Introduction to IOT

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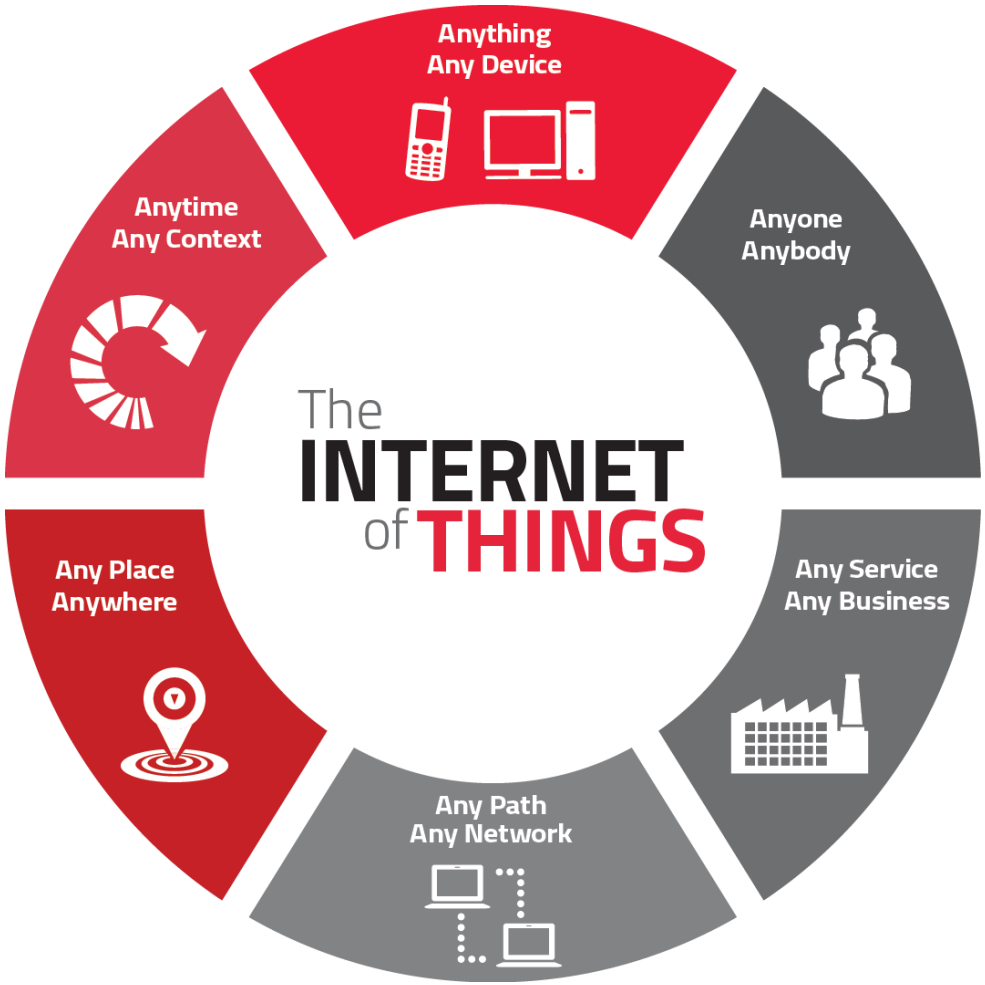
Books used to prepare this course

- Vijay Madisetti & Arshdeep Bahga
- Francis deCosta
- Cuno Pfister
- Wikipedia and Online Resources

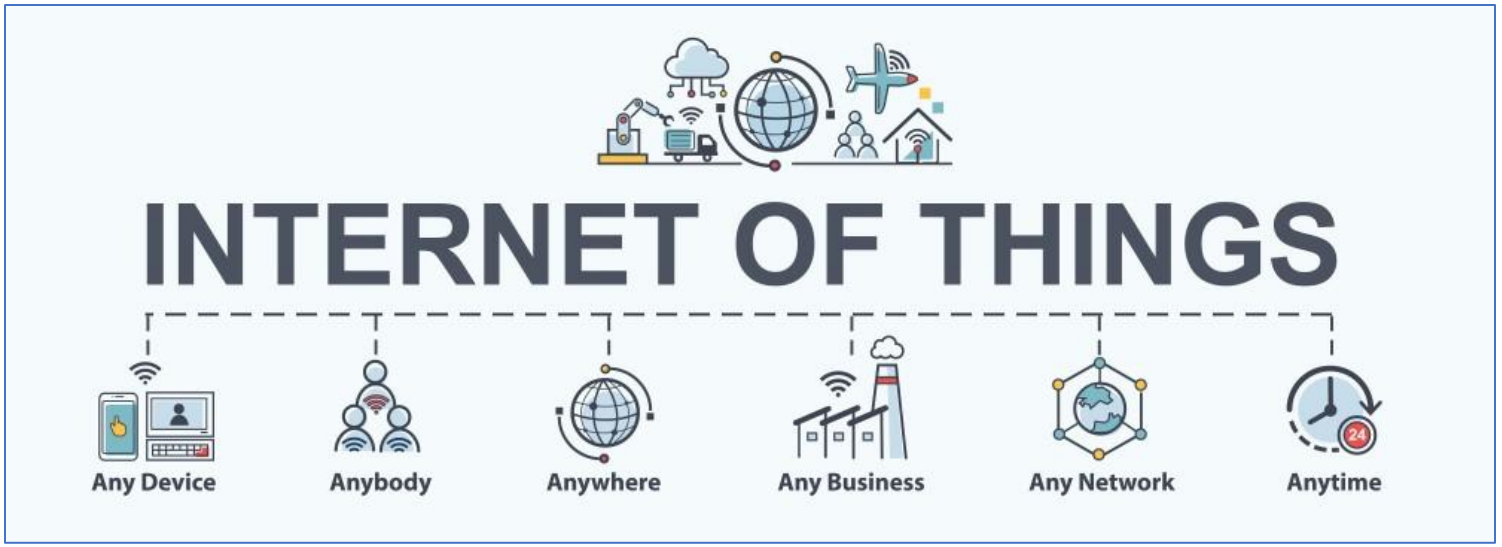
Internet of Things



IoT devices are not limited to computers or machinery. The Internet of Things can include anything with a sensor that is assigned a unique identifier (UID). The primary goal of the IoT is to create self-reporting devices that can communicate with each other (and users) in real-time.

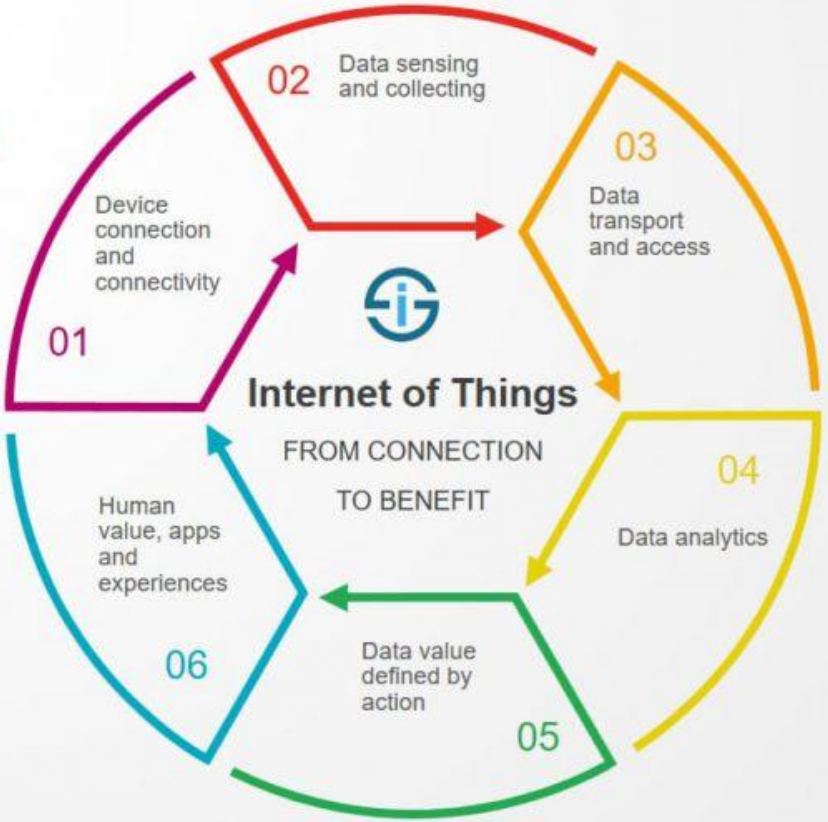
What is the Internet of Things (IoT)?

The Internet of Things (IoT) is a network of physical devices that can transfer data to one another without human intervention. The term was first coined by computer scientist Kevin Ashton in 1999.



The Internet of Things

From connecting devices to human value



01 Device connection

IoT devices
IoT connectivity
Embedded intelligence

02 Data sensing

Capture data
Sensors and tags
Storage

01 Communication

Focus on access
Networks, cloud, edge
Data transport

Data analytics 04

Big data analysis
AI and cognitive
Analyis at the edge

Data value 05

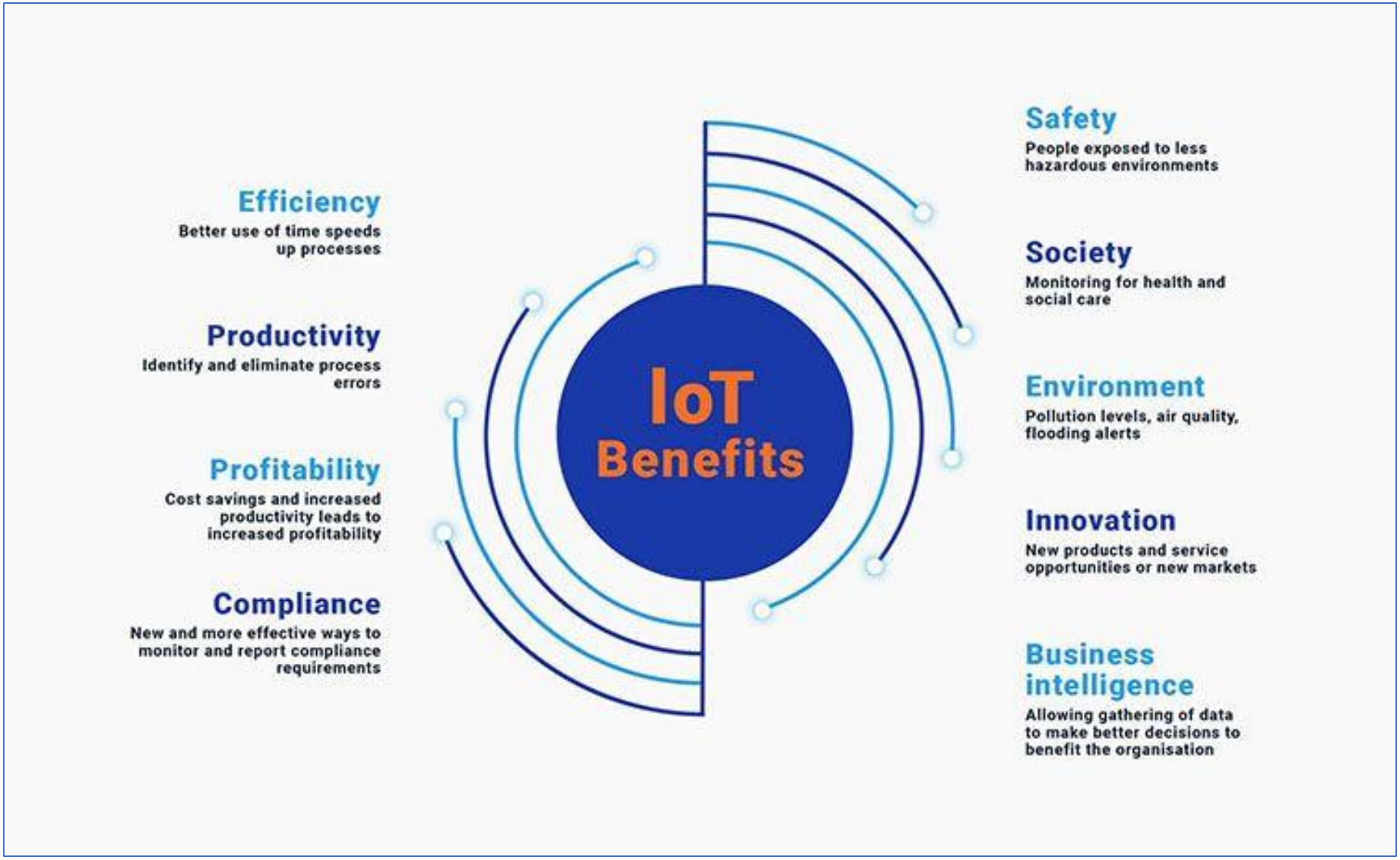
Analysis to action
APIs and processes
Actionable intelligence

Human value 06

Smart applications
Stakeholder benefits
Tangible benefits

Importance of IOT

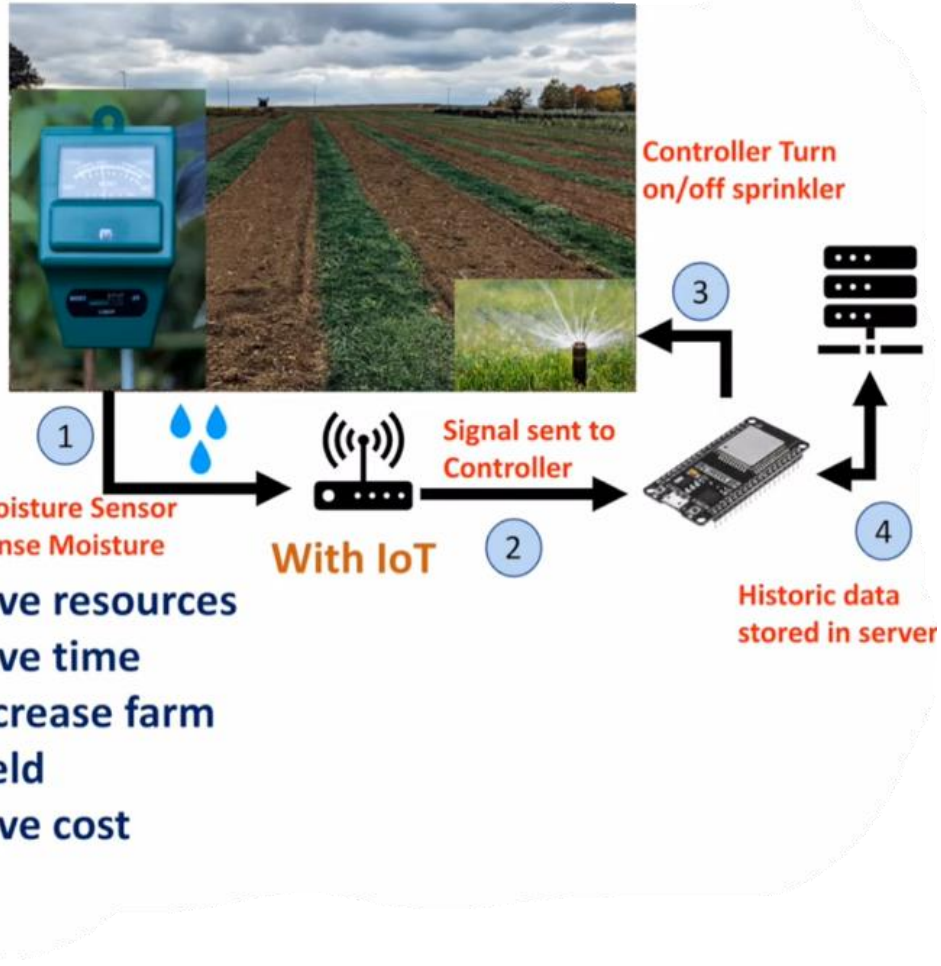
- **Automation and efficiency.** IoT devices allow businesses to automate routine tasks, optimize energy consumption, and enhance overall efficiency. For example, IoT-enabled machinery can automate assembly lines in the automotive industry, while smart grids in energy management can dynamically balance supply and demand.
- **Real-time data and predictive maintenance.** IoT provides businesses with access to real-time data, which can be leveraged for predictive maintenance and timely decision-making. IoT sensor data from industrial equipment can detect early signs of wear and tear, allowing for timely repairs and minimizing downtime.
- **Enhanced customer experience.** In retail or service sectors, IoT solutions can improve customer engagement and experience. Smart devices can offer personalized recommendations, automated support, and seamless interactions without the need for human intervention.
- **Sustainability.** IoT's ability to monitor and control energy consumption has significant implications for sustainability. From reducing waste in manufacturing to optimizing energy use in office buildings, IoT helps businesses align with environmental goals.


IoT Benefits
Efficiency
Better use of time speeds up processes
Productivity
Identify and eliminate process errors
Profitability
Cost savings and increased productivity leads to increased profitability
Compliance
New and more effective ways to monitor and report compliance requirements
Safety
People exposed to less hazardous environments
Society
Monitoring for health and social care
Environment
Pollution levels, air quality, flooding alerts
Innovation
New products and service opportunities or new markets
Business intelligence
Allowing gathering of data to make better decisions to benefit the organisation

Importance of IOT

Without IoT

- Uses more resources
- Consumes more time
- Decrease farm yield



With IoT

- Save resources
- Save time
- Increase farm yield
- Save cost

Internet of Things Uses By Industry

HOME
- Smart Temperature Control
- Optimized Energy Use

INDUSTRIAL
- Machine-to-Machine Communication
- Quality Control

AUTOMOTIVE
- Vehicle Auto-Diagnosis
- Optimized Traffic Flow
- Smart Parking

AGRICULTURE
- Offspring Care
- Crop Management
- Soil Analysis

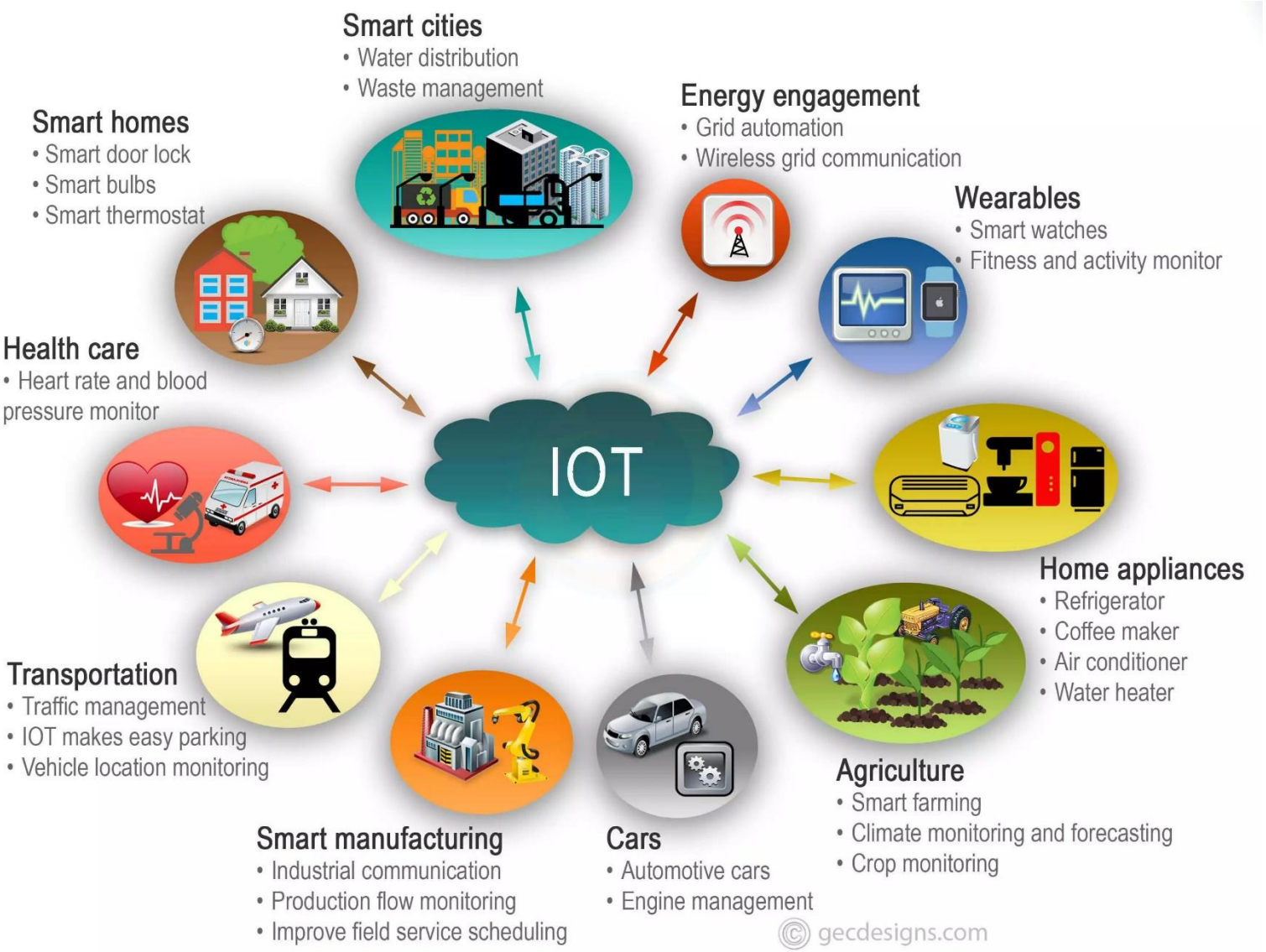
MILITARY
- Situational Awareness
- Threat Analysis

MEDICAL
- Optimized Patient Care
- Wearable Fitness Devices
- Quality Data Reporting

ENVIRONMENTAL
- Forest Fire Detection
- Species Tracking
- Weather Prediction

RETAIL
- Theft Protection
- Inventory Control
- Focused Marketing

IoT Applications



IoT Applications in Industrial Automation

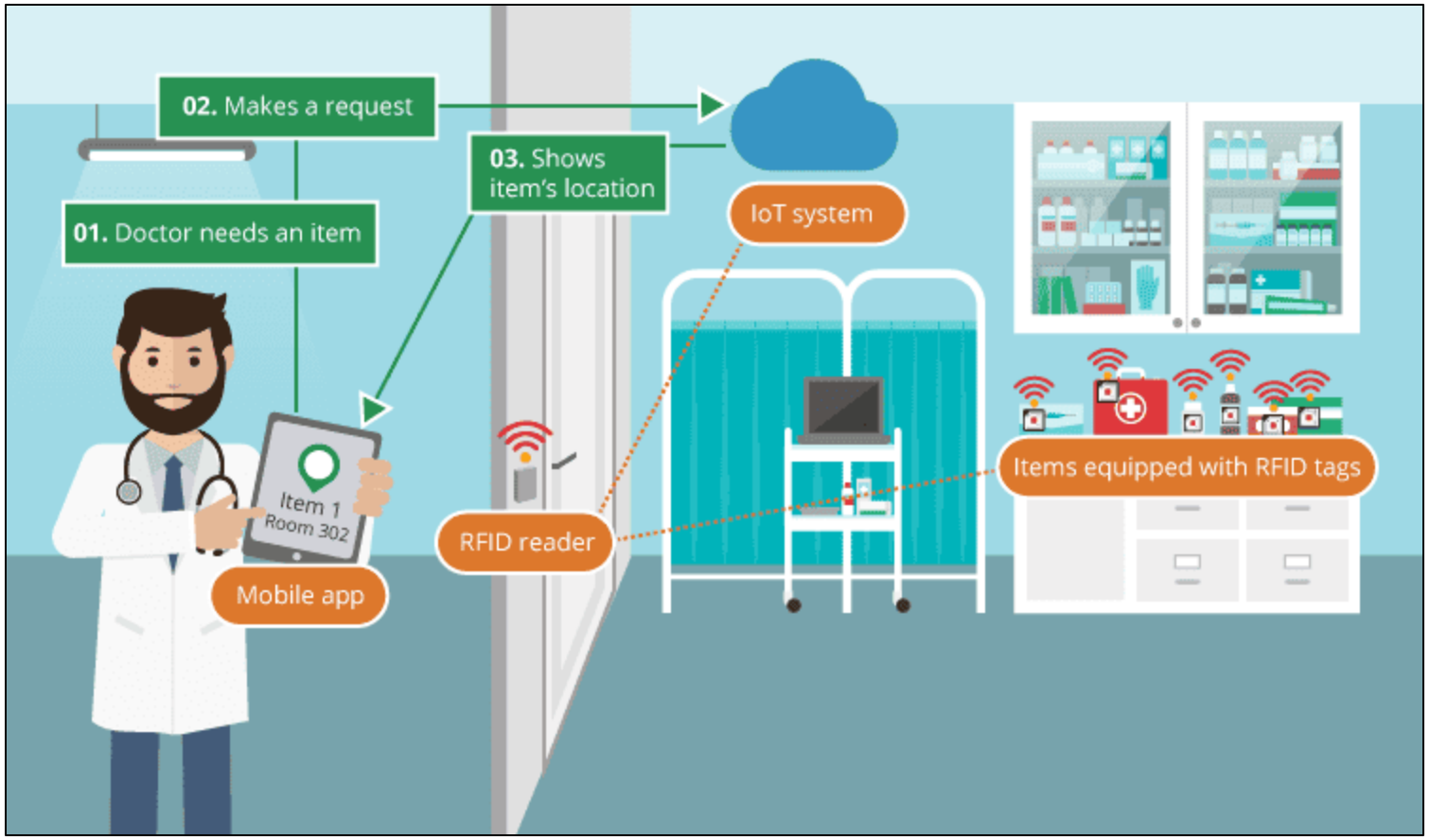
- Smart tracking for products in-transit
- Notifies users on deviations in delivery plans

- Creates Digital Factories
- Improves Line-of-Command in work units

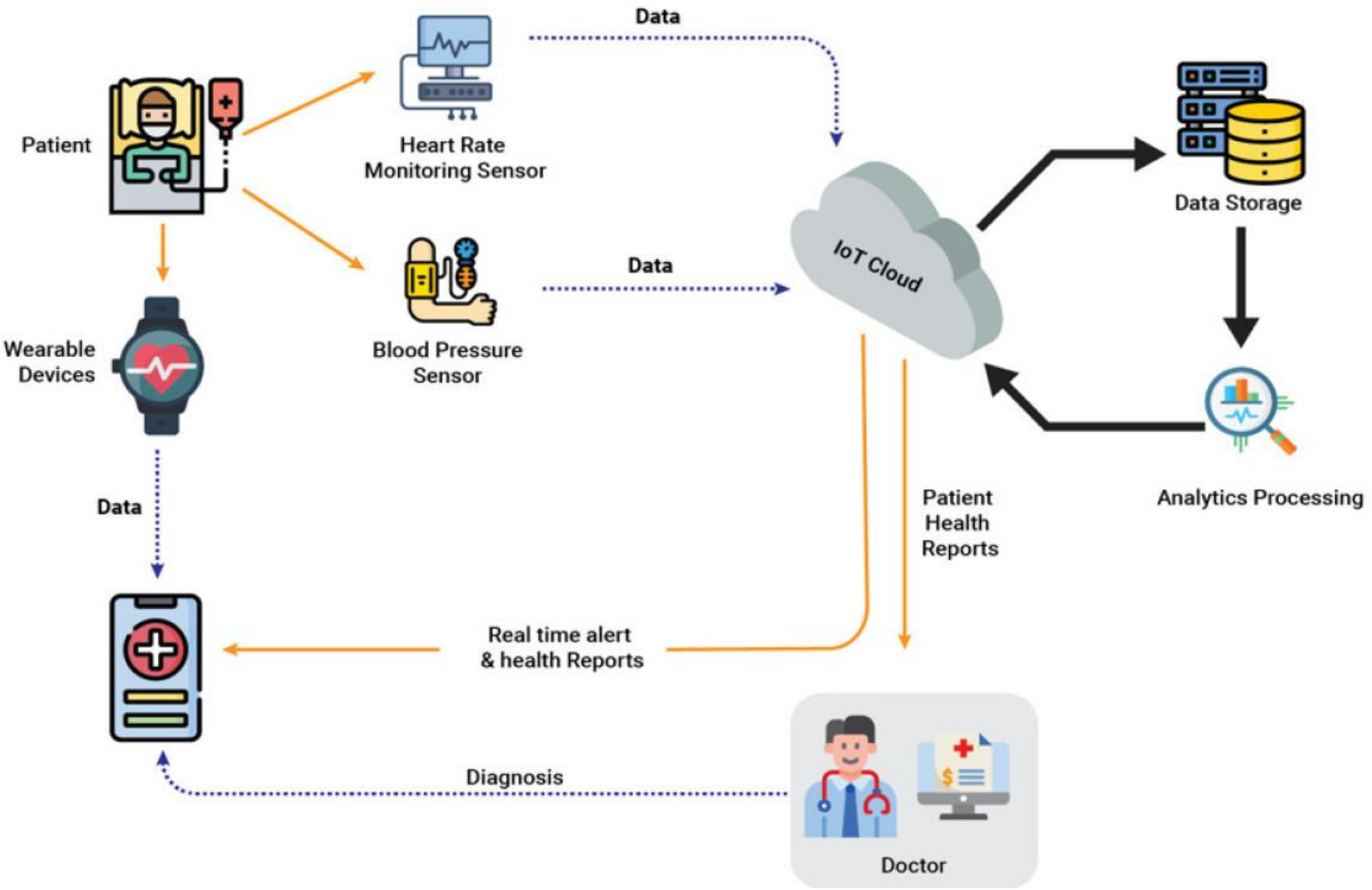
- Monitors in near real-time through out the supply chain
- Provides cross channel visibility into inventories

- Product Quality testing in various stages of Manufacturing cycle
- Packaging Optimization

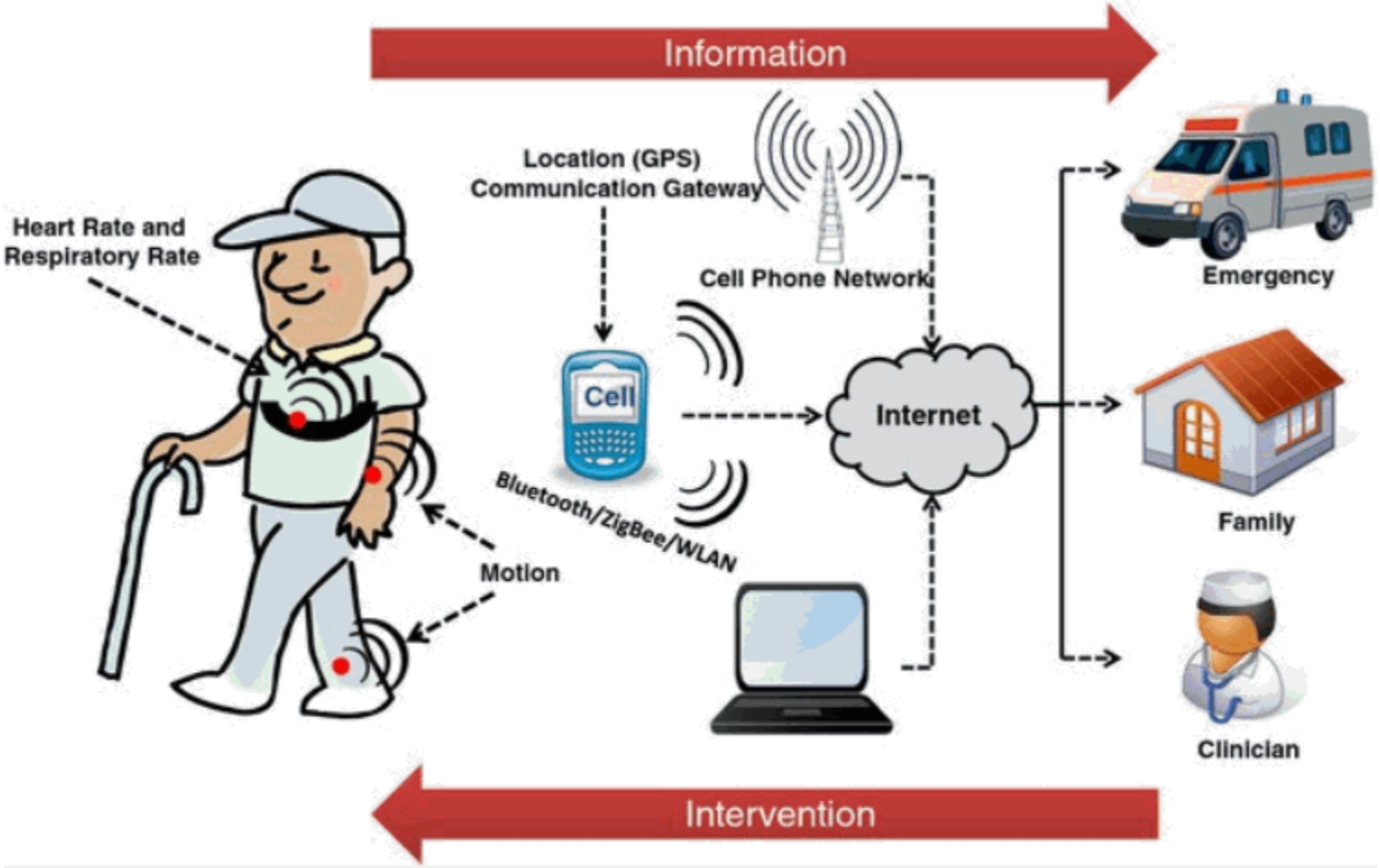
IoT Applications in Healthcare



IoT Applications in Healthcare



IoT Applications in Healthcare

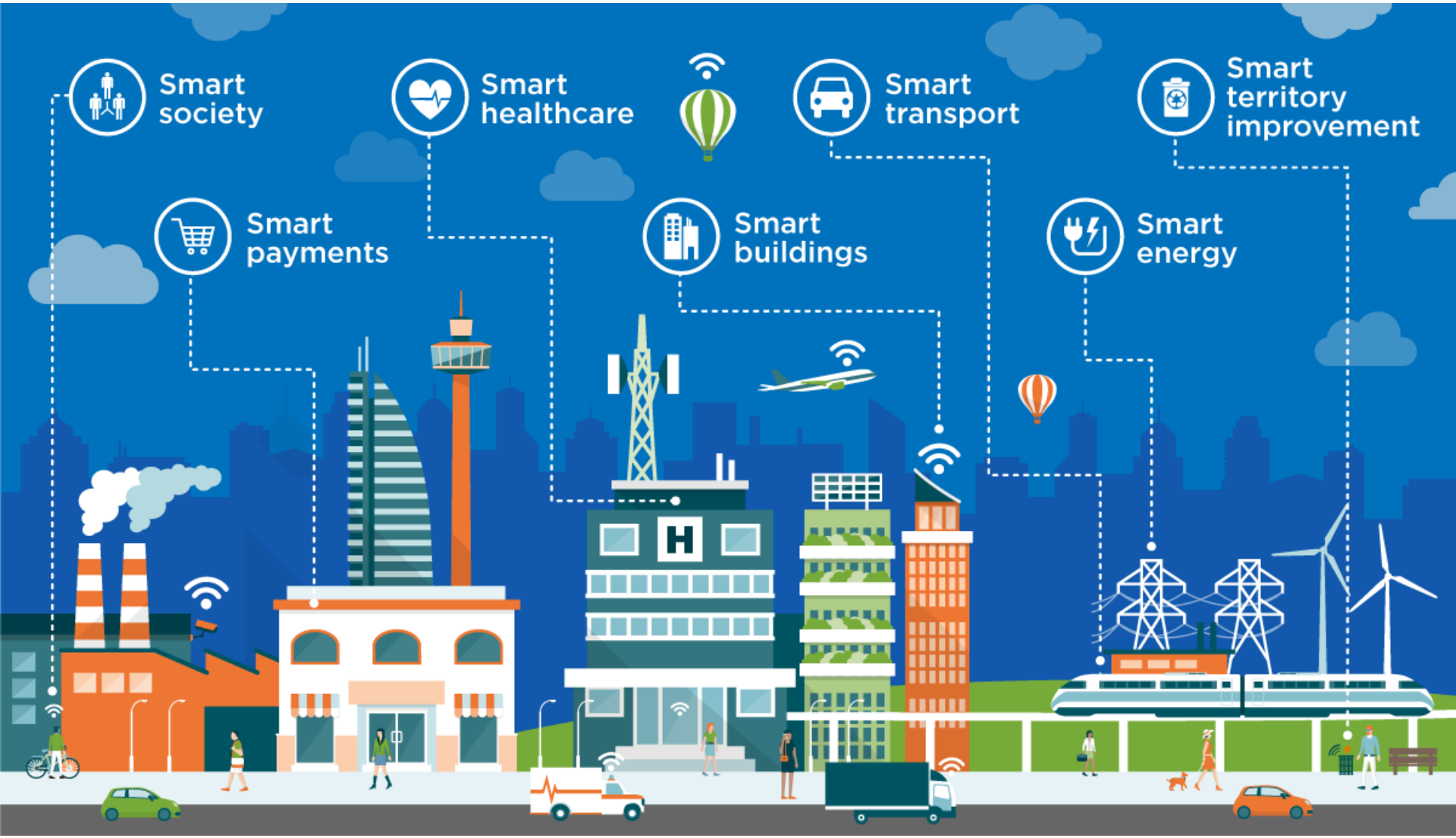


IoT in Remote Health Monitoring

IoT in Smart Farming

(Precision Farming)

IoT in Smart Cities



Emerging Technologies in IoT

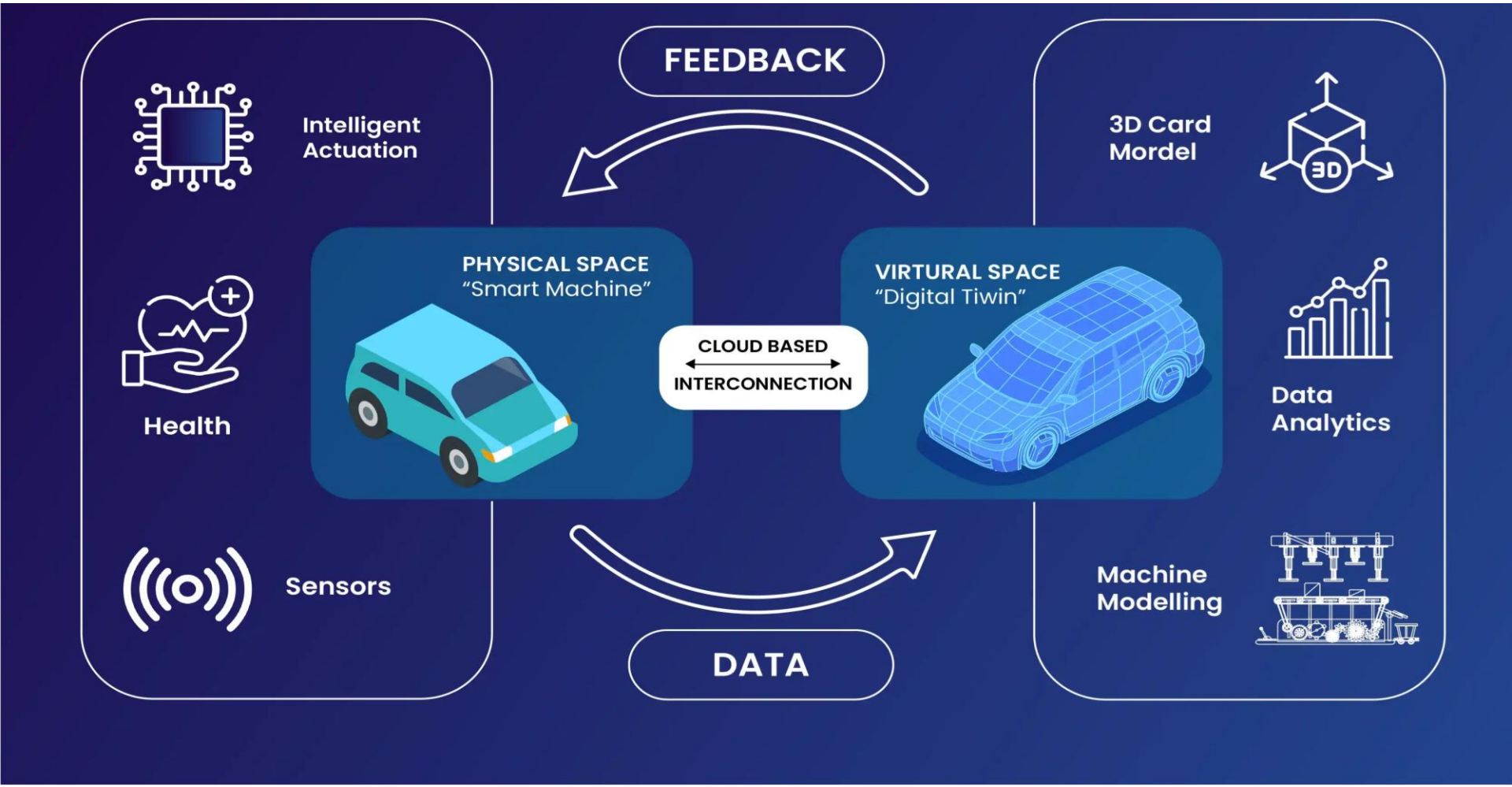
•**Augmented Reality (AR)** – Overlay digital information.

Emerging Technologies in IoT

•**Virtual Reality (VR)** – Immersive simulations.

Emerging Technologies in IoT

•**Digital Twins** – Real-time monitoring and predictive analytics.



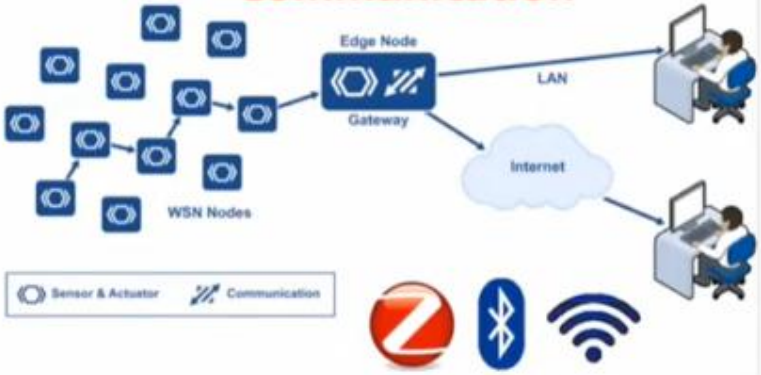
ABCD's of IOT

Applications

- Smart Home
- Wearables
- Smart City
- Smart Retail

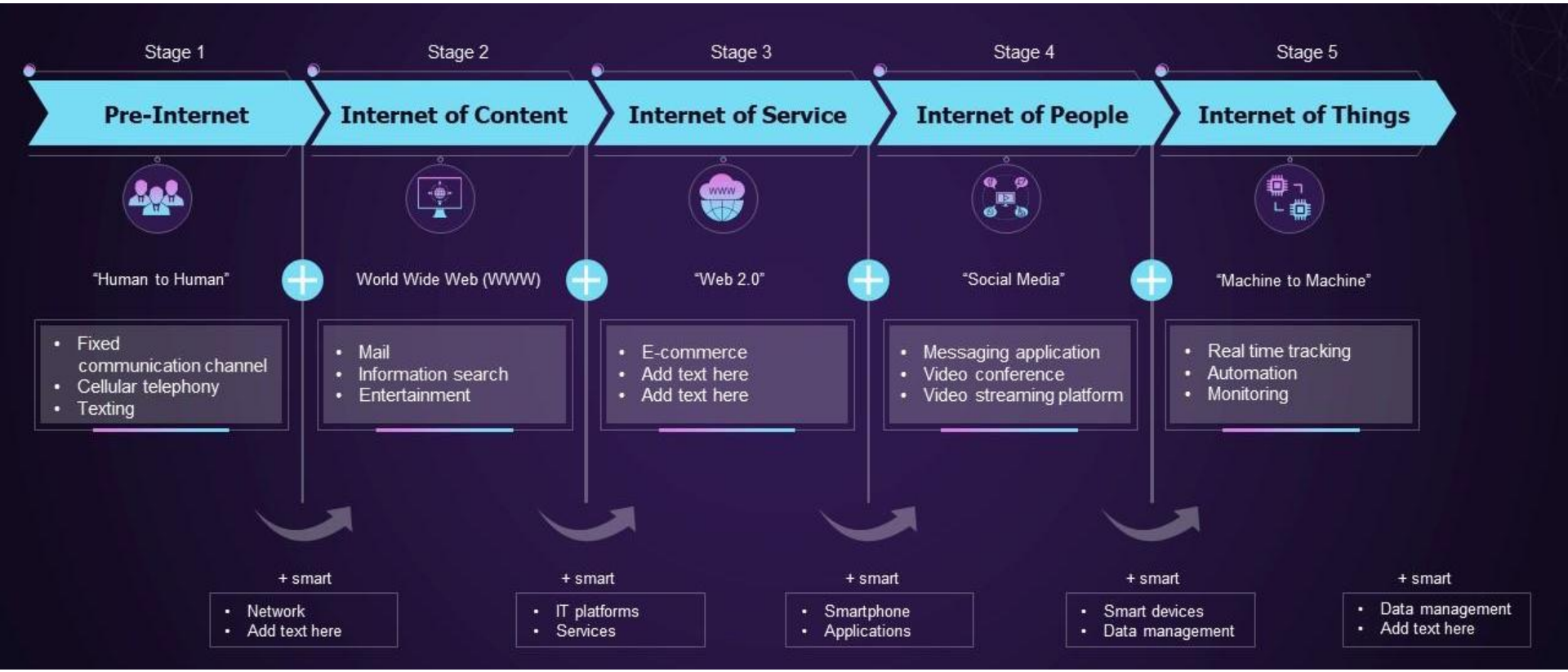
Big Data Analytics

Connectivity and Communication

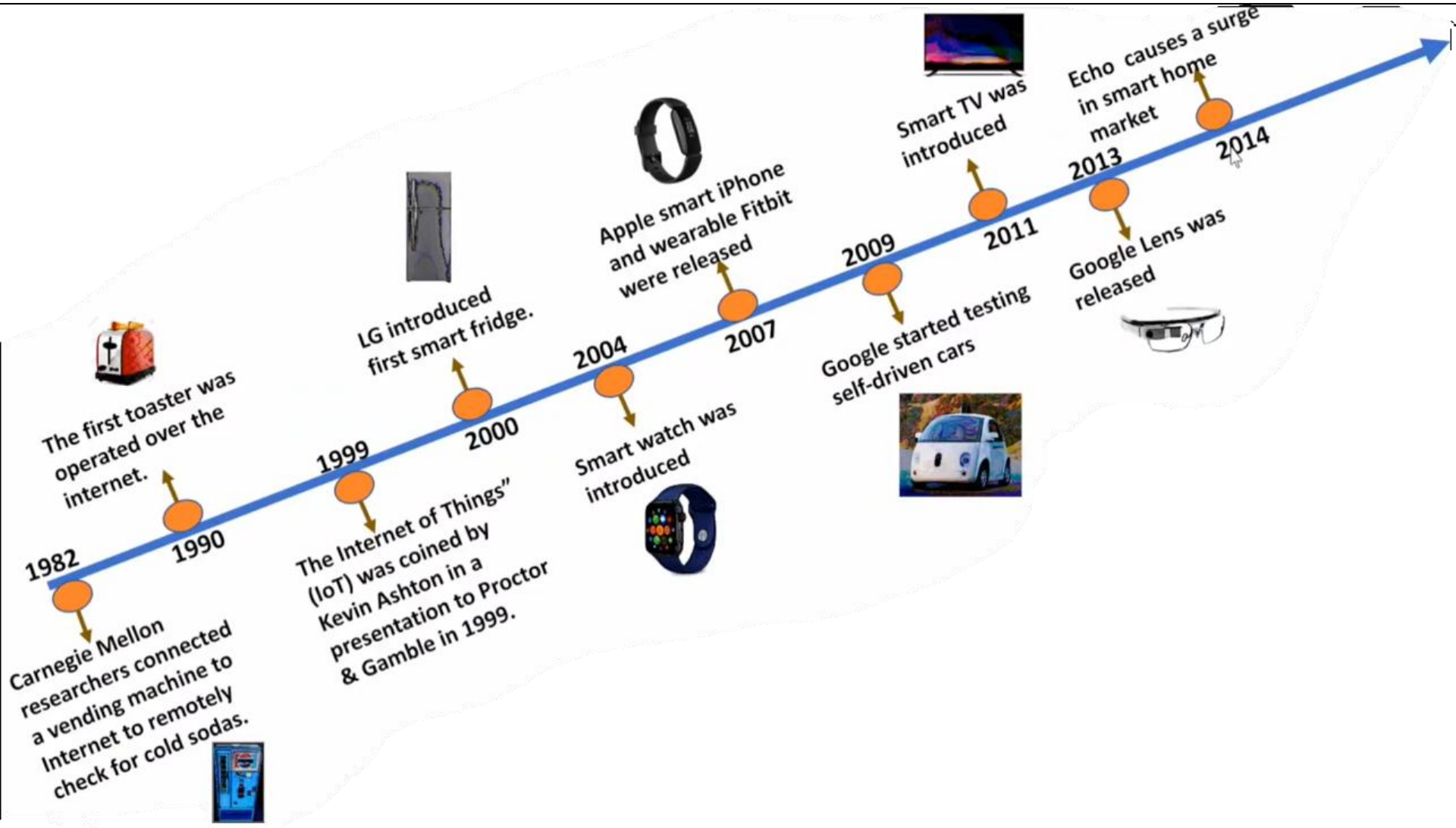


Devices – that are smart!

Evolution of IoT



History of IoT



Thank You