

Internet of Things

The Key for Beyond Industrial Technology



Mohamad Ridwan

Industrial Evolution



— 18th Century —

Industry 1.0

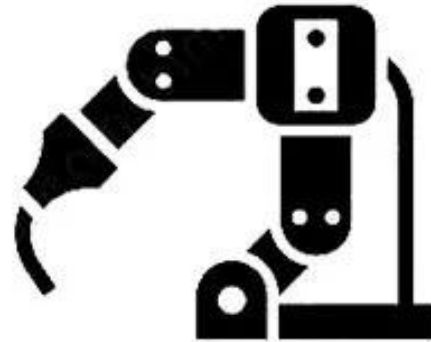
Mechanical production equipment powered by steam



— 19th Century —

Industry 2.0

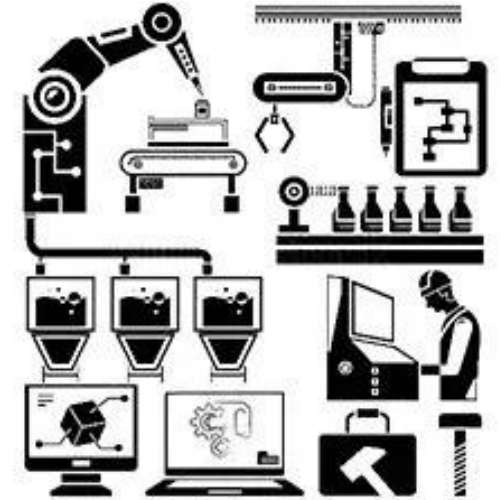
Mass production assembly lines requiring labour and electrical energy



— 20th Century —

Industry 3.0

Automated production using electronics and IT

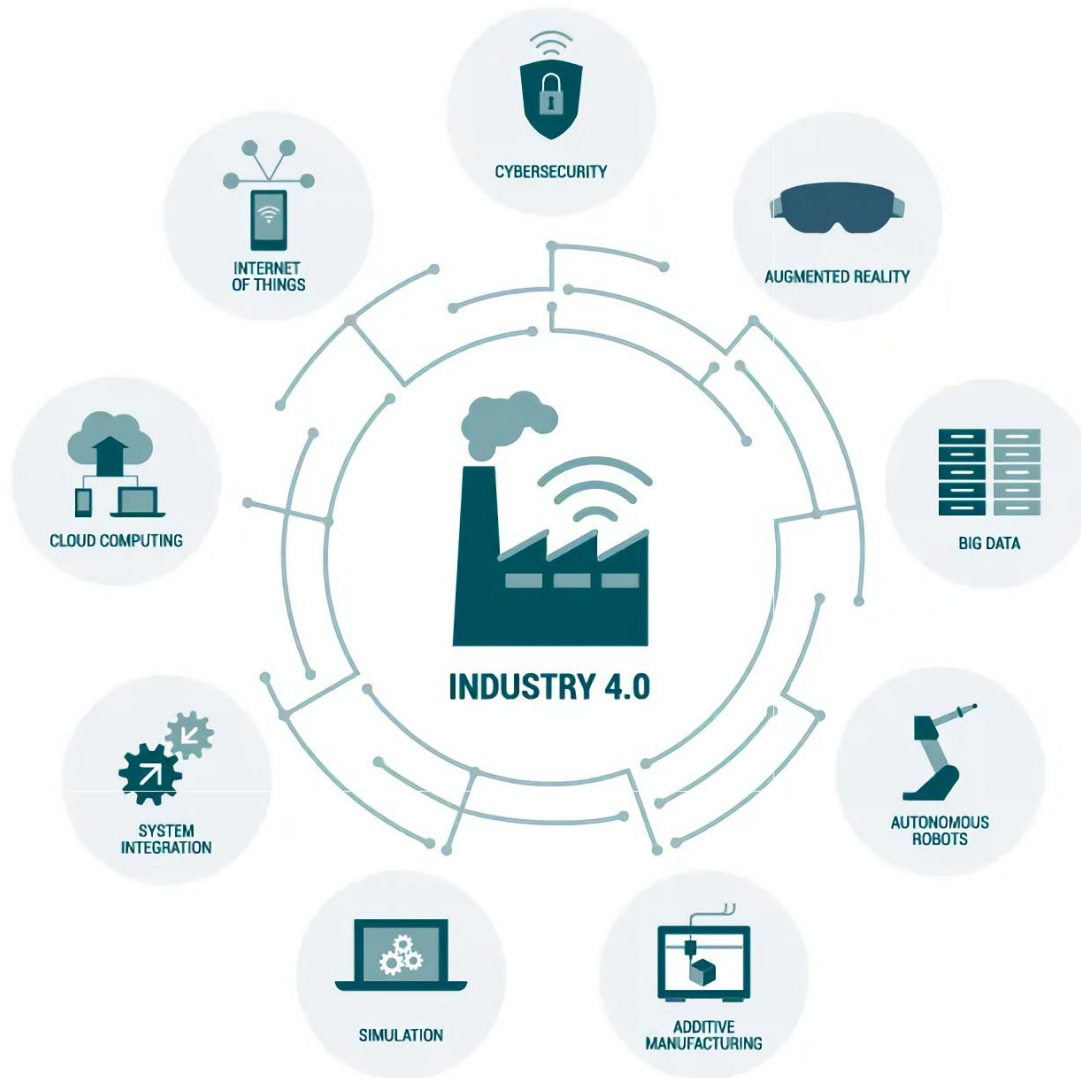


— Today —

Industry 4.0

Intelligent production incorporated with IoT, cloud technology & big data

Industry 4.0 – The Digital Transformation

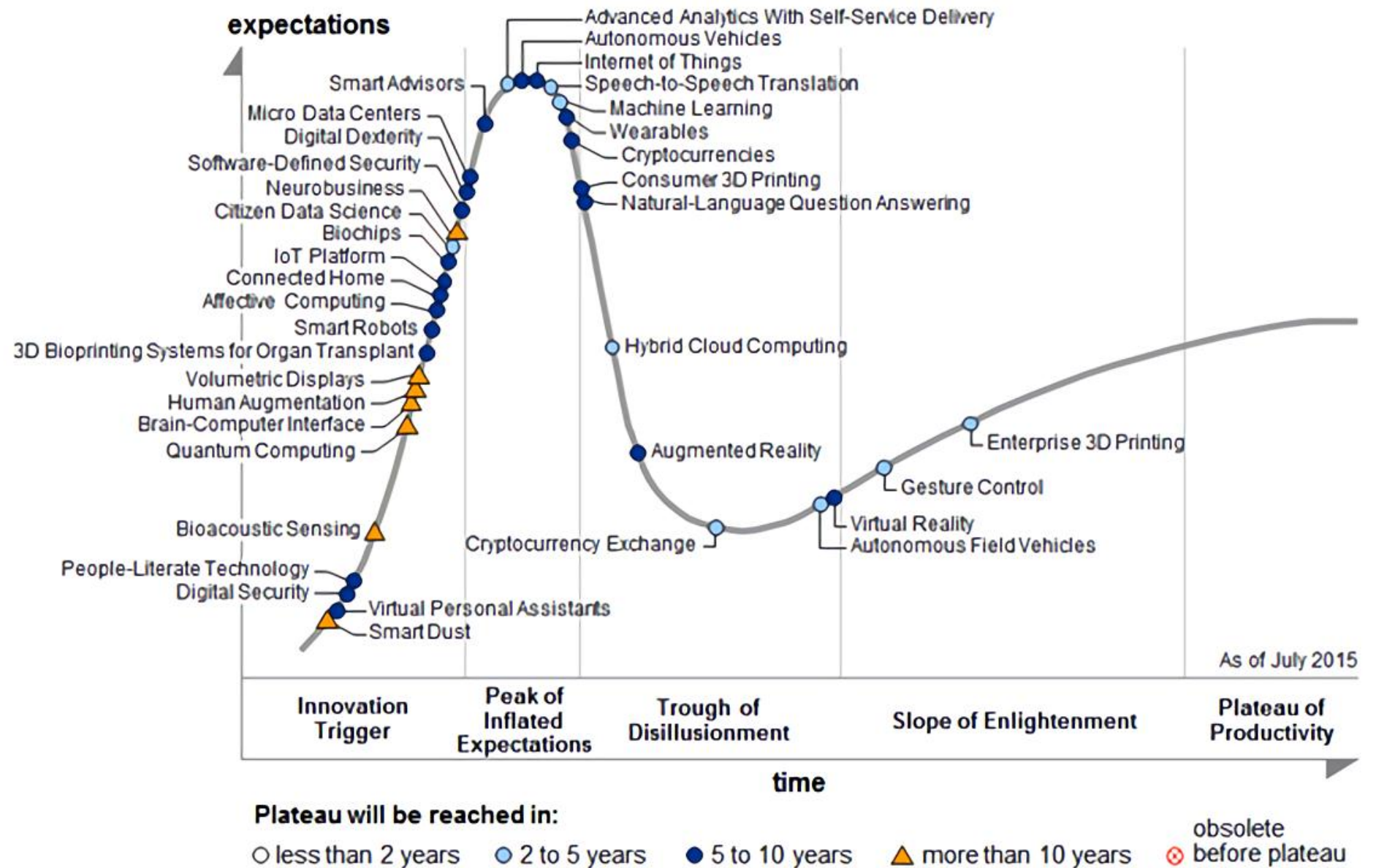


Industry 4.0 refers to :

- The intelligent networking of machines and processes for industry with the help of information and communication technology (*Platform Industry 4.0*)
- A connected environment of big data, people, processes, services, systems and IoT-enabled industrial assets with the generation, leverage and utilization of actionable data and information

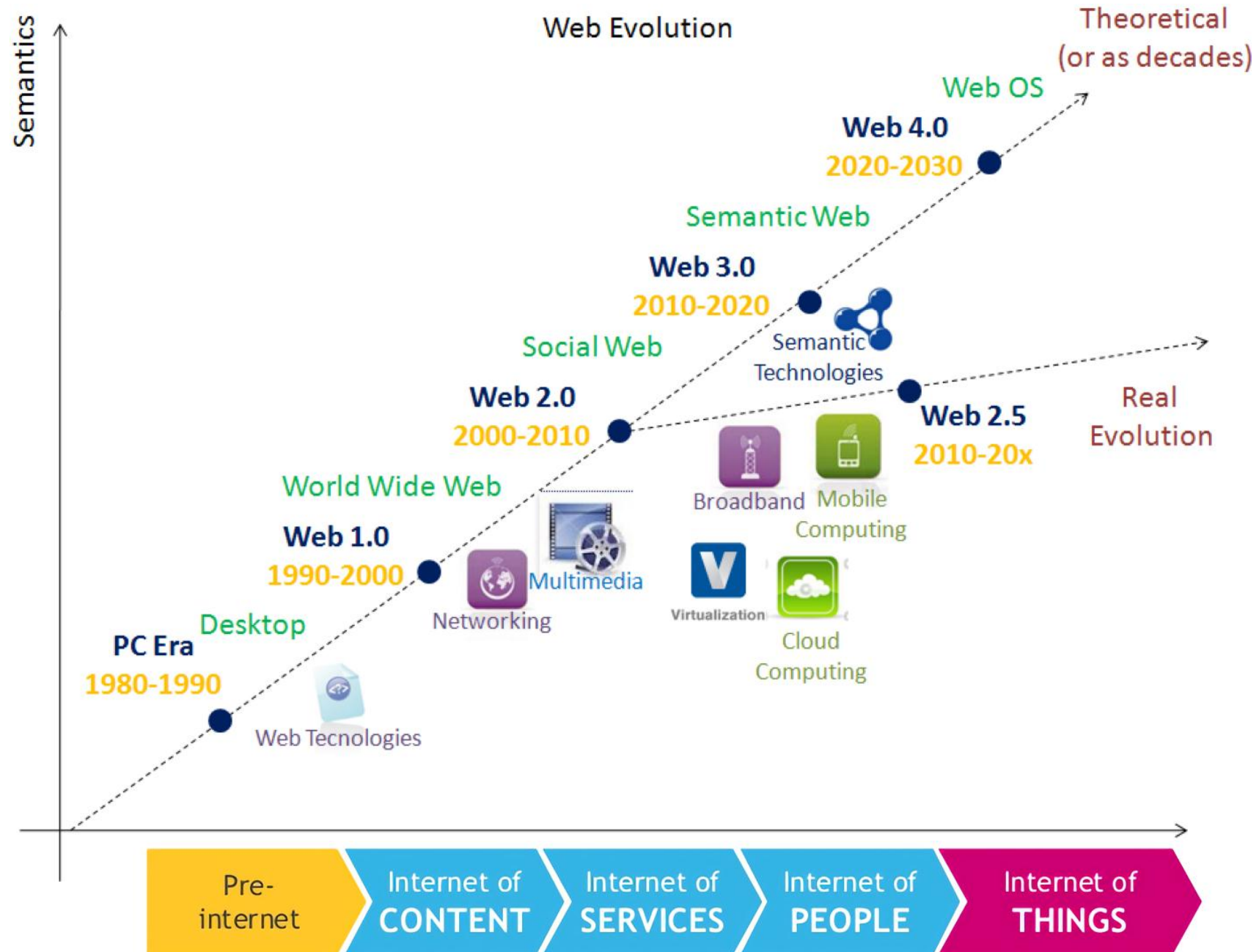
A key role is indeed played by the Internet of Things or IoT

Emerging Technology Hype Cycle



<https://www.gartner.com/imagesrv/newsroom/images/emerging-tech-hc.png>

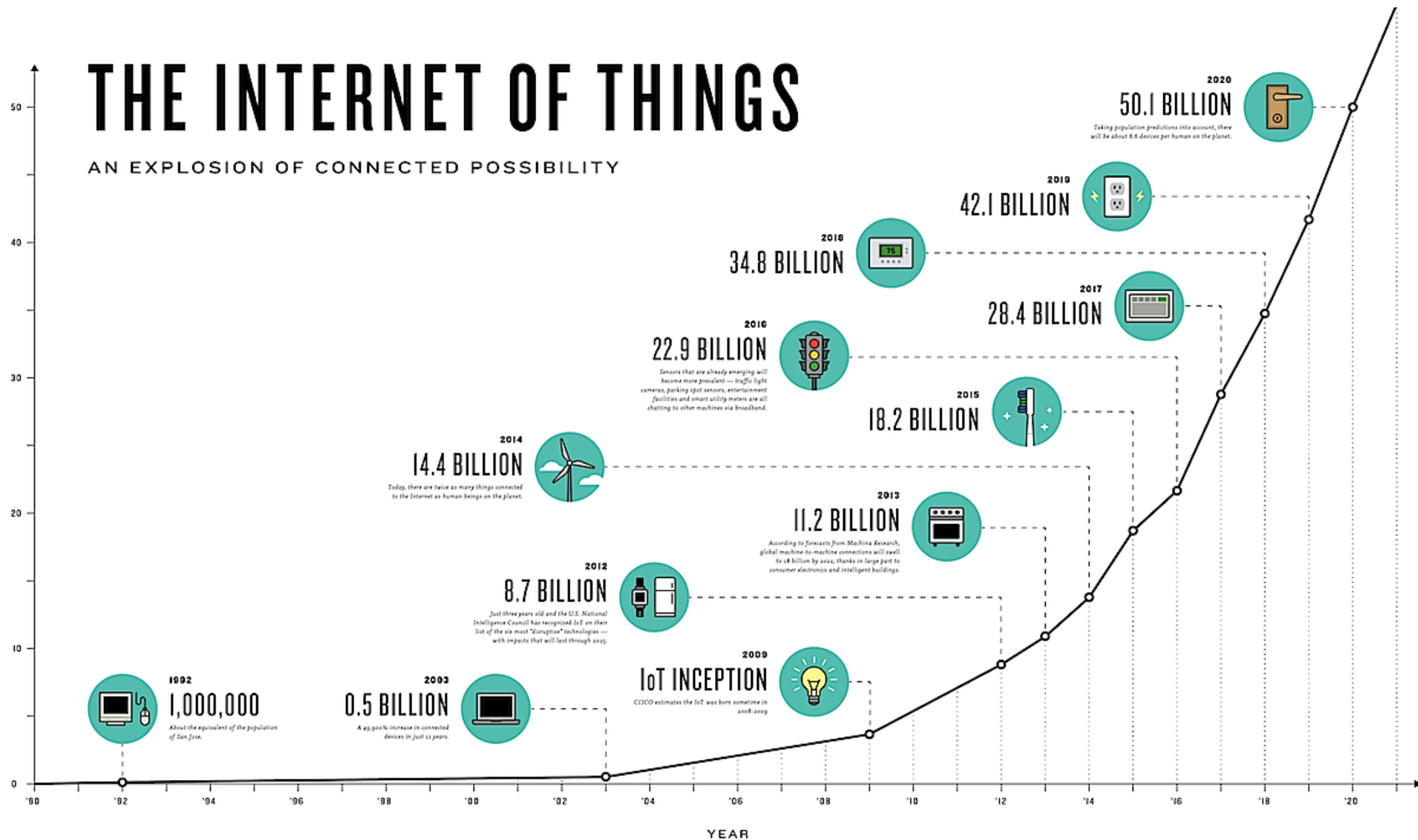
Internet Evolution



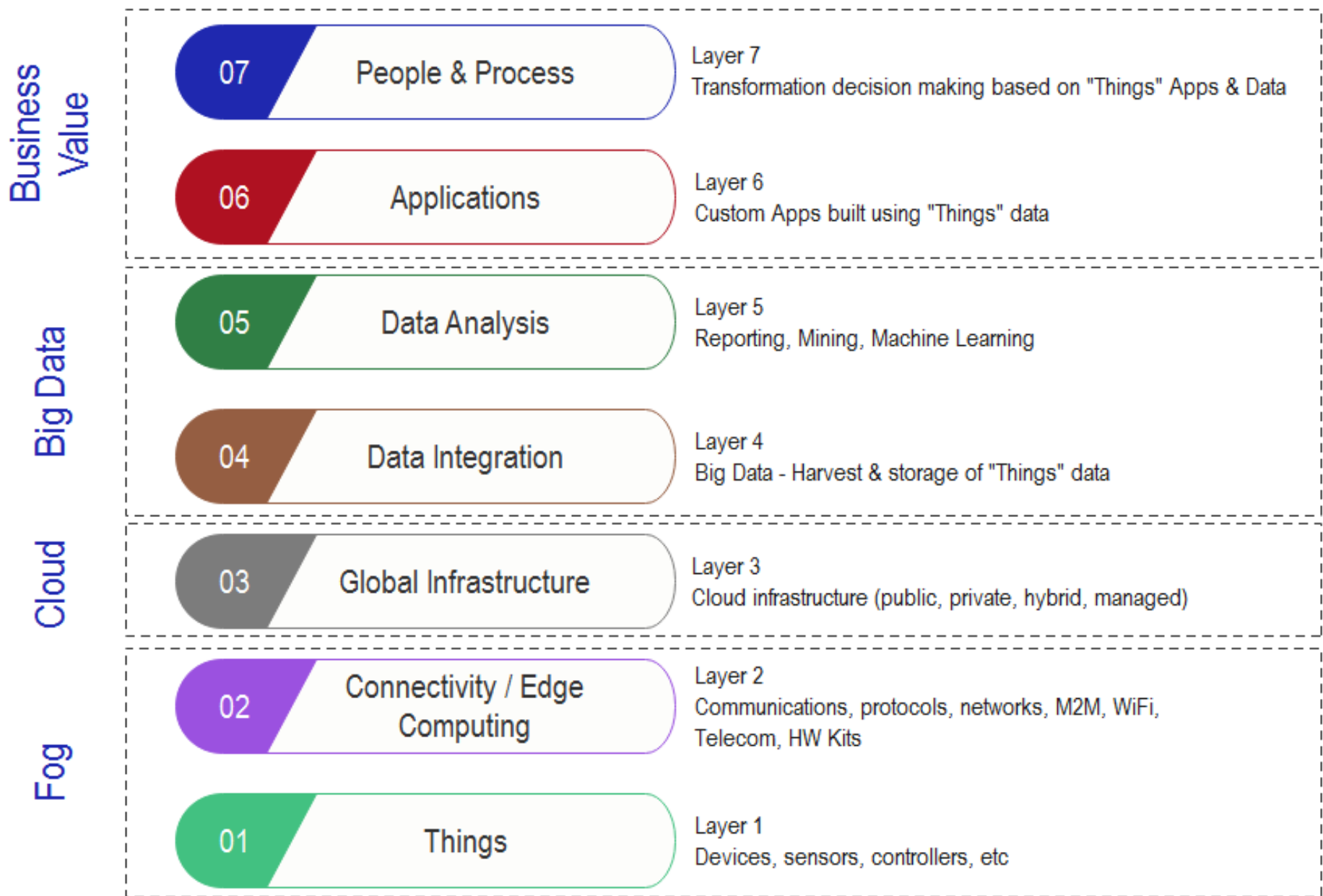
THE INTERNET OF THINGS

AN EXPLOSION OF CONNECTED POSSIBILITY

BILLIONS OF DEVICES



7 Layers of the Internet of Things (IoT)



IoT Applications

01

Smart Home

02

Smart Wearable
Technology

03

Smart City

04

Smart Office

05

Smart Farming

06

Smart Robotics

07

Smart Industrial Automation

08

Smart Healthcare

09

Smart Transportation System

10

Smart Energy Management
System

11

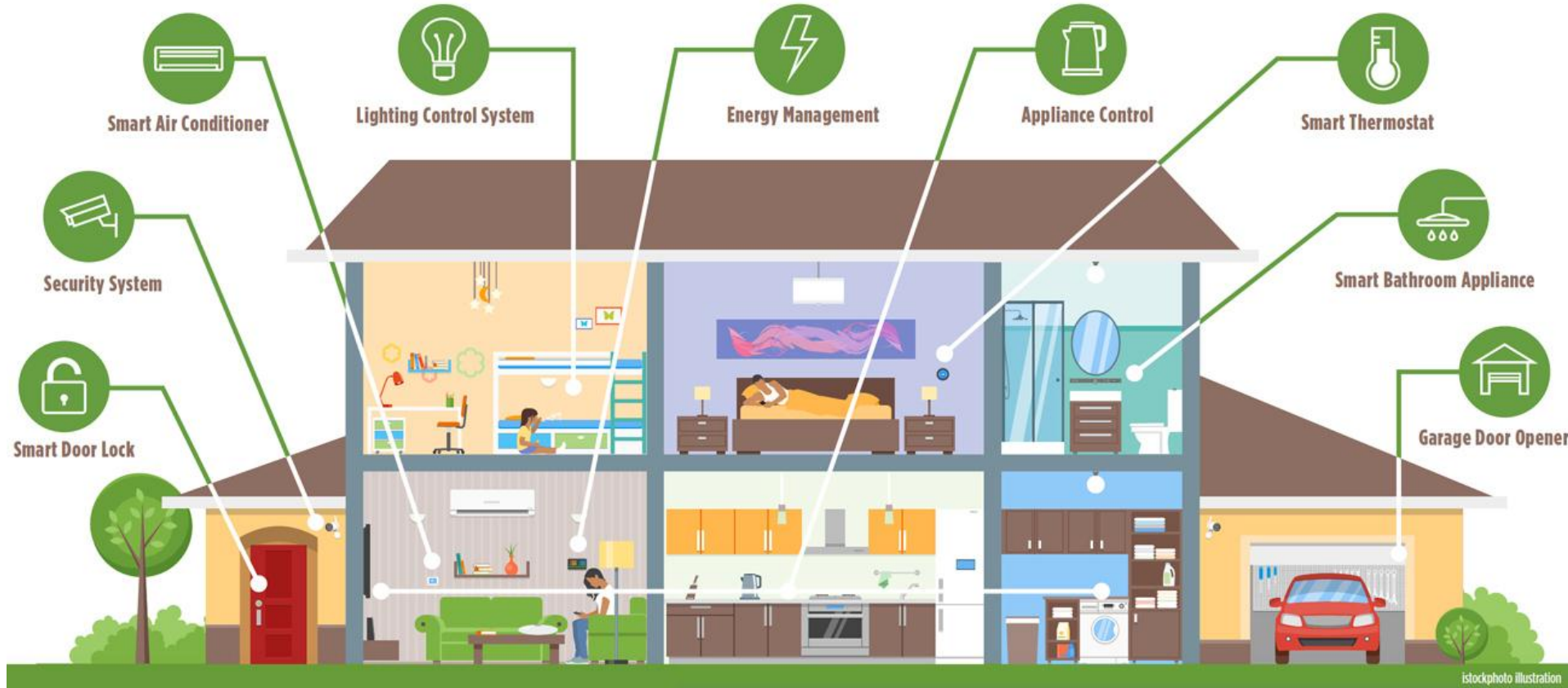
Smart Retail & Logistic

12

Smart Business

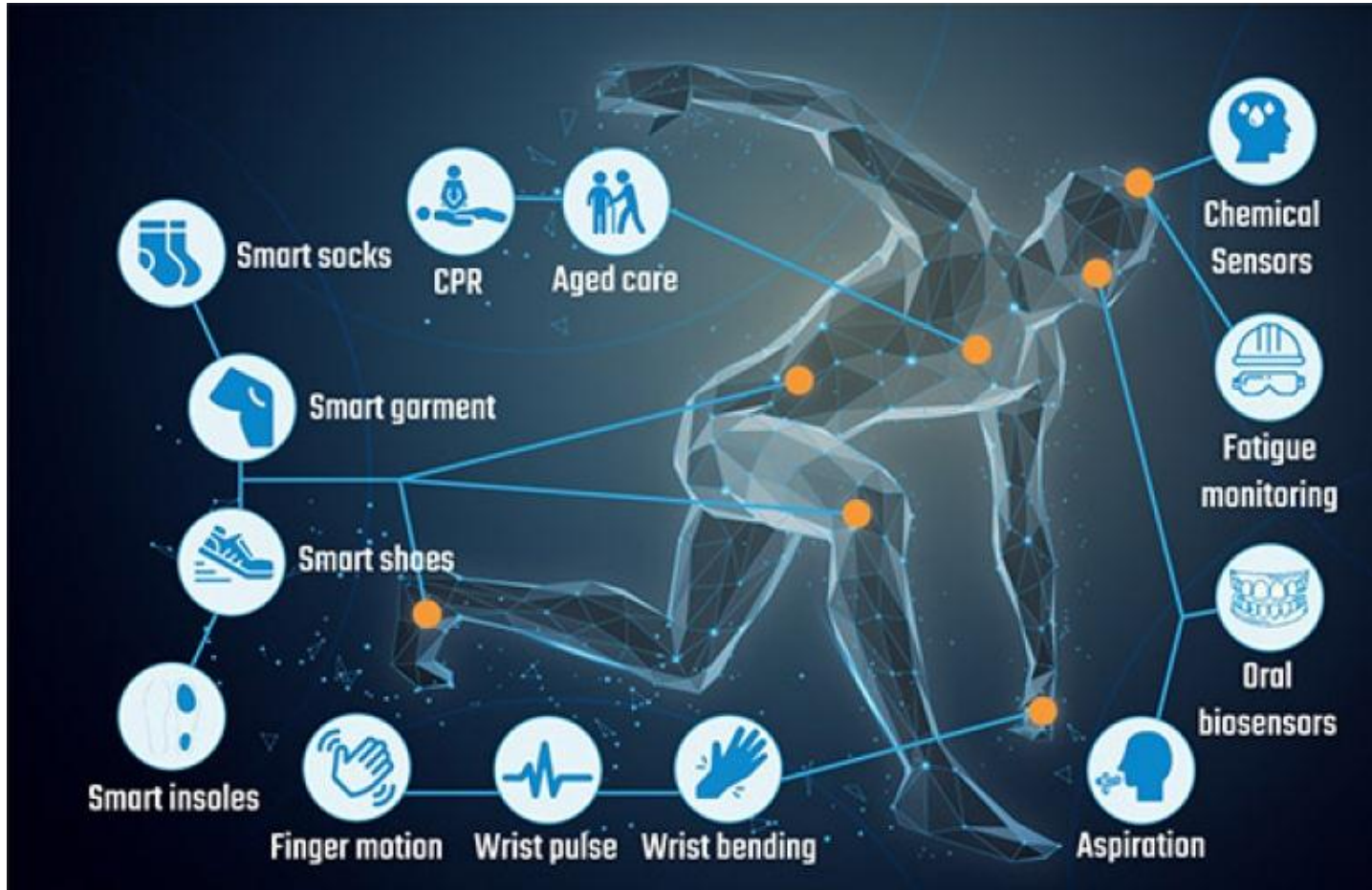
HOME, SMART HOME

Cool gadgets, practicality drive trend in residential lifestyle technology



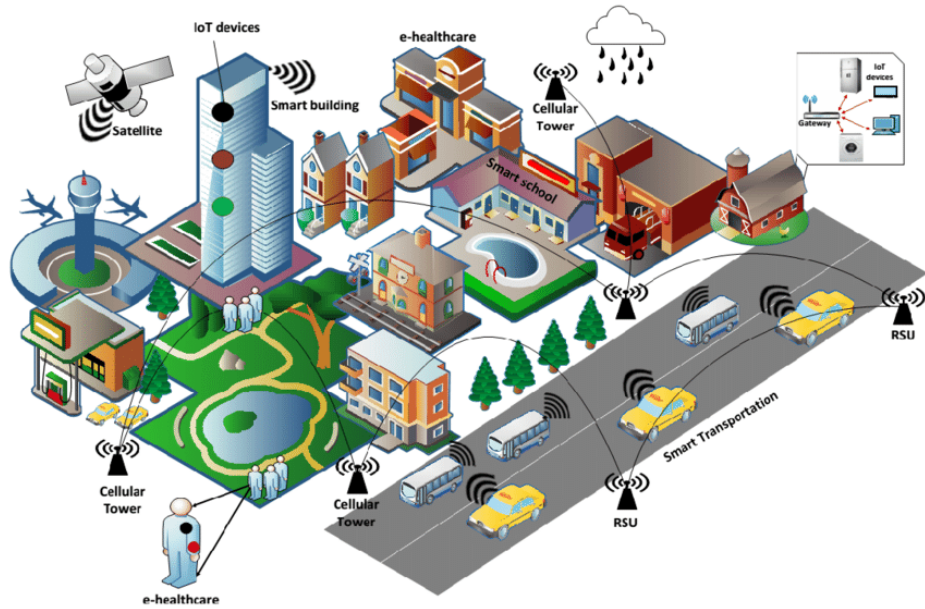
A smart home is defined to be one in which the devices can communicate with each other and with their environment. In a smart home one can customize and control the home environment for more security and increased efficiency in energy management. There is a large variety of technologies that can be used for creating smart homes (e.g., smart home lighting, air quality sensing, learning thermostat, smart refrigerator control, etc.)

Smart Wearable Technology



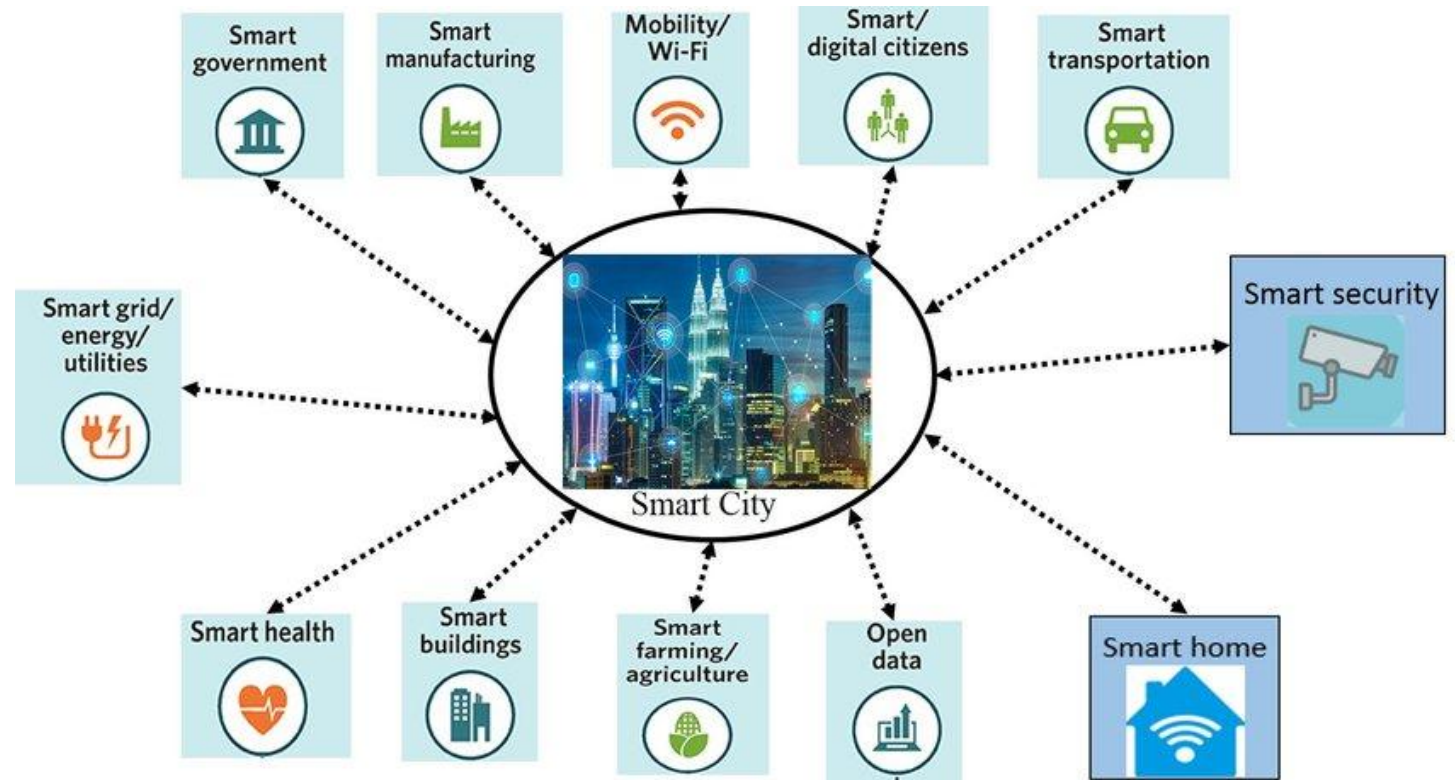
Wearable IoT technology is a large field that involves a variety of devices such as health, assistive, and entertainment equipment. Currently, wearables represent one of the hottest trends in IoT use. Examples of smart wearables are:

1. Activity trackers,
2. Smart watches/fitness bands/rings,
3. Smart phones,
4. Interactive socks/shoes,
5. Smart clothing,
6. Smart glasses,
7. Helmets
8. Headphones/earbuds,
9. Smart jewelry/collars



Examples of smart city IoT applications include smart surveillance, smart management systems, automated and safe transportation, environmental monitoring, energy distribution, water network management, monitoring of parking spaces availability, monitoring of material conditions and vibrations in buildings and bridges.

Smart City





Smart Office



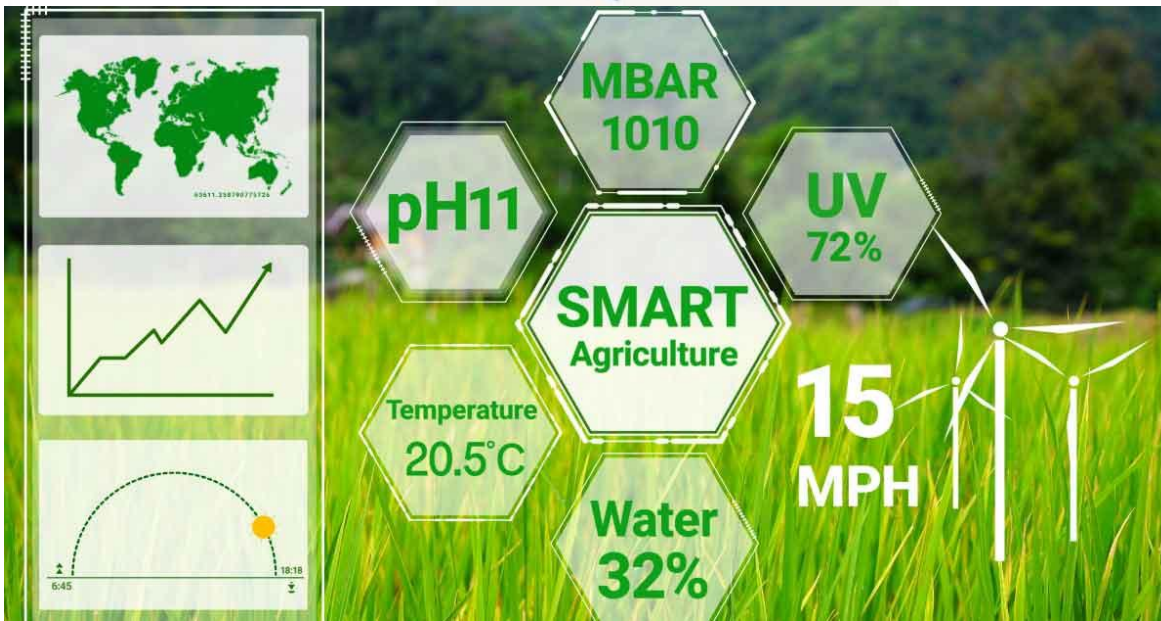
A smart office uses several IoT devices (notepads, printers, smart lighting, etc.) that are connected (they talk each other). Ideally, in a smart office everything from the furniture to the copier are connected through IoT. Smart IoT-based office functions include adjustment of room temperature, checking who is at the doors, locking doors, etc.

Smart Farming

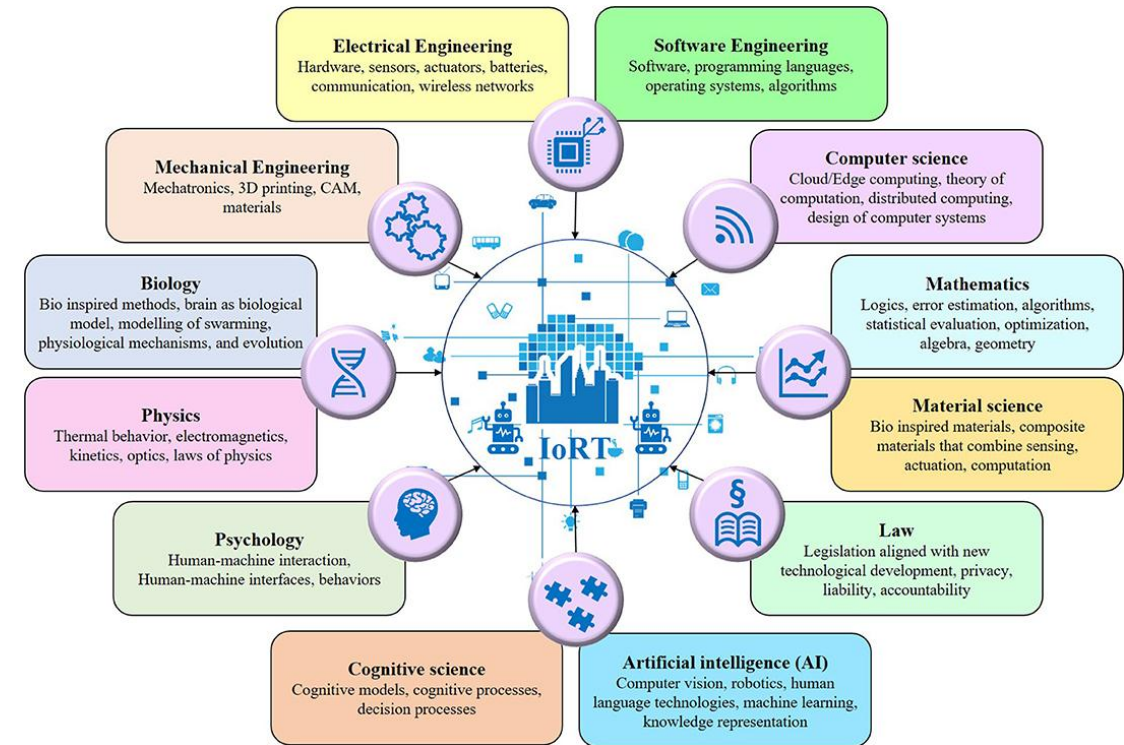


The agricultural sector requires highly scalable technology solutions that can be provided by IoT applications. Here, IoT contributes in several ways, e.g.,

- ✓ sensor-based field and resource mapping,
- ✓ monitoring soil moisture,
- ✓ remote crop monitoring,
- ✓ control of microclimate conditions for improving fruit and vegetable production and quality,
- ✓ forecasting snow, ice or wind changes,
- ✓ control of temperature and humidity levels to prevent microbial/fungus contaminants,
- ✓ river water quality analysis and management with regard to its use for drinking,
- ✓ smart logistics and warehousing, etc.



Smart Robotics



The incorporation of robotic issues into the wider IoT was called by ABI Research “Internet of Robotic Things” (IoRT). IoRT is actually concerned with machine to machine (M2M) communication between robots and devices in an ecosystem in where data are leveraged to drive insights and actionable outcomes.

Potential applications of IoRT include:

- ❑ Use a robotic device to check if a car is allowed to use a given park lot in a corporate parking area.
- ❑ Collaboration of IoRT and humans in a manufacturing unit to make operational and other decisions.
- ❑ Use of IoRT for elderly assistance and domestic cleaning.

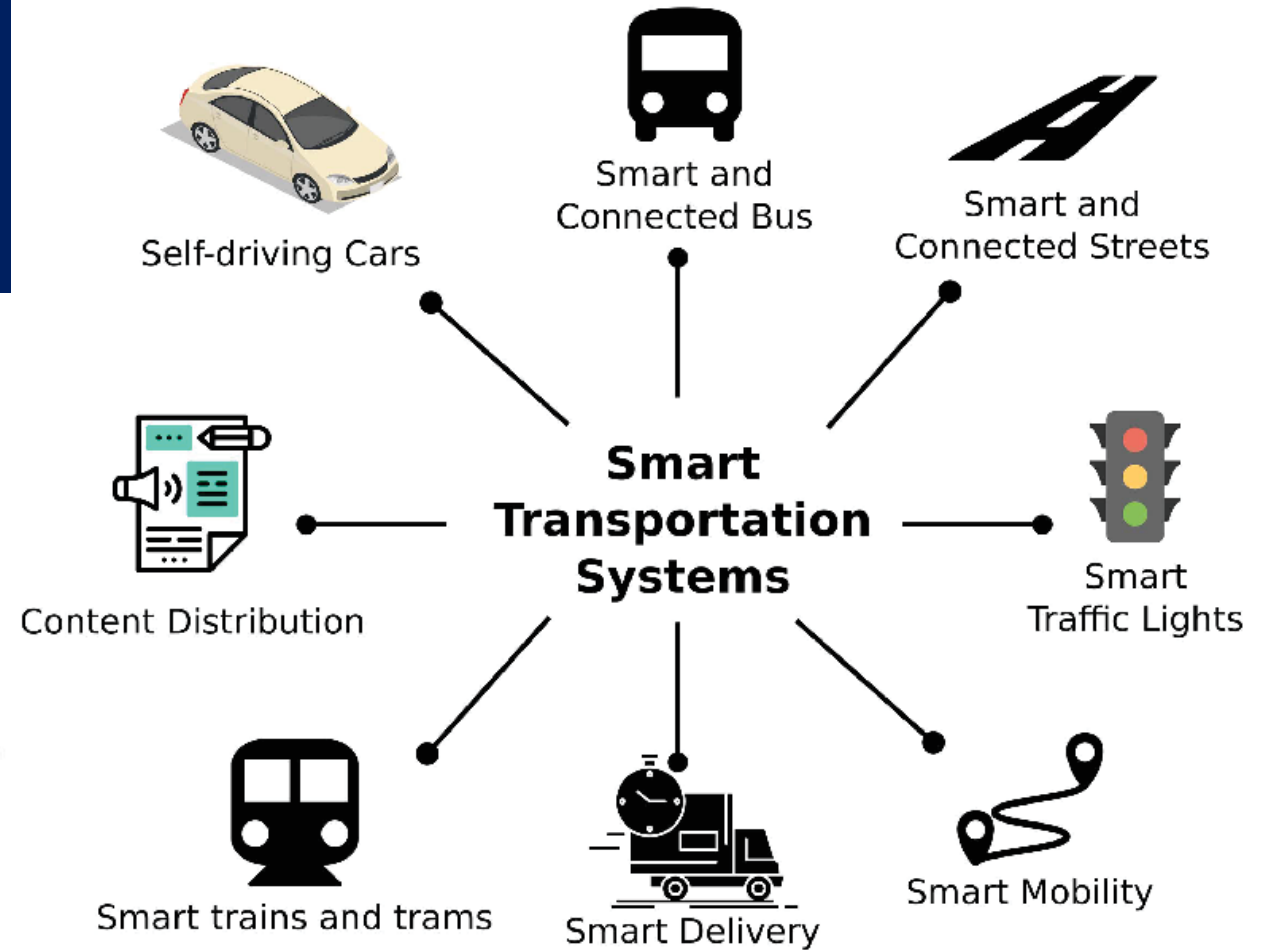
Smart Industrial Automation



This constitutes one of the major application areas of IoT. With the aid of IoT infrastructure, advanced sensor networks, wireless connectivity, and M2M communication, conventional industrial automation is modernized completely.

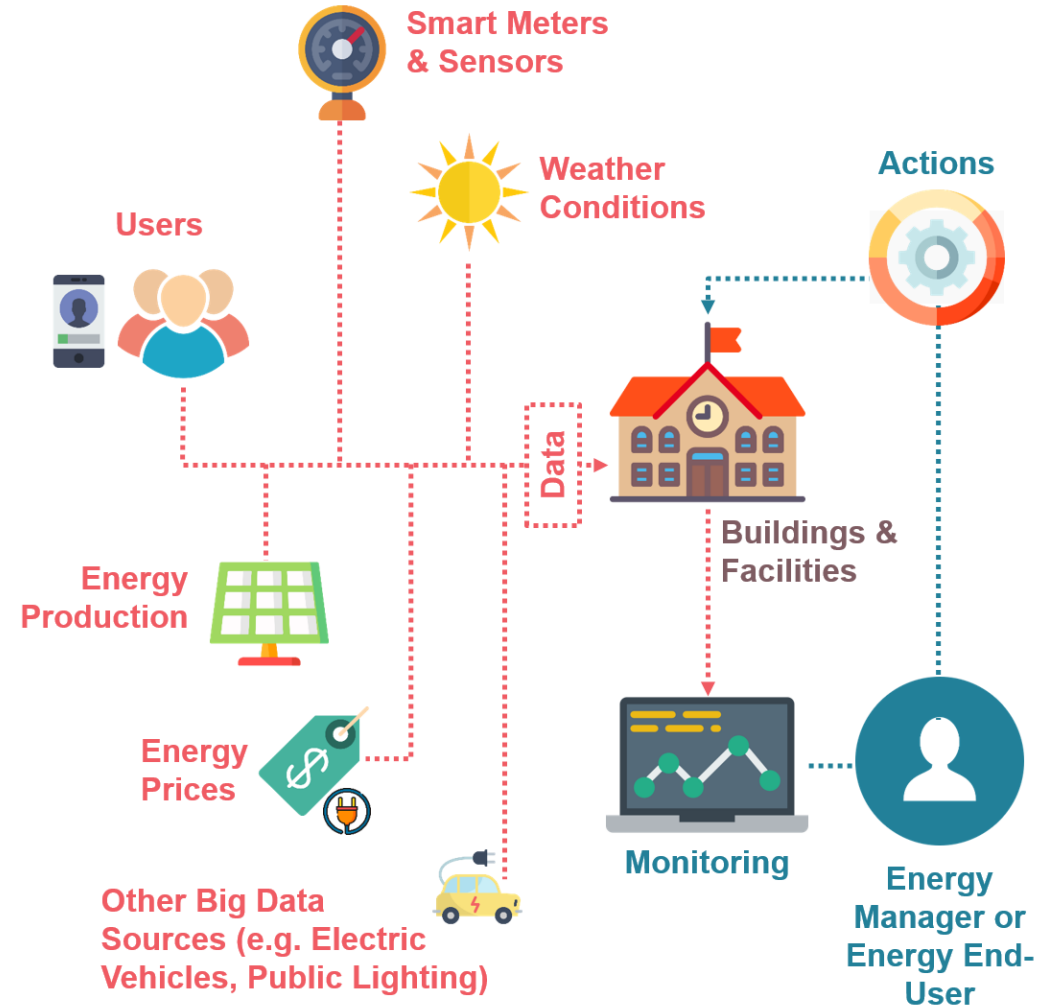
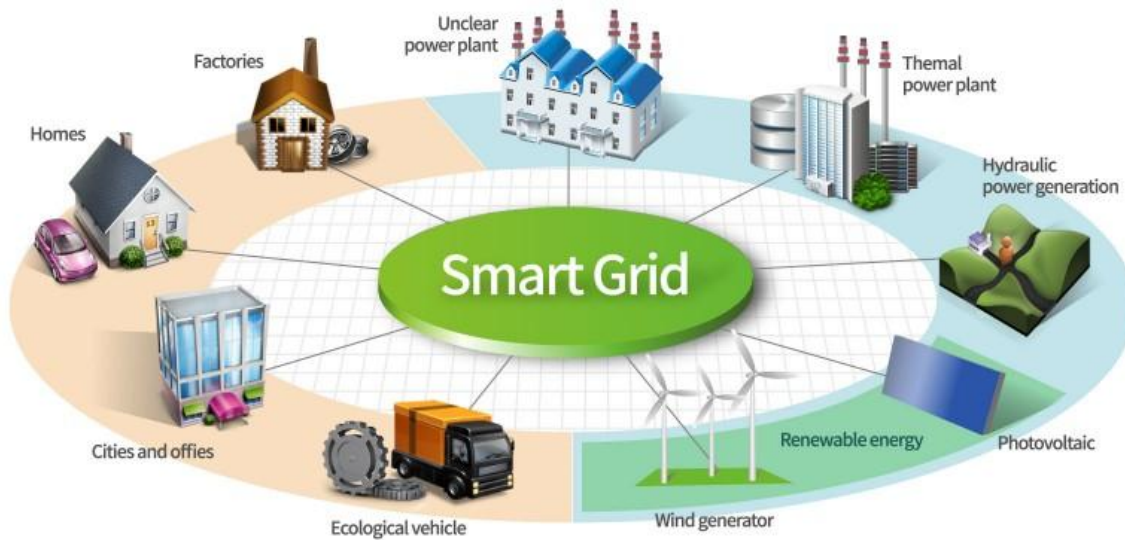
Most industries (small and large) have already adopted and are using IoT enhancements. IoT based industrial automation represents the present state of automation, called industrial automation 4.0 or “Industrial Automation Internet of Things”(IIoT).

Smart Transportation System



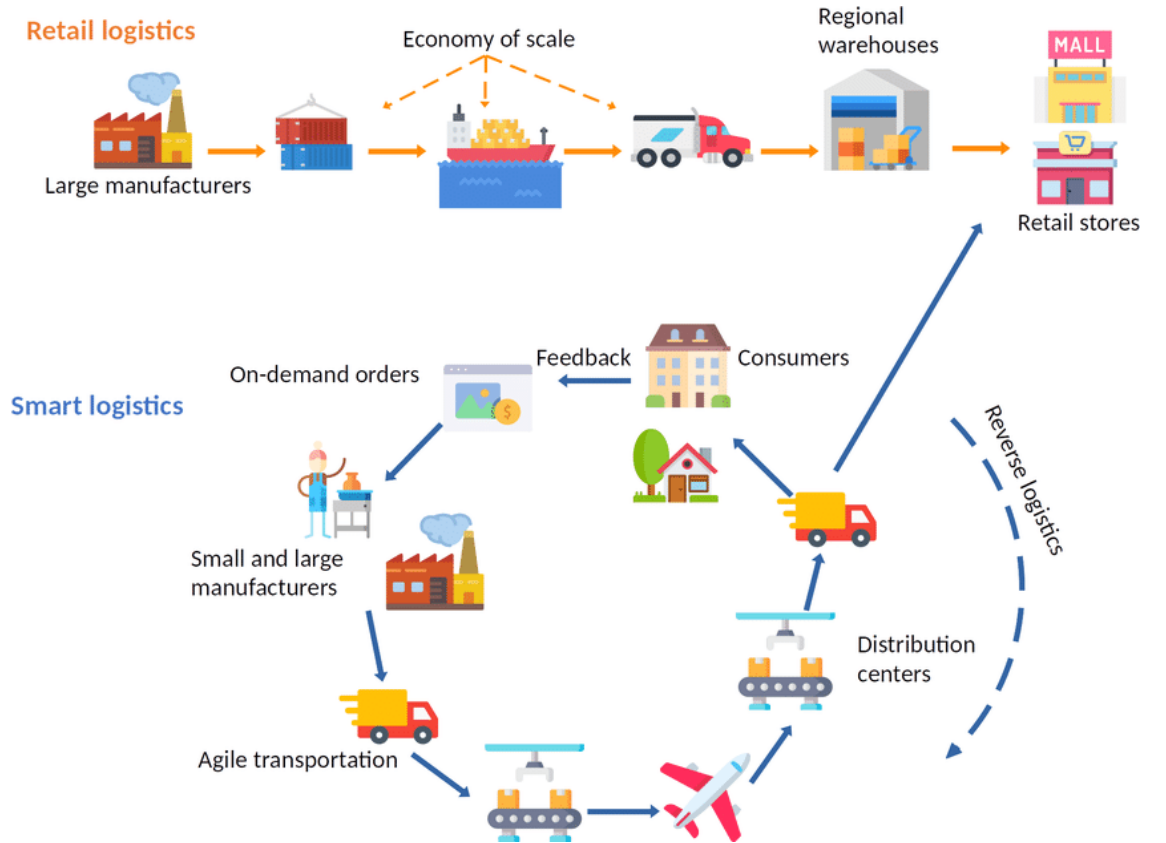
IoT can help to manage transportation and traffic congestion much better than current standard networks. Cars equipped with IoT sensors can monitor traffic and transmit the information to a centralized control system which sends feedback to vehicles on road according to an optimal traffic control law (e.g., regulating the speed limits in congestion areas, suggesting shortest possible routes for reaching desired destinations, etc.).

Smart Energy Management System



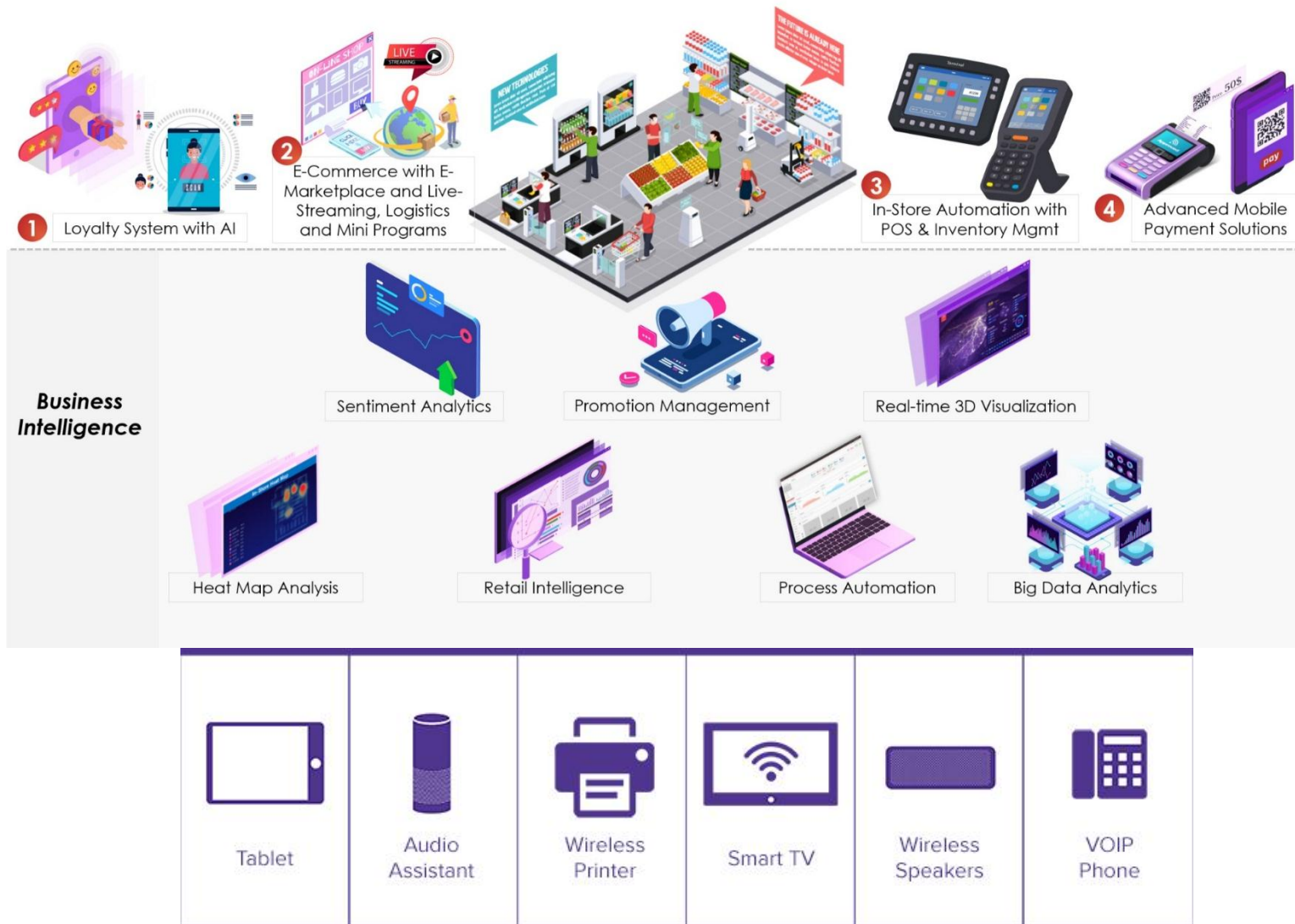
This area of IoT applications finds increased popularity with the use of power grids that are very smart and highly reliable. Smart grids collect data in an automated way and analyze the behavior of electric energy suppliers and consumers aiming at improving both the efficiency and economics of electricity use

Smart Retail & Logistic



IoT finds extensive application in retail and logistics. The proximity-based advertising model of smart retailing is already a reality. In chain management IoT contributes in monitoring of storage conditions along the supply chain. IoT can also facilitate product tracking for traceability purposes and payment processing on the basis of the location and duration of various operations (public transport, car parking, etc.)

Smart Business

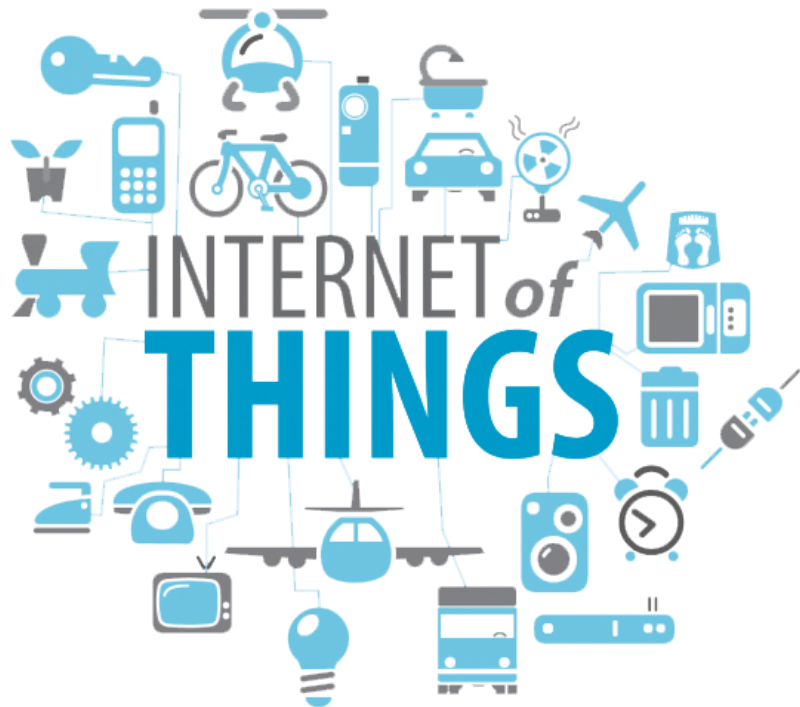


The adoption of IoT in business improves interest rate, and brings a change in business processes leading to cost minimization and quality improvement. Customers of a product can be easily monitored, and assets following and inventory control are facilitated.

In general, IoT business models with smart components for monitoring, control, optimization, and automation are distinguished in two categories:

- Enhancement of available products with IoT add-on services
- Development of IoT products that is impossible to exist without IoT

Advantages of IoT



01

Communication and connectedness

IoT supports communication between devices and machines (M2M communication) and between humans and machines (H2M communication) enabling them to stay connected, and so making total transparency available with better quality

02

Monitoring

IoT can give more information that could not be otherwise collected.

03

Impact to society

IoT benefits all (individuals, community, business stakeholders), and, in general, through lower energy consumption and faster delivery of services, etc., contributes to the betterment of society and people's quality of life.

04

Money saving

Through efficient interconnection and sharing of devices, our work, our services and our systems are made cheaper and more efficient.

05

Accuracy

IoT involves a huge amount of data. Analyzing large amounts of data allows one to make right decisions easily and perform tasks accurately.

06

Time

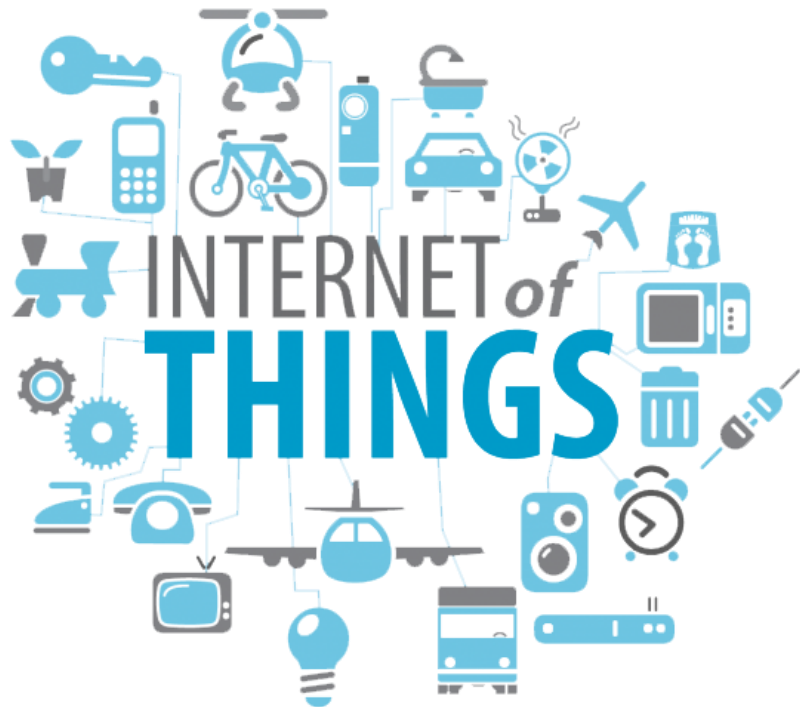
Time means money. IoT helps to save a lot of time. In present days, all of us need more valuable time.

07

Improved customer engagement

In standard information applications, customer engagement is normally passive or very little. In IoT this is completely changed. Customers are actively engaged in the processes and functions involved.

Disadvantages of IoT



01

Privacy and security

IoT is supported by multiple technologies and so multiple inventors are involved in it. This creates the danger of privacy threat. IoT is now attracting strong attention by hackers and cybercriminals.

02

Complexity

The IoT environment is complex and its design, maintenance and deployment are very difficult. Therefore as with all complex systems there is higher possibility of failure.

03

Component compatibility and interoperability

Extensive compatibility and interoperability tests are required before launching an IoT system for use, which implies increased cost on the IoT device manufacturers and the providers of IoT services.

04

Safety risk

Using IoT, safety is ultimately in the hands of the consumer. You have always to suspect the product and check it carefully. On the other hand, your safety is at risk if private and confidential/sensitive information is accessed by unauthorized people.

05

Compliance

The complexity of IoT makes much more difficult the compliance with regulations and legislation. With standard software compliance, the issue of IoT compliance seems to be a very challenging problem.

06

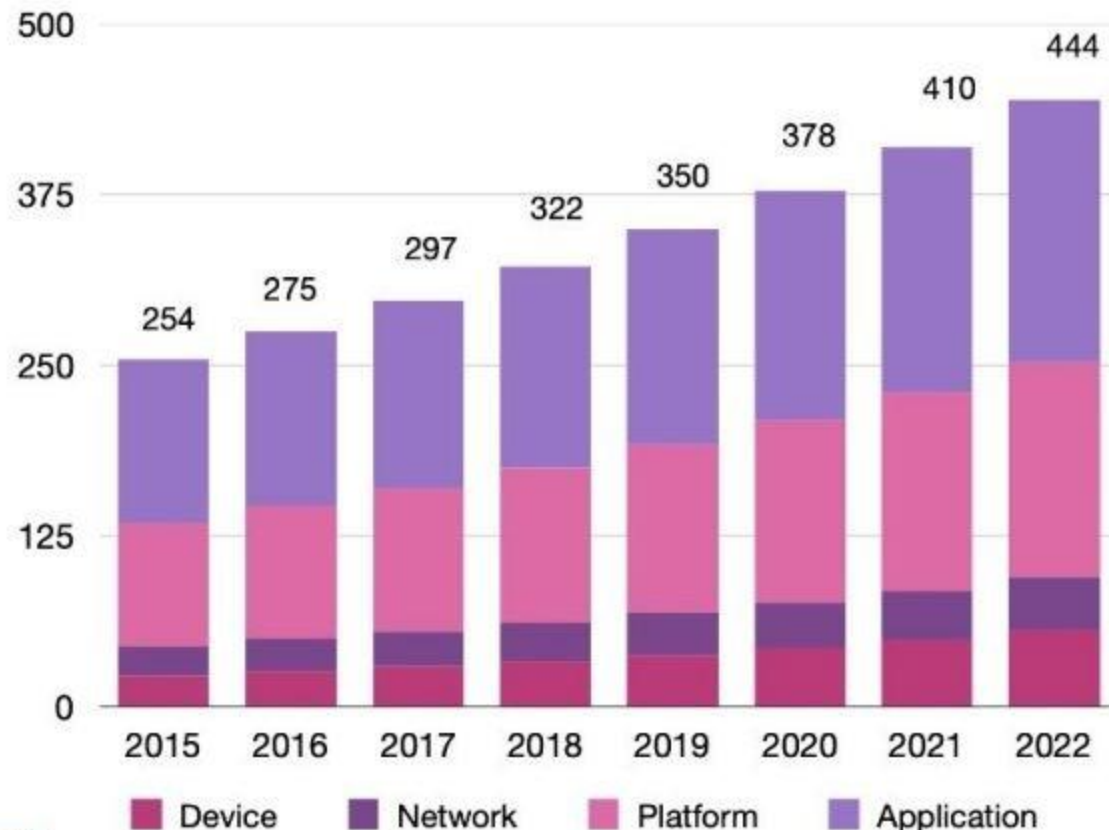
Societal issues

Automating every day activities and using IoT in business and industry, the need for human resources will be naturally reduced, and this may create unemployment in the society.

IoT Market in Indonesia

Indonesia IoT Market 2015-2022 (Trilyun Rp)

Huge opportunities, 78% on Application & Platform



The biggest verticals for Service/ Application comes from following segments:

- Transportation,
- Home/Building,
- Public Sector,
- Manufacturing,
- Retail,
- Healthcare,
- Banking/Security

Menteri Perindustrian Airlangga Hartarto menjelaskan, pangsa pasar **Internet of Things (IoT)** di Indonesia diperkirakan berkembang pesat dan nilainya bakal mencapai Rp 444 triliun pada tahun 2022.



Source:

- <https://www.kominfo.go.id/content/detail/15354/potensi-pasar-internet-of-things-di-indonesia-capai-rp-444-t/0/>
- sorotan_media
- IoT Forum Indonesia
- Internal Telkom Analysis

Conclusion

- Challenging specific topics for further consideration include the following: security and protection of personal data in the cloud computing, people centric (participatory) sensing, data analytics, and encryption.
- General topics include IoT architectures and platforms, new protocols, standardization, efficiency, and quality of service (QoS).
- New protocols for sensing in IoT will play a primary role in complete realizations. Participatory sensing will reduce the cost of sensing in the user's local environment.
- Currently, many international initiatives are in the air, and many others are predicted to emerge across the academia and industry which will allow a coordinated exploitation and implementation of IoT worldwide.

The World Is Getting Smarter

THANK YOU
TECHNOLOGY

