Capacity Building Workshop on Spectrum Aspects of Internet of Things (IoT) (Vertical Industries)

Sao Tomé

Sao Tomé & Principe

Attlee M. GAMUNDANI

16 October 2023

Internet of Things

- IoT market trends and application domains
- IoT components and value chain
- Connectivity and IoT business models
- IoT standardisation (organisations and initiatives)

Day 1 - Session 1

16th October 2023

Slido.com

#3056933

Internet of Things

Learning Outcomes

- Understand the current market trends and application domains of IoT.
- Gain knowledge about the components and value chain of IoT.
- Comprehend the various connectivity options and associated business models.
- Familiarise with organisations and initiatives working on IoT standardisation.

Defining IoT

The various IoT Definitions

- IoT devices as those capable of two-way data transmission (excluding passive sensors and RFID tags). It includes connections using multiple communication methods such as cellular, short range and others **(GSMA)**.

- "**Internet of Everything**" - IoT is the next evolution of the Internet, connecting the unconnected people, processes, data, and things in your business today **(CISCO)**

- Sensors and actuators connected by networks to computing systems. These systems can monitor or manage the health and actions of connected objects and machines. Connected sensors can also monitor the natural world, people, and animals" **(McKinsey)**

- "Internet of Things" **(Kevin Ashton)**

IOT

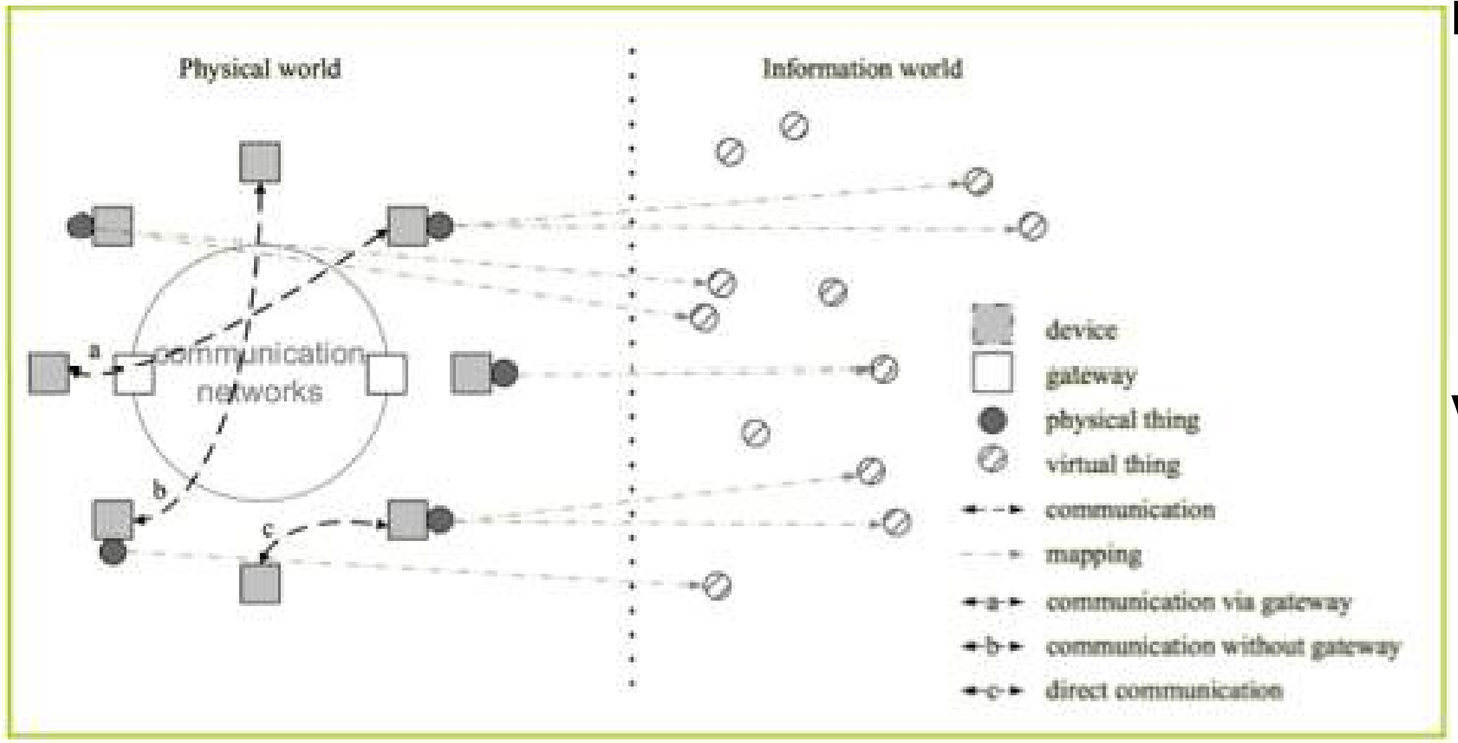
- ***Resolution ITU-R 66***

IoT is a concept encompassing various platforms, applications, and technologies implemented under a number of radio communication services

- ***ITU-T Recommendation [Y.2060 renamed as Y.4000]***

A global infrastructure for the information society, enabling advanced services by interconnecting (physical and virtual) things based on existing and evolving interoperable information and communication technologies

Introduction to IoT



Source: Recommendation ITU-T Y.2060

Physical things

- Exist in the physical world and are capable of being sensed, actuated and connected.
- **Examples**: industrial robots, goods and electrical equipment.

Virtual things

- Exist in the information world and are capable of being stored, processed and accessed.
- **Examples**: Multimedia content, application software.

Transforming everyday objects into intelligent devices

Collecting data and making autonomous decisions

Atzori, L., Iera, A., & Morabito, G. (2010). The internet of things: A survey. Computer networks, 54(15), 2787-2805.

Understanding IoT

The "Thing" in IoT

- An entity or physical object that has a Unique identifier, an embedded system and the ability to transfer data over a network.
    - Heart monitoring implants
    - Biochip transponders on farm animals
    - Automobiles with built-in sensors
    - Wearables etc.

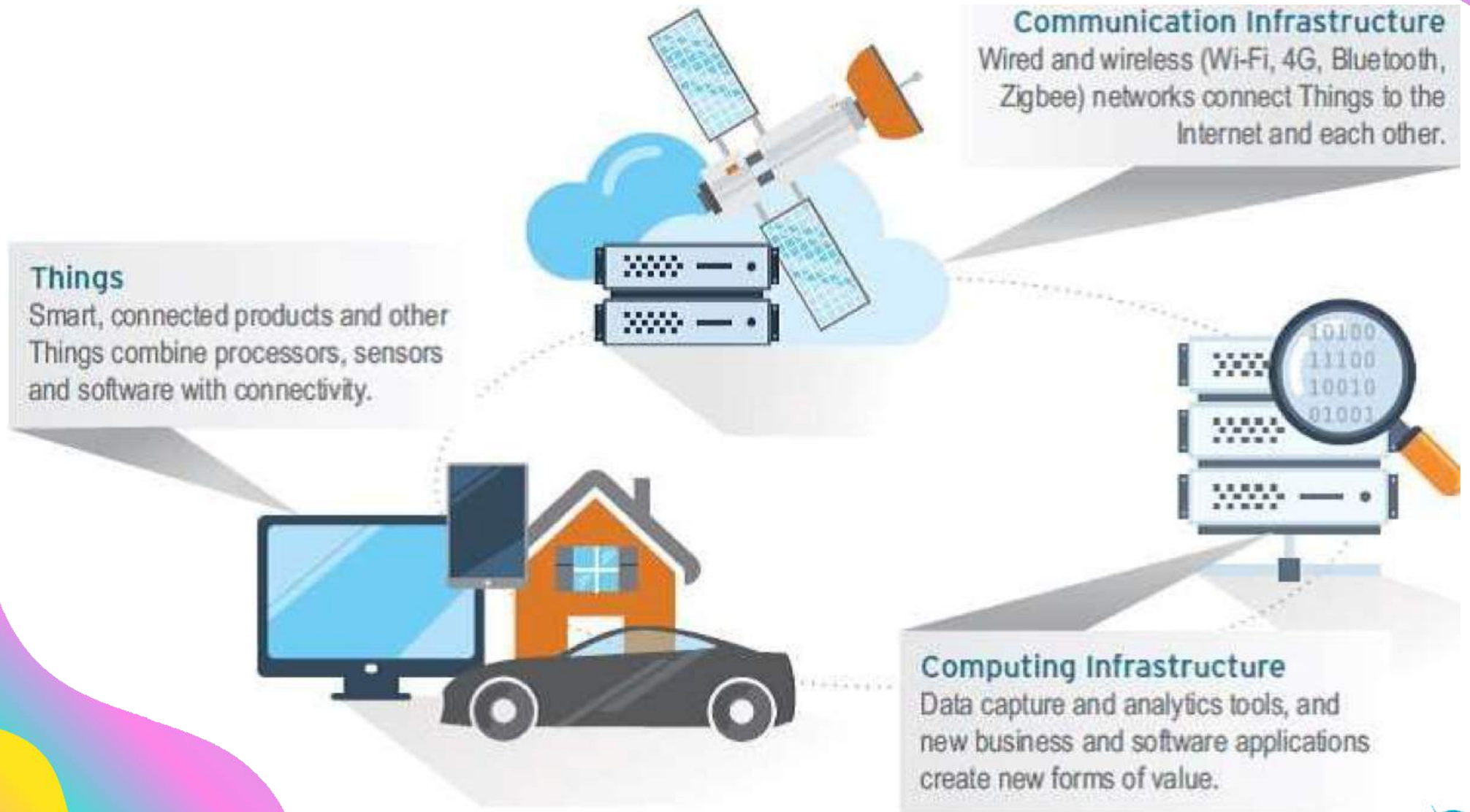
IoT Components

- Devices/Sensors
  - Collects data.
- Connectivity
  - Ties everything together.
- Data Processing
  - Cloud or edge locations.
- User Interface
  - Alerts, analysis, actions.

Reference

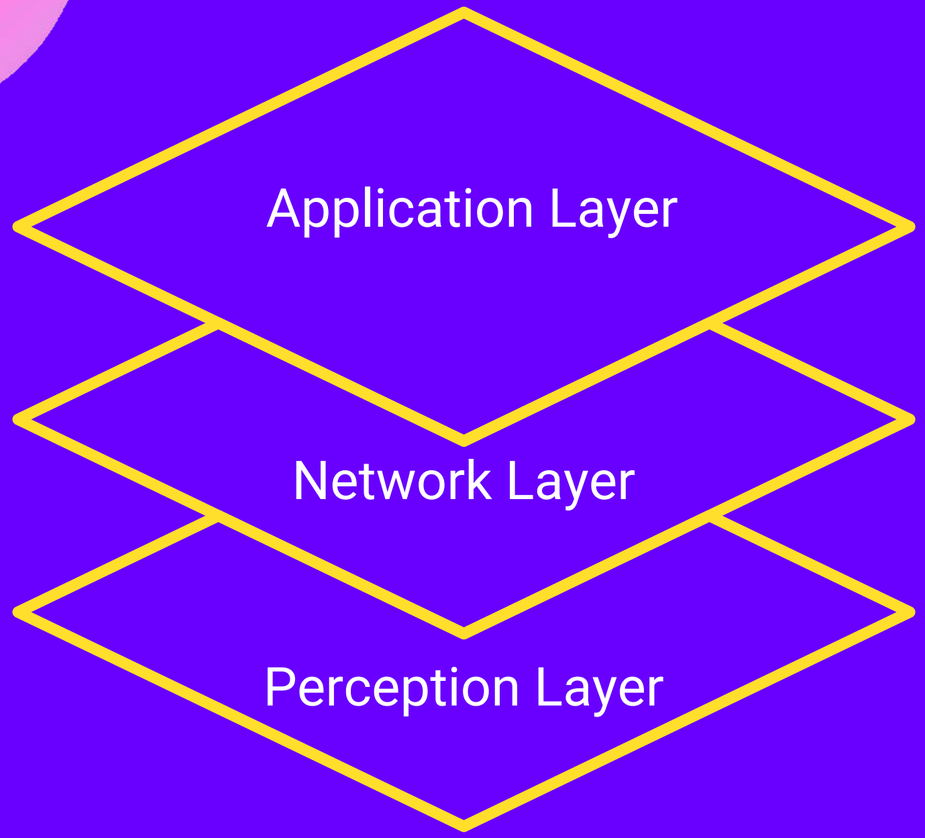
Vermesan, O., & Friess, P. (Eds.). (2013). Internet of Things: Converging Technologies for Smart Environments and Integrated Ecosystems. River Publishers.

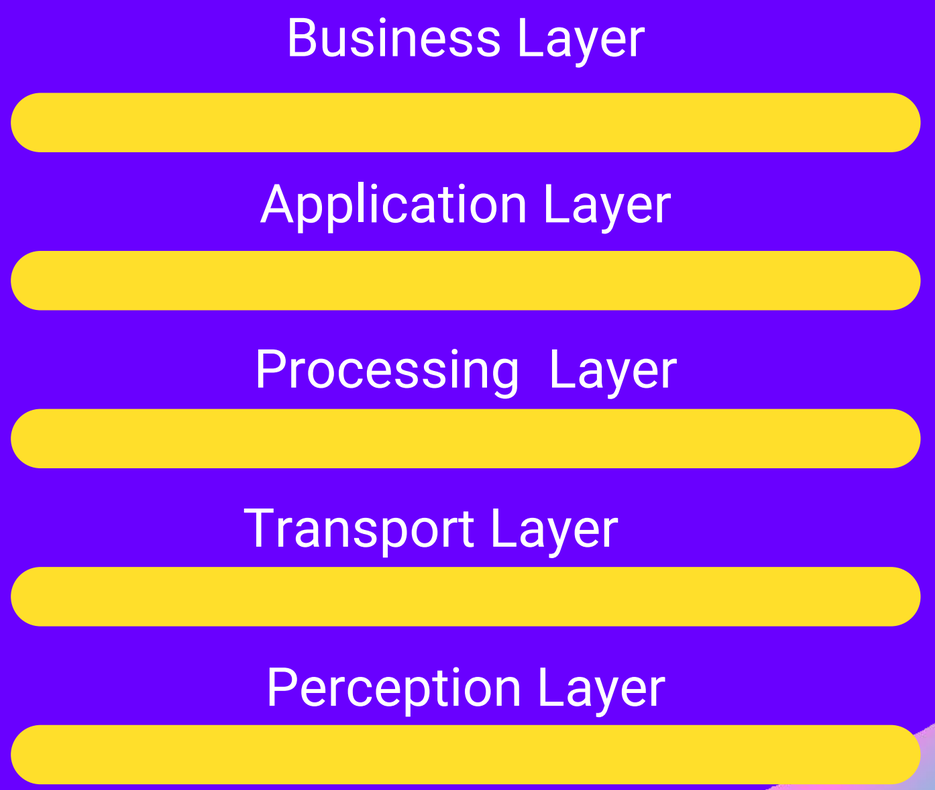
IoT's Key Components



The IoT Architecture

3 and 5 Layer Architecture





How does IoT Work?

Sensor

- Collect and process data to detect changes in the physical status of things

RFID; NFC e.t.c

- Identify and track the data of things

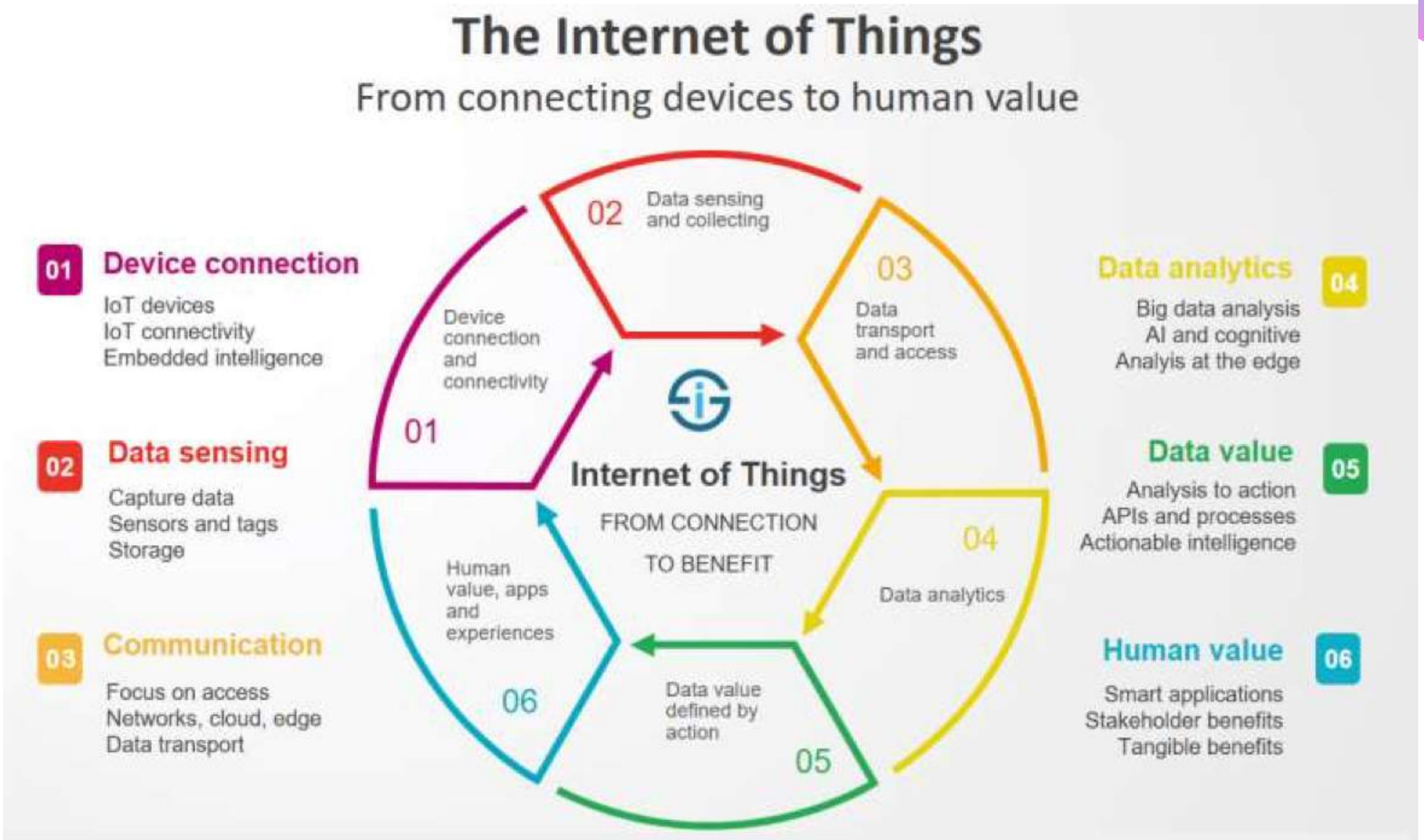
Nano Tech

- make smaller and smaller things have the ability to connect and interact

Smart tech

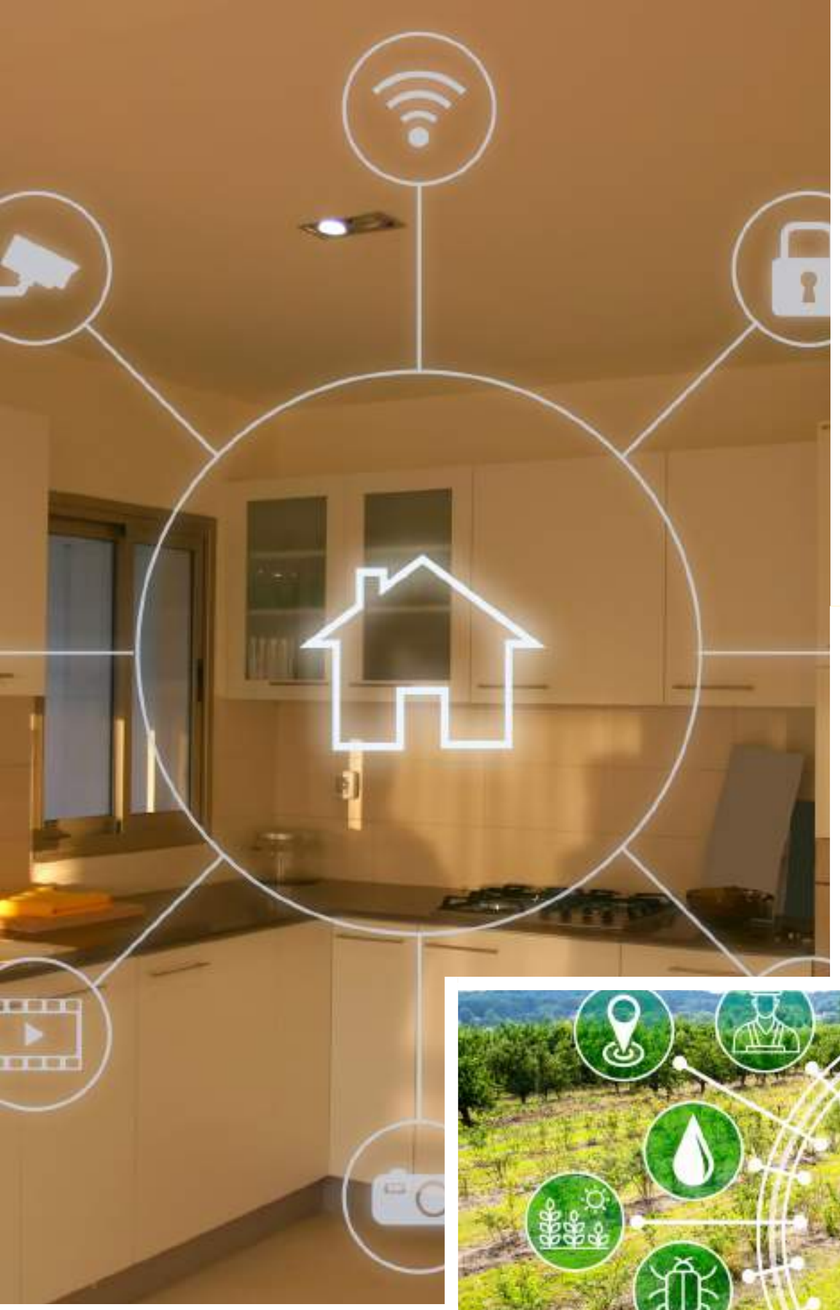
- Enhance the power of the network by developing processing capabilities to different part of the network

Step by Step working of IoT



Case Studies

https://www.iotone.com/case-studies



Application Domains

The concept of Internet-of-Things, with its vision of Internet-connected objects of various capabilities and form factors, could boost the role of ICT as innovation enabler in a variety of application markets.

Smart Homes

Home automation systems.

Wearables

Health monitoring.

Smart Cities

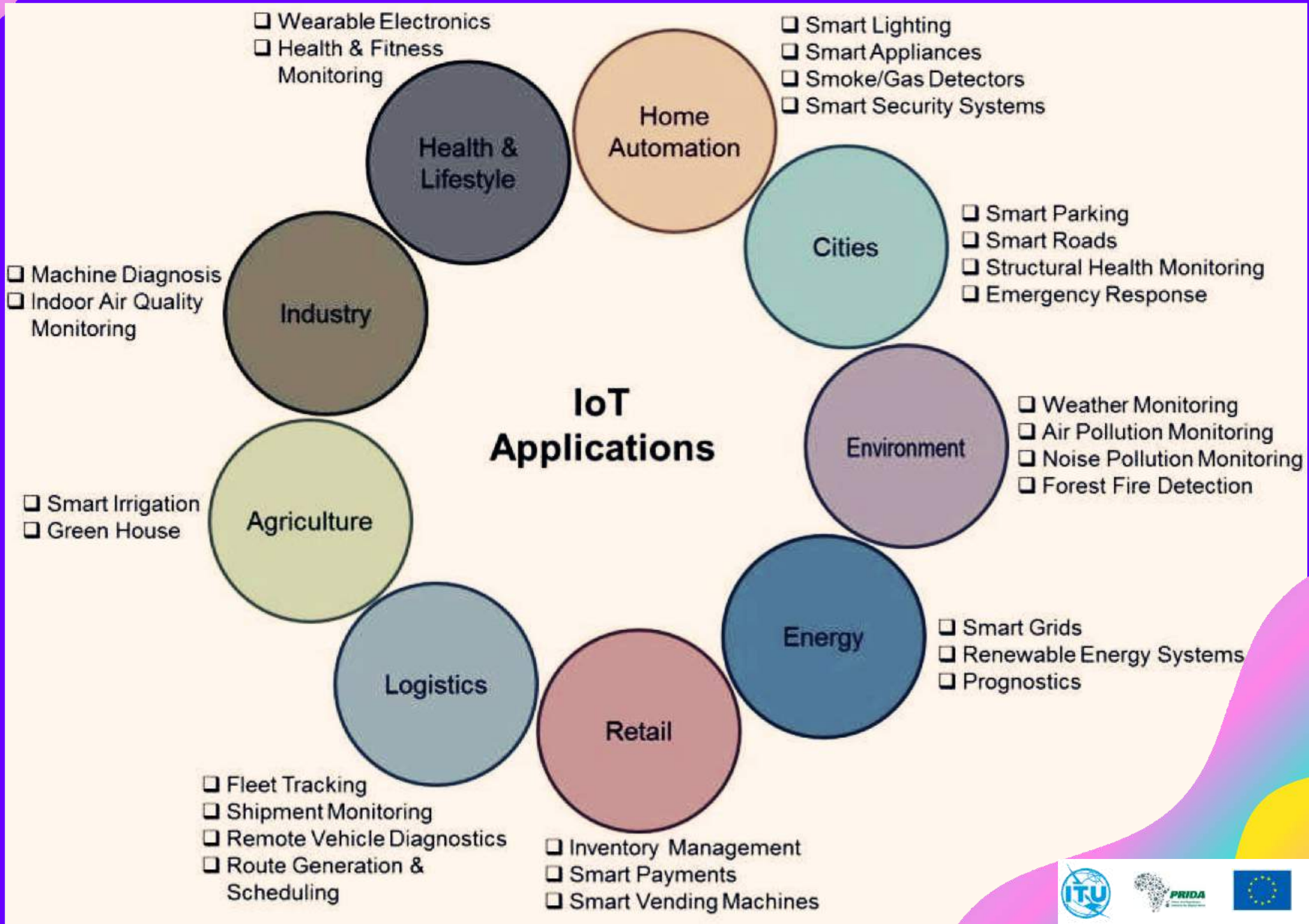
Urban planning and management.

Agriculture

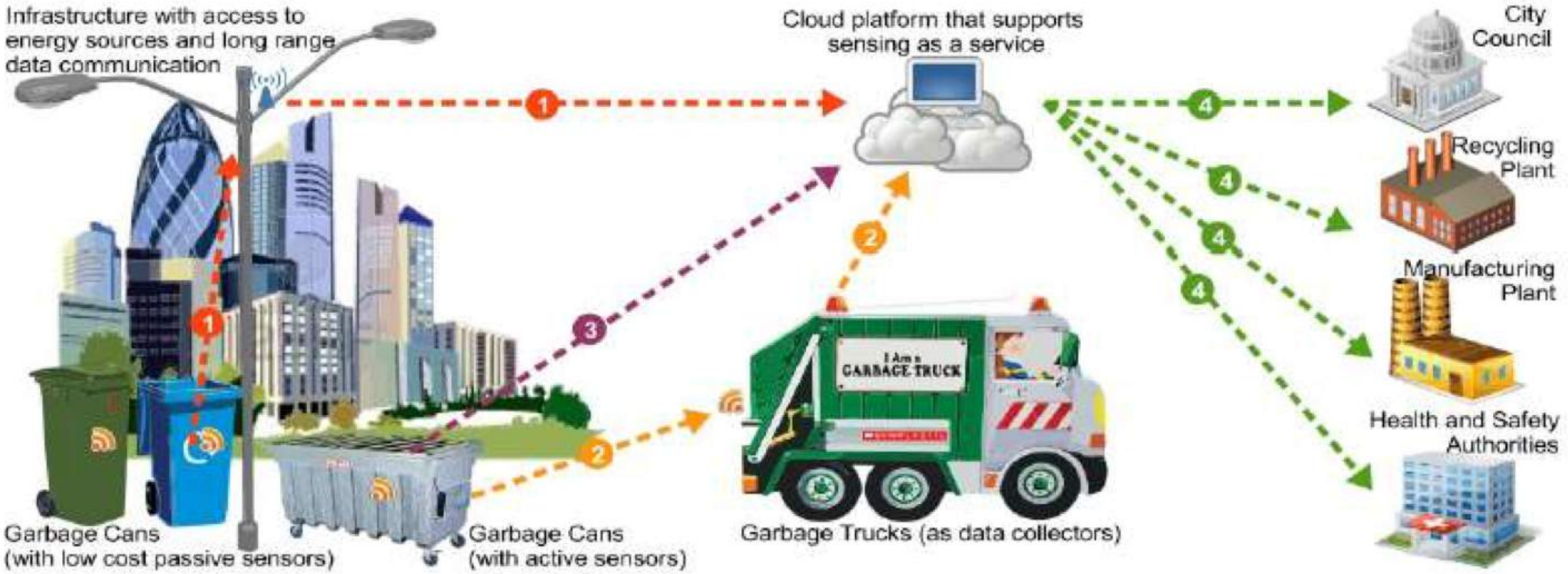
Precision farming.

Miorandi, D., Sicari, S., De Pellegrini, F., & Chlamtac, I. (2012). Internet of things: Vision, applications and research challenges. Ad hoc networks, 10(7), 1497-1516.

Internet of Things Applications



Efficient Waste Management in Smart Cities Supported by the Sensing-as-a-Service



[Source: "Sensing as a Service Model for Smart Cities Supported by Internet of Things", Charith Perera et. al., Transactions on Emerging Telecommunications Technology, 2014]

Case Study 1

IoT Market Trends

IoT Data Feeds AI Models

Searches for "AIoT" have increased by 275% in 5 years.

IoT Platforms look to Improve Functionality

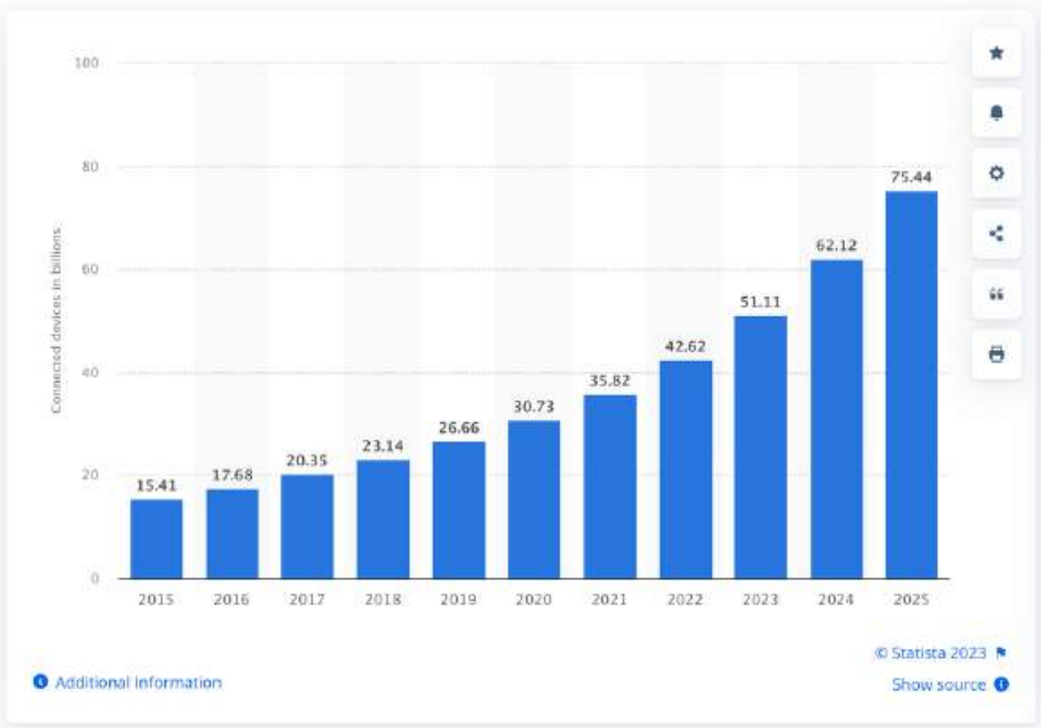
Spending on IoT software grew by over 24% in 2021.

IoT Connects Healthcare To Patient Needs

McKinsey has found that telehealth visits to doctors' offices and outpatient facilities have stabilized at roughly 38x higher than it was pre-pandemic.

Industry 4.0 Increasingly Relies On IoT

Without IoT, the large-scale data collection and monitoring required to improve industrial capacity would be impossible.



Statista. (2023). Internet of Things (IoT) connected devices installed base worldwide from 2015 to 2025(in billions)

Exponential Growth

Projected to reach 75 billion devices by 2025

Sectors Leading in IoT

Healthcare, Automotive, industrial automation.

The Value Chain in IoT

- Device Manufacturers
- Connectivity Providers
- Data Processors: Companies offering cloud services.
- End-User Solutions: Apps and interfaces for users.

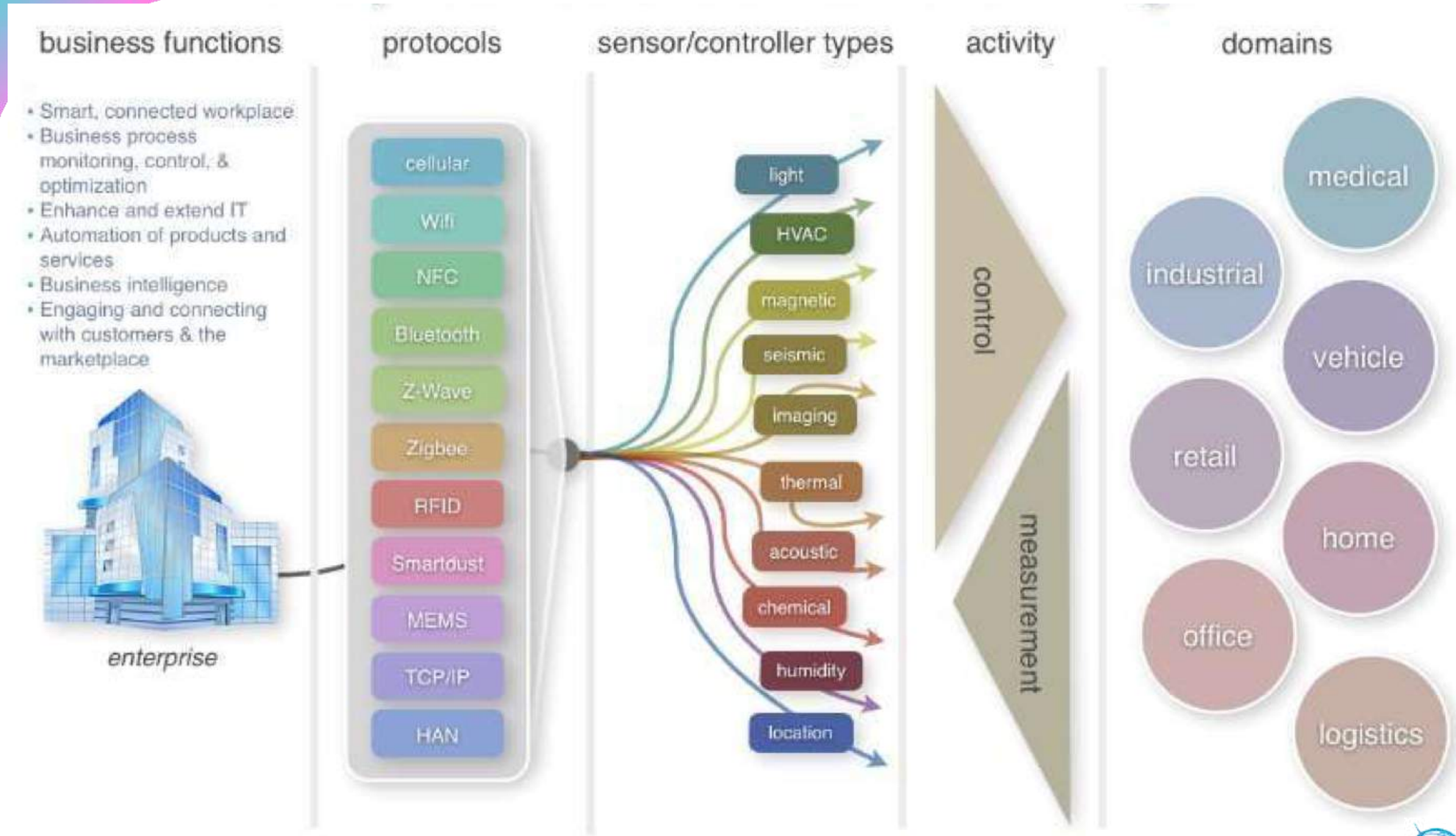
Device Manufacturers

Creates the IoT devices.

Connectivity Providers

Internet, cellular providers.

Enterprise view of IoT



Thank You For Your Attention

End of Session 1

Session 2

Up Next

You can e-mail your further questions to:- amgamundani@gmail.com