A path towards the future: Automation Services based on the Internet of Things and Ubiquitous Computing

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Presentation overview

- What is IoT and ubiquitous computing
- The current eco-system of IoT
- Elements of IoT
  - Data acquisition
  - Existing network technologies
  - Data processing and visualisation
- Potential applications

What is the Internet of Things (IoT) ?

IoT is like teenage sex:

everyone talks about it,

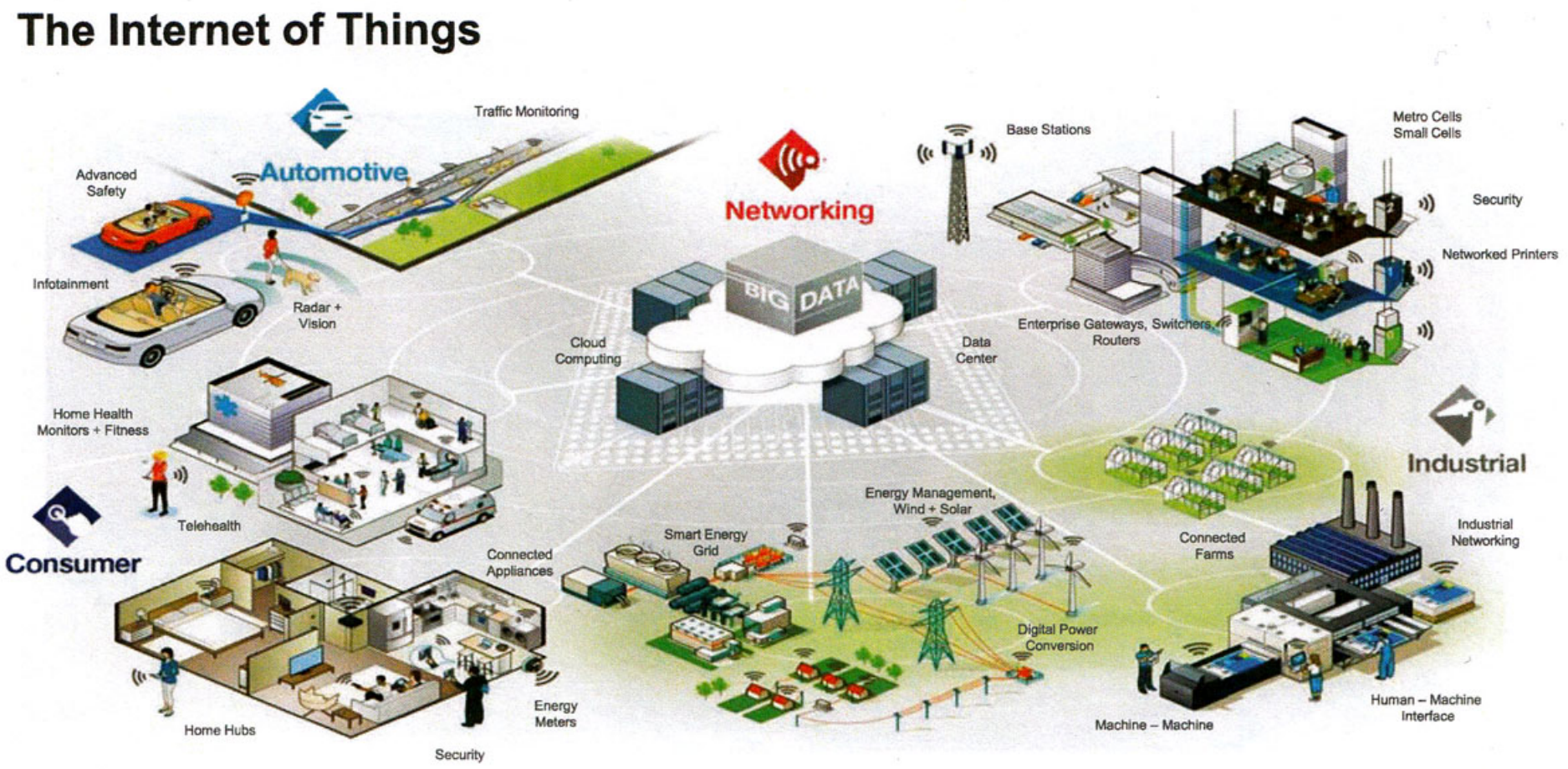
nobody really knows how to do it,

everyone thinks everyone else is doing it,

so everyone claims they are doing it…

- A great quote from Dan Ariely of Duke University about "Big Data" analysis, which applies just as well to IoT

Current IoT eco-system



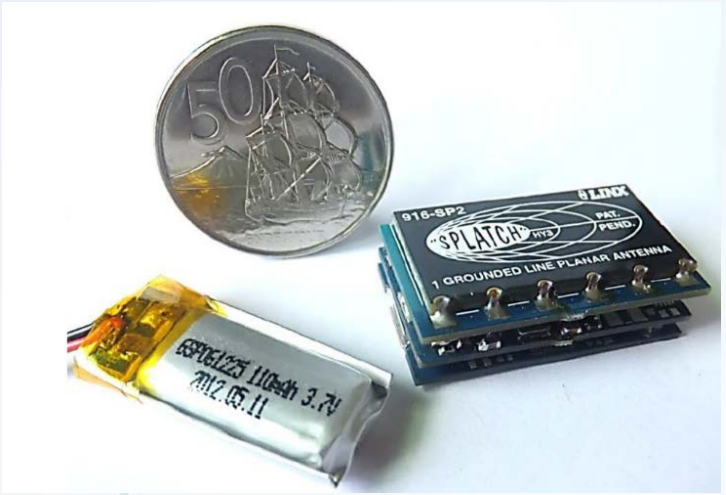
Source: http://www.theregister.co.uk/2014/05/07/freescale_internet_of_things/

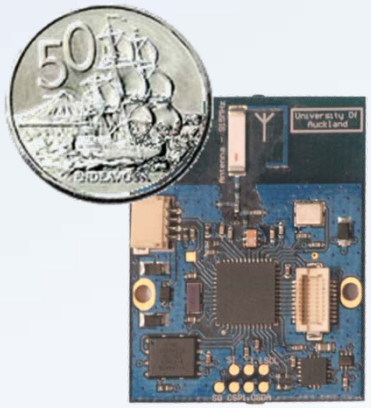
What is IoT & ubiquitous computing ?

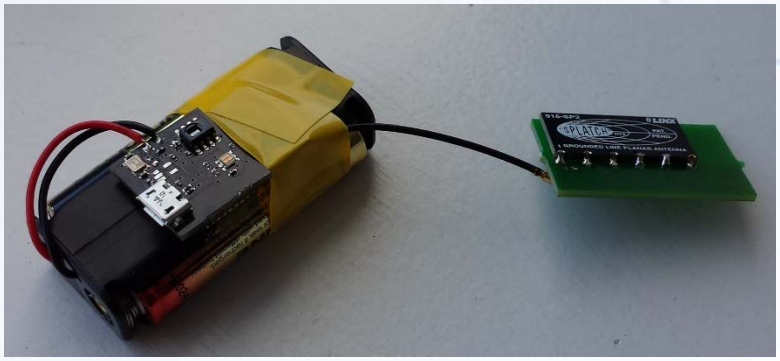
- What is IoT and ubiquitous computing
  - A collection of independent computing resources (or "Things") that
    - are connected to networks
    - share resources and data to a certain extent
    - appears as a single coherent system to end users
    - interacts with human and other "Things"
    - provides integrated services
- Benefits
  - Human centred rather than machine centred
  - Integrated services with more superior non-functional (e.g. real-time, remote access) requirements
  - Ubiquity, variety, longevity, interconnectivity, interoperability
- Elements of IoT
  - Sensing
  - Communication
  - Data processing and visualisation

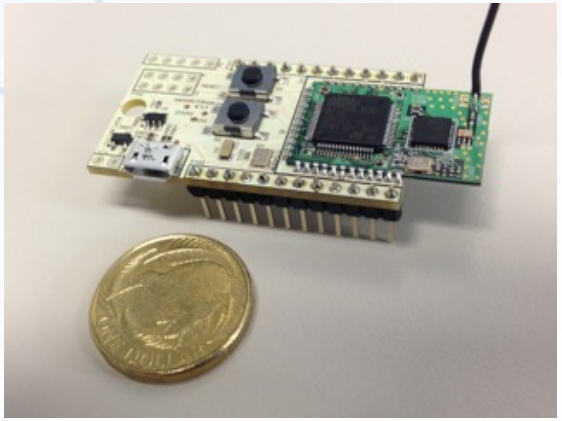
Sensing

- The goal is to achieve unobtrusive, ubiquitous sensing and interaction
  - with immediate physical environment
  - with human or other "Things"
  - for large scale, distributed, remote monitoring and control
- Challenges:
  - Ubiquity
  - Longevity
  - Interoperability



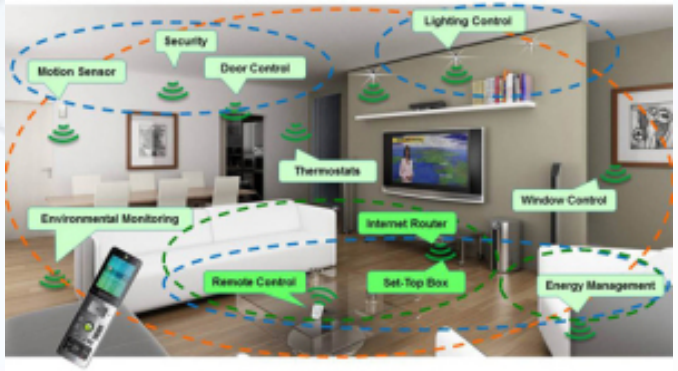






Communication

- Wide varieties of communication technologies
  - Short range RF (low power, long operating life): RFID, Bluetooth, WiFi
  - Narrowband LTE (long range, low data rate): LoRaWAN, Sigfox
  - Backbone (high bandwidth, fast speed): IP, Cellular networks, Fibre
  - Proprietary networks
  - Legacy
- What are the most suitable technologies for your applications?
- Challenges: how to provide intuitive and integrated services, with hidden interconnectivity

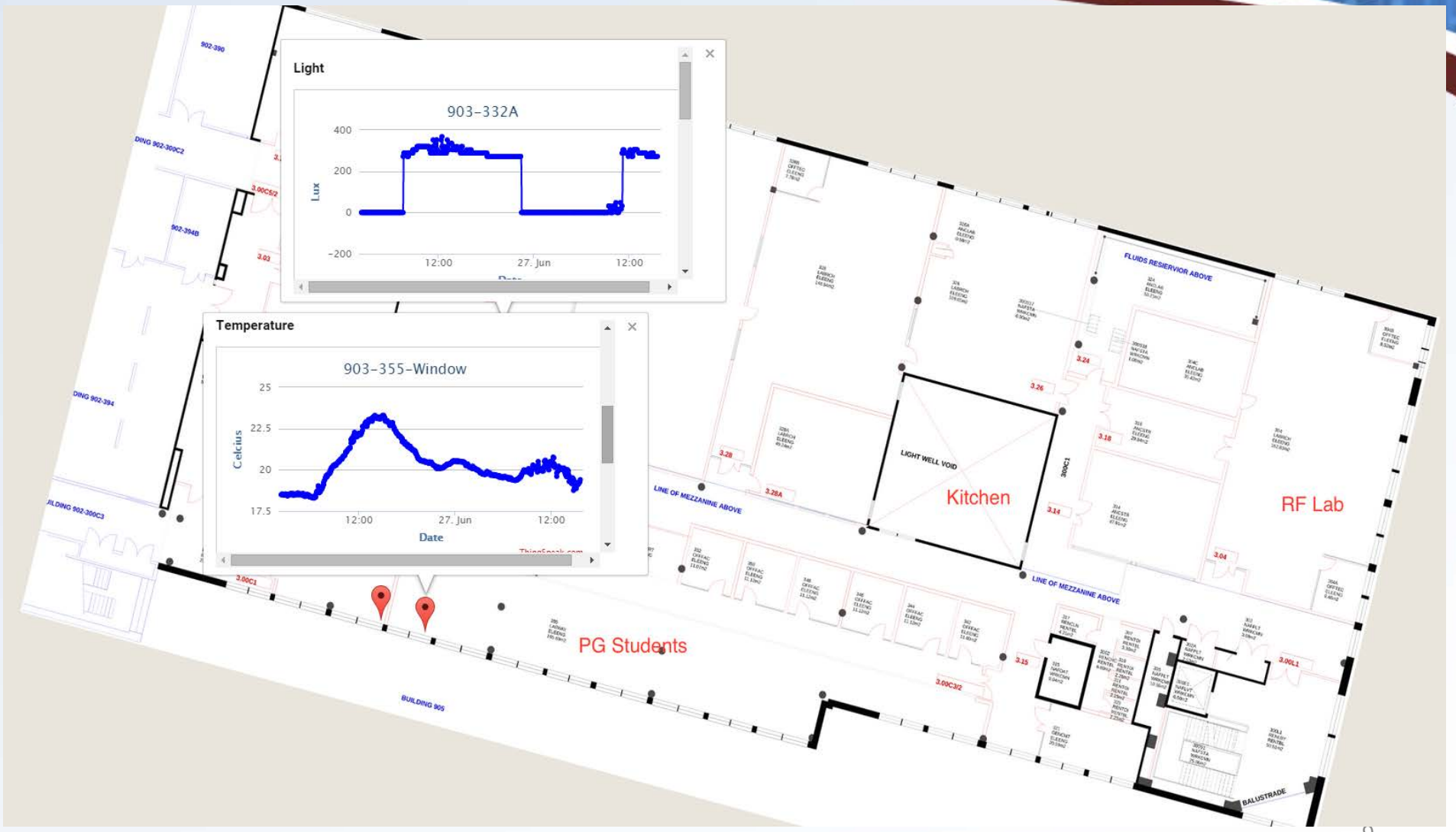


Source: http://www.soarhawkesbay.co.nz/weather-stations/
http://www.advanticsys.com/shop/prokit-p-27.html
https://autohomebyqeo.wordpress.com/2014/03/24/the-internet-of-things/

Data processing

- It is all about Data!
- Data: the most valuable “by-product”
  - Many industries are collecting data for no reason
  - Use of different context information for more intelligent applications
  - Extraction of unknown patterns to facilitate better decision making
- Challenges: abundant but noisy data
  - Data filtering, storage and organisation
  - Industries require customised models to be built
    - Patterns/correlations of different parameters/factors
  - Extraction of useful patterns and information
    - Route optimisation
    - Quality assurance
    - Trend analysis

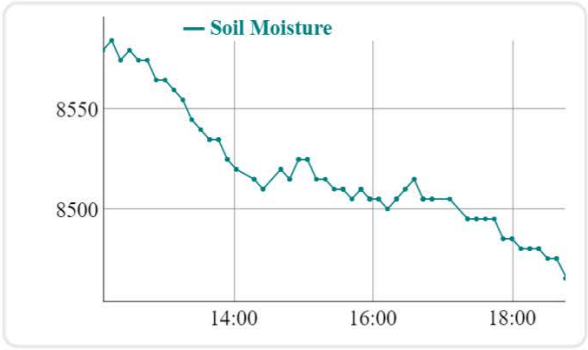
Data visualisation



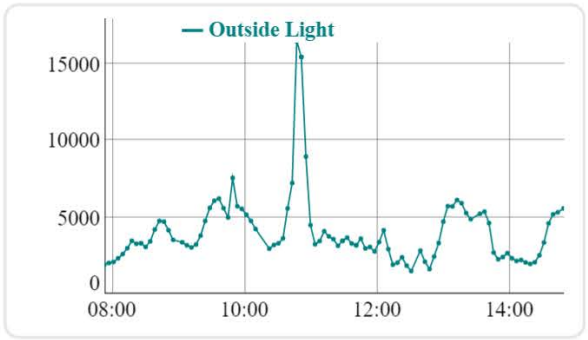
Data visualisation

Plant Monitoring

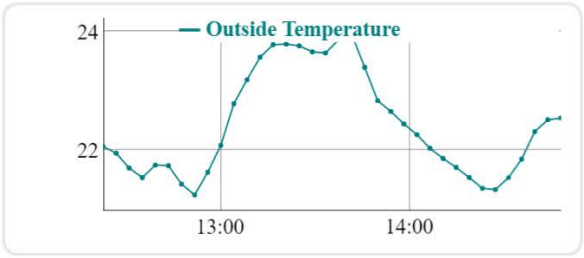
Soil Moisture



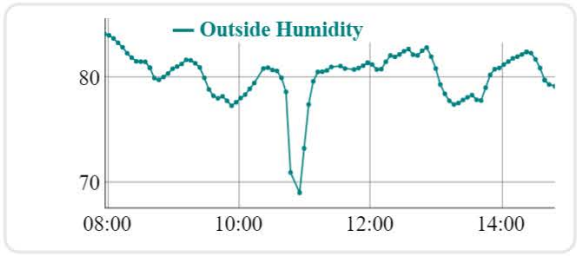
Light



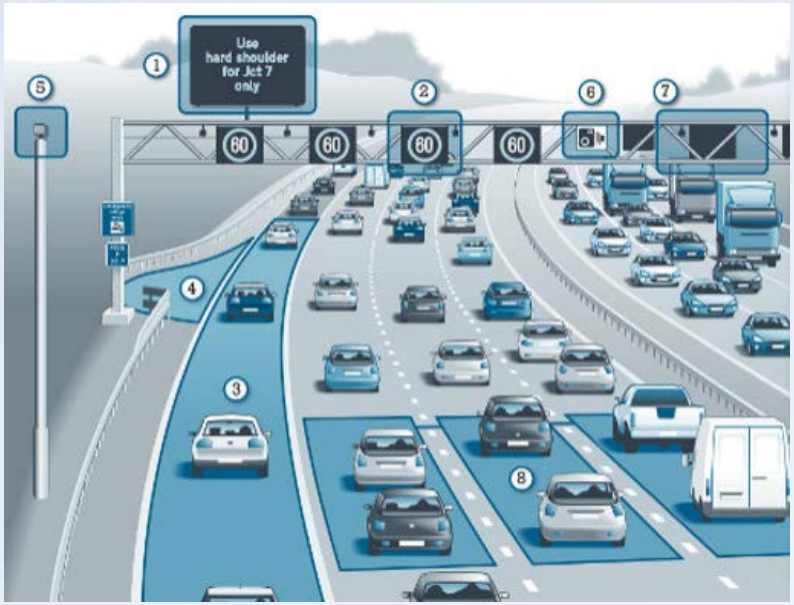
Temperature



Humidity

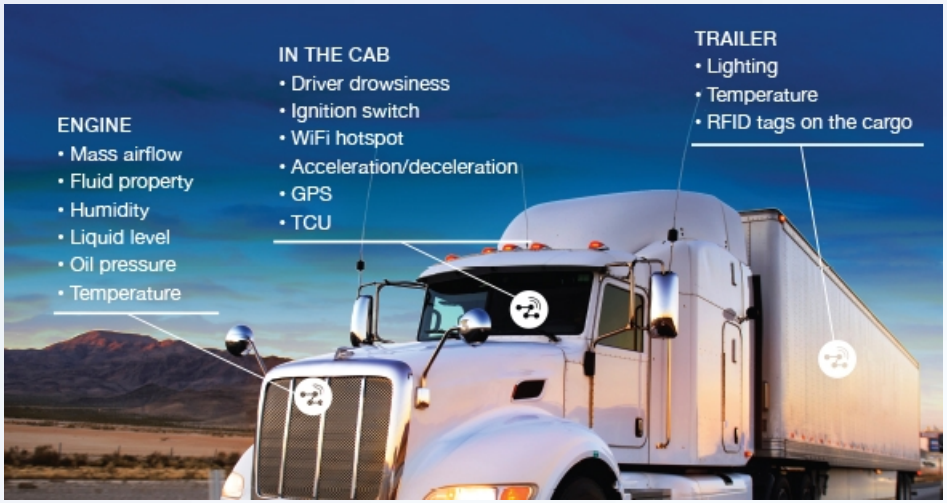


Potential applications



Source: http://eandt.theiet.org/magazine/2013/01/how-to-traffic-jams.cfm

Source: https://bensontao.wordpress.com/



Source: http://blog.jasper.com/truck-has-more-connections-kevin-bacon

Source: https://enterprise.microsoft.com/en-us/blog/caglayan-blog/how-iot-enables-smart-agriculture/

Thank you

Questions?

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