Internet of Things

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the Internet of things

watch the ITU forum on IoT

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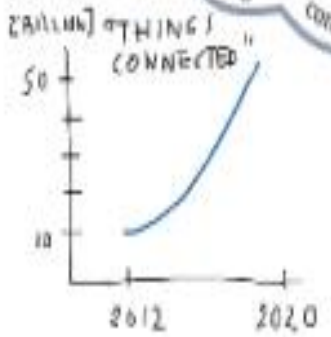
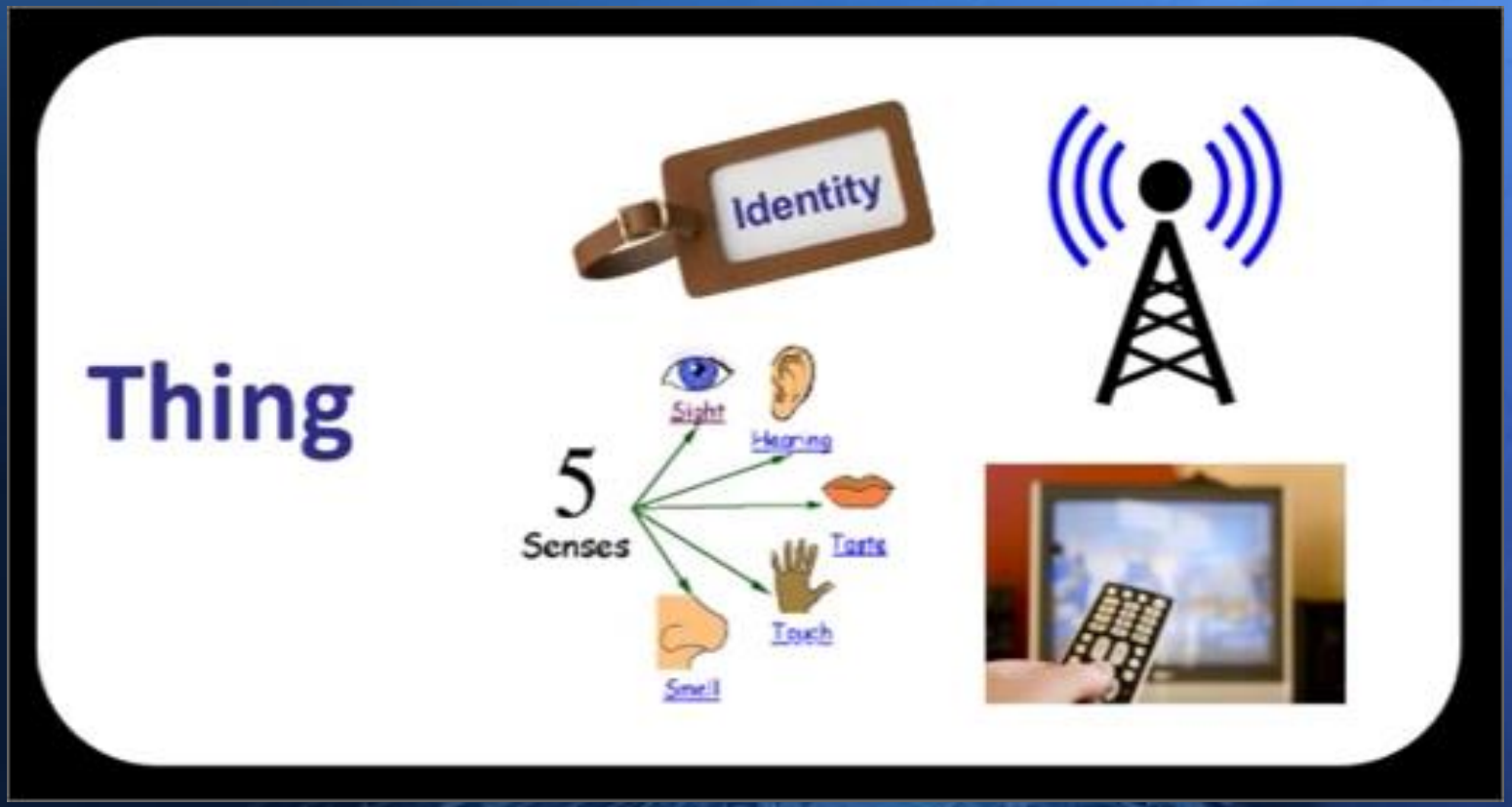
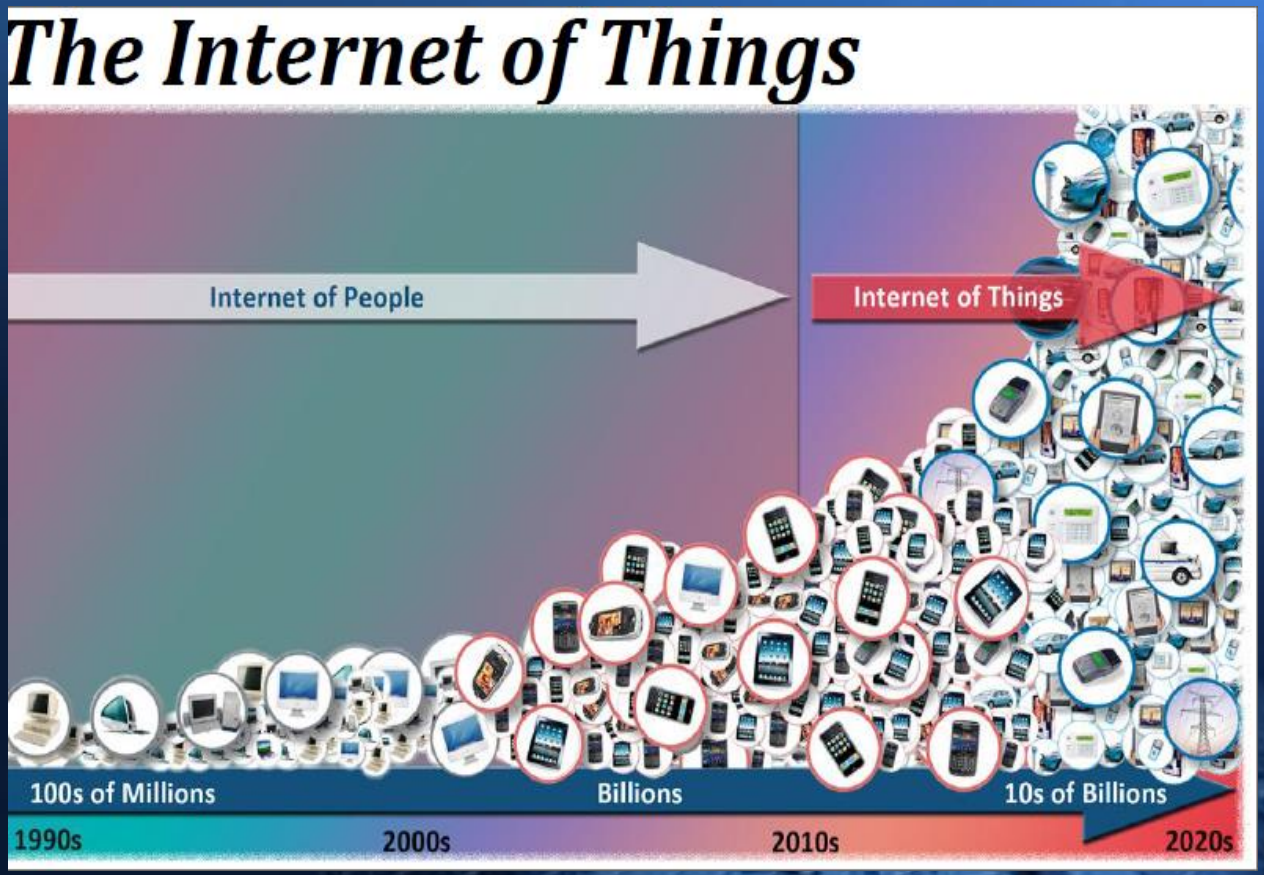


Thing



Ask google : where is my keys.?
Where are my kids?

History


The Internet of Things
Internet of People
Internet of Things
100s of Millions
Billions
10s of Billions
1990s
2000s
2010s
2020s

What's the Internet of Things

- **History**

1997, "*The Internet of Things" is the seventh in the series of ITU Internet Reports originally launched in 1997 under the title "Challenges to the Network".*

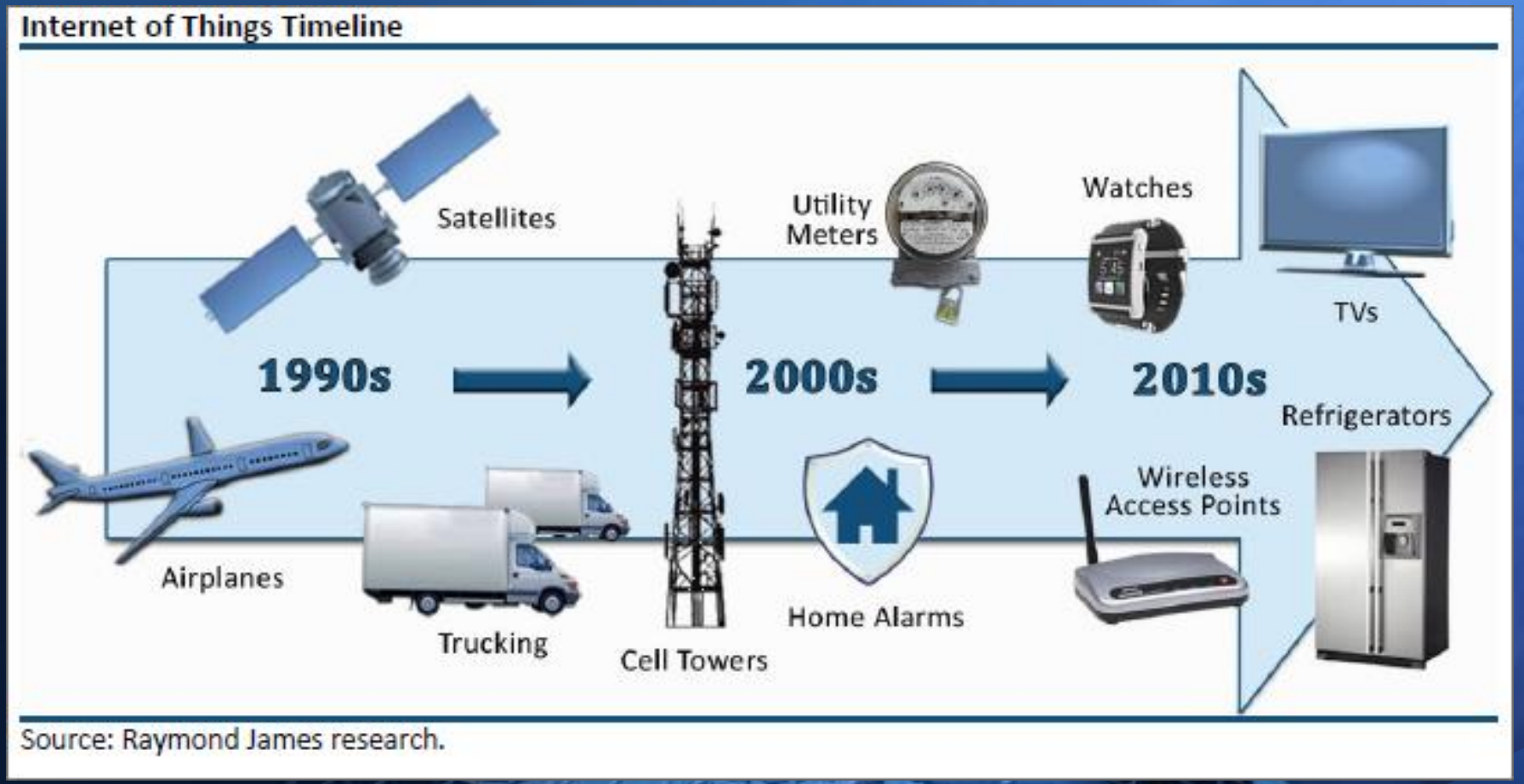
1999, Auto-ID Center founded in MIT – Keven Ashton

2003, EPC Global founded in MIT

2005, Four important technologies of the internet of things was proposed in WSIS conference.

2008, First international conference of internet of things: The IOT 2008 was held at Zurich.

IoT Timeline



What's the Internet of Things

- **Definition**

  (1) The Internet of Things, also called The Internet of Objects, refers to a wireless network between objects, usually the network will be wireless and self-configuring, such as household appliances.

  ------Wikipedia

  (2) By embedding short-range mobile transceivers into a wide array of additional gadgets and everyday items, enabling new forms of communication between people and things, and between things themselves.

  ------WSIS 2005

What's the Internet of Things

- **Definition**

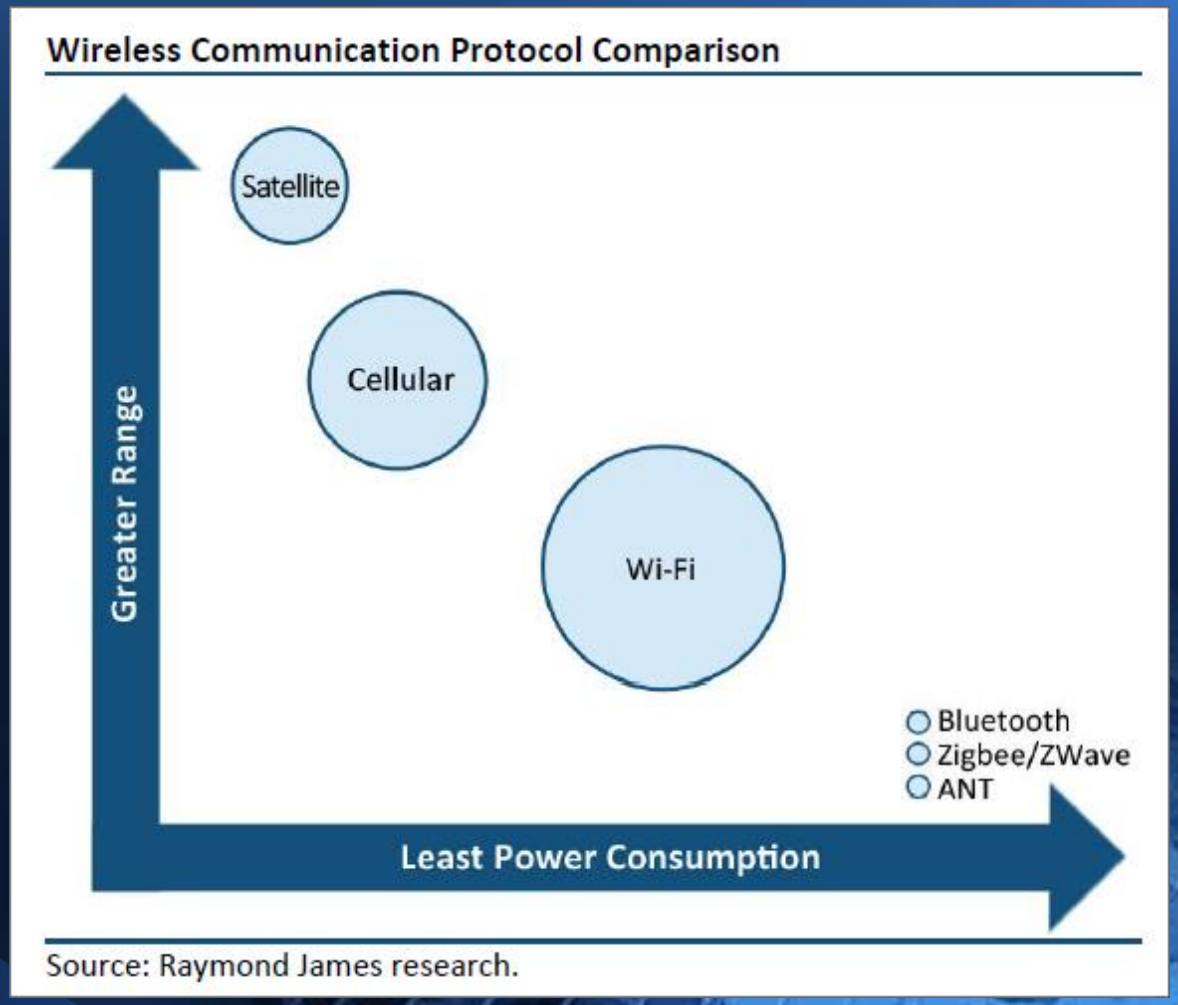
(3) **T**he term "Internet of Things" has come to describe a number of technologies and research disciplines that enable the Internet to reach out into the real world of physical objects.

------IoT 2008

(4) "Things having identities and virtual personalities operating in smart spaces using intelligent interfaces to connect and communicate within social, environmental, and user contexts".

-------IoT in 2020

Driver of IoT connectivity



What's the Internet of Things

From any time ,any place connectivity for anyone, we will now have connectivity for anything!

EX: UK Gov

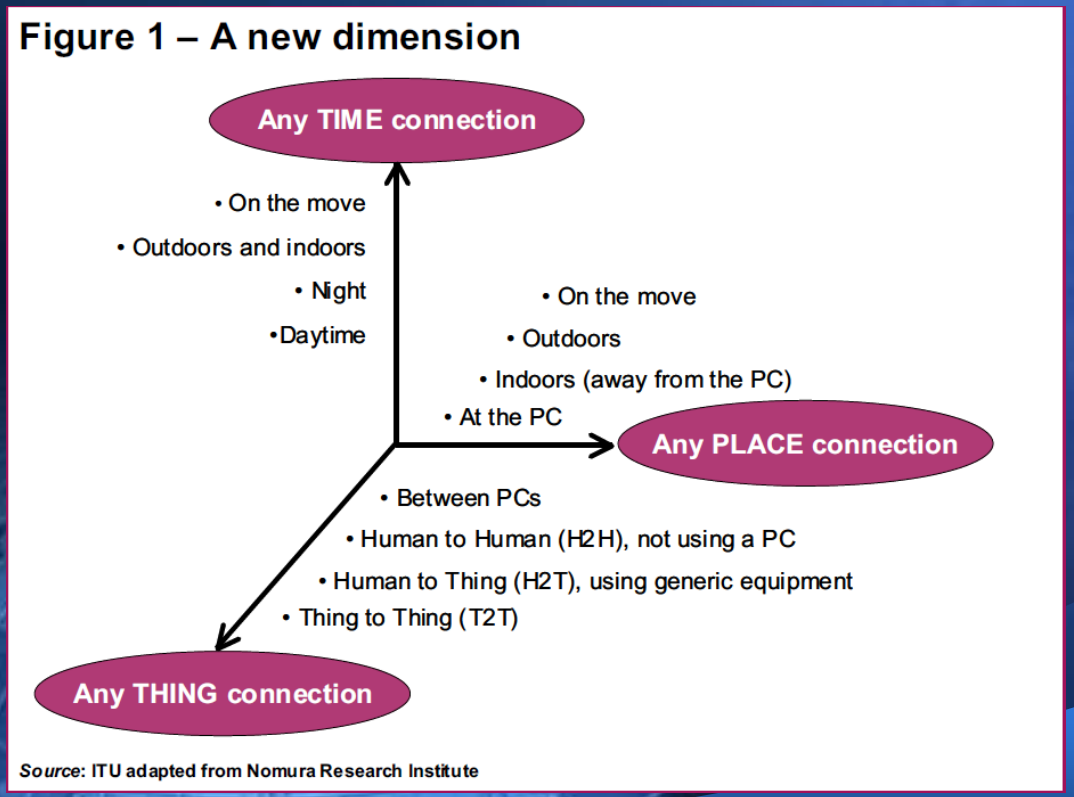
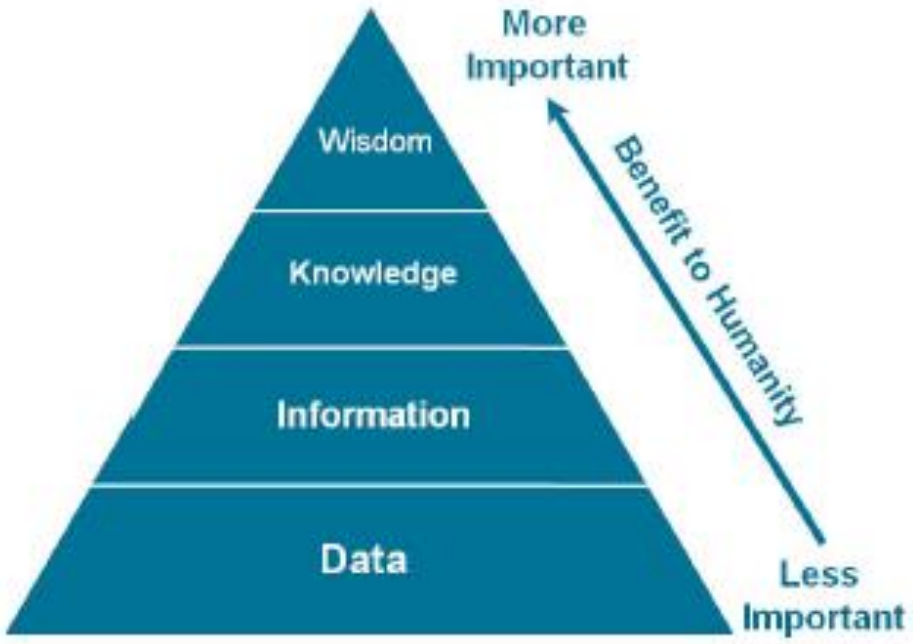


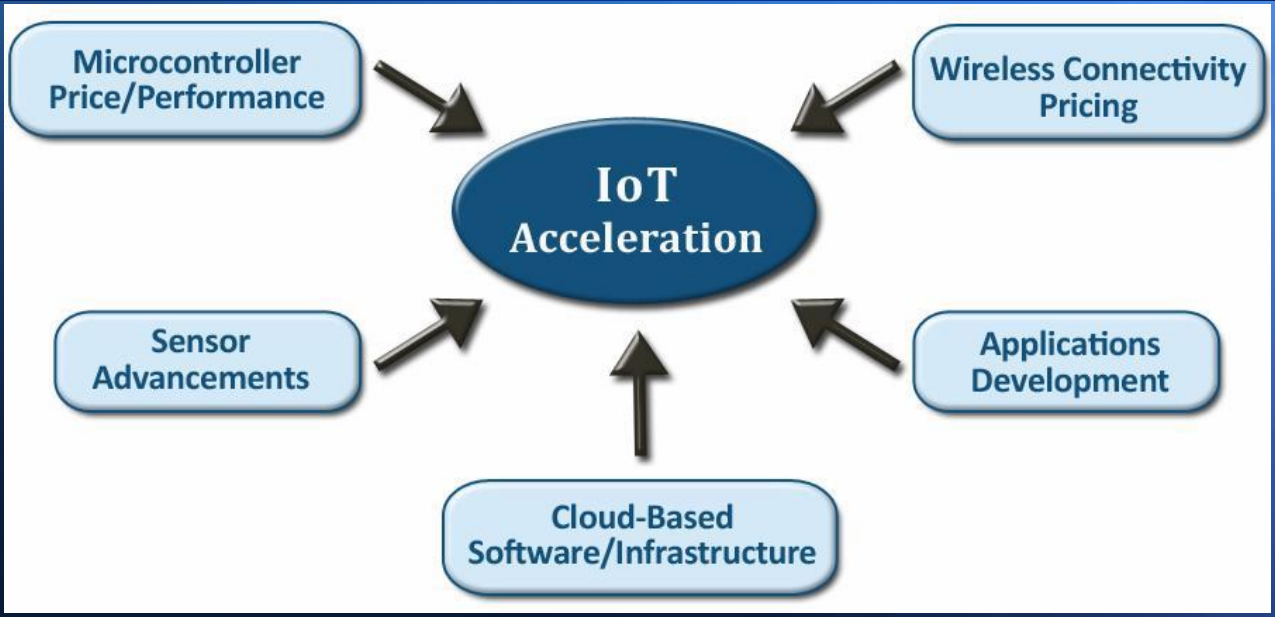
Figure 3. Humans Turn Data into Wisdom

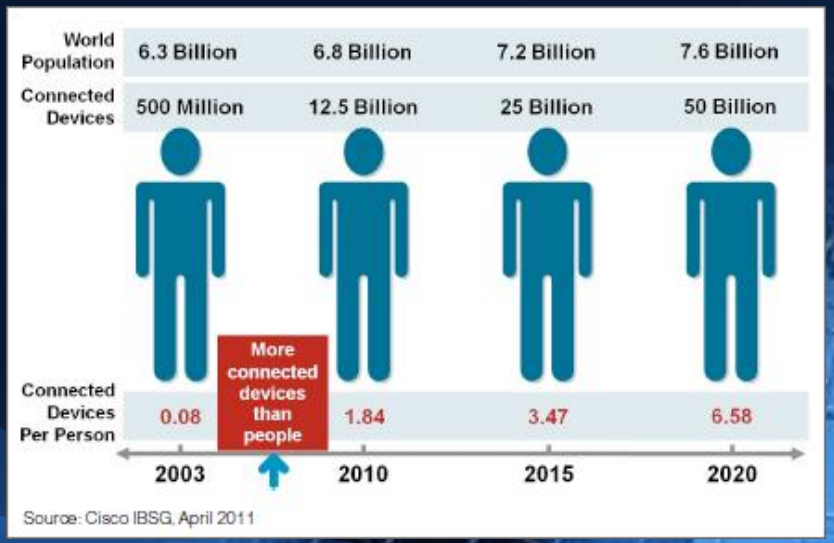


Source: Cisco IBSG, April 2011

It is also important to note there is a direct correlation between the input (data) and output (wisdom). The more data that is created, the more knowledge and wisdom people can obtain. IoT dramatically increases the amount of data available for us to process. This, coupled with the Internet's ability to communicate this data, will enable people to advance even further.

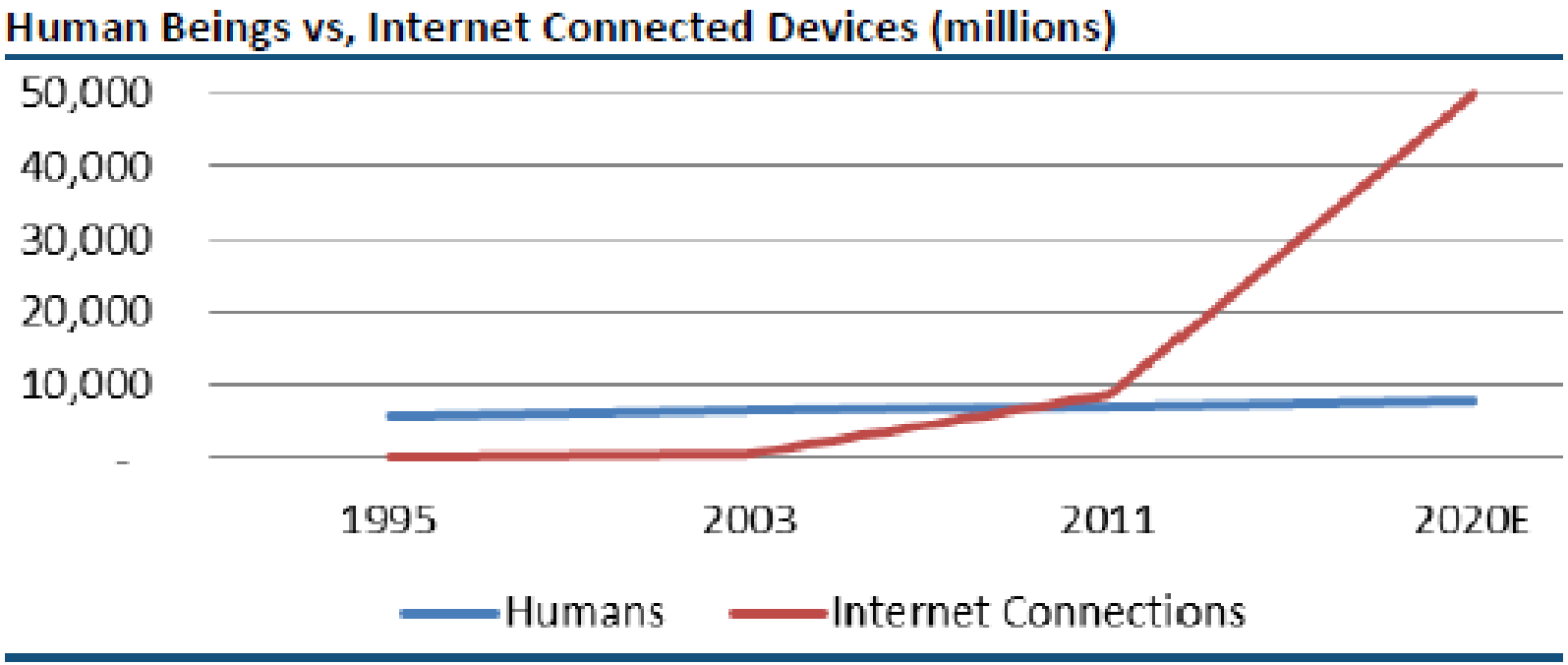
IoT Perspective





	2003	2011	2020
Humans	6,3B	7B	7,6B
Devices	500M	12,5B	50B

Perspective



Source: Cisco Systems, LM Ericsson, Raymond James research.

Why Internet of Things

- *Dynamic control of industry and daily life*

  Resource efficiency –energy conservation

- *Improve the resource utilization ratio*

- *Better relationship between human and nature*

  Pollutiion and disaster avoidance.

- *Forming an intellectual entity by integrating human society and physical systems*

Why Internet of Things (ii)

- *Universal transport & internetworking*
- *Accessibility & Usability?*
- *Acts as technologies integrator*

Businesses perspective of IoT

The driver of all this connectivity is essentially the desire to "add value" to products or services

e.g: $100 handset turns to $600 smartdevice – connected to internet

Cisco study

Businesses Additional profit	Potential of using internet
613B	50%
14,4 trilions net profit for the coming two decades	

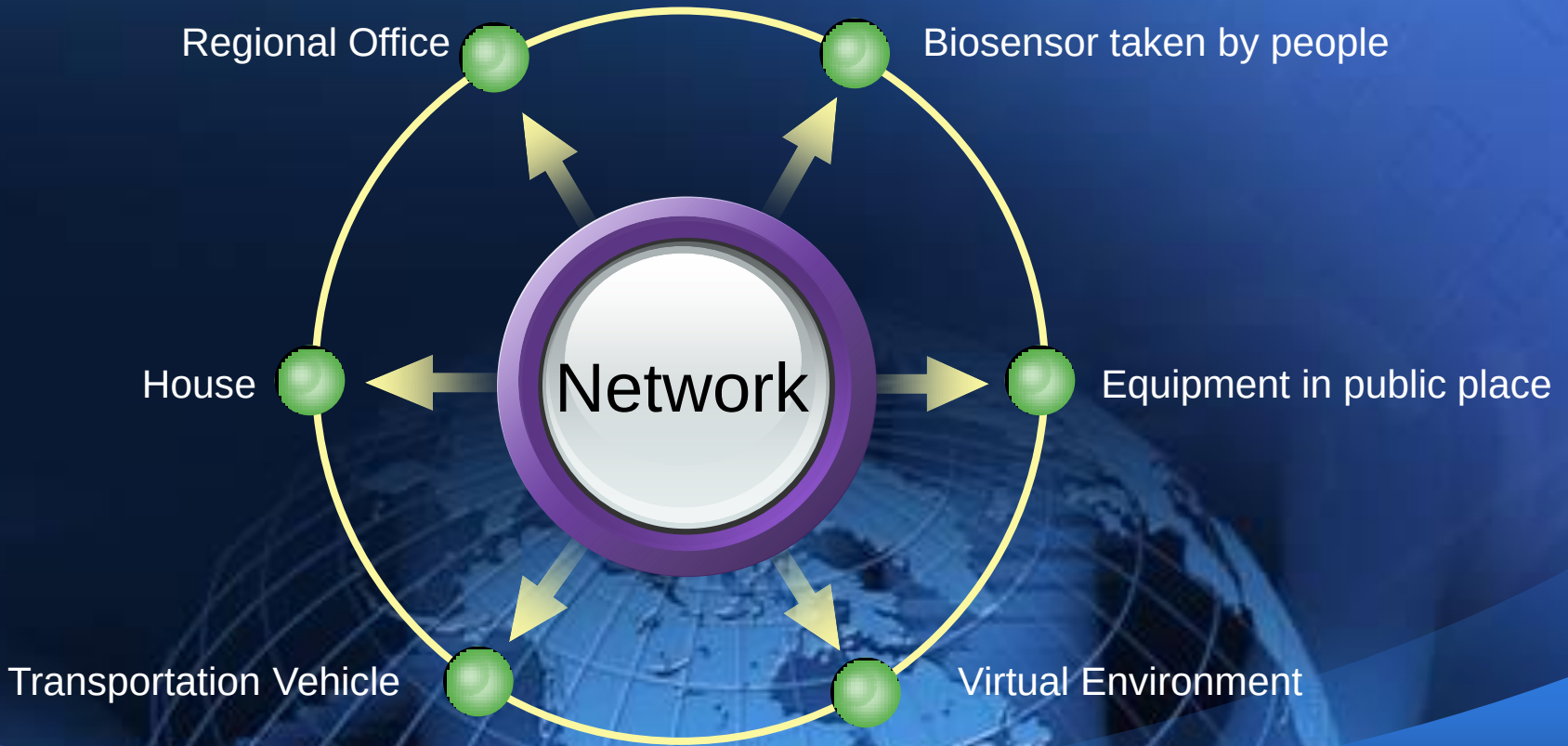
The IoT value chain

Product	Description
Radios	Chips that provide connectivity based on various radio protocols
Sensors	Chips that can measure various environmental/electrical variables
Microcontrollers	Processors/Storage that allow low-cost intelligence on a chip
Modules	Combine radios, sensors, microcontrollers in a single package
Platform Software	Software that activates, monitors, analyzes device network
Application Software	Presents information in usable/analyzable format for end user
Device	Integrates modules with app software into a usable form factor
Airtime	Use of licensed or unlicensed spectrum for communications
Service	Deploying/Managing/Supporting IoT solution

Source: Raymond James research.

The application of IoT(1)

Vertical Market Solutions



The application of IoT(1)

The Looming Opportunity: Internet of Things

aria

Consumer
- Smart home control (lighting, security, comfort)
- Optimized energy use
- Maintenance

Retail
- Product tracking
- Inventory control
- Focused marketing

Medical
- Wearable devices
- Implanted devices
- Telehealth services

Military
- Resource allocation
- Threat analysis
- Troop monitoring

Industrial
- SmartMeters
- Wear-out sensing
- Manufacturing control
- Climate control

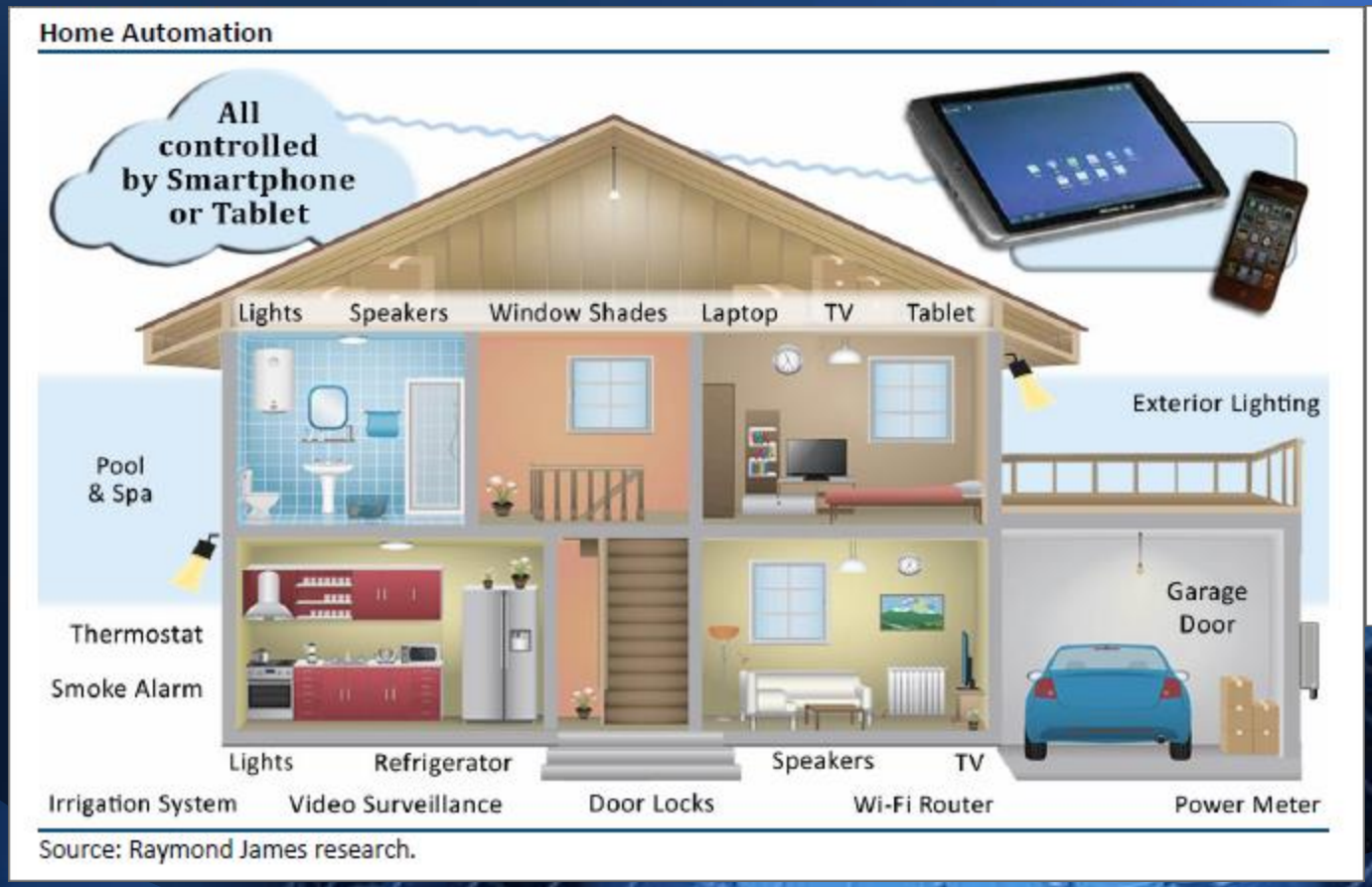
Automotive
- Parking
- Traffic flow
- Anti-theft location

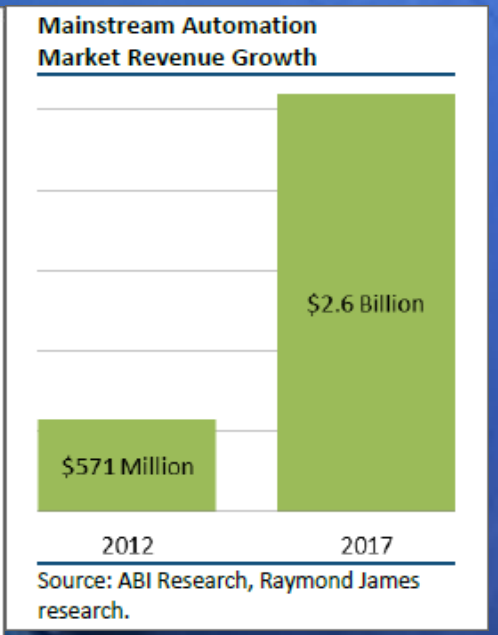
Environmental
- Species tracking
- Weather prediction
- Resource management

Agriculture
- Crop management
- Soil analysis

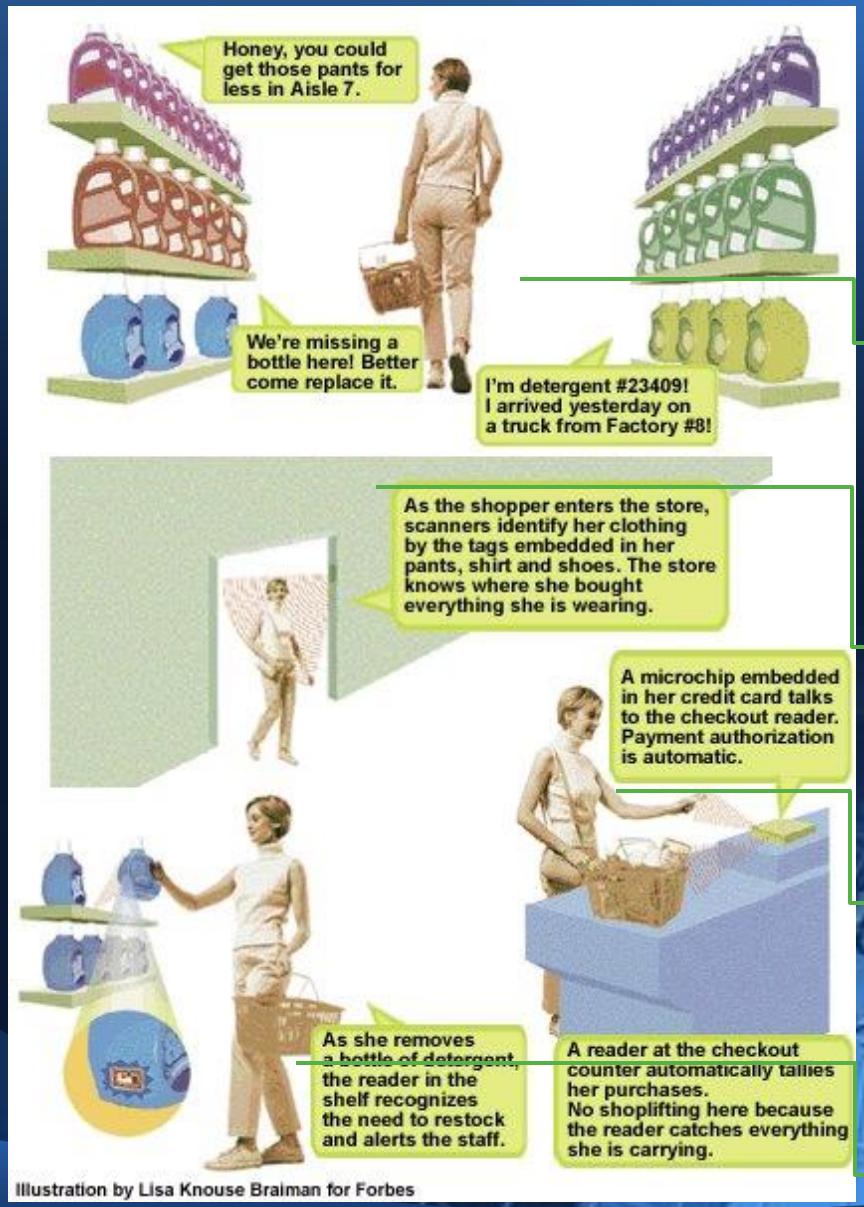
The application of IoT(5)

Scenario: Intelligent Home





The application of IoT(2)



Scenario: shopping

(2) When shopping in the market, the goods will introduce themselves.

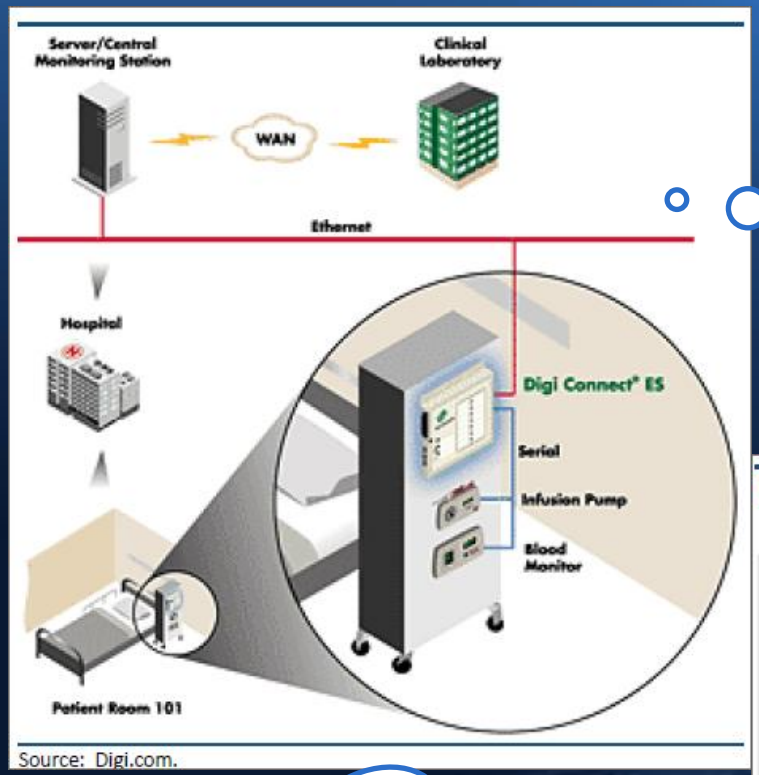
(1) When entering the doors, scanners will identify the tags on her clothing.

(4) When paying for the goods, the microchip of the credit card will communicate with checkout reader.

(3) When moving the goods, the reader will tell the staff to put a new one.

The application of IoT(4)

Scenario: Health Care



Source: Digi.com.

illustration below from Sierra Wireless describes how a health care provider could theoretically use real time data collected from hospitals, wearable devices, home health monitoring devices, and elsewhere to provide better service

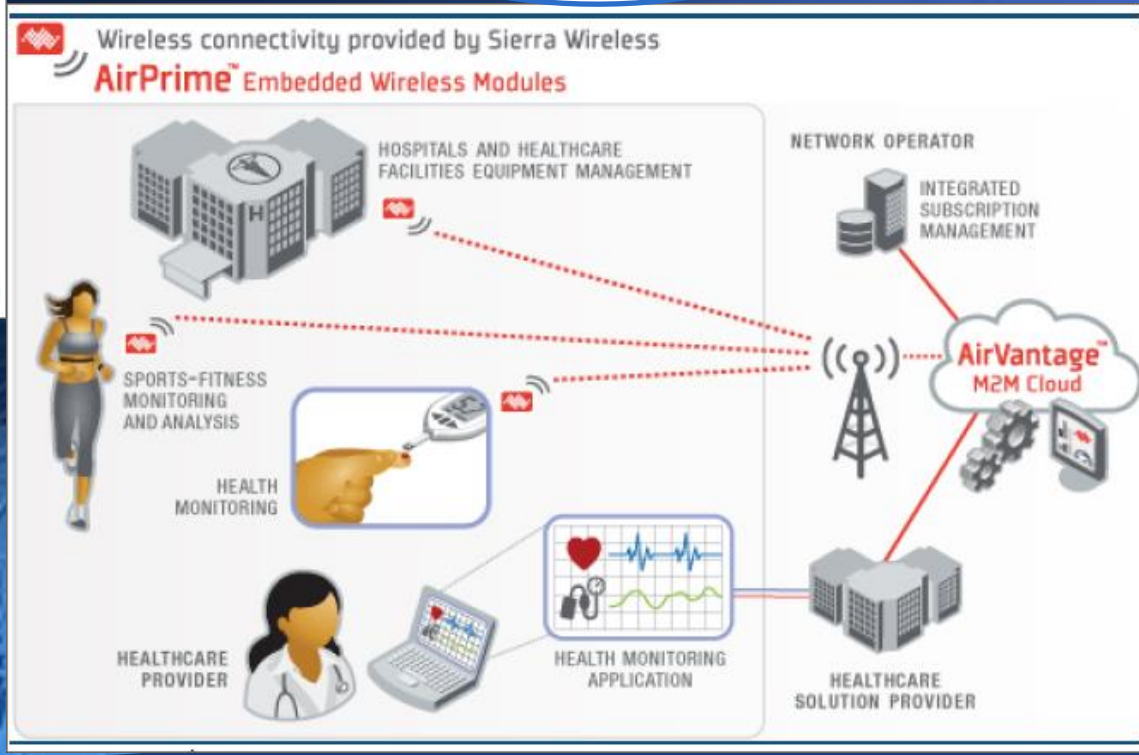
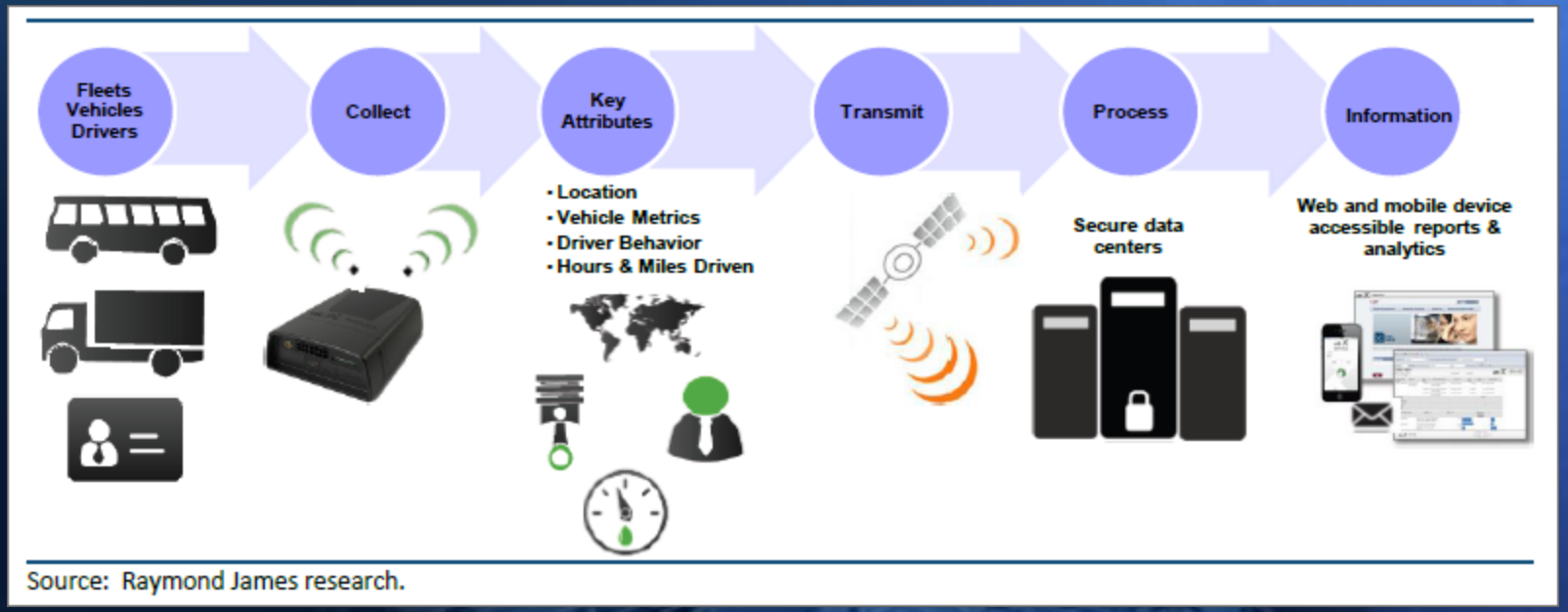


illustration of a solution allowing for remote monitoring of bedside diagnostics, which is just one application for the Internet of Things within the health care environment

The application of IoT(6)

Scenario: Transportation

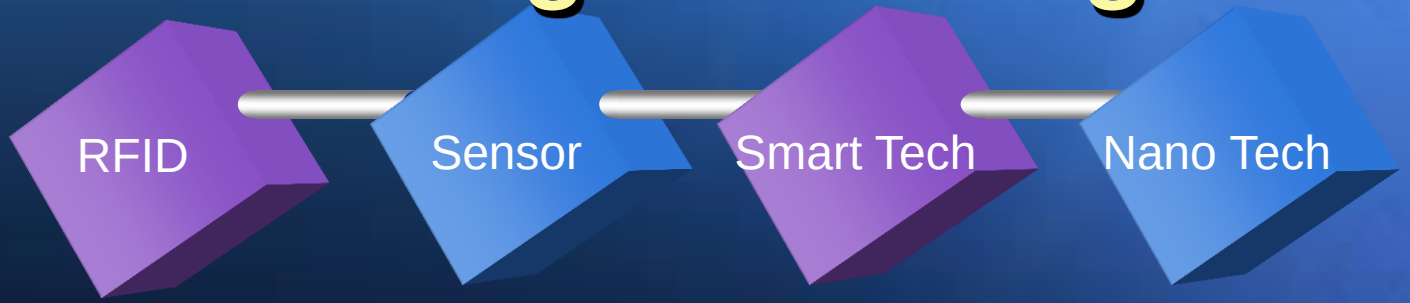


+200 variables on each truck

5% market penetration

State of the Art of IoT

Enabling Technologies



RFID	Sensor	Smart Tech	Nano Tech
To identify and track the data of things	To collect and process the data to detect the changes in the physical status of things	To enhance the power of the network by devolving processing capabilities to different part of the network.	To make the smaller and smaller things have the ability to connect and interact.

Sensor technology

Sensors are the magic of IoT

- The ability to detect changes in the physical status of things is essential for recording changes in the environment.

- Wireless sensor technology play a pivotal role in bridging the gap between the physical and virtual worlds, and enabling things to respond to changes in their physical environment. Sensors collect data from their environment, generating information and raising awareness about context.

- Sensor Market includes : Micro-electromechanical systems (MEMS) - based sensors, optical sensors, ambient light sensors, gesture sensors, proximity sensors, touch sensors, fingerprint sensors and more

Example: ***sensors in an electronic jacket can collect information about changes in external temperature and the parameters of the jacket can be adjusted accordingly***

State of the Art of IoT

Research groups

1

MIT Auto-ID Lab & EPC Global.

Stanford University

Georgia Institute of Technology

Cambridge Univ

2

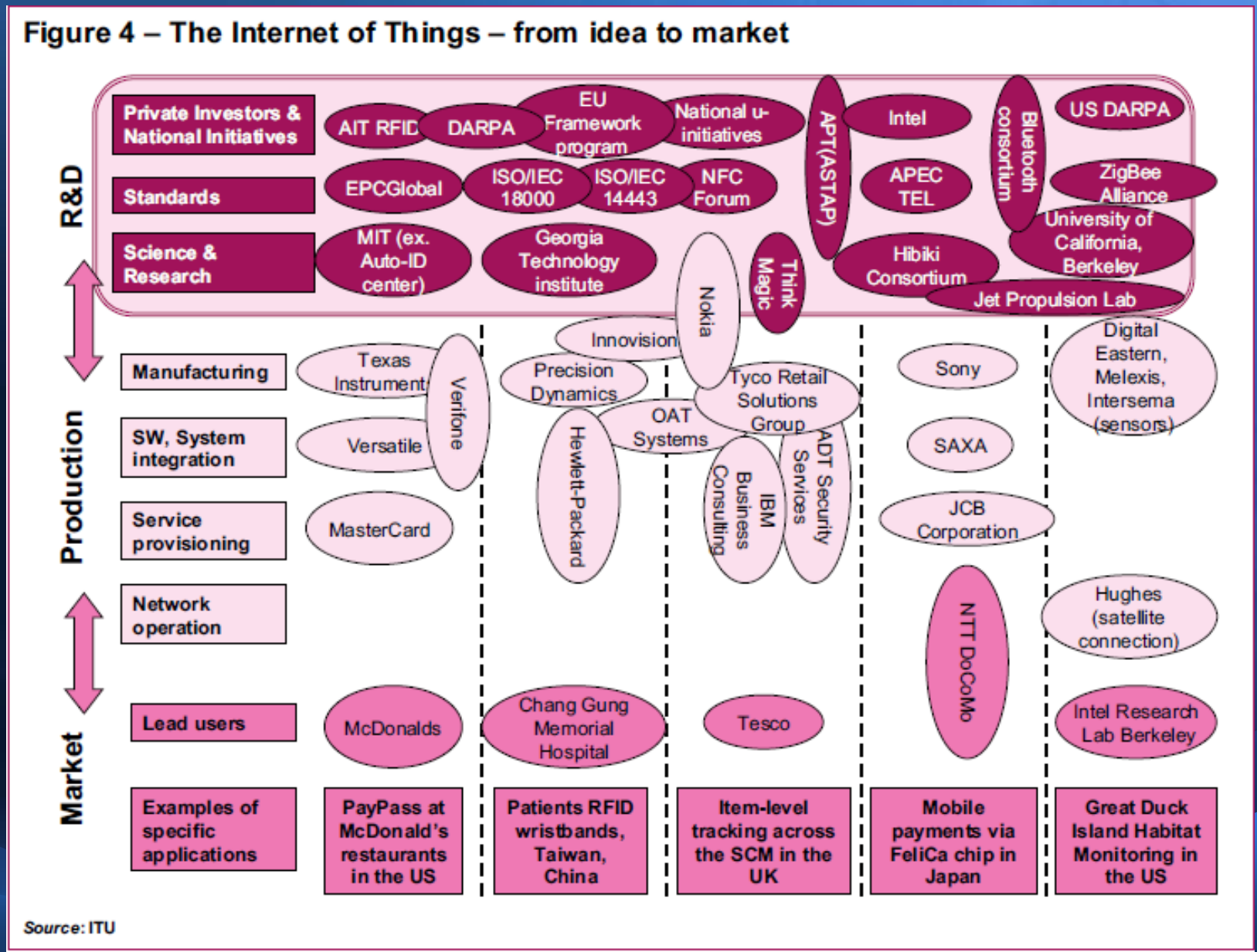
EPFL & ETH Zurich Information and Communication Systems Research Group

Chemnitz University of Technology VSR Group

3

Nokia
SAP
IBM
GOOGLE
AMBIENT
Metro Group
Siemens
Sun
Cisco
GE

State of the Art of IoT



The challenge of IoT

Total challenge of IOT

1.Technological Standardization in most areas are still remain fragmented.
2.managing and fostering rapid innovation is a challenge for governments
3. privacy and security
4.Absence of governance
5.Vulnerability to internet attack

The challenge of IoT

How to convincing users that the IoT technology will protect their data and privacy when tracking

The challenge of IoT

Solution of the main challenge: Education and Information

Central aspects for the success of the upcomming IoT

- **Capacity building programs**
- **Breadth and depth engines**
- **Strategic communication Plan**
- **Opportunities Vs Threats of the IoT**

The challenge of IoT

Solution of the main challenge: Legislation

Two approaches :

- The real law
- The Cyberlaw

Lack of legal instruments

1. Privacy
2. Intellectual property rights
3. Security
4. Data Protection
5. Cybercrime

The challenge of IoT

Limitation of IoT

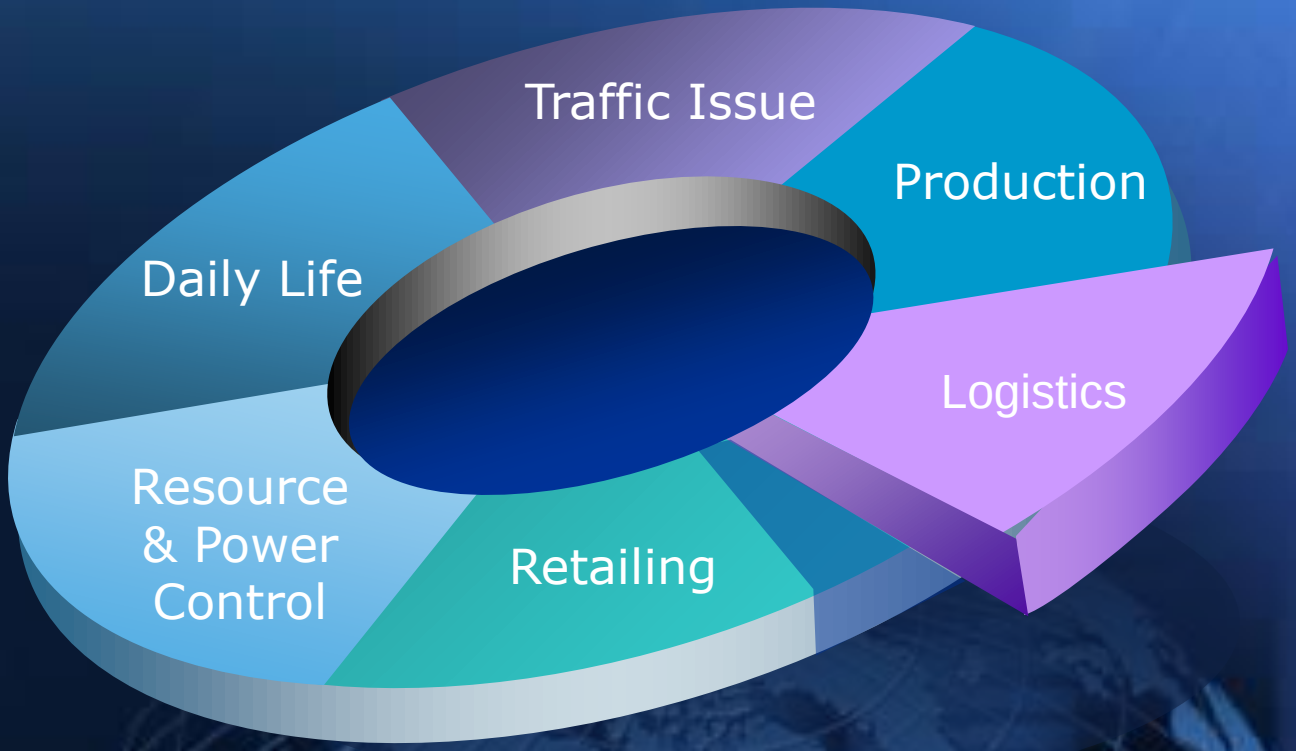
The application of IoT in extreme situations are still not tested (outer space, very hot or cold area)

Standardization and Interoperability

Legal instruments

Technical limitation in some cases

Future of IOT



Future of IOT

There are three core sectors of the IoT :

- enterprise,
- home, and
- government,

with the Enterprise Internet of Things (EIoT) being the largest of the three. By 2019, the EIoT sector is estimated to account for nearly 40% or 9.1 billion devices

Future of IOT

Size considerations

The Internet of objects would encode 50 to 100 trillion objects, and be able to follow the movement of those objects. Human beings in surveyed urban environments are each surrounded by 1000 to 5000 trackable objects

Space considerations

Internet of Things, things are able to take actions on their own initiative, this human-centric mediation role is eliminated, and the time-space context that we as humans take for granted must be given a central role in this information ecosystem. Just as standards play a key role in the Internet and the Web, geospatial standards will play a key role in the Internet of Things

Criticism and controversies

While many technologists tout the Internet of Things as a step towards a better world, scholars and social observers have doubts about the promises of the ubiquitous computing revolution

Privacy, autonomy and control

Future of the IoT

Peter-Paul Verbeek, a professor of philosophy of technology, Netherlands, writes that technology already influences our moral decision making, which in turns affects human agency, privacy and autonomy. He cautions against viewing technology merely as a human tool and advocates instead to consider it as an active agent.

Justin Brookman, of the Center for Democracy and Technology, expressed concern regarding the impact of IoT on consumer privacy, saying that "There are some people in the commercial space who say, ‘Oh, big data — well, let’s collect everything, keep it around forever, we’ll pay for somebody to think about security later.’ The question is whether we want to have some sort of policy framework in place to limit that

Editorials at WIRED have also expressed concern, one stating 'What you’re about to lose is your privacy. Actually, it’s worse than that. You aren’t just going to lose your privacy, you’re going to have to watch the very concept of privacy be rewritten under your nose

With IoT, you dont need to go online because your environment is already there serving you….

So if we dont need to be online than IoT will eliminate the Internet online

Open Discussion

IoT new issues in the Internet Governance Debate

- **Technical**
- **Economic**
- **Development**
- **Sociocultural**
- **Legal**
- **Human Rights**


Thank You !
CIC