Internet-of-Things (IoT)

Introduction

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].

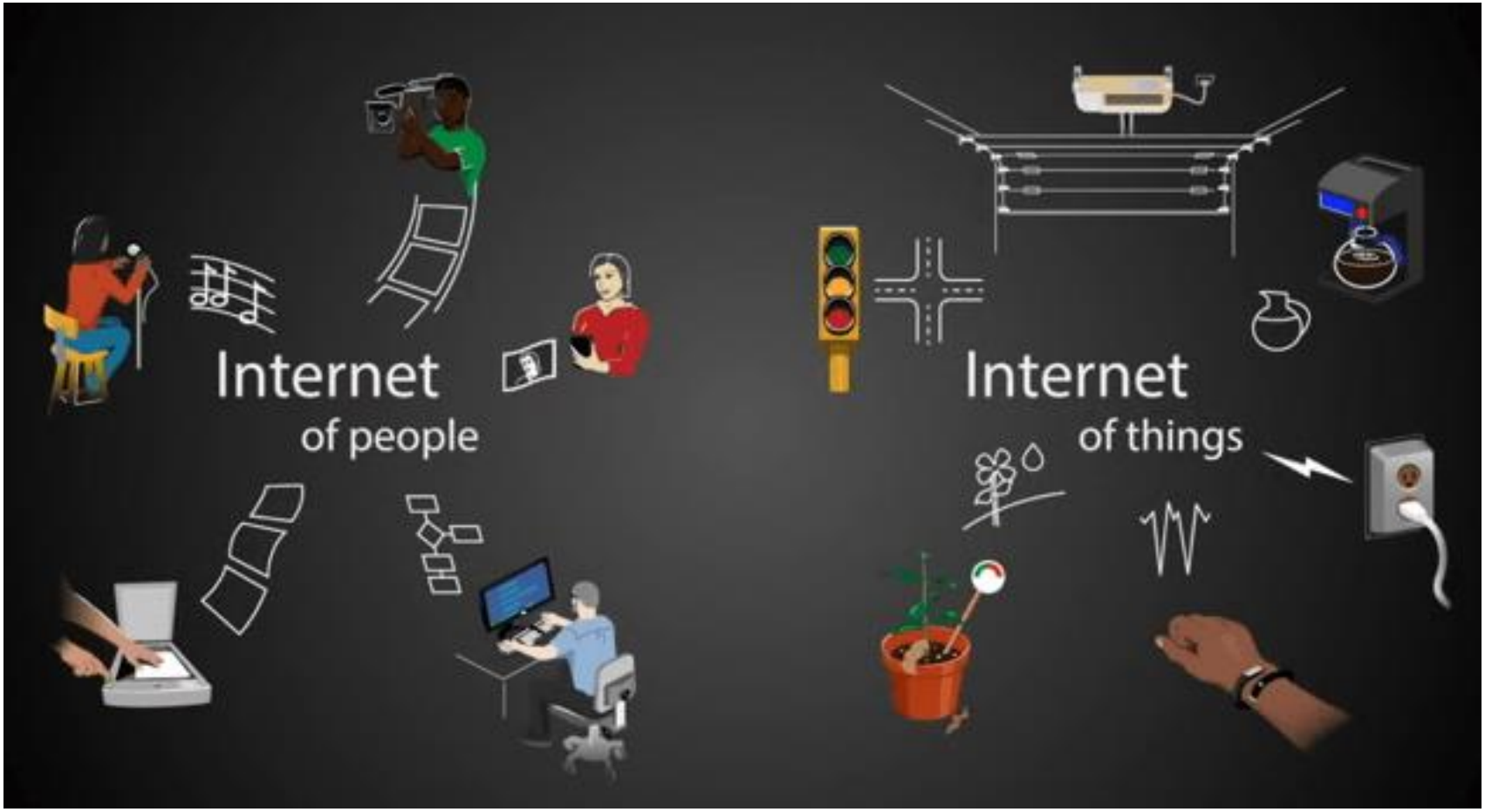
- IoT refer to the connection of devices to the Internet.

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

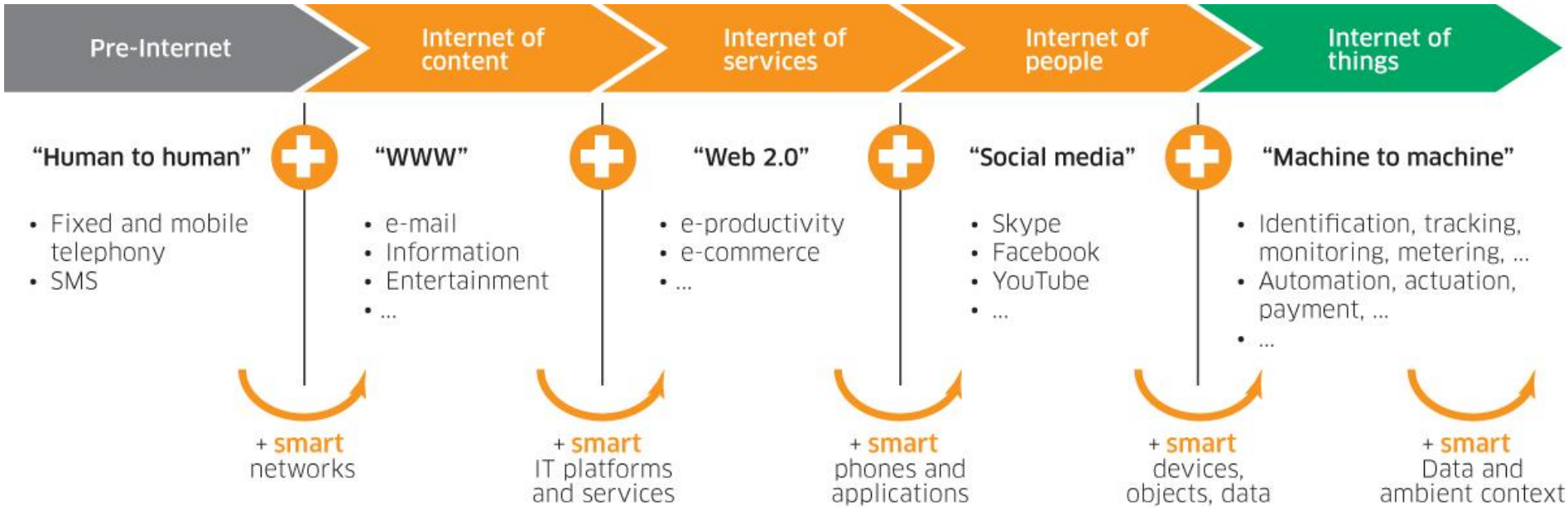
Internet of People (IOP)

- People are connected with the Internet.
- Internet is everywhere in the World.
- It is the primary connection between people.

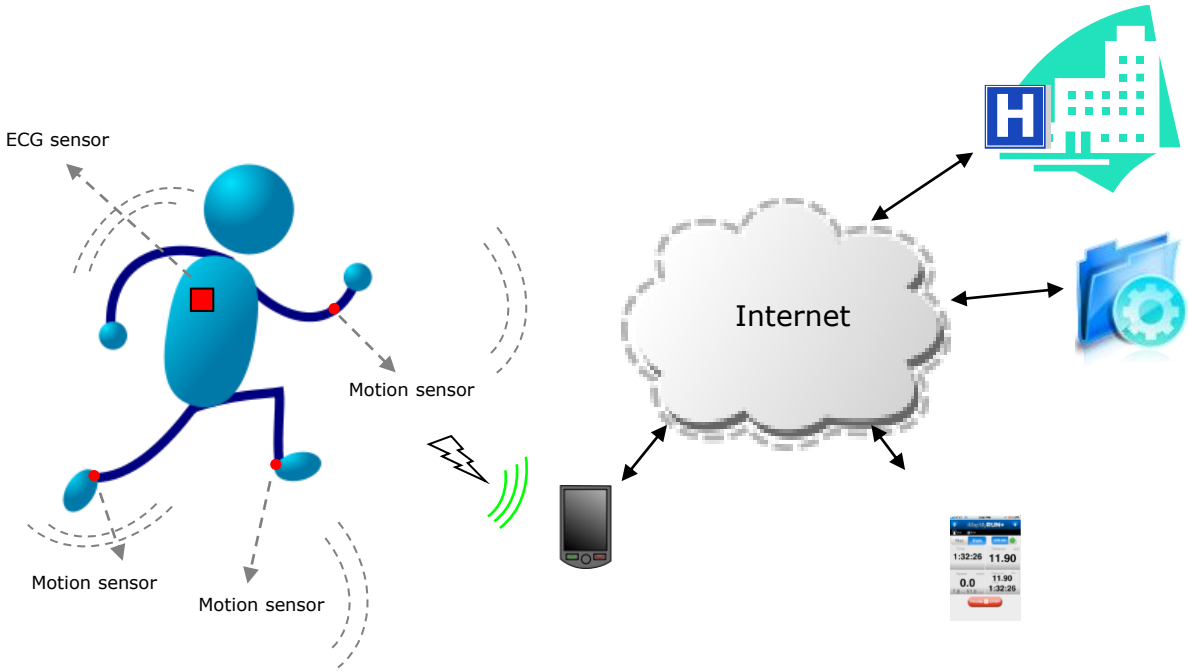
IOP IOT



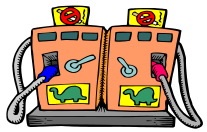
Internet-of-Things Evolution

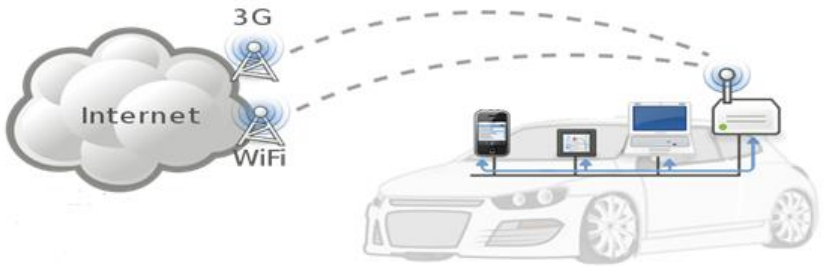


People Connecting with Things



Things Connecting with Things





- Complex and heterogeneous resources and networks

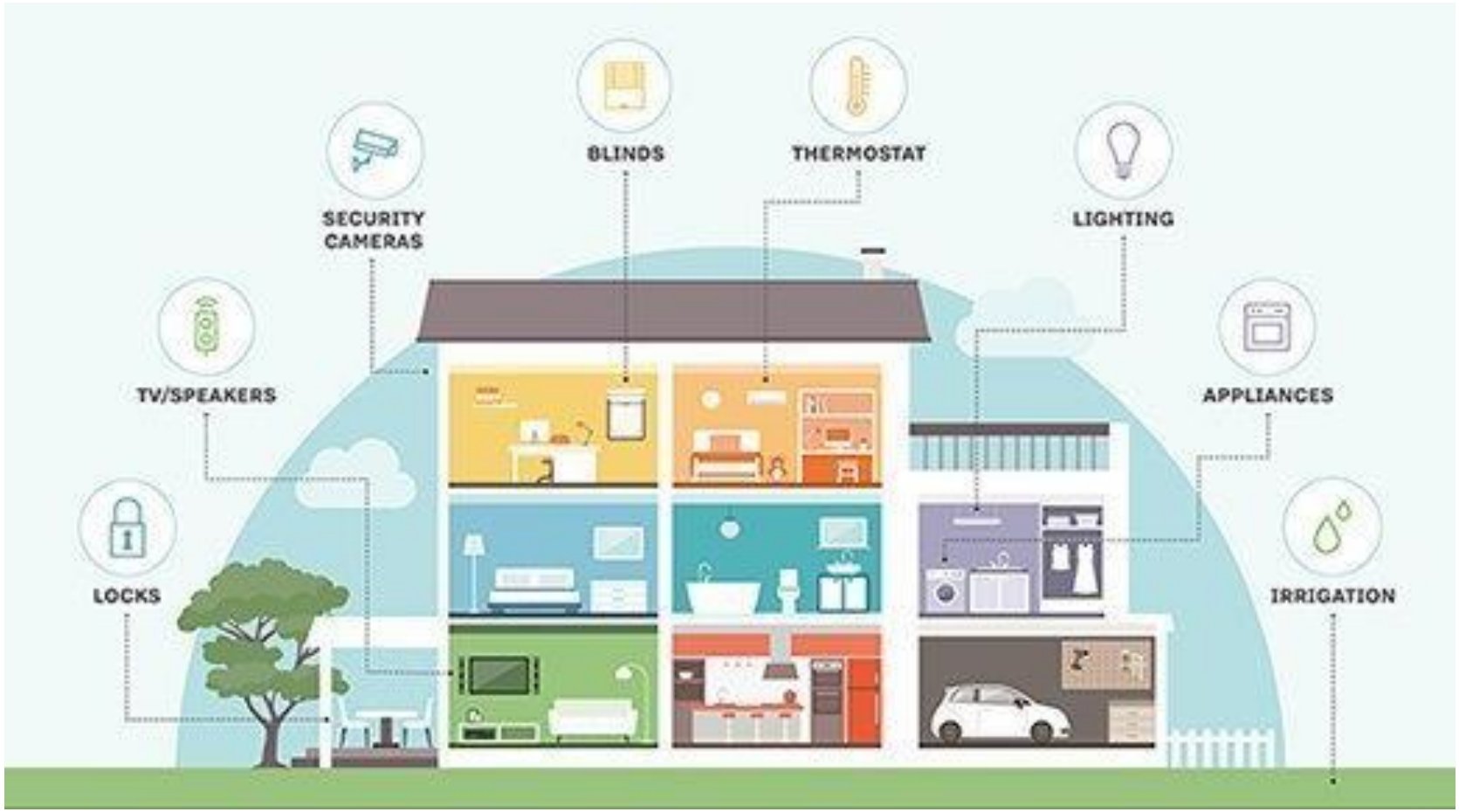
Where is IOT?

IOT is everywhere!

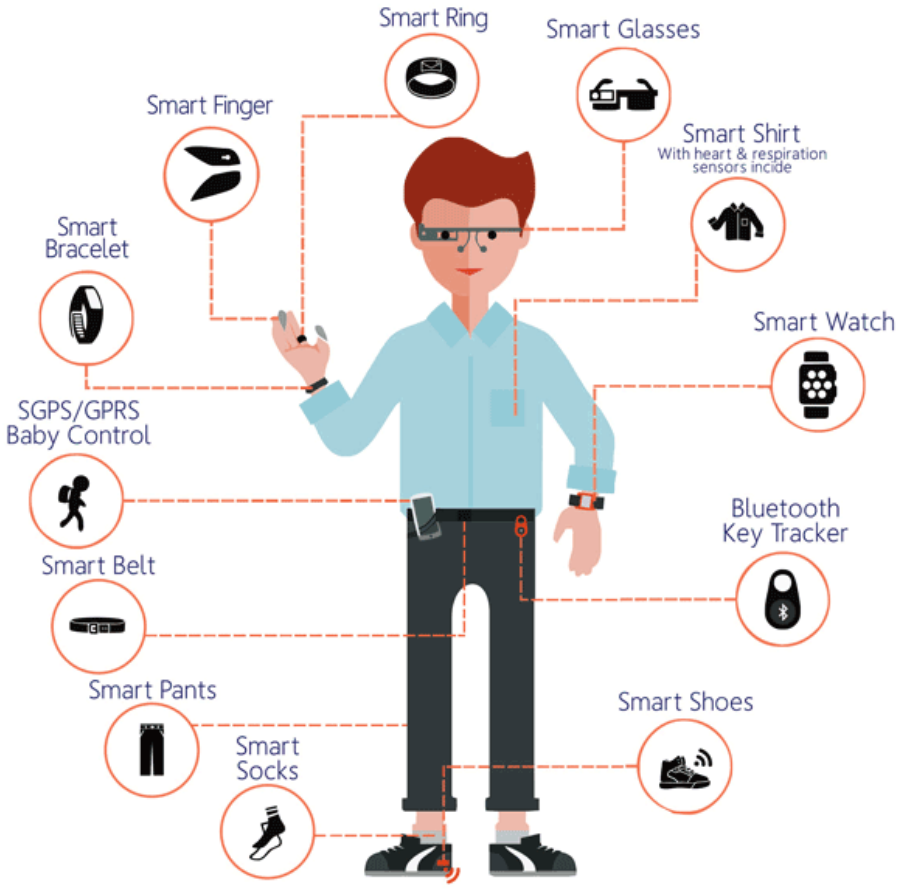

IoT

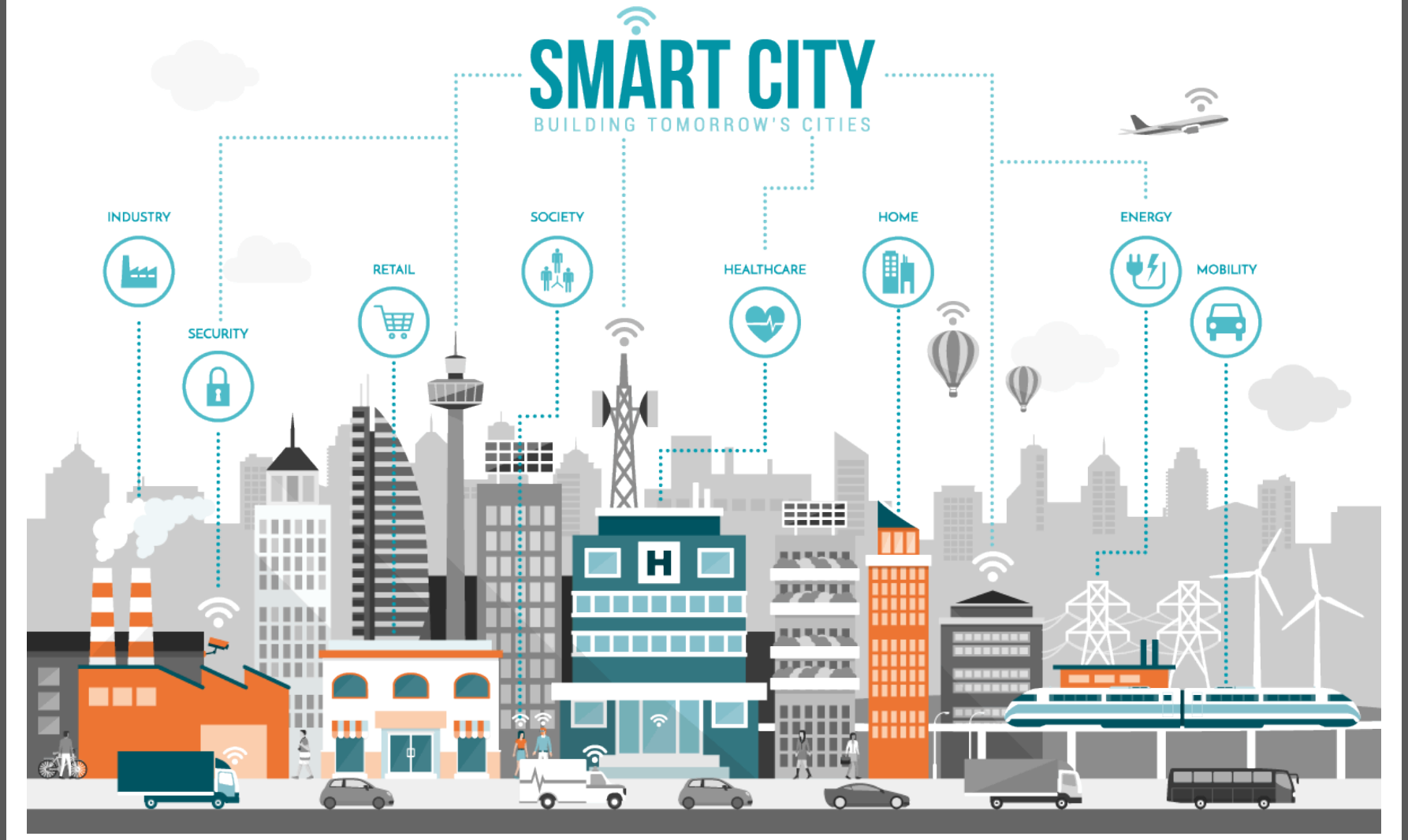
Applications

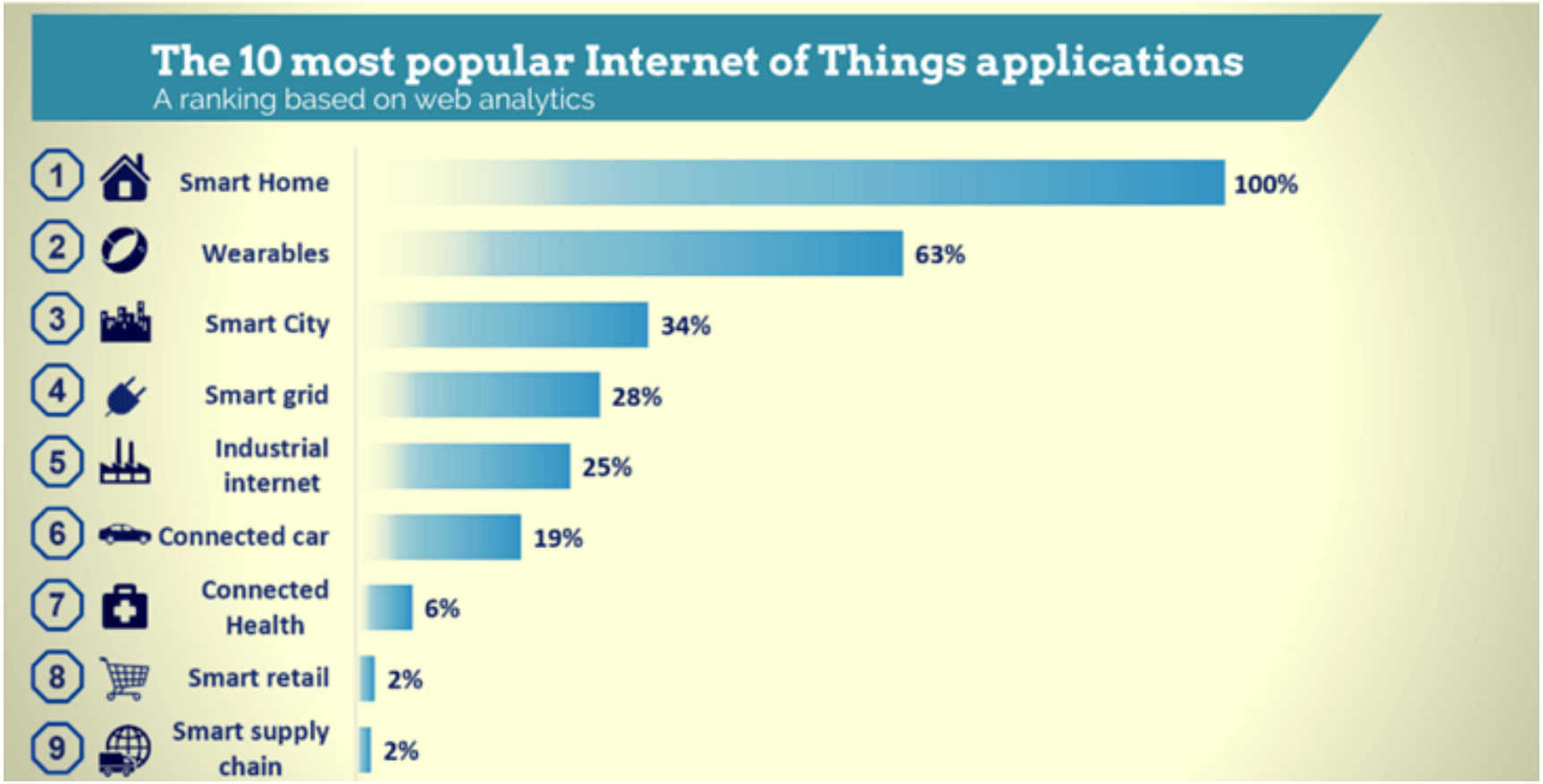
Smart Homes


BLINDS
THERMOSTAT
SECURITY CAMERAS
LIGHTING
TV/SPEAKERS
APPLIANCES
LOCKS
IRRIGATION

Wearable


Smart Ring
Smart Glasses
Smart Finger
Smart Shirt
With heart & respiration sensors incide
Smart Bracelet
Smart Watch
SGPS/GPRS Baby Control
Bluetooth Key Tracker
Smart Belt
Smart Pants
Smart Shoes
Smart Socks


SMART CITY
BUILDING TOMORROW'S CITIES
INDUSTRY
SECURITY
RETAIL
SOCIETY
HEALTHCARE
HOME
ENERGY
MOBILITY
H

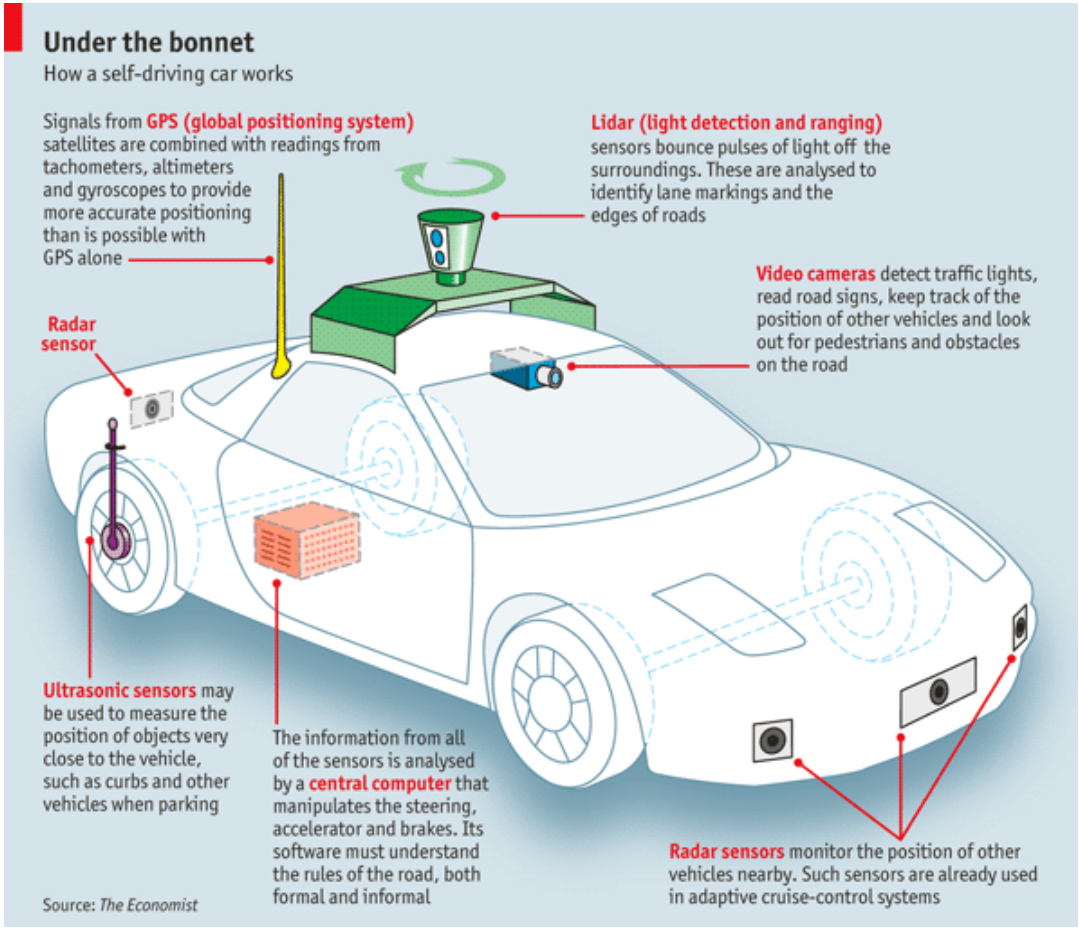

The 10 most popular Internet of Things applications
A ranking based on web analytics
1 Smart Home 100%
2 Wearables 63%
3 Smart City 34%
4 Smart grid 28%
5 Industrial internet 25%
6 Connected car 19%
7 Connected Health 6%
8 Smart retail 2%
9 Smart supply chain 2%

Augment Existing Things

Augmenting Life With New Things

- Smart City
- Smart Car
- Smart Me (healthcare, fitness, wellness)

Example: Connected Roadways



Example: Connected Roadways

State of Self-Driving Car

The Connected Factory in Action

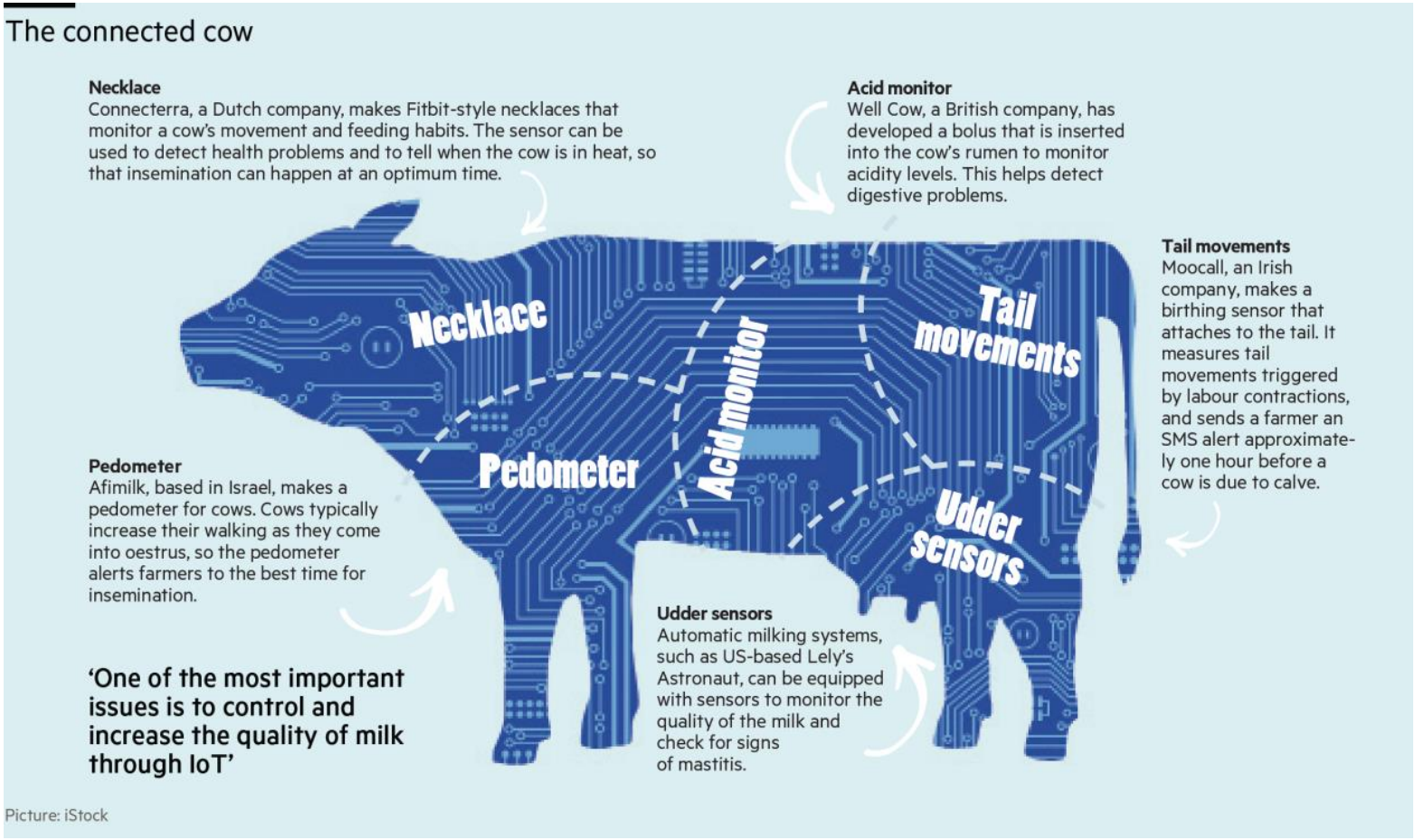
Example: Connected Factory

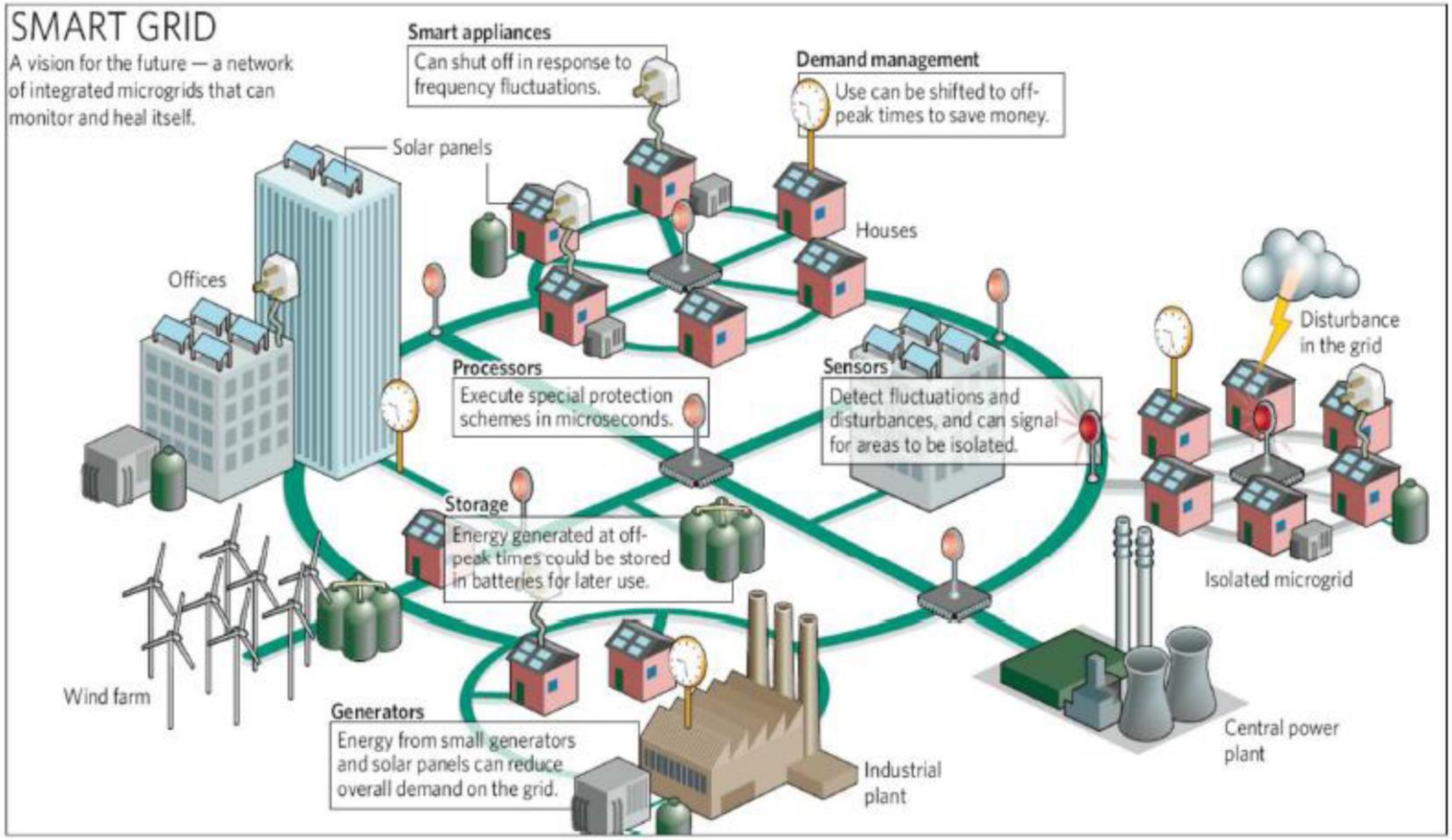
- New product and service introductions faster
- Increasing production, quality, uptime
- Mitigating unplanned downtime
- Protecting from cyber threats
- Worker productivity and safety

Example: Smart & Connected Buildings

- Energy management
- Lighting
- Safety
- HVAC
- Building automation
- Smart spaces

Example: Smart Creatures





Example: Smart Grid

Enablers: Portability

Reducing the size of hardware to enable the creation of computers that could be physically moved around relatively easily

Enablers: Miniaturization

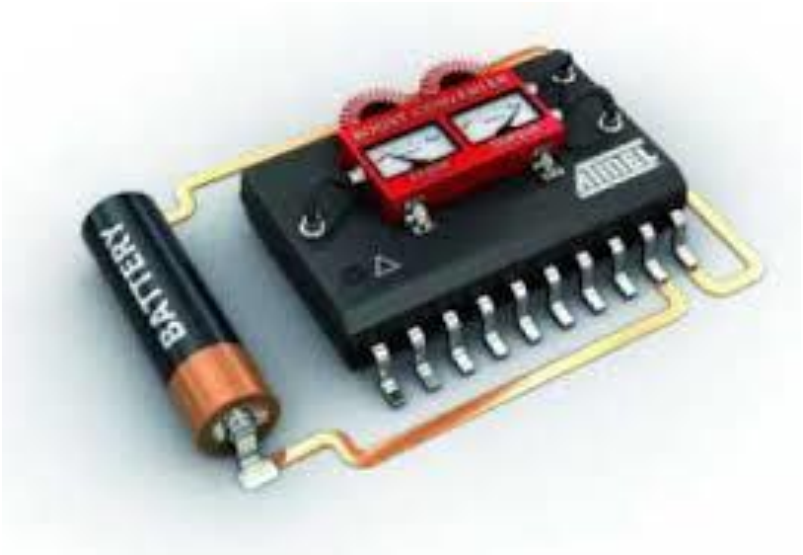
Creating new and significantly smaller mobile form factors that allowed the use of personal mobile devices while on the move

50mm x 50mm

35mm x 35mm

15mm x 15mm

Enablers: Low Power and Low Heat



- Low power architectures
- Low power radios
- Sleep modes
- Energy harvesting

Enablers: Connectivity

- Developing devices and applications that allowed users to be online and communicate via wireless data networks while on the move

Wi Fi

Bluetooth®

4G LTE

Enablers: Convergence

Integrating emerging types of digital mobile devices, such as Personal Digital Assistants (PDAs), mobile phones, music players, cameras, games, etc., into hybrid devices.

Enablers: Divergence

Opposite approach to interaction design by promoting information appliances with specialized functionality rather than generalized ones

Enablers: Ecosystems

The emerging wave of *digital ecosystems* is about the larger wholes of pervasive and interrelated technologies that interactive mobile systems are increasingly becoming a part of.

Example: Smartphone

- Portability: carry it anywhere you want
- Miniaturization: make it possible to build device to fit in your pocket
- Connectivity: Wi-Fi, LTE/4G, cellular, Bluetooth
- Convergence: phone, camera, gaming device, movie streaming, music player, …
- Digital Ecosystem: cloud, social networks, software development kits, app stores, big data, standardization …

IoT Issues & Challenges

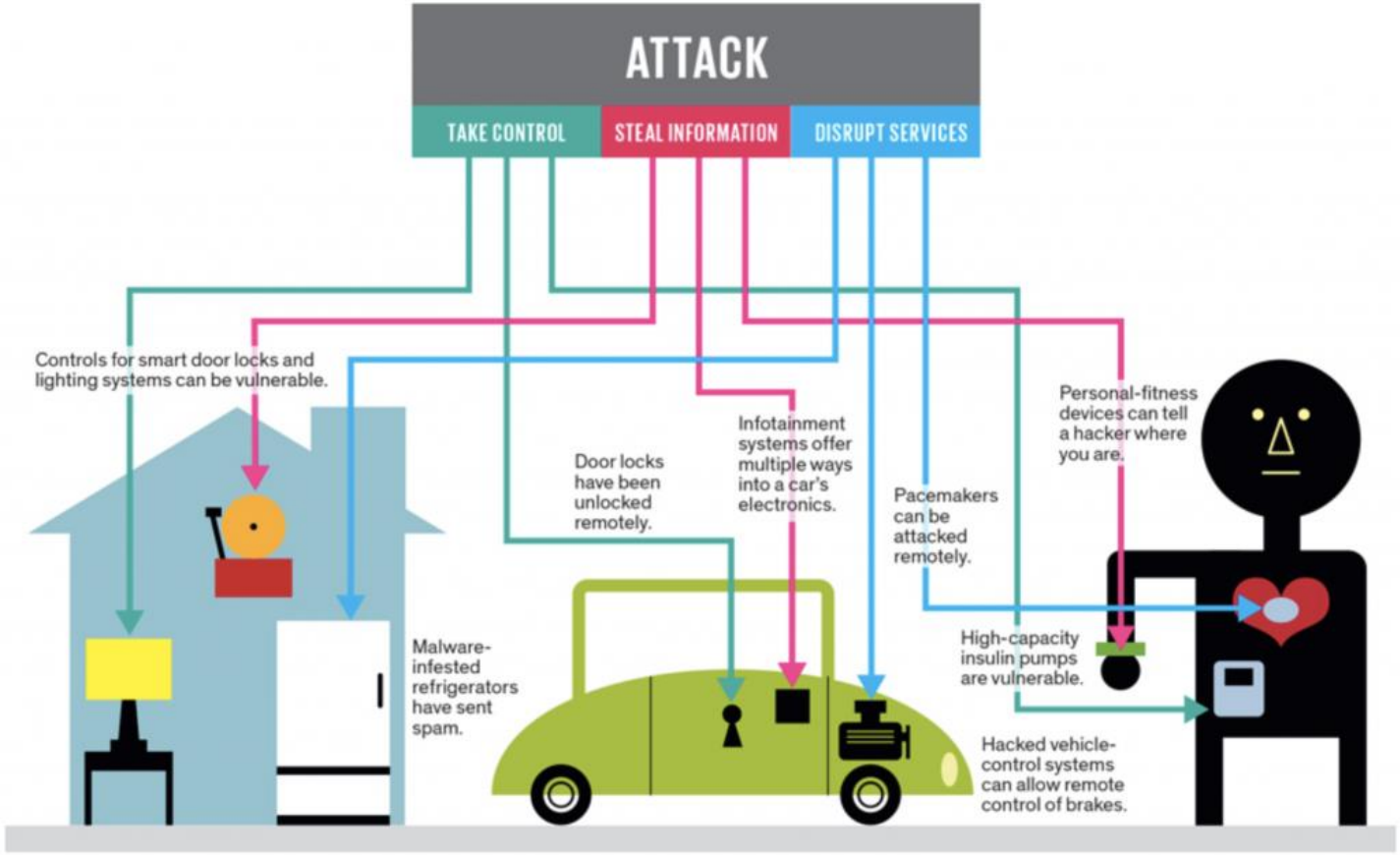


Illustration: J. D. King

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