The Australian e-Health Research Centre
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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 Alzheimer's
- 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

SNOMED CT

> 350,000 concepts
> 1.5M relationships

Terminology for data set A

Terminology for data set B
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
  - Primarily aimed at providing vision care for the children in the region
- Video conferencing – such as the RIDES system – will then become vital
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