IoT oVERVIEW

What is IOT Business

Identity

CLOUD
IoT Platform
Device Mgmt Software

Sensors

Node

Gateway

Smart Systems and the Internet of Things are driven by a combination of:
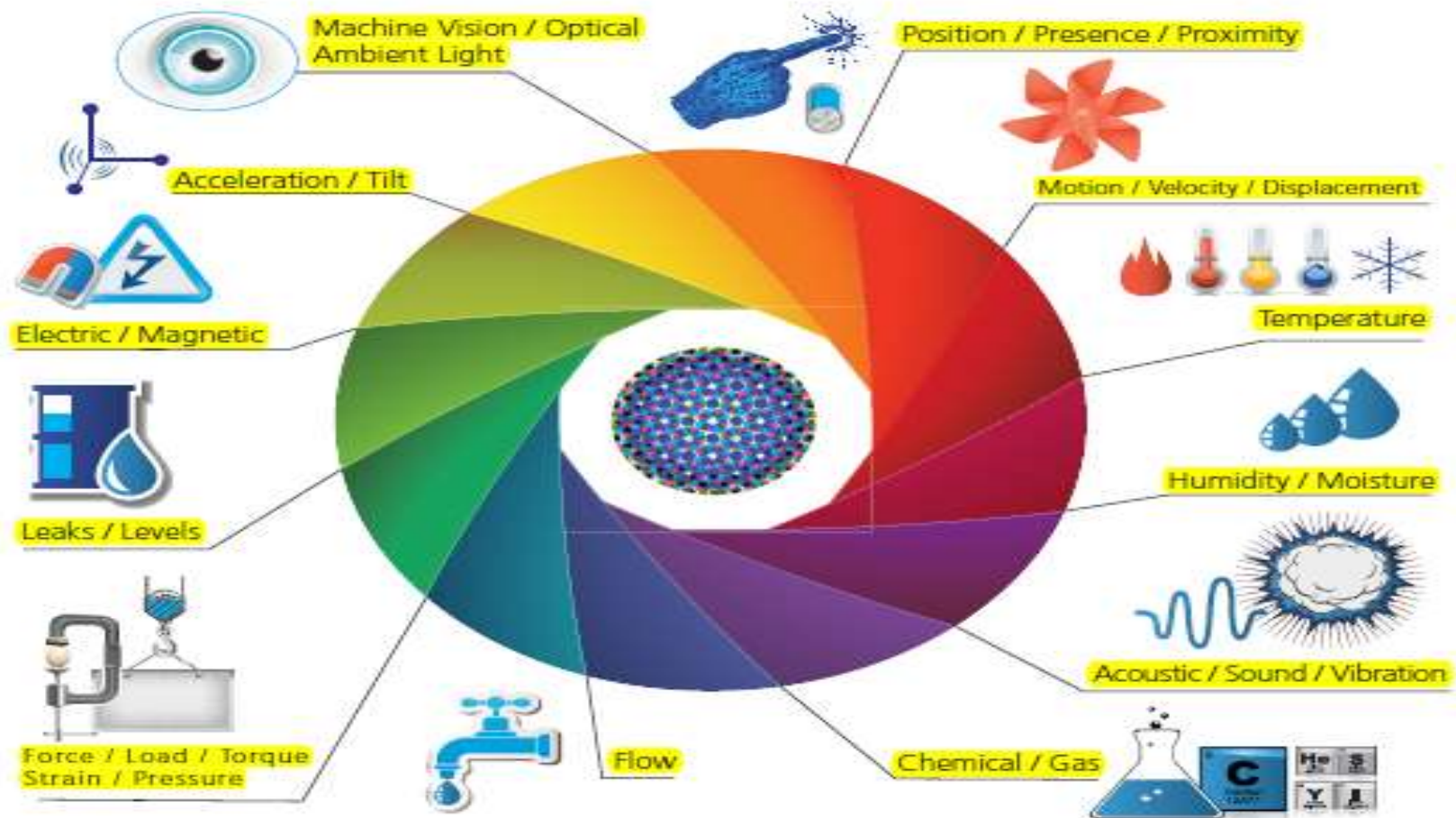
① **SENSORS** & ACTUATORS   ② **CONNECTIVITY**   ③ **PEOPLE** & **PROCESSES**

SENSORS & ACTUATORS

We are giving our world a digital nervous system. Location data using GPS sensors. Eyes and ears using cameras and microphones, along with sensory organs that can measure everything from temperature to pressure changes.

Machine Vision / Optical Ambient Light

Position / Presence / Proximity

Acceleration / Tilt

Motion / Velocity / Displacement

Electric / Magnetic

Temperature

Leaks / Levels

Humidity / Moisture

Acoustic / Sound / Vibration

Force / Load / Torque Strain / Pressure

Flow

Chemical / Gas

② CONNECTIVITY

These inputs are digitized and placed onto networks.

InterPlanetary Network

LTE Advanced
Cellular 4G / LTE
3G - GPS / GPRS
2G / GSM / EDGE, CDMA, EVDO
WEIGHTLESS
WIMAX
LICENSE-FREE SPECTRUM
DASH 7

WiFi

WiFi

BLUETOOTH
UWB
Z-WAVE
ZIGBEE
6LoWPAN
NFC
ANT
RFID

POWERLINE
ETHERNET
PRINTED

IPv4 IPv6 UDP DTLS RPL Telnet MQTT DDS CoAP XMPP HTTP SOCKETS REST API

WAN
Wide Area Network - 802.20

MAN
Metropolitan Area Network - 802.16

LAN
Local Area Network - 802.11

PAN
Personal Area Network - 802.15

3 PEOPLE & *PROCESSES*

These networked inputs can then be combined into bi-directional systems that integrate data, people, processes and systems for better decision making.
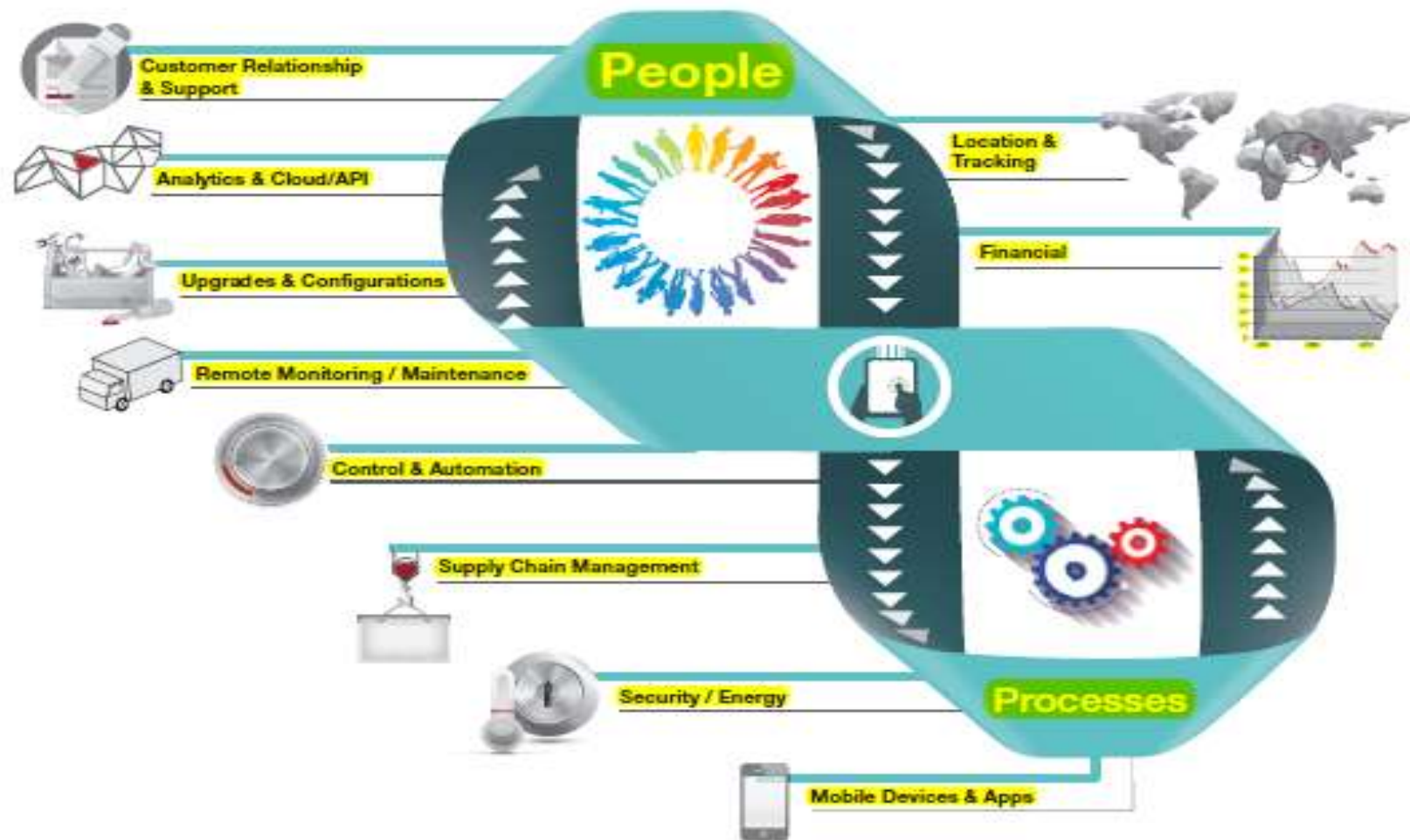
The interactions between these

SENSORS + CONNECTIVITY + PEOPLE + PROCESSES

entities are creating new types of smart applications and services.

Starting with popular connected devices already on the market

SMART THERMOSTATS

nest

Save resources and money on your heating bills by adapting to your usage patterns and turning the temperature down when you're away from home.

CONNECTED CARS

CAR 2GO

Tracked and rented using a smartphone. Car2Go also handles billing, parking and insurance automatically.

ACTIVITY TRACKERS

BASIS

Continuously capture heart rate patterns, activity levels, calorie expenditure and skin temperature on your wrist 24/7.

SMART OUTLETS

belkin.

Remotely turn any device or appliance on or off. Track a device's energy usage and receive personalized notifications from your smartphone.

PARKING SENSORS

STREETLINE
CONNECTING THE REAL WORLD

Using embedded street sensors, users can identify real-time availability of parking spaces on their phone. City officials can manage and price their resources based on actual use.
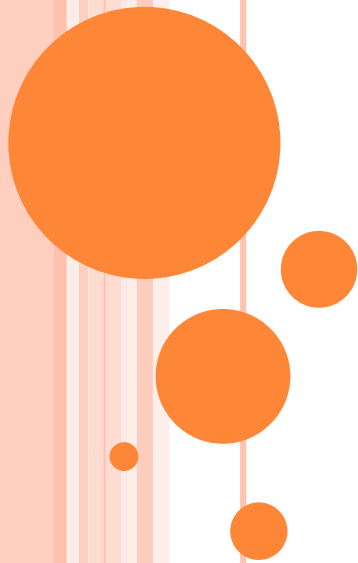
Things get interesting when these connected devices and services start creating

COMPOUND APPLICATIONS

within their own verticals and across industries:
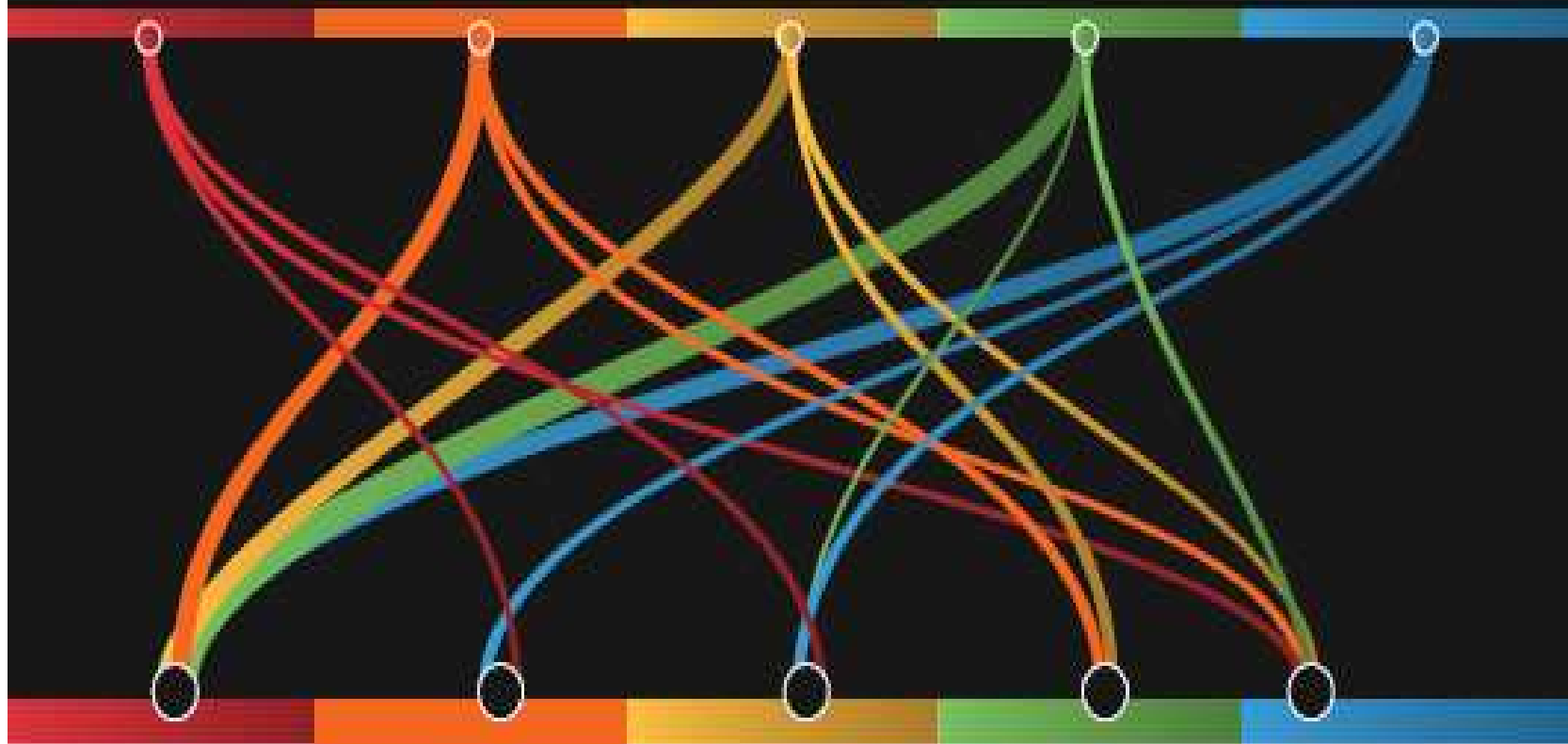
IoT Applications

IoT Applications

Now a days there are more objects connected to the internet than persons in this world. Now we can interact not only with contents in websites but with real objects.

The following are the list of areas where Internet of Things are used.

- **Smart Cities**
- **Health**
- **Smart Environment**
- **Smart water**
- **Security and Emergencies**
- **Retail**
- **Logistics**
- **Industrial Control**
- **Smart agriculture**
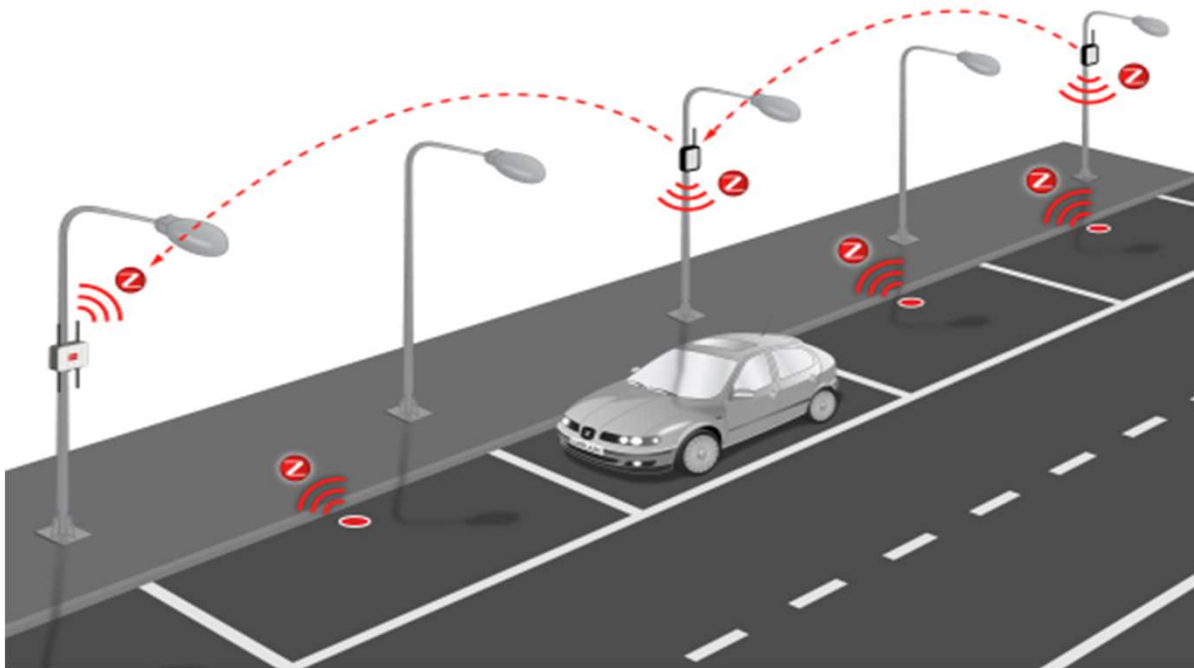- **Home automation**

SMART CITIES

In cities we are using out IoT applications in different forms.

➢ smart Parking
➢ Structural Health
➢ Traffic Congestion
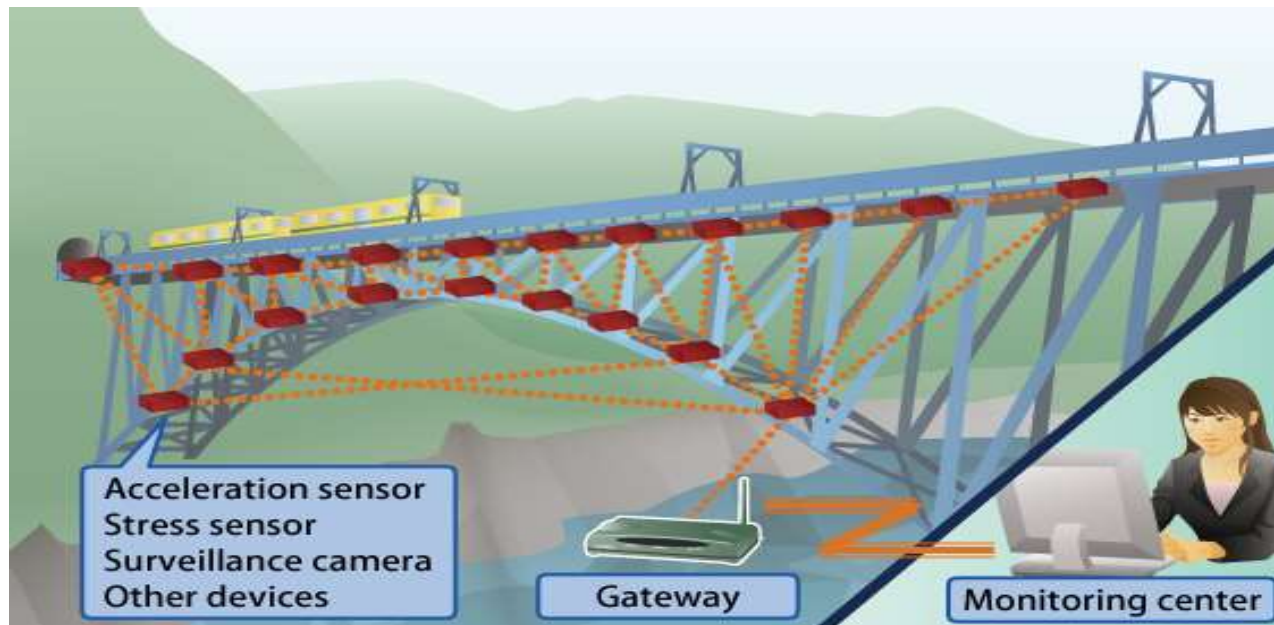➢ Smart Lighting
➢ Waste Management
➢ Smart Roads
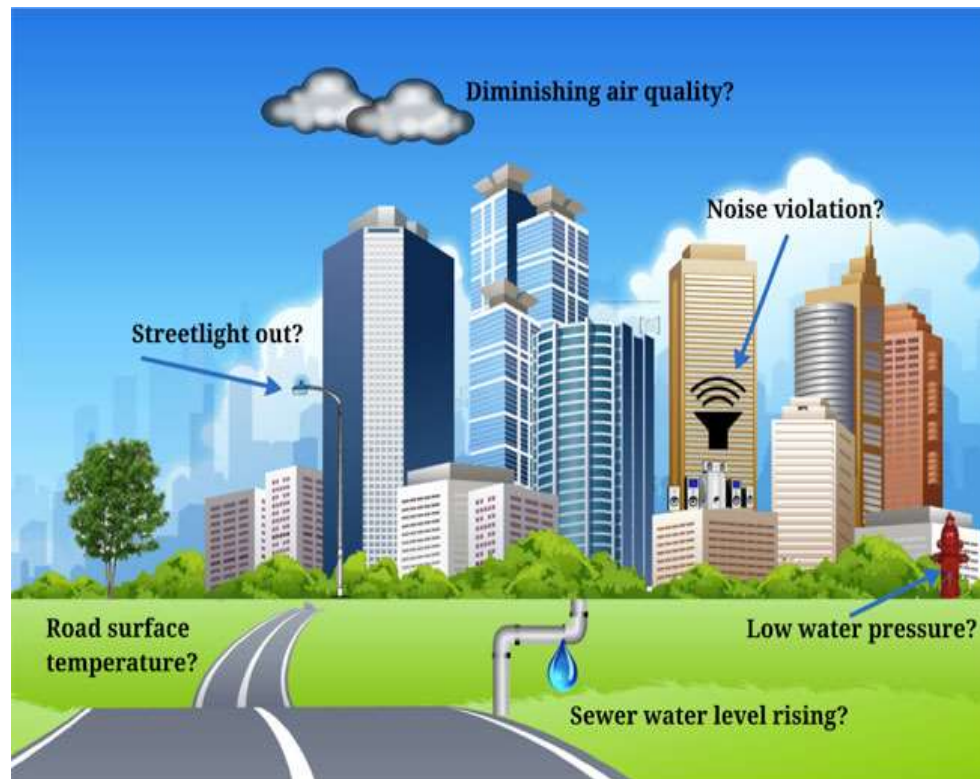
SMART CITIES: SMART PARKING

- Monitoring of parking spaces availability in the city

SMART CITIES: STRUCTURAL HEALTH

- Monitoring of vibrations and material conditions in buildings, bridges and historical monuments.

Acceleration sensor
Stress sensor
Surveillance camera
Other devices

Gateway

Monitoring center

SMART CITIES: TRAFFIC CONGESTION

- Monitoring of vehicles and pedestrian levels to optimize driving and walking routes.

SMART CITIES: SMART LIGHTING

- Intelligent and weather adaptive lighting in street lights.

SMART CITIES: WASTE MANAGEMENT

- Detection of rubbish levels in containers to optimize the trash collection routes.

SMART CITIES: SMART ROADS

- Intelligent Highways with warning messages and diversions according to climate conditions and unexpected events like accidents or traffic jams.
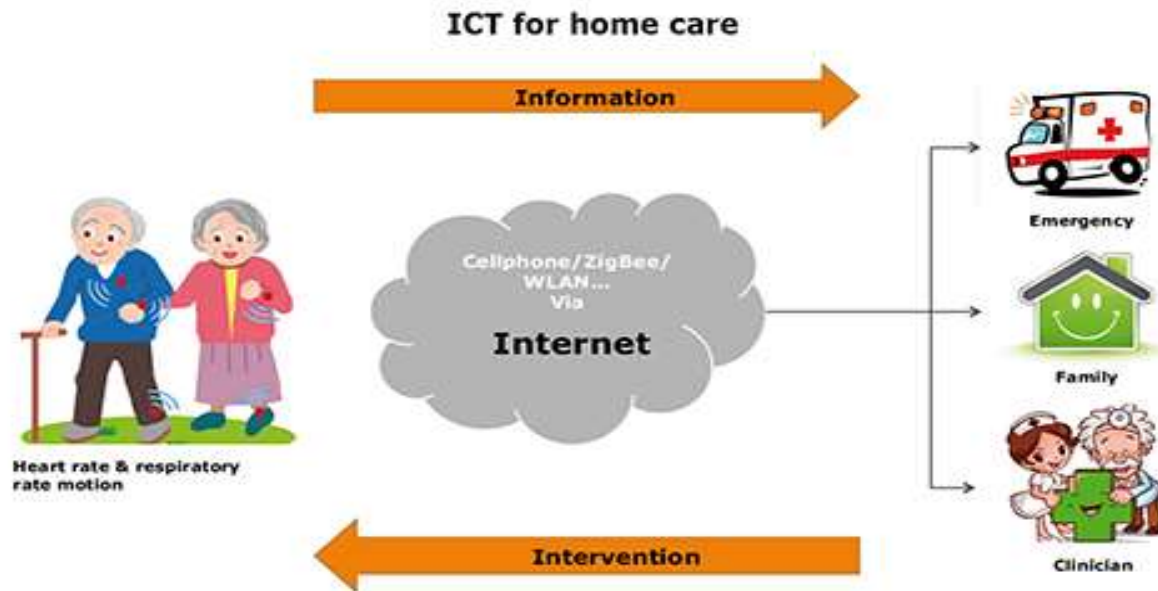
HEALTH

We are widely used IoT applications in Health care.

- Fall Detection
- Medical Fridges
- Patience Surveillance
- Ultraviolet Radiation

HEALTH: FALL DETECTION

- Assistance for elderly or disabled people living independent.

HEALTH: MEDICAL FRIDGES

- Control of conditions inside freezers storing vaccines, medicines and organic elements.

HEALTH: PATIENTS SURVEILLANCE

- Monitoring of conditions of patients inside hospitals and in old people's home.

Centralized Patient Observation

HEALTH: ULTRAVIOLET RADIATION

- Measurement of UV sun rays to warn people not to be exposed in certain hours.

SMART ENVIRONMENT

Let us see how the IoT applications are useful in Environment.

- Forest fire Detection
- Air Pollution
- Snow level Monitoring
- Landslide and Avalanche Prevention
- Earthquake Early Detection

SMART ENVIRONMENT: FOREST FIRE DETECTION

- Monitoring of combustion gases and preemptive fire conditions to define alert zones.
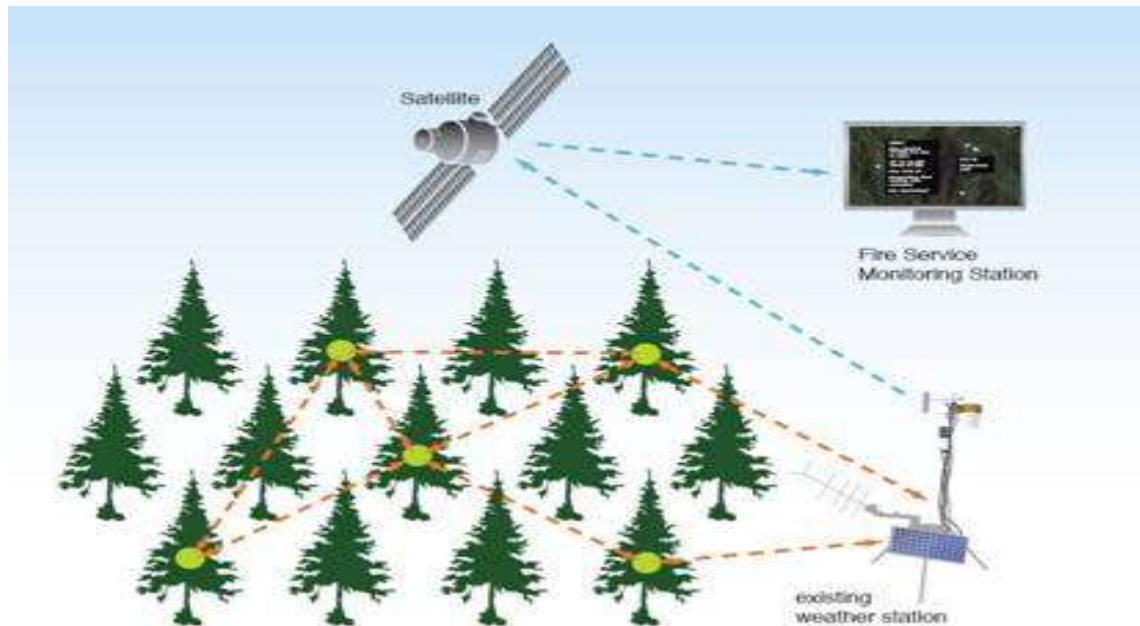
SMART ENVIRONMENT: AIR POLLUTION

- Control of CO2 emissions of factories, pollution emitted by cars and toxic gases generated in farms.
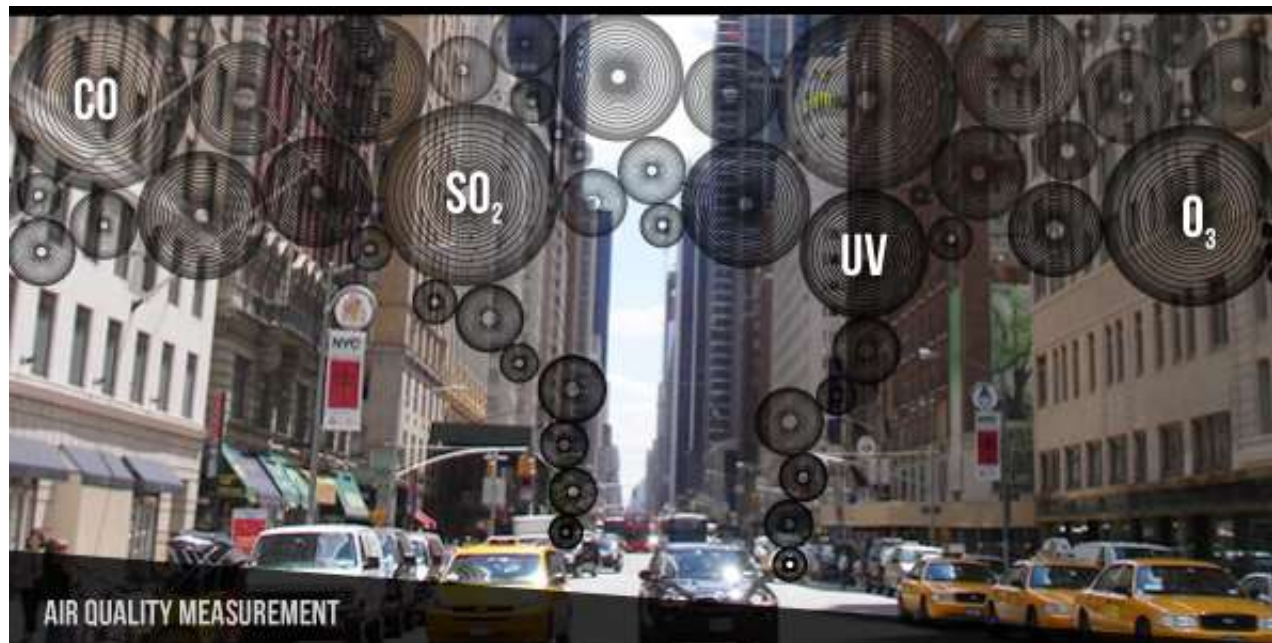
Smart Environment: Landslide and Avalanche Prevention

- Monitoring of soil moisture, vibrations and earth density to detect dangerous patterns in land conditions.
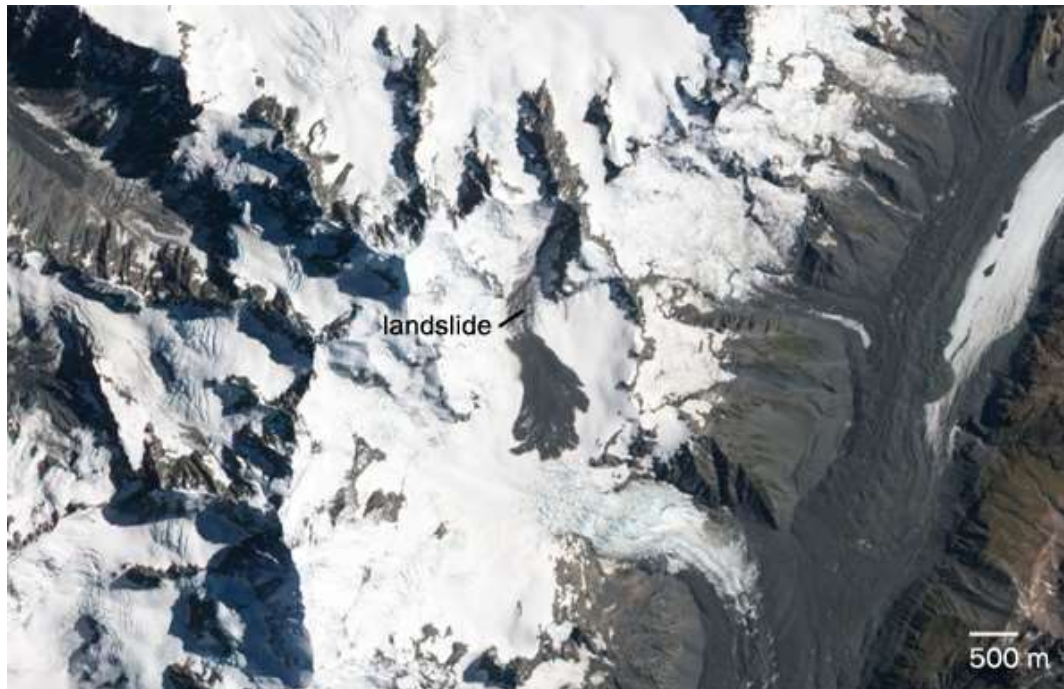
SMART ENVIRONMENT: EARTHQUAKE AND EARLY DETECTION

- Distributed control in specific places of tremors.
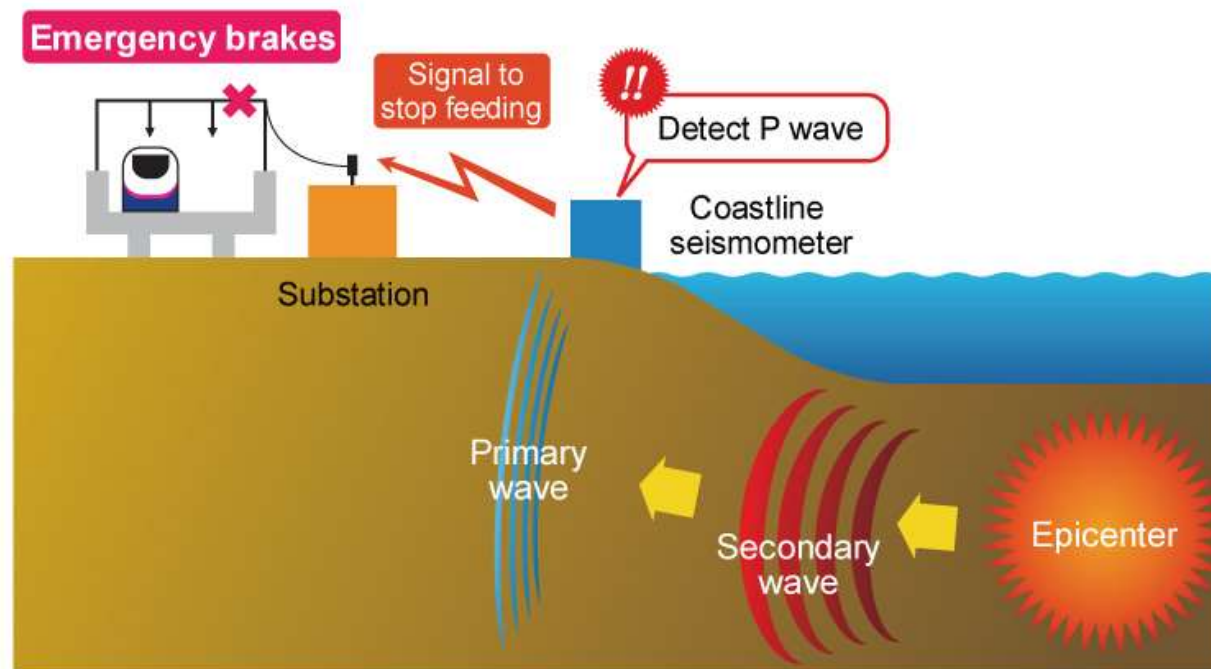
SMART WATER

Smart water management has become a key policy issue , as a growing number of factors are impacting the delivery of already scarce fresh water to millions of people

- Potable water monitoring
- Chemical leakage detection in rivers
- Swimming pool remote measurement
- Pollution levels in the sea
- Water Leakages
- River Floods

SMART WATER: POTABLE WATER MONITORING

- Monitor the quality of tap water in cities.

Smart Water: Chemical leakage detection in rivers

- Detect leakages and wastes of factories in rivers.

SMART WATER: SWIMMING POOL REMOTE MEASUREMENT

- Control remotely the swimming pool conditions.

SMART WATER: POLLUTION LEVELS IN THE SEA

- Control real-time leakages and wastes in the sea.

Smart Water: Water Leakages

- Detection of liquid presence outside tanks and pressure variations along pipes.

Smart Water: River Floods

- Monitoring of water level variations in rivers, dams and reservoirs.

SECURITY AND EMERGENCIES

Now a days in every area security is very important and with IoT we will provide security at very High End.

- Perimeter Access Control
- Liquid Presence
- Radiation Levels
- Explosive and Hazardous Gases

SECURITY : PERIMETER ACCESS CONTROL

- Access control to restricted areas and detection of people in non-authorized areas.

SECURITY: LIQUID PRESENCE

○ Liquid detection in data centers, warehouses and sensitive building grounds to prevent break downs and corrosion.

SECURITY: RADIATION LEVELS

- Distributed measurement of radiation levels in nuclear power stations surroundings to generate leakage alerts.

Radiation Detection

SECURITY: EXPLOSIVE AND HAZARDOUS GASES

- Detection of gas levels and leakages in industrial environments, surroundings of chemical factories and inside mines.

RETAIL

IoT is going to very much use in retail in future.

- Supply Chain Control
- NFC Payment
- Intelligent Shopping Applications
- Smart Product Management

TOP RETAIL TECH TRENDS FOR 2014

RETAIL: SUPPLY CHAIN CONTROL

- Monitoring of storage conditions along the supply chain and product tracking for traceability purposes.

RETAIL: NFC PAYMENT

- Payment processing based in location or activity duration for public transport, gyms, theme parks, etc.

RETAIL: INTELLIGENT SHOPPING APPLICATIONS

- Getting advices in the point of sale according to customer habits, preferences, presence of allergic components for them or expiring dates.

RETAIL: SMART PRODUCT MANAGEMENT

- Control of rotation of products in shelves and warehouses to automate restocking processes

LOGISTICS

Let us see how IoT will play important role in logistics.

- Quality of Shipment Conditions
- Item Location
- Storage Incompatibility Detection
- Fleet Tracking
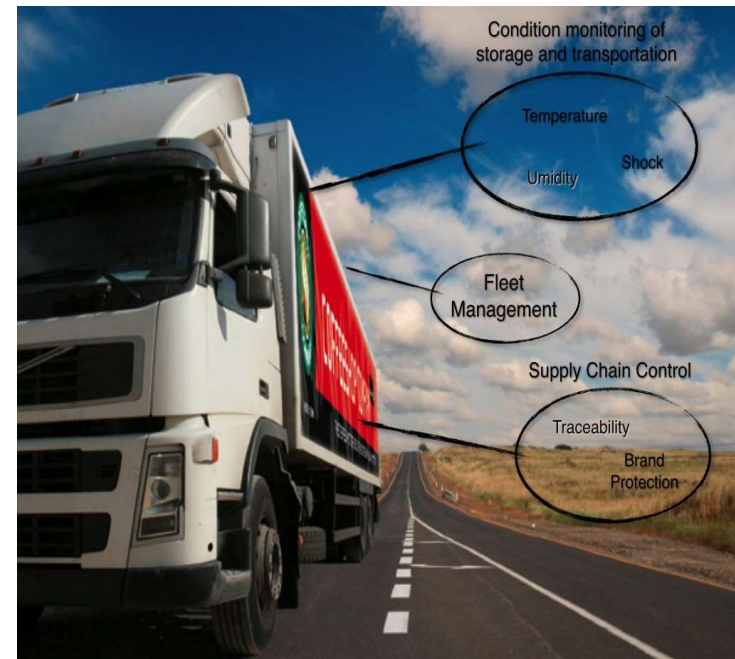
LOGISTICS: QUALITY OF SHIPMENT CONDITIONS

- Monitoring of vibrations, strokes, container openings or cold chain maintenance for insurance purposes.

LOGISTICS: ITEM LOCATION

- Search of individual items in big surfaces like warehouses or harbors.

LOGISTICS: STORAGE INCOMPATIBILITY DETECTION

- Warning emission on containers storing inflammable goods closed to others containing explosive material.

LOGISTICS: FLEET TRACKING

- Control of routes followed for delicate goods like medical drugs, jewels or dangerous merchandises.

INDUSTRIAL CONTROL

Now a days IoT used in industrial side also

- **M2M Applications**
- **Indoor Air Quality**
- **Temperature Monitoring**
- **Ozone Presence**
- **Vehicle Auto-diagnosis**

Industrial Control: M2M Applications

- Machine auto-diagnosis and assets control

INDUSTRIAL CONTROL: INDOOR AIR QUALITY

- Monitoring of toxic gas and oxygen levels inside chemical plants to ensure workers and goods safety.

INDUSTRIAL CONTROL: TEMPERATURE MONITORING

- Control of temperature inside industrial and medical fridges with sensitive merchandise.

INDUSTRIAL CONTROL: OZONE PRESENCE

- Monitoring of ozone levels during the drying meat process in food factories

INDUSTRIAL CONTROL: VEHICLE AUTO-DIAGNOSIS

- Information collection from CAN Bus to send real time alarms to emergencies or provide advice to drivers.

HOME AUTOMATION

In the future we are going to live in our homes along with IoT.

o Home & Family

o Door & Locks

o Light & Switches

o Damage & Danger

o Motions & Cameras

o Comfort

HOME AUTOMATION: HOME & FAMILY

- Get alert when people come and go from any locations

HOME AUTOMATION: DOOR & LOCKS

- automatically locks when you leave the home.

HOME AUTOMATION: LIGHT & SWITCHES

- control & automate power to your lights and Electronics.

HOME AUTOMATION: DAMAGE & DANGER

- Protect life and property against threats like leak and floods

HOME AUTOMATION: MOTIONS & CAMERAS

o   Get alerts when there is a motion on the front porch or in the back yard.

HOME AUTOMATON: COMFORT

- Not too hot, not too cold just right.

SMART AGRICULTURE

IoT's are used for doing Smart Agriculture.

- **Wine Quality Enhancing**
- **Green Houses**
- **Meteorological Station Network**
- **Compost**

SMART AGRICULTURE: WINE QUALITY ENHANCING

- Monitoring soil moisture and trunk diameter in vineyards to control the amount of sugar in grapes and grapevine health.
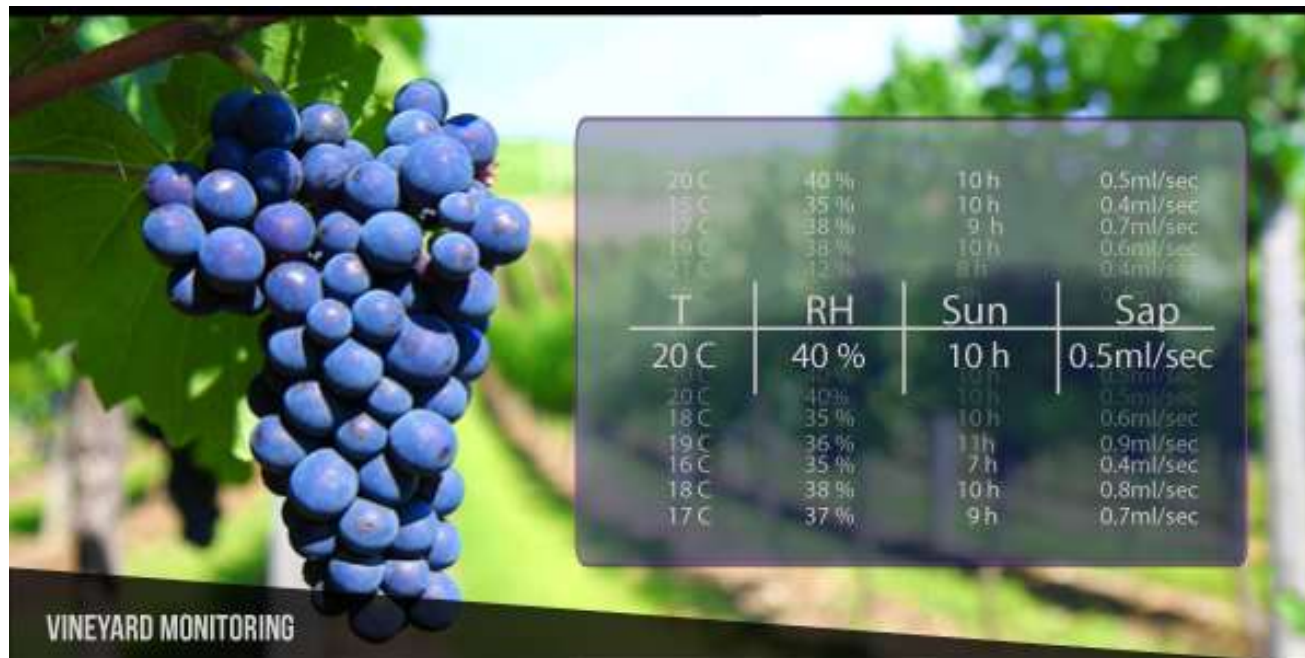
SMART AGRICULTURE: GREEN HOUSES

- Control micro-climate conditions to maximize the production of fruits and vegetables and its quality

HUMIDITY	TEMPERATURE	DAYLIGHT
42%	19	6
38%	18	8
45%	26	7
40%	24	5
46%	27	9

ENVIRONMENTAL MONITORING IN GREENHOUSES
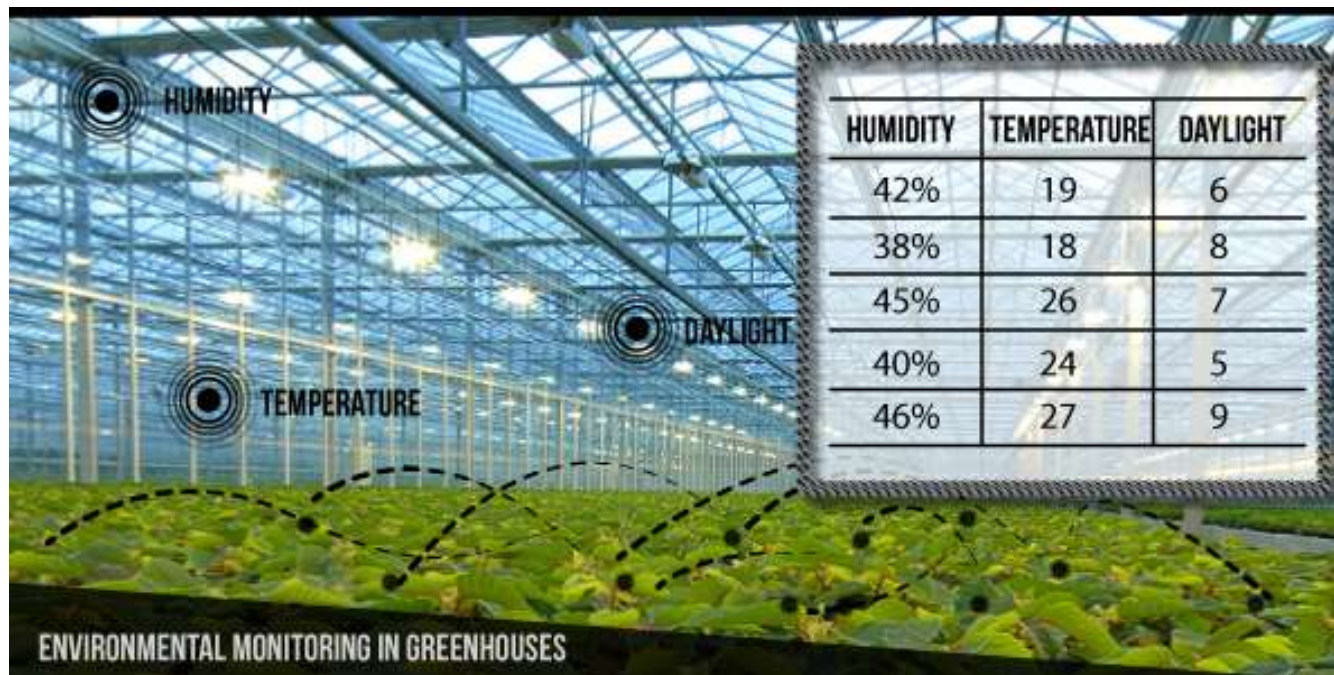
Smart Agriculture: Meteorological Station Network

- Study of weather conditions in fields to forecast ice formation, rain, drought, snow or wind changes.

SMART AGRICULTURE: COMPOST

- Control of humidity and temperature levels in alfalfa, hay, straw, etc. to prevent fungus and other microbial contaminants.

The **Internet** gave us the opportunity to connect in ways we could never have dreamed possible. The **Internet of Things** will take us beyond connection to become part of a living, moving, **global nervous system**.

Whether you are an individual, technology developer, or adopter of these technologies the Internet of Things will stretch the boundaries of today's systems. Are you prepared for the changes in the way we will learn, work, and innovate?

How large is the IoT Market?

In the not-too-distant future, hundreds of millions, then billions, of individuals and businesses with billions, then trillions, of smart, communicating devices will stretch the boundaries of current systems. Creating the potential to change the way we work, learn, entertain and innovate.

Connected Devices

In 2014 nearly **2 billion** connected devices will be shipped

This number will grow to nearly **8 billion** devices for the year 2020
*Not including mobile phones

Home (Consumer)
3,745.71 (Devices millions)

Transport (Mobility)
392.72 (Devices millions)

Body (Health)
360.03 (Devices millions)

Buildings (Infrastructure)
1,726.59 (Devices millions)

Cities (Industry)
1,524.70 (Devices millions)

Business Impact

Installed Base
(Devices in millions)

Year	Value
2014	6,033.63
2017	13,142.30
2020	27,858.35
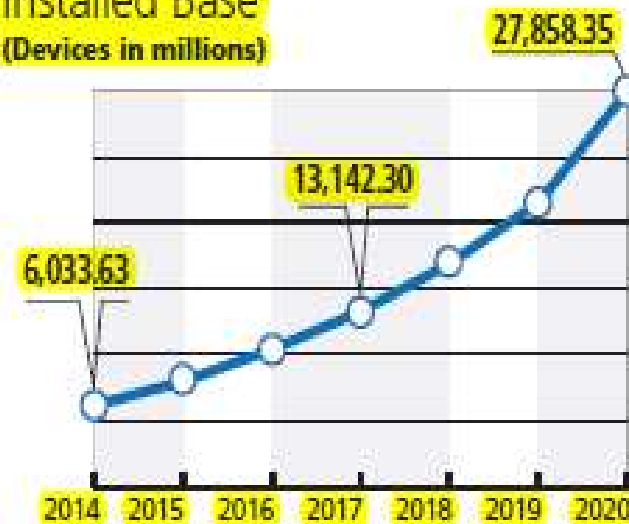
The implications of these trends are enormous. Vertically defined, stand-alone products and application markets will increasingly become a part of larger **networked "horizontal" systems**.

Revenue opportunities from the Internet of Things:

HOME *CONSUMER*
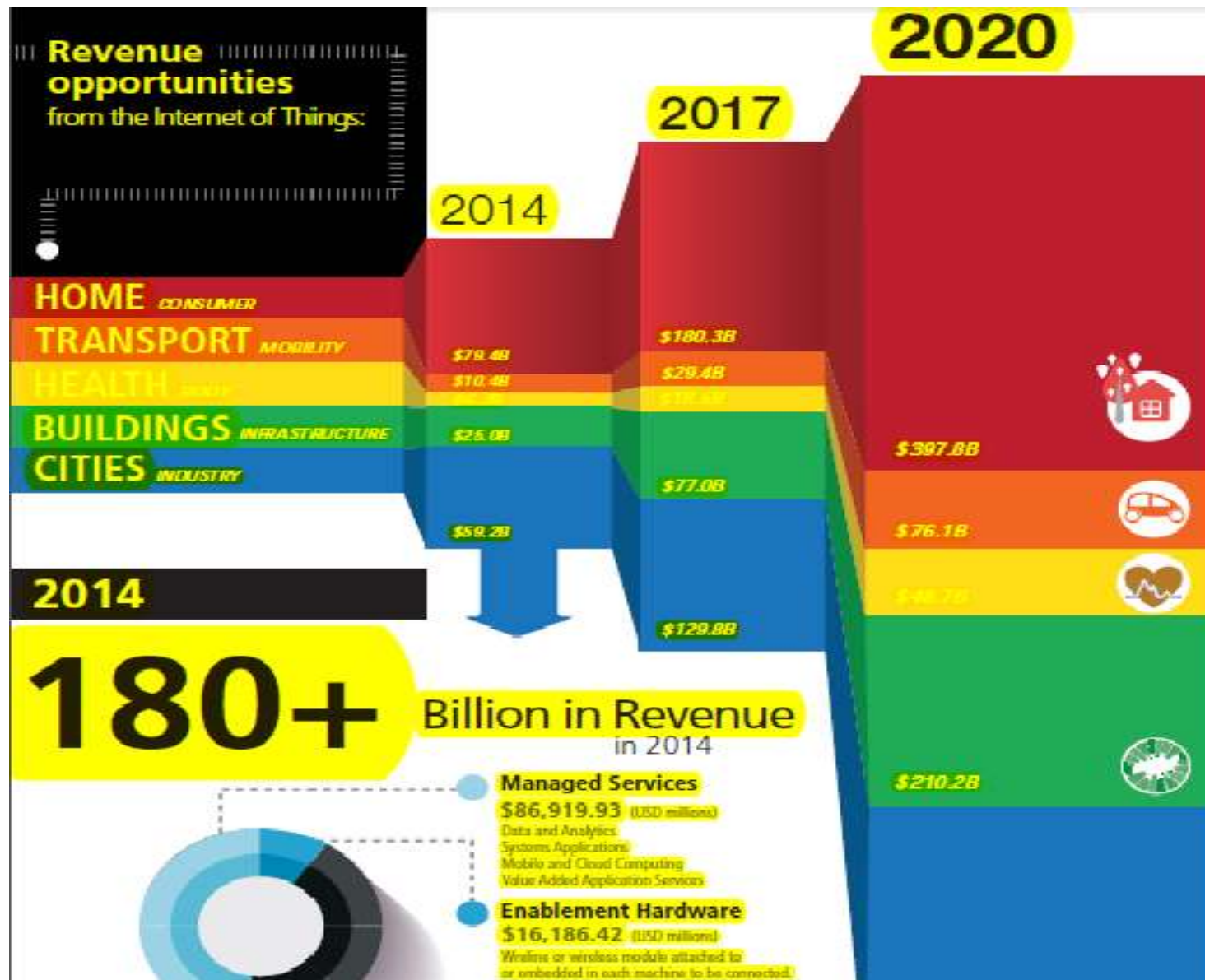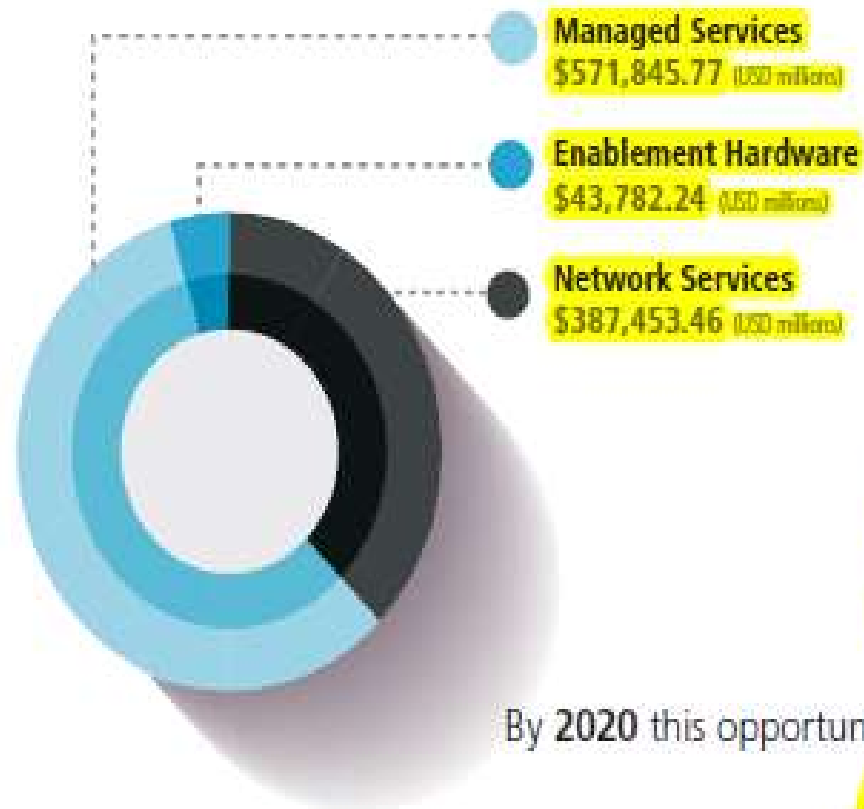TRANSPORT *MOBILITY*
HEALTH *WELFARE*
BUILDINGS *INFRASTRUCTURE*
CITIES *INDUSTRY*

2014

180+ Billion in Revenue in 2014

Managed Services
$86,919.93 (USD millions)
Data and Analytics
Systems Applications
Mobile and Cloud Computing
Value Added Application Services

Enablement Hardware
$16,186.42 (USD millions)
Wireless or wireless module attached to
or embedded in each machine to be connected.

2014 — $79.4B, $10.4B, $10.6B, $25.0B, $59.2B

2017 — $180.3B, $29.4B, $18.6B, $77.0B, $129.8B

2020 — $397.8B, $76.1B, $48.7B, $210.2B

2020

Managed Services
$571,845.77 (USD millions)

Enablement Hardware
$43,782.24 (USD millions)

Network Services
$387,453.46 (USD millions)

By **2020** this opportunity will grow to more than

$1

>$1 Trillion

IoT in 2020

TAAS

Things as a service

Things **when** you need it, as long as you need it
Cost **when** you use it, as long as you use it
Maintenance is always **ours**

Price $500

Price $5

Price $19.99

Price $1500

Price $450

Price $4

Price $.99

Price $150

Price $500

Price $5

When you have a chronic condition you're certainly not alone. IoT devices care about you.
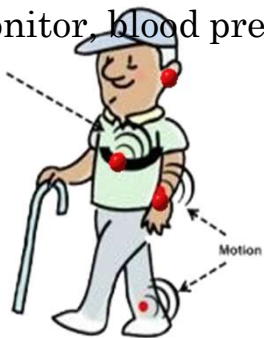
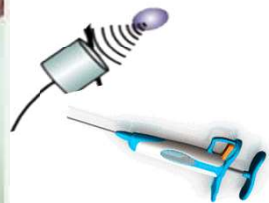Daily Conditions like
- Infections
- BP
- Pains

Health Data store

Chronic condition like Blood Sugar level (non invasive) , heart rate monitor, blood pressure

Motion

Different Pattern of your Health data stored and analyzed

Dr. inputs fed into the system

According to Doctor's prescription and or pattern recognition based actuation, Device injects insulin/medicine automatically

Refrigerator Inventory
+ Lettuce
+ Tomatoes
+ Orange Juice
Eggs / OUT OF STOCK
NOTIFICATION PENDING

Order goes to Warehouse/store

HouseMasterApp orders the items which are running low.

Pickingup your Order

Arrives at the outdoor delivery destination, it hovers and carefully lowers the parcel

You get the bill and pay via mobileApp

Faster,Hassle free Delivery

the strategy has cr

Drones replace Delivery vans - 2020

Federal Drone Authority

Future advertising is very personalized

Sarah goes to the Store

HouseMaster Data

Welcome **Sarah**, We have special discounts on your today's product List which your HouseMaster App send me earlier
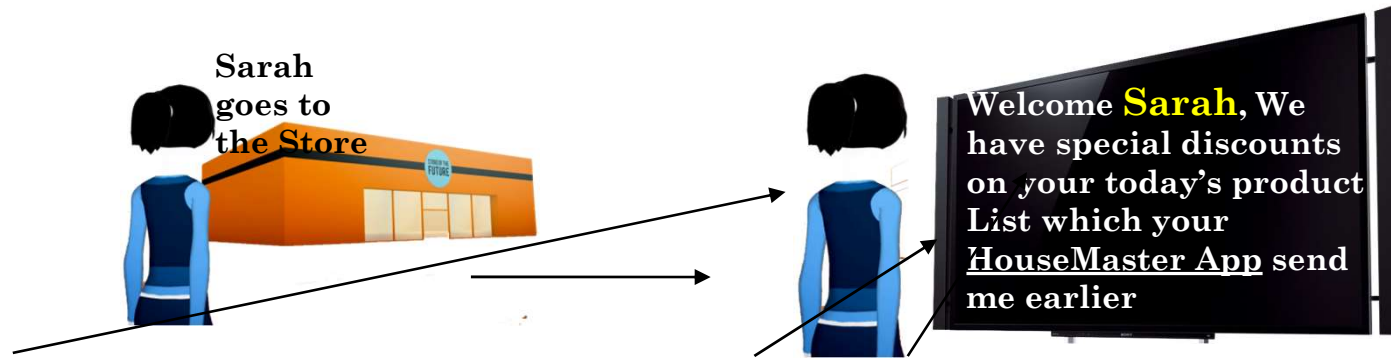
HouseMasterApp orders items

ITEMS TOTAL: $589

Sarah collects items and Bill paid by HouseMasterApp running on HMOS

Flat 30 to 50% Discount