Caring for the Last 3%
Telehealth Potential and Broadband Implications for Remote Australia
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Overview
- Health Outcomes: urban vs remote Australia
- Broadband to remote Australia
  - Options & key features
- Telehealth Services over Broadband
  - What makes a telehealth service
  - What will work over satellite: a Framework
  - Examples

The Health Gap between Urban and Remote Australia

People in Rural Australia have higher mortality rates…

Mortality ratios compared with Major Cities, by place of residence: 2004-06

more hospital admissions...

Admissions per 1,000 population, by place of residence 2007-8

and less access to Health Services (2006-7)

<table>
<thead>
<tr>
<th>Health Care Professionals, per 100,000</th>
<th>Major Cities</th>
<th>Very remote areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generalist Medical Practitioners</td>
<td>58</td>
<td>196</td>
</tr>
<tr>
<td>Registered Nurses</td>
<td>589</td>
<td>978</td>
</tr>
<tr>
<td>Allied Health Workers</td>
<td>64</td>
<td>354</td>
</tr>
</tbody>
</table>

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<tr>
<th>Services Received, by Place of Residence vs major cities (2006-7)</th>
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<tr>
<td>Service Type</td>
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<tr>
<td>GP services</td>
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<tr>
<td>Specialist services</td>
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<tr>
<td>Allied health services</td>
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Broadband to Remote Australia

National Broadband is Coming

- NBN goal is for every Australian premises to have access to high speed Broadband
- 93% Optical Fibre, (most urban)
- 4% Fixed Wireless
- 3% Satellite

<table>
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<tr>
<th>Estimated Resident Population</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Major Cities (RA1)</td>
<td>15,449,335</td>
</tr>
<tr>
<td>Inner Regional (RA2)</td>
<td>4,327,143</td>
</tr>
<tr>
<td>Outer Regional (RA3)</td>
<td>2,028,317</td>
</tr>
<tr>
<td>Remote (RA4)</td>
<td>326,764</td>
</tr>
<tr>
<td>Very Remote (RA5)</td>
<td>192,374</td>
</tr>
</tbody>
</table>

Source: National Broadband Plan 2011-2015, Estimated Resident Population by Remoteness Division
Very remote Australia will get Satellite

What's the Impact?

- Bandwidth
  - How many lanes
  - Speed limit

- Latency
  - How long is the road
  - Getting on and off

- Architecture
  - Everything goes through cities

Satellite Latency

- 3 elements of latency
  - Coding: Preparation for transmission
  - Travel to satellite & back
  - Decoding
  - 1 sec latency common, but improving

- Communications usually Geosynchronous
  - Orbit at 36,000 km to match rotation
  - Speed of light travel time ~0.25s
  - LEOs lower, but need multiple satellites

- Human reaction time is 250ms
What makes a Telehealth Service?

Communication elements combined for a purpose:
- Speech
- Social media
- Asynchronous information sharing (store & forward)
- Simple sensor monitoring
- Rich media sensor monitoring
- Video Streaming
- Video conferencing
  - Low resolution (standard)
  - High resolution
- Remote guidance
- Immersive telepresence
- Remote operation
A Framework for Element Requirements

Using the Framework: Example

Remote clinic to offer home based monitoring for CHF

- Consider Network
  - Connection type at other end matters
  - Need to allow for round trip for response

Backhaul (Fibre)

10x100 Mb/s upstream

Information Bandwidth

- if both ends remote = satellite
  - Bandwidth upstream limit = 1 Mb/s, Latency ~ 1 second

Interaction Time/s

- Bandwidth downstream limit = 150 Mb/s

Information Bandwidth

Using the Framework: Example

Satisfaction: ‘it depends’
- Two elements OK
- Third is marginal
- Need to understand
  - video conferencing task
  - Consequences of delayed interaction
  - Alternatives
Global Telehealth Conference 2012

“More Like A Set of Guidelines...”

- Limits not black & white → satisfaction
- Bandwidth will change over time
  - Technology is moving fast: more will be available
  - Elements will use more as available
- New elements will appear with innovation
- Interaction timescales will move less
  - The speed of light is not going to change
  - Neither is human reaction time

Call to Action

- Satellite is available now.
- There are satellite-proof services that could be rolled out now (store & forward): address barriers to deployment
- There are services near the edge: explore through research and development
- Some services challenge the laws of nature: walk away

Thank you

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