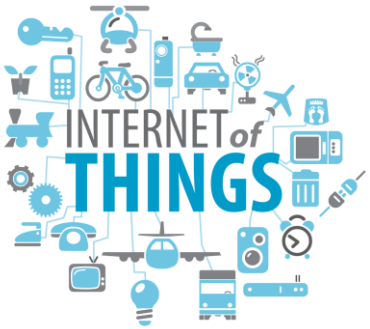
UNIVERSITY OF SCIENCE - VNUHCM
Faculty of Information Technology

INTERNET OF THINGS

INTRODUCE TO INTERNET OF THINGS

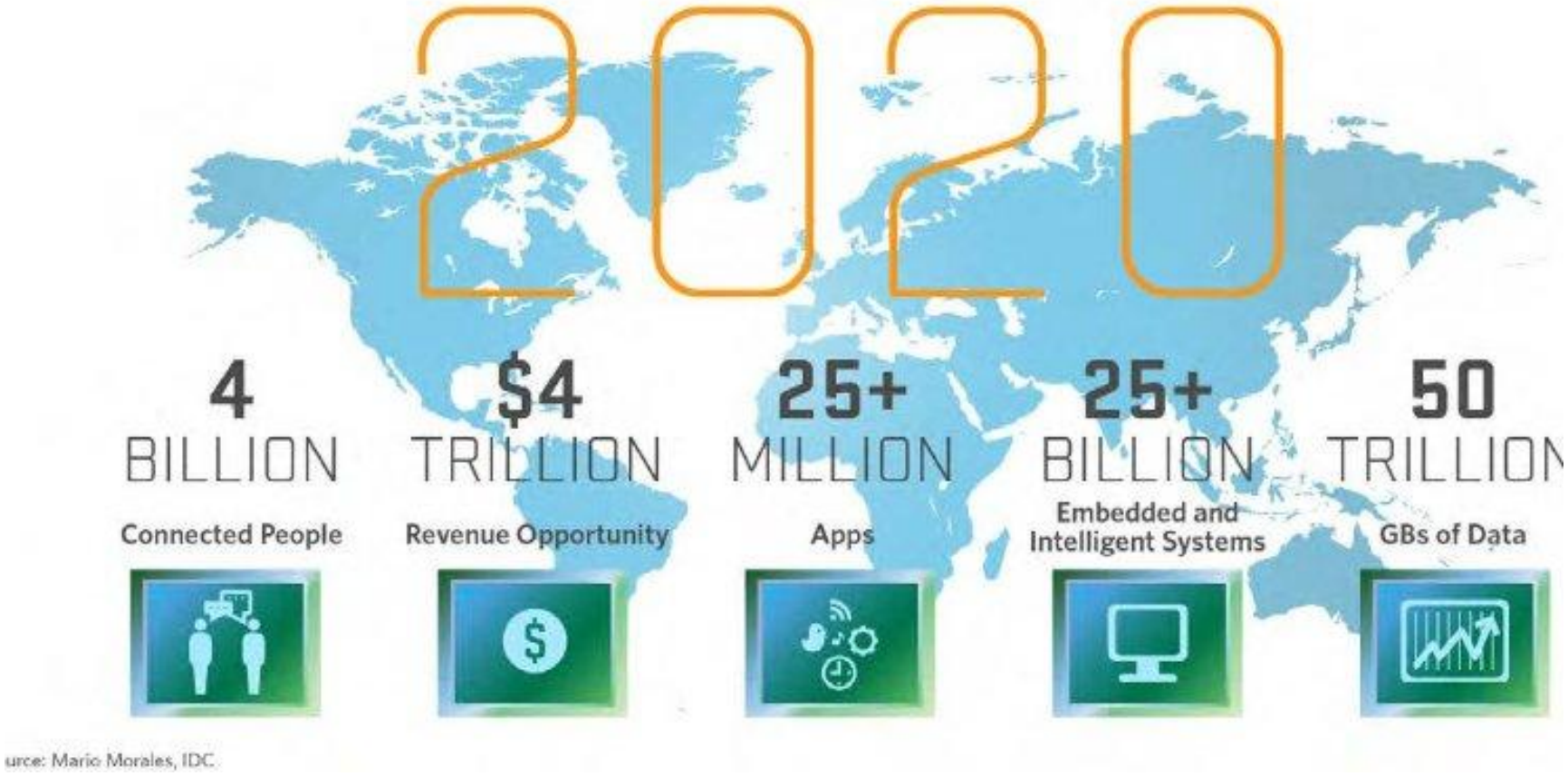


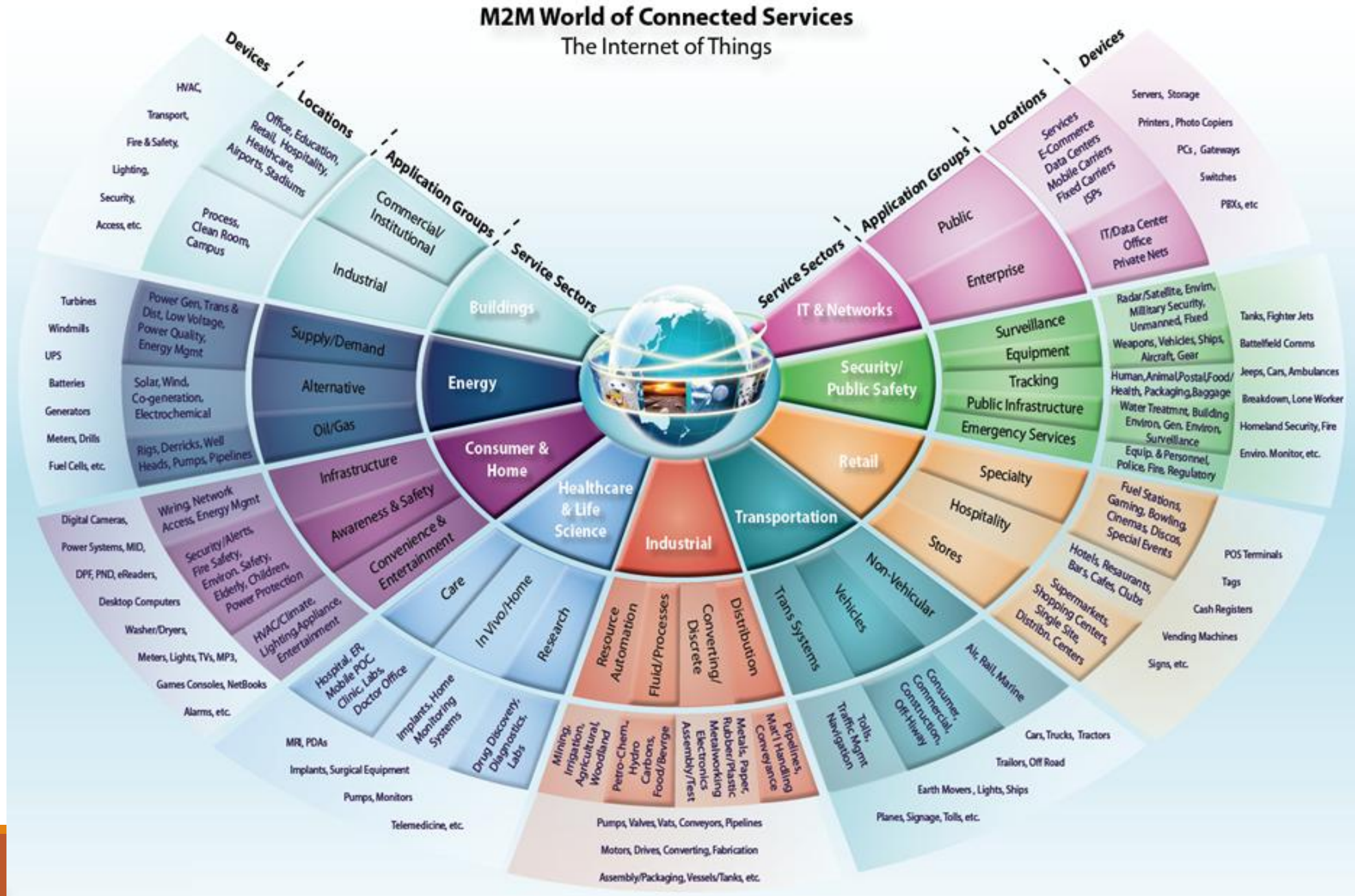
Contents

INTERNET OF THINGS (IoT)

The Internet of things (IoT) describes physical objects (or groups of such objects) that are embedded with sensors, processing ability, software, and other technologies, and that connect and exchange data with other devices and systems over the Internet or other communications networks.

INTERNET OF THINGS IN 2020

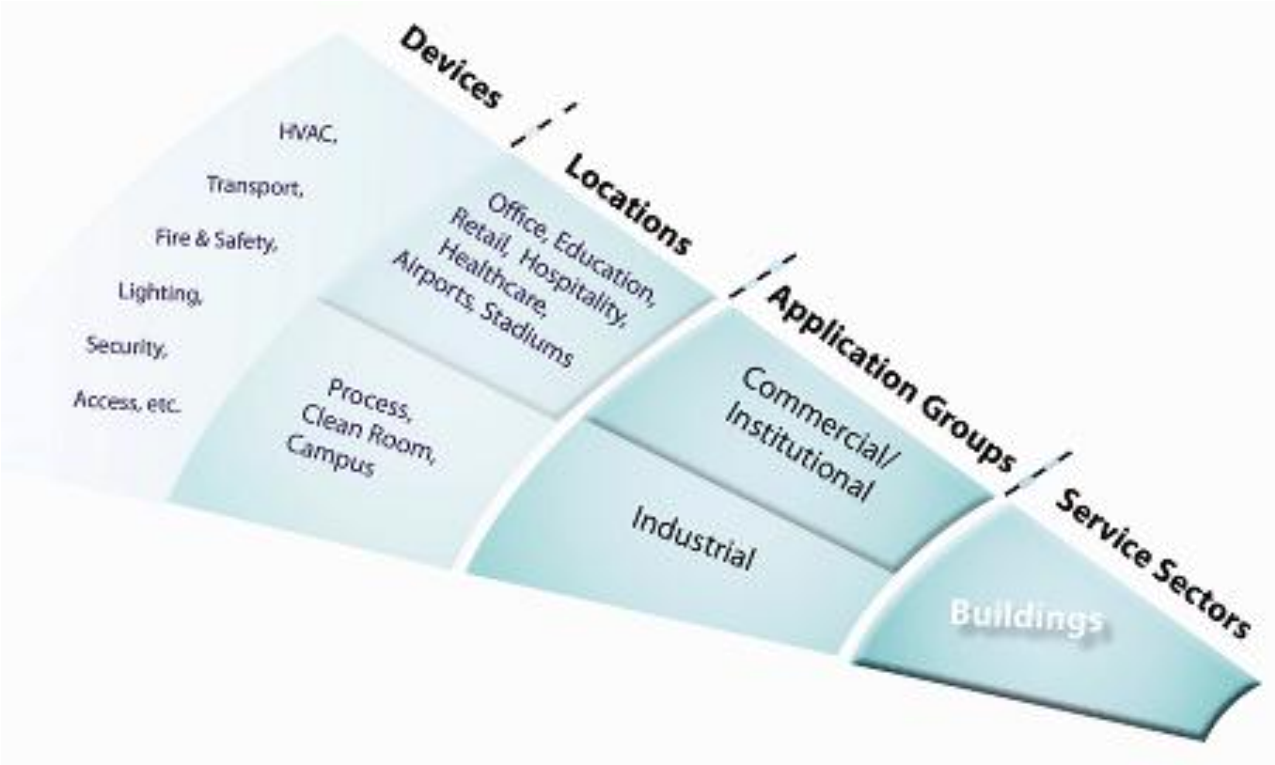



M2M World of Connected Services
The Internet of Things
Devices
Locations
Application Groups
Service Sectors
HVAC,
Transport,
Fire & Safety,
Lighting,
Security,
Access, etc.
Office, Education, Retail, Hospitality, Healthcare, Airports, Stadiums
Process, Clean Room, Campus
Commercial/ Institutional
Industrial
Buildings
Energy
Consumer & Home
Healthcare & Life Science
Industrial
Transportation
Retail
Security/ Public Safety
IT & Networks
Public
Enterprise
Services
E-Commerce
Data Centers
Mobile Carriers
Fixed Carriers
ISPs
Servers, Storage
Printers , Photo Copiers
PCs , Gateways
Switches
PBXs, etc
IT/Data Center
Office
Private Nets
Turbines
Windmills
UPS
Batteries
Generators
Meters, Drills
Fuel Cells, etc.
Power Gen, Trans & Dist, Low Voltage, Power Quality, Energy Mgmt
Solar, Wind, Co-generation, Electrochemical
Rigs, Derricks, Well Heads, Pumps, Pipelines
Supply/Demand
Alternative
Oil/Gas
Infrastructure
Awareness & Safety
Convenience & Entertainment
Wiring, Network Access, Energy Mgmt
Security/Alerts, Fire Safety, Environ. Safety, Elderly, Children, Power Protection
HVAC/Climate, Lighting,Appliance, Entertainment
Digital Cameras,
Power Systems, MID,
DPF, PND, eReaders,
Desktop Computers
Washer/Dryers,
Meters, Lights, TVs, MP3,
Games Consoles, NetBooks
Alarms, etc.
Care
In Vivo/Home
Research
Hospital, ER, Mobile POC, Clinic, Labs, Doctor Office
Implants, Home Monitoring Systems
Drug Discovery, Diagnostics, Labs
MR, PDAs
Implants, Surgical Equipment
Pumps, Monitors
Telemedicine, etc.
Resource Automation
Fluid/Processes
Converting/ Discrete
Distribution
Mining, Irrigation, Agricultural, Woodland
Petro-Chem, Hydro Carbons, Food/Bevrge
Metals, Paper, Rubber/Plastic Metalworking
Electronics Assembly/Test
Pipelines, Mat'l Handling Conveyance
Pumps, Valves, Vats, Conveyors, Pipelines
Motors, Drives, Converting, Fabrication
Assembly/Packaging, Vessels/Tanks, etc.
Trans Systems
Non-Vehicular
Vehicles
Air, Rail, Marine
Consumer, Commercial, Construction, Off-Hiway
Tolls, Traffic Mgmt Navigation
Cars, Trucks, Tractors
Trailors, Off Road
Earth Movers , Lights, Ships
Planes, Signage, Toils, etc.
Specialty
Hospitality
Stores
Fuel Stations, Gaming, Bowling, Cinemas, Discos, Special Events
Hotels, Resaurants, Bars, Cafes, Clubs
Supermarkets, Shopping Centers, Single Site, Distribn. Centers
POS Terminals
Tags
Cash Registers
Vending Machines
Signs, etc.
Surveillance
Equipment
Tracking
Public Infrastructure
Emergency Services
Radar/Satellite, Envirn, Military Security, Unmanned, Fixed
Weapons, Vehicles, Ships, Aircraft, Gear
Human,Animal,Postal,Food/ Health, Packaging,Baggage
Water Treatmnt, Building Environ, Gen. Environ, Surveillance
Equip. & Personnel, Police, Fire, Regulatory
Tanks, Fighter Jets
Battelfield Comms
Jeeps, Cars, Ambulances
Breakdown, Lone Worker
Homeland Security, Fire
Enviro. Monitor, etc.

Sector 1: Buildings and Offices

Target objects: buildings, factories, office centers, universities, government agencies, etc.

The equipment in the buildings, the departments are connected, and strictly managed. Manual control systems such as lighting control, temperature control, fire alarm, customer and staff management will all be automated according to the change of the external environment.



The Smart *Internet of Things* School

Personalized learning with adaptive eTextbooks

Digital classroom white boards and display

iBeacons

Complete coverage with high performance Wi-Fi

Wearables for athletics and attendance tracking

Video recorders for lecture capture

International Collaboration and social exchange

Online testing

Sensors on trash receptacles

Robot cleaning

Augmented and virtual reality

Makerspaces with 3D printers and laser trimmers

Supplies and inventory tracking by sensor with auto-reorder

Student devices & eTextbooks

- Notebooks
- Tablets
- Smartphones

Robotics for STEM and remote presence

Internet of Things-based HVAC

Monitor and display of air quality throughout school

File and program storage, local or cloud-based

- Demographics, academics, behavior, interests
- LMS, CMS, SIS
- Educational programs and applications
- Video files: lectures and recorded lab experiments

Network application analytics to monitor devices and network behavior

Surveillance security cameras

Wi-Fi sensors and locks

- Entrances and exits
- Classroom doors

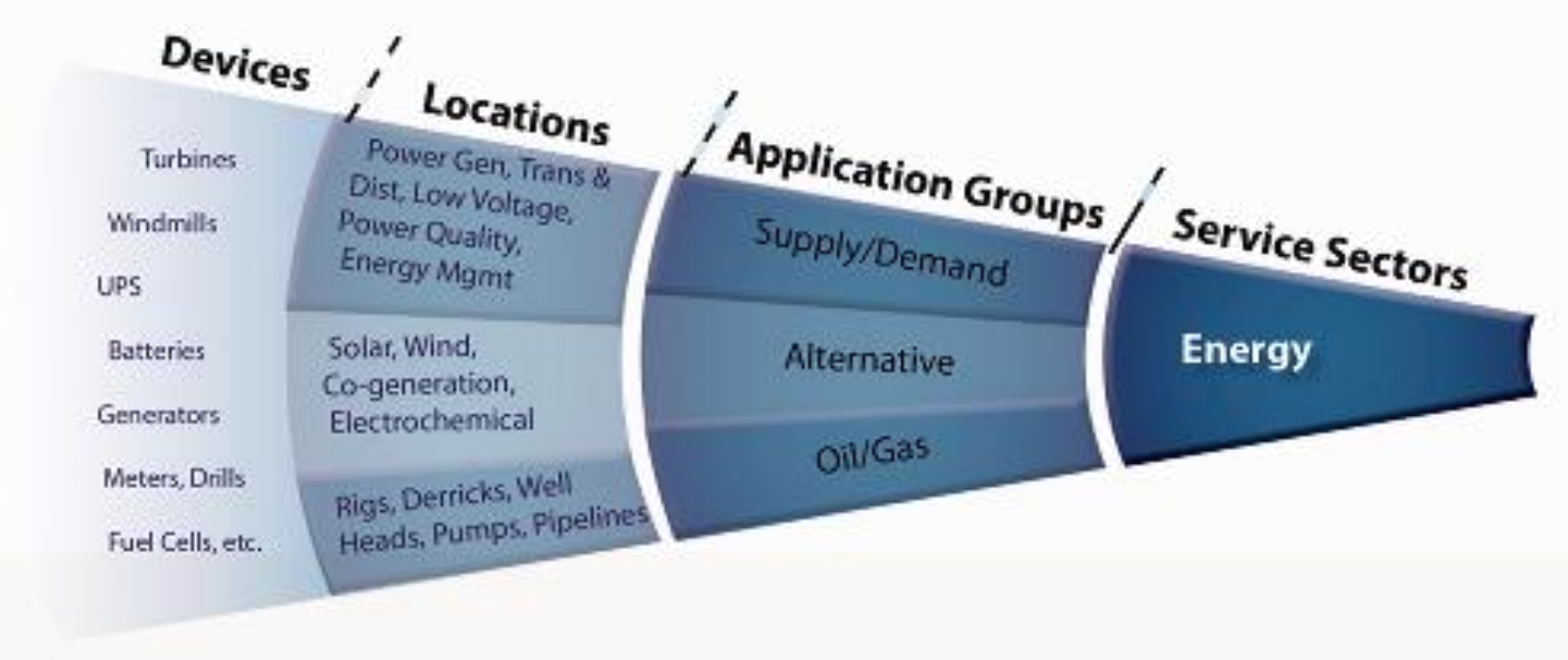
Sensors in parking lot and driveways

Sensors track buses and verify student passengers

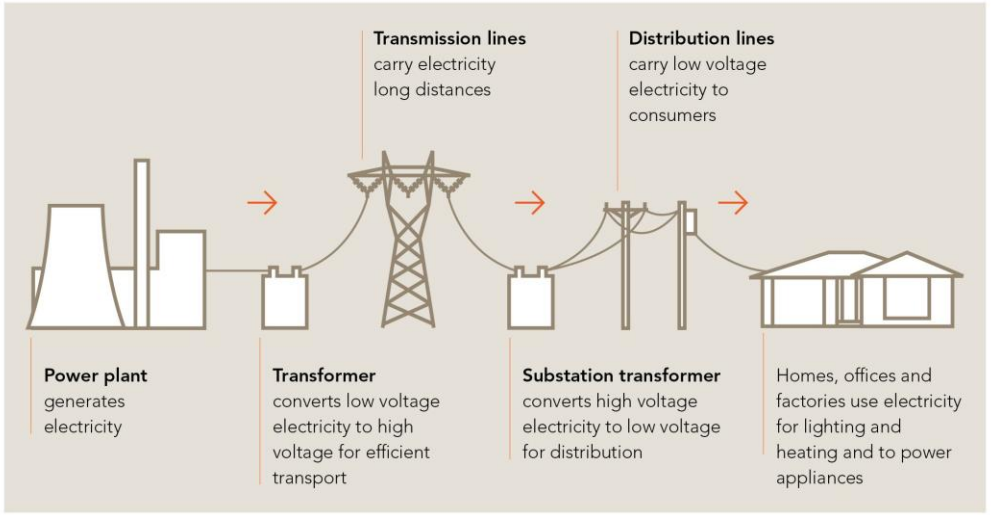
Sector 2: Energy

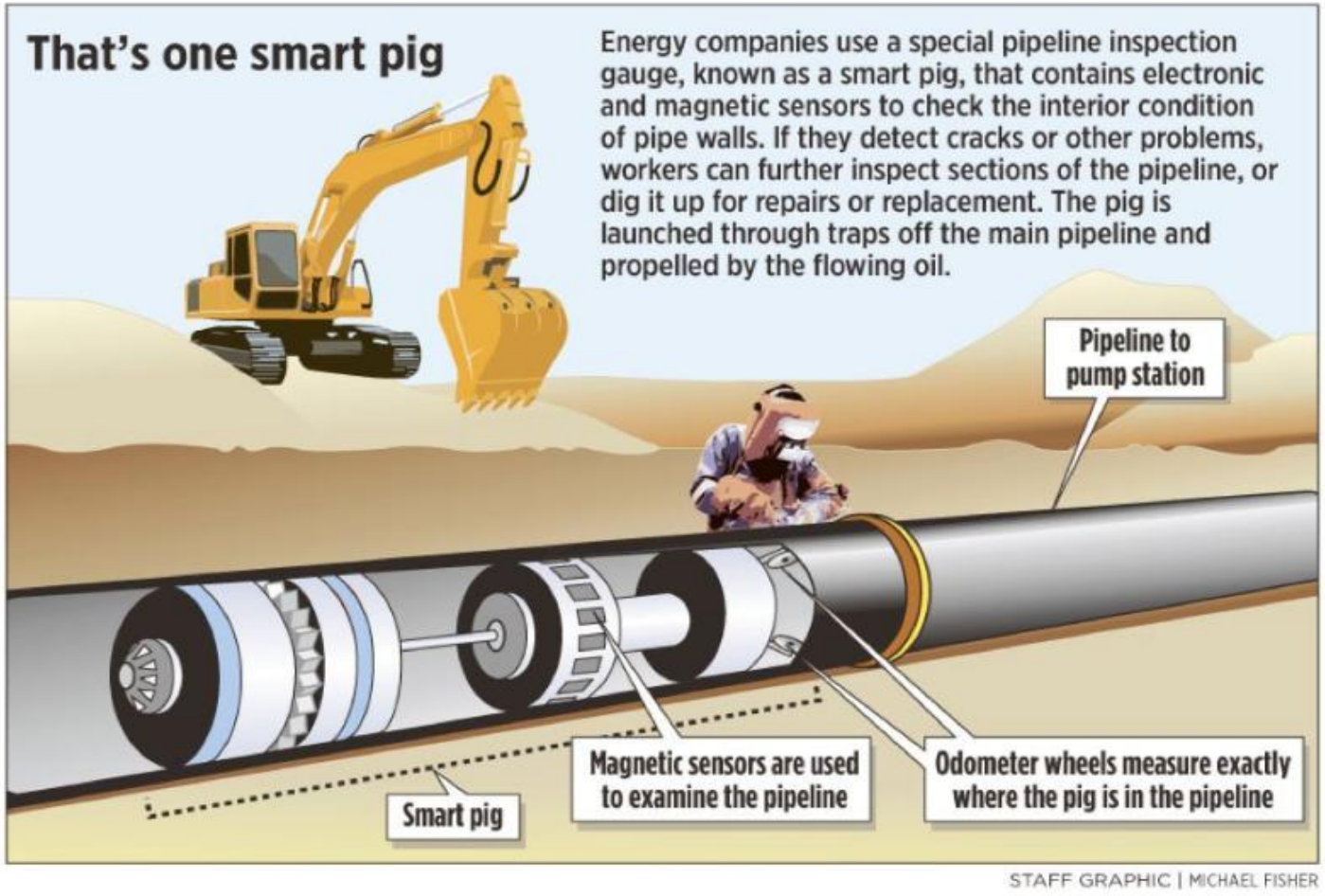
- Flexible response in energy production and supply, management of power plants, quality control and management of energy resources such as wind, solar energy, thermal power, hydroelectricity, etc.

- Intelligent systems manage oil and gas pipelines: pumps, pipes, valves, meters.

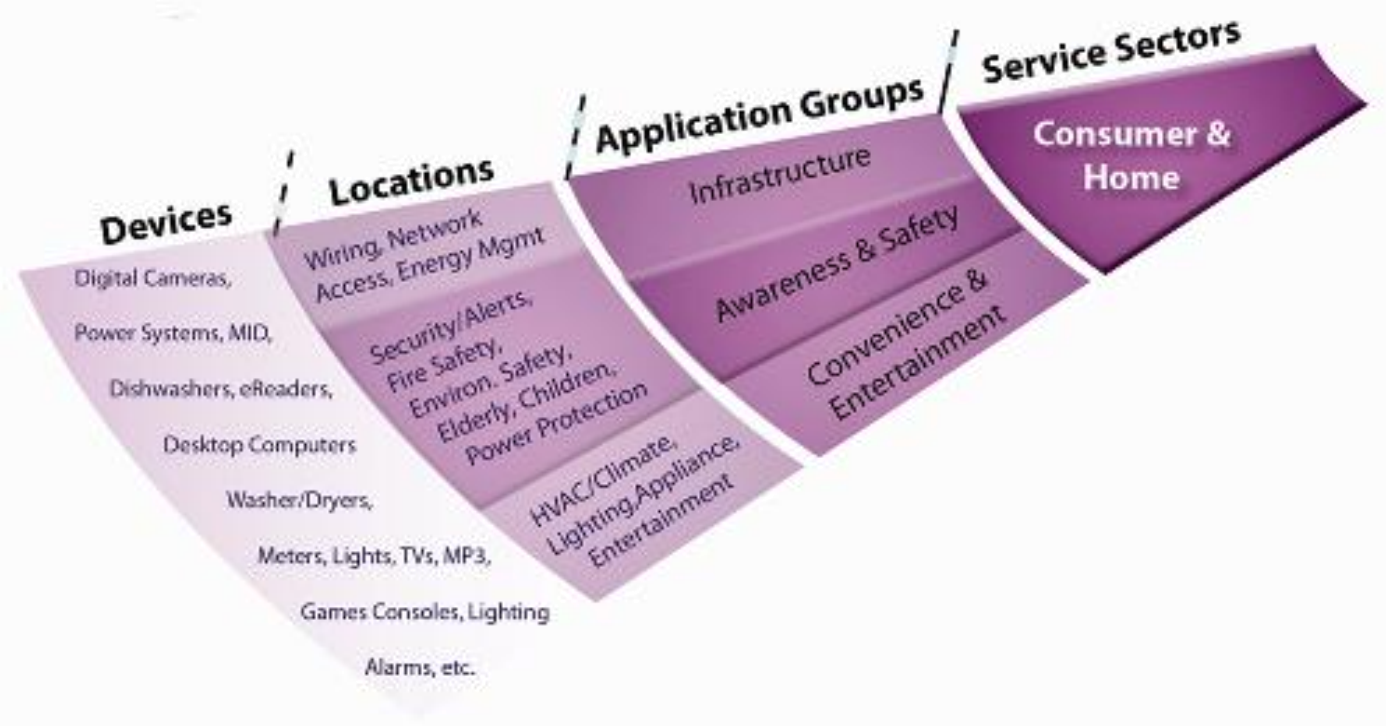


Sector 2: Energy





Sector 3: Smarthome



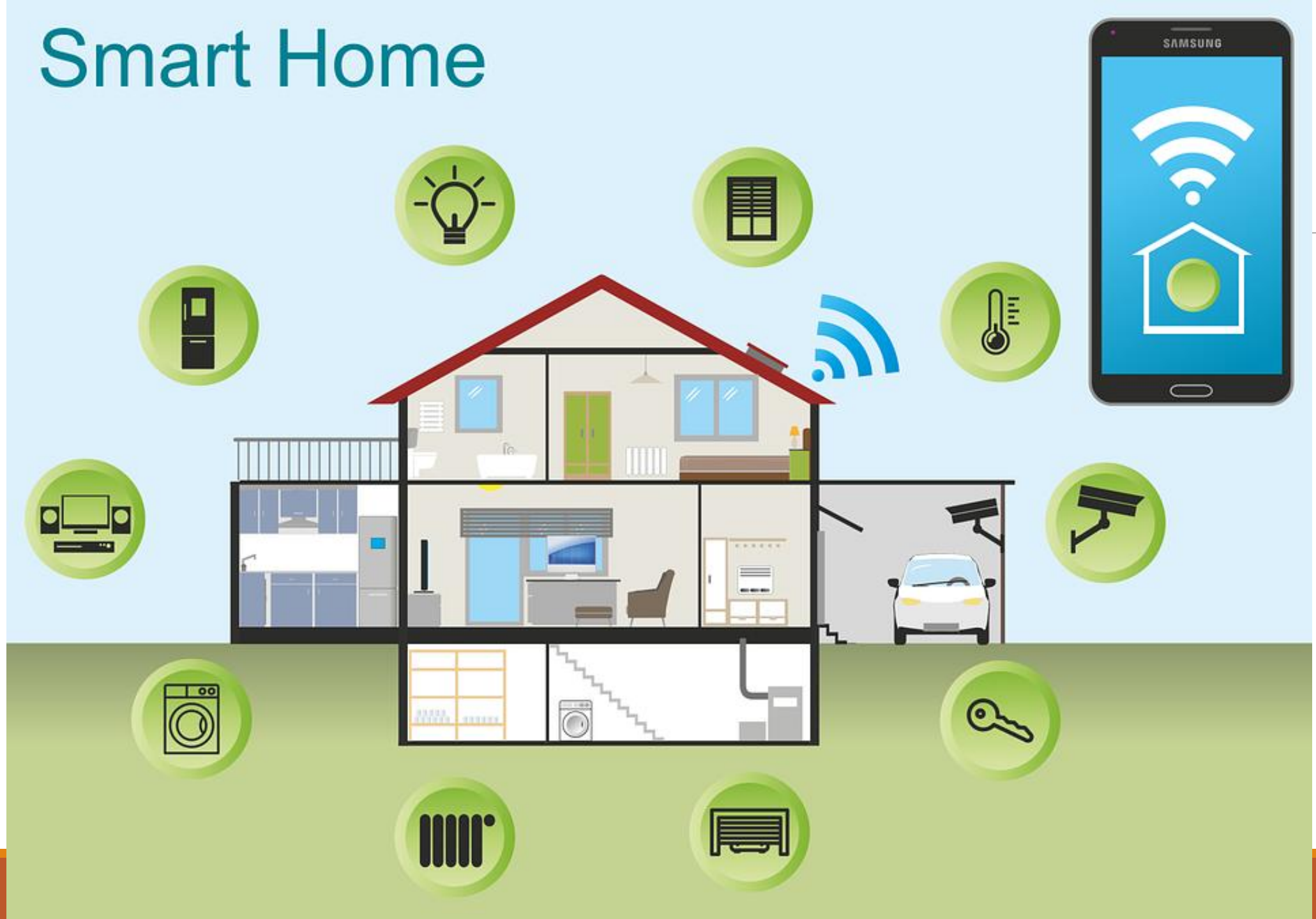
- Manage electricity, water, gas, network access, energy systems in smart homes

- Security protection, fire alarm, gas leak, anti-theft, child management

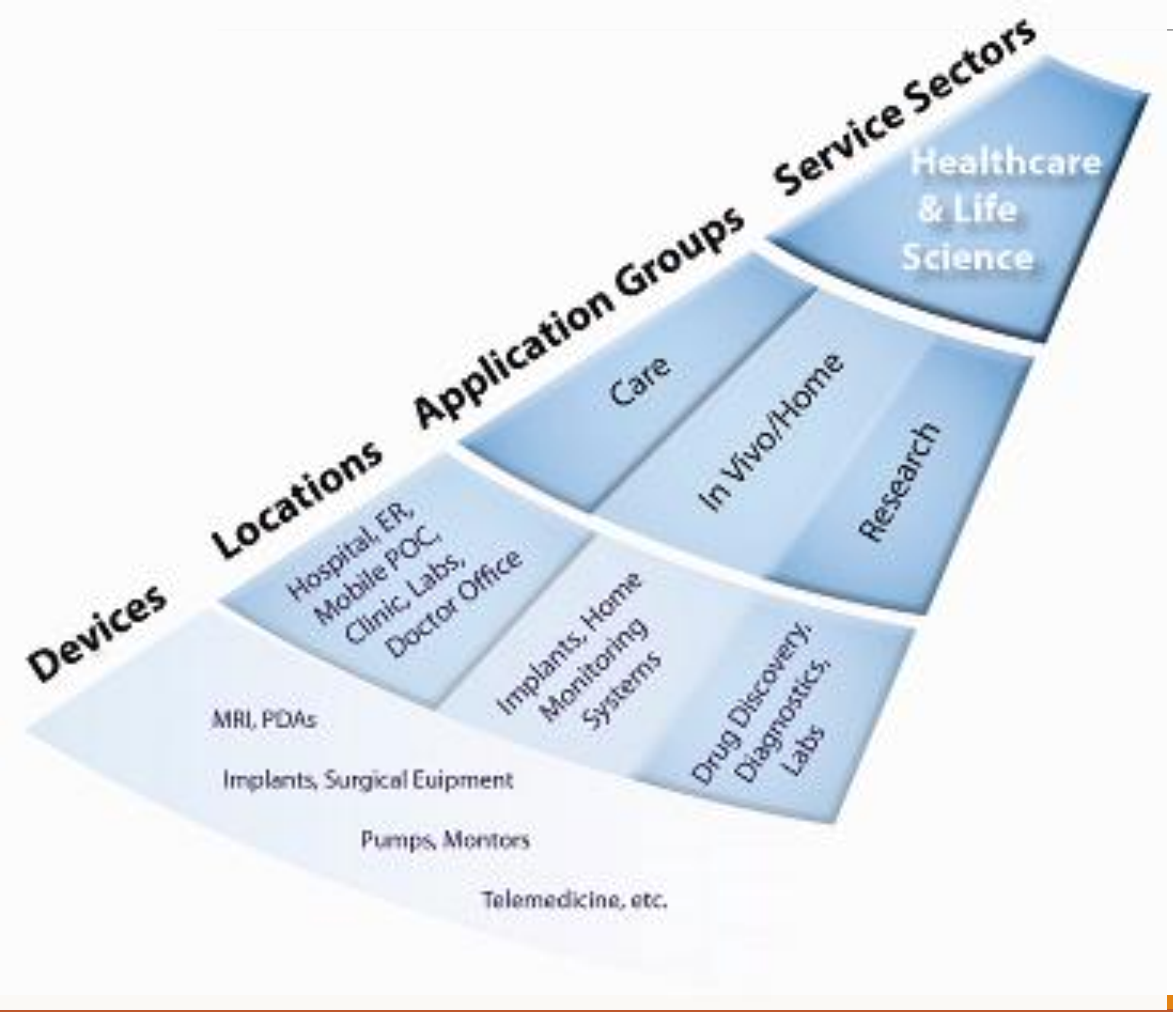
- Automatic control of room temperature, electric lighting system adapts to the environment

- Other smart home applications

Smart Home



Sector 4: Healthcare & Life Science

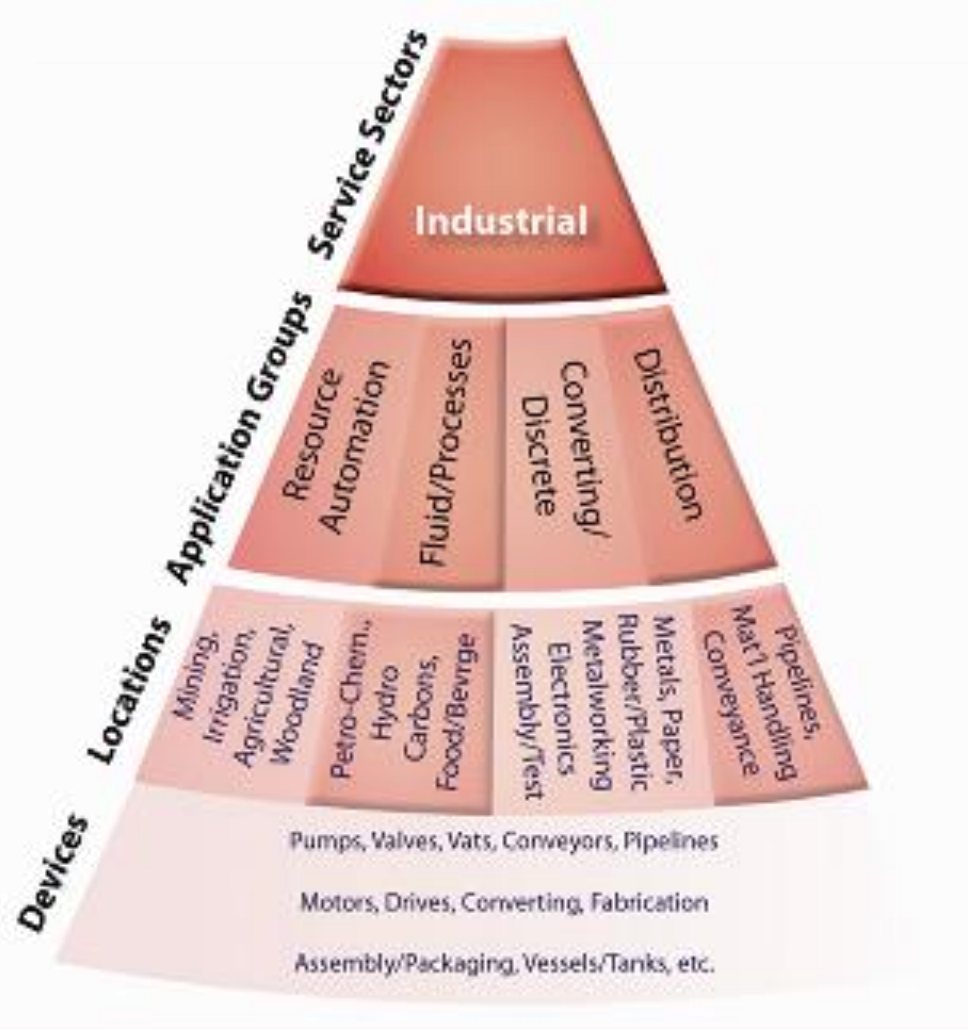


- Healthcare: apply IoT in hospitals, clinics, medical centers

- Ensure a safe living and working environment

- Applications in medical equipment

Sector 5: Industrial



- Management of industrial systems, tanks, production lines, packaging.

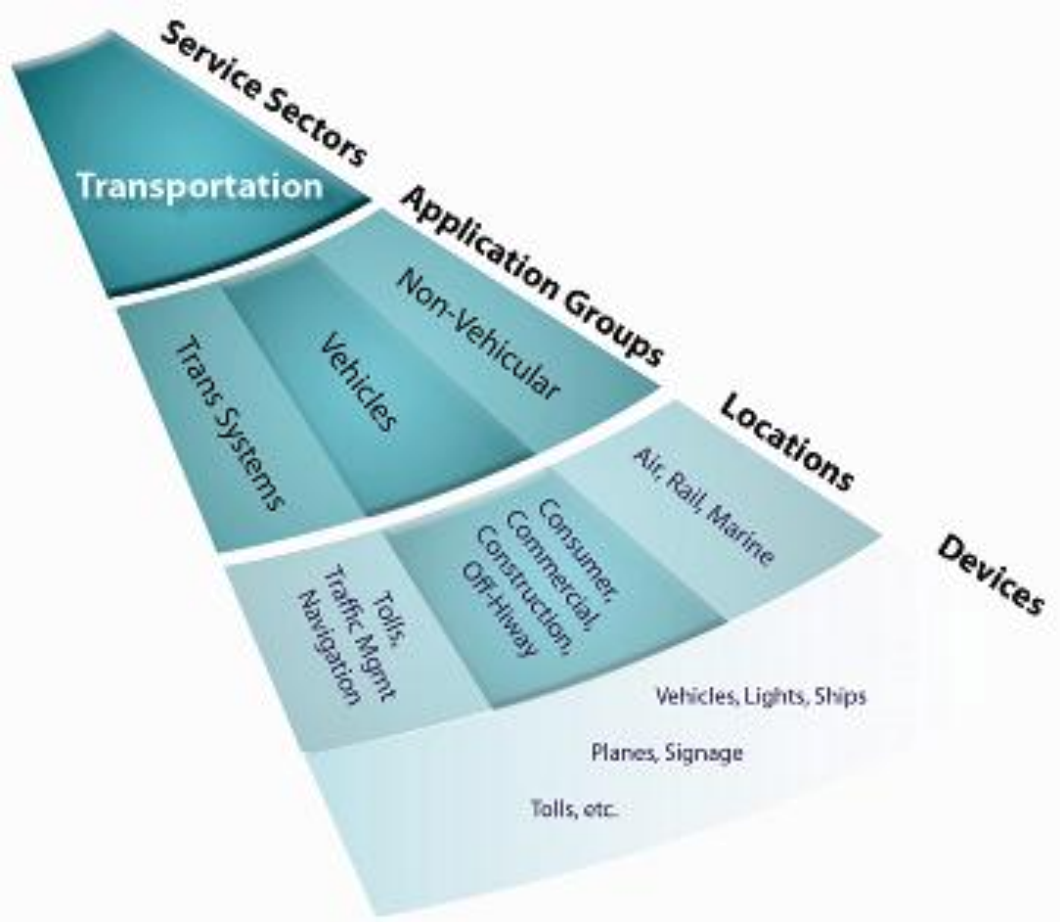
- Infrastructure management, supply chains

- Automation in high-tech agriculture, management of warehouses, factories, farms


NEW CHINA

IoT & Smart agriculture

Sector 6: Transportation

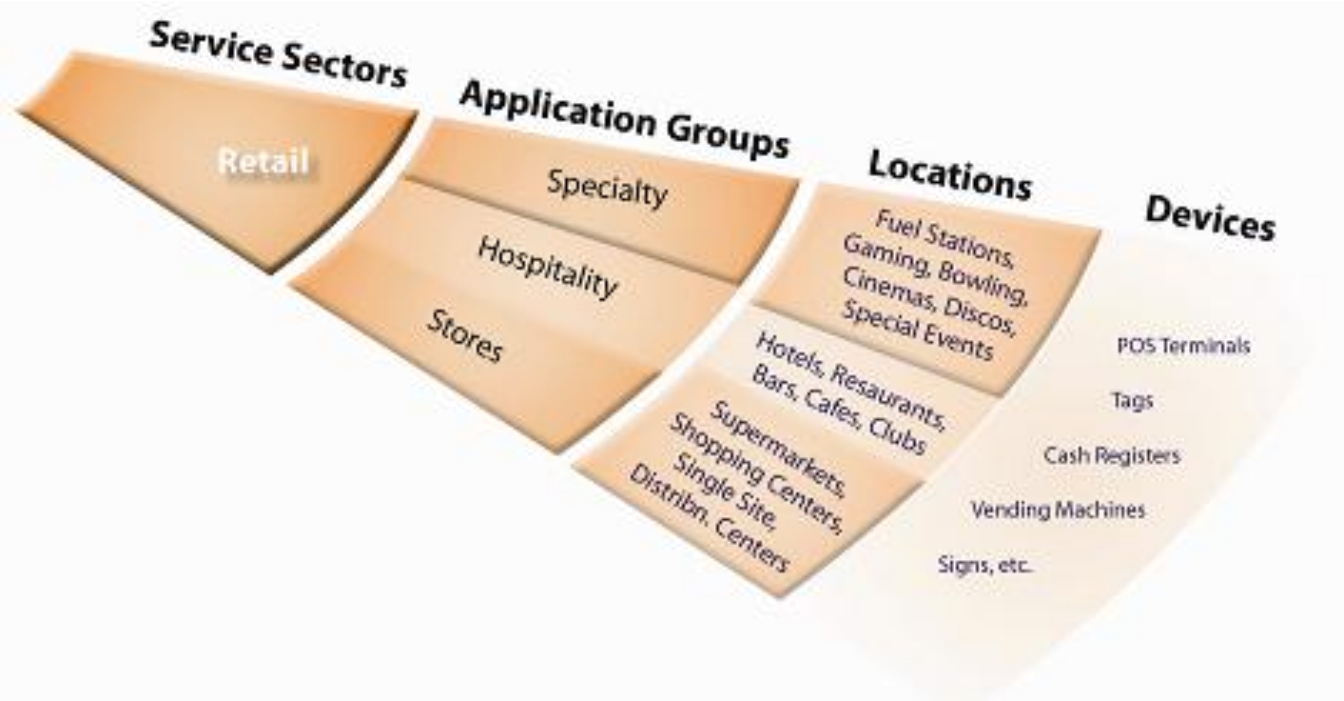


- Road vehicles: Traffic management, equipment status analysis

- Autonomous vehicle

- Intelligent traffic management system, passenger information management, smart parking

Sector 7: Retail



Strengthening the supply chain, providing more information for products, vending machines, services such as gas stations, car washes, ..., entertainment, advertising screens

Stores: shopping malls, supermarkets

Entertainment services: including hotels, restaurants, bars, cafes, clubs.

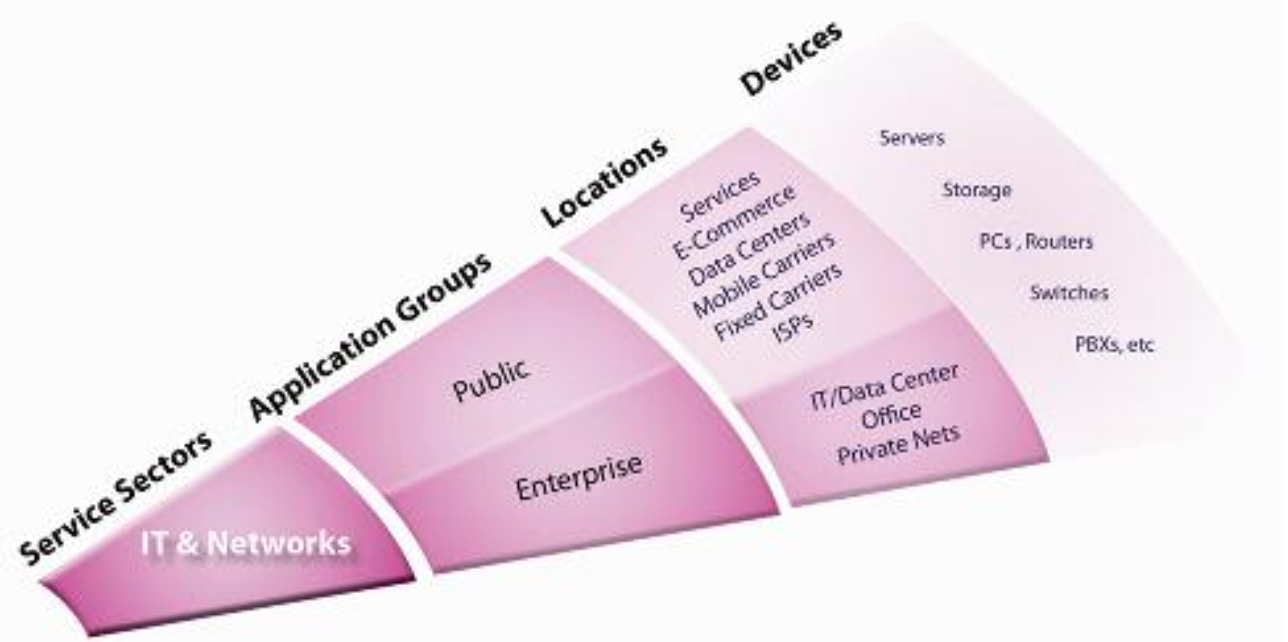
Sector 8: Security

Emergency services such as police, fire, ambulance, traffic accident detection, personal warning device.

CCTV, speed camera, detecting and tracking suspects, detecting theft, terrorism...

Military application equipment, weapons.

Sector 9: IT & Networks



Network of office equipment such as copiers, printers

Connection of smart devices to data centers

Control system of public broadcasting stations, signal towers, remote control systems

Challenges!

The issue of protecting personal information becomes very complicated

Ensure security for the entire system when there are many connected devices

Challenges!

Make sure millions of devices connect at the same time

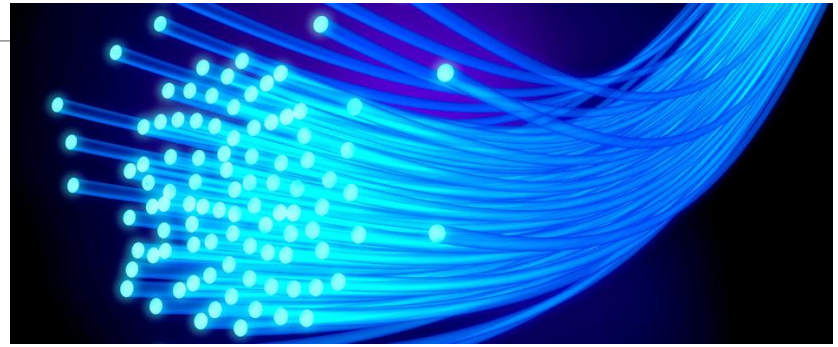
Bandwidth coordination problem

Energy saving

Low cost

Make sure all equipment works stably

Find a common platform for all devices



The system needs to be designed with fast response and high load capacity

The advent of compact devices poses a problem of energy saving