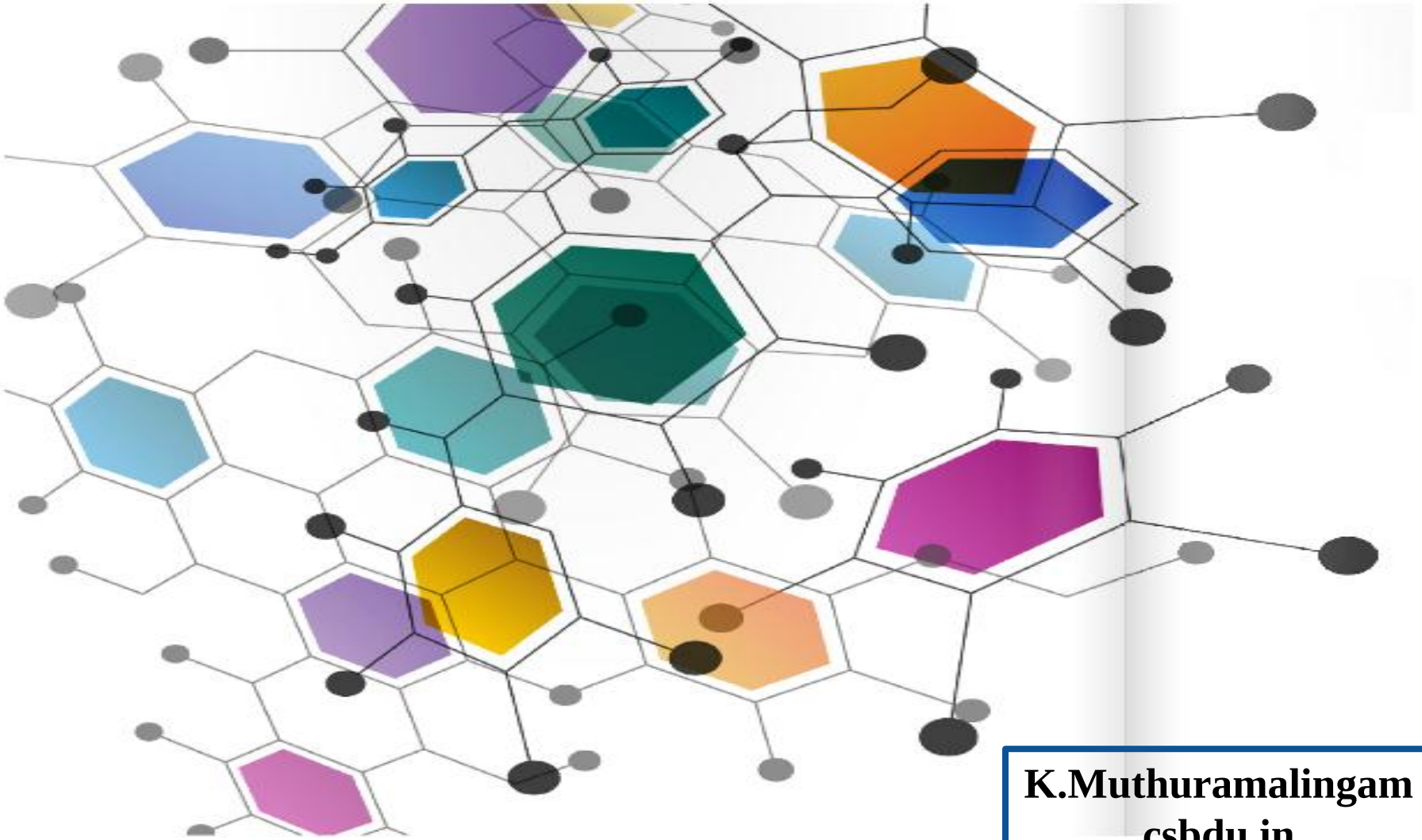
Evolution of Internet of Things



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Multiple Technologies

System

- A System is a way of working, Organizing one or many task according to a fixed plan, program or set of rules.

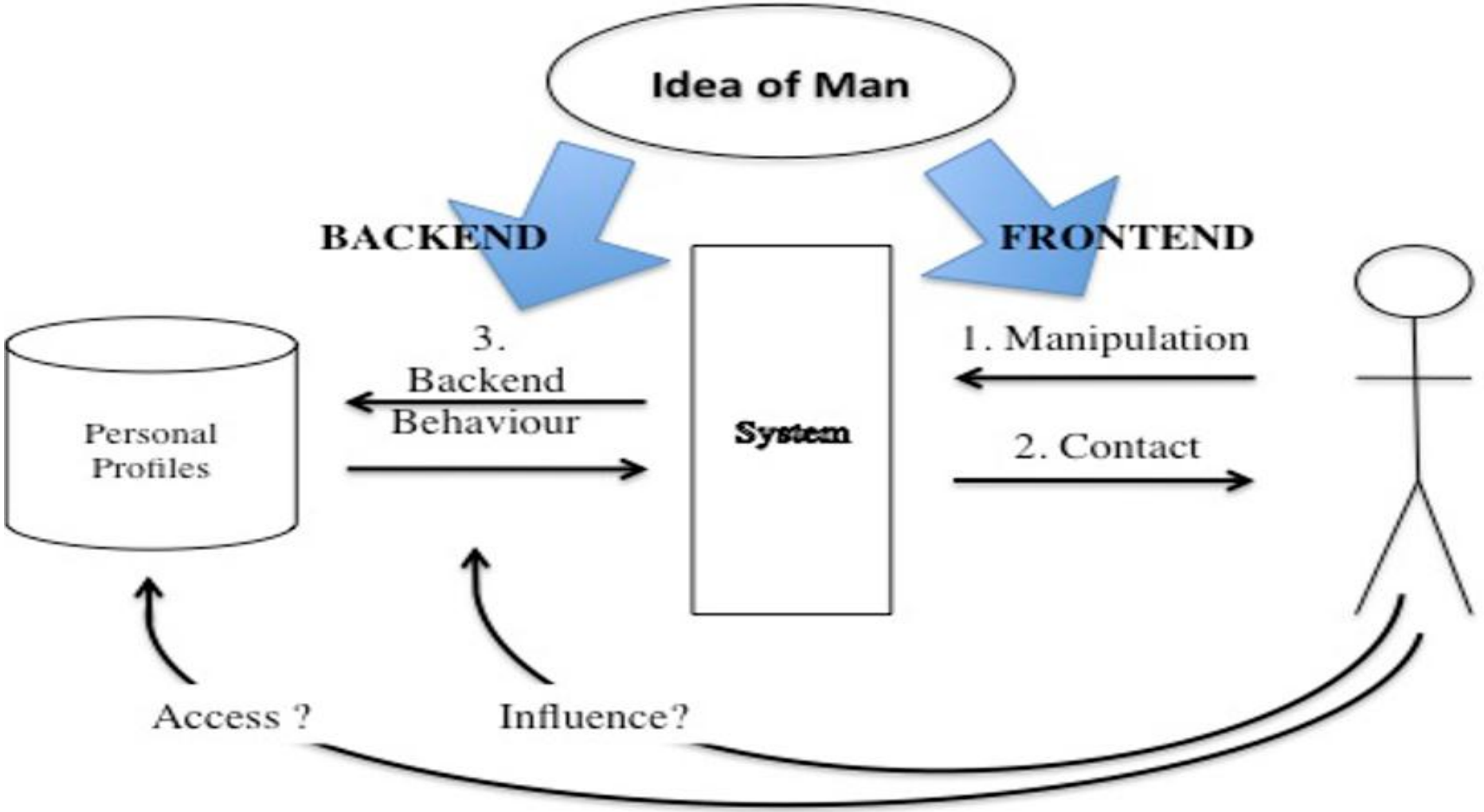
Watch: It is time display system.

Parts: Hardware, Needle, Battery, Dial Chassis and Strap.

Rules: All needle move clockwise only.

- A thin needle rotate every second.
- A long needle rotate every minute.
- A short needle rotates every hour.
- All needle return to the original position after 12 hours.

How The ‘Idea of Man’ Influences System Design



Need of Embedded Systems

- In the day-to-day life we come across a wide variety of consumer electronic products.
- We are habituated to use them easily and flawlessly to our advantage.
- Common examples are TV Remote Controllers, Mobile Phones, FAX machines, Xerox machines etc.
- Each of these devices does have one or more programmable devices waiting to interact with the environment as effectively as possible they provide service in real time

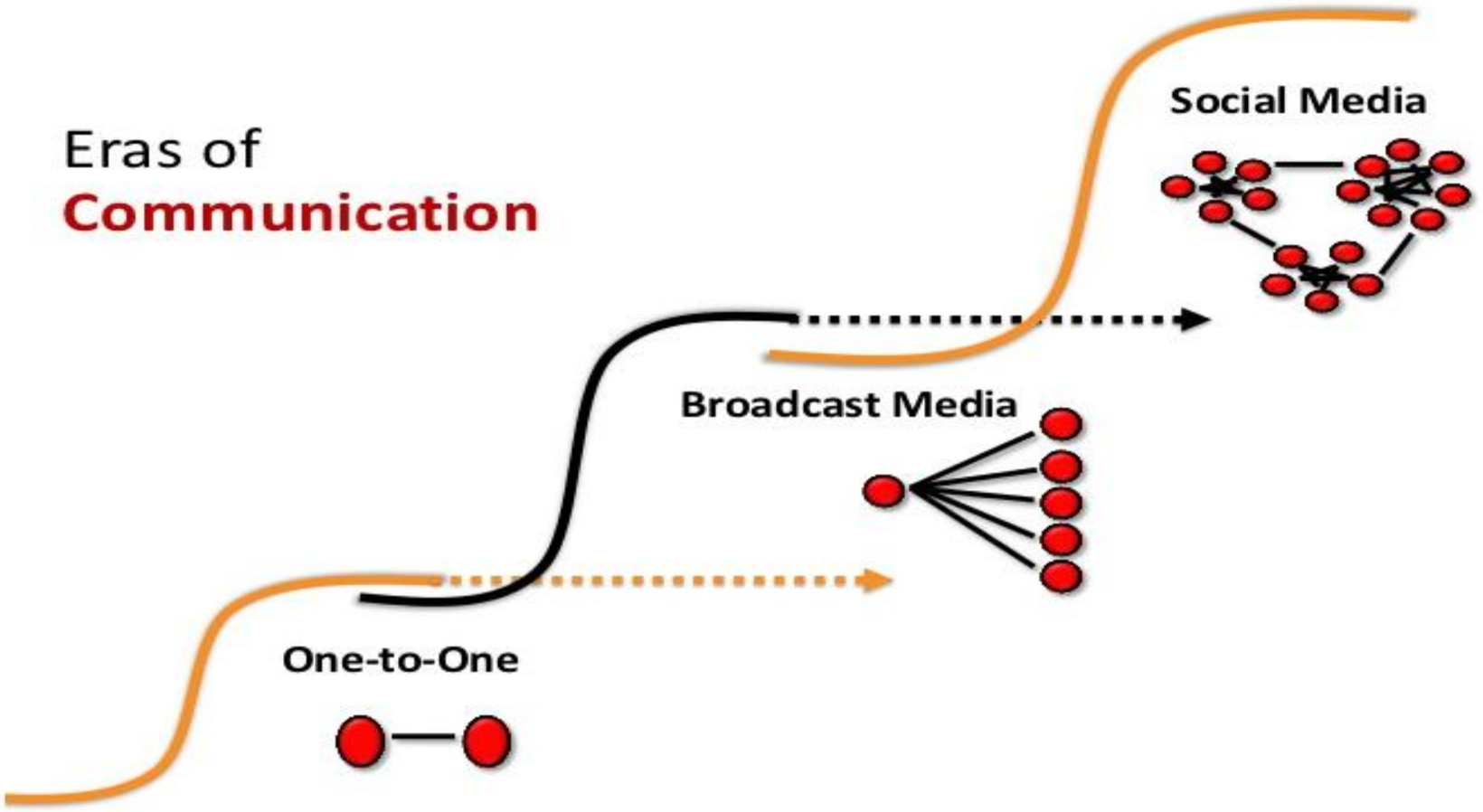
Characteristics of Embedded System

- Embedded systems are computing systems with tightly coupled hardware and software integration.
- Designed to perform dedicated function
- Embedded means that the system is a integral part of a larger system
- Multiple embedded systems can co-exist in a single system.
- General purpose processor are typically not aware of the applications.
- An embedded processor is application-aware.

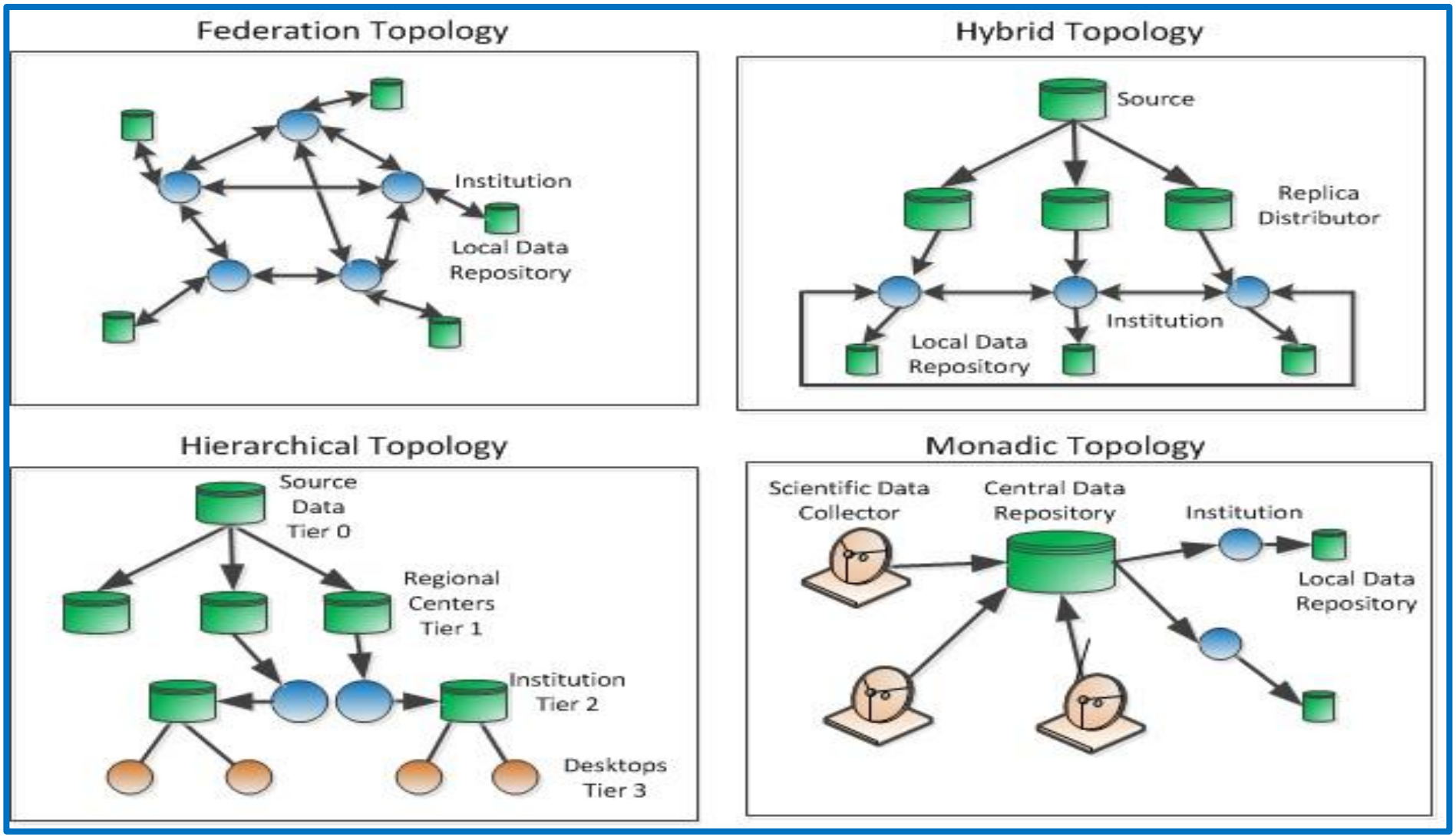
Scope of Embedded System

- Telecommunications
- Defence instruments
- Railroad Networks
- Consumer Electronics
- Electronic Payments
- Smart Cards Industry.

Communication Convergence



Network Topologies



Wireless Sensor Networks

Wireless Sensor Network. Why?

- Human beings have excellent cognitive abilities.
- However, it is unfortunate that human beings cannot fully utilize their potential abilities.
- Human beings tend to entrust computers and other sensing devices in dangerous and complicated matters.

Example: Robot usage in war field and other dangerous areas

Wireless Sensor networks

A device that measures a physical quantity and converts it into a signal which can be read by an observer or an instrument .

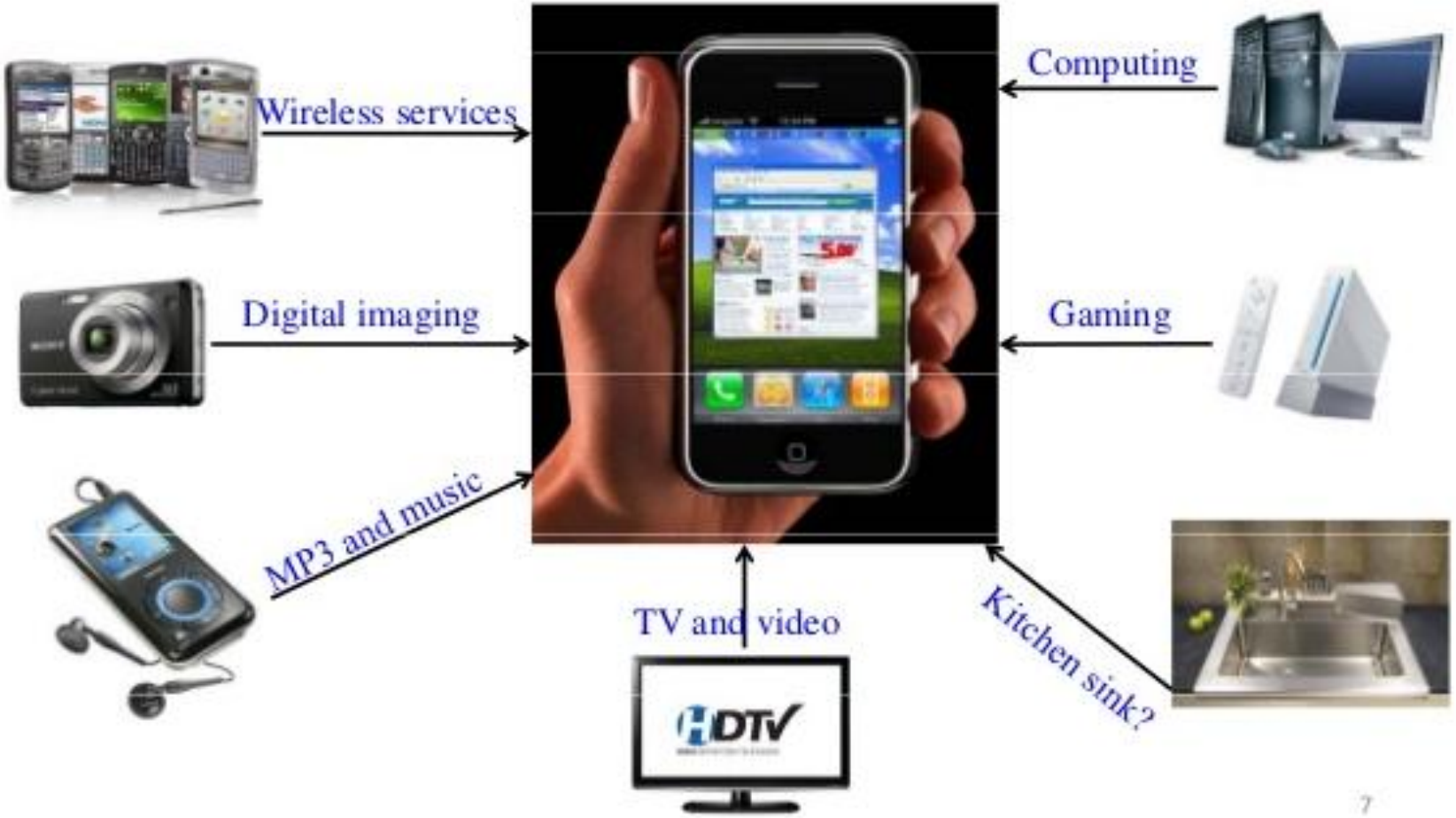
Node in a wireless sensor network is capable of performing some processing, gathering sensory information and communicating with other connected nodes in the network.

PROTOCOLS

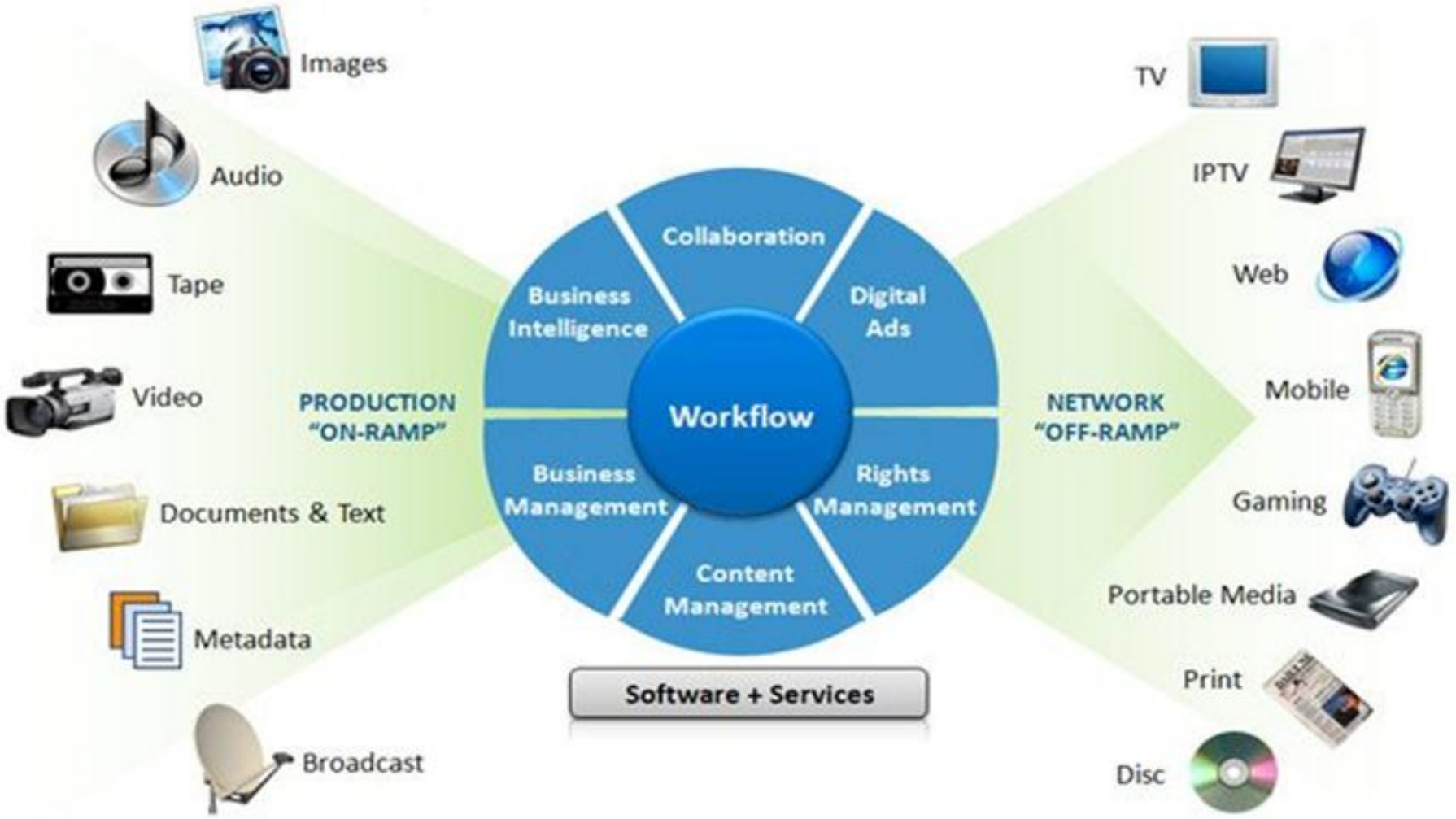
Wireless sensor networks consists of protocols and algorithms with self-organizing capabilities.

These sensors work with each other to sense some physical phenomenon and the information gathered is processed to get relevant results.

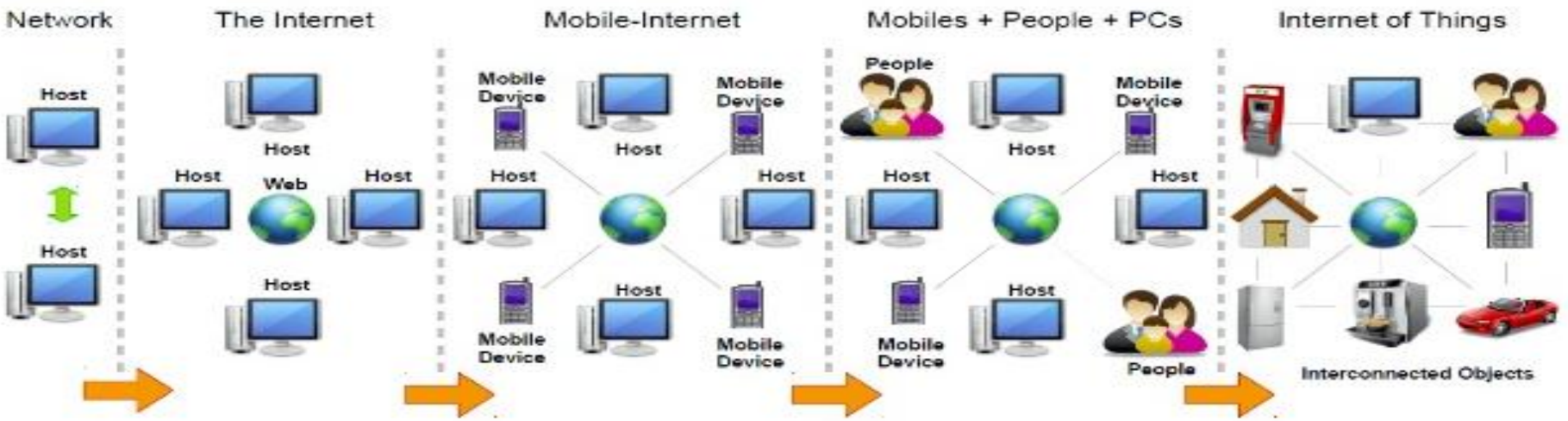
Technology Convergence

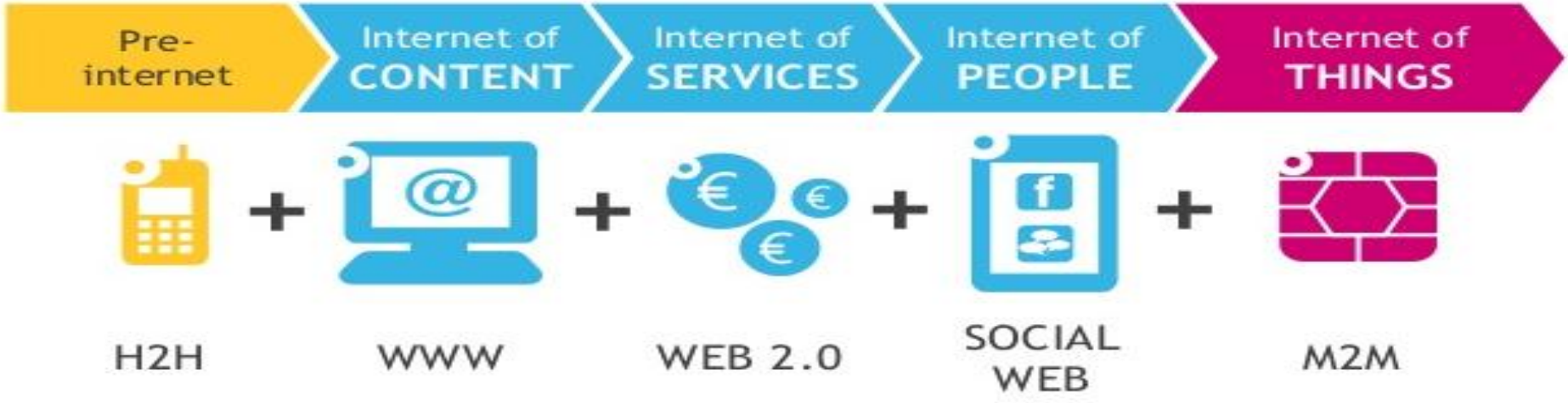


Deliver any Content to any Device



Internet Evolution

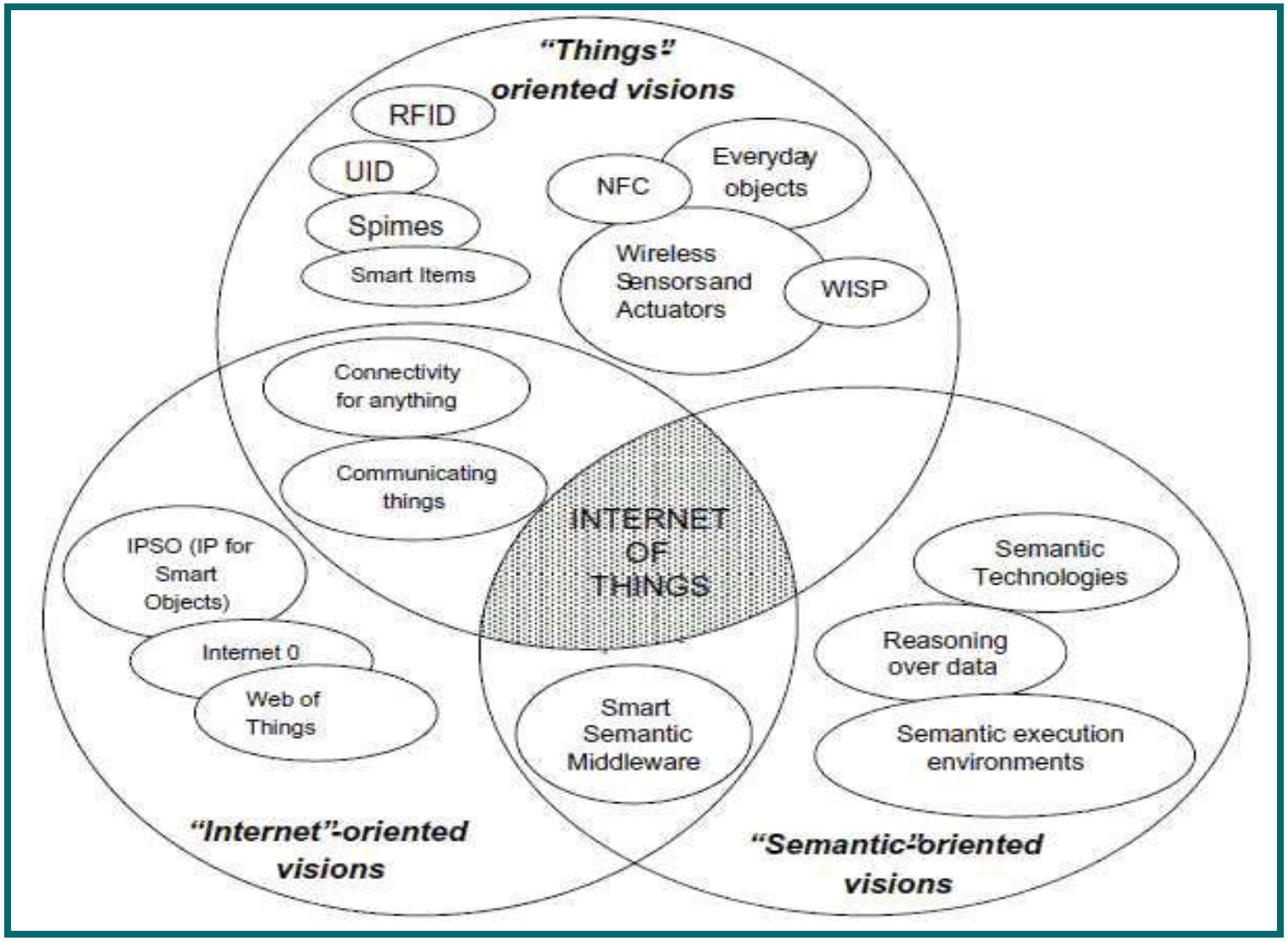




What Exactly Is The "Internet of Things“?

- Internet of Things can be realized in three paradigms:
  - (i) internet-oriented (middleware)
  - (ii) things oriented (sensors)
  - (iii) semantic-oriented (knowledge).
- Internet of Things is the interconnection of uniquely identifiable embedded computing devices within the existing Internet infrastructure.
- Internet of Things today consists of many different sensor networks and protocols, connected to dedicated cloud services, providing access through smartphone and browser apps.

Convergence of different visions of IoT



IOT Elements

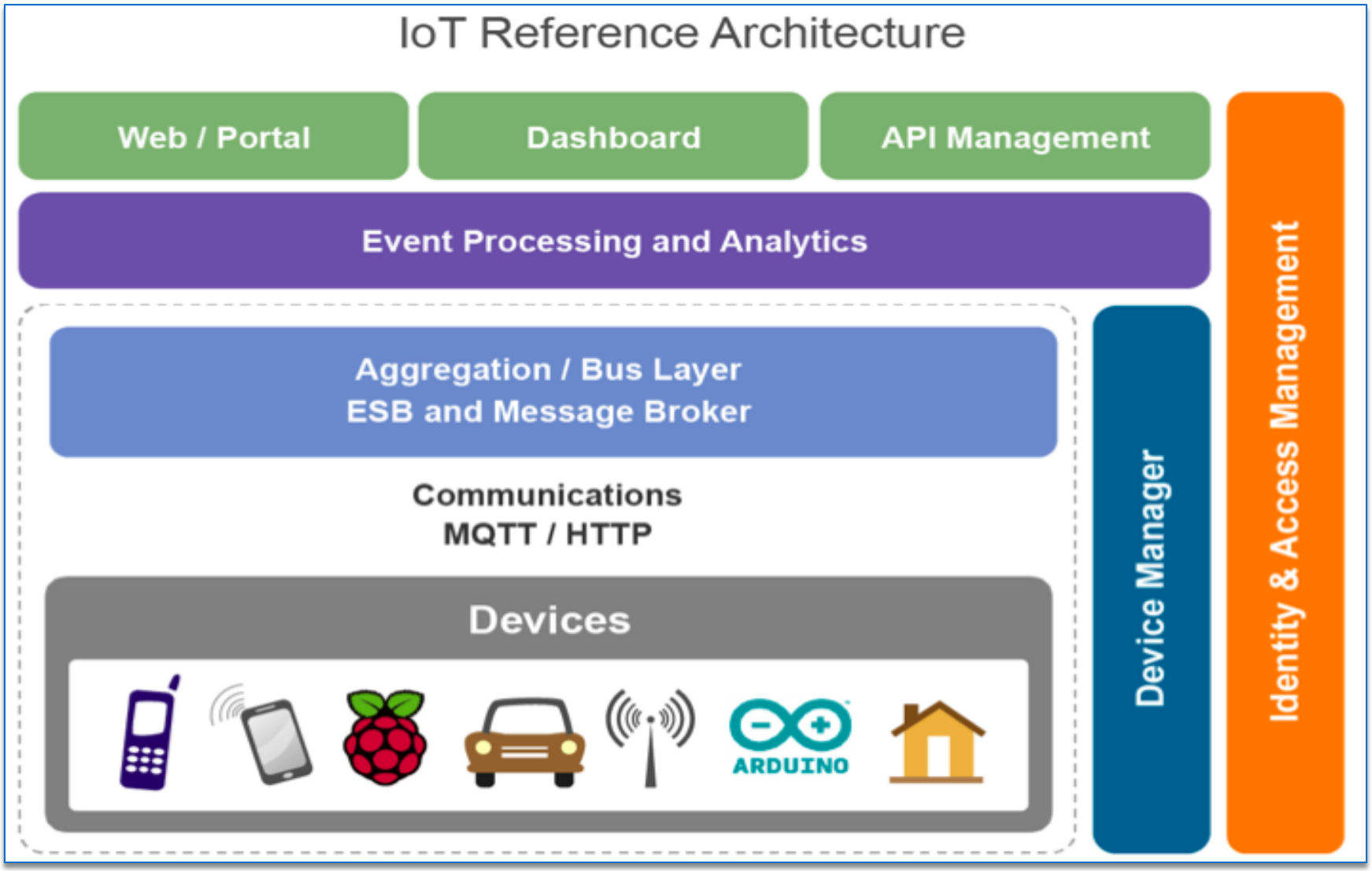
There are three IoT components:

(a) Hardware: Made up of Sensors, Actuators and Embedded communication hardware.

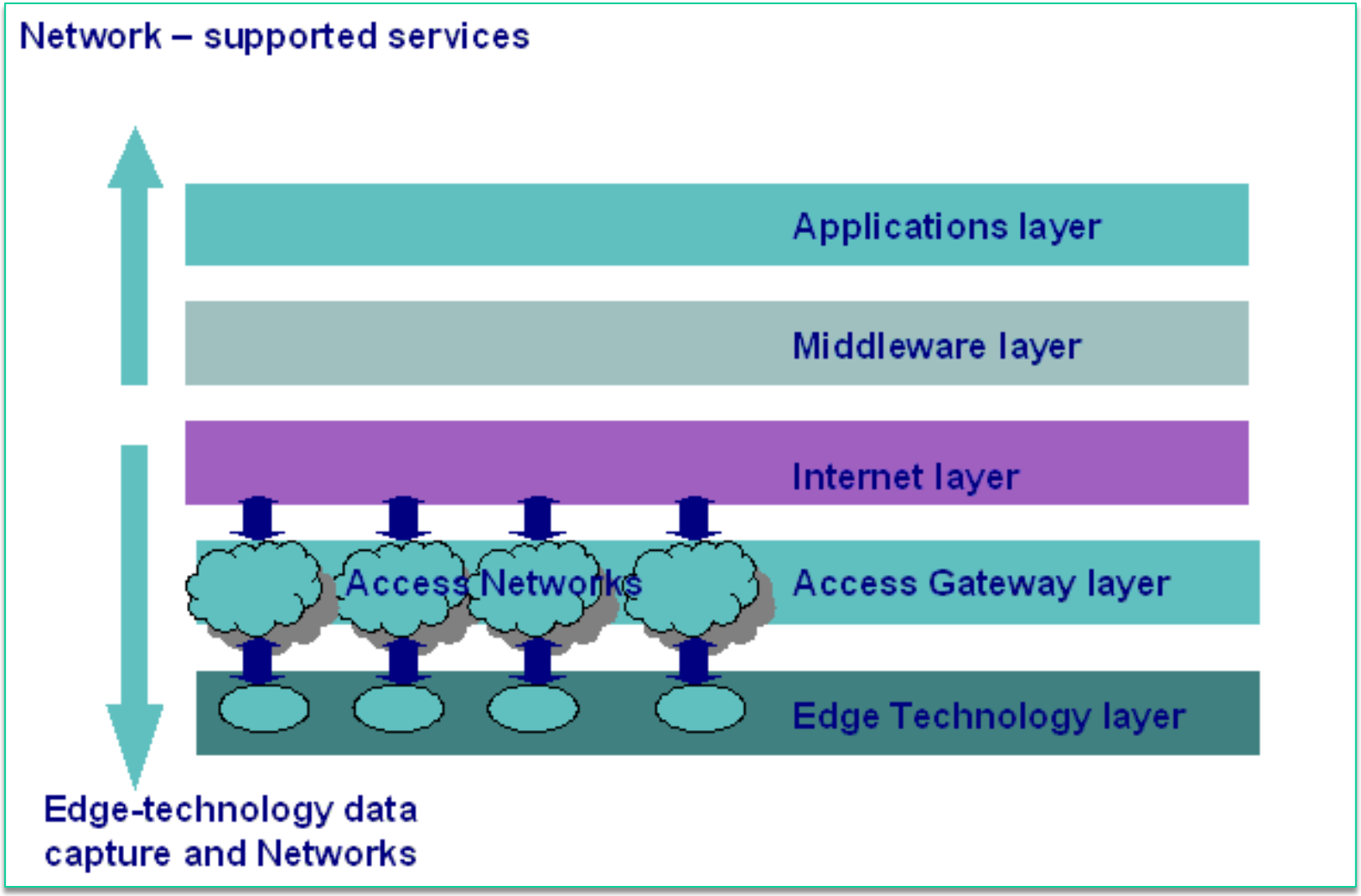
(b) Middleware: on demand for storage and computing tools for data analytics

(c) Presentation: To understand visualization and interpretation tools which can be widely accessed on different platforms and which can be designed for different applications.

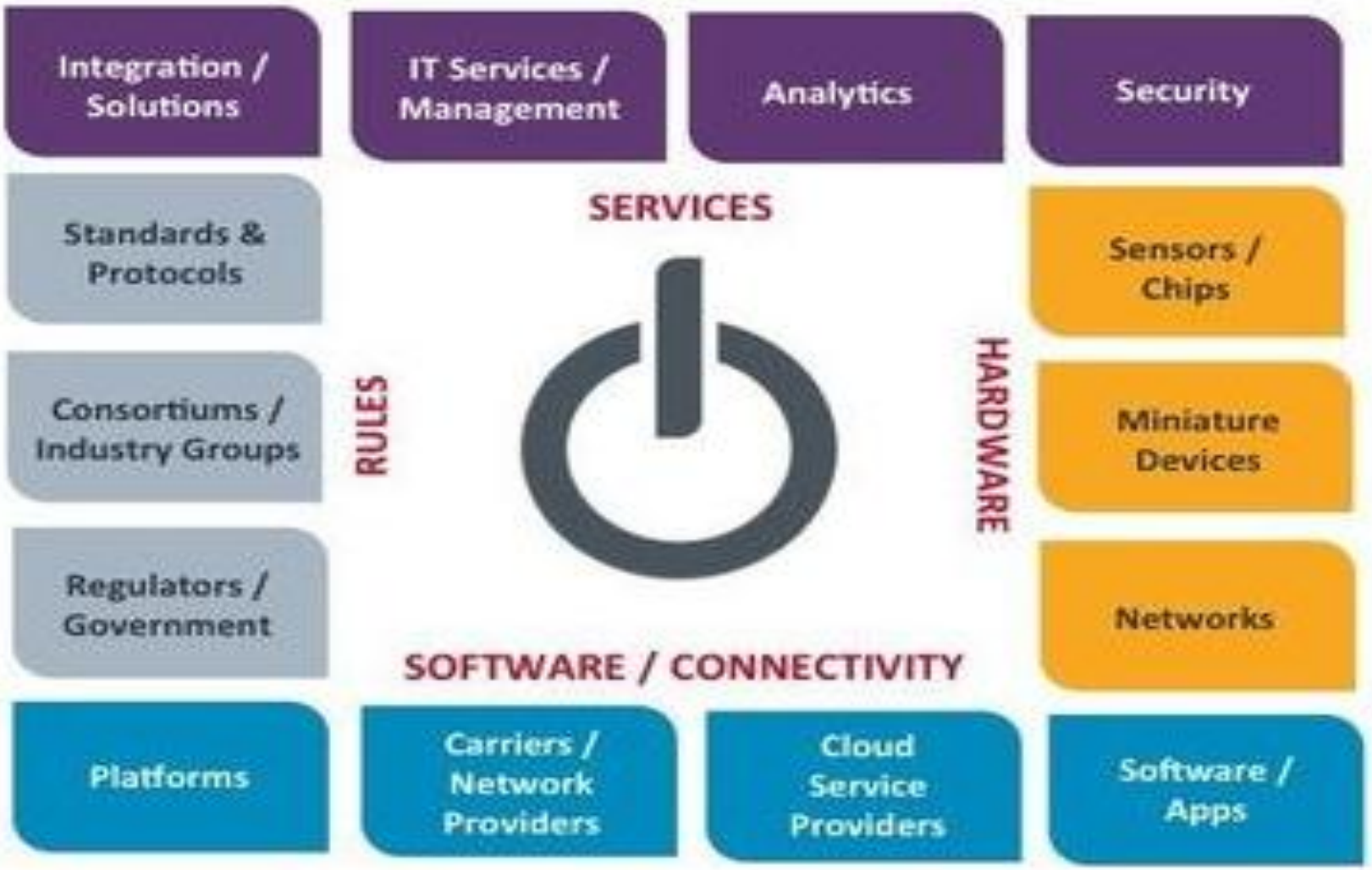
Internet of Things architecture



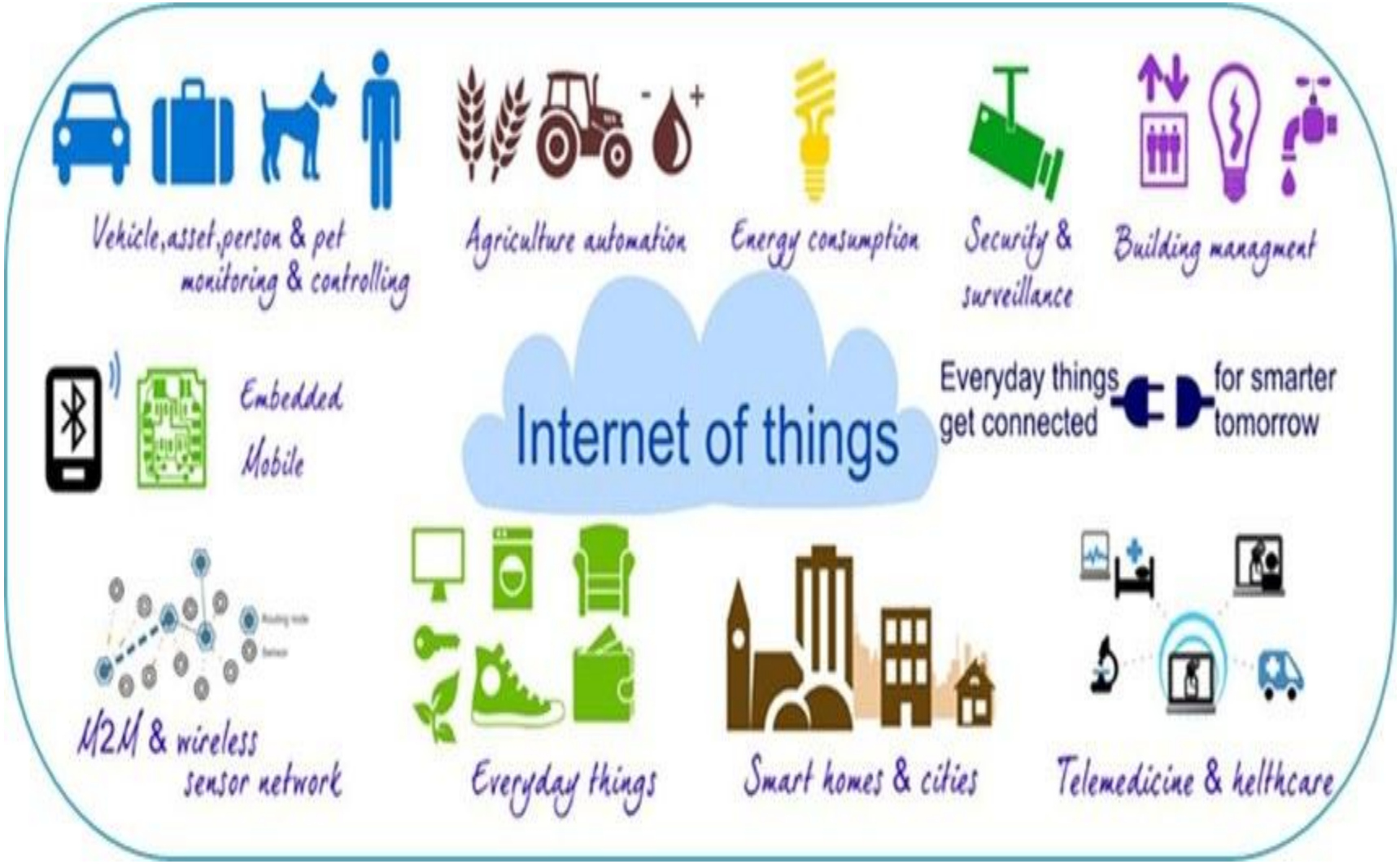
Layered Architecture of Internet of Things



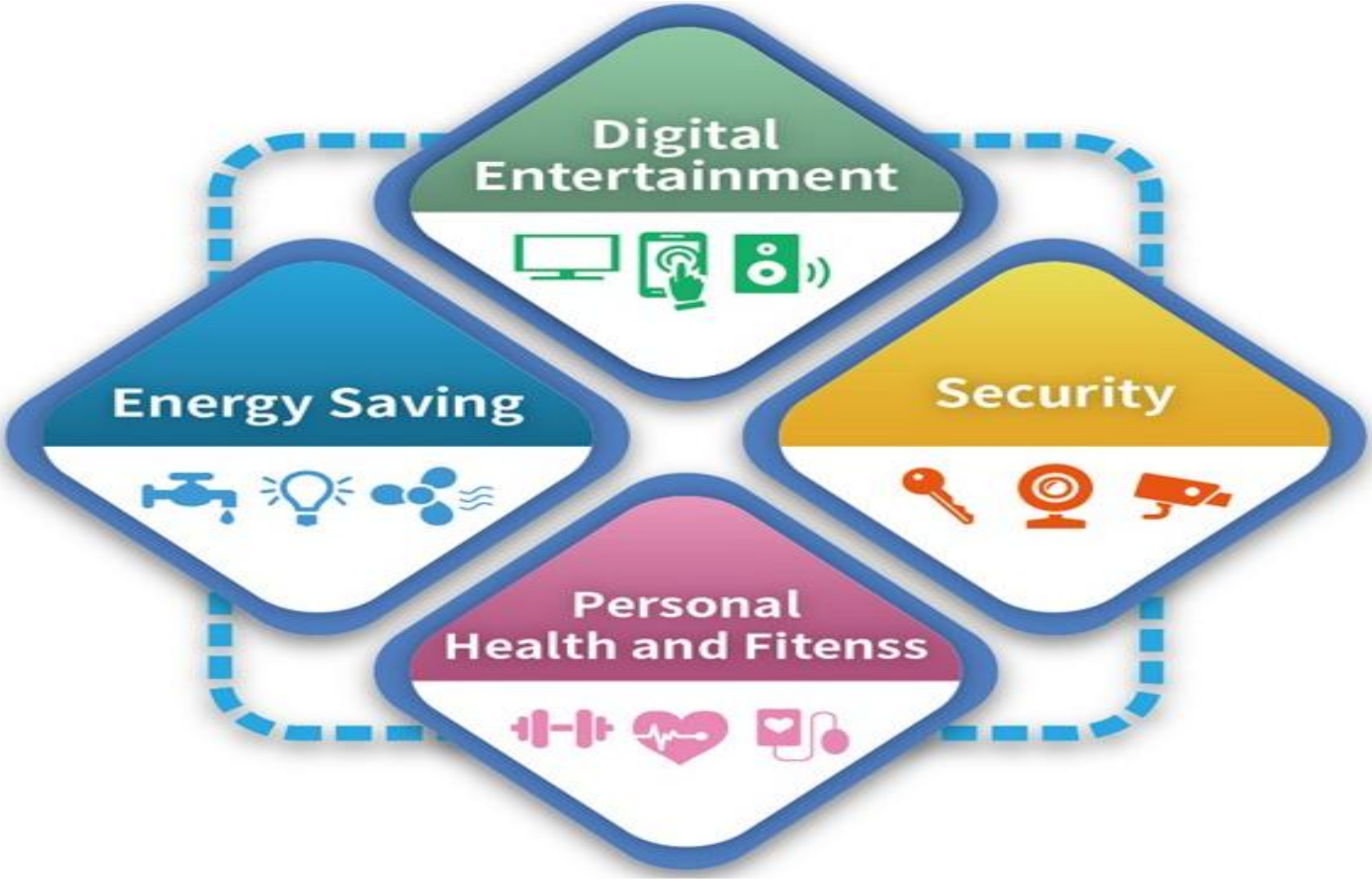
Evolving Internet of Things



IOT Applications



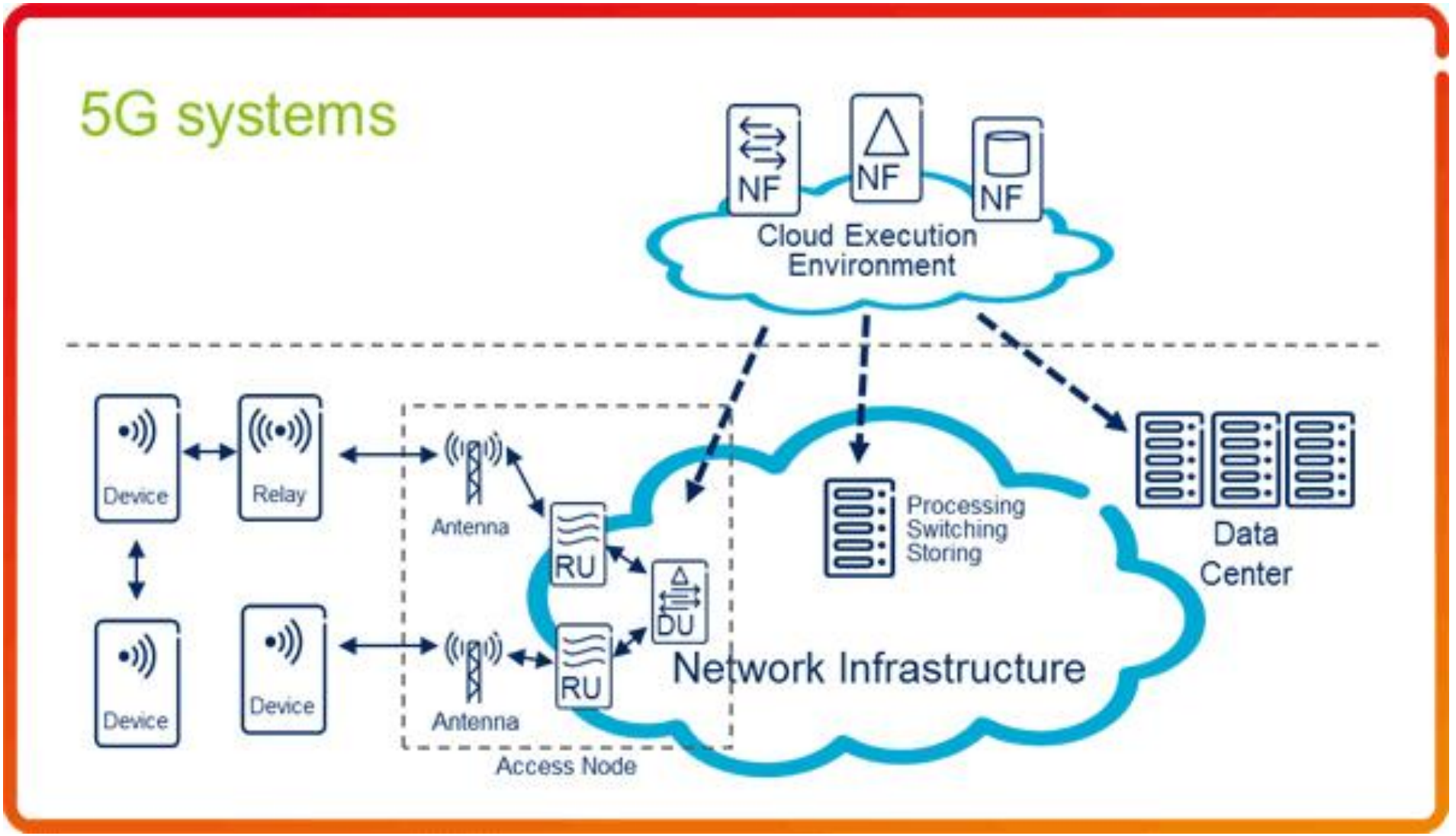
Presently we concentrate on these fields



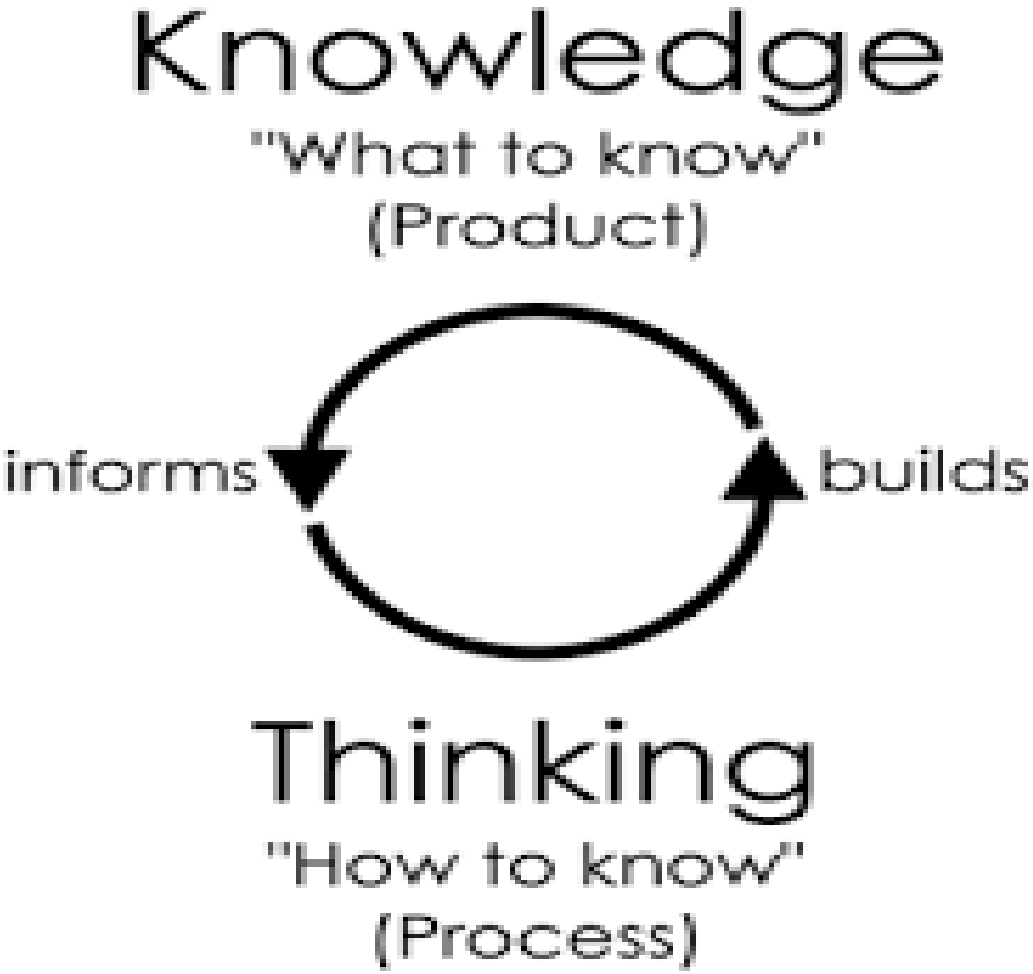
Research Issues - Internet of Things

Security and Privacy

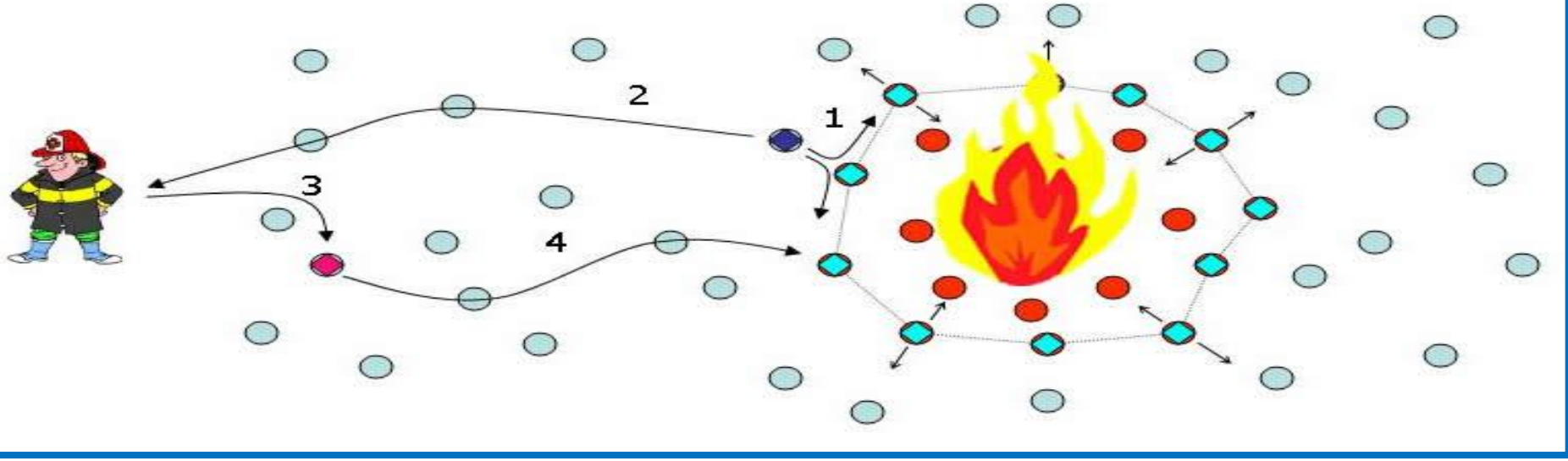
Future Internet

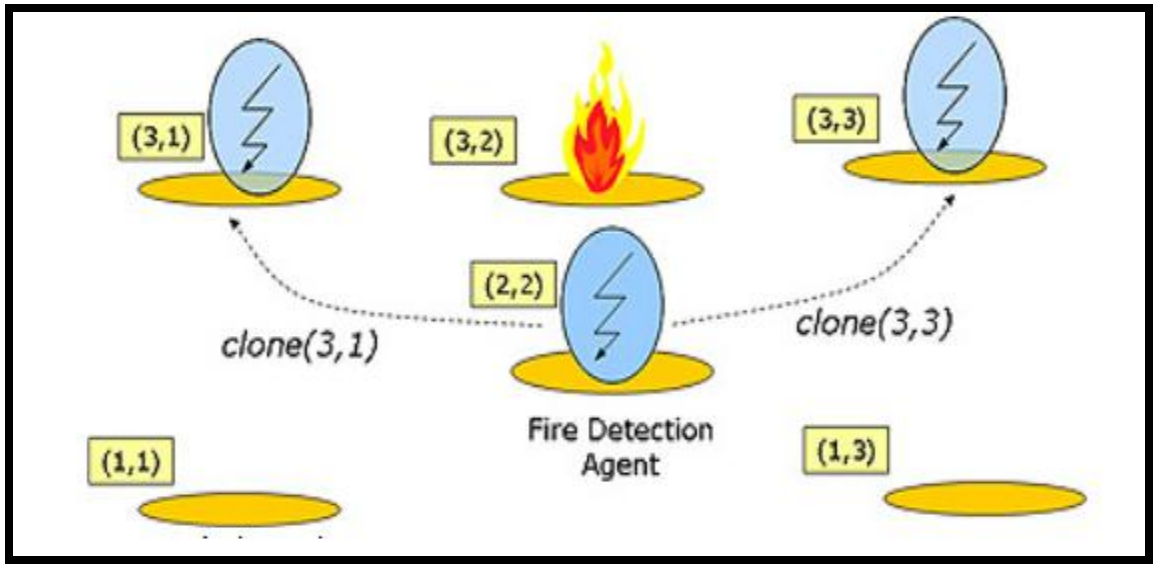


Knowledge aggregation

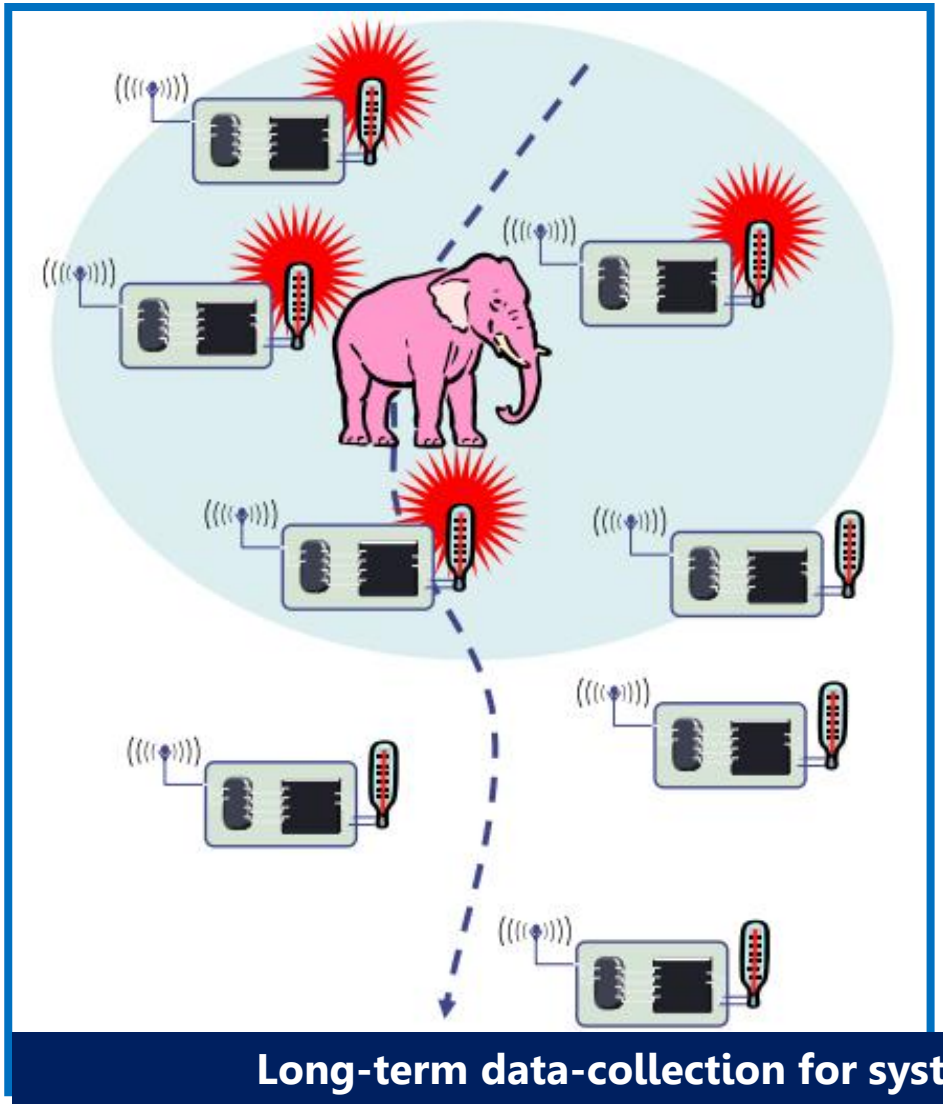


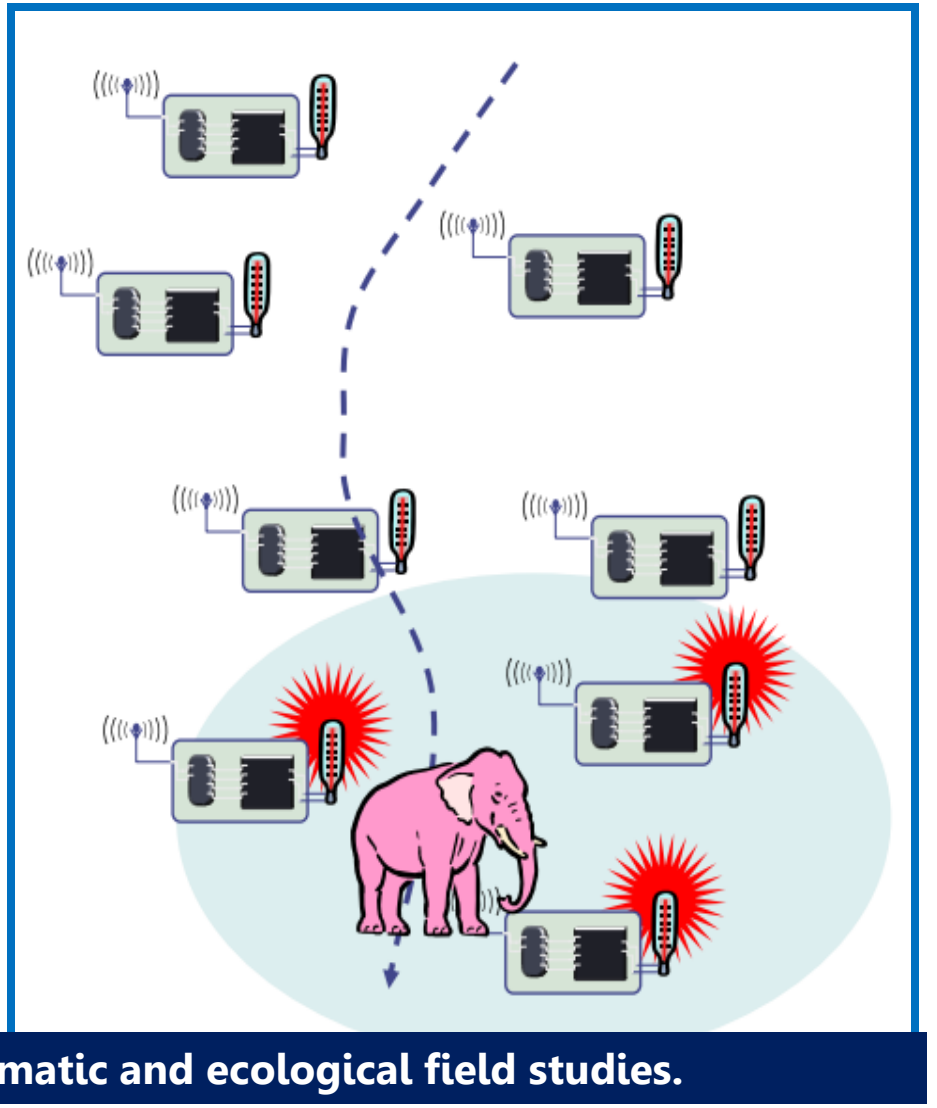
Wireless Sensor Networks





Habitat Monitoring





Long-term data-collection for systematic and ecological field studies.

Cloud Computing

SaaS
Software as a Service

- Email
- CRM
- Collaborative
- ERP

CONSUME

PaaS
Platform as a Service

- Application Development
- Decision Support
- Web
- Streaming

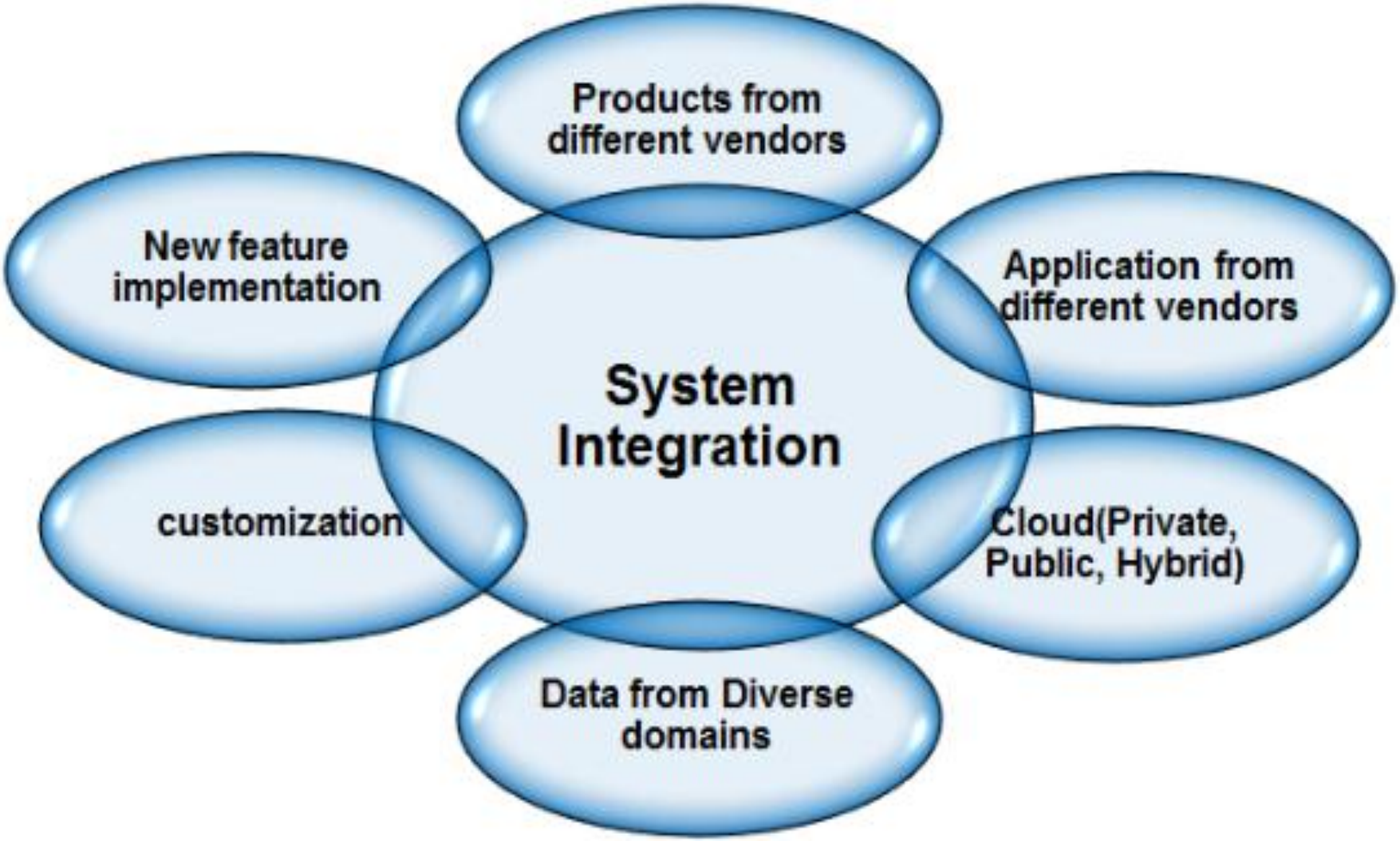
BUILD ON IT

IaaS
Infrastructure as a Service

- Caching
- Legacy
- File
- Networking
- Technical
- Security
- System Mgmt

MIGRATE TO IT

System Integration



Standards

"Thing" = Vehicle (physical object)

Vehicle has multiple devices

Sensors:

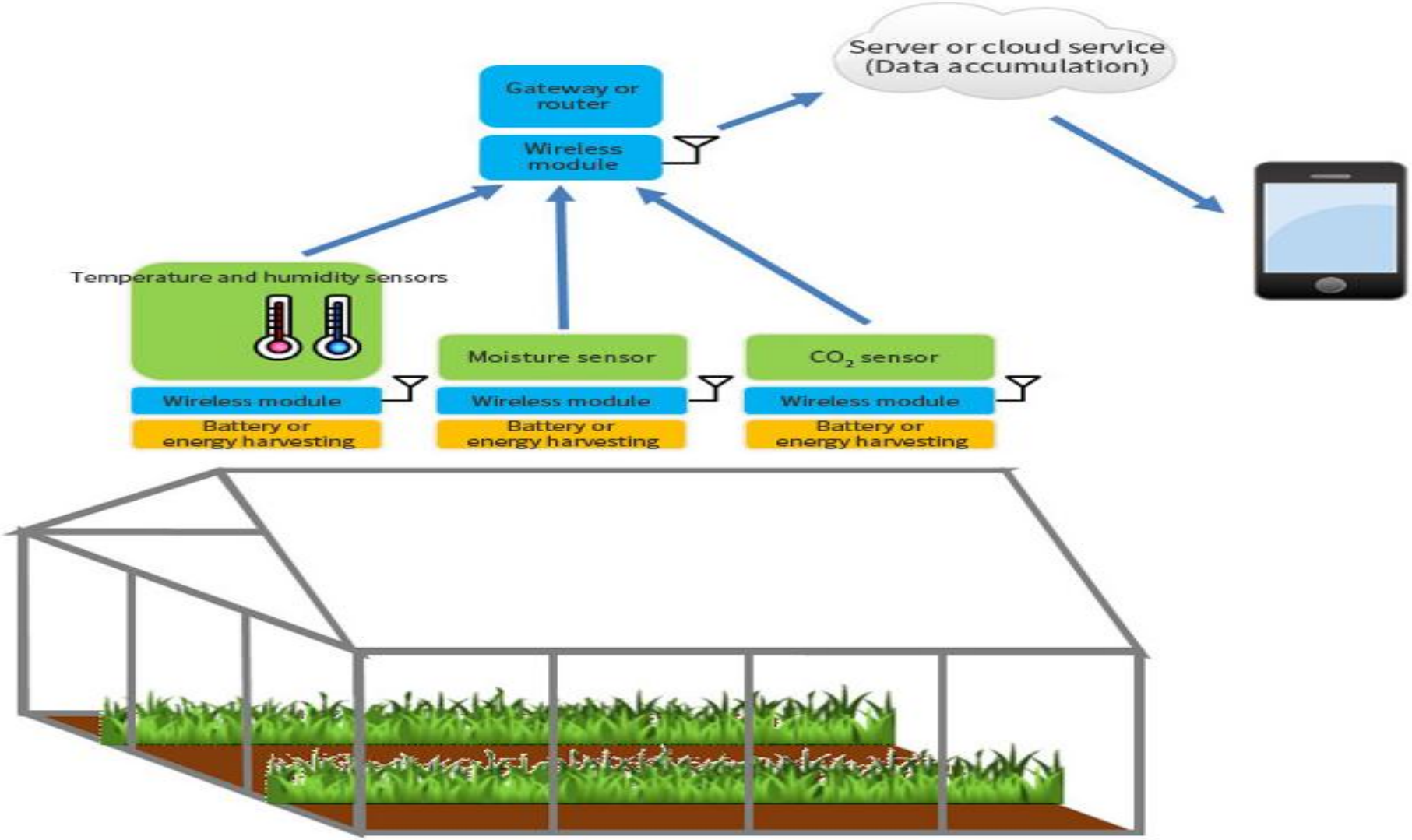
- GPS (location)
- Speed
- Suspension
- Skid
- Collision
- Air Bag
- Emission

Actuators:

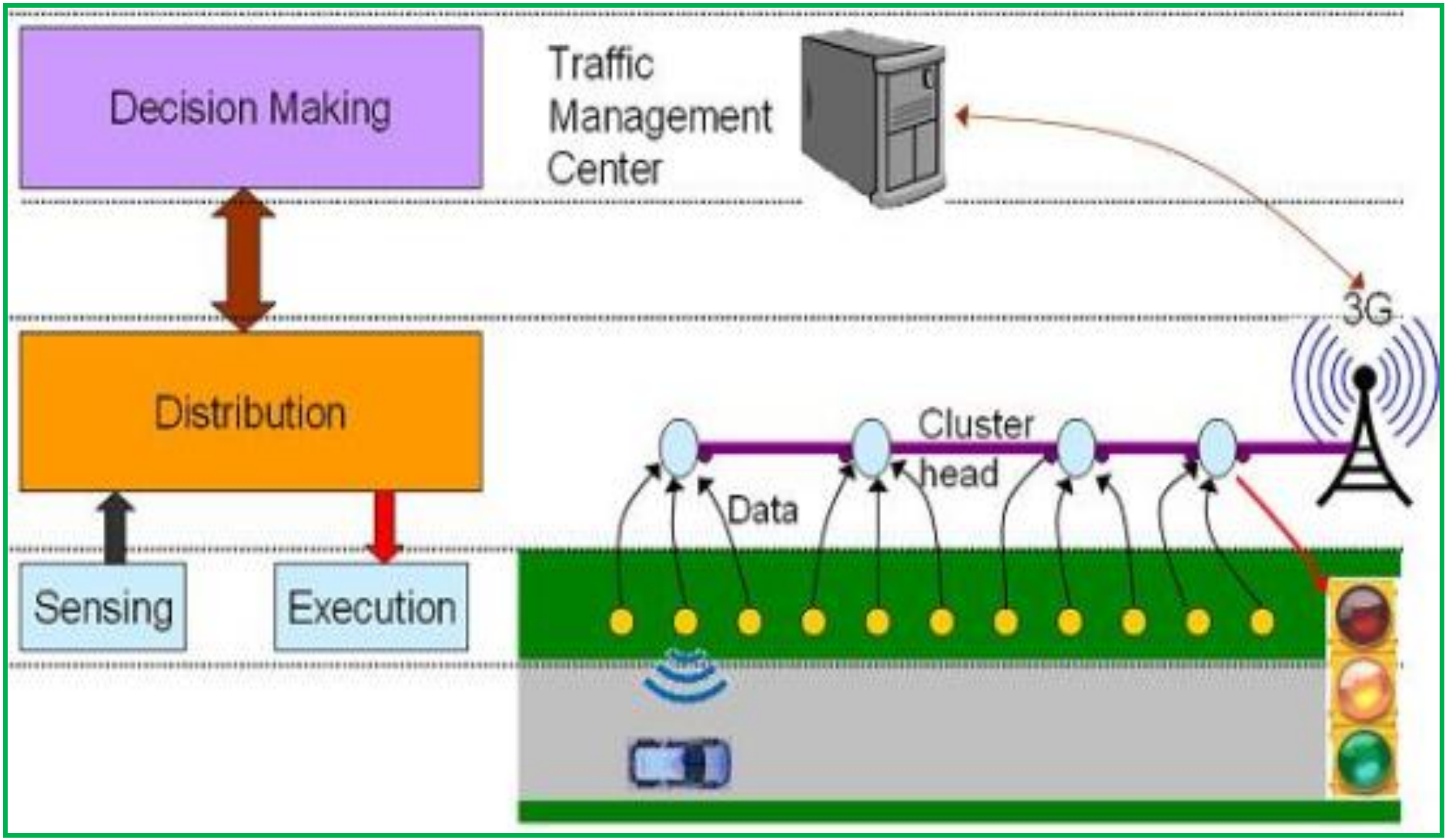
- Brake controller
- Throttle controller
- Stability controller
- Windshield wiper

In IoT, all these devices (sensors and actuators) can be accessed via the Internet!

Application of IoT in Agriculture



Application of IoT in Traffic Management



Conclusion

- While looking into the next stages of this term and its technologies there are many opportunities and challenges to face including privacy concerns, security, costs, standards, regulations and the list goes on.
- IoT would add a new dimension to the world of information and communication.
- Where do you think the IoT is headed next?
- Share your opinion

Near Future ?

I Acknowledge my sincere thanks to JJ College