The Australian e-Health Research Centre
**Michael Lawley**
12th August 2011

CSIRO Snapshot

- One of Australia's most trusted brands
- High quality R&D services with global scale and connectivity
    - Ranked in top 10 in world in 4 active research fields, top 1% of world scientific institutions in 14 of 22
    - Over 4500 researchers and annual investment of approximately $1.3bn
    - 31% co-invested by 1300 clients & partners from Government & Industry
    - $3.5bn in R&D infrastructure across more than 55 sites
    - Equity interests in 47 companies, 456 active technology licenses and 3710 patents
    - National & global innovation connector with strong domestic research partnerships and 1200 annual international activities

Leveraging CSIRO domain knowledge for ICT

- 5th Computer
- The Dish – moon landing
- WLAN patent
- ASKAP Focal plane array
- 6 Gbps mm-wave wireless
- Brain atlas for Alzheimers
- High resolution galactic imaging

Government

Ngara listen | hear | think

RESEARCH CENTRE

FLAGSHIPS   CSIRO
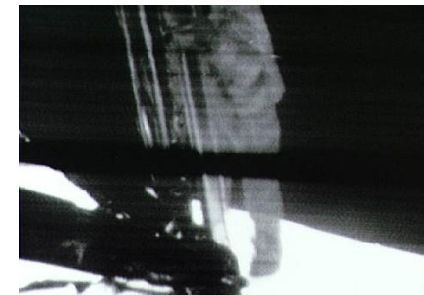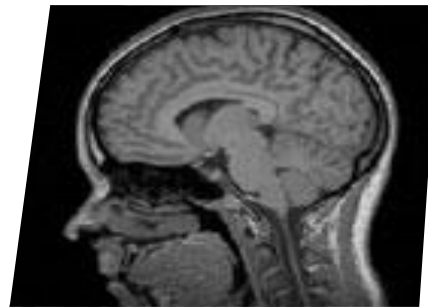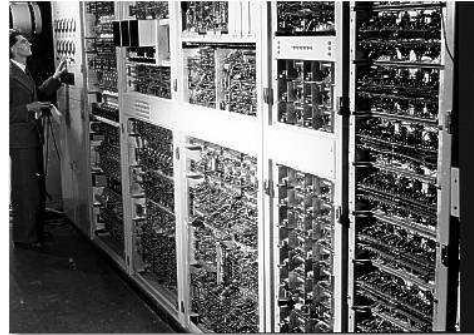
The Australian e-Health Research Centre

AeHRC is the leading national eHealth research group in Australia currently 60-70 staff, students, visiting researchers

Funding from
- **CSIRO**
- **Qld Govt - DEEDI, Queensland Health**
- **engagement partners**
- **revenue**

Investment into research programs

National reach - Brisbane HQ, smaller teams nationally - NSW, Victoria, SA, and now WA, and through CSIRO in Tasmania and ACT

Success built on partnering - Government, clinicians, industry
- **Local engagement to drive national benefit**

Queensland Government

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National Research
FLAGSHIPS

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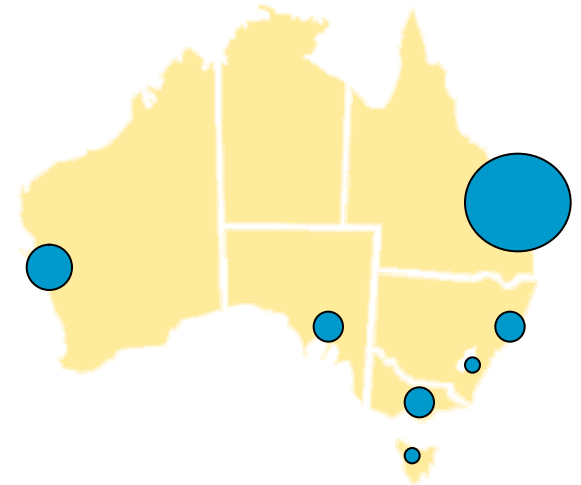
The Team
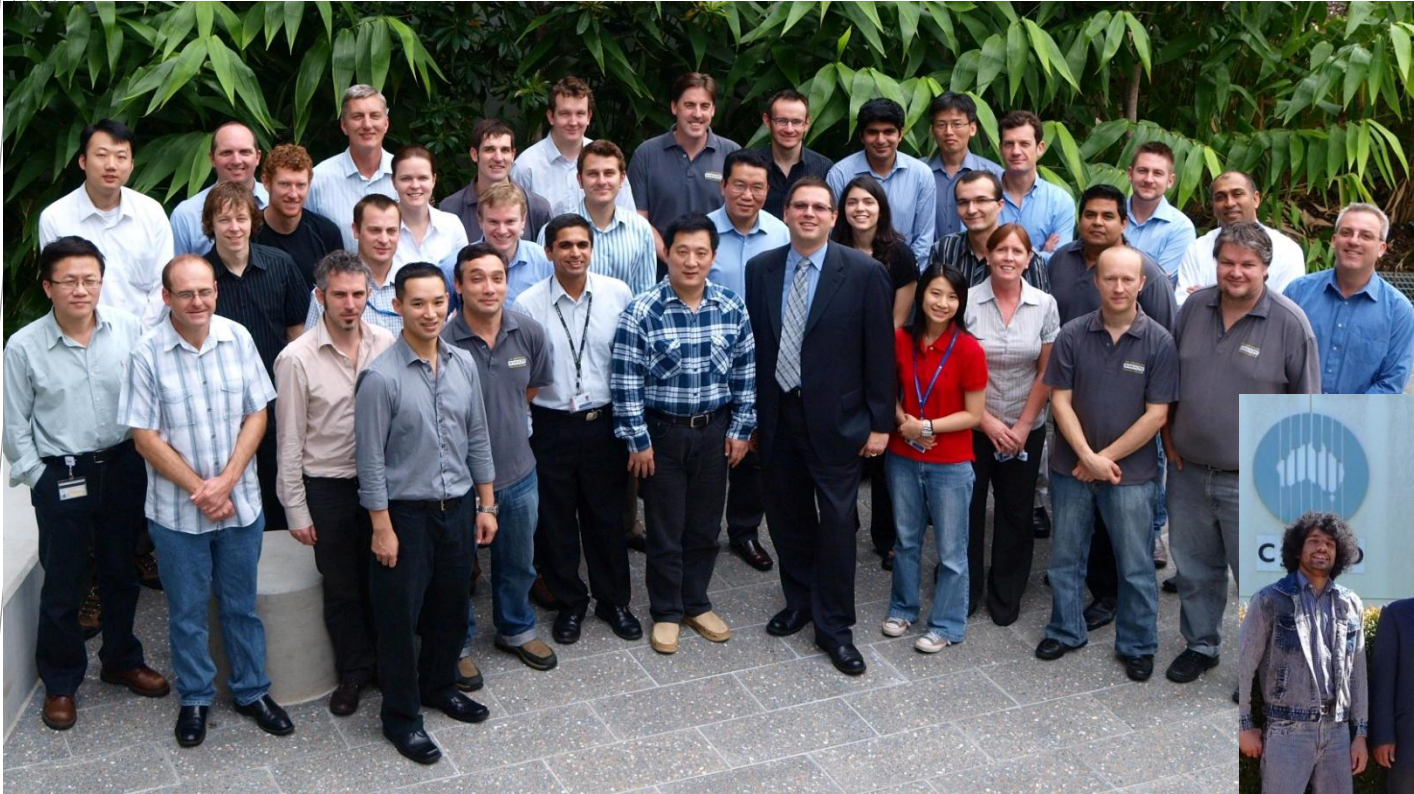
Broad Research Areas

- Health Data and Semantics
- Biomedical Imaging and Simulation
- Tele-health and Ophthalmology
- Mobile technology for chronic disease management

Patient Admission Prediction Tool

- Predicts admissions and presentations to hospital emergency departments

- Assists in better management of emergency and elective surgery

- Being rolled out to major Queensland Hospitals

- Industry interest in commercialisation and follow-on projects

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Vision Based Tracking

A few examples (Gold Coast Hospital):

(a) Entering room.

(b) Leaving room.

(c) Attacking hospital staff.

(d) Sleeping or resting.

(e) Talking to staff.

(f) Attempt to break out of the room.

Mobile Phone based Cardiac Rehab

- Main outcome measure:
  - % Uptake and completion of CR program
- Other measures:
  - Adherence to physical activity guidelines (30 mins moderate level activity each day
  - Patient satisfaction: is this technology and home-based process the preferred means by patients?
  - Quality of life.
  - Risk factors: BMI, blood pressure, lipids, smoking, alcohol, diabetes
  - Diet/ nutrition status
  - Costs
  - Return to work rate
  - Readmission rate, deaths
  - Psychosocial status
  - Pharmacological management

Advanced Imaging

Knee cartilage segmentation
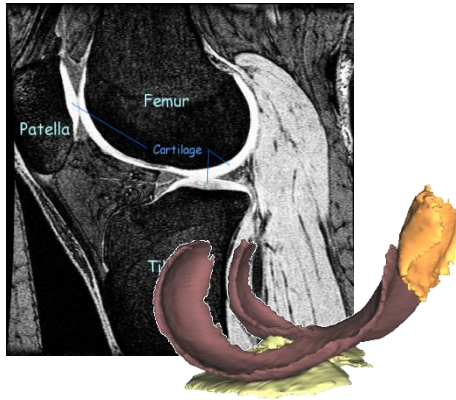
Neuroimaging for
ageing and Alzheimer's
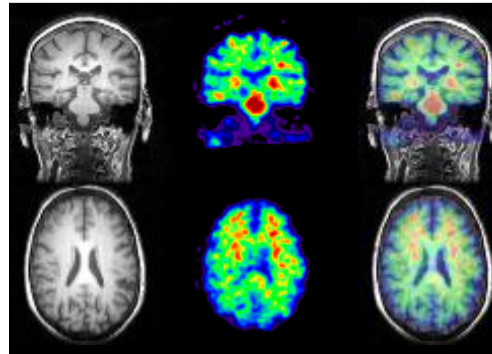
Prostate radiotherapy
planning with MRI
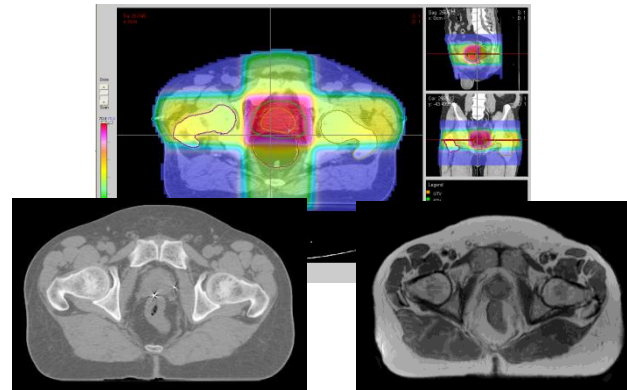
Brain tumour characterization
Using PET and MRI
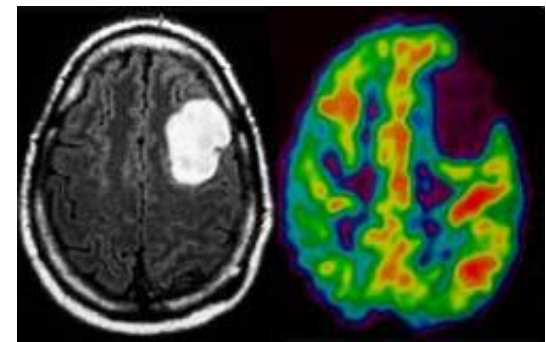
Colonoscopy Simulator

- Colorectal cancer is the most common cancer in Australia affecting both sexes
    - Early detection crucial
    - Colonoscopy golden standard but difficult to learn
- Colonoscopy training
    - Manipulation
    - Navigation, loop prevention
    - Polyp detection
    - Curriculum

Very large scale terminologies and formal reasoning

Terminology for data set A

Terminology for data set B
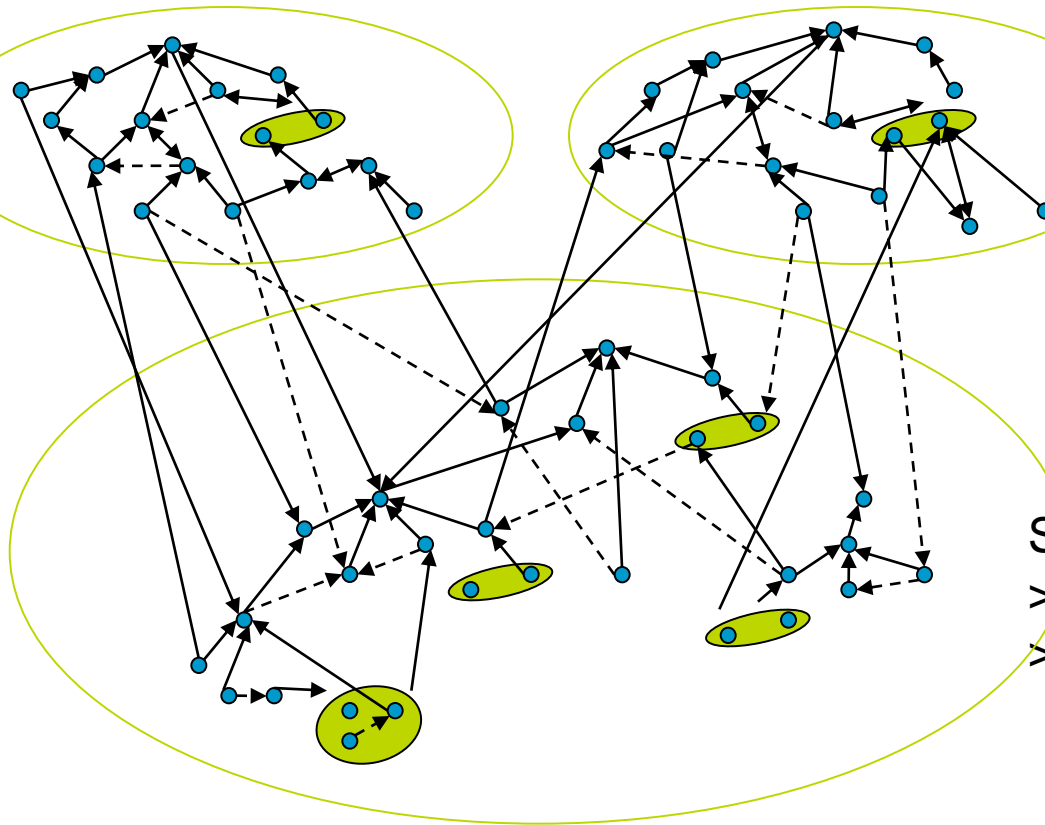
SNOMED CT
> 350,000 concepts
> 1.5M relationships

Processing Medical Narratives

- Derive Computable information from rich narratives
- Manual review is time and labour intensive

- Information is trapped in the language of the report
- Difficult to compare reports or find a specific detail without reading through the text.
- Subject to omission errors
  - Cases inadvertently skipped / keywords missed

Remote Tele-ophthalmology: Pilbara Pilot
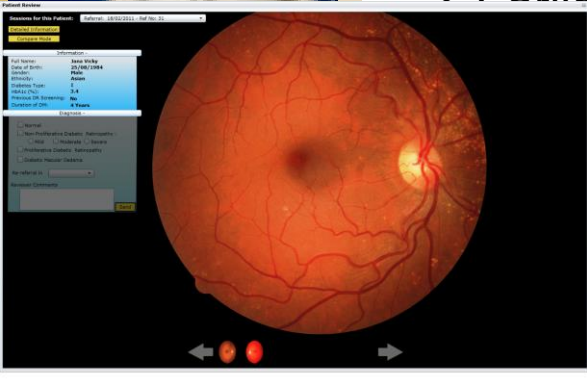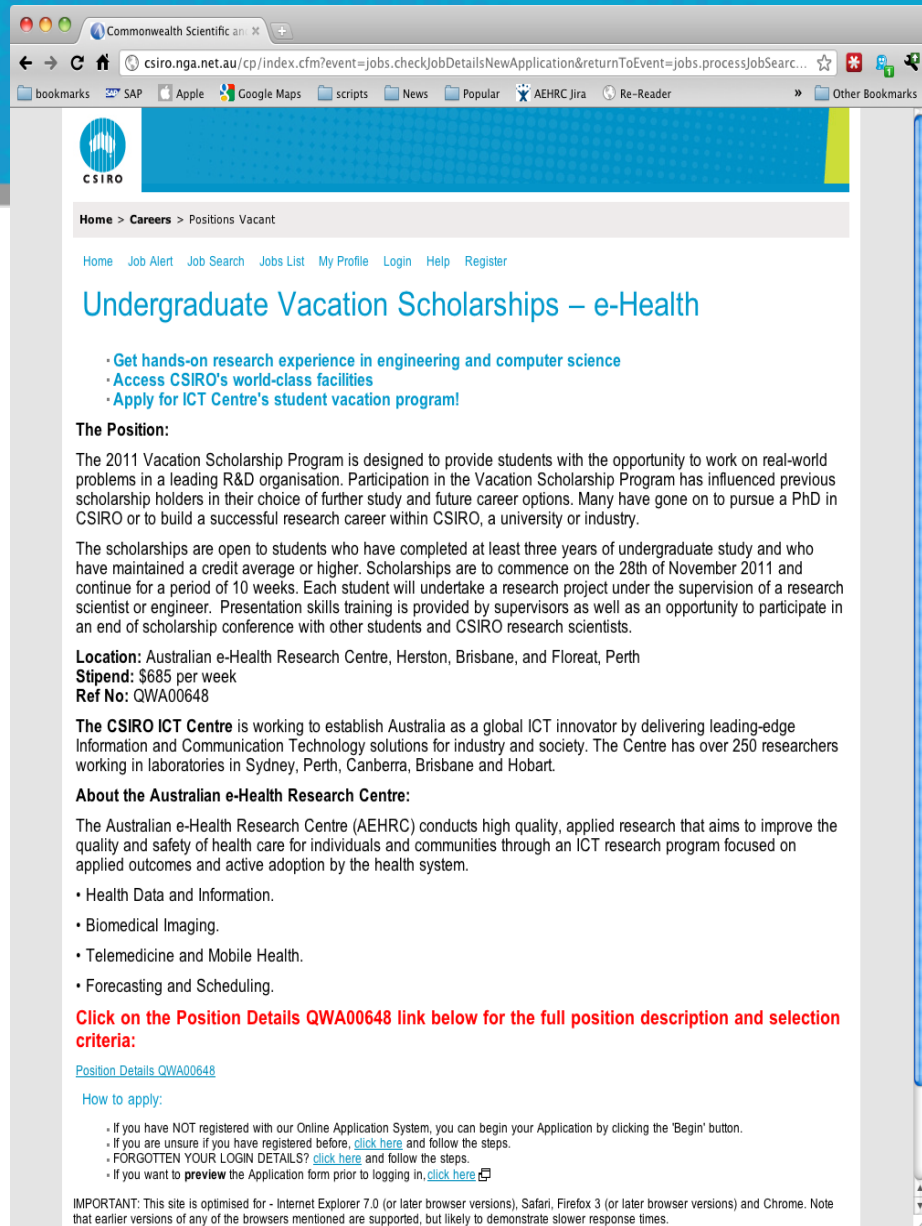
- Eye images taken at Pilbara Hospital
  - 8 images – 2.3MB per image
  - New methodologies being explored – video and 3D viewing of the retinal
- Images uploaded to web EMR for viewing in Perth by Specialist
  - On-going monitoring and diagnosis for diabetic retinopathy, glaucoma and other eye disease
- Follow-up where necessary
  - Earlier diagnosis
  - ...arily aimed at providing vision ...for the children in the region
  - ...o conferencing – such as the ...S system – will then become

Student Vacation Projects

http://www.csiro.au/people/Careers.html

- Go to *Positions vacant*
- Search for *vacation*

Small sample of available projects

- Wireless Physiological Monitoring
- Physical Activity monitoring on a mobile/tablet
- Texture Mapping of The Bronchial Tree
- Modelling of Virtual Bronchoscope Properties
- Colon attachment modelling
- Understanding how your brain is wired and how disease changes it: HARDI Tools and Analysis
- Advanced visualization and interaction with large 4D medical images
- Understanding Shape and Form of Biological Objects: Shape and Appearance Analysis in Biomedical Imaging

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Thank you

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