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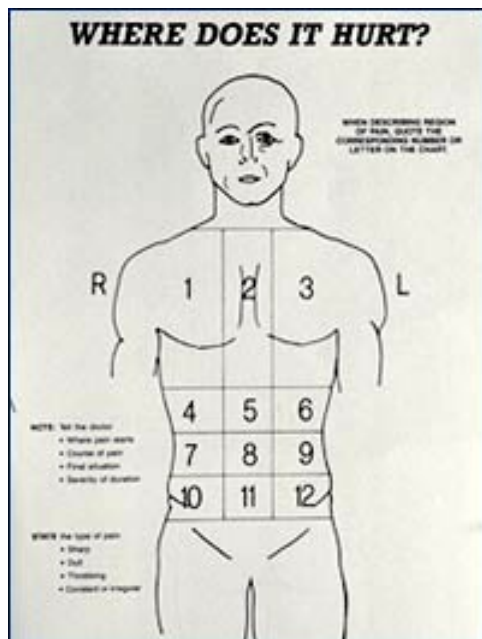
Telehealth and the promise of advanced networks

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Honorary Secretary, Australasian Telehealth Society



Telehealth

- Delivery of some aspect of health care when one or more of the participants are separated by distance
- Includes some educational and administrative uses of ICT in the healthcare system
- A subset of “eHealth” – the use of ICT in healthcare
- Usually regarded as synonymous with “telemedicine”



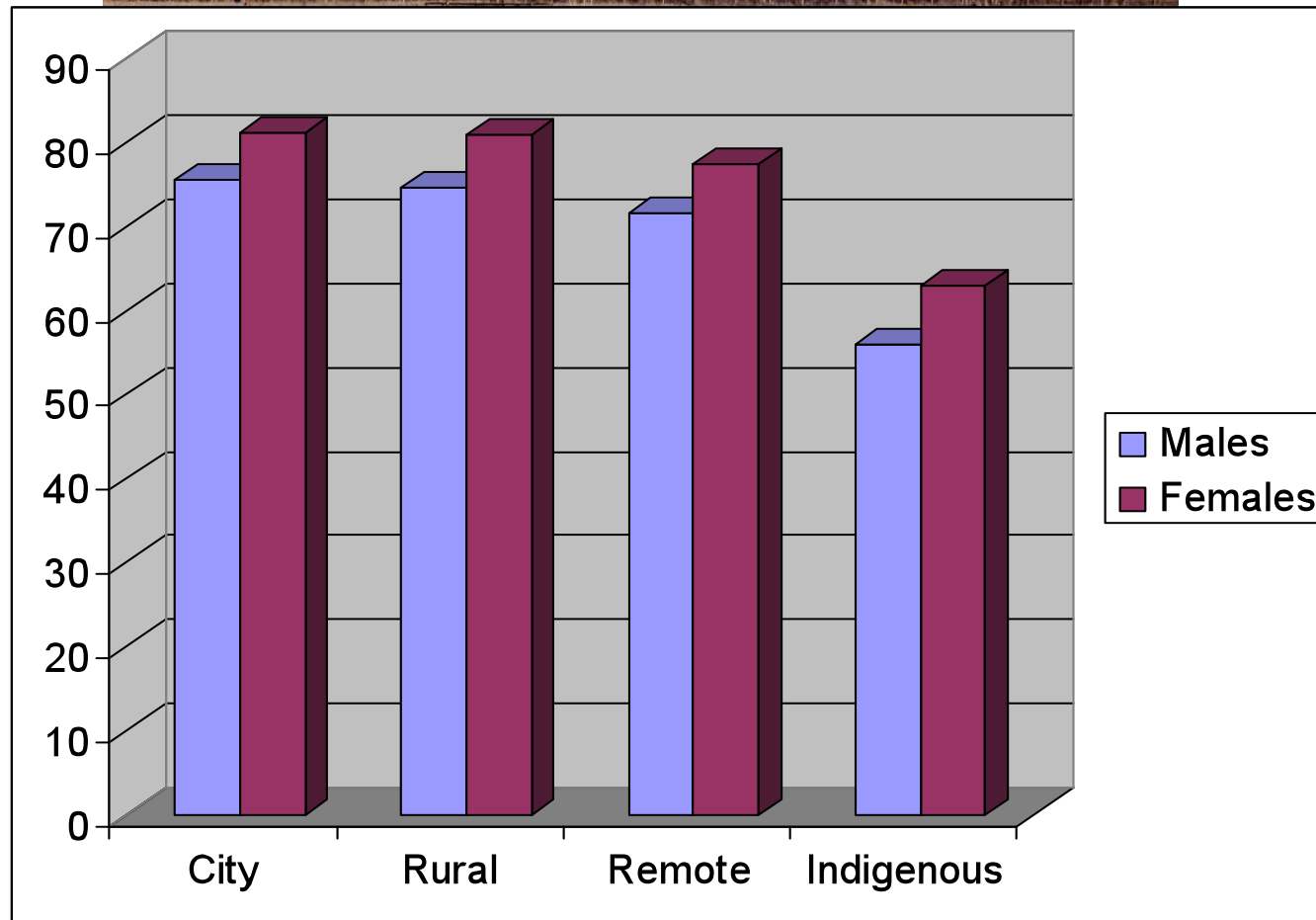
Early examples of telehealth – Royal Flying doctor service



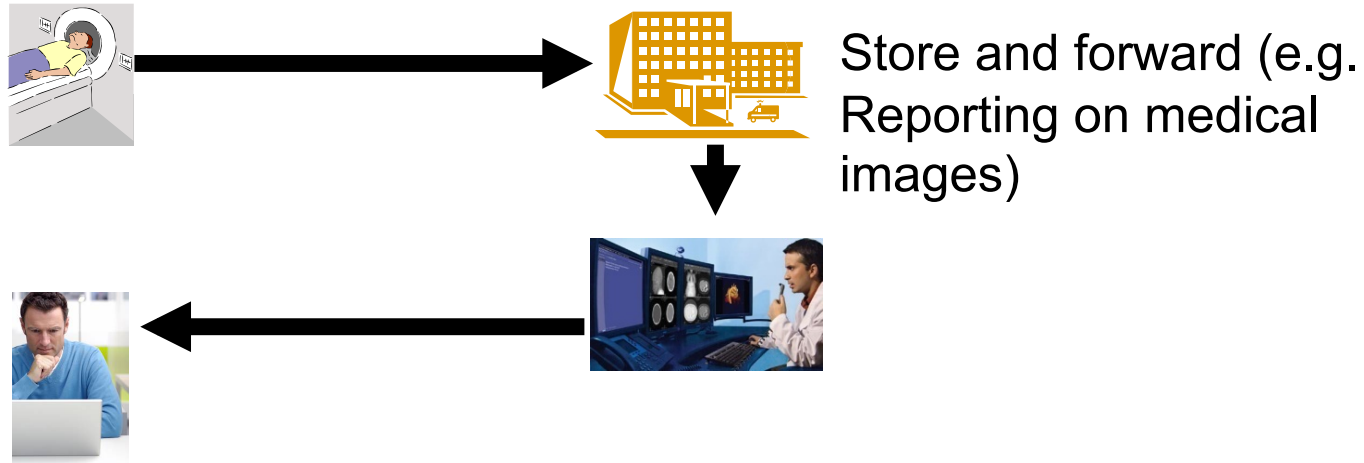
The need for telehealth



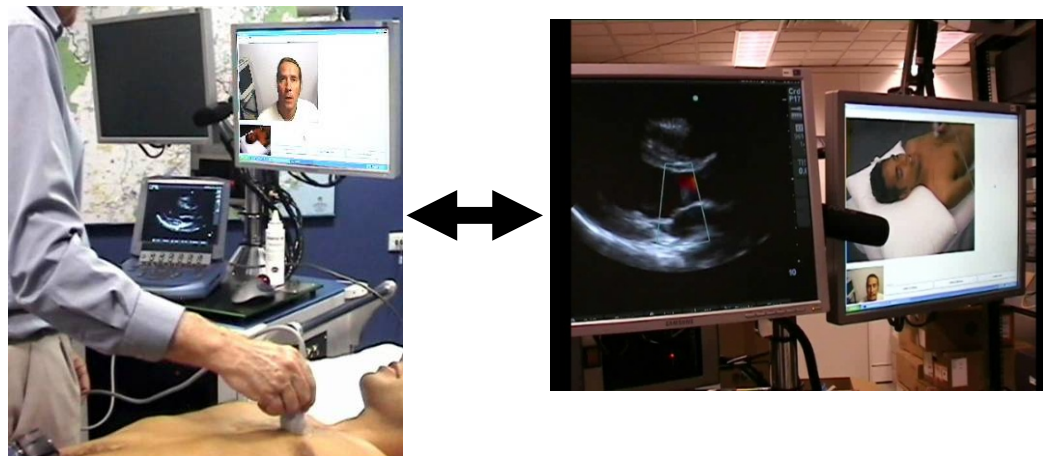
Life expectancy (years)



Some classifications

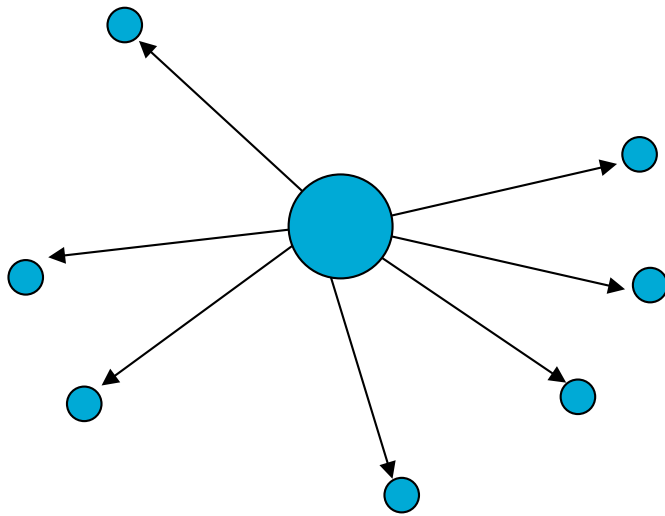


Real time (e.g. Monitoring an ultrasound examination)



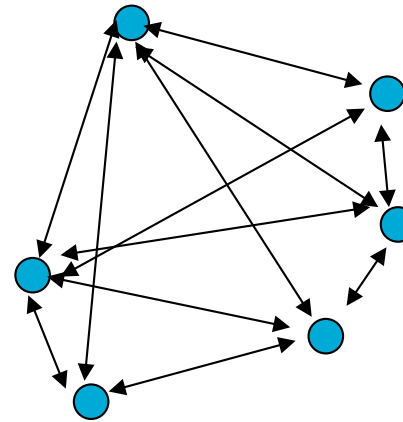
More classifications

Hub and spoke



Makes central expertise available over a wide area

Distributed



Mutual support among a group of clinicians or patients

What can telehealth do?

- Ensure that each patient is managed with optimum medical expertise wherever that patient or the source of expertise are available.
- Makes that expertise available at the cheaper, less complex periphery of the health system
 - GP's office or local clinic
 - Small hospital with minimal specialist cover
 - Patient's home
 - Accident or disaster scene
 - Wherever....



Health and the promise of advanced networks



Some barriers to telehealth expansion

- Lack of access to affordable broadband connectivity
- Technology is often hard to use
- Entrenched work practices make healthcare industry resistant to change
- Lack of Medicare rebate
- There are only so many specialists anyway
- Technology is based on videoconferencing, not delivering medical services



What if the barriers were to be removed?

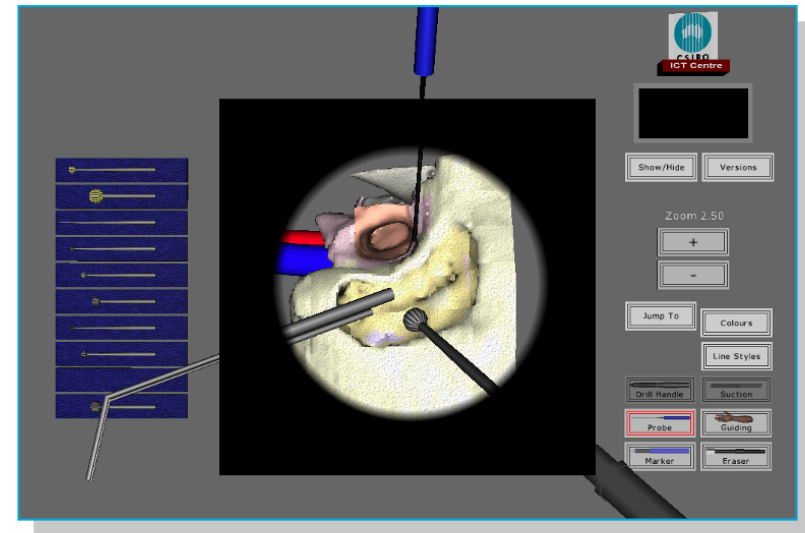
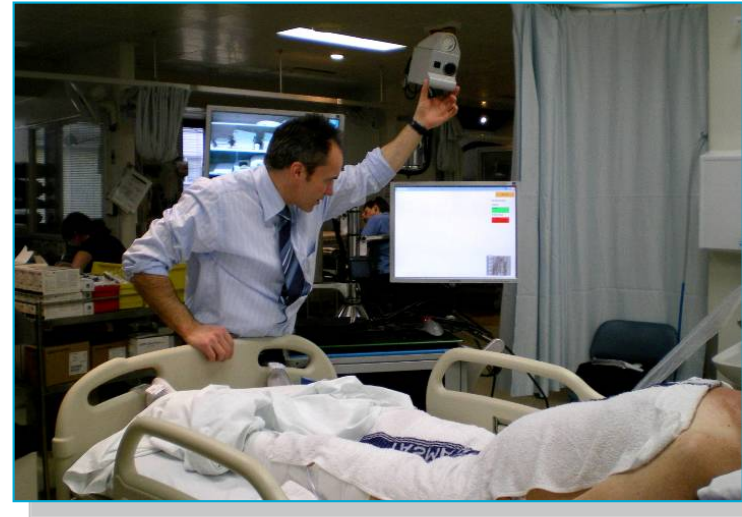
- The Centre for Networking Technologies for the Information Economy
- Funded by Australian Department of Broadband, Communications & the Digital Economy and CSIRO.
- 2001-2007
- What would life be like if bandwidth were free and infinite?



CeNTIE2

Centre for Networking Technologies for the Information Economy

Four telehealth applications



1. Virtual Critical Care Unit (ViCCU)

- Emergency support for hospitals in Katoomba, Lithgow
- Specialist at Nepean Hospital
- Multiple cameras and video channels for real time team guidance
- Evaluated of 18 months for
 - Clinical Effectiveness
 - Technical Design
- Now integrated into hospital use



1. Virtual Critical Care Unit (ViCCU)

**Nepean Hospital
(specialist)**



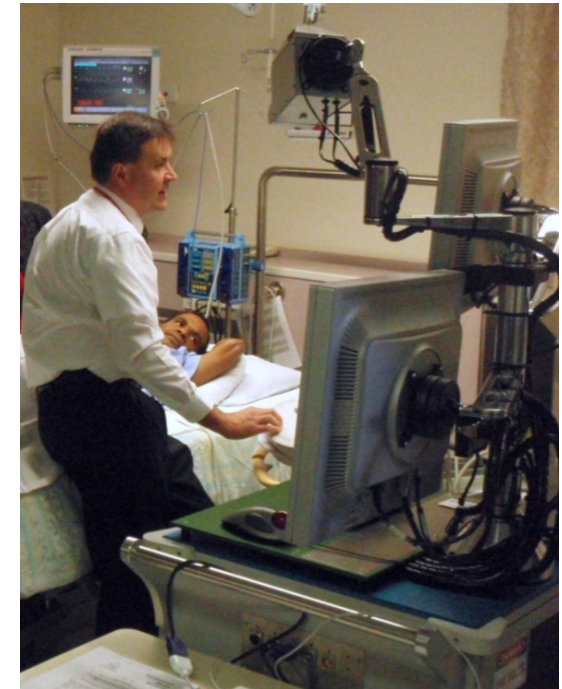
100 Mbit/s fibre



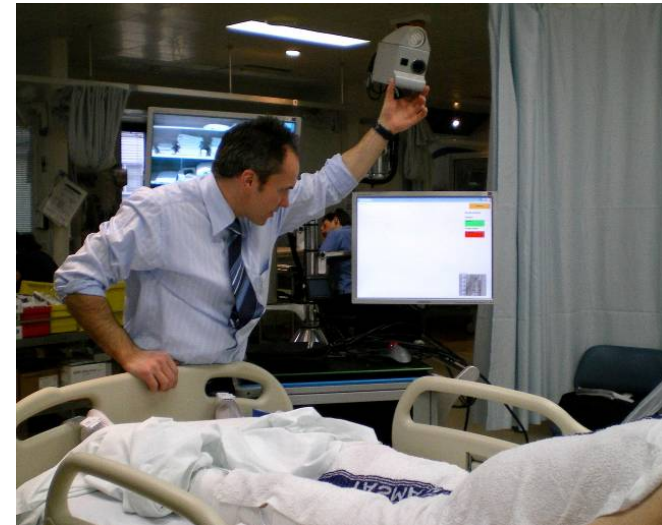
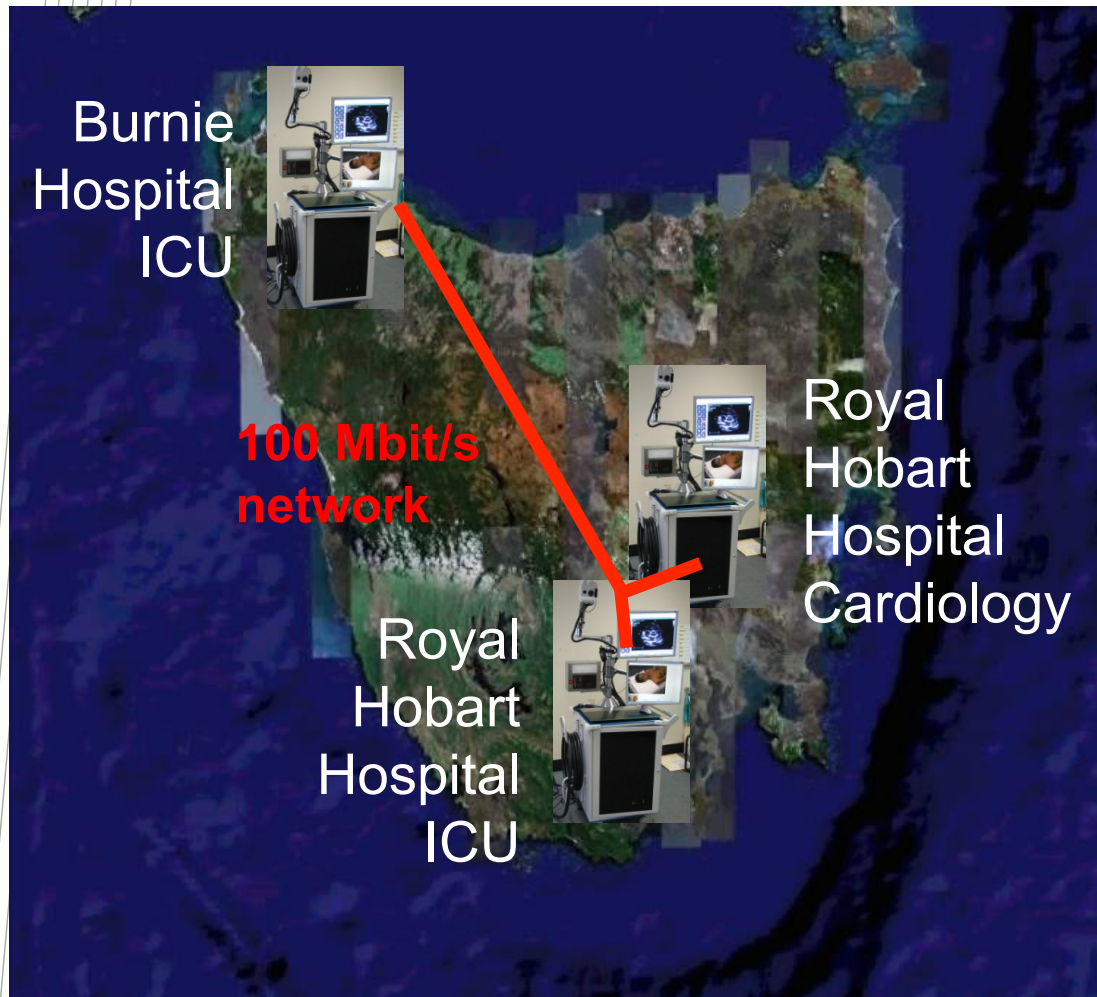
Katoomba Hospital

2. ECHONET

- Provided mobile bedside-to-bedside connections among
 - Burnie Hospital ICU (Tasmania)
 - Royal Hobart Hospital ICU
 - Royal Hobart Hospital Cardiology
- 3-way connections possible
- Two video channels
 - Camera View
 - Echocardiography (or other electronic source)
- Used for patient management and teaching
- Nine month clinical trial
- Evaluated for social/organisational, technical and clinical benefits

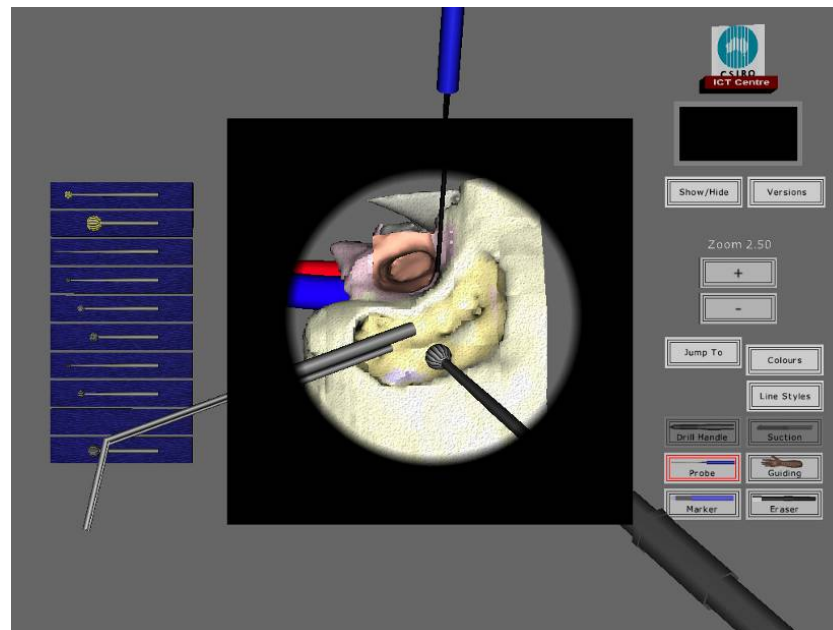


2. ECHONET

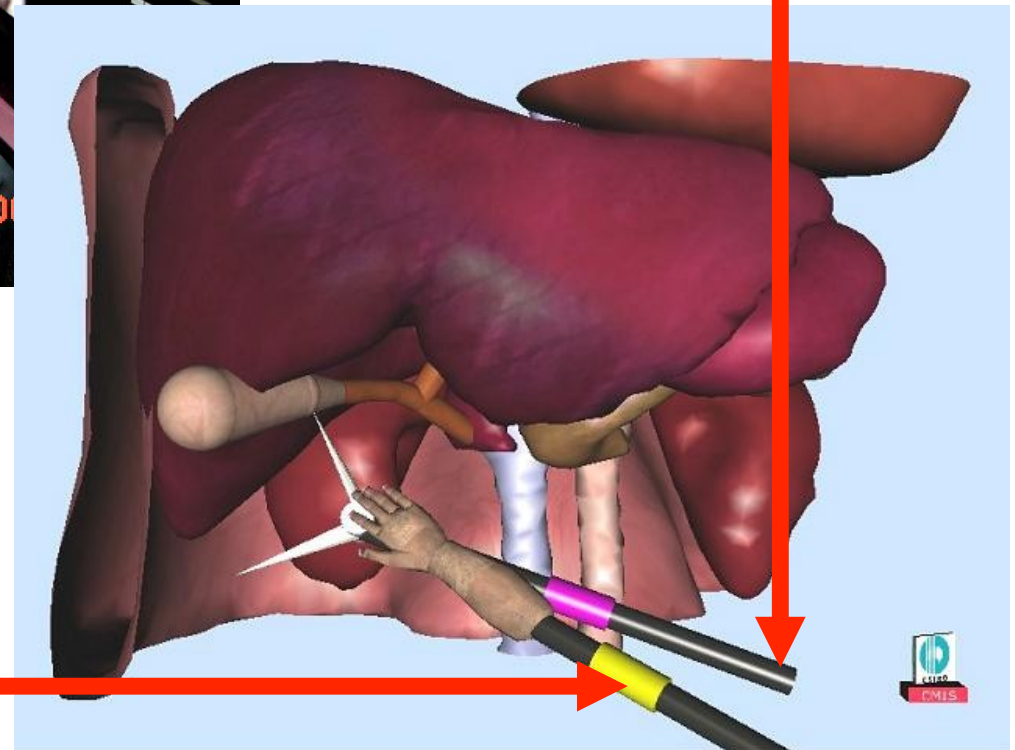
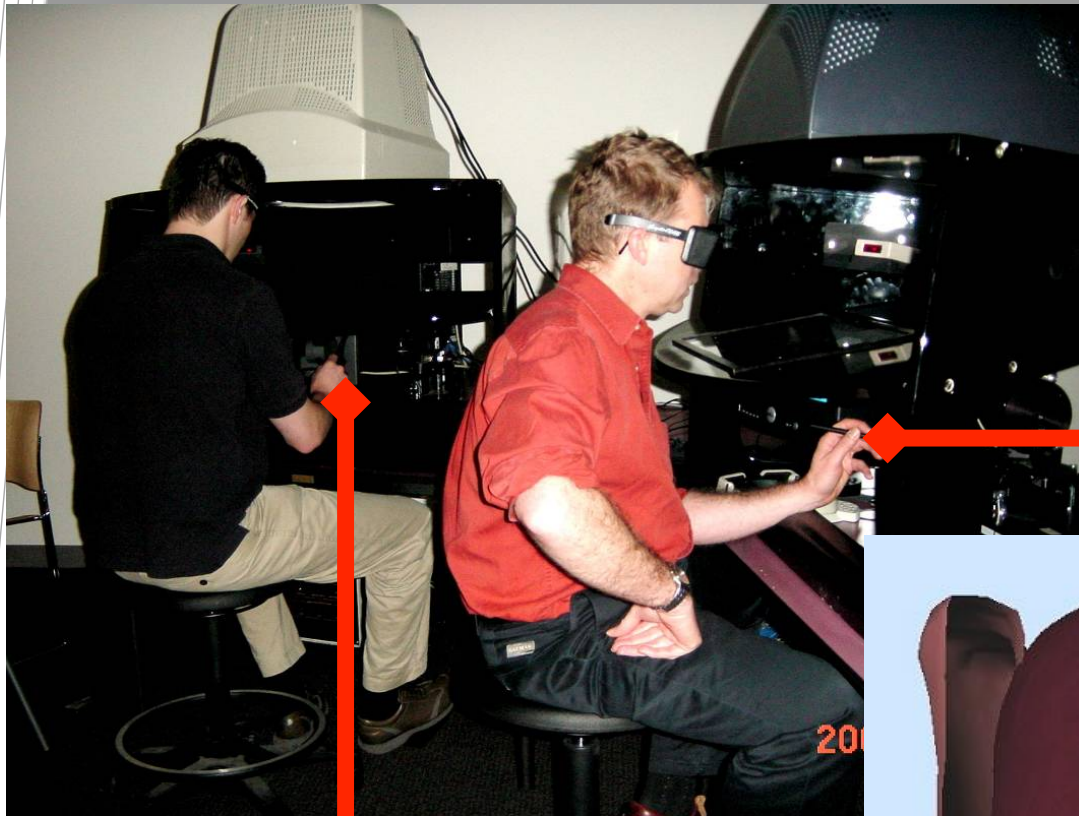


3. Virtual surgical training

- Two surgeons working in a shared virtual environment
- Separation could be a few metres or intercontinental
- 3D vision + sound + haptic (force feedback)
- Other teaching information available on demand
- Evaluated during actual training of ENT surgeons
- Commercial version now available



3. Virtual surgical training



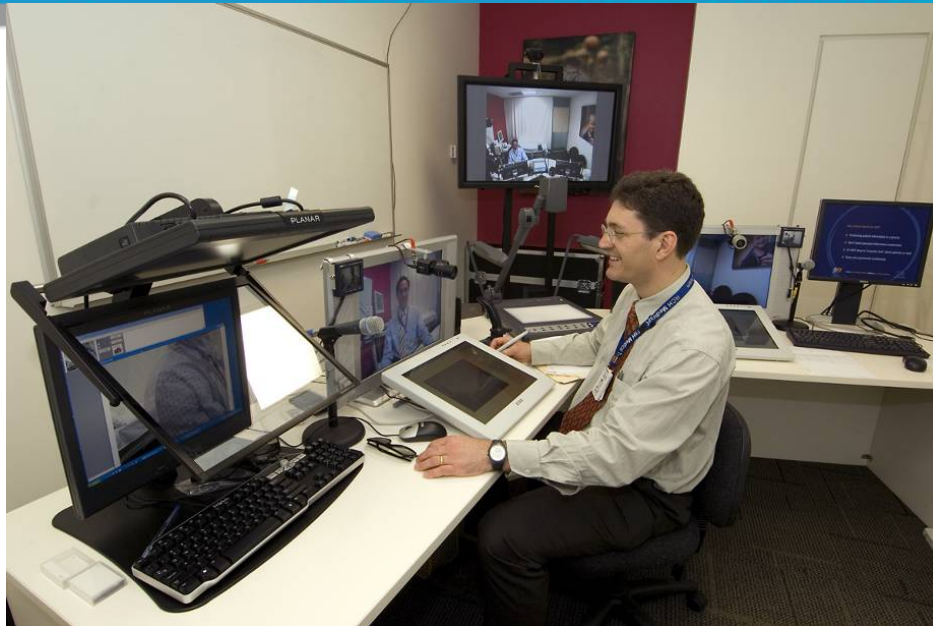
4. Remote outpatient consultations

- Replaces a paediatric surgical followup consultation with a virtual consultation
- Specialist and remote rooms designed to mimic actual specialist's office
- Several advanced visualisation systems to create rich but natural data environment
 - Pointers and drawing tools
- Evaluated by
 - Specialists
 - Remote assistant
 - Patients & families

in a trial within Royal Children's Hospital,
Melbourne



4. Remote outpatient consultations

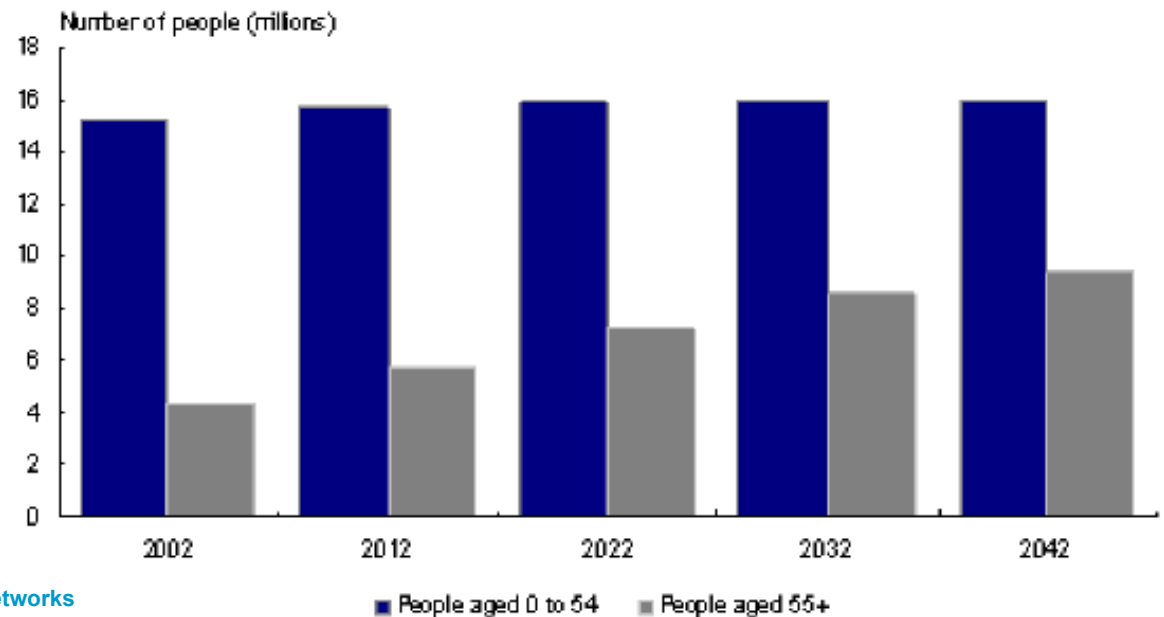


Findings from CeNTIE projects

- Users could *deliver services*, not just talk about them
- Users able to achieve a high level of patient focus
 - Usability
 - User-centric - designed around current work practices
- **Advanced visualisation technology and high bandwidth created a sense of “physical presence”.**
 - Low latency – natural conversations
 - Sense of “trust” between health professionals
 - Bandwidth for trust higher than bandwidth for diagnosis
- **Clinicians were able to work in a complex information space**
 - Multimedia, generated in real time, potential for errors
- **Social and organisational outcomes**
 - The systems created new working relationships among geographically separated teams
 - Reduced professional isolation
 - Supported teams not just individuals

Telehealth to the individual

- Ageing population
- Rise in chronic disease
- Independent living vs residential care
- Shift to prevention rather than trying to cure the incurable
- Three approaches
 - Smart home
 - Assisted home-based self-management
 - Wearable devices



Home telehealth – “smart homes”

- Multiple sensors
- Connected by LAN
- “Smarts” assess well-being and raise alarms
 - Alarms based on departures from learned patterns

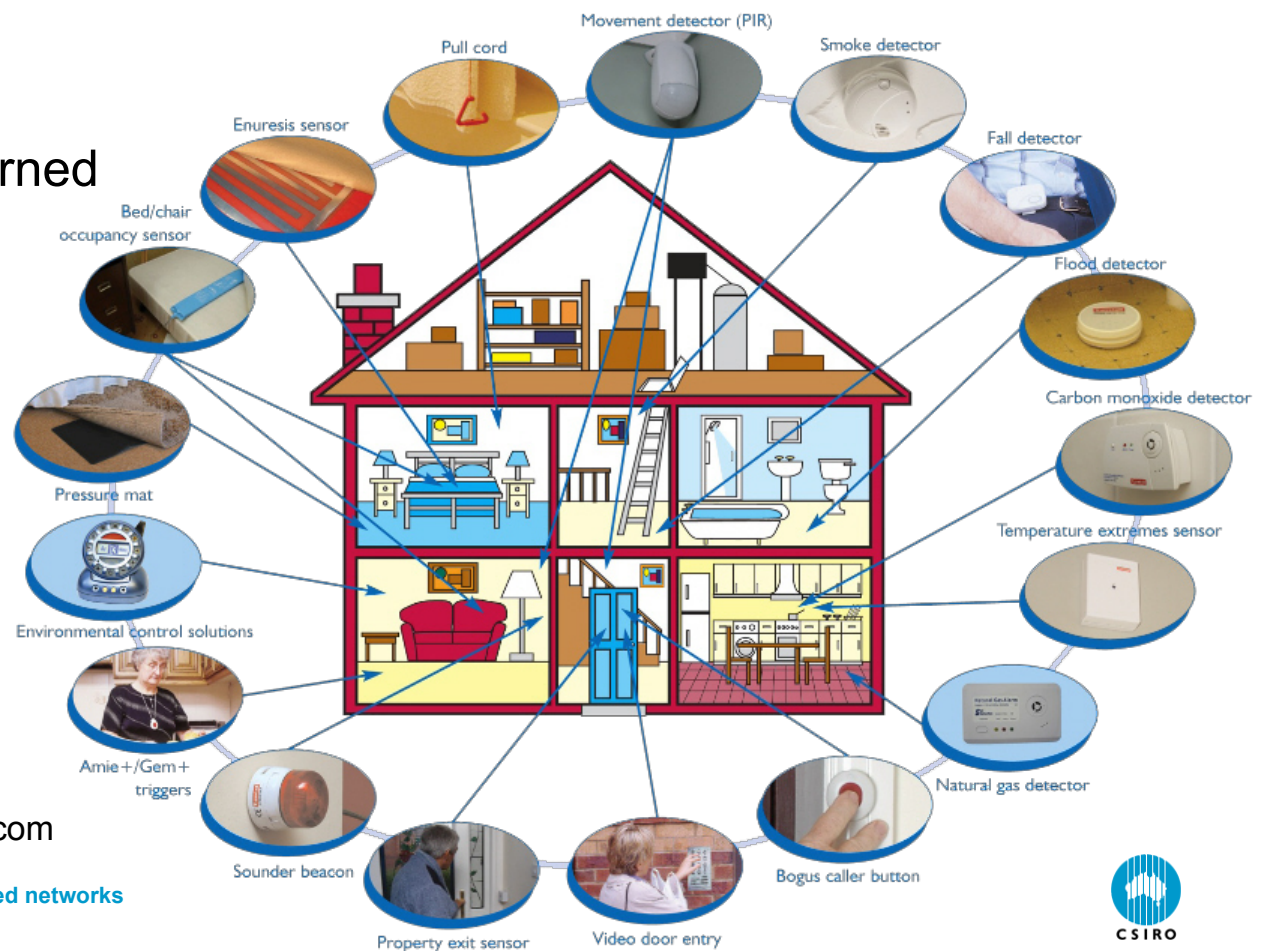


Image: skalaventures.com

Home telehealth – self-management

- Self-administered tests (e.g. Blood pressure)
- Guided (where necessary) by videoconference

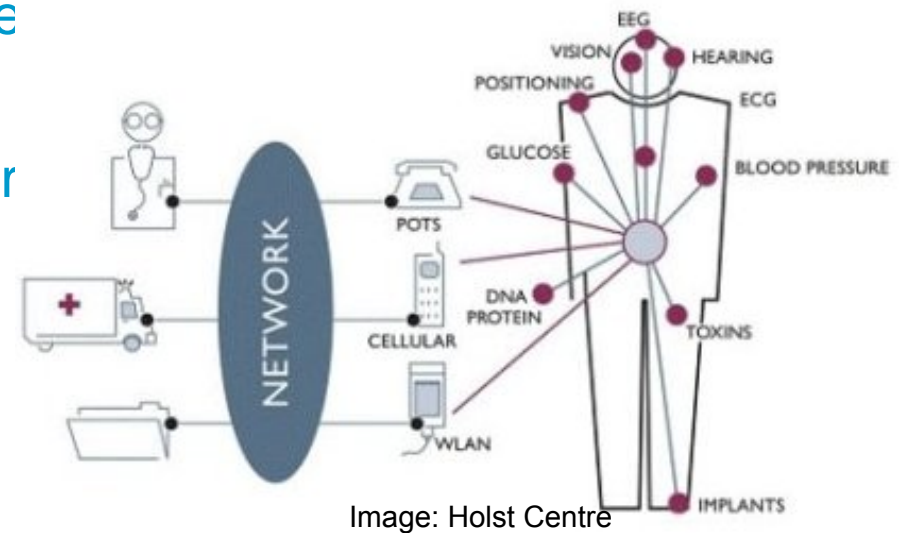


Pictures: Intel



Home telehealth – wearable systems

- Wearable, unobtrusive device
- Body area network
- Automatically raise alarms for
 - Unusual vital signs trends
 - Adverse events such as falls



Technology for Easy Life

MDKeeper™ Real-Time Monitoring of Patient's Vital Signs.

Anytime, Anywhere.

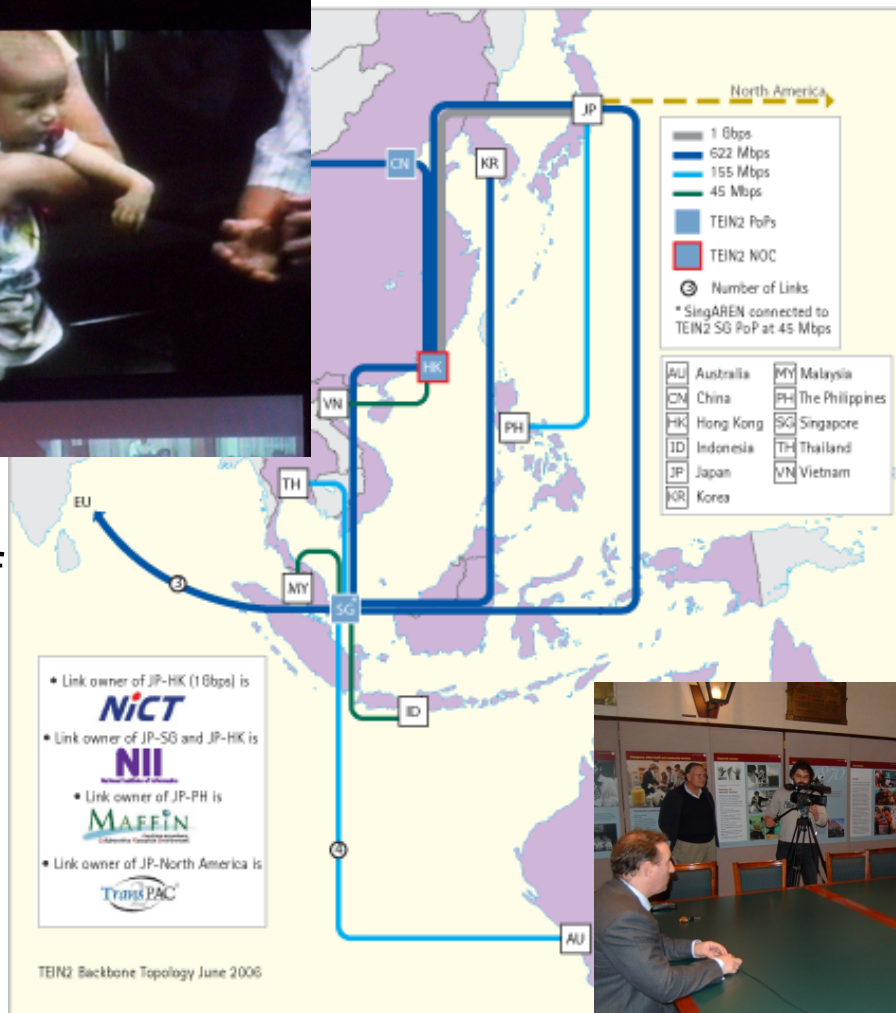
Image: Aerotel

Telehealth can overcome boundaries



National Hospital of Paediatrics, Hanoi, Vietnam

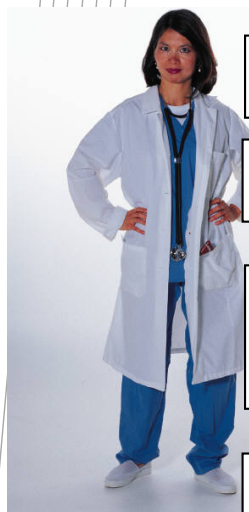
TEIN2 Network 2006



Royal Children's Hospital Melbourne



Future telehealth



- Doctor's office
- Doctor's home
- Doctor on ward rounds
- Doctor anywhere



- Emergency bed
- Accident scene
- Patient's home
- Patient anywhere

Instantaneous,
multichannel secure
connections

- Patient's
personal health
record



Challenges for networks

- Provision of secure *ad hoc* networks
- Guaranteed QoS
- Inhomogeneous technology
 - Fibre
 - Wireless
 - Mobile
 - WAN→LAN→BAN
- Transparency for the users
 - Patient focus
 - Users might be the patients
- Adaptable to user interfaces
 - Immersive
 - Carried in the pocket

