HCMC University of Technology and Education

Internet of Things

Everything that can be automated will be automated.

1. Course Introduction

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Course Objectives

❑ Provide the fundamentals of IoT

- Architecture, Wireless technologies, Communication Protocols, Cloud services

❑ Hand-on IoT system design

You practice and you get better. It’s very simple

Order of Instruction

Course Introduction

- Course content, Assessment, References,

Introduction to Internet of Things

- Historical background
- Trends and Applications

IoT Architectures

- IoT layers

Order of Instruction

Communication Protocols

- Between devices
- Over the Internet

Web server and Database

- Storing, processing, displaying online

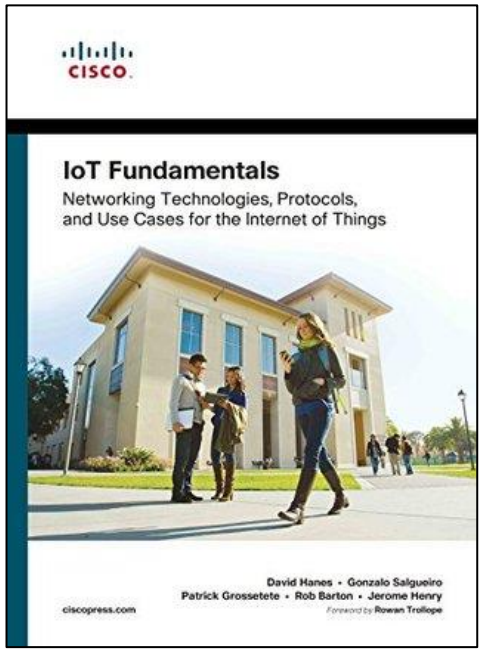
Data Analysis and Cloud services

- AWS, Google cloud, Microsoft Azure

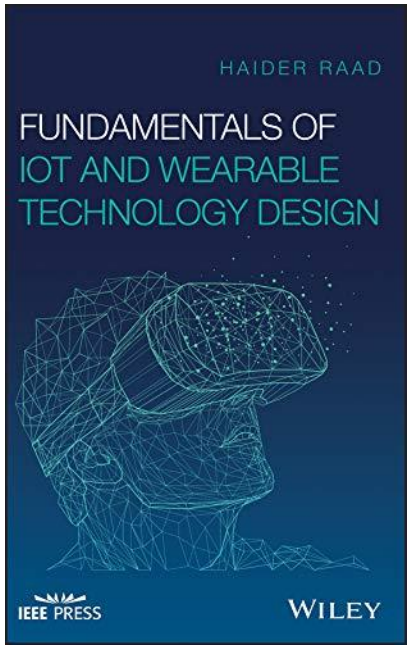
Assessments

- ❑ In-class assignments – 50%
- ❑ Final Project – 50%

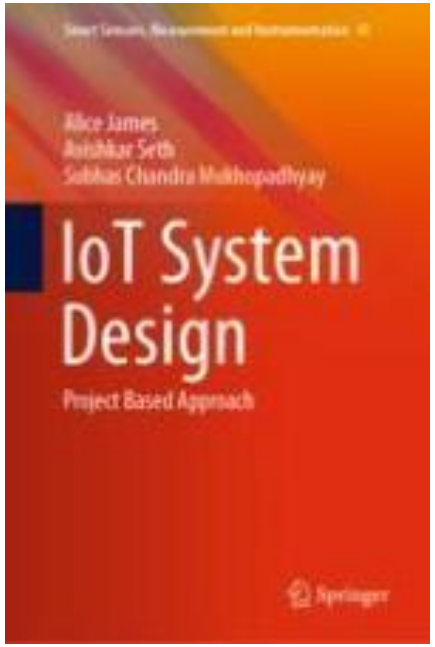
References – Textbook



IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things – Cisco Press, 2017



Fundamentals of IoT and Wearable Technology Design – Wiley, 2021



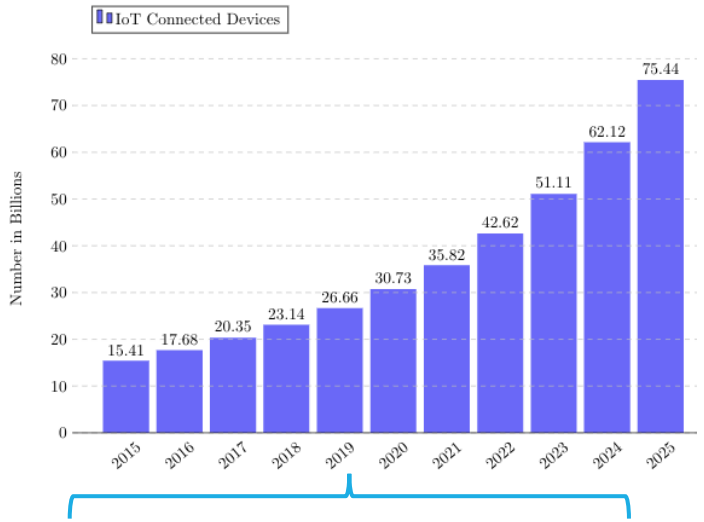
IoT System Design – Springer, 2022

Internet of Things

- IoT is **an ecosystem** of **internet connected devices** with the ability **to collect and transfer information** over a network to **provide automated decision making**

- IoT focuses on **connecting "things"**
- IoT is prime enabler for **digitization**

IoT: Historical background



1901
Invention of Radio communication

1950s
Inception of computers

1983
The born of Internet

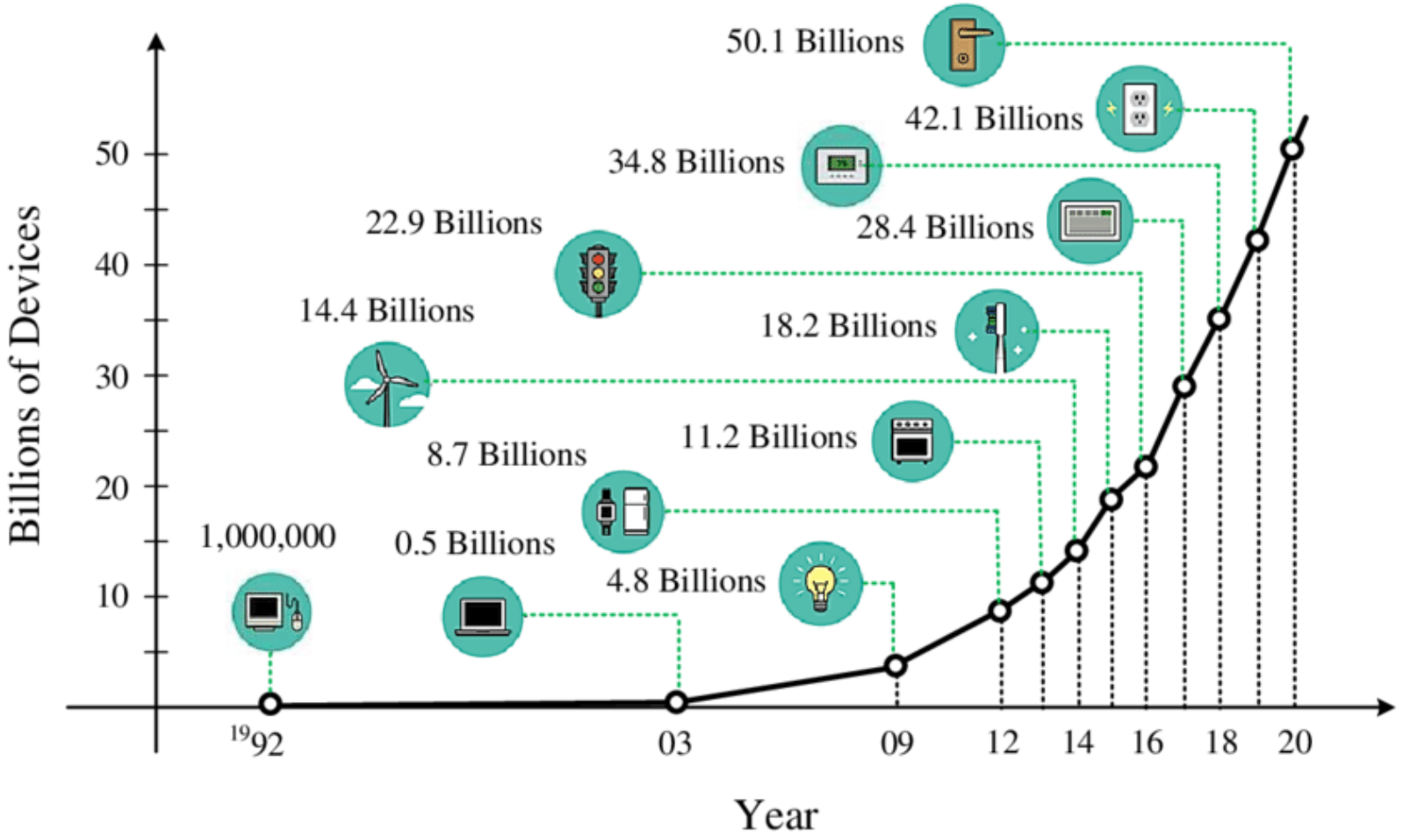
1999
Kevin Ashton invented the term "Internet of Things"

IoT: Historical background

" Today computers, and, therefore, the Internet, are almost wholly **dependent on human beings for information**... The problem is, **people have limited time, attention, and accuracy**. All of which means they are not very good at capturing data about things in the real world. If we had **computers that knew everything there was to know about things, using data they gathered without any help from us**, we would be able to track and count everything and greatly **reduce waste, loss and cost**. We would know when things needed replacing, repairing or recalling and whether they were fresh or past their best. "

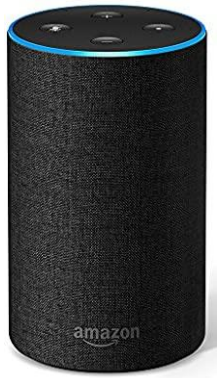
Kevin Ashton, 1999

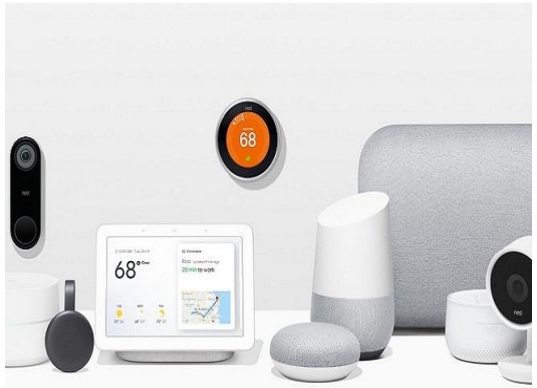
IoT: Historical background

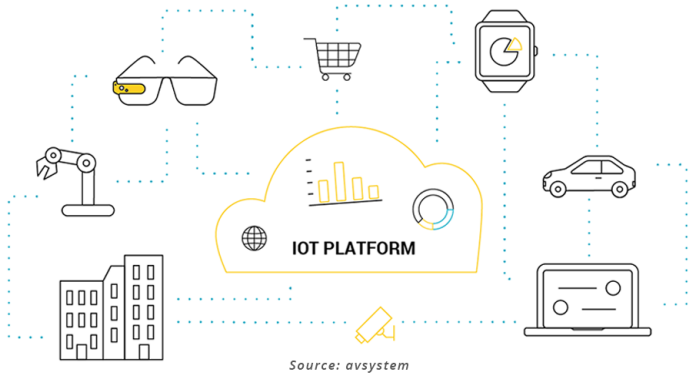


Number of connected devices to the Internet from Cisco and Ericsson report

IoT: Historical background







2010 First IoT network
Nest smart thermostat network

2014 IoT devices
- Google Inc. acquires Nest
- Google's Smart home devices
- Google's Self-driving car
- Amazon's Echo, a voice-controlled devices

2016
- GM invested in self-driving car
- Apple's HomeKit platform
- Google released Google Home

2017 IoT Platform
- Microsoft launched Azure IoT
- Google released Cloud IoT Core

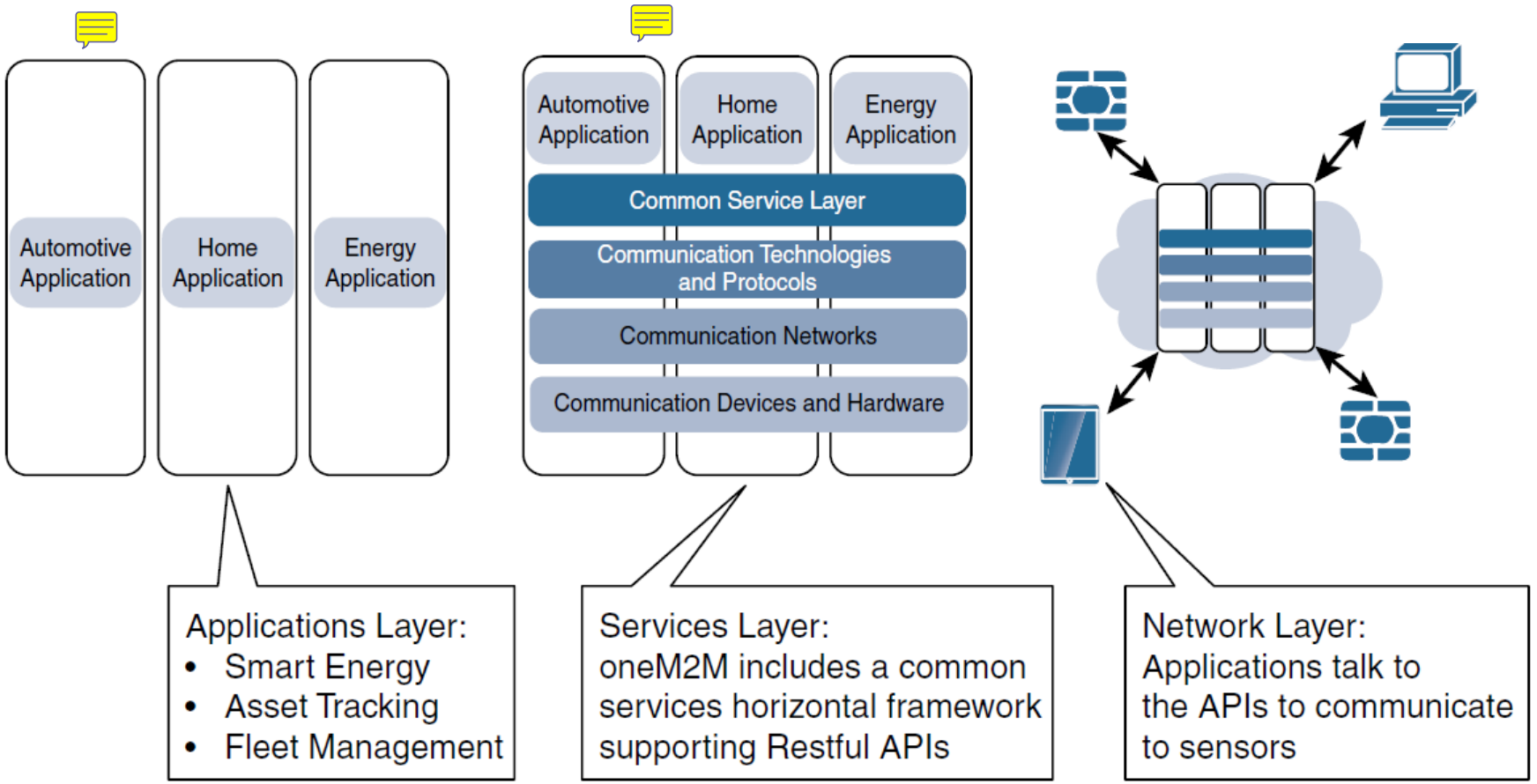
IoT Trends

- AI and IoT (AIoT)
- Edge Computing
- Massive IoT
- Industrial Internet of Things (IIoT)
- Healthcare - Internet of Medical Things (IoMT)
- Supply Chain
- Smart Cities & Utilities

IoT Challenges

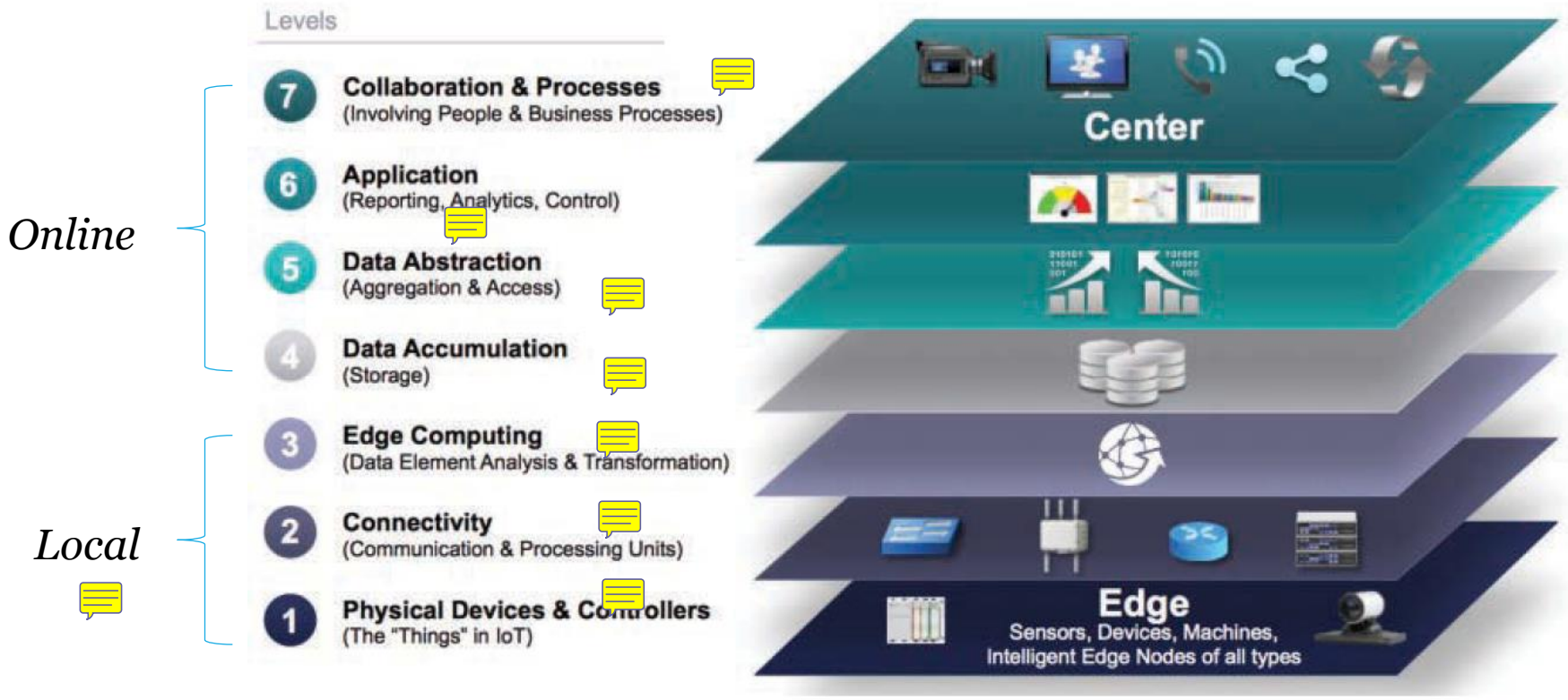
- **Infrastructure gap**
  - "Internet gap" and "AI gap"
- **Security and Privacy**
  - Sharing individual information
- **Big data and data analytics**
  - Massive amount of data
- **Inter-Operation**
  - Various protocols and architectures in the market

IoT Architecture



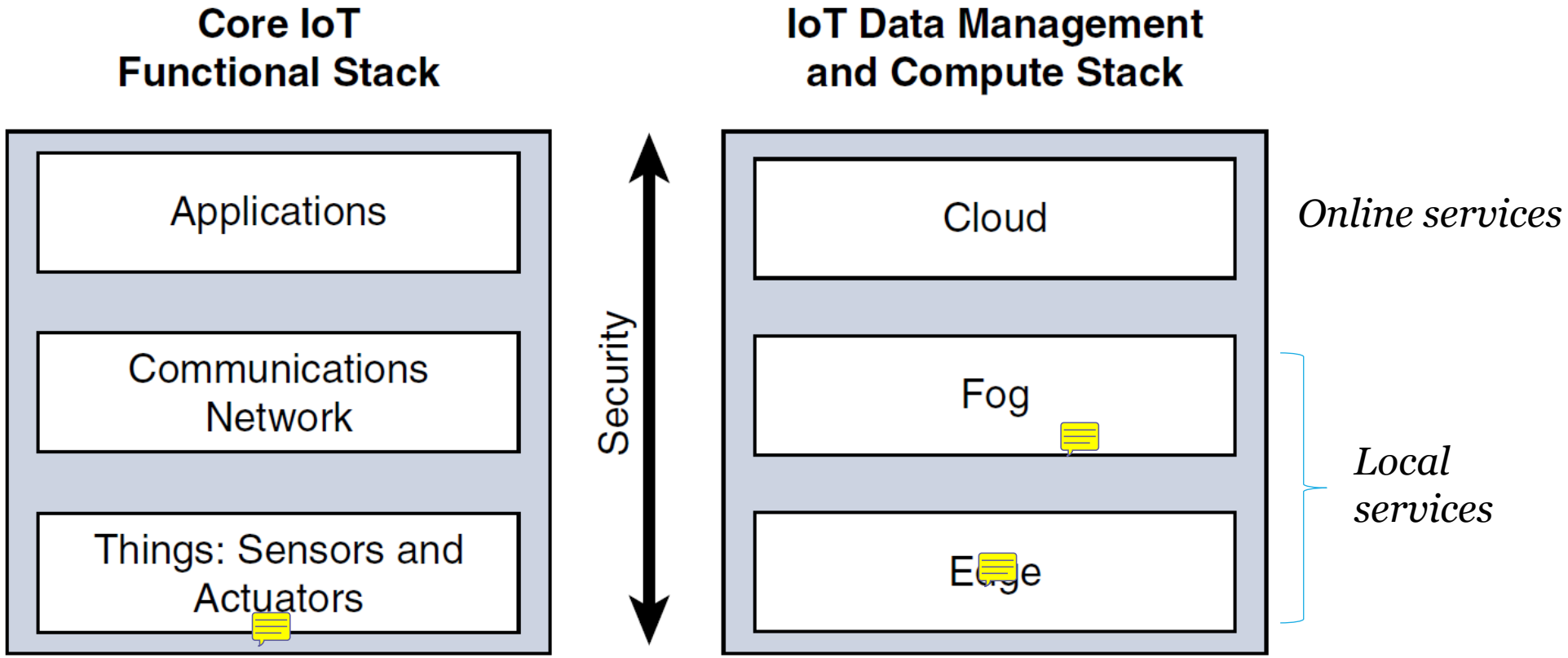
oneM2M IoT Architecture - 2012

IoT Architecture



IoTWF IoT Architecture - 2014

IoT Architecture



Simplified IoT Architecture