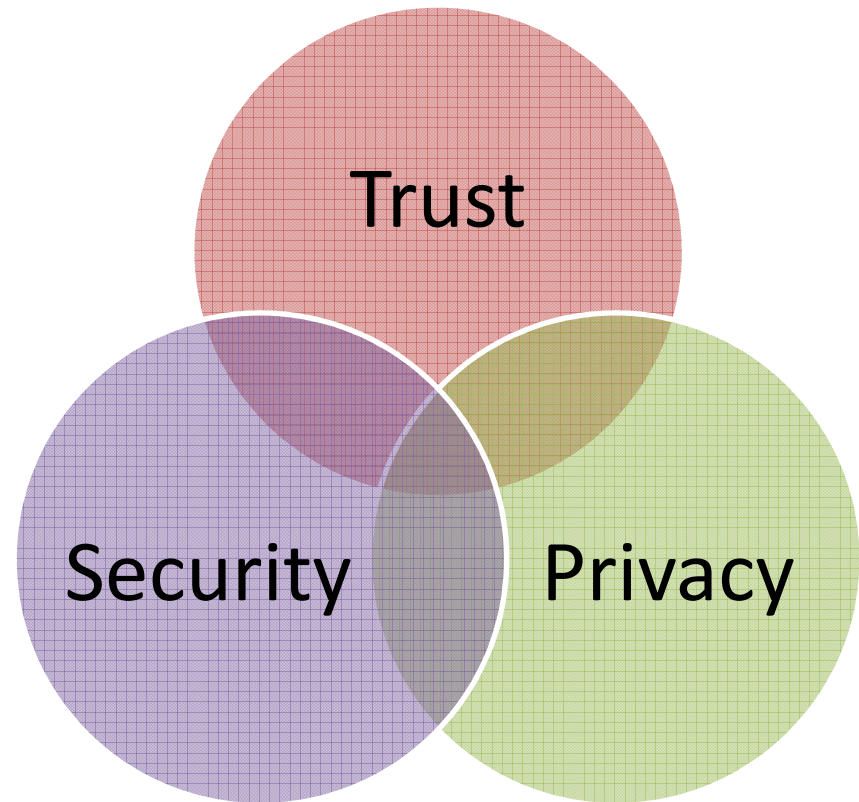


Trust and Ethics on Internet of Things



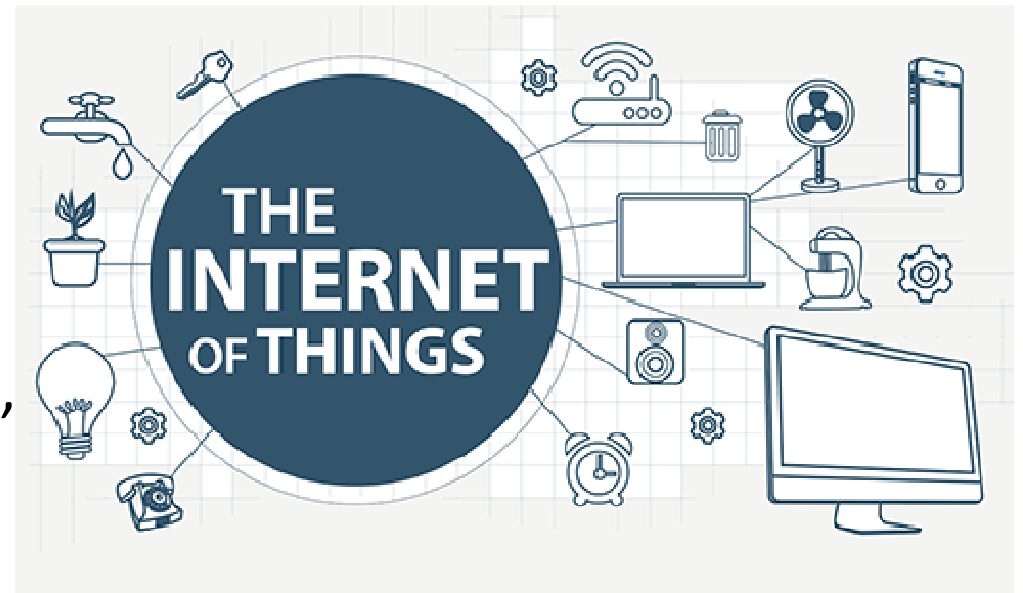
Agenda

- Trust, privacy and security and in the digital age- what do kiwis think?
- The Internet of Things (the IoT)
- The Privacy Commissioner
- Questions



The Internet of Things

‘Spatially distributed devices with embedded identification, sensing and/or actuation capabilities that connect, interact and share information’
(Miorandi et al, 2012)



Forbes

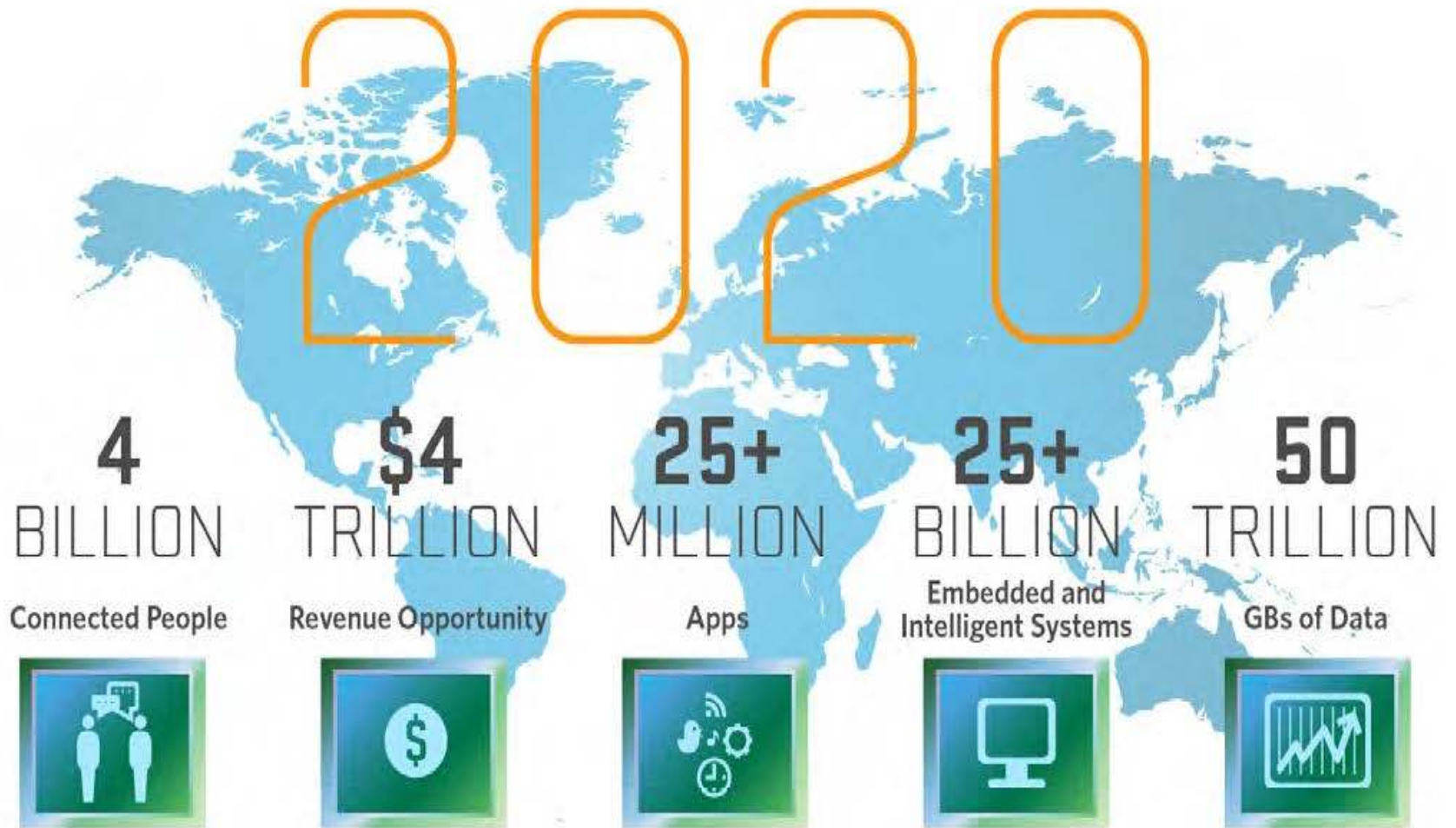
- Worldwide spending on the IOT will be \$1.3 trillion by 2019
- Globally 6.4 billion 'things' will be connected to the internet by the end of 2016 (up 30% on 2015).
- Estimated to reach 20.8 billion things by 2020
- The global wearable device market grew 233% in 2015 including the sale of 4.4 million Fitbits and 3.6 million Apple smart watches

Source: Forbes and the IoT available at: <http://www.forbes.com/internet-of-things/#599fa69f2986>



School of Business
Unlimited Future, Unlimited Possibilities





Source: Mario Morales, IDC



School of Business
Unlimited Future, Unlimited Possibilities



Perspectives

The (former) Politician's Perspective

'new industrial revolution that will boost productivity, keep us healthier, make transport more efficient, reduce energy needs and tackle climate change'

(Cameron, 2014).

The Academic's Perspective

'a tipping point involving the fusion of smart technologies and service is being reached where smart everything is approaching'

(Medina-Borja, 2015)

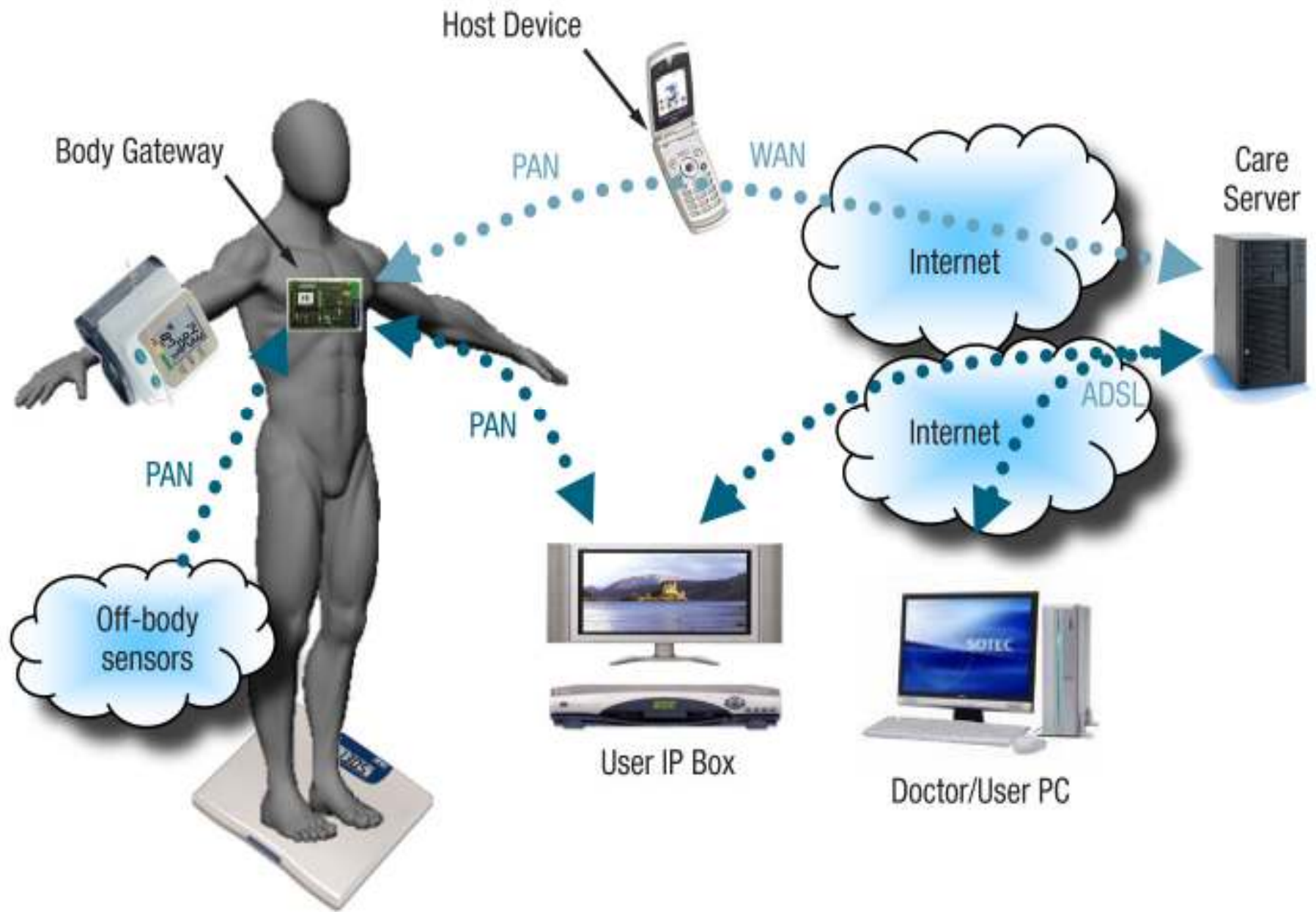




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- | | | |
|--|------------------------|-----------------------------------|
| 1 Ambient Intelligence Agent (AmI) Control | 6 Automatic Pet Feeder | 12 Lawn Moisture Sensor |
| 2 Light Sensor | 7 Motorized Drapes | 13 Face Recognition Sensor |
| 3 Windows and Door Control | 8 Automatic Watering | 14 Motion Sensors |
| 4 HVAC Control | 9 Mailbox Sensor | 15 Door Sensors |
| 5 Lighting Control | 10 Driveway Sensor | 16 AmI Interface with Car |
| | 11 Security System | 17 AmI Interface with Smart Phone |





Libelium Smart World

Air Pollution

Control of CO₂ emissions of factories, pollution emitted by cars and toxic gases generated in farms.

Forest Fire Detection

Monitoring of combustion gases and preemptive fire conditions to define alert zones.

Wine Quality Enhancing

Monitoring soil moisture and trunk diameter in vineyards to control the amount of sugar in grapes and grapevine health.

Offspring Care

Control of growing conditions of the offspring in animal farms to ensure its survival and health.

Sportsmen Care

Vital signs monitoring in high performance centers and fields.

Structural Health

Monitoring of vibrations and material conditions in buildings, bridges and historical monuments.

Quality of Shipment Conditions

Monitoring of vibrations, strokes, container openings or cold chain maintenance for insurance purposes.

Smartphones Detection

Detect iPhone and Android devices and in general any device which works with WiFi or Bluetooth interfaces.

Perimeter Access Control

Access control to restricted areas and detection of people in non-authorized areas.

Radiation Levels

Distributed measurement of radiation levels in nuclear power stations surroundings to generate leakage alerts.

Electromagnetic Levels

Measurement of the energy radiated by cell stations and WiFi routers.

Traffic Congestion

Monitoring of vehicles and pedestrian affluence to optimize driving and walking routes.

Smart Roads

Warning messages and diversions according to climate conditions and unexpected events like accidents or traffic jams.

Smart Lighting

Intelligent and weather adaptive lighting in street lights.

Intelligent Shopping

Getting advices in the point of sale according to customer habits, preferences, presence of allergic components for them or expiring dates.

Noise Urban Maps

Sound monitoring in bar areas and centric zones in real time.

Water Leakages

Detection of liquid presence outside tanks and pressure variations along pipes.

Vehicle Auto-diagnosis

Information collection from CanBus to send real time alarms to emergencies or provide advice to drivers.

Item Location

Search of individual items in big surfaces like warehouses or harbours.

Waste Management

Detection of rubbish levels in containers to optimize the trash collection routes.

Smart Parking

Monitoring of parking spaces availability in the city.

Golf Courses

Selective irrigation in dry zones to reduce the water resources required in the green.

Water Quality

Study of water suitability in rivers and the sea for fauna and eligibility for drinkable use.

Bentham's Panopticon?



“These technologies will be some of the most intimate we have ever used and which we will be installing on ourselves and throughout our living spaces”.

Bolger (2014)



What's different?

- All pervasive
- Inconspicuous
- No focal point on which to base trust decisions
- Many interactions beyond the cognition of actors.
- The customer engages with the entire service system itself.



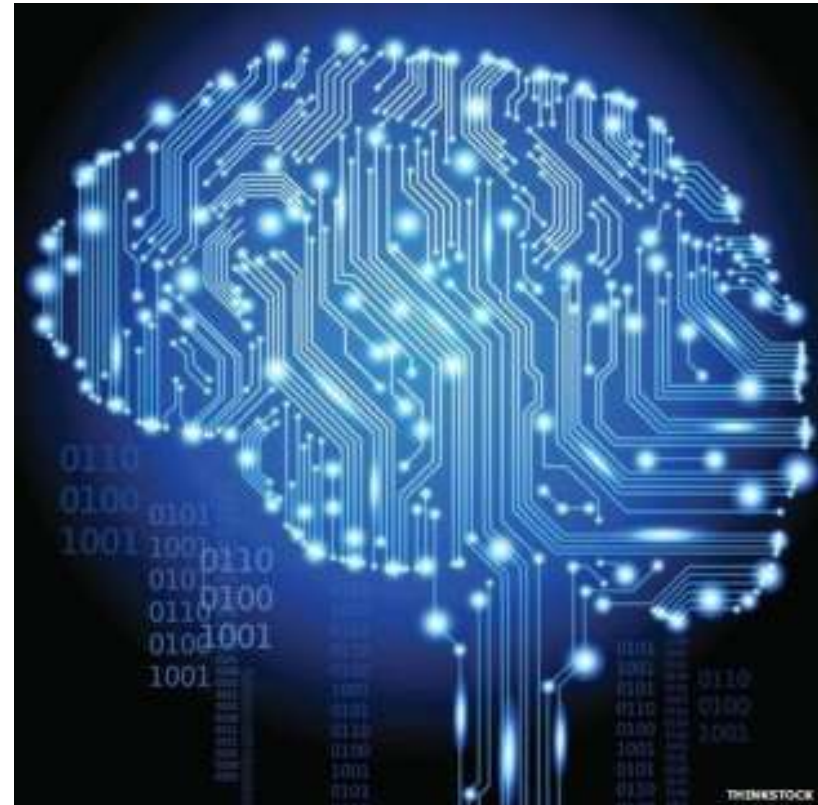
The IoT

'low and fast under the radar screen....with most immediate applications too mundane to excite'
(Langheinrich)



Emergent Technologies

- Whole body imaging
- RFID (in people)
- Drones
- DNA sequencing
- Human enhancement technologies
- Biometric data



Extending Categories of Privacy?

- Privacy of communication (emails, texts, snapchat etc)



Extending Categories of Privacy?

- Privacy of personal behaviour and action (in public spaces- what you wear -for profiling)



Extension of Categories of Privacy?

- Privacy of location and space (the right to move around public and semi-public places without being identified)



Extension of Categories of Privacy?

- Privacy of association (the right to associate with whomever you wish)



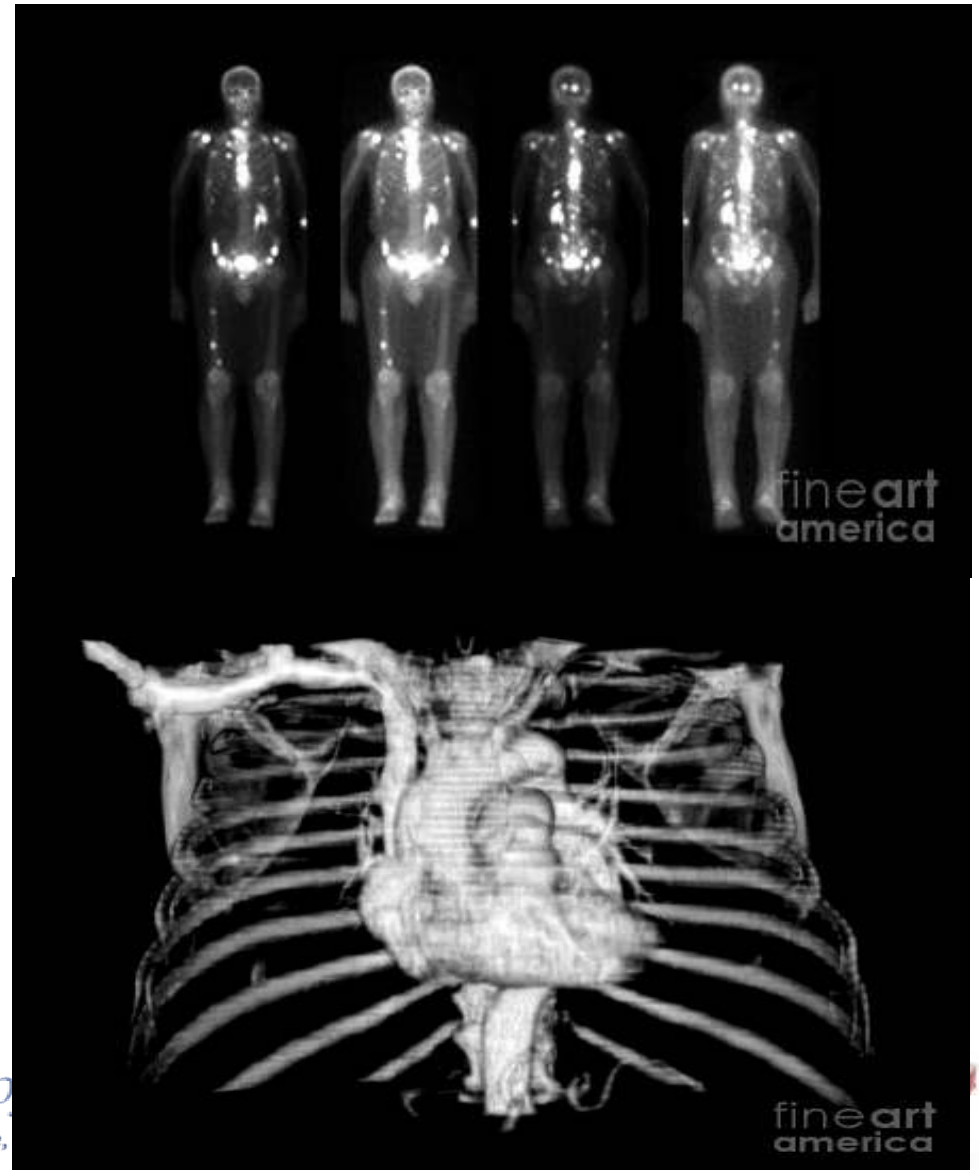
Extension of Categories of Privacy?

- Privacy of the person (physically but also genetic codes and biometrics)



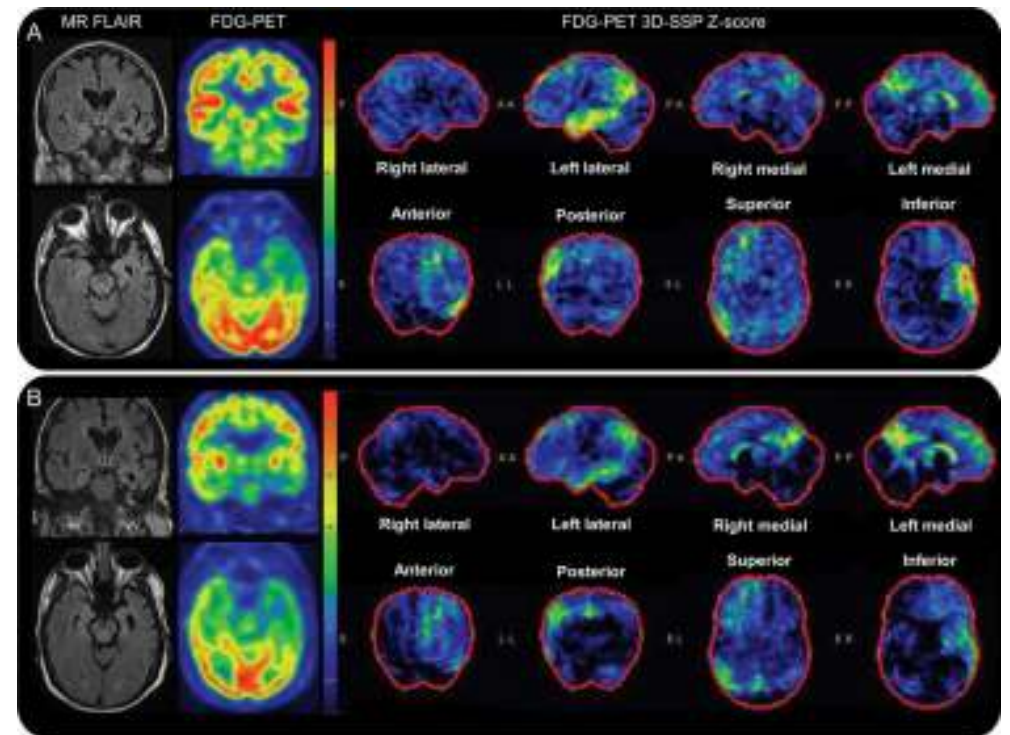
Extension of Categories of Privacy?

- Privacy of data and imaging (full body airport scans, medical scans)



Extension of Categories of Privacy?

- Privacy of thought and feelings (neuro-imaging that implies certain emotive reactions)



How much?

- Notice/awareness??
 - Who and why
- Choice/consent??
 - How used and not used
- Access??
 - Correction of errors
- Extent of security??



Legislative Frameworks

- Consumers- relies on awareness and control
- Lobby groups- advocacy behaviour
- Firms- self regulation
- Regulatory bodies- legislation and law to protect rights



The Privacy Commissioner



Privacy Commissioner
New Zealand
Te Mana Matapono Matatapu

- <https://www.privacy.org.nz/>



And Finally.....

Any Questions?

