



Data
Schools

Module 2: Introduction To IoT

Introduction

Learning Objectives

Upon successful completion of this chapter, you will be able to describe various IoT concepts like IoT basics, IoT introduction, fundamentals of IoT, etc

What is IoT?

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- The Internet of Things (IoT) is the network of physical objects— devices, vehicles, buildings and other items embedded with electronics, software, sensors, and network connectivity—that enables these objects to collect and exchange data.

What is IoT?



What is IoT?

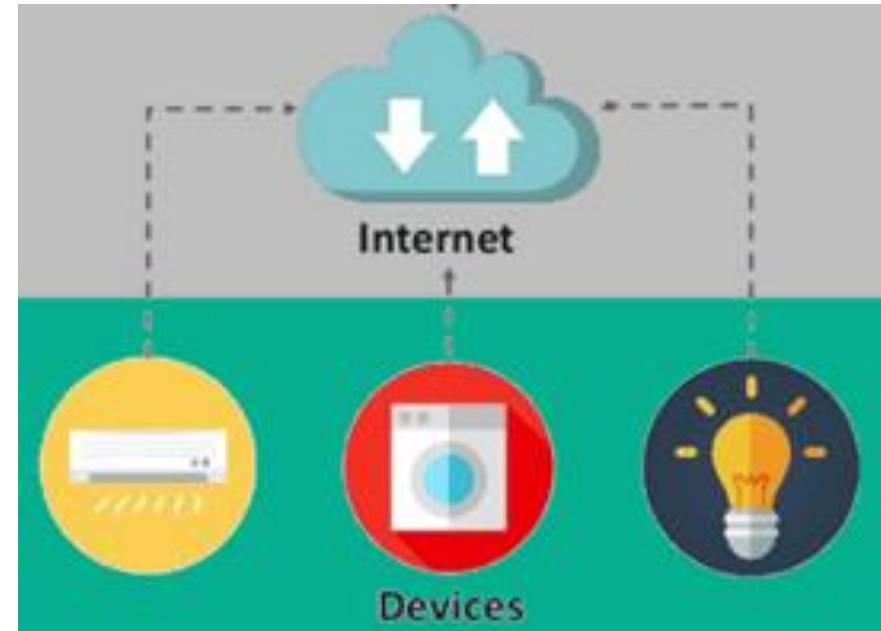
- Sensors talk to each other
- Only a few sensors are connected to the internet through gateway/router.
 - Why not all?
- The data generated by sensors can grow huge.
 - For example, GBs or TBs of data from video surveillance.
 - “Big Data” issues - This is where scalability of clouds come in handy.

History of IoT

- 1970 - The actual idea of connected devices was proposed
- 1990 - John Romkey created a toaster which could be turned on/off over the Internet
- 1995 - Siemens introduced the first cellular module built for M2M
- 1999 - The term “Internet of Things” was used by Kevin Ashton during his work at P&G which became widely accepted
- 2004 – The term was mentioned in famous publications like the Guardian, Boston Globe, and Scientific American
- 2005 - UN’s International Telecommunications Union (ITU) published its first report on this topic.
- 2008 - The Internet of Things was born
- 2011 - Gartner, the market research company, include “The Internet of Things” technology in their research

How IoT Works?

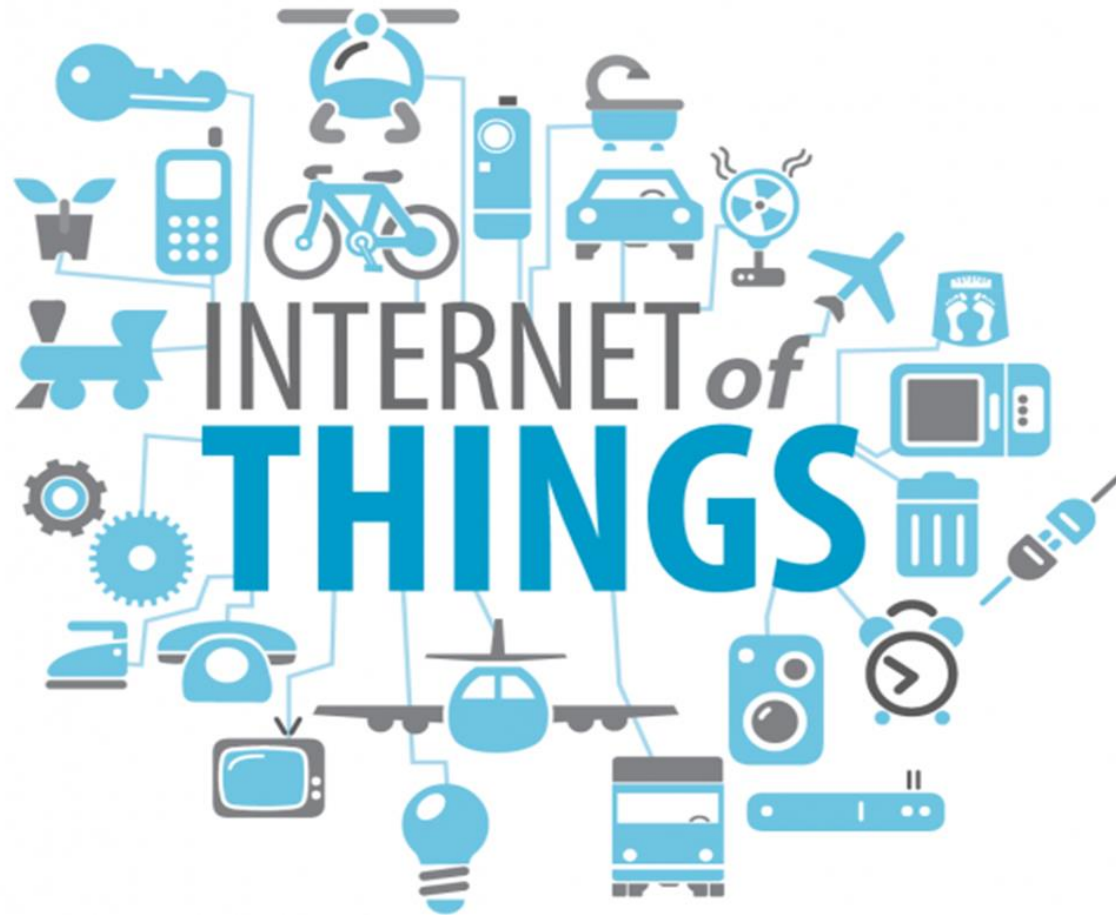
- There are four fundamental components
 - Sensors/Devices
 - Connectivity
 - Data Processing
 - User Interface



How IoT Works

- 1. Sensors/Devices:** Sensors or devices are a key component that helps you to collect live data from the surrounding environment.
- 2. Connectivity:** All the collected data is sent to a cloud infrastructure.
- 3. Data Processing:** Once that data is collected, and it gets to the cloud, the software performs processing on the gathered data.
- 4. User Interface:** The information needs to be available to the end-user in some way

Applications of IoT

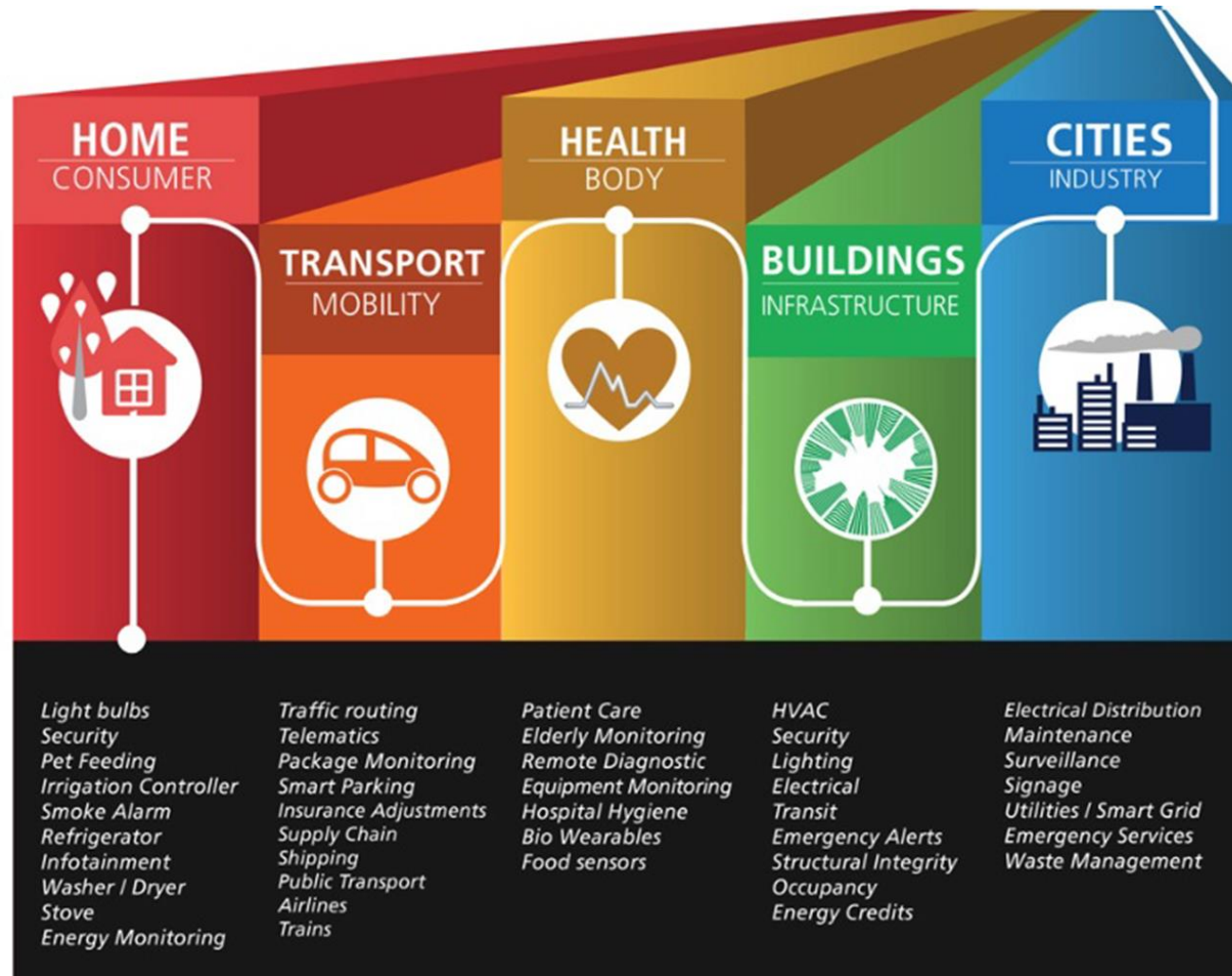


"The Ultimate Goal of IOT is to Automate Human Life."

Applications of IoT

- Building and Home automation
- Manufacturing
- Medical and Healthcare systems
- Media
- Environmental monitoring
- Infrastructure management
- Energy management
- Transportation
- Better quality of life for elderly
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Applications of IoT



Applications of IoT

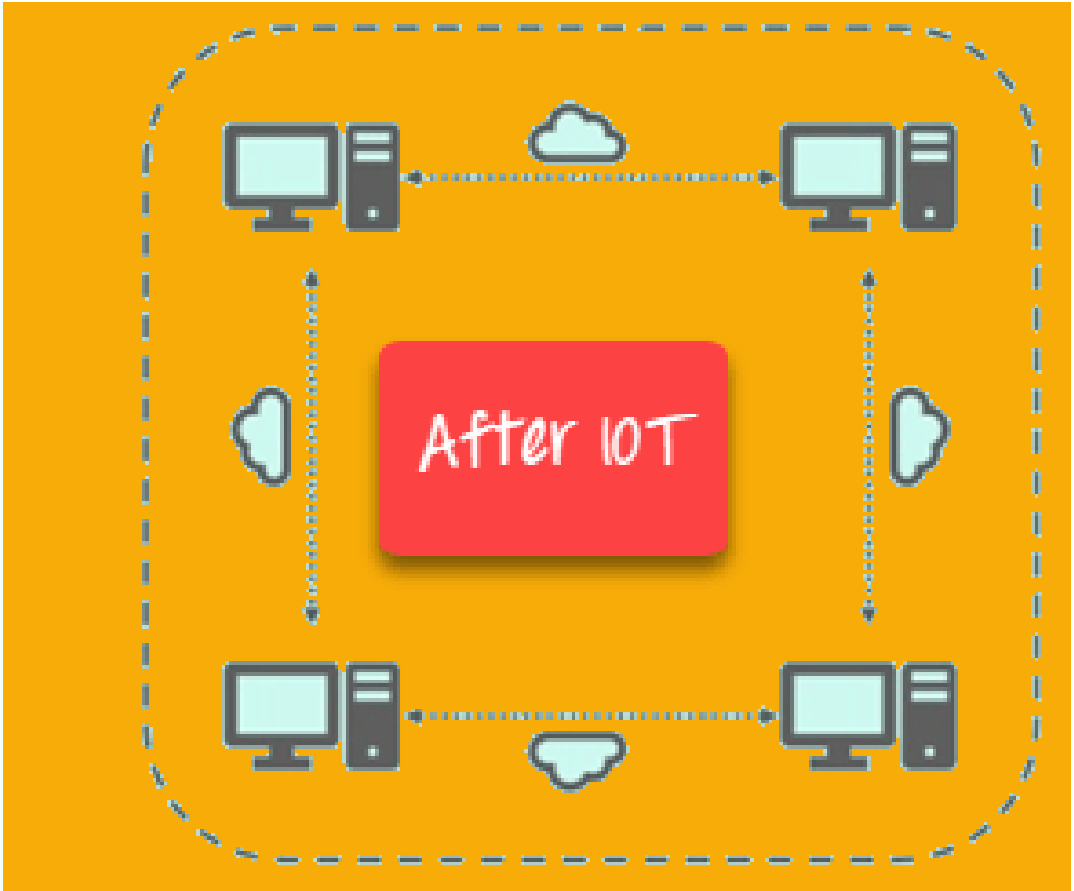
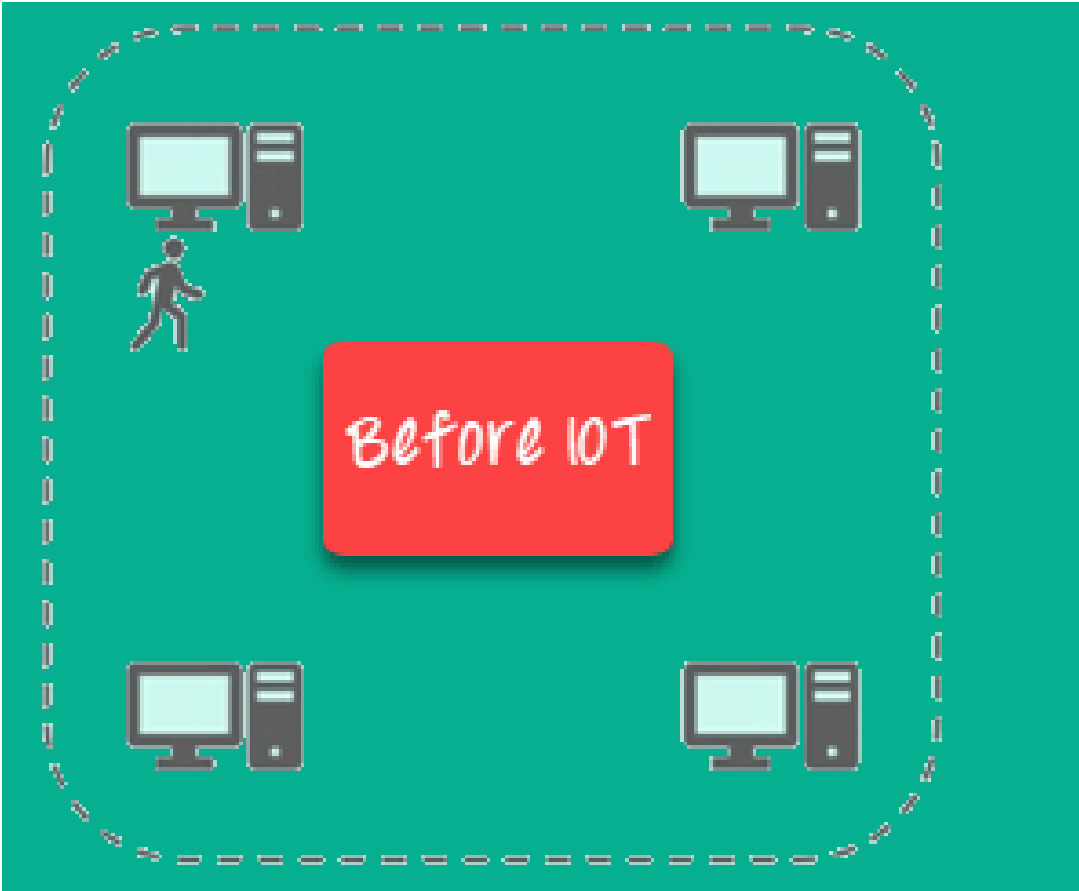
Application Type	Description
Smart Thermostats	Helps you to save resource on heating bills by knowing your usage patterns.
Connected Cars	IoT helps automobile companies handle billing, parking, insurance, and other related stuff automatically.
Activity Trackers	Helps you to capture heart rate pattern, calorie expenditure, activity levels, and skin temperature on your wrist.
Smart Outlets	Remotely turn any device on or off. It also allows you to track a device's energy level and get custom notifications directly into your smartphone.
Parking Sensors	IoT technology helps users to identify the real-time availability of parking spaces on their phone.
Connect Health	The concept of a connected health care system facilitates real-time health monitoring and patient care. It helps in improved medical decision-making based on patient data.
Smart City	Smart city offers all types of use cases which include traffic management to water distribution, waste management, etc.
Smart home	Smart home encapsulates the connectivity inside your homes. It includes smoke detectors, home appliances, light bulbs, windows, door locks, etc.
Smart supply chain	Helps you in real time tracking of goods while they are on the road or getting suppliers to exchange inventory information.

Challenges of Internet of Things (IoT)

At present IoT is faced with many challenges, such as:

- Insufficient testing and updating
- Concern regarding data security and privacy
- Software complexity
- Data volumes and interpretation
- Integration with AI and automation
- Devices require a constant power supply which is difficult
- Interaction and short-range communication

Advantages of IoT



Advantages of IoT

Key benefits of IoT technology are as follows:

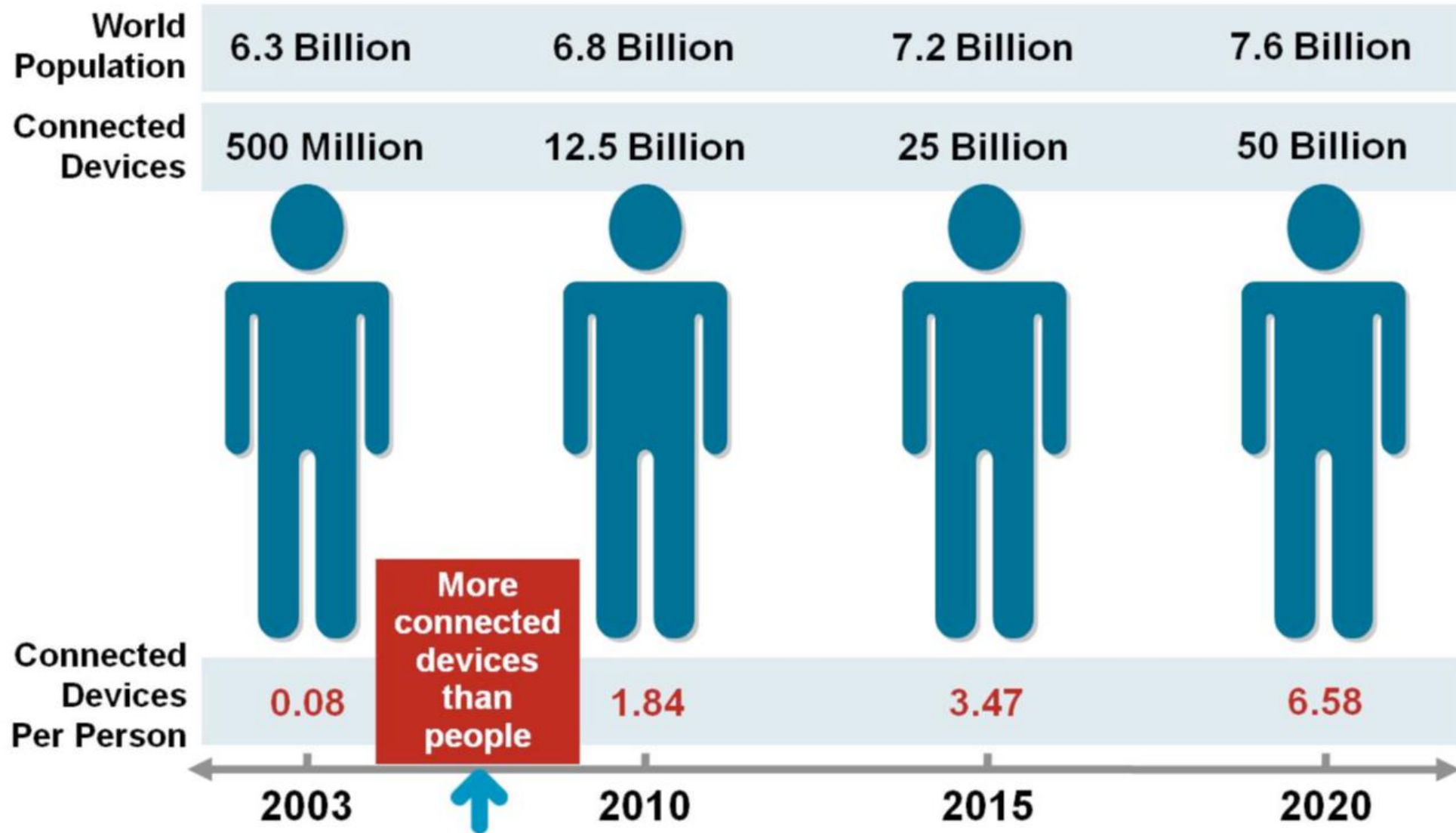
- **Technical Optimization:** IoT technology helps a lot in improving technologies and making them better. Example, with IoT, a manufacturer can collect data from various car sensors. The manufacturer analyzes them to improve its design and make them more efficient.
- **Improved Data Collection:** Traditional data collection has its limitations and its design for passive use. IoT facilitates immediate action on data.
- **Reduced Waste:** IoT offers real-time information leading to effective decision making & management of resources. For example, if a manufacturer finds an issue in multiple car engines, he can track the manufacturing plan of those engines and solves this issue with the manufacturing belt.
- **Improved Customer Engagement:** IoT allows you to improve customer experience by detecting problems and improving the process.

Disadvantages IoT

Now, let's see some of the disadvantages of IoT

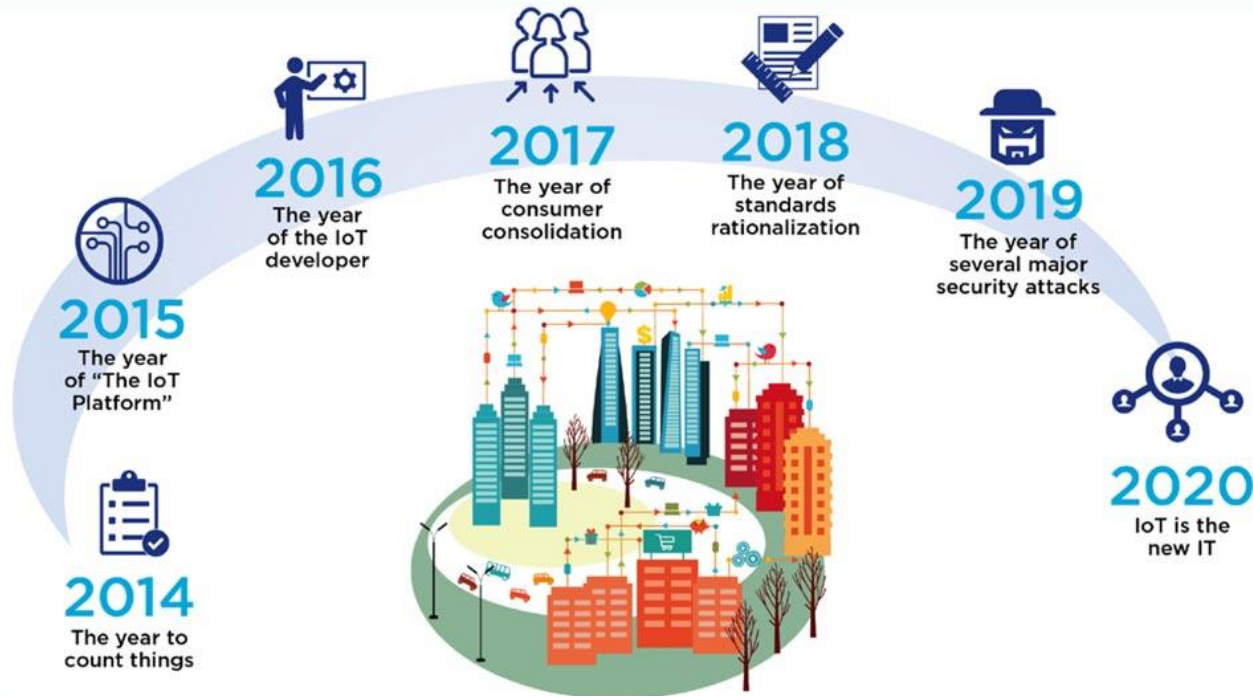
- **Security:** IoT technology creates an ecosystem of connected devices. However, during this process, the system may offer little authentication control despite sufficient security measures.
- **Privacy:** The use of IoT, exposes a substantial amount of personal data, in extreme detail, without the user's active participation. This creates lots of privacy issues.
- **Flexibility:** There is a huge concern regarding the flexibility of an IoT system. It is mainly regarding integrating with another system as there are many diverse systems involved in the process.
- **Complexity:** The design of the IoT system is also quite complicated. Moreover, it's deployment and maintenance also not very easy.
- **Compliance:** IoT has its own set of rules and regulations. However, because of its complexity, the task of compliance is quite challenging.

Current Status & Future Prospect of IoT



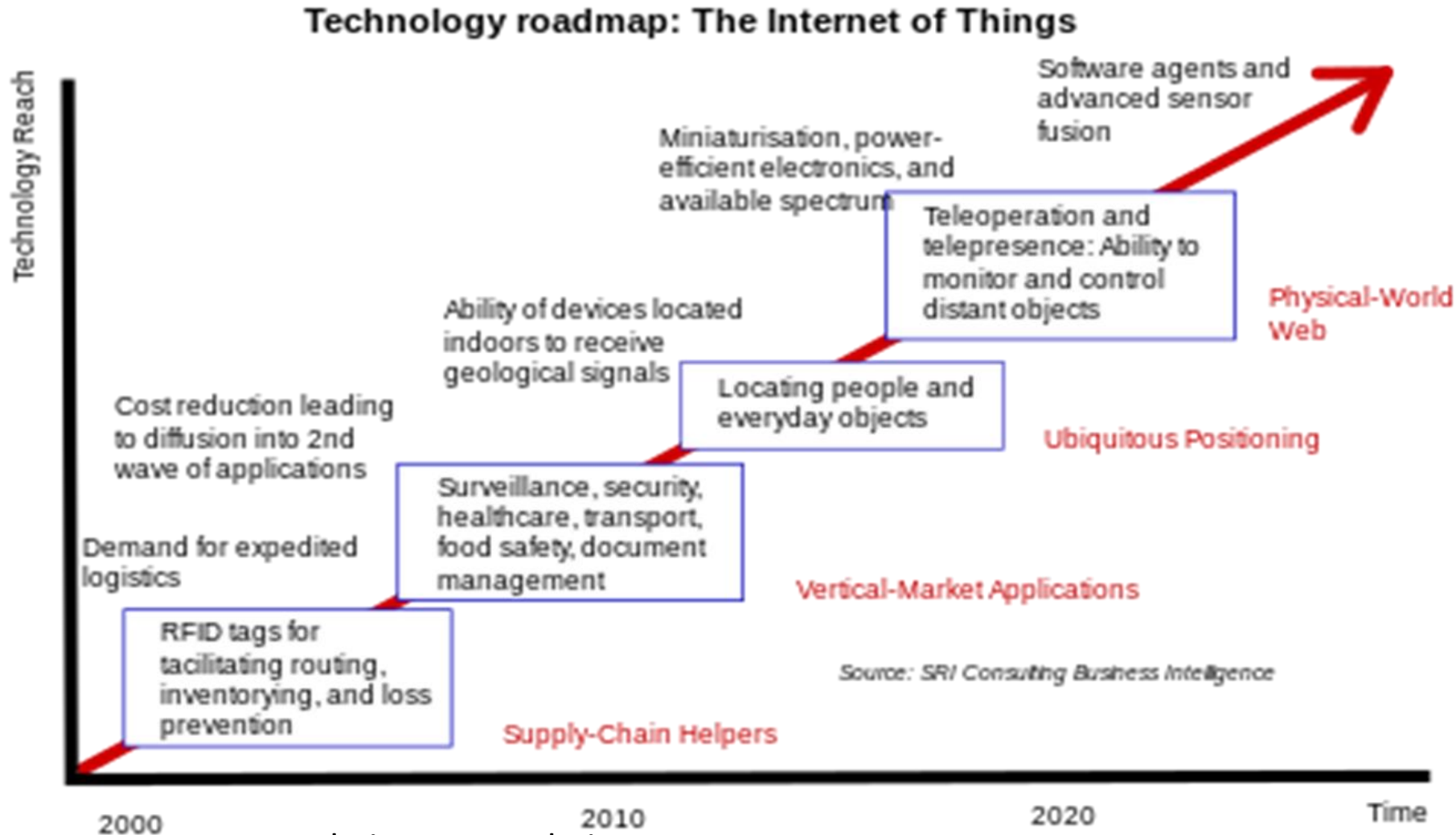
The Future of IoT

Pivotal Moments In IoT Market Evolution



“The Future of IoT Includes Edge Computing, AI, and Blockchain”

Technology Roadmap of IoT



Summary

- Introduction to Internet of Things (IoT): The Internet of Things (IoT) is a network of physical objects or people called “things” that are embedded with software, electronics, network, and sensors which allows these objects to collect and exchange data.
- The actual idea of connected devices was proposed in 1970
- Four Key components of IoT framework are 1) Sensors/Devices, 2) Connectivity, 3) Data Processing, 4) User Interface
- Various applications of IoT are Smart Thermostats, Connected Cars, Activity Trackers, Smart Outlets, Connect Health, etc
- Technical Optimization, Improve Data Collection, Reduced Waste, Improved Customer Engagement are key benefits of IoT
- Security, Privacy, Complexity, Compliance, are key challenges of IoT

ANY
QUESTIONS