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# The Australian e-Health Research Centre

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12<sup>th</sup> August 2011



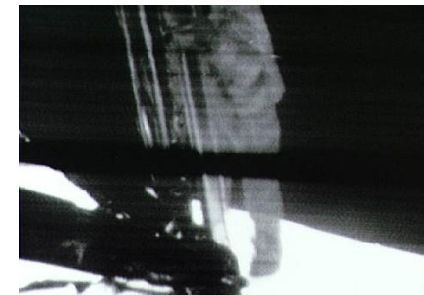
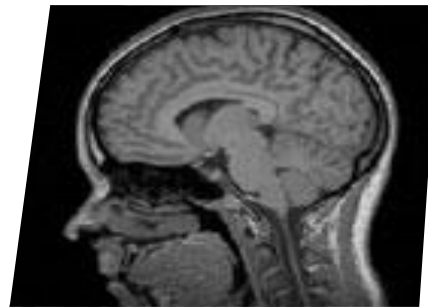
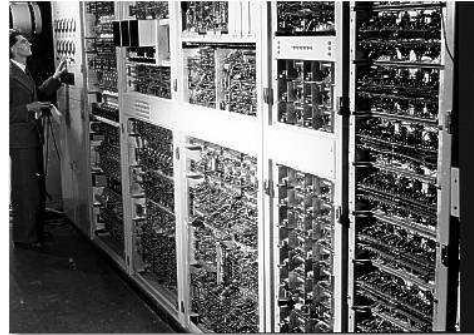
# CSIRO Snapshot

- 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

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



# 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**

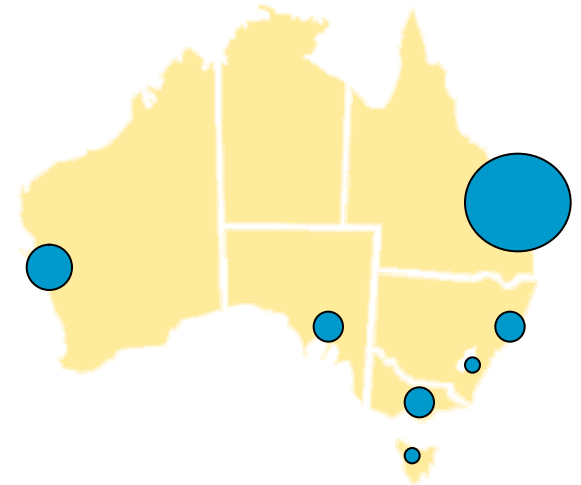
- **CSIRO**
- **Qld Govt - DEEDI, Queensland Health**
- **engagement partners**
- **revenue**

## **Investment into research programs**

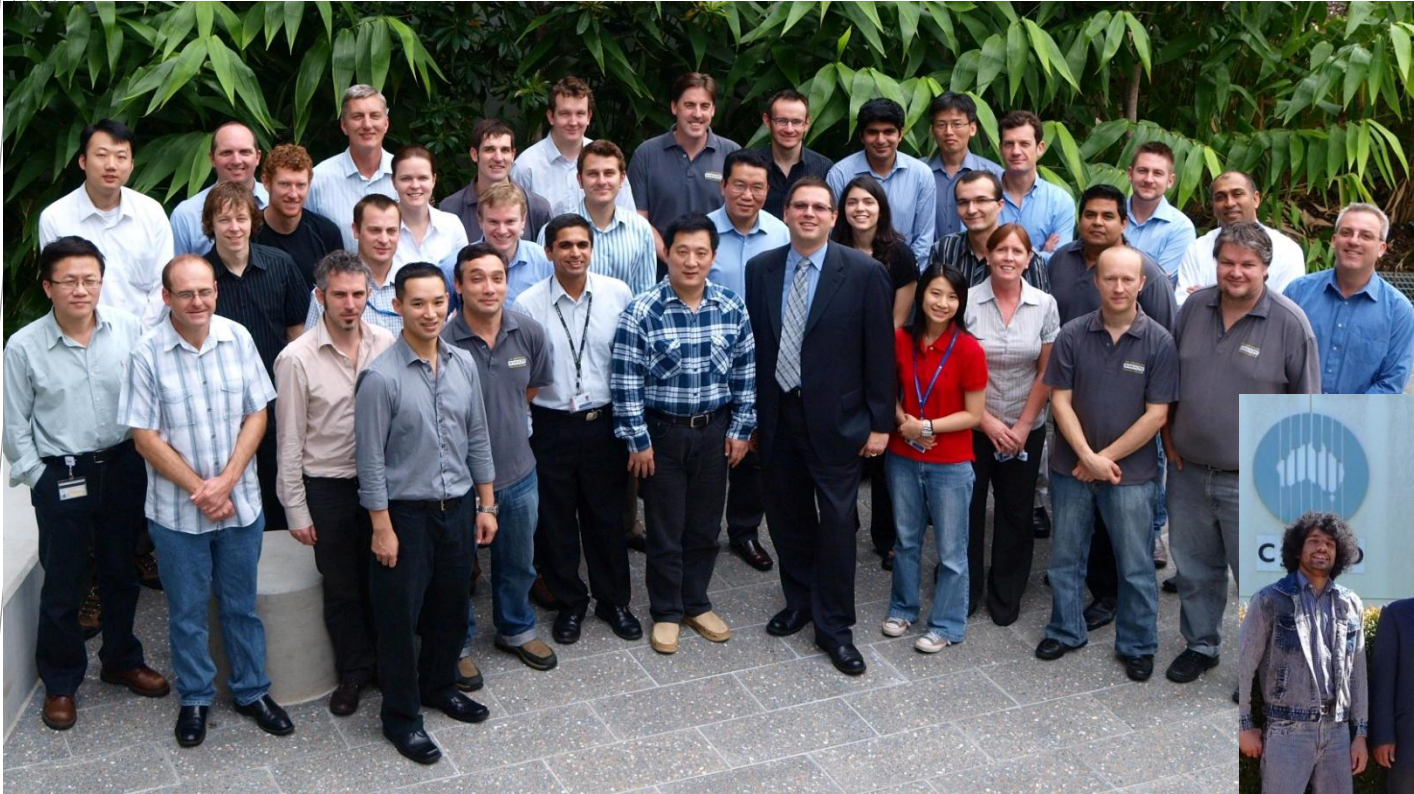
**National reach - Brisbane HQ, smaller teams nationally - NSW, Victoria, SA, and now WA, and through CSIRO in Tasmania and ACT**

## **Success built on partnering - Government, clinicians, industry**

- **Local engagement to drive national benefit**



# 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



# 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.

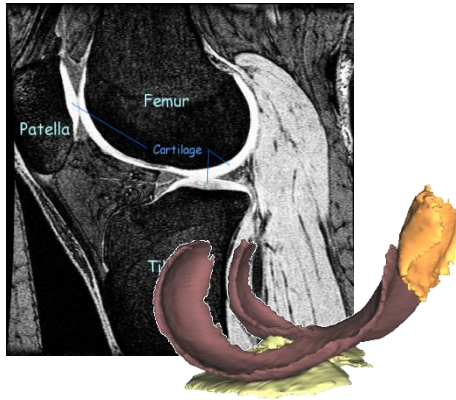


# Mobile Phone based Cardiac Rehab

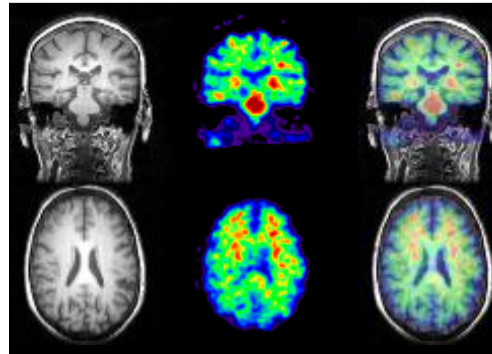
- **Main outcome measure:**
  - % Uptake and completion of CR program
- **Other measures:**
  - Adherence to physical activity guidelines (30 mins moderate level activity each day)
  - Patient satisfaction: is this technology and home-based process the preferred means by patients?
  - Quality of life.
  - 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

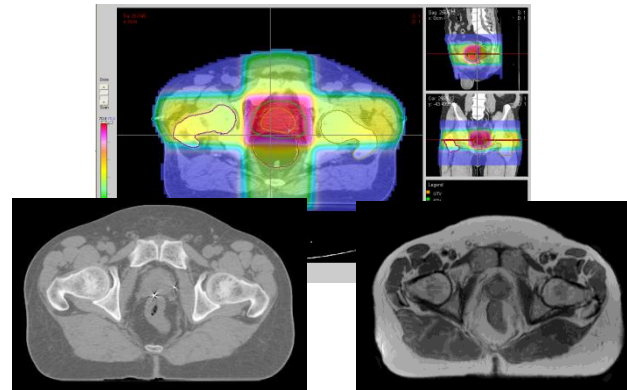
Knee cartilage segmentation



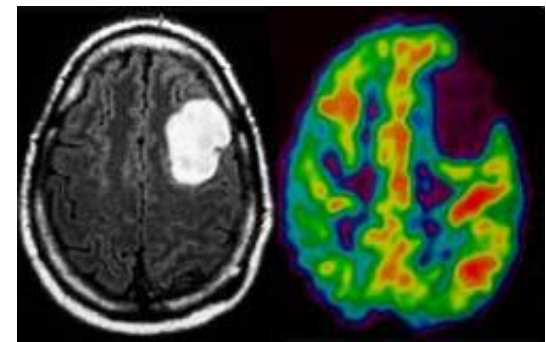
Neuroimaging for ageing and Alzheimer's



Prostate radiotherapy planning with MRI



Brain tumour characterization Using PET and MRI



# Colonoscopy Simulator

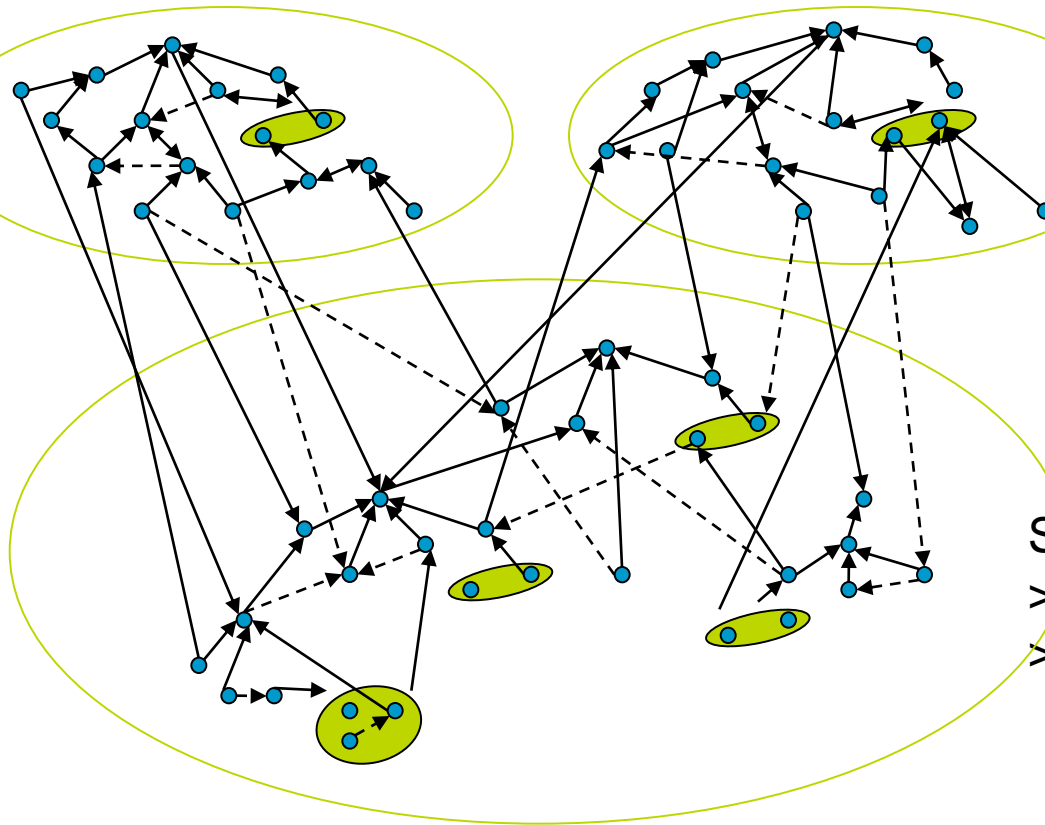
- Colorectal cancer is the most common cancer in Australia affecting both sexes
  - Early detection crucial
  - Colonoscopy golden standard but difficult to learn
- Colonoscopy training
  - Manipulation
  - Navigation, loop prevention
  - Polyp detection
  - Curriculum



# 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

HISTORY:  
Specimen source: T10 vertebral mass. Smoker, history of progressive weakness. MRI revealed multiple spinal masses, cord compression at T10 demonstrated lung mass (at hilar). Clinical Diagnosis: Metastasis to spine. Operative Procedure/Tissue Submitted: CT guided trucut biopsy of T10 vertebral mass. ? mets. ^

DIAGNOSIS:  
1. Vertebra (T10), biopsy: Metastatic small cell carcinoma  
[redacted], M.D. and [redacted], M.D. ^  
I, [redacted], M.D., the signing staff pathologist, have examined and interpreted the slides from this case. ^  
Code: II ^  
FC: 88305 ^  
SNOMED CODES: M 80413 U 00120 T 10510 P 1140



CR								INST						
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SIZE				C			N			/			C	

- 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

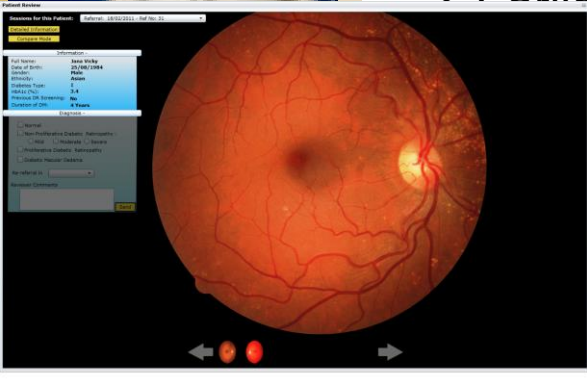
## WESTERN AUSTRALIA

0 500 km  
0 300 miles

INDIAN OCEAN



Queensland  
Government

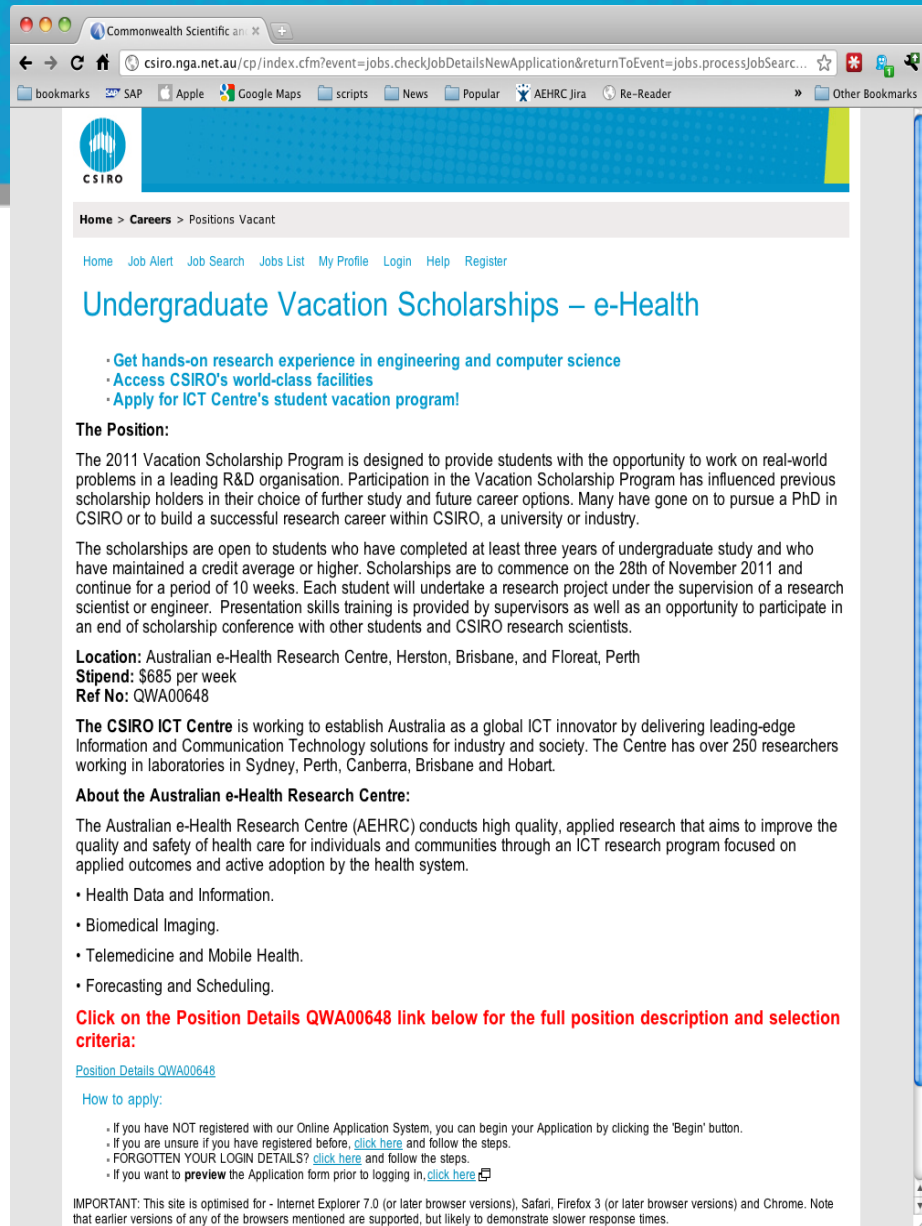


- Eye images taken at Pilbara Hospital
  - 8 images – 2.3MB per image
  - New methodologies being explored – video and 3D viewing of the retinal
- Images uploaded to web EMR for viewing in Perth by Specialist
  - On-going monitoring and diagnosis for diabetic retinopathy, glaucoma and other eye disease
- Follow-up where necessary
  - Earlier diagnosis
  - Primarily aimed at providing vision for the children in the region
  - Teleconferencing – 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*



Commonwealth Scientific and Industrial Research Organisation

Home > Careers > Positions Vacant

Home Job Alert Job Search Jobs List My Profile Login Help Register

## Undergraduate Vacation Scholarships – e-Health

- Get hands-on research experience in engineering and computer science
- Access CSIRO's world-class facilities
- Apply for ICT Centre's student vacation program!

**The Position:**

The 2011 Vacation Scholarship Program is designed to provide students with the opportunity to work on real-world problems in a leading R&D organisation. Participation in the Vacation Scholarship Program has influenced previous scholarship holders in their choice of further study and future career options. Many have gone on to pursue a PhD in CSIRO or to build a successful research career within CSIRO, a university or industry.

The scholarships are open to students who have completed at least three years of undergraduate study and who have maintained a credit average or higher. Scholarships are to commence on the 28th of November 2011 and continue for a period of 10 weeks. Each student will undertake a research project under the supervision of a research scientist or engineer. Presentation skills training is provided by supervisors as well as an opportunity to participate in an end of scholarship conference with other students and CSIRO research scientists.

**Location:** Australian e-Health Research Centre, Herston, Brisbane, and Floreat, Perth  
**Stipend:** \$685 per week  
**Ref No:** QWA00648

**The CSIRO ICT Centre** is working to establish Australia as a global ICT innovator by delivering leading-edge Information and Communication Technology solutions for industry and society. The Centre has over 250 researchers working in laboratories in Sydney, Perth, Canberra, Brisbane and Hobart.

**About the Australian e-Health Research Centre:**

The Australian e-Health Research Centre (AEHRC) conducts high quality, applied research that aims to improve the quality and safety of health care for individuals and communities through an ICT research program focused on applied outcomes and active adoption by the health system.

- Health Data and Information.
- Biomedical Imaging.
- Telemedicine and Mobile Health.
- Forecasting and Scheduling.

**Click on the Position Details QWA00648 link below for the full position description and selection criteria:**

[Position Details QWA00648](#)

**How to apply:**

- If you have NOT registered with our Online Application System, you can begin your Application by clicking the 'Begin' button.
- If you are unsure if you have registered before, [click here](#) and follow the steps.
- FORGOTTEN YOUR LOGIN DETAILS? [click here](#) and follow the steps.
- If you want to **preview** the Application form prior to logging in, [click here](#)

IMPORTANT: This site is optimised for - Internet Explorer 7.0 (or later browser versions), Safari, Firefox 3 (or later browser versions) and Chrome. Note that earlier versions of any of the browsers mentioned are supported, but likely to demonstrate slower response times.

# 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
- ....



**The Australian e-Health Research Centre**

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Thank you

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