced throughput: Bringing more uniform, multi-Gbps peak rates.

100x Network efficiency: Optimizing network energy consumption with more efficient processing.

source visualcap via @mikequindazzi

Internet of Things – for a Connected Living

System of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction

Wearables
- Entertainment
- Fitness
- Smart watch
- Location and tracking

Building & Home Automation
- Access control
- Light & temp control
- Energy optimization
- Predictive maintenance
- Connected appliances

Smart Cities
- Residential E-meters
- Smart street lights
- Pipeline leak detection
- Traffic control
- Surveillance cameras
- Centralized and integrated system control

Smart Manufacturing
- Flow optimization
- Real time inventory
- Asset tracking
- Employee safety
- Predictive maintenance
- Firmware updates

Health Care
- Remote monitoring
- Ambulance telemetry
- Drugs tracking
- Hospital asset tracking
- Access control
- Predictive maintenance

Automotive
- Infotainment
- Wire replacement
- Telemetry
- Predictive maintenance
- C2C and C2I

BIG DATA – The Goldmine of the Future

- Big data is a term that describes the large volume of data – both structured and unstructured – that inundates a business on a day-to-day basis
- Characteristics of Big Data
  - Volume
  - Variety
  - Velocity
  - Variability
  - Veracity

- The tremendous use of Big Data is the use the mix of above Vs to create the most important V – VALUE.

- Data Analytics and Data Science concepts acting as tools to extract meaningful information from Big data for various use cases.

Top 10 sectors using big data analytics

Banking and securities
Helps in reducing Fraudulent Transactions

Communications & Media
For simultaneous real time reports of several Platforms

Healthcare
to collect public health report and identift global spread of various viruses.

Education
To update and upgrade prescribed literature for rapid growth

Manufacturing
To enhance Supply Chain Management

Insurance
For developing new products and handling claims through anaytics.

Consumer Trade
To enhance Supply Chain Management

Transportation
For better managing traffic plan and logistics

Energy
Helps in measuring Electricity usage with Smart meters

Sports
To monitor the performance of individual players and teams by analysis

maruti techlabs

Artificial Intelligence – The Smarter Future

- Simulation of human intelligence processes by machines, especially computer systems

- Artificial intelligence is based on the principle that human intelligence can be defined in a way that a machine can easily mimic it and execute tasks, from the most simple to complex. The goals of artificial intelligence include learning, reasoning, and perception

- The applications for artificial intelligence are endless. The technology can be applied to many different sectors and industries
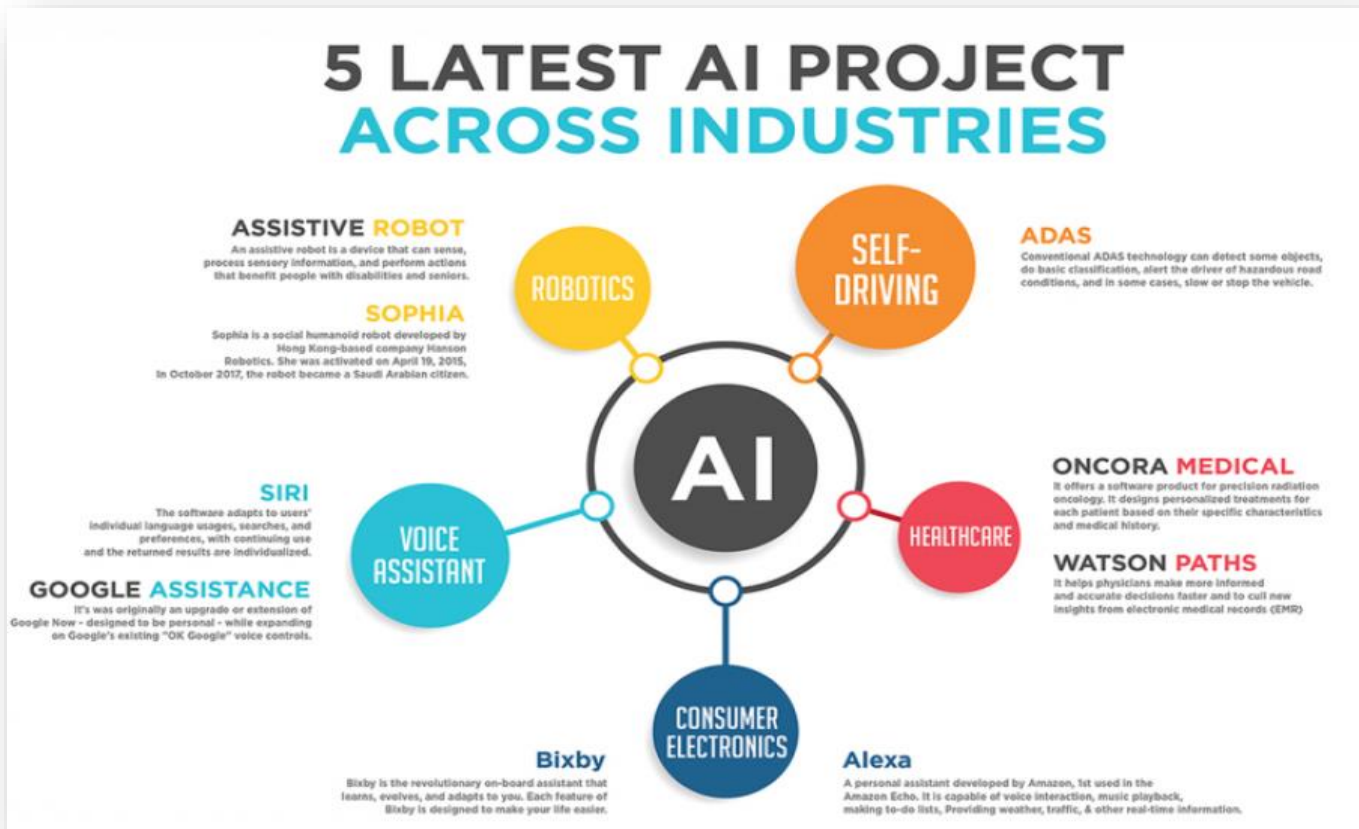
Edge computing is the practice of processing data near the **edge** of your network, where the data is being generated, instead in a centralised data-processing warehouse

Benefits

– Speed – reduced latency
– Security
– Scalability
– Versatility
– Reliability

- As innovative devices like autonomous vehicles and medical sensors become more common, edge computing will have an increasingly large impact on society

- The computing is done at or near the source of the data, instead of relying on the cloud at one of a dozen data centres to do all the work. It doesn't mean the cloud will disappear. It means the cloud is coming to you….

HOW EDGE COMPUTING WORKS

Edge computing allows data from internet of things devices to be **analyzed at the edge of the network** before being sent to a data center or cloud.

Internet of Things

Cloud

EDGE Local Processing

Edge Gateway

Corporate Data Center

© NETWORK WORLD
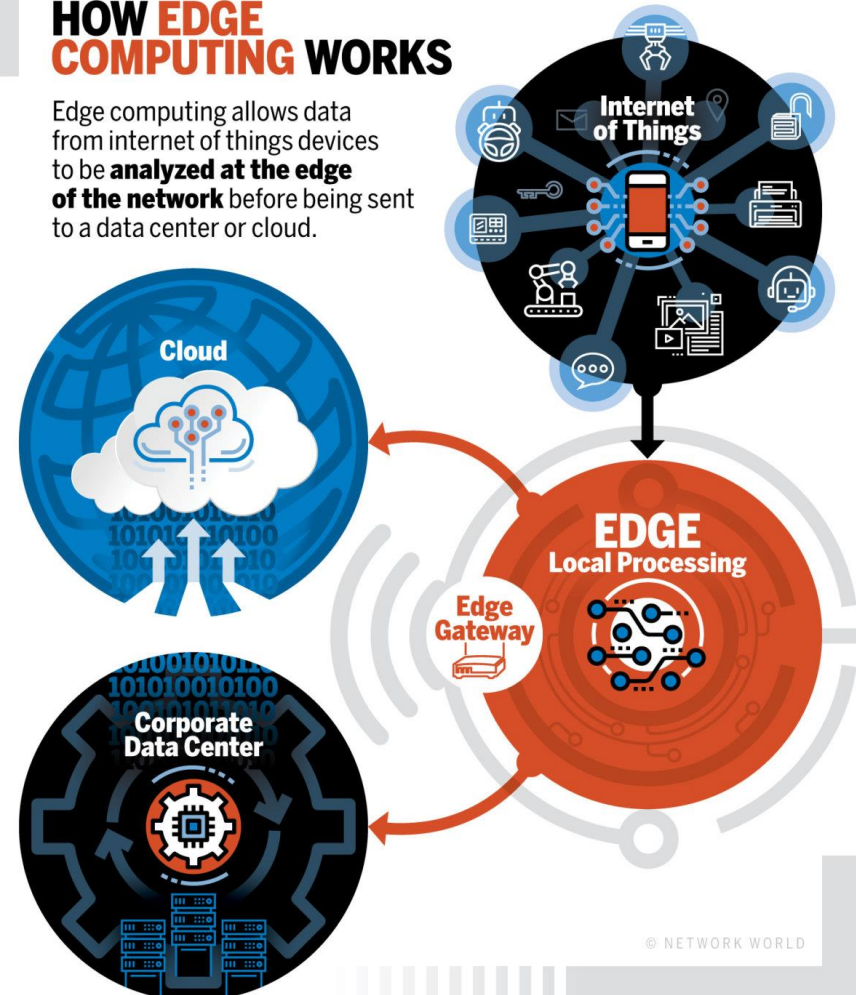
- A blockchain is, in the simplest of terms, a time-stamped series of immutable record of data that is managed by cluster of computers not owned by any single entity. Each of these blocks of data (i.e. block) are secured and bound to each other using cryptographic principles (i.e. chain).

- Major Features
  – Immutability
  – Transparency
  – Better Security
 – Faster Transactions
  – Smart Contracts
  – Disintermediation

Why Blockchain Technology
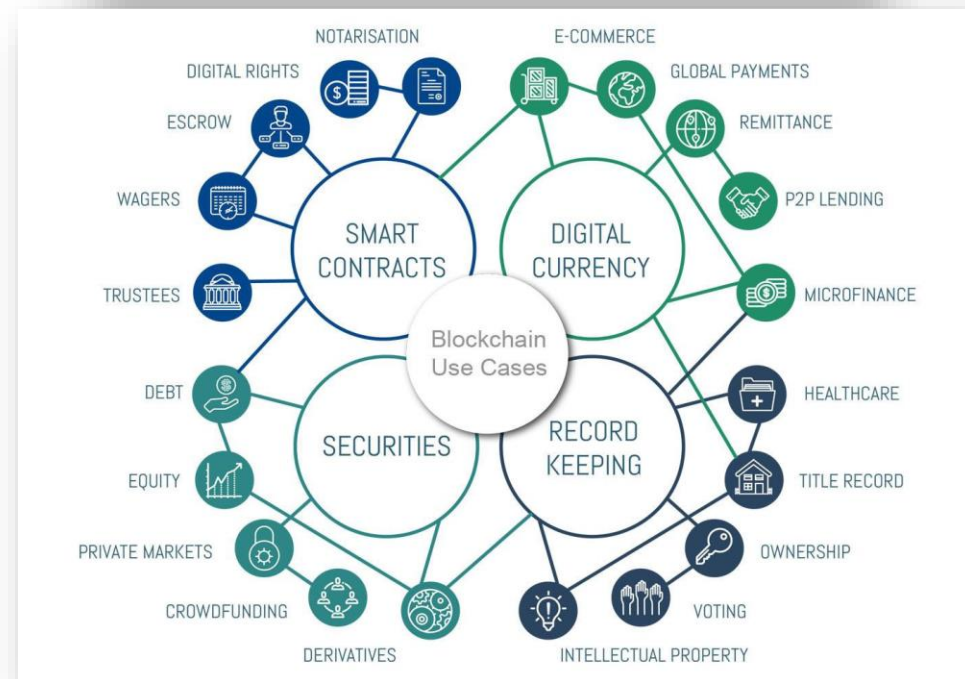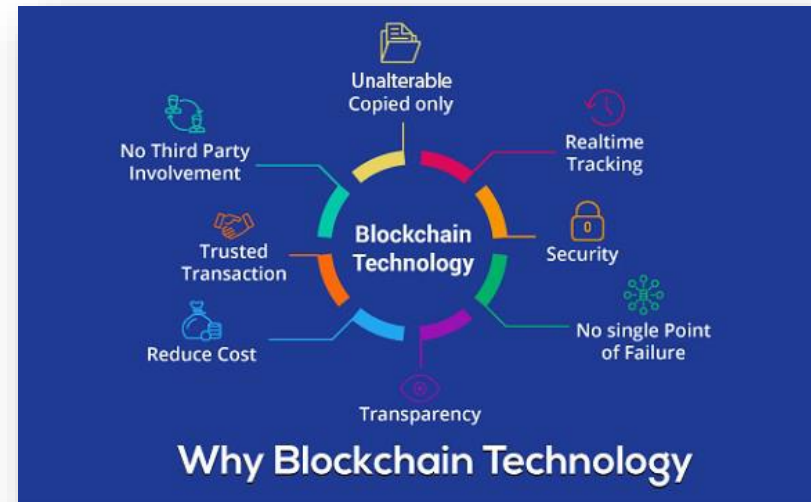
- The Fusion of the previously discussed technologies will enable Intelligent connectivity which connects everyone and everything for a **Better Future**

- These Telecom technologies are not standalone systems but they converge with each other in much smarter way to create infinite number of applications in multiple sectors

- Intelligent connectivity enables transformational new capabilities in transport, entertainment, industry and much more.

- In order for technical systems to match human actions digitally with connected environments - the network used must be ultra-reliable, as many critical tasks will be executed remotely, and must also rely on cost-effective edge infrastructure to enable scaling.

- UPLLC is therefore necessary for such services to work optimally. Intelligence can then be enabled close to the user experience through mobile edge computing; at the application level IoT, artificial intelligence (AI), automation, robotics, telepresence, augmented reality (AR) and virtual reality (VR) will all also play a part.

Diving into the Future - It is not just the convergence of various technologies but also the Convergence of the Human Capabilities with the Cyber world – thus creating a truly fascinating futuristic world.

Convergence in Financial Sector
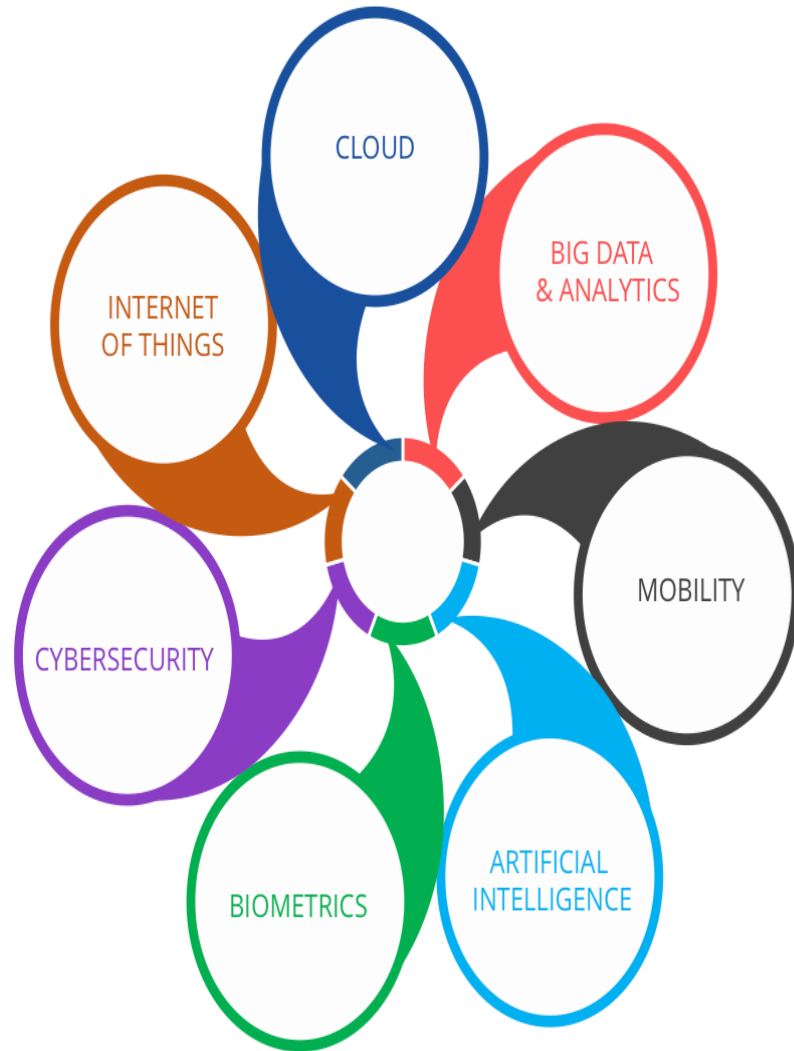
BIG DATA & ANALYTICS
Financial Services Industry are focusing on transforming their archive systems with a strong focus on data analytics. Payments has witnessed increased use of consumer data to provide value-added services to customers. In Insurance we see increased use of advanced data techniques and analytics to identify and quantify risk.

MOBILITY
The so called challenger banks are focusing on digital and are engaging customers through mobile technology. For example, mobile telecoms giant, Orange launched Orange Bank with an unique mobile banking experience.

ARTIFICIAL INTELLIGENCE
Startups are using AI to improve and expand credit offerings, insurance options, personal finance services, and regulatory software. For example machine learning will have an impact on asset managers and investment banks where analysts leverage data and AI solutions to be more efficient.

BIOMETRICS
Biometric authentication is slowly infiltrating the financial system. Driving the movement to biometrics payments is Apple Pay, which paved the way for consumers to make payments in stores and on apps using fingerprints. Android Pay and Samsung Pay helped drive adoption further.

CYBERSECURITY
Increased digitisation and connectivity means cybercrime is rising by leaps and bounds. Recent cyber attacks on Tesco Bank and Lloyds Bank has made cybersecurity an top agenda for banks and other financial institutions.

INTERNET OF THINGS
In insurance, IOT has already been applied through telematics for instance, which allow for the monitoring of driver behavior for car insurance. In the UK, Neos claims to be the country's first connected home insurance company, providing customers with connected technologies to monitor potential threat in real-time.
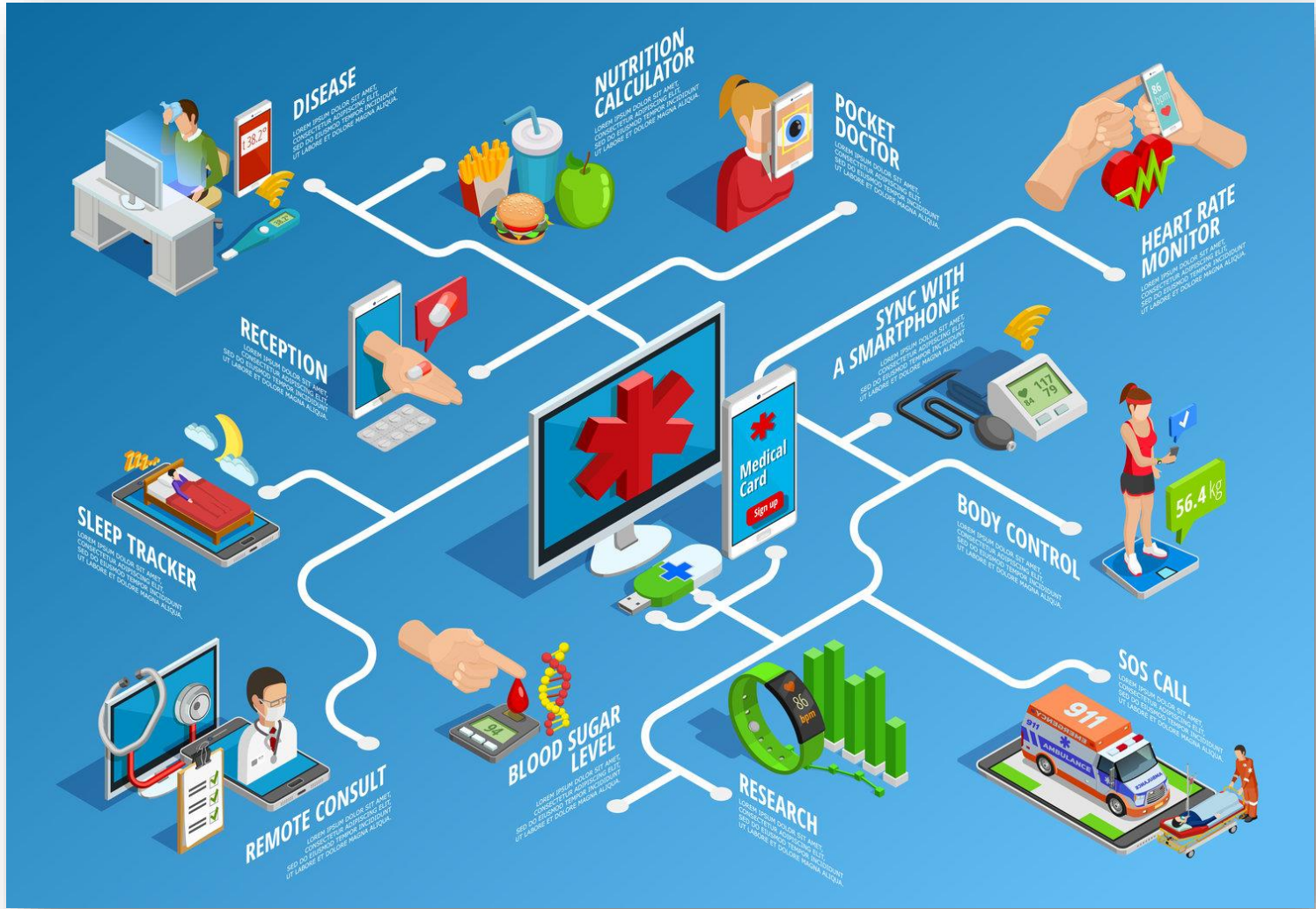
CLOUD
The banking and capital markets sector is embracing cloud-based software and systems. Microservices, utility provider services and automatic upgrades are examples of FinTech innovation that is possible in the cloud.

Convergence in Health Sector

- Improving patient experience with personalized, preventative care

- Telehealth, telemedicine, e-health

- Adding a high-speed 5G network to existing architectures can help quickly and reliably transport huge data files of medical imagery, which can improve both access to care and the quality of care

- Telemedicine requires a network that can support real-time high-quality video, which often means wired networks. With 5G, healthcare systems can enable mobile networks to handle telemedicine appointments, which can greatly increase the reach of the program

- By using IoT devices, healthcare providers can monitor patients and gather data that can be used to improve personalized and preventive care

- Many key healthcare functions are beginning to use artificial intelligence (AI) to determine potential diagnoses and decide on the best treatment plan for a specific patient. Additionally, AI can help predict which patients are more likely to have post-operative complications, allowing healthcare systems to provide early interventions when necessary
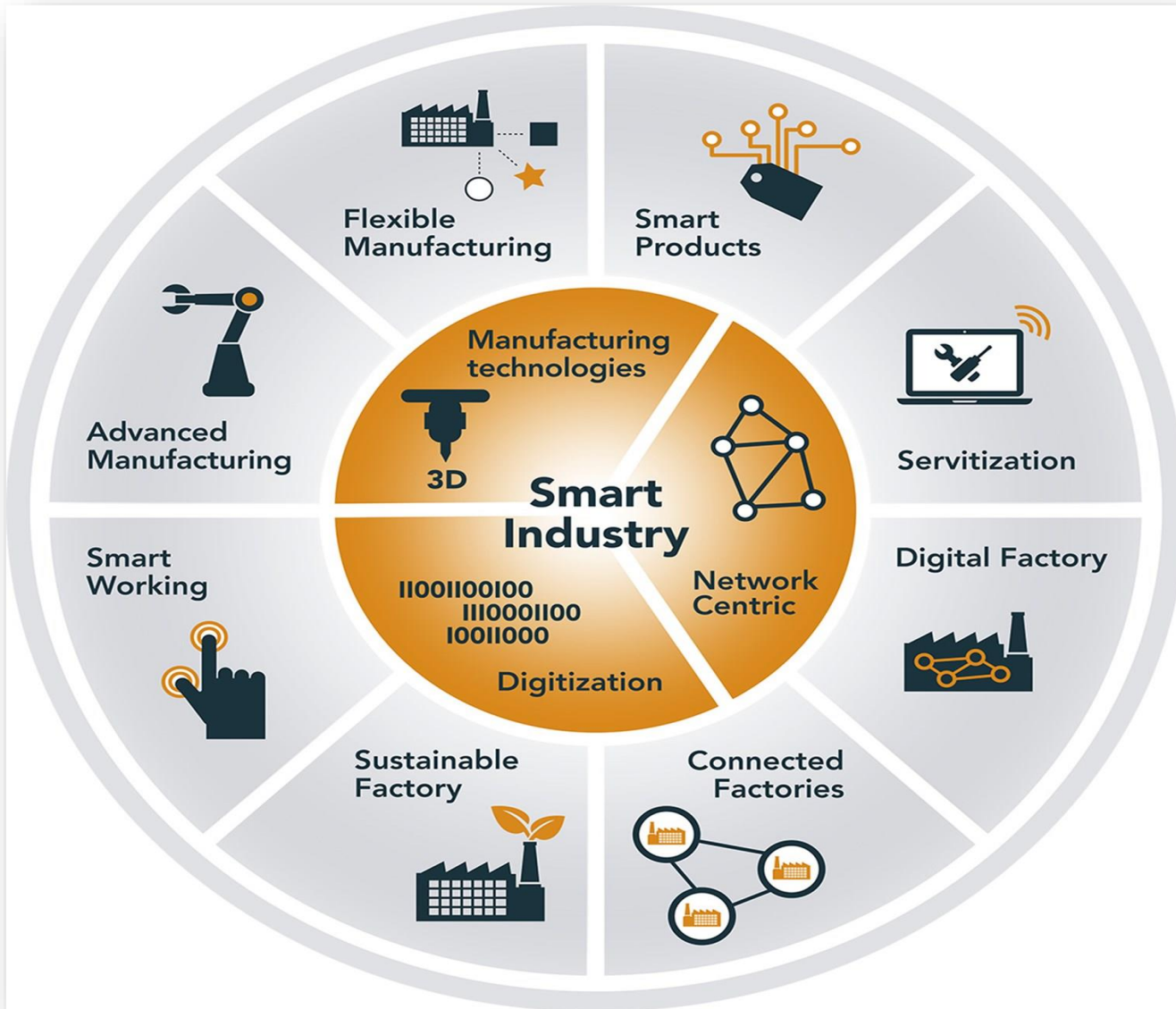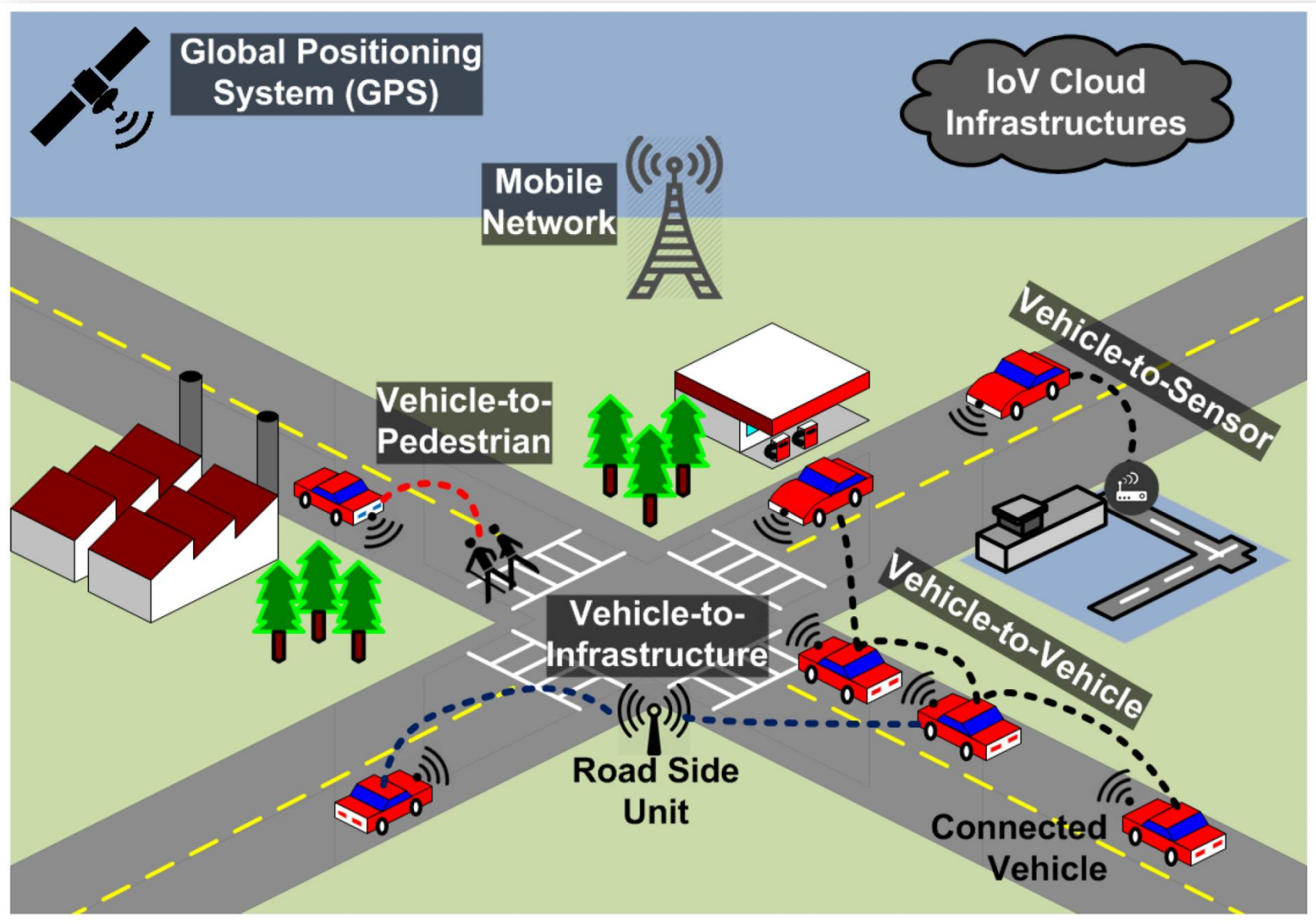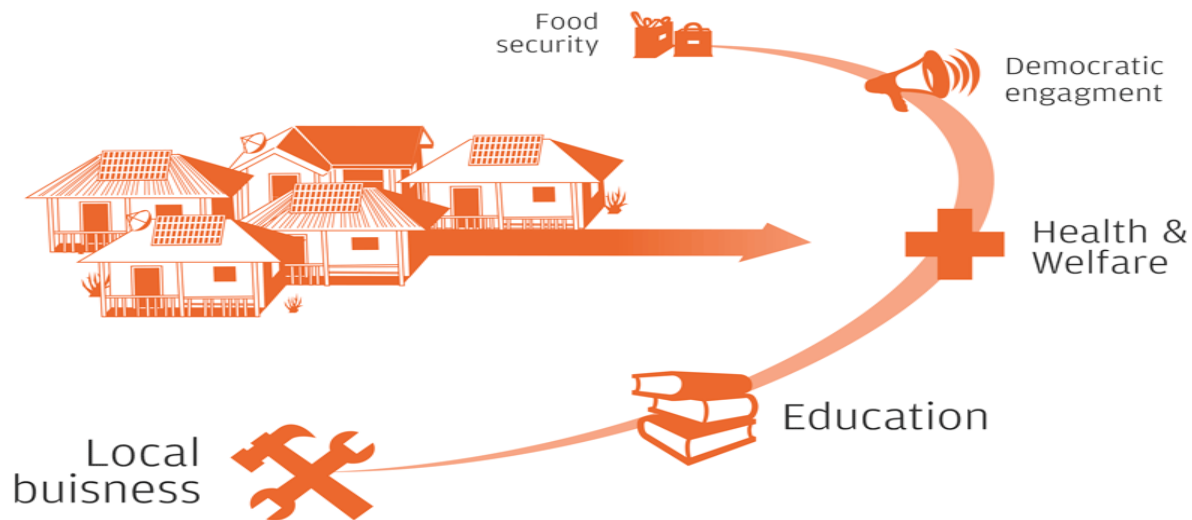
Smart Healthcare

SWOT Analysis of Digital Convergence

Strengths	Weaknesses
Telecom penetration Smartphone usage Empowerment - Ease, Comfort, Fast 3As – Availability, Affordability, Accessibility Cost effective Disintermediation	Investments Digital Divide Digital Illiteracy Absence of uniform standards Regulatory imbalances
Opportunities	**Threats**
4 Ds – Demography, Demand, Doable, Development Plugging the Divide - Equality	Cyber Security Data protection & privacy issues Loss of Jobs?