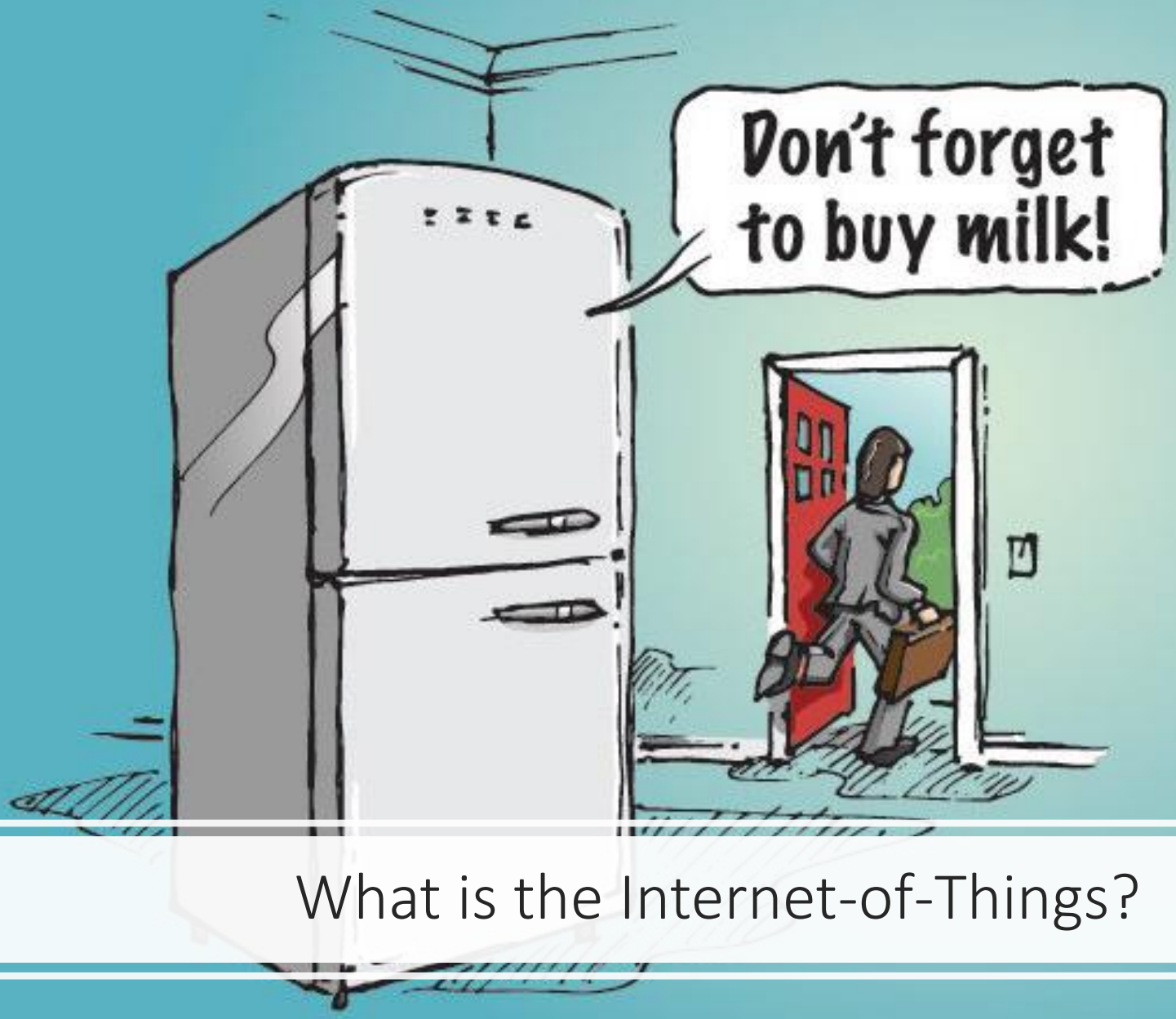
Internet-of-Things (IoT)

Introduction



What is the Internet-of-Things?

How Does My Fridge Do That?

- You are leaving the home (sense user)
- There's no milk in fridge (sense object)
- Use this information to make a decision (process)
- Inform user of decision (communicate)

You are leaving the home (sense user)

There's no milk in fridge (sense object)

- What type of sensor?
- Is milk needed?
- No milk or "little" milk? (prediction)

Use this information to make a decision (process)

Inform user of decision (notify)

How Does My Fridge Do That?

You are leaving the home (sense user)

- What type of sensor?
- Distinguish between parent and child
- Identify reason for leaving home
- Identify other contexts (e.g., store hours)

There's no milk in fridge (sense object)

Use this information to make a decision (process)

Inform user of decision (notify)

How Does My Fridge Do That?

You are leaving the home (sense user)

There’s no milk in fridge (sense object)

Use this information to make a decision (process)

- Where is processor?
- What are the rules?
- Fixed rules versus dynamic rules (learning)

Inform user of decision (notify)

How Does My Fridge Do That?

You are leaving the home (sense user)

There’s no milk in fridge (sense object)

Use this information to make a decision (process)

Inform user of decision (notify)

- How?
- When?
- Privacy?
- Subtleness?
- Information overflow?

How Does My Fridge Do That?

Internet-of-Things (IoT)

Physical object (“thing”)

+

Controller (“brain”)

+

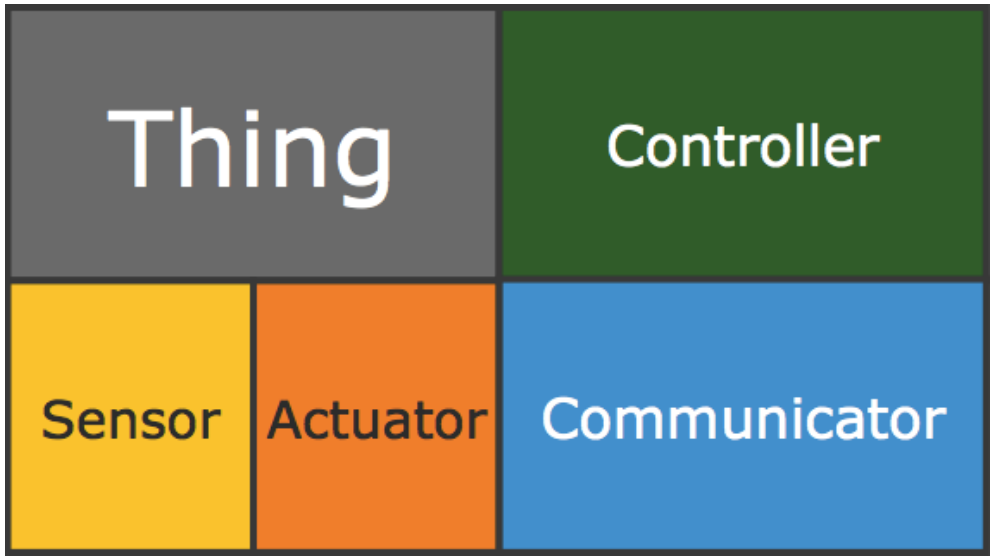
Sensors

+

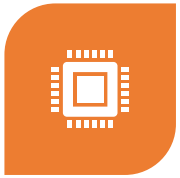
Actuators

+

Networks (Internet)



Related Areas/Terminology



EMBEDDED SYSTEMS: NOT NECESSARILY CONNECTED

SENSOR NETWORKS: COLLECTION OF SENSOR DEVICES CONNECTED THROUGH WIRELESS CHANNELS

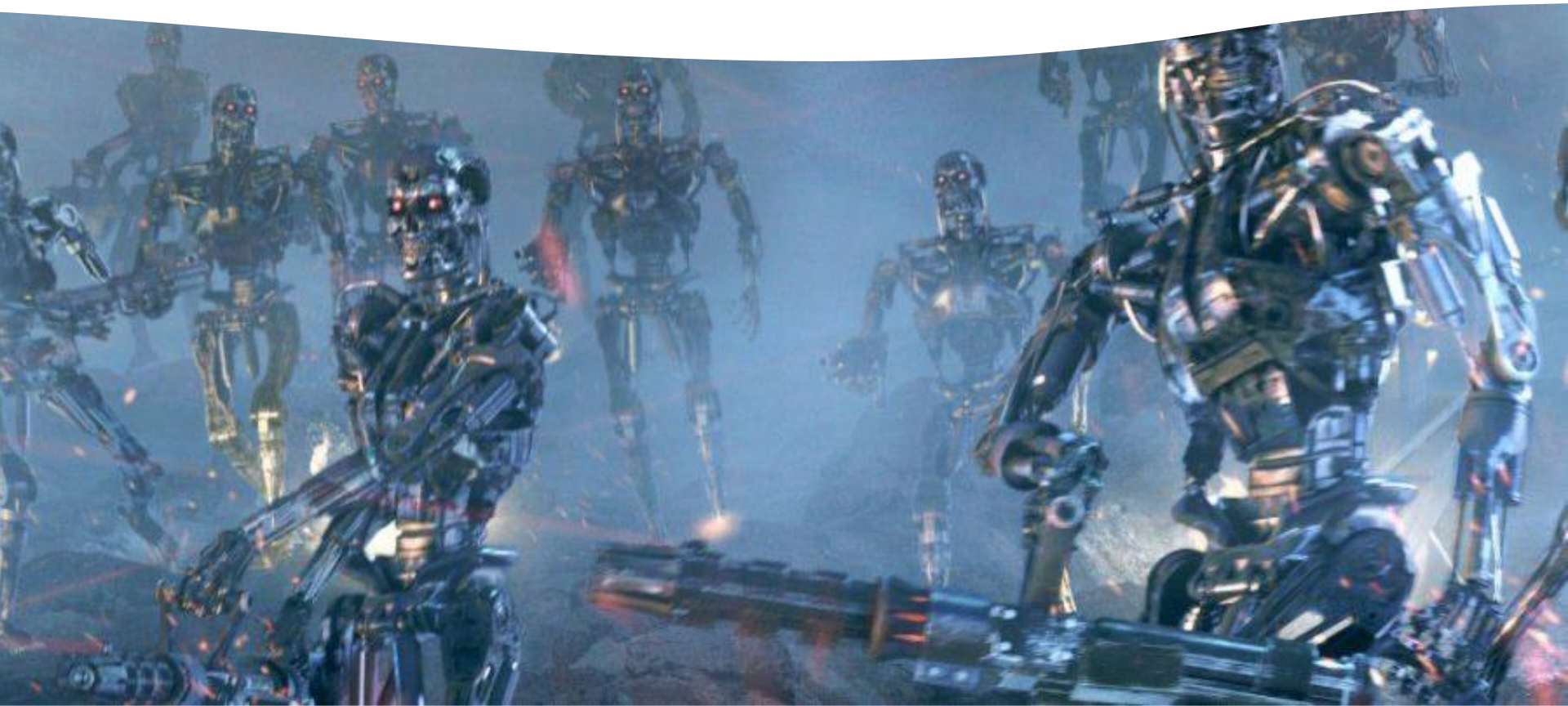
CYBER-PHYSICAL SYSTEMS: FOCUS ON INTERACTION BETWEEN PHYSICAL AND CYBER SYSTEMS

REAL-TIME SYSTEMS: FOCUS ON TIME CONSTRAINTS

PERVASIVE/UBIQUITOUS COMPUTING: FOCUS ON ANYTIME/ANYWHERE COMPUTING

Related Areas

- Machine-to-machine (M2M) communications
- Internet of Everything (Cisco Systems)
- “Skynet” (Terminator movie)



"Internet-of-Things"

Term coined by British entrepreneur Kevin Ashton, while working at MIT Auto-ID Labs

Referred to (and envisioning) a future global network of objects connected specifically by RFID (radio-frequency identification)

Complete automation of data collection

First article about IoT in 2004 from MIT; called it 'Internet 0'.

*https://en.wikipedia.org/wiki/Internet_0

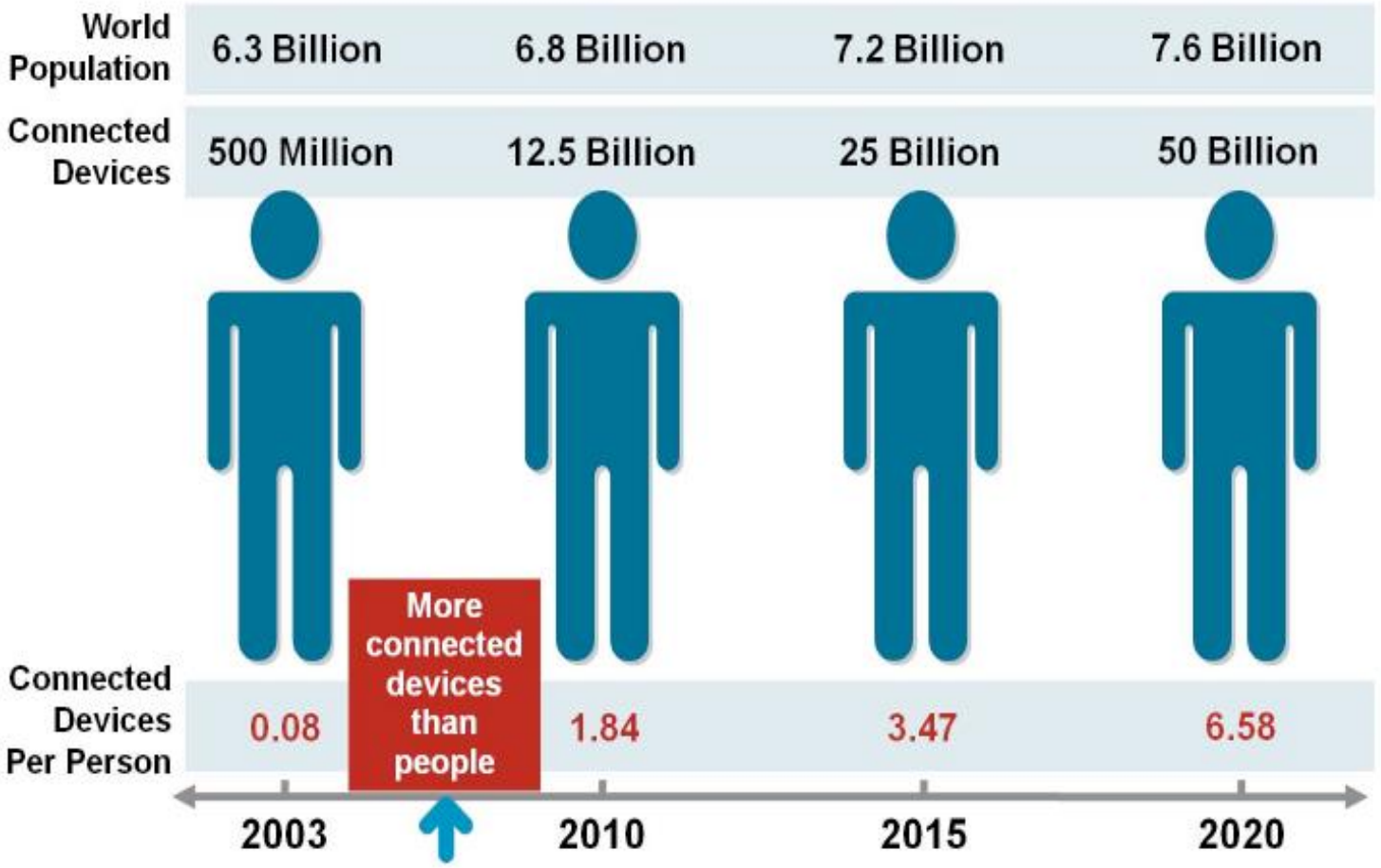
Internet-of-Things Vision & Growth

THE INTERNET OF THINGS

Connected devices (billions)

	15 billion	28 billion	CAGR 2015–2021
Cellular IoT	0.4	1.5	27%
Non-cellular IoT	4.2	14.2	22%
PC/laptop/tablet	1.7	1.8	1%
Mobile phones	7.1	8.6	3%
Fixed phones	1.3	1.4	0%
	2015	2021	

Internet-of-Things Vision & Growth



Source: Cisco IBSG, April 2011

What is IoT

- Internet of things (IoT) is the network of physical devices, vehicles, home appliances, and other items embedded with electronics, software, sensors, actuators, and connectivity which enables these things to connect, collect and exchange data[1].

- IoT refer to the connection of devices to the Internet.

[1]https://en.wikipedia.org/wiki/Internet_of_things