CSE 425: Internet of Things

Dept. of CSE BUBT| Summer 2021

Md. Hasibur Rahman

Follow google classroom for class conducting rules and regulations

What is IoT?

Imagine all the things in your house are connected. They can *communicate* with each other. They can *read your mind* and do what you want by reading the *circumstances* around you.

You can monitor your grandmother's health condition from your class *far away* from her. You can switch on/off the fan, lights, window of your bedroom from your office.

https://www.google.com/imghp?hl=EN

History of IoT

Term “Internet of Things” @1999 was created by Kevin Ashton to linking the company’s supply chain to the Internet

He was quoted as saying: “In the *twentieth century*, computers were brains *without senses*—they only knew what we told them.”

IoT is changing this paradigm; in the *twenty-first* century, computers are *sensing* things for themselves

Kevin Ashton (B:1968)
British technologist.
Worked at MIT.

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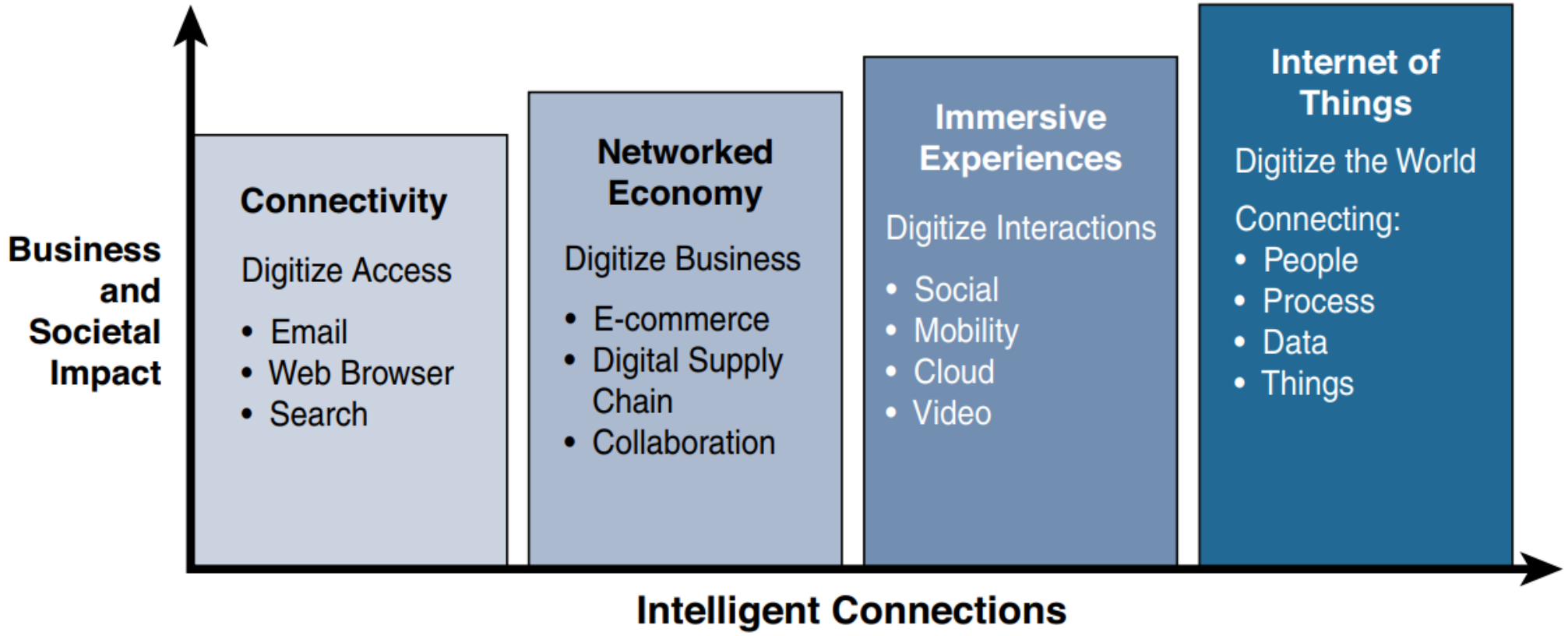
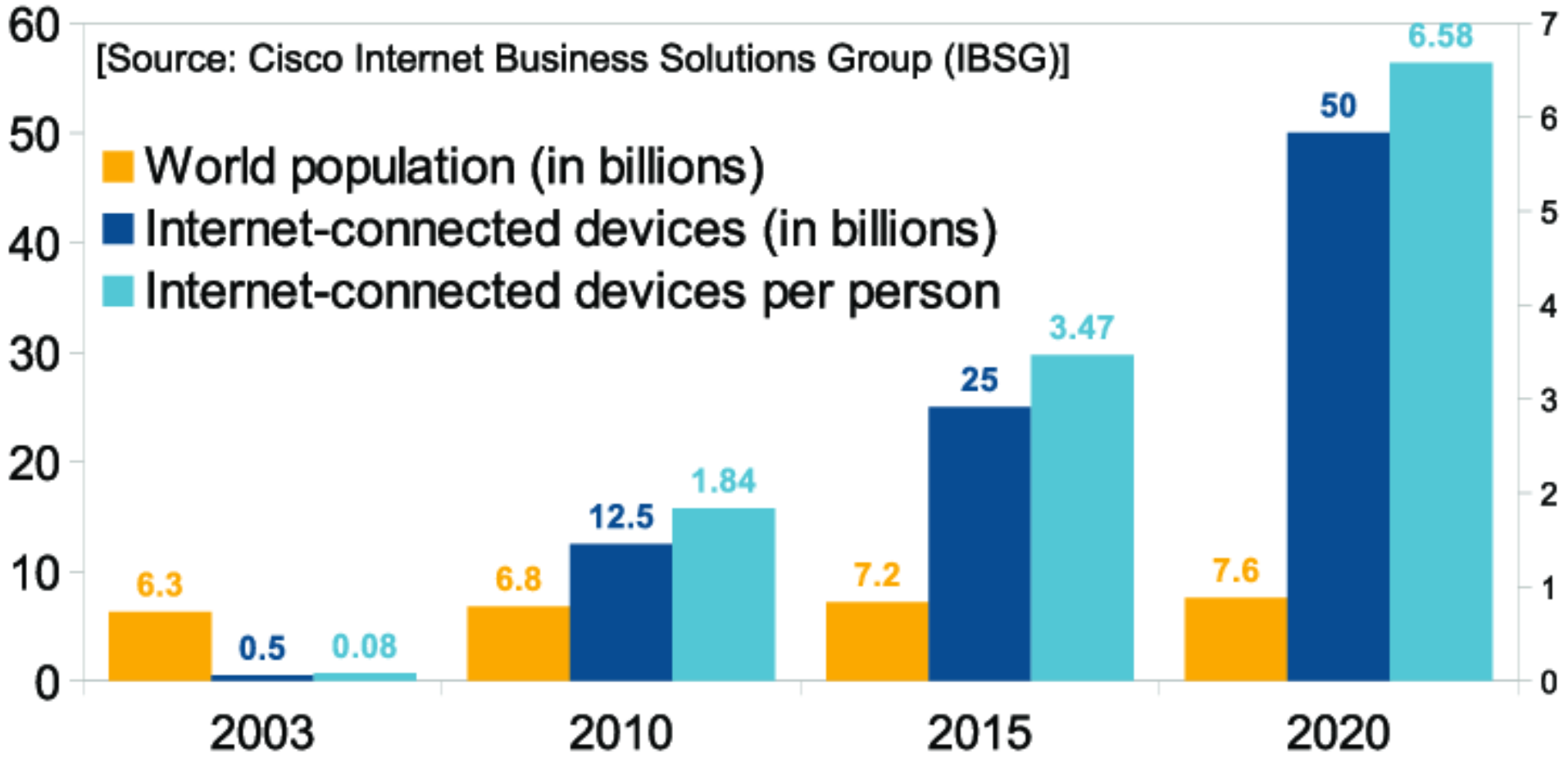
Evolution of IoT

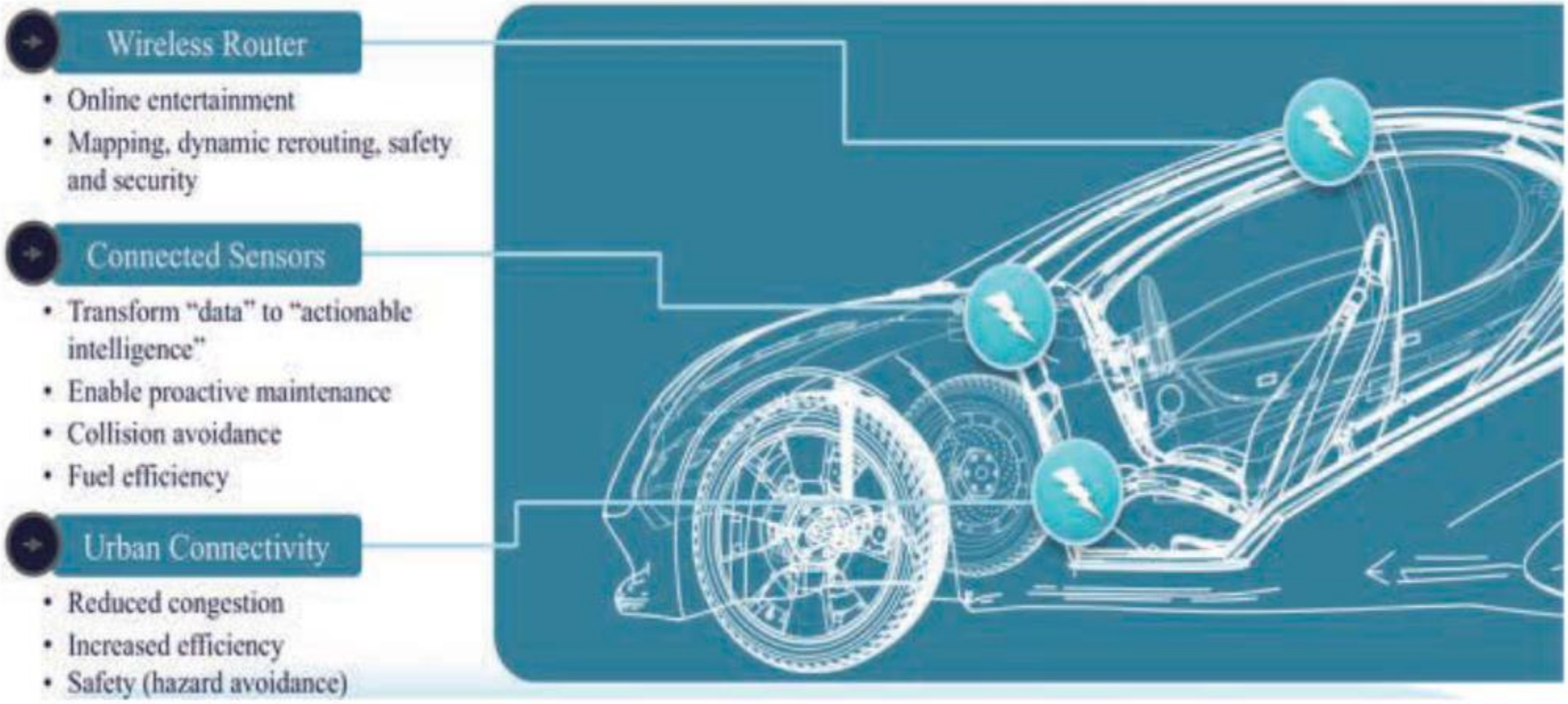
IoT started at the middle of 2008 and 2009. It's evolution depends on Internet evolution.



Impact of IoT



Impact of IoT: Connected Car



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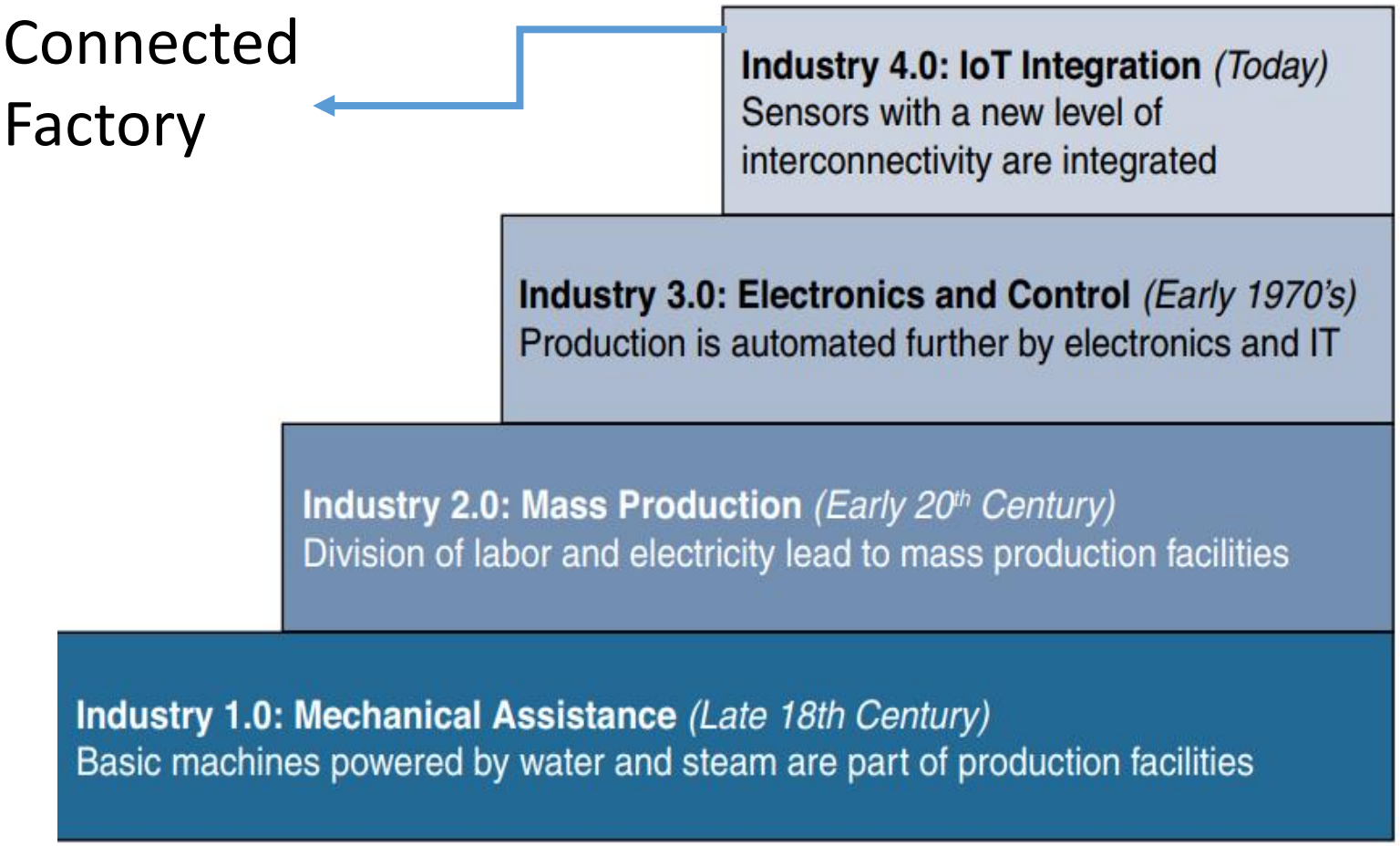
Impact of IoT: 4th Industrial Revolution



IoT Enabler

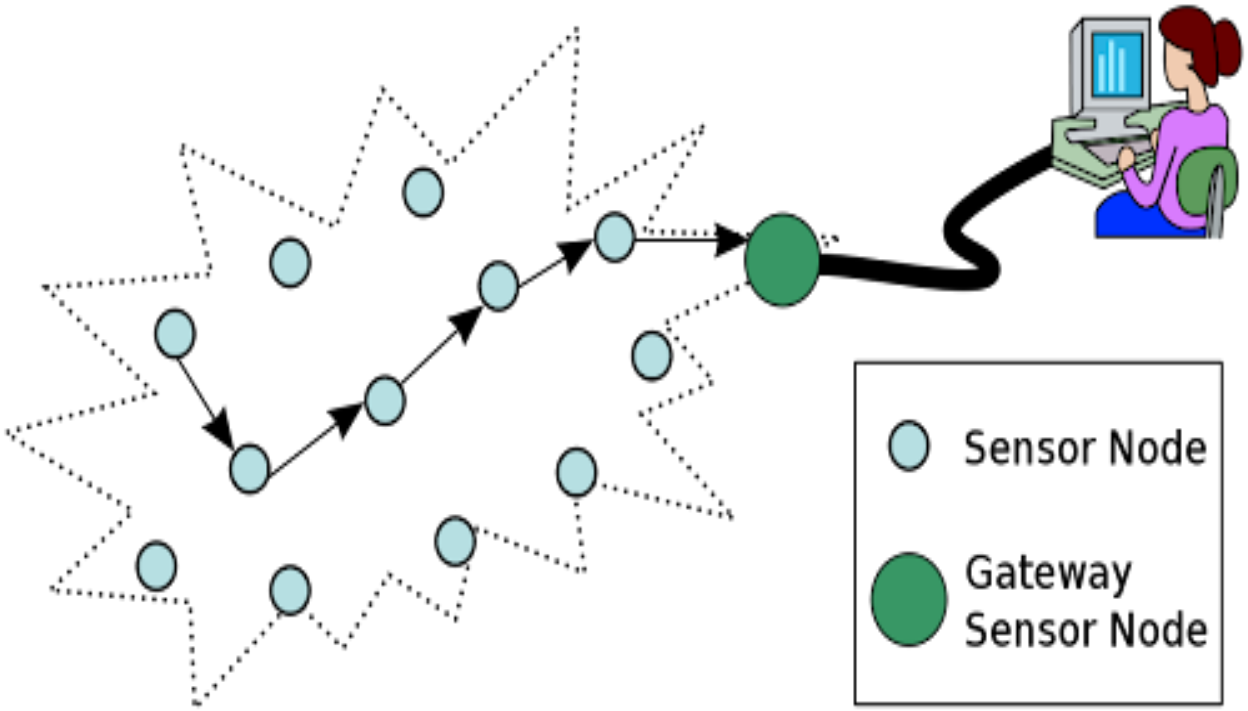
Wireless Sensor Networks

Cloud Computing

Big Data Analytics

Communication Protocol

Embedded System



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IoT Challenges

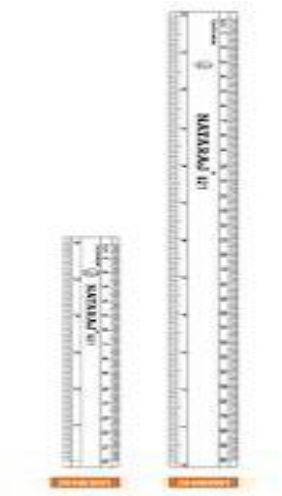
Scale

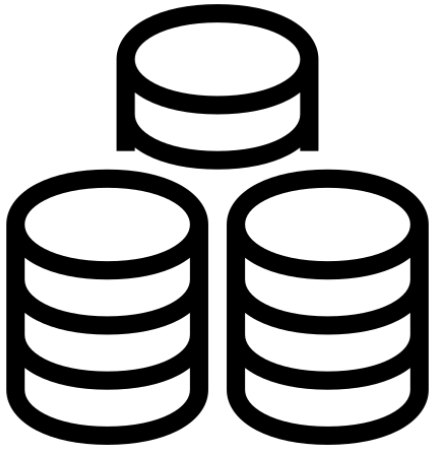
Security

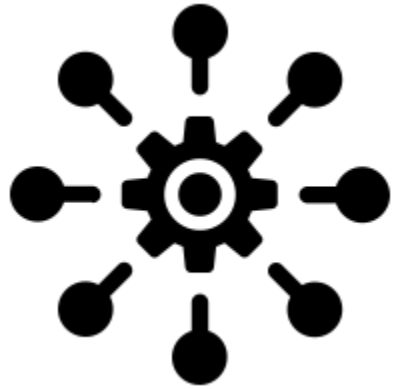
Privacy

Big data and data analytics

Interoperability







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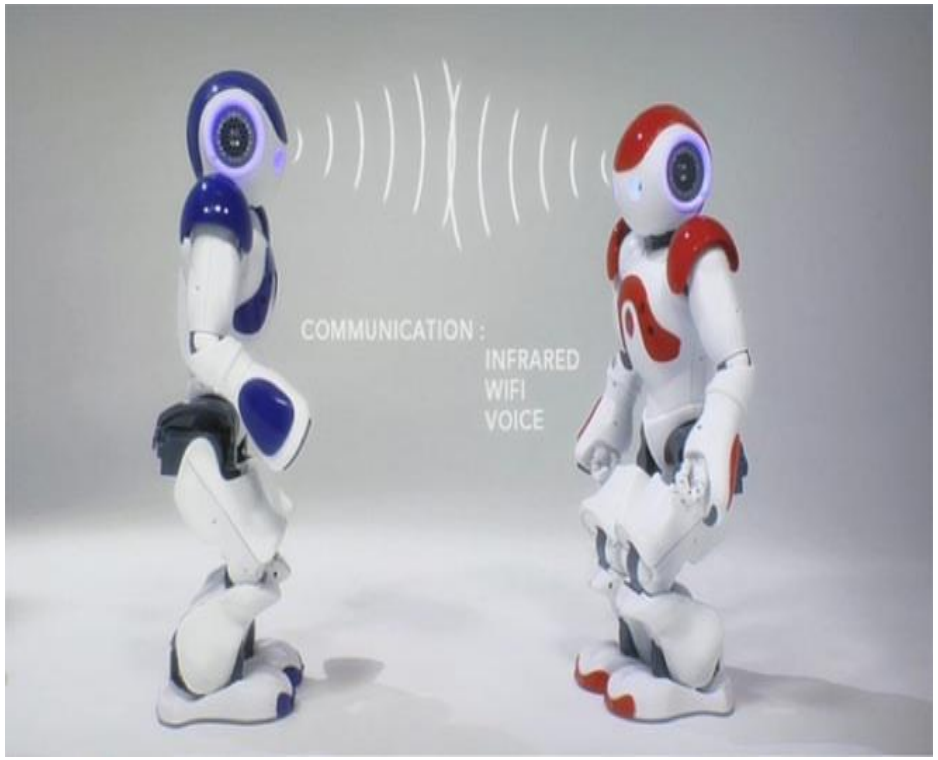
M2M

- Machine to machine (M2M) is direct communication (Point to Point) *between devices* using any communications channel, including *wired and wireless*.
- Machine have embedded hardware can sense, actuate and communicate
- Remote monitoring, control and data exchange



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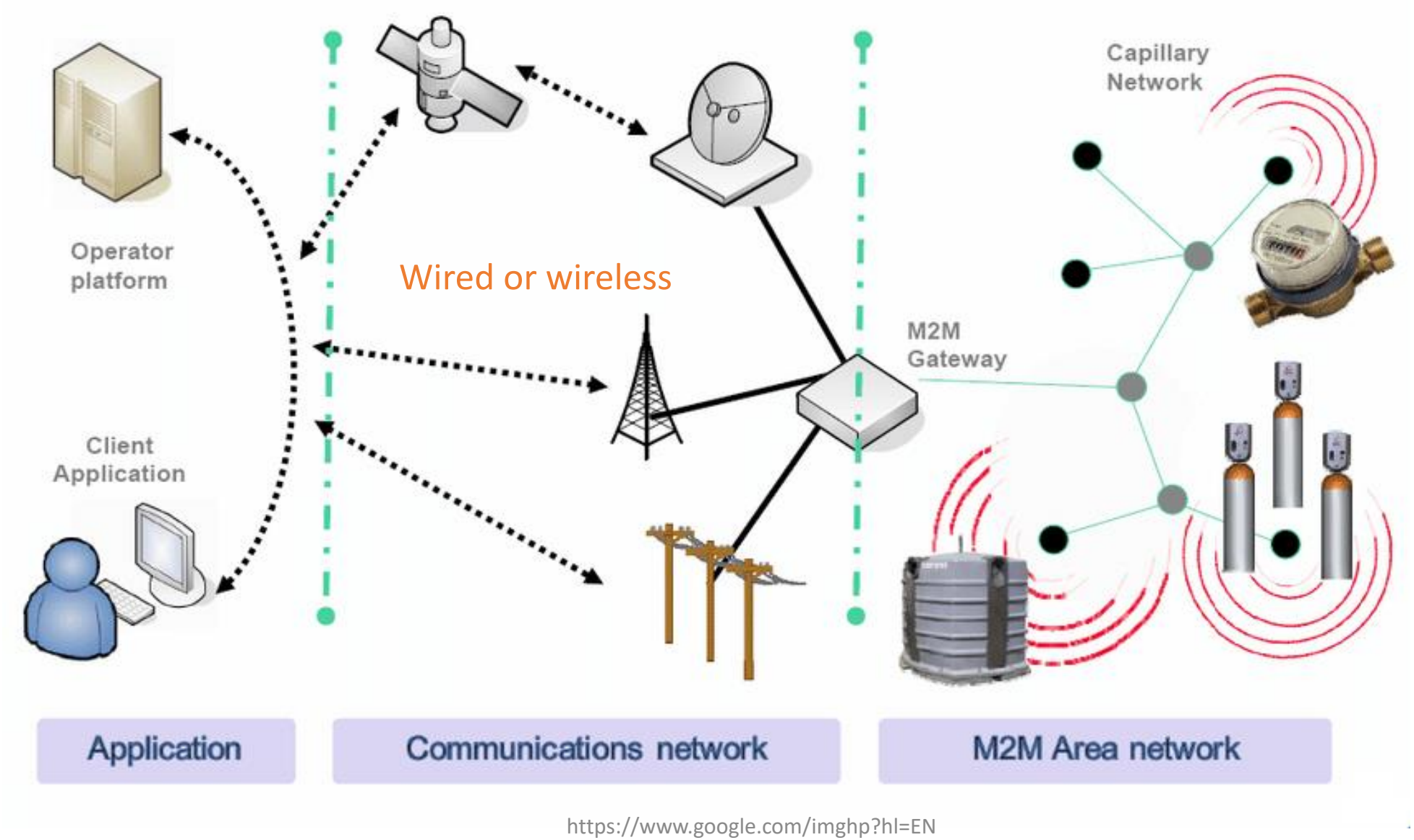
M2M Architecture



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M2M Example

M2M tools allow business owners to be alerted on their smartphones when an important piece of equipment needs servicing, so they can address issues as quickly as they arise. Sophisticated networks of sensors connected to the Internet could even order replacement parts automatically.

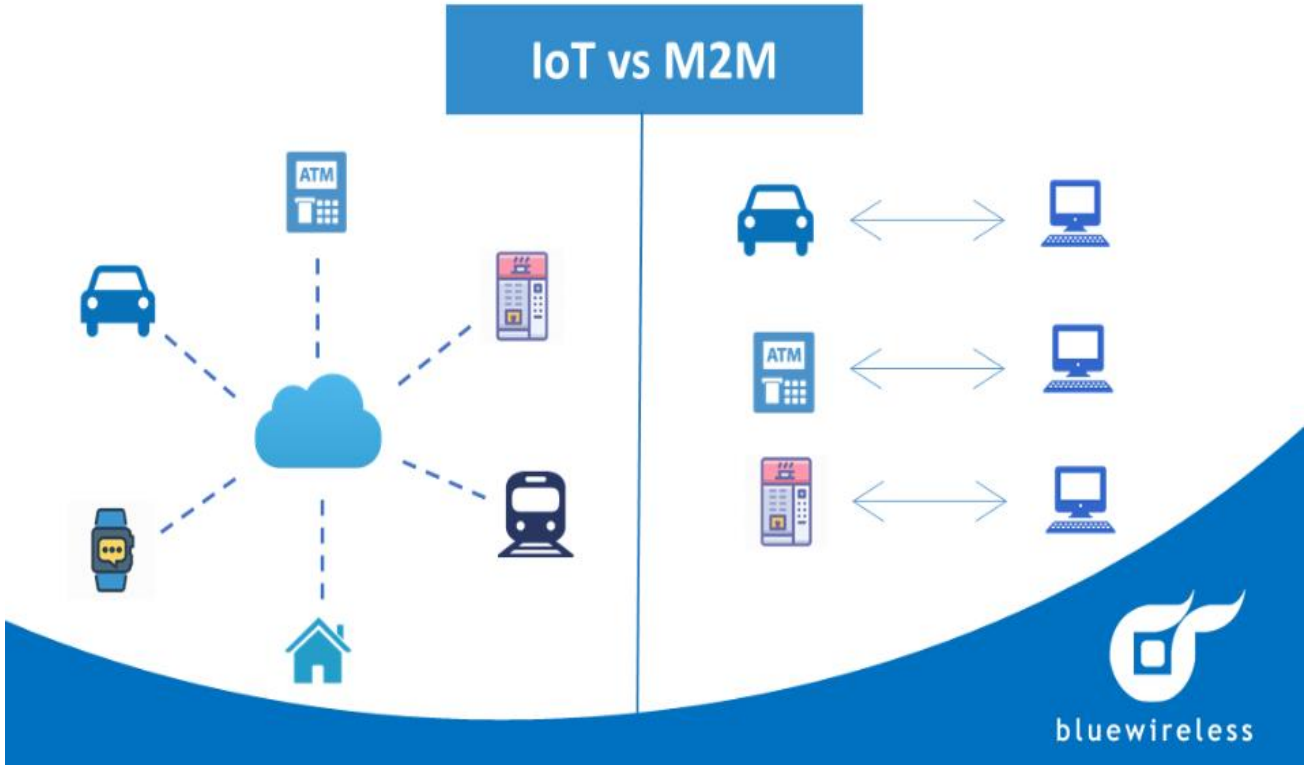
An M2M-capable washing machine could send alerts to the owners' smart devices once it finishes washing or drying, and a smart refrigerator could automatically order groceries from Amazon once its inventory is depleted.

When a patient's vital signs drop below normal, an M2M-connected life support device could automatically administer oxygen and additional care until a healthcare professional arrives on the scene.

https://www.link-labs.com/blog/what-is-m2m

IoT vs M2M

- IoT is itself a subset of M2M
- Communication
- Scalability
- Wired or Wireless



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M2M vs. IoT: Making the Choice

M2M technology may be a better choice if:

- Your application requires point-to-point communication between machines
- Your application has a limited set of specific machine communication needs that need to be executed quickly and reliably
- Your application needs to be operational whether or not a WiFi connection is available
- Rapid scalability is not a primary concern for your network
- Your device network needs to be isolated for security reasons

https://www.iotforall.com/m2m-vs-iot-understanding-the-differences

M2M vs. IoT: Making the Choice

IoT technology may be a better choice if:

- Your application requires real-time syncing of many different devices throughout a networking cloud
- Your devices have access to a fast and reliable WiFi connection
- Devices on your network need the ability to communicate with multiple other devices simultaneously
- Your application requires smooth and easy scalability for large numbers of devices and users
- Your application requires the ability to make its data and devices compatible with multiple standards

https://www.iotforall.com/m2m-vs-iot-understanding-the-differences

IoT Architecture: oneM2M

One of the greatest challenges in designing an IoT architecture is dealing with the heterogeneity of devices, software, and access methods. By developing a horizontal platform architecture, oneM2M is developing standards that allow interoperability at all levels of the IoT stack. For example, you might want to automate your HVAC system by connecting it with wireless temperature sensors spread throughout your office. You decide to deploy sensors that use LoRaWAN technology (discussed in Chapter 4, “Connecting Smart Objects”). The problem is that the LoRaWAN network and the BACnet system that your HVAC and BMS run on are completely different systems. This is where the oneM2M common services architecture comes in. oneM2M’s horizontal framework and RESTful APIs allow the LoRaWAN system to interface with the building management system over an IoT network, thus promoting end-to end IoT communications in a consistent way, no matter how heterogeneous the networks.

IoT Architecture: oneM2M Main Elements

In 2012 ETSI and 13 other founding members launched oneM2M.