



Predicting telehealth infrastructure needs

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CSIRO ICT CENTRE
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The background


- Communications/IT revolution
- Construction of large infrastructure
 - National Broadband Network
- Expectations for telehealth to address significant health issues
 - Ageing population
 - Workforce pressures
 - Cost pressures

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The basic question

- How can we ensure that future infrastructure (e.g. NBN) is future-proofed from the point of view of telehealth.
- How will telehealth itself evolve over the lifetime of infrastructure such as the NBN?
- NBN often promoted as justified by health applications



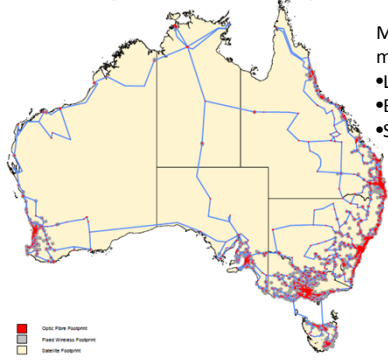
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NBN – large area covered by wireless or satellite

Most remote users may be limited by

- Latency
- Bandwidth
- Symmetry



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Prediction of infrastructure needs => Prediction of telehealth developments

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Predicting the future

- "It's tough to make predictions, especially about the future"



Life in 2000AD (1960s)

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Telehealth future – one vision (*Science & Invention*, Feb 1925)



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Materials and methods


- Literature search
 - Telehealth literature
 - Computer Supported Cooperative Work (CSCW) literature
- CSIRO Broadband Pilots
- Interviews with panel of thought leaders

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Literature search

- Articles from
 - CINAHL &
 - Medline
 - Contents search of JTT & TeH
- Satisfying one of
 - At least one bandwidth-critical current application is described
 - An application in the frontier of current practice is described
 - A technology associated with advanced networks is discussed in the context of telehealth
 - There is a substantial discussion of future trends
- In total, 147 articles were analysed




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High-end systems Evidence base



VICCU - Emergency



ECHONET – Intensive care



RIDES – Paediatric post-surgery

Three advanced telehealth systems trialled in the CSIRO CeNTIE program

LS Wilson, DR Stevenson & PC Cregan, Telehealth on Advanced Networks, *Telemedicine & eHealth* 16, pp 69-79 (2010).

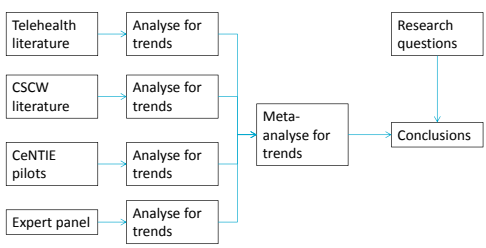
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Expert panel

- Recruited from Australia and USA
- 11 participants
- Semi-structured interview performed by researchers
- Each interview lasted around 45 minutes
- In person, Skype or telephone
- Analysed using thematic coding

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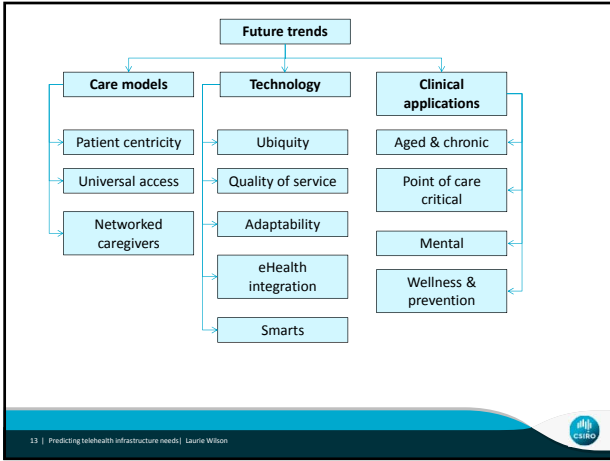
Analysis



```

    graph LR
      TL[Telehealth literature] --> AT1[Analyse for trends]
      CL[CSCW literature] --> AT2[Analyse for trends]
      CP[CeNTIE pilots] --> AT3[Analyse for trends]
      EP[Expert panel] --> AT4[Analyse for trends]
      AT1 --> MAT[Meta-analyse for trends]
      AT2 --> MAT
      AT3 --> MAT
      AT4 --> MAT
      RQ[Research questions] --> MAT
      MAT --> C[Conclusions]
    
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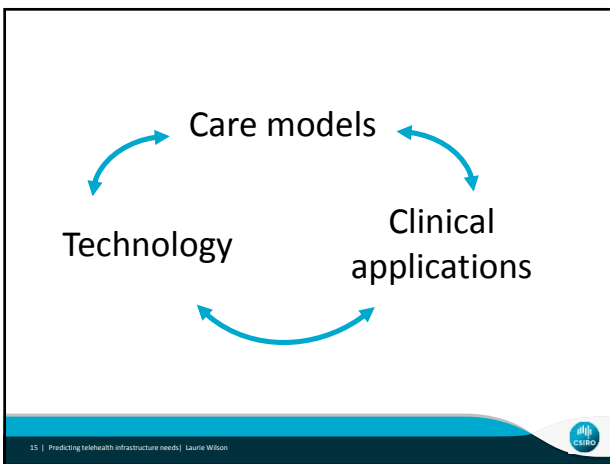
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Care models → Patient centricity

- Both a driver and beneficiary of telehealth evolution
- Key technologies
 - Home-based systems
 - Mobile applications
 - Personal health records
- Implies ubiquity of access
- Also includes such issues as
 - Human factors/culture and
 - Process change
 - Policy/regulation
 - Business model, funding
 - Implementation and sustainability
 - Legal/liability issues.

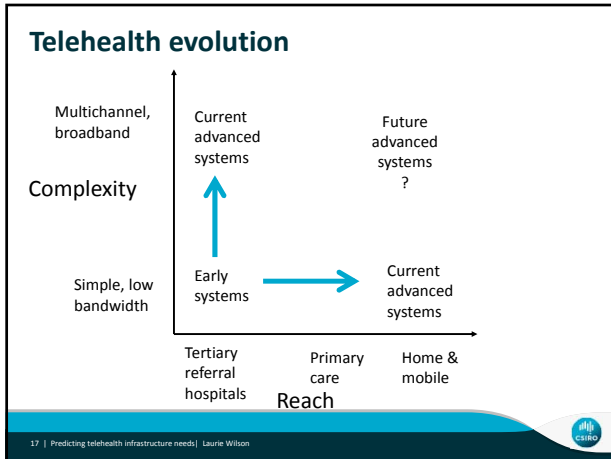
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High end & point of care systems

- Emerging applications, e.g.
 - Telestroke
 - ICU
 - Emergency
- Workforce issues
- Networked of caregivers
- Possibly increased use of store and forward

16 | Presentation title | Presenter name



- ### Conclusions 1
- Future infrastructure needs cannot easily be predicted from current applications
 - Telehealth will need to evolve with care models, technology and clinical applications developing interdependently
 - These will facilitate a more patient-centric model of healthcare delivery.
 - Home and mobile-based healthcare delivery will be the fastest-growing area.
 - “The more bandwidth the better”
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- ### Conclusions 2
- Infrastructure needs to provide:
 - Ubiquity
 - Support on mobile devices
 - Symmetrical if possible
 - Fixed systems supporting one or more channels broadcast-quality video
 - Reliable and easy to use by non-professionals
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- ### Acknowledgements
- Expert panel**
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 - Mohamed Khadra (Australia)
 - George Margelis (Australia)
 - Jay Sanders (USA)
 - Peter Yellowlees (USA)
 - Yulun Wang (USA)
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