Current Landscape and Outlook of the IoT/M2M
物聯網發展現況及前瞻

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Outline

- Brief Introduction to IoT/M2M
- Current Landscape of the IoT/M2M
- Outlook of the IoT/M2M

Brief Introduction to IoT/M2M

What is IoT/M2M?

已普遍存在的物聯網

- 智慧型公車站牌

物聯網簡介

- 物聯網(Internet of Things, IoT)起源
  - 比爾蓋茲在 1995 年出版的《未來之路》一書中首先提到相關的想法與應用。
  - Kevin Ashton 在 1999年對寶僑公司(P&G)的演講中首先提出了 Internet of Things 這個名詞
    - 他們均已勾勒出了以網際網路為基礎，利用 RFID、無線感測器網路（Wireless Sensor Network）、網路通訊等技術，建置一個可以連結世界上萬事萬物的“物聯網”。
  - 國際電信聯盟(ITU)在 2005 年提出了第一份有關物聯網的報告

物聯網簡介

- 物聯網起源

—IBM 則在 2008 年提出了智慧地球的構想進一步闡述

  - 手段: 透過嵌入在人類生活的周遭設備中的感測器(如電網、鐵路、橋樑、隧道、公路、建築、供水系統等設備)，讓智慧能貫穿於系統與流程之中。
  - 目的: 讓政府、企業、組織、甚至到個人運作更有效率。

物聯網簡介

- 物聯網定義
  - IETF
    - A world-wide network of interconnected objects uniquely addressable, based on standard communication protocols.
  - ITU-T IoT group
    - A world where ‘things’ can automatically communicate to computers and each other providing services for the benefit of human kind.

物聯網簡介

- 物聯網定義

—W3C

  - "The Internet of Things refers to a virtual representation of a broad variety of objects on the Internet and their integration into Internet or Web based systems and services. Based on interaction and communication interfaces such as RFID, NFC, barcodes or 2D codes they expose information, features and functionalities which can be integrated into systems and services."

物聯網簡介

- 物聯網定義

  — Wikipedia

  - The Internet of Things (IoT) refers to uniquely identifiable objects (things) and their virtual representations in an Internet-like structure.
    - ✓ E.g., Radio-Frequency IDentification (RFID) tags, etc.
  - The Machine-to-Machine (M2M) is aimed to establish the conditions that allow a device to (bidirectionally) exchange information with a business application via a communication network.
    - ✓ E.g., smart grid, home automation, etc. .

IoT vs. M2M

- M2M devices need to connect to the communication network, while IoT don't. For example,
  - RFID tagged objects are in IoT, but not in M2M. The readers are in both.

Thing: passive, no mean to communicate upstream with applications, but they can be read by M2M devices

IoT vs. M2M

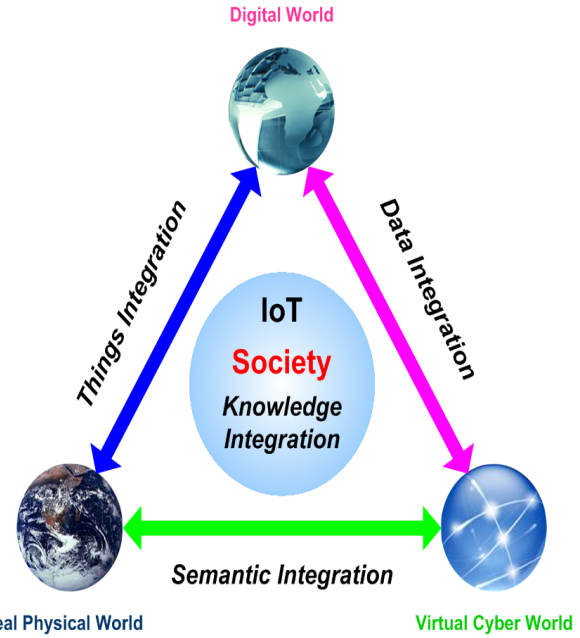
- One of M2M relationships can be seen as human-machine interface extensions of a person, while IoT can be purely “Things”. For example,
  - The eBook reader is reading for a real person, which belongs to M2M.

In reality, these two terms are often used interchangeably. There is no need to distinguish one from the other.

物聯網簡介

- 什麼是物聯網?

—綜合了近幾年的發展，物聯網是要在人類真實生活世界中的物體上，植入各種感測器，使其具有智慧，可以藉由各種(無線)網路連結上網，使這些物體上的資訊可以被擷取(分享)、收集，做為智慧控制的決策依據，並能將決策結果透過遠端指令，進行智能控制，最終能提供物體與人、物體與物體、人與人之間等各種不同類型的溝通與對話，促進智慧型系統對萬物進行高效、節能、安全、環保等目標之實現。(黃仁竑, 2013)



物聯網簡介

- 物聯網關鍵概念
  - —Connect anything to the Internet(萬物連上網路)
    - Anything that can be connected, will be connected
      - ✓Cell phones, coffee makers, washing machines, headphones, lamps, wearable devices; anything you can think of.
    - Accessible from the Internet based on standard protocols
      - ✓Not just in a closed system
  - —Intelligent system
    - Decision, control, integration, application
    - Smart city, smart home, smart planet, smart grid, smart transportation, …

物聯網簡介

- 物聯網關鍵概念

—Massive (sensing) devices

- Tens of billions of devices capturing information around us

—Connected to the Internet

- Information is available through the Internet
- Standardized interface
- Semantic addressing

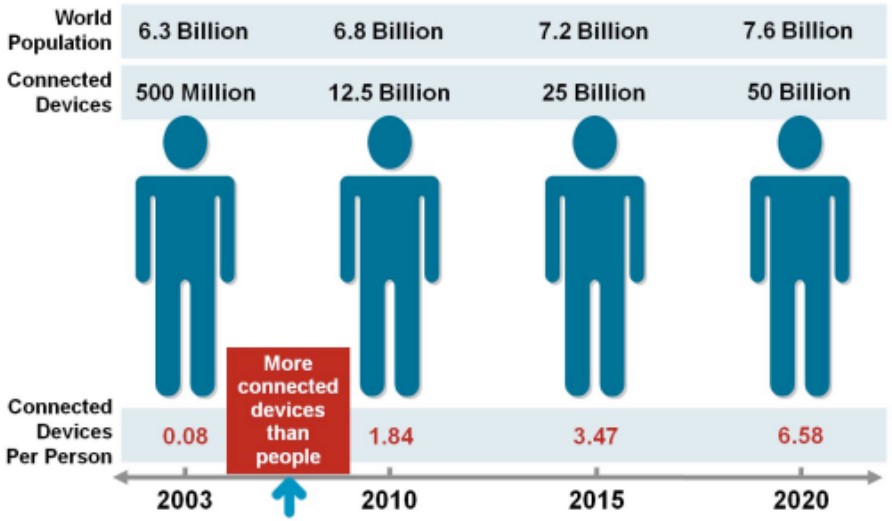
—Intelligent applications

- Information is collected, processed, analyzed which …

is used to help us derive greater knowledge, make smart decisions, build smart applications (context-aware), …

物聯網簡介

- 多少物件連網?
  - —思科(Cisco IBSG)預測2015年會有250億設備，2020年會有500億設備連上網路。



by Dave Evans

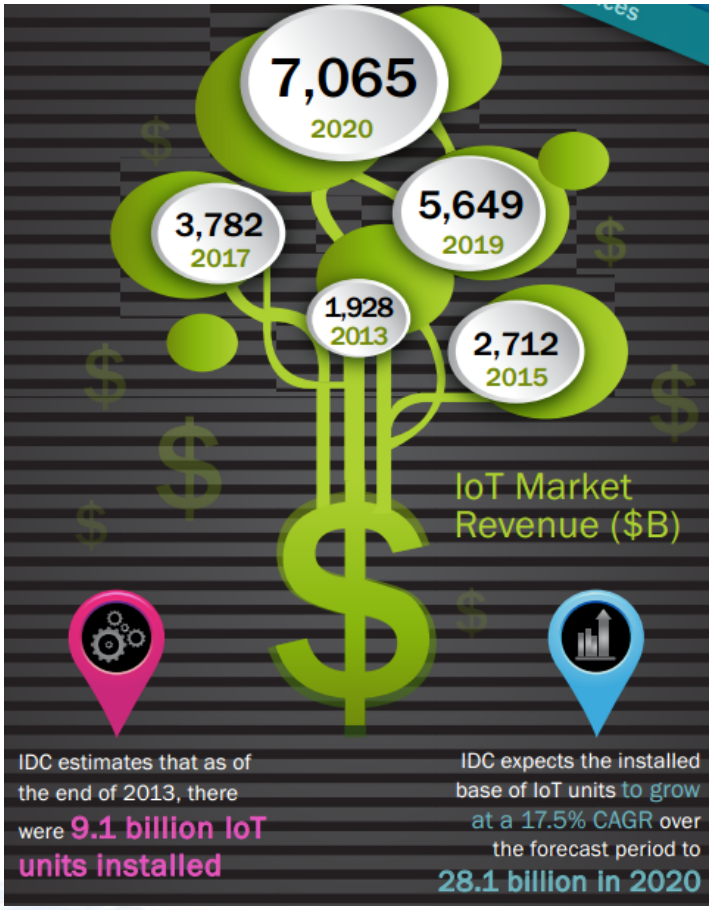
  - —高德納(Gartner)預測在2020年有260億設備連上網路
  - —IDC預測在2020年有281億設備連上網路

物聯網簡介

- 多少物件連網?
  - IHS Automotive對smart car進行預測，在2020年會有超過1億5千萬台汽車上Internet
  - ABI Research對smart car的預測是到2030年會有4億台vehicle搭載IoT技術
  - On World預估2020年會有超過1億個的無線燈泡連上網路
  - Acquity Group對一些裝置在未來5年的成長做出以下預測
    - Smart thermostat (智慧恆溫系統) ：30%
    - Connected security system(連網保全系統)：25%
    - Smart refrigerator(智慧冰箱)：21%
    - Wearable fitness device(穿載式健身裝置)：20%
    - Smart watch(智慧型手錶)：18%
    - Self-driving vacuum cleaner(自動掃地機)：15%
    - Wearable heads up display（抬頭顯示器）：13%
    - Smart Clothing(智慧型衣服)：10%

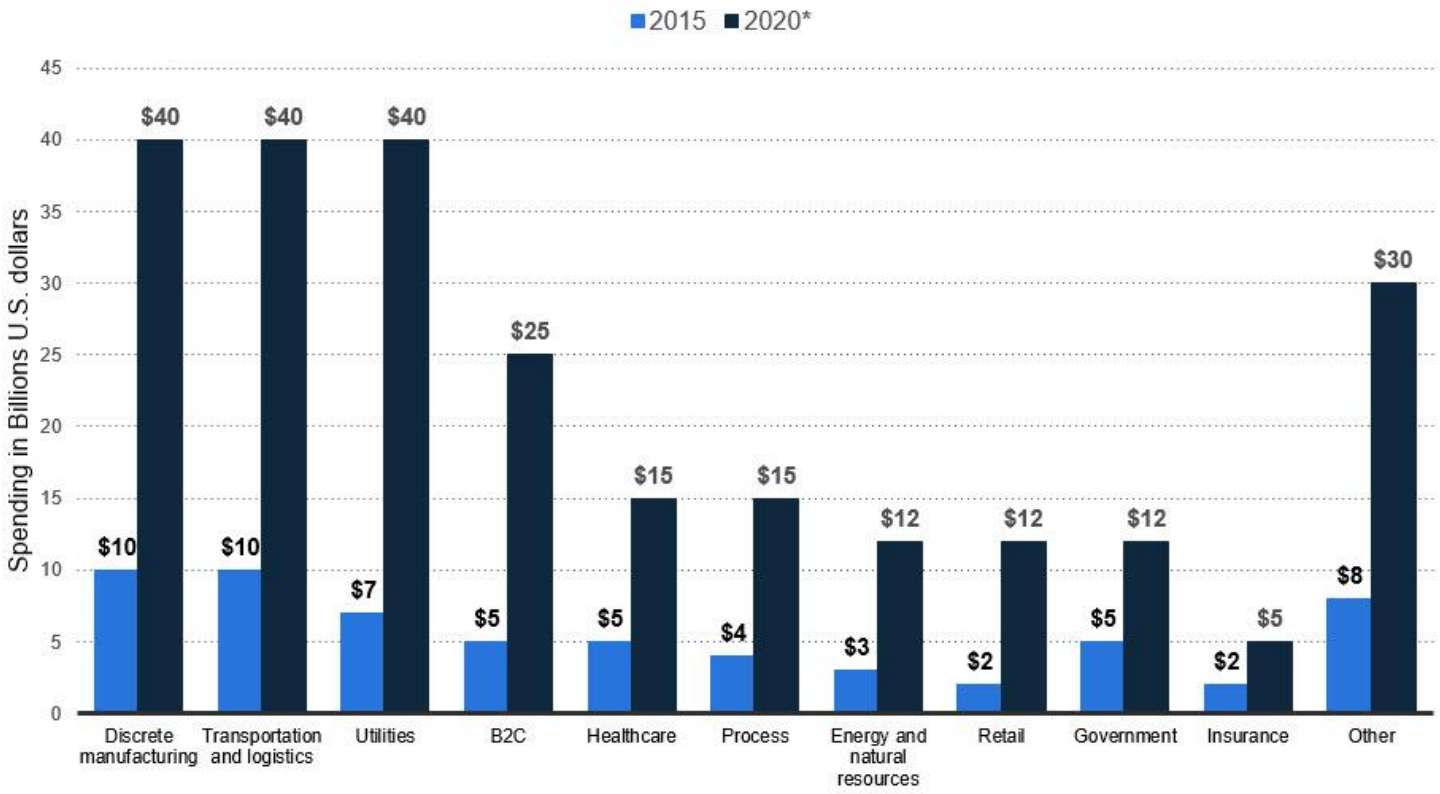
物聯網簡介

- 物聯網產值
  - —IDC (International Data Corporation)預估
    - 2015年會達到2兆7120億
    - 2017年會達到3兆7820億
    - 2019年會達到5兆6490億
    - 2020年會達到7兆0650億
  - —高德納(Gartner)預測
    - IoT帶來的經濟附加總值將於2020年達1.9兆美元
  - —RnRMarketResearch.com
    - 2020年會達1兆4230億

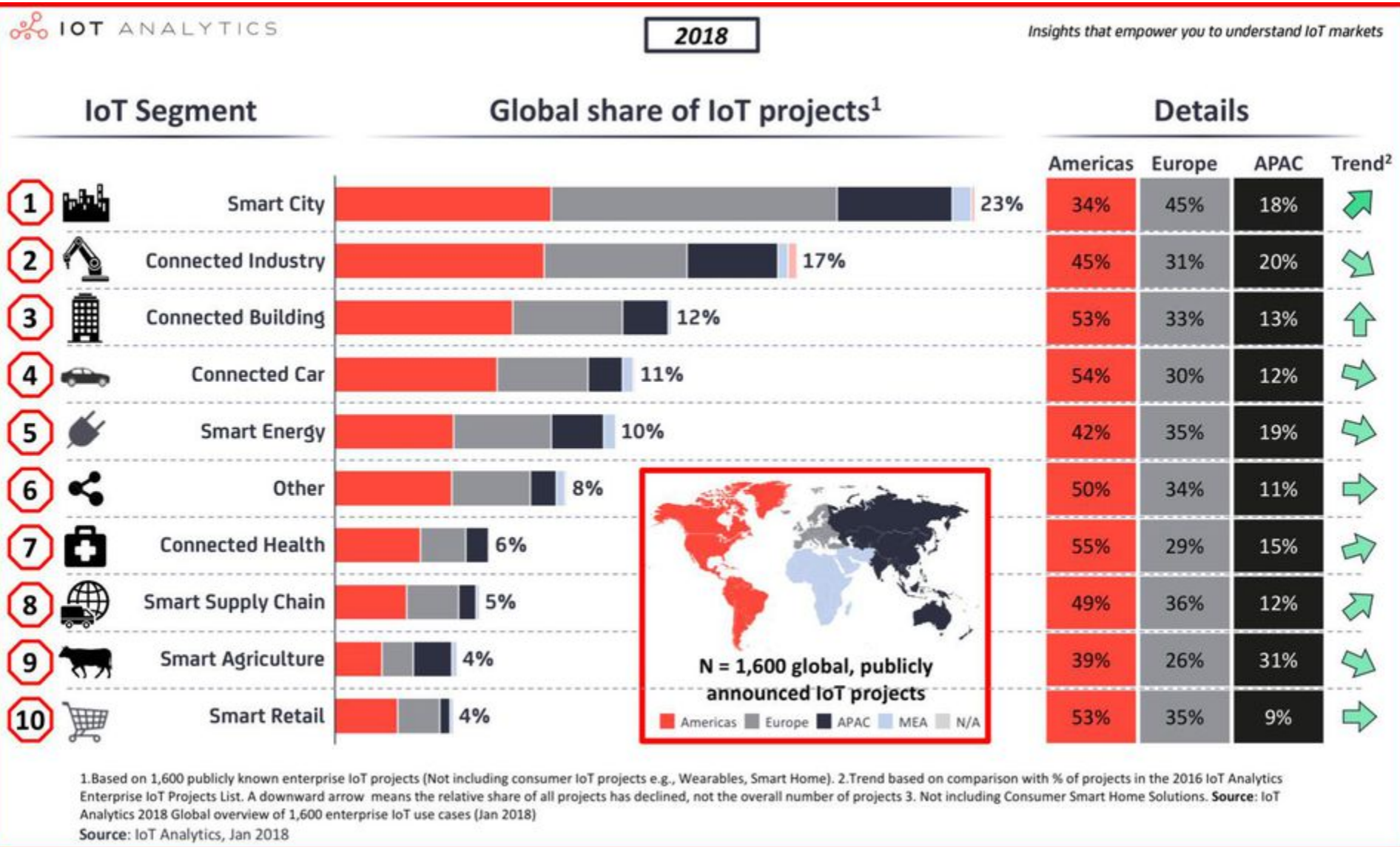


IoT's explosive growth

Spending on Internet of Things Worldwide by Vertical in 2015 and 2020 (in billions of U.S. dollars)

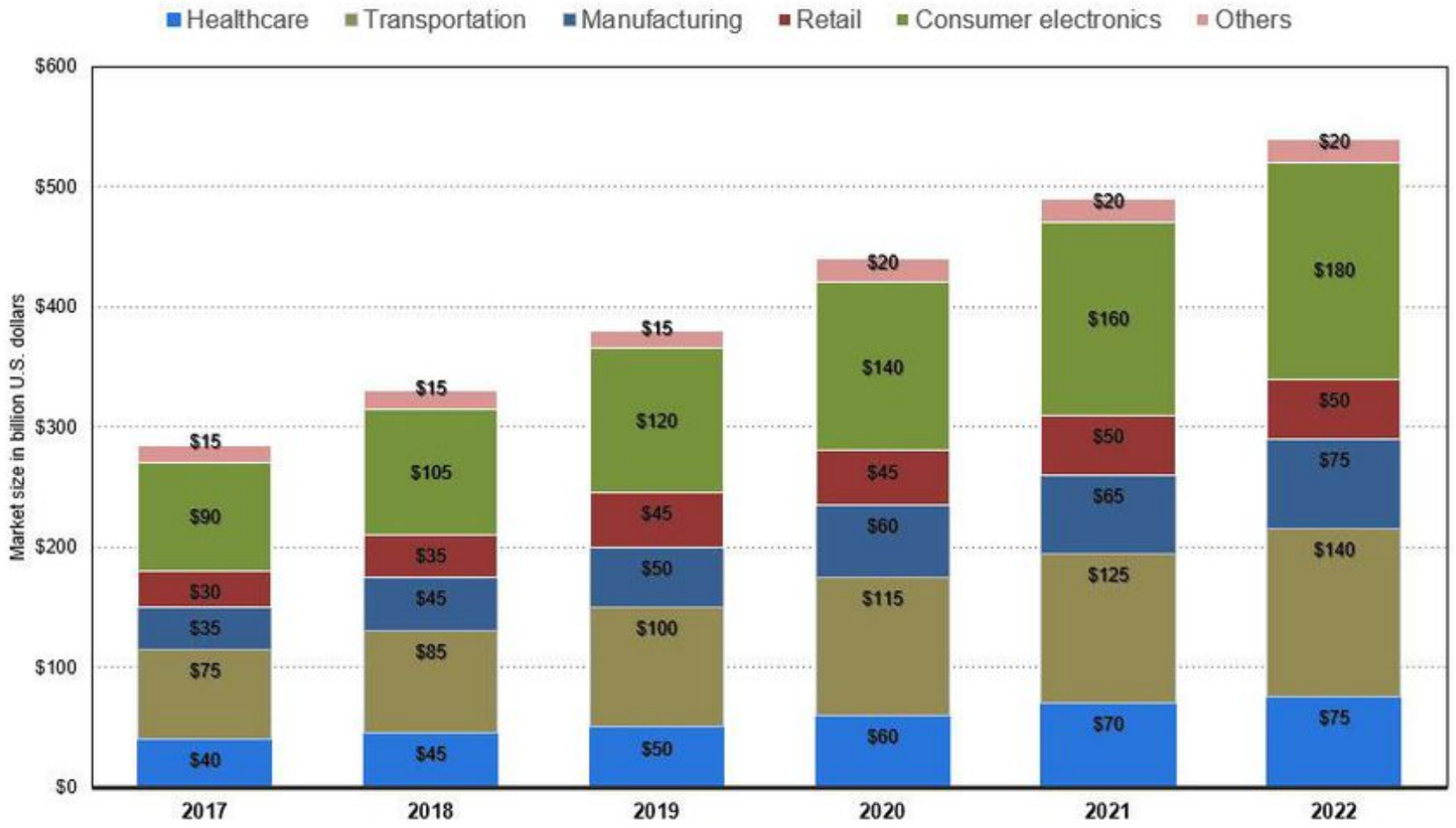


2018 IoT Segments

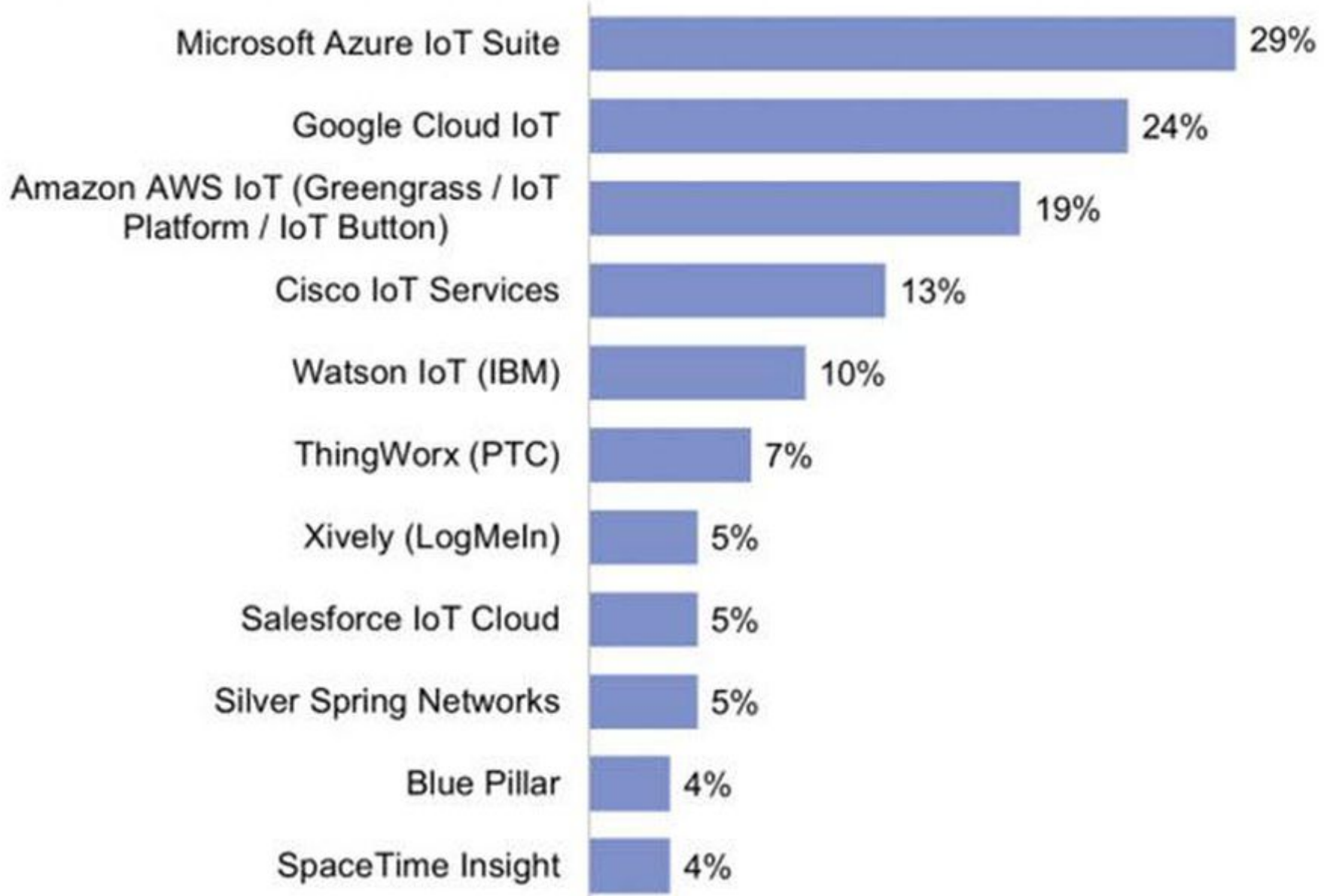


IoT Market Revenue by Application in North America 2017-2022

Size of the Internet of Things (IoT) Market by Application in North America from 2017 to 2022 (in billions of U.S. dollars)

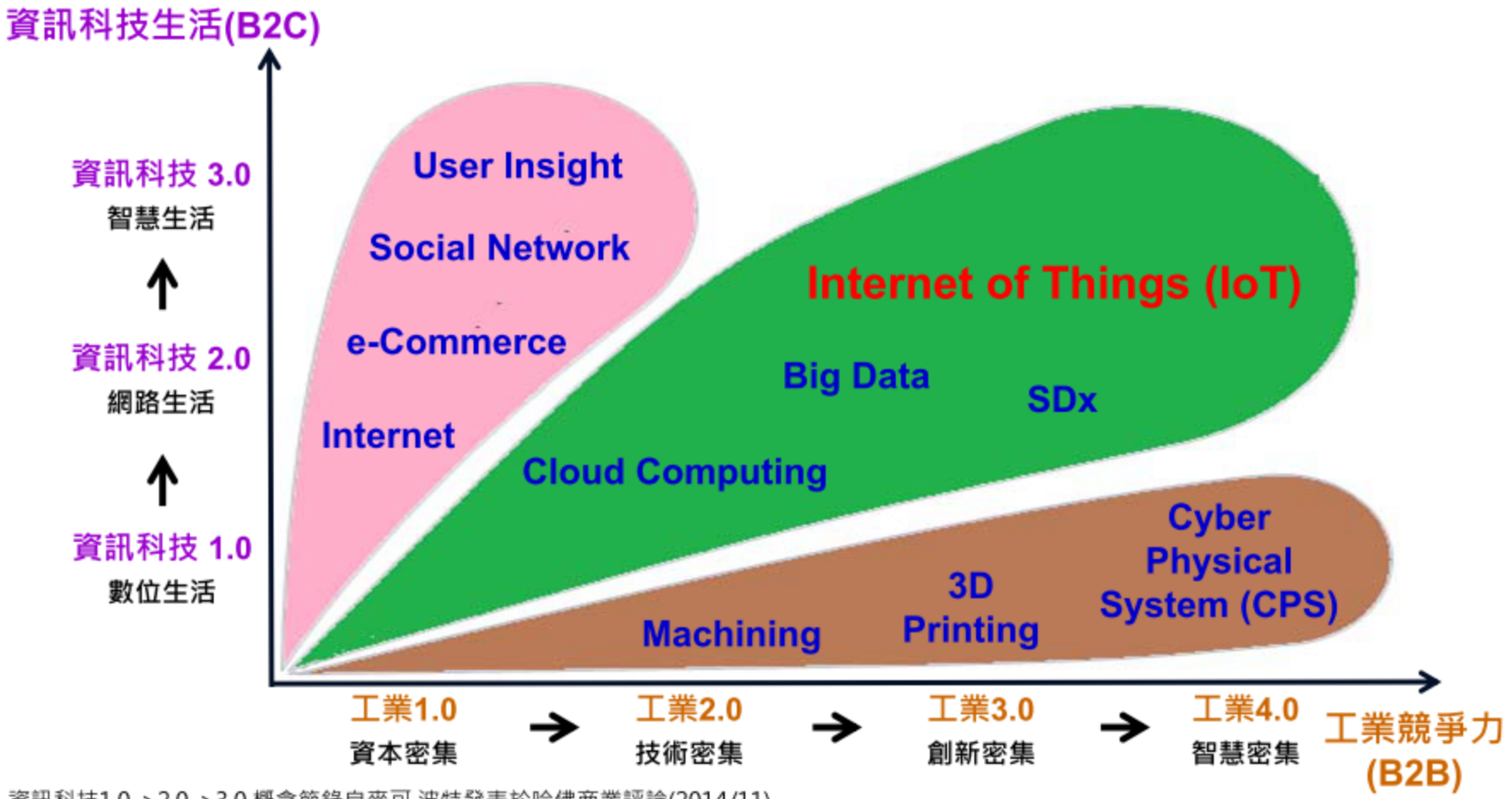


Q: What technologies do you use to run connected devices in your software projects? Please select all that apply.



物聯網同時驅動生活優化及工業競爭力提升

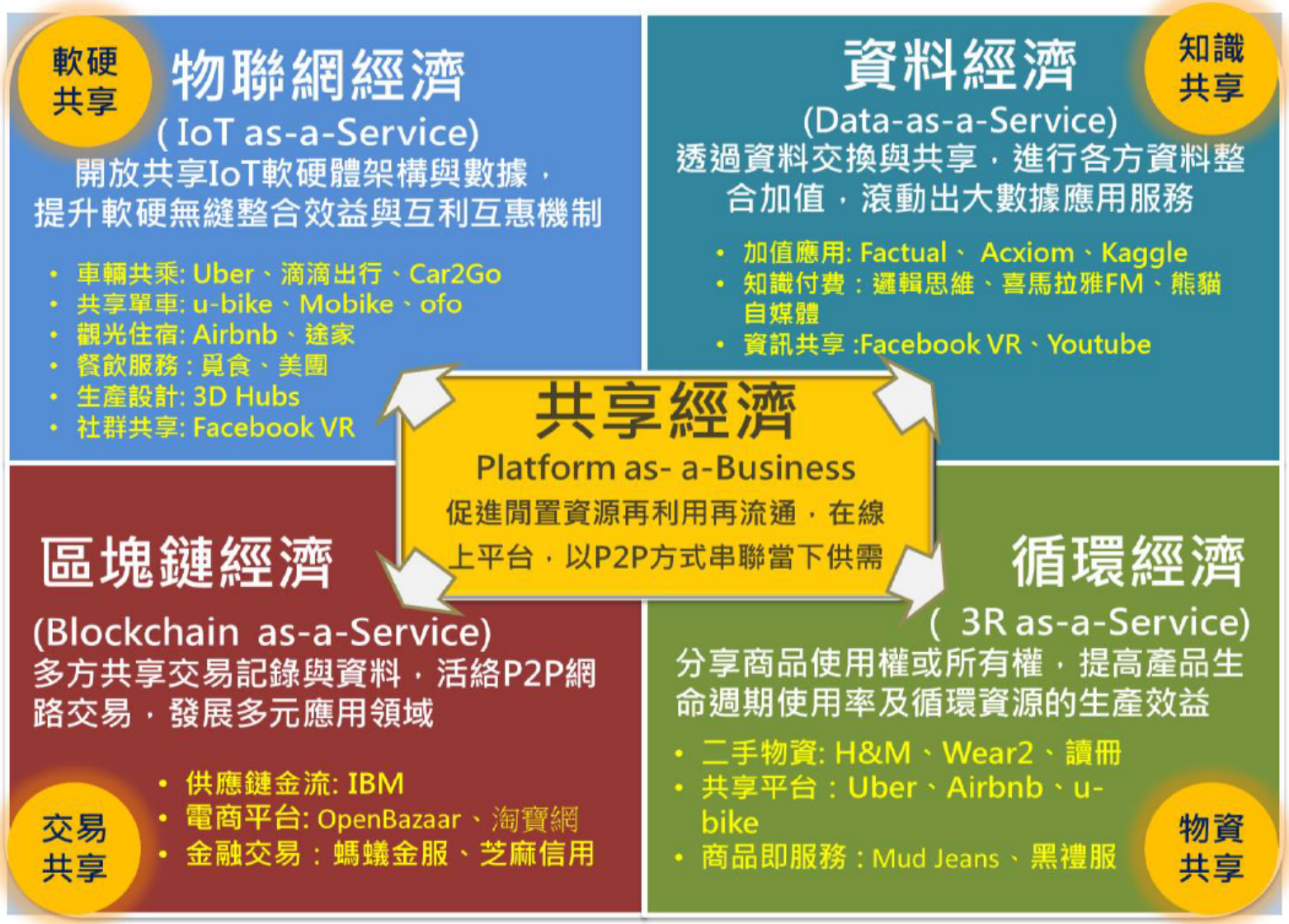
- 物聯網以資料經濟為核心，將帶來資訊科技生活優化(B2C) 、以及工產競爭力(B2B)之產業變革，以型塑優質生活及推升效率製造，產業樣貌因而改變



註：資訊科技1.0->2.0->3.0 概念節錄自麥可.波特發表於哈佛商業評論(2014/11)
生產力4.0係運用智慧機器人、物聯網及巨量資料等技術於製造業、服務業與農業等，內涵為提高人均產值，促使整體產業產值持續攀升(經濟部, 2014/12)

資料來源：工研院IEK(2015/05)

萬物互聯共享，驅動四大新經濟

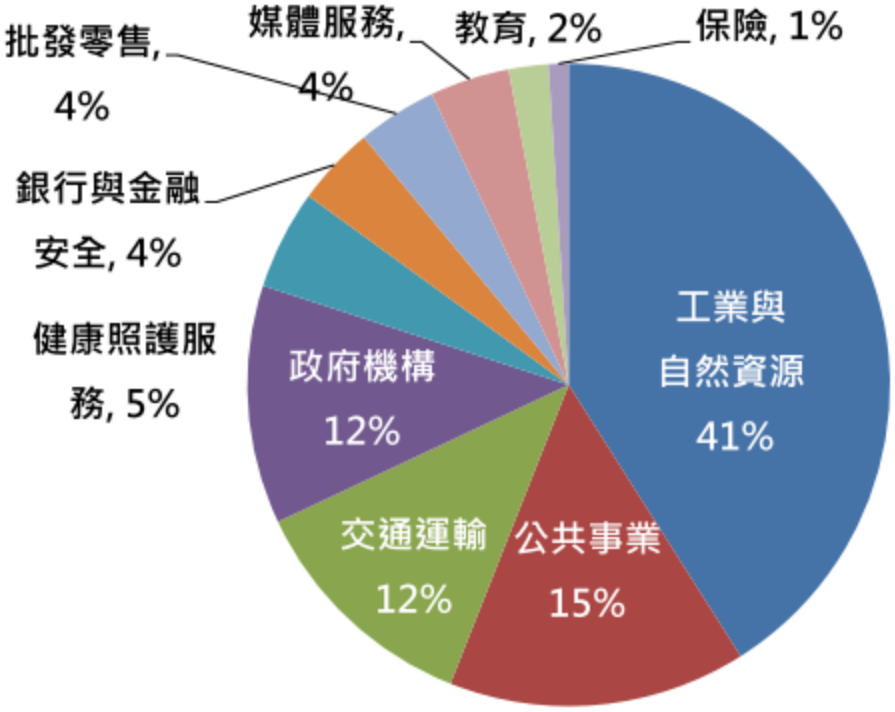


物聯網即服務 (IoT-as-a-Service)	軟硬無縫整合及服務自動化
協同共享服務 (Collaborative Sharing Platform-as-a-Business)	P2P平台與大數據整合分析技術為後盾，能永續經營
區塊鏈即服務 (Blockchain as-a-Service)	P2P分散網路資料處理速度與效度，正在發展新商業應用型態
人工智慧即服務 (AI-as-a-Service)	自主決策的速度並互動如人，毫秒間能流暢驅動相關軟硬體
創新與創業投資	未來龐大商機可期，為近來新創投資重點

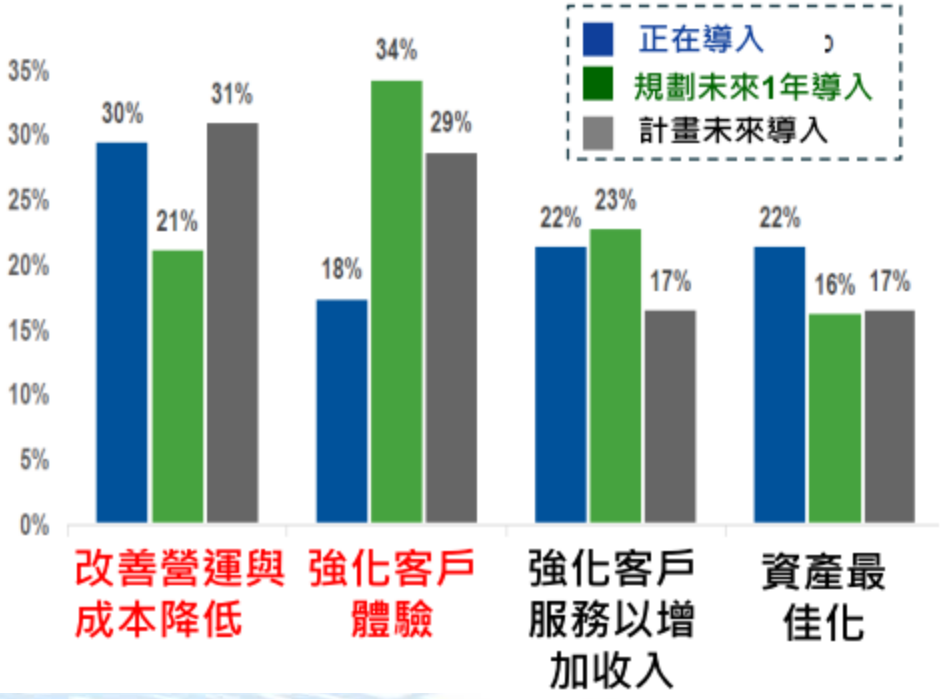
IoTaaS(物聯網即服務)模式將創造4兆美金的產值

- 預估2020年全球50%的企業流程與系統將導入IoT， IoT服務(IoTaaS, IoT as-a-Service) 將創造4兆美金的產值
  - ✓ 應用服務分布： 工業與自然資源(41%)
  - ✓ 導入目的： 改善營運與降低成本、強化客戶體驗為主

IoTaaS 應用服務分布



企業導入IoT的目的



物聯網未來龐大商機可期，為近來新創投資重點

產業前景：科技產業再次革命，創造前所未有產業榮景

- Forrester Research：2020年前，全球物聯網產值將達現今網路產值之30倍多
- Gartner：2020年全球物聯網相關裝置數量將成長至208億台，創造出硬體與應用相關支出之市場規模近3.1兆美元
- ABI：全球穿戴行動裝置產品市場規模，至2018年將超過80億美金
- 經濟學人：全球公司在物聯網的投資金額中，每年有 29% 的公司投資金額有超過10% 的年成長率，其中有 3% 的公司投資年成長率甚至超過 20%

市場前景：牽涉範疇廣泛，市場規模龐大

- IDC：2020年全球將有295億個裝置被聯結，創造高達1.7兆美元的市場規模

民生福祉前景：人類生活與工作模式轉變，與地球共生共榮

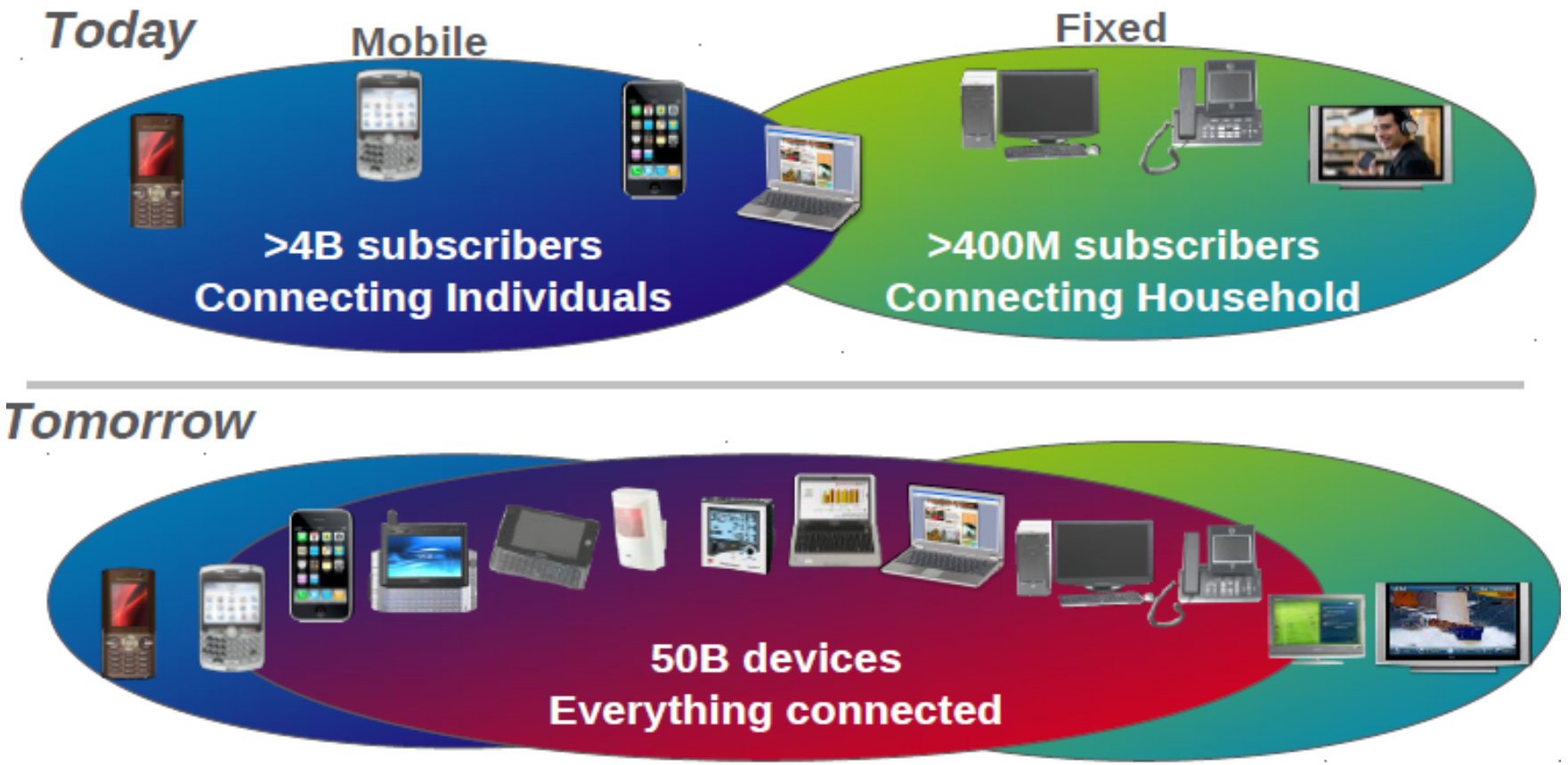
- Cisco：IoE將會改變我們的每日生活，包含我們開車的方式，使用並節省能源、管理健康、玩樂與工作。IoE將會使人們的生活更簡單、更健康及更安全
- Cisco：IoE將會創造新的且截然不同的工作、更高的薪水與更多的生意

Current Landscape of the IoT/M2M

Outline

- **IoT/M2M Trends**
- IoT/M2M Business Opportunities

IoT/M2M Trends



Source: Ericsson Research

Varieties of IoT/M2M

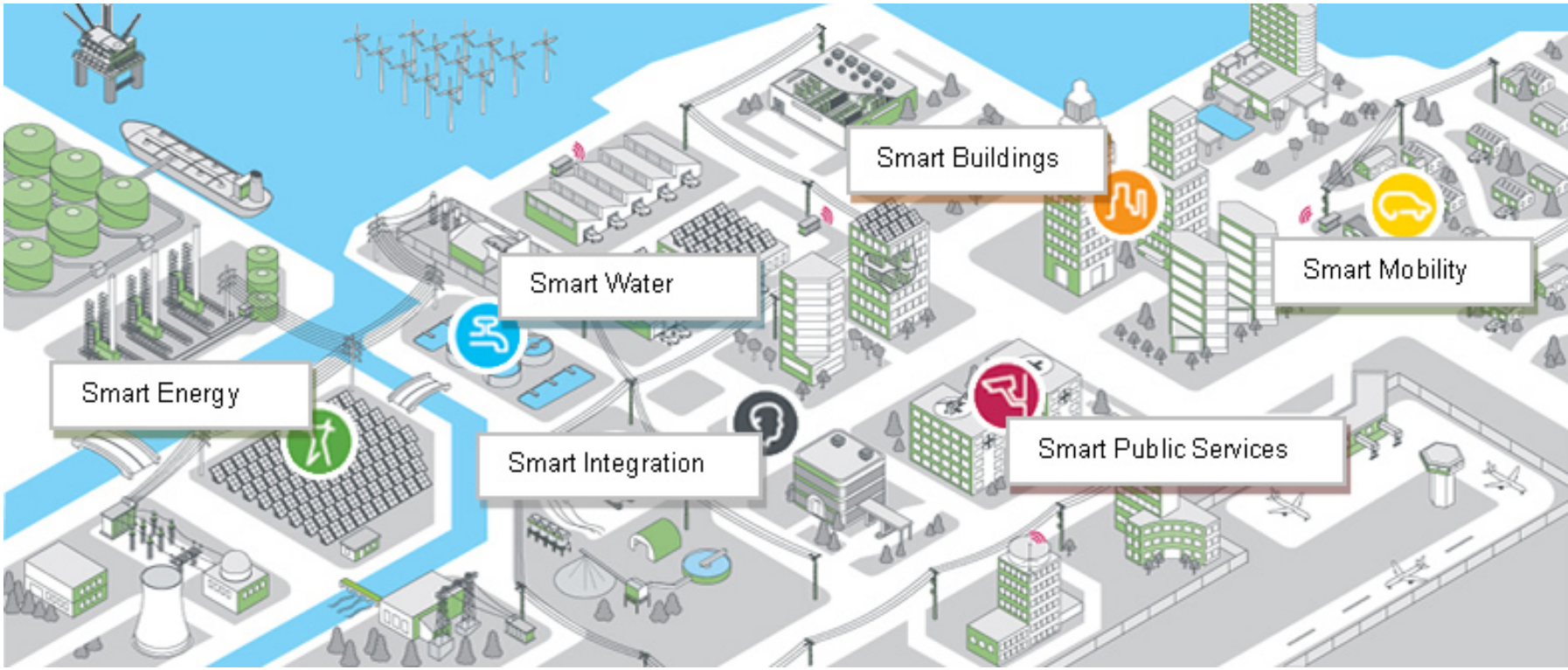
Most Promising IoT/M2M Verticals

- Smart City
- Industry 4.0
- Smart Building
- Smart Home
  - Amazon Echo/Alexa, Google Home/Assistant, Apple HomePad
- eHealth
- Connected Vehicle
- Smart Grid
- Smart Campus

物聯網應用

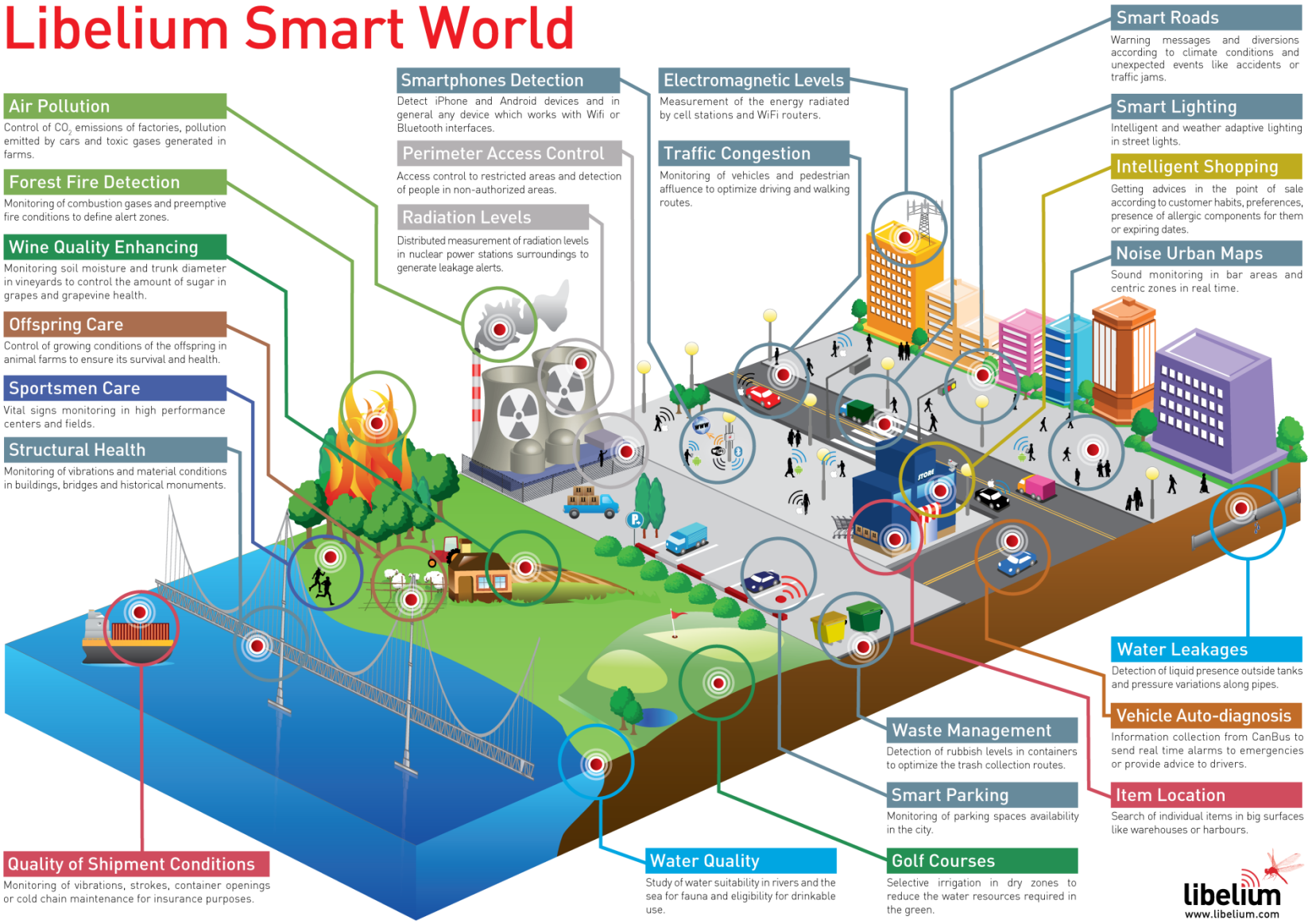
- 應用重點領域
  - —物流管理 (智慧工廠)
  - —能源管理 (智慧電網)
  - —智慧生活空間 (智慧住家)
  - —智慧交通系統 (智慧交通)
  - —居家健康照護/遠距醫療/個人健康照護 (電子醫療)
  - —居家保全/城市視訊監控 (安全監控)

Smart City



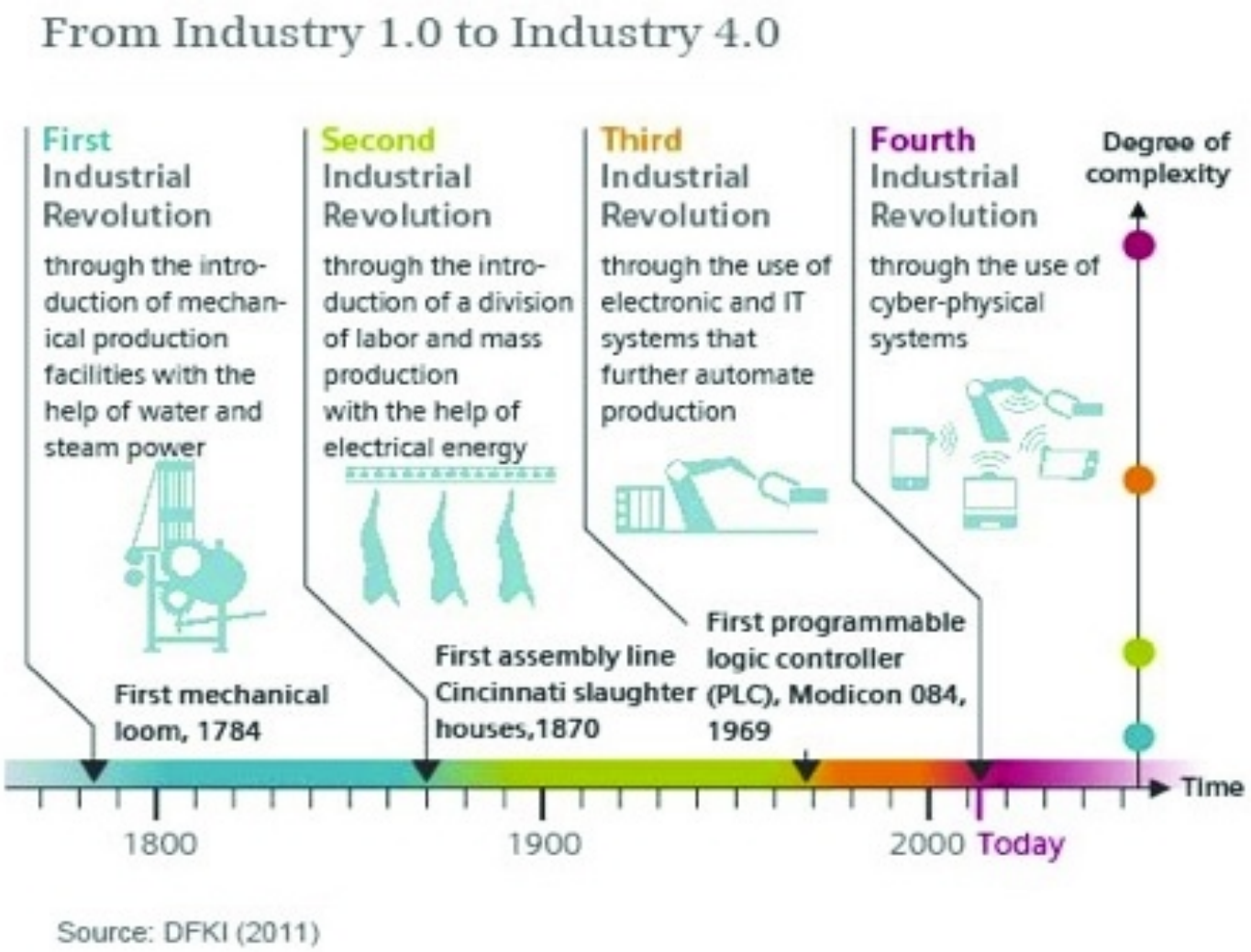
Source: www.schneider-electric.com

Smart World

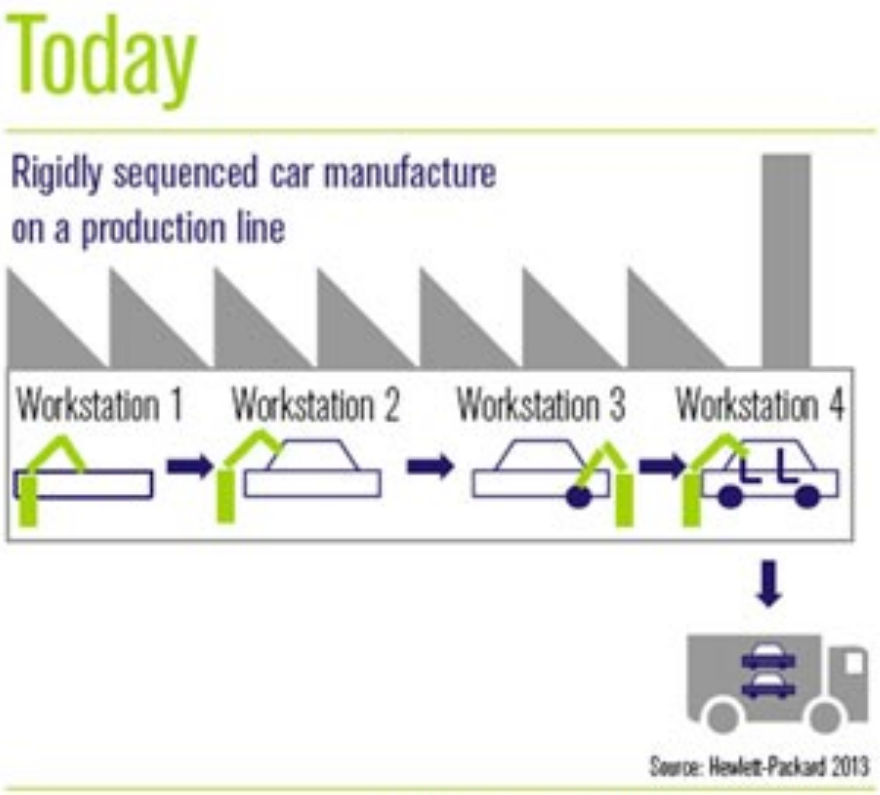


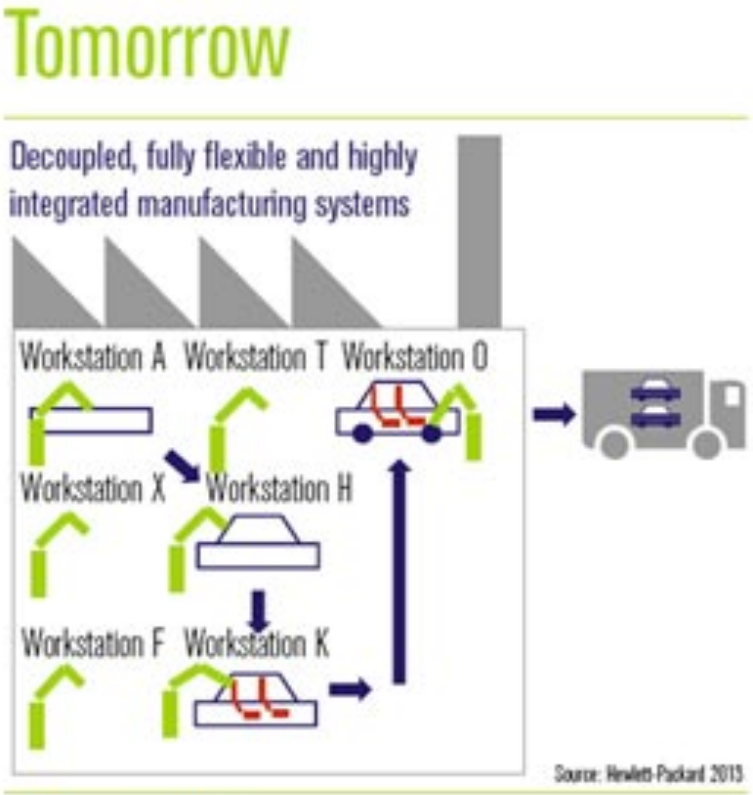
來源:Libelium公司

Industry 4.0 (1)



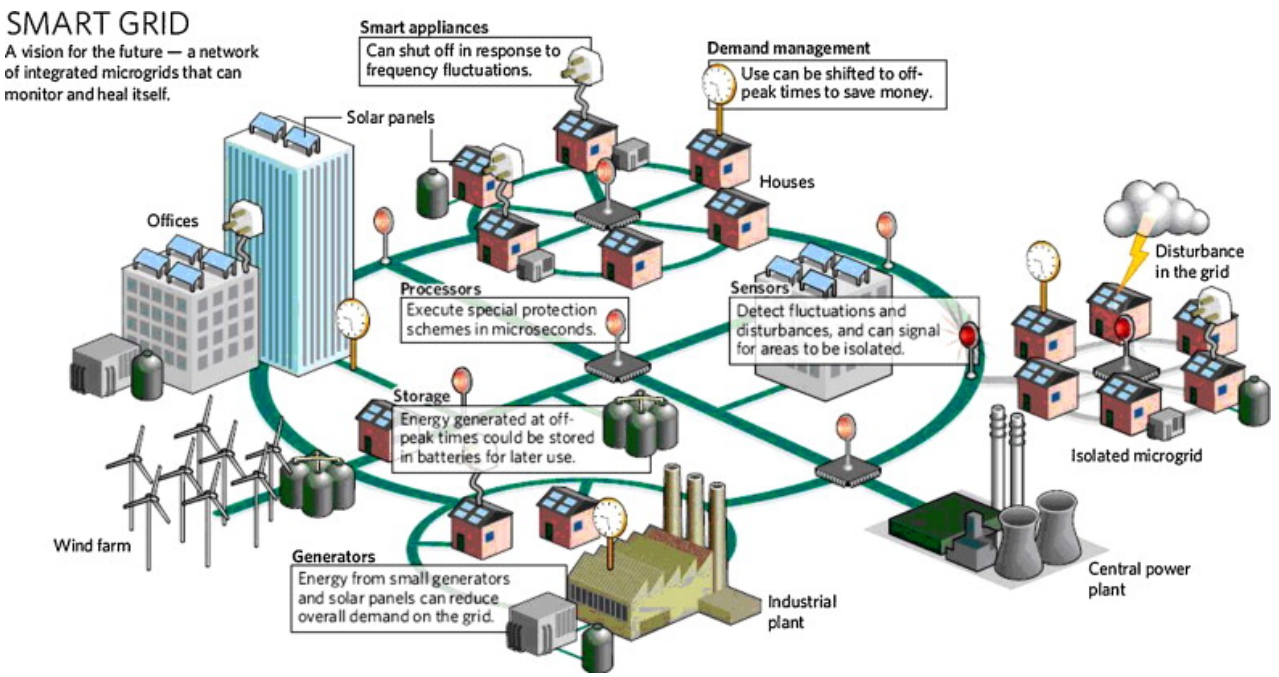
Industry 4.0 (2)





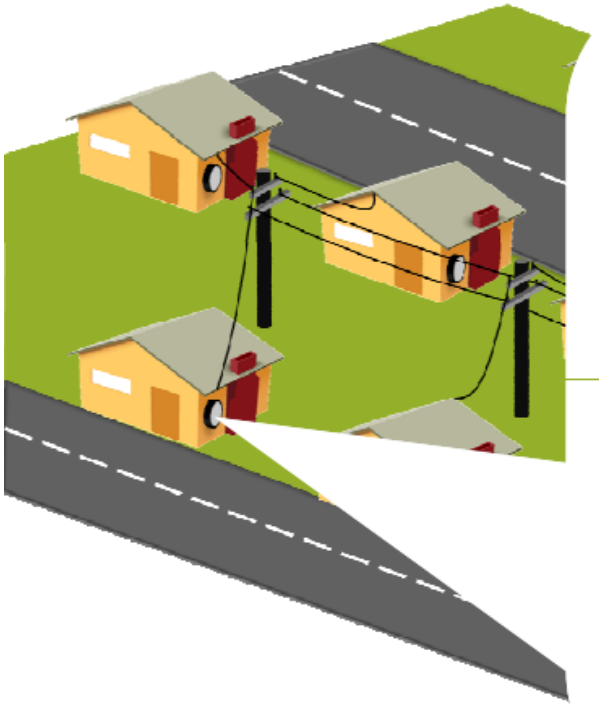
Smart Grid

- A smart grid is an electrical grid that uses information and communications technology to gather and act on information, such as information about the behaviors of suppliers and consumers.
- Fundamental re-engineering of the electricity services industry



Reference: http://www.geekwithlaptop.com/so-called-utility-%E2%80%9Csmart%E2%80%9D-meters-open-to-attack

智慧電網

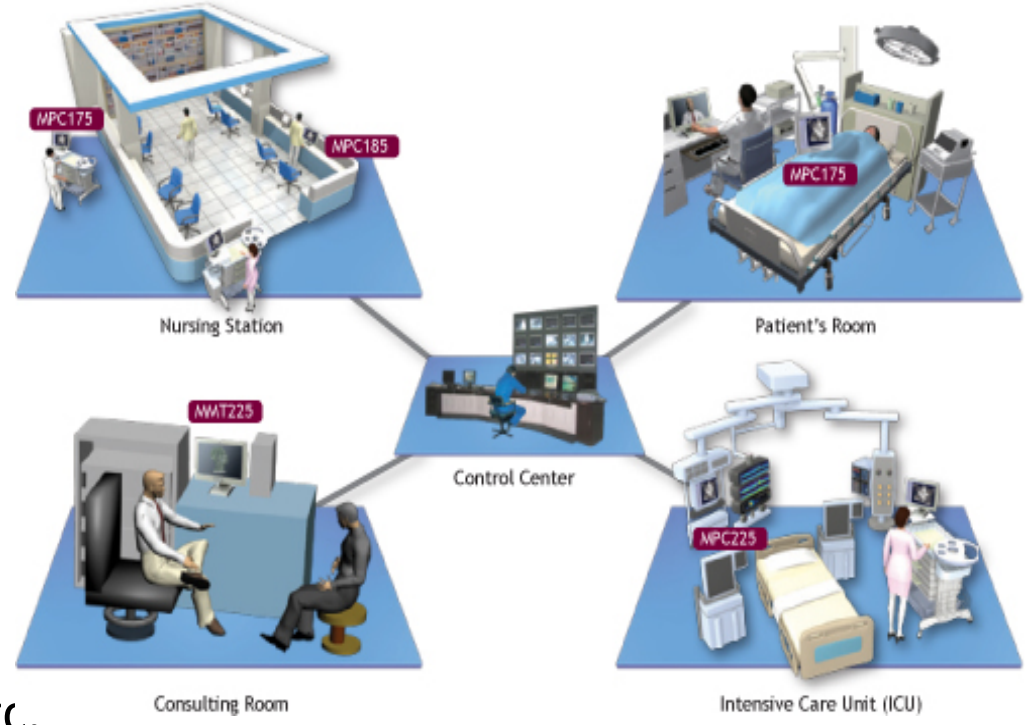


監看用電量

自動回報每項家電產品的用電量

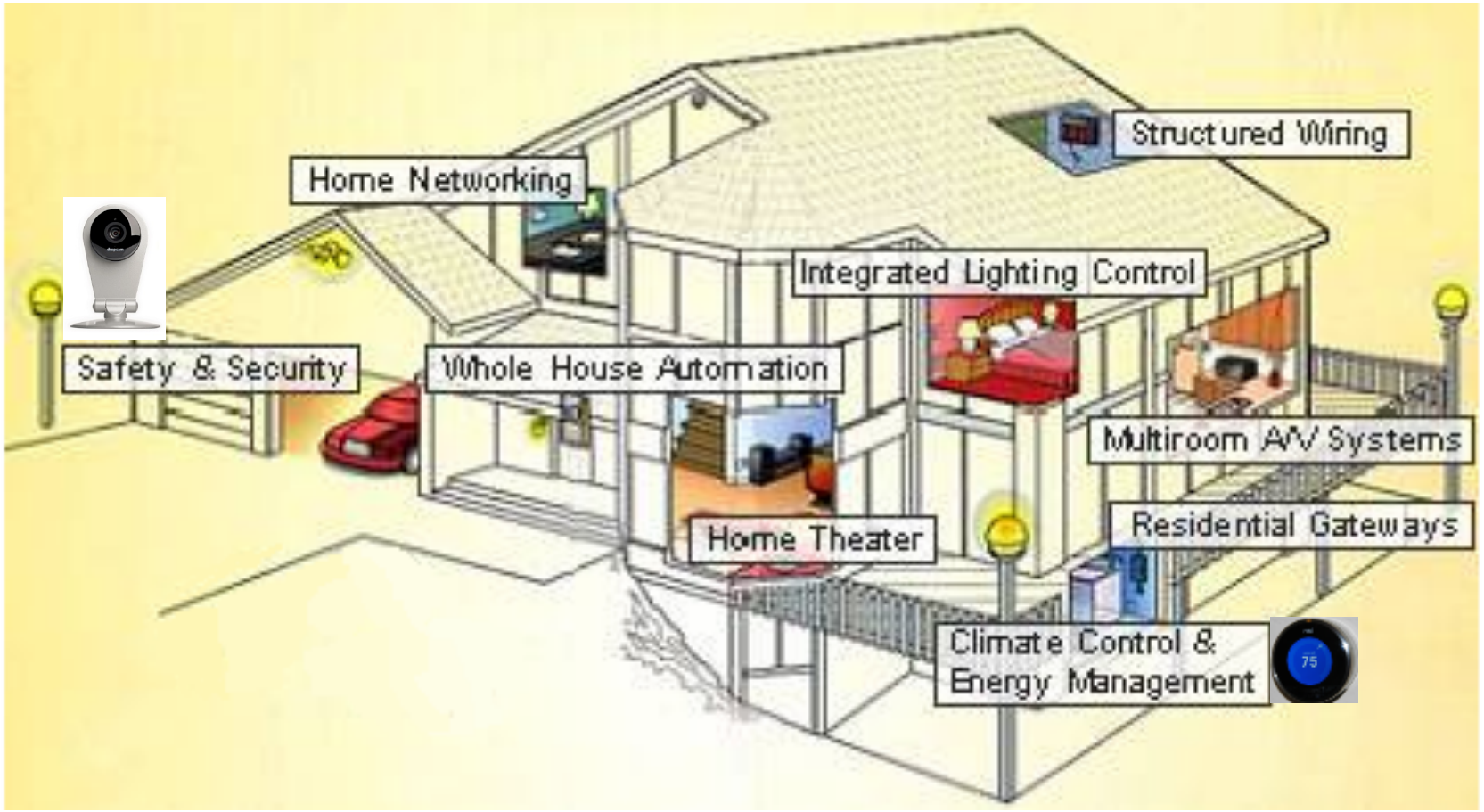
E-Health

- Remote patient monitoring
  - Remotely obtain heart rate, blood glucose levels, and other parameter of body through WAN.
- Homecare living
  - Actively provide information of taking medication, health knowledge.
- Asset tracking
  - Track high-value asset such as intravenous pumps, wheel chairs etc.



Reference: http://axiomtek.com/solutions/healthcare.asp

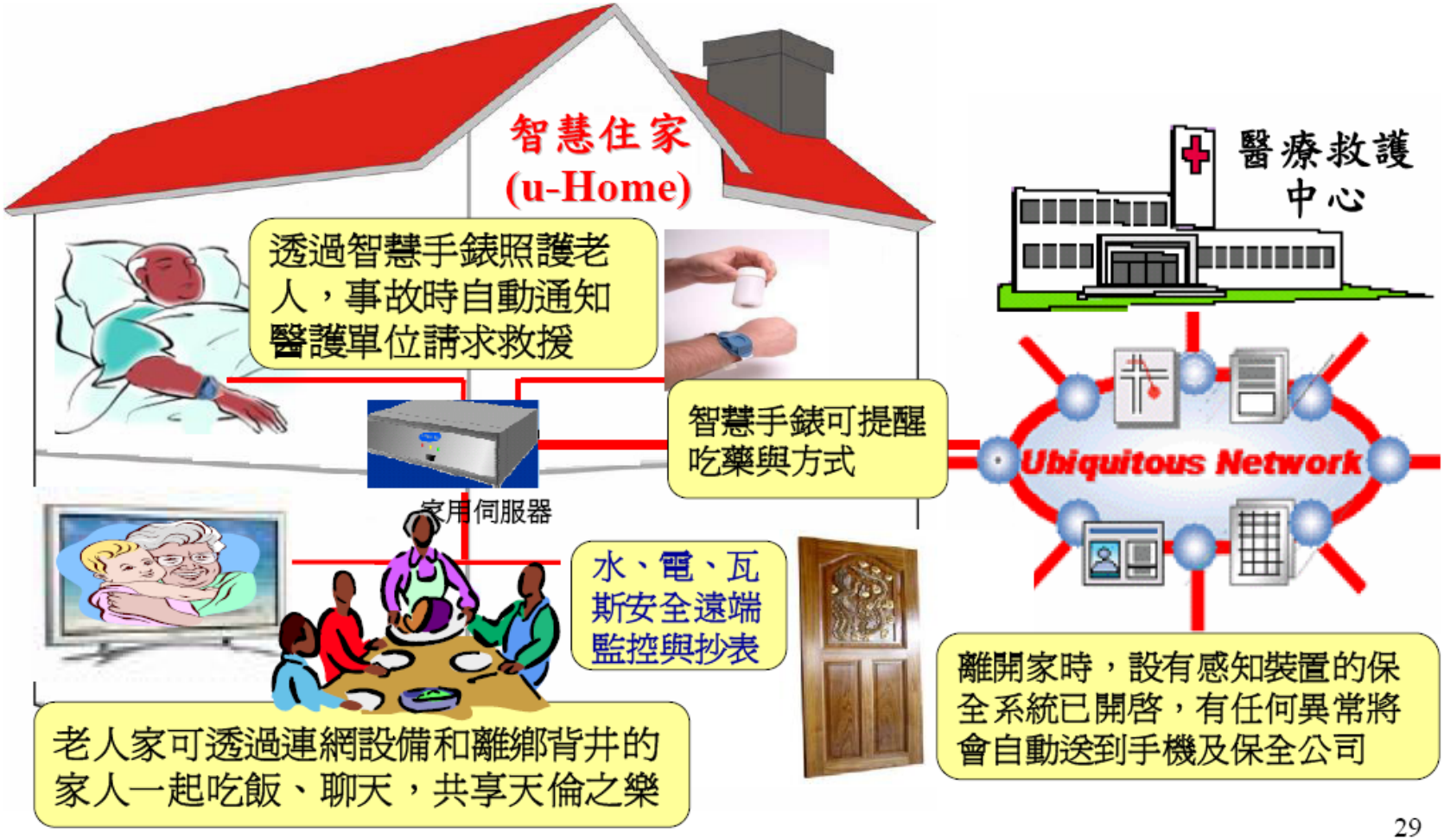
Smart Home



Source: Home Automation http://www.caba.org/

智慧住家

- 居家安全


智慧住家
(u-Home)
透過智慧手錶照護老人，事故時自動通知醫護單位請求救援
智慧手錶可提醒吃藥與方式
家用伺服器
水、電、瓦斯安全遠端監控與抄表
老人家可透過連網設備和離鄉背井的家人一起吃飯、聊天，共享天倫之樂
醫療救護中心
Ubiquitous Network
離開家時，設有感知裝置的保全系統已開啓，有任何異常將會自動送到手機及保全公司

29

Connected Vehicle

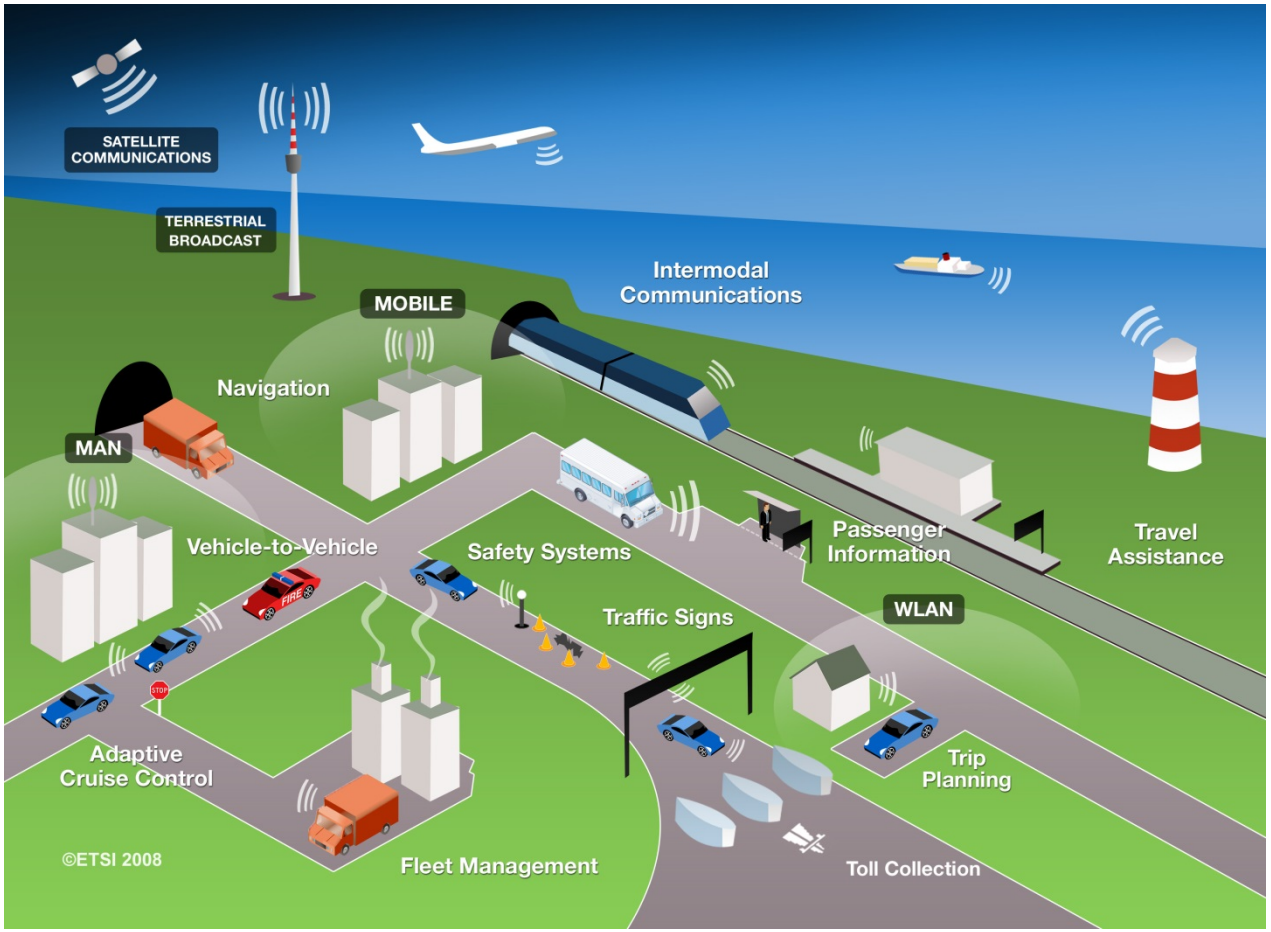
- Fleet management
  - Obtain information of a group of vehicles such as vessels or cars, and send dispatch notification to them
- Collision Avoidance
  - Between vehicle and vehicle
  - Between vehicle and pedestrian

Source: orci.research.umich.edu

- Vehicle maintenance
  - Obtain operating parameters from vehicle to diagnosing mechanical issues.
  - Bilaterally communicate with car dealers: get software update and reminders.
  - Compute insurance premium by the risks of vehicles
  - Entertainment, theft prevention, emergency call, toll, and so on.

智慧交通

燈號控制
自動駕駛
安全駕駛
智慧導航
即時路況
緊急應變
先進大眾運輸

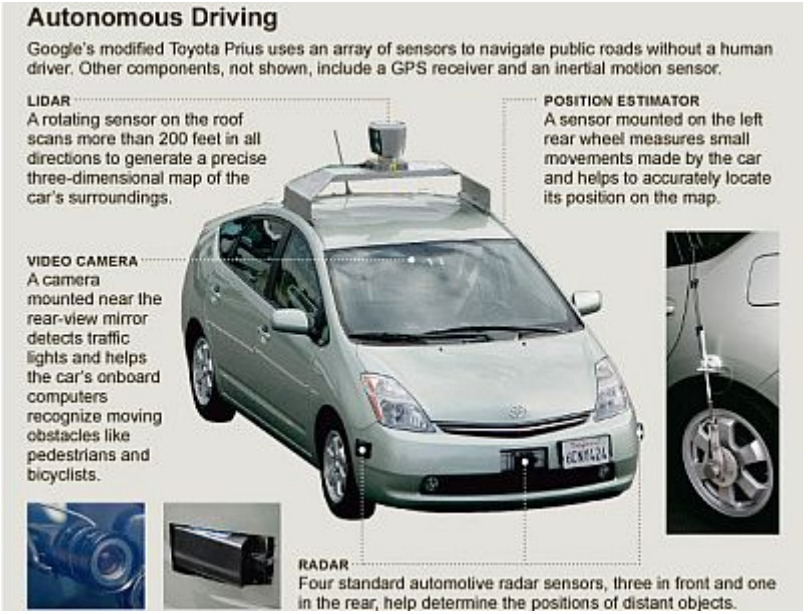


ETSI Technical Committee Intelligent Transport Systems (TC ITS) 負責 smart transportation system的標準與規範制定。

http://sandacom.wordpress.com/2010/01/12/its-intelligent-transportation-systems-part-1-introduction/

智慧交通

- 谷歌無人駕駛自動車



Advanced Automatic Crash Notification System(AACN)

智慧交通

美國已有 22 州通過自駕車相關法案(包含法規及行政命令)，囊括自駕車定義、安全標準、聯網標準、執照審核及研究開發等內容，其中有 16 州制訂自駕車測試相關規範(包含已通過法案及審議中的草案)。

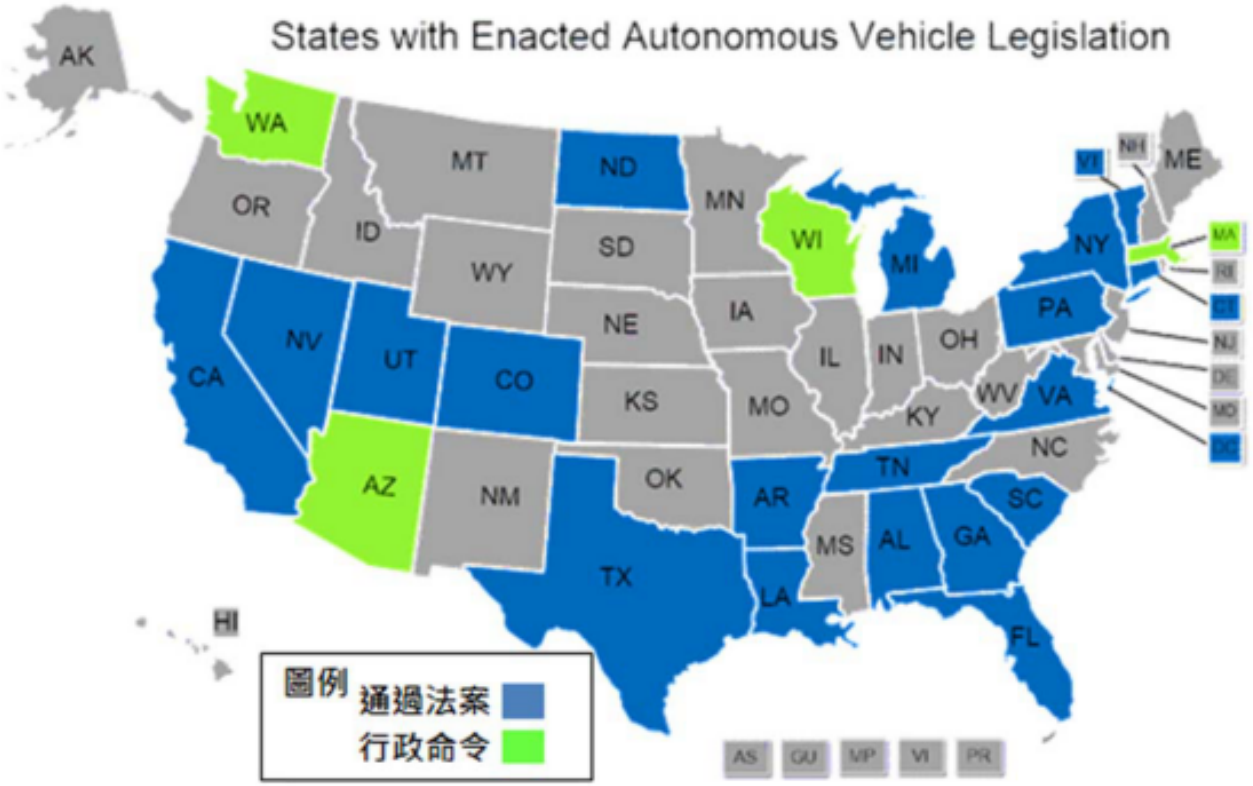


圖. 美國目前已具自駕車相關法案之州別 (資料來源:NCSL)

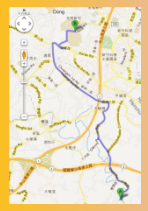
智慧交通

汽車感測與自動控制


tire pressure


engine RPM


gas emission


personal route


signal control


driver behavior


traffic jam

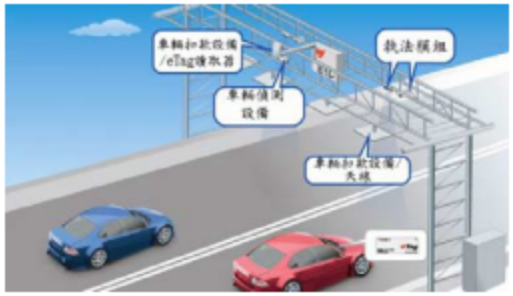

GPS

G-sensor


weather

智慧交通

台灣智慧交通成功案例：ETC系統整合服務掌握智慧城市應用



- 從Infrared系統的失敗經驗(耗費近30億)重新進入RFID系統
  - 全面轉換成無柵欄電子計程收費，為智慧運輸系統建立最基礎的車流資訊
  - 收費路網的總長度926公里，創造每年新台幣24億元之節能減碳效益
  - 每天1400萬筆電子收費交易，世界最高之正確率99.9%
  - 智慧運輸系統後續應用：停車場、社區、學校等管制...

Market Trends Driving IoT/M2M

- Everything Connected (e.g. 50 billion devices by 2020)
- Processor/Memory Economics (e.g. Intel's announcement on Quark and Atom for wearable devices)
- Big Data and Analytics (e.g. machine learning embedded in Google Nest)

Outline

- IoT/M2M Trends
- **IoT/M2M Business Opportunities**

物聯網帶動的重要產業技術

- 蓬勃發展的技術

—Smart sensors
  - IPv6 enabled
  - Low cost, energy saving, abundant storage and processing power

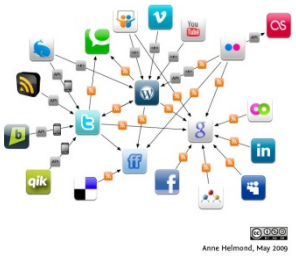
—Smart phones
  - Gateway of sensors (especially personal area network)

—Cloud
  - Store and process massive data

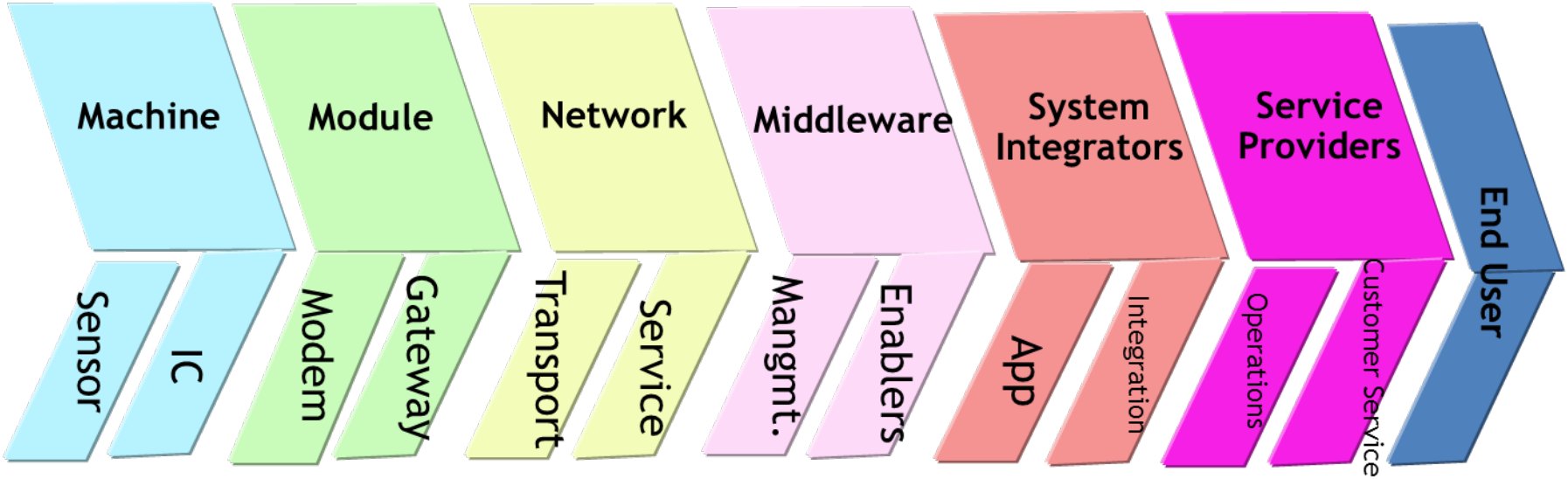
—Big data
  - Analysis of massive data

物聯網帶動的重要商業機會

- 商業機會(IBM smart planet)
  - —Data: the new natural resource
  - —Cloud: the new growth engine
  - —Social: the new production line
  - —Mobile: the new office space



IoT/M2M Ecosystem



Middleware Providers

Service Providers

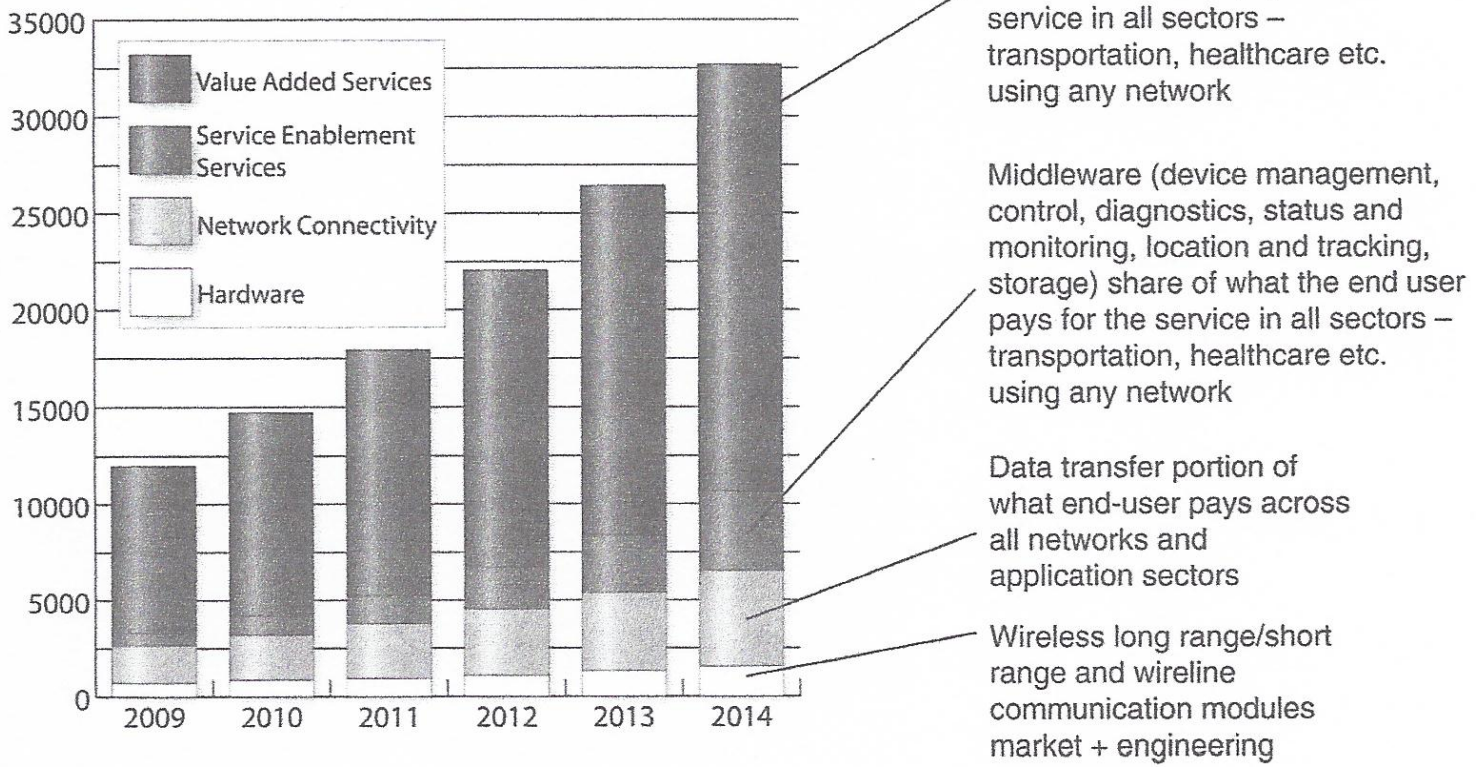
Machine & Device Manufacturers

Network Equipment Providers

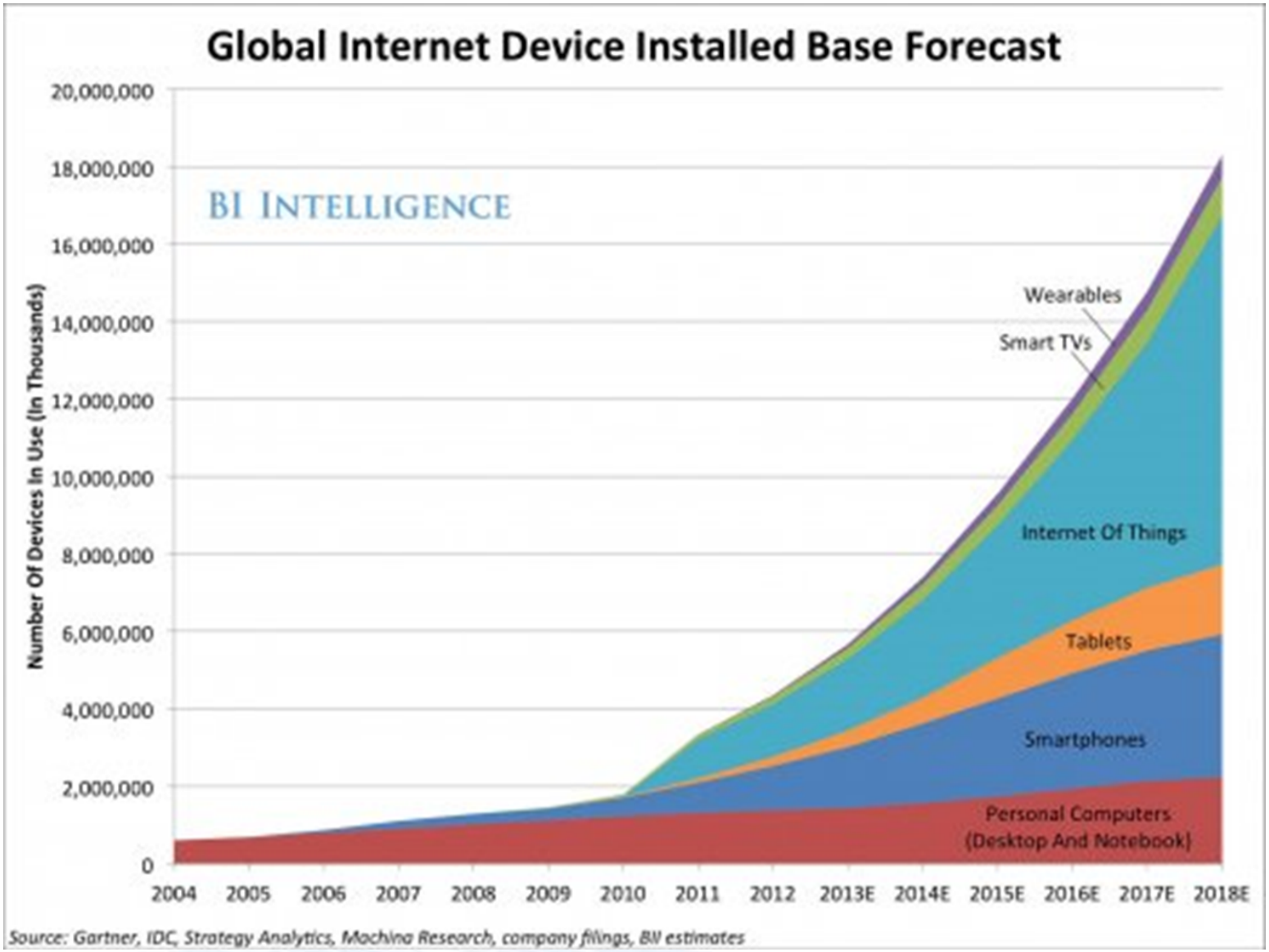
Application Developers

System Integrators

Market Size Projections

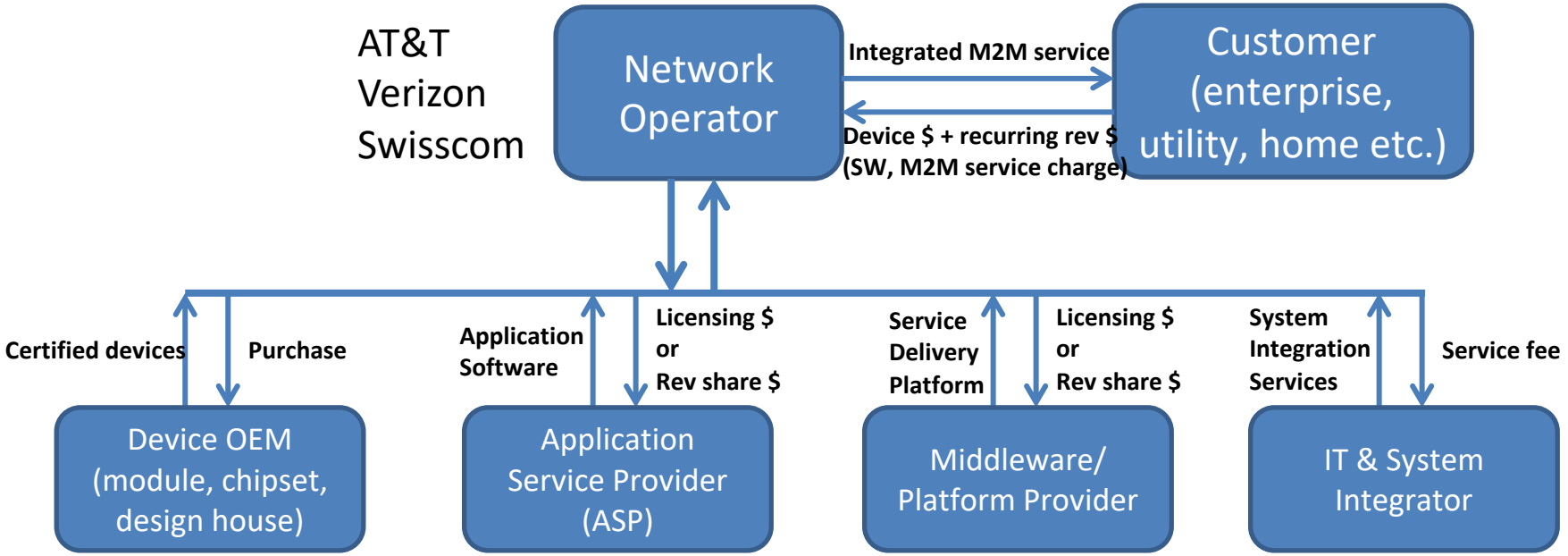


Source: "M2M COMMUNICATIONS - A SYTEMS APPROACH", 2012, Wiley.


Global Internet Device Installed Base Forecast
BI INTELLIGENCE
Number Of Devices In Use (In Thousands)
20,000,000
18,000,000
16,000,000
14,000,000
12,000,000
10,000,000
8,000,000
6,000,000
4,000,000
2,000,000
0
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013E
2014E
2015E
2016E
2017E
2018E
Wearables
Smart TVs
Internet Of Things
Tablets
Smartphones
Personal Computers
(Desktop And Notebook)
Source: Gartner, IDC, Strategy Analytics, Machina Research, company filings, BI estimates

Service Providers & Network Operator

- Network Operator-led Business Model



Enfora
Sierra Wireless
Cinterion
SIMcom
Telit

Vertical Specific Developers

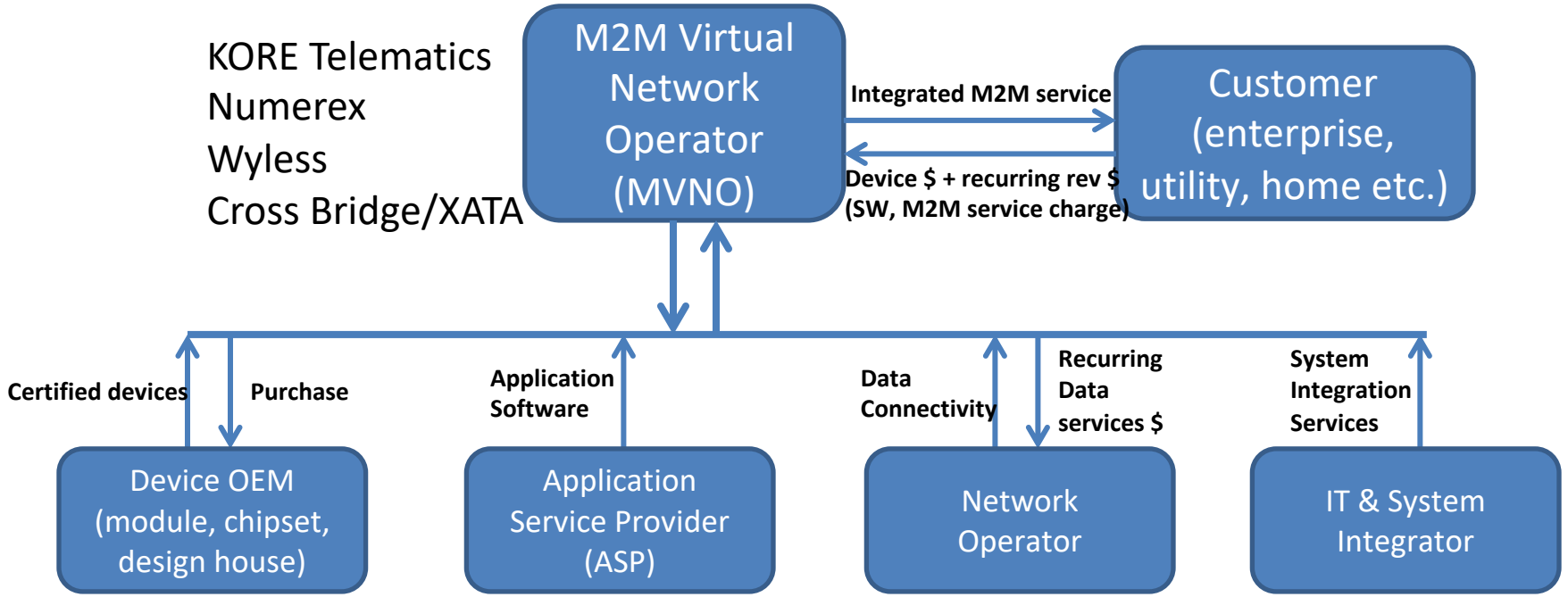
Jasper
Itron
KORE Telematics
Numerex
(more in Slide 25)

IBM
Accenture
Swisscom

Source: "M2M COMMUNICATIONS - A SYTEMS APPROACH", 2012, Wiley.

Service Providers & Network Operator

- MVNO (M2M Virtual Network Provider)-led Model



Source: "M2M COMMUNICATIONS - A SYTEMS APPROACH", 2012, Wiley.

System Integrator

- IBM
- Accenture
- Swisscom
- Etc.

Middleware/Platform Provider

Commercial Offers

- OpenMTC (Licensed Source)
- Xively
- Nimbits
- Axeda
- Device Insight
- Thingworx
- Ninja Blocks platform
- ioBridge (Web Gateway)
- Thingvibe
- Digi
- Bosch
- SAP
- Etc.

Open Source

- OSIOT Interoperability Project
- Eclipse M2M Industry Group
- Koneki
- Paho
- Lua
- MQTT
- OM2M (Open Source)
- Contiki – IP-based open source operating system for the IoT
- Etc.

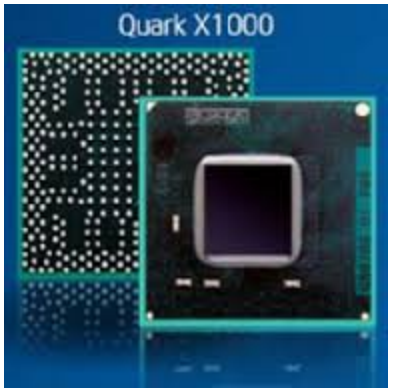
Device and Gateway Manufacturer

- Devices
  - Withings
  - Philips Hue
  - Nike (FuelBand)
  - Fitbit (Force)
  - Apple (iWatch)
  - Jawbone (UP 24)
  - Misfit (Shine)
  - Dropcam
  - Kwikset Kevo E-Lock
  - Honeywell Lyric Thermostat
  - Etc.
- Gateways
  - ECS
  - Actility Cocoon
  - AAEON
  - Portwell
  - Astar-tek
  - Freesacle
  - NXP
  - White Oak Canyon
  - Axiomtek
  - Kontron
  - ADLINK
  - Advantech
  - Etc.
- Development Kits
  - Arduino
  - Raspberry Pi
  - BITalino
  - WunderBar
  - Intel's Galileo/Edison
    - Yocto Application Development Toolkit (ADT)
  - TI's wireless connectivity
  - Mediatek LinkIt
  - Etc.

Chip Manufacturer (Just an example here)

Intel Quark

Mediatek, Marvel, ARM, Intel, TI, QUALCOMM etc.



Intel Quark

Outlook of the IoT/M2M

IoT Alliances

Handbook: Internet of Things Alliances and Consortia

Emerging of IoT/M2M Industry Alliances

- AllSeen Alliance
- Open Connectivity Foundation (OCF)
  - Open Interconnect Consortium (OIC)
- Google Weave
- Apple Homekit
- Industrial Internet Consortium

AllSeen Alliance

- AllSeen Alliance provides the AllJoyn™ framework that is open source software that allows for proximity peer to peer over various transports.
- It is written in C++ at its core, and provides multiple language bindings and complete implementations across various operating systems and chipsets.
- The AllJoyn framework provides an object-oriented approach to making peer to peer easy, avoiding the need to ever deal with lower-level network protocols and hardware.
- The AllJoyn SDK provides a set of APIs that allow a novice developer to create applications that take advantage of AllJoyn's capabilities.
  - Java API
  - C++ API
  - C# Unity API
  - C API

Open Connectivity Foundation (OCF)

- The Open Connectivity Foundation (OCF) is creating a specification and sponsoring an open source project to make this possible.
- OCF will unlock the massive opportunity in the IoT market, accelerate industry innovation and help developers and companies create solutions that map to a single open specification. OCF will help ensure secure interoperability for consumers, business, and industry.
- The OCF unifies the entirety of the former Open Interconnect Consortium (OIC) with leading companies at all levels – silicon, software, platform, and finished-goods – dedicated to providing this key interoperability element of an IoT solution.
- The OCF sponsors the IoTivity open source project which includes a reference implementation of our specification available under the Apache 2.0 license.
- The OCF also includes all the activities formerly sponsored by UPnP Forum.

Open Interconnect Consortium (OIC)

- The OIC, led by Intel, Atmel, Broadcom, Dell, and Samsung, is dedicated to defining requirements and ensuring interoperability of all devices in the IoT.
- Specifically, the OIC envisions a highway-like system of connectivity between IoT verticals, and it recently launched IoTivity, an open-source framework based on the Apache 2.0 licensing and governance model.
- The companies that make up the consortium also make security a top priority, though it's unclear how the group will address privacy.
- One differentiator for the OIC is that it wants to deliver a reference implementation of its IoT standards, rather than simply offering the standards themselves.

Google Weave

Brillo, Nest

- Weave is an application-layer protocol for interacting with devices.
- It has three main components:
  - Weave cloud service
  - Device-side library(libweave, libuweave) and wrappers
  - Client library(android, iOS, web)
- It provides turnkey supports:
  - Device discovery
  - Authentication
  - Provisioning
  - Real time communication

THE THREAD GROUP (GOOGLE NEST)

- Formed by Google's Nest Labs, the Thread Group includes more than 80 members, including Samsung, ARM Holdings, Silicon Labs, and Freescale Semiconductor.
- The group's goal is to encourage manufacturers of smart-home devices to use the Thread standard for device communications through a network.
- Unlike other alliances that provide IoT platforms and interconnectivity of existing standards, Thread relies on a low-power radio protocol known as IPv6 over Low power Wireless Personal Area Networks (6LoWPAN) as the base networking protocol.

Apple Homekit

- An iOS(8) framework for home automation
- Discover HomeKit accessories (devices)
- Configure
- Create actions and control devices
- Actions can be grouped and triggered using Siri
- A common database stored on iOS, contains all home information configured. Available to all apps
- App interaction to DB is done through HomeKit
- Access to home devices remotely through iOS connectivity
- HomeKit API can only be used if App is in foreground

Industrial Internet Consortium

- It is a nonprofit partnership of Industry, Government and Academia.
- Founded by AT&T, Cisco, General Electric, Intel and IBM. (150+ members)
- Started in March, 2014, not a standards-setting consortium.
- Utilize existing and create new industry use cases and testbeds for real-world applications.
- Deliver best practices, reference architectures, case studies, and standards requirements to ease deployment of connected technologies.
- Influence the global development standards process for internet and industrial systems.
- Facilitate open forums to share and exchange real-world ideas, practices, lessons, and insights.
- Build confidence around new and innovative approaches to security.

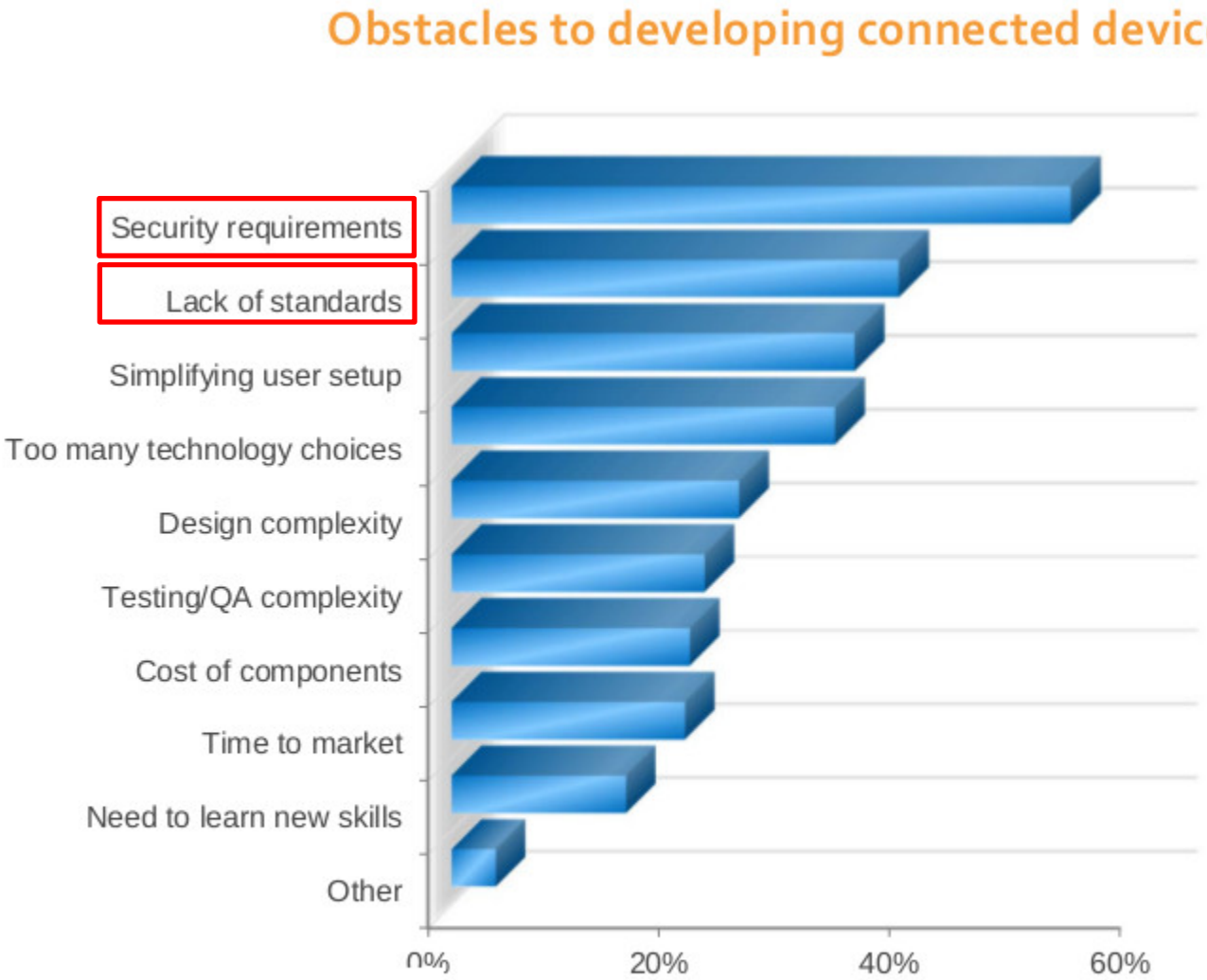
industrial internet CONSORTIUM

物聯網面臨的挑戰

- Numerous incomplete standards
- Big data store and process
- Security and privacy
- Network mismatch (not designed for IoT)
- Network scalability
- Naming and addressing (semantic web)
- …

IDC認為物聯網市場的挑戰

VDC調查物聯網的障礙因素



VDC Research
Insights for the Connected World

物聯網相關之國際標準組織

- ETSI (European Telecommunications Standards Institute)
- Institute of Electrical and Electronics Engineers (IEEE): IEEE-SA IoT Steering Committee
- International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC): ISO/IEC JTC1/SWG 5 (ad hoc group 4)
- US National Institute of Standards and Technology (NIST)
  - Smart Grid framework (SG-FW)
- CCSA, China
- European Standard Organization (ESO)
- Object Management Group (OMG)
- Open Geospatial Consortium (OGC)
- European Commission mandates
  - Smart metering [M/441]
  - RFID and system [M/436]

物聯網重要的新網路協定

- 感測網路
  - IEEE 802.15.4, IEEE 802.15.4e (2012)，IEEE 802.15.4g
  - Bluetooth 4.2 (2014), Bluetooth 5.0 (2016)
  - RFID
  - Power Line Communication (PLC)
  - ANSI C12 (AMI), KNX(home/building), BACNet (building)
  - IETF: 6LoWPAN, RPL
- 長距離傳輸網路
  - LTE-A NB-IoT，RoLa, SigFox
- 應用層
  - CoAP, MQTT

LPWAN: Low Power Wide Area

	SIGFOX	LoRa	clean slate cIoT	NB LTE-M Rel. 13	LTE-M Rel. 12/13	EC-GSM Rel. 13	5G (targets)
Range (outdoor) MCL	<13km 160 dB	<11km 157 dB	<15km 164 dB	<15km 164 dB	<11km 156 dB	<15km 164 dB	<15km 164 dB
Spectrum Bandwidth	Unlicensed 900MHz 100Hz	Unlicensed 900MHz <500kHz	Licensed 7-900MHz 200kHz or dedicated	Licensed 7-900MHz 200kHz or shared	Licensed 7-900MHz 1.4 MHz or shared	Licensed 8-900MHz 2.4 MHz or shared	Licensed 7-900MHz shared
Data rate	<100bps	<10 kbps	<50kbps	<150kbps	<1 Mbps	10kbps	<1 Mbps
Battery life	>10 years	>10 years	>10 years	>10 years	>10 years	>10 years	>10 years
Availability	Today	Today	2016	2016	2016	2016	beyond 2020

mIoT: massive IoT

Summary

- Current Landscape of the IoT/M2M
  - —Brief Introduction to IoT/M2M
  - —IoT/M2M Trends
  - —IoT/M2M Business Opportunities
- Outlook of the IoT/M2M
  - —Emerging of IoT/M2M Industry Alliances

Acronym

- M2M: Machine-to-Machine
- IoT: Internet of Things
- M2M area network (devices + gateway)
- Communication networks: Mobile network or public Internet
- European Telecommunication Standards Institute (ETSI)
- Information and Communication Technologies (ICT)
- Radio-Frequency Identification (RFID)
- American Recovery and Reinvestment Act (ARRA)
- Energy Independence and Security Act (EISA)
- National Institute of Standards and
- Technology (NIST)
- Third-Generation Partnership Project (3GPP)
- In-Vehicle System (IVS)
- Public Safety Answering Point (PSAP)
- European Standard Organization (ESO)
- Priority action plan (PAP)
- Wireless Personal Area Network (WPAN)
- Power-Line Communication (PLC)
- Meter-Bus (M-BUS)
- Internet Engineering Task Force (IEFT)
- Average Revenue Per User(ARPU)
- Representation State Transfer (REST)
- Federal Communication Commission (FCC)
- Device Language Message Specification (DLMS)
- Machine Type Communication (MTC)
- Open Mobile Alliance (OMA)