Skills gaps assessment for ITS in 2035

NZTA RR 639 Technology related transport skill requirements and availability

Transport Knowledge Hub 30th May 2018, Wellington

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Dr. Douglas Wilson, Associate Professor, The University of Auckland
A note to the audience

This presentation is based on research report RR 639 – *Technology related transport skill requirements and availability.*

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People using this research should apply and rely on their own skill and judgement and, if necessary, they should seek appropriate legal or other expertise regarding its use.
Research team

BERL

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Beca

• Stephen Hewett

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Research topic

In an ITS environment in NZ by 2035 environment, what are likely gaps between demand and supply of:

• Occupations – a basket of skills
• Skills – a basket of qualifications and learning by doing
• Qualifications – a basket of training
• Training – a basket of learning experiences: codified and tacit, formal and on-site

of ITS workers:

• Professionals – engineers, ICT, planning, policy
• Technicians – engineers, ICT, automotive technicians, etc
• Others – drivers

This presentation focuses on skills gaps expressed as occupations gaps
Research framework

Conceptual framework:

• Technological change creates a change in demand for occupations
  • which creates a change in the demand for skills
    • which induces a change in qualifications sought
      • which leads to a change in demand for training

Evidence base (from research project):

• ITS studies – global (eg TSC) and local (eg ATAP)
• experts and stakeholders - individuals, survey and workshops (Auck & Wgtn)
• labour market statistics (official counts – Census 2013)
• macroeconomic modelled projections (BERL model) of future economy
Method – skills gaps

Assess technological change
• create scenarios of ITS uptake in terms of: technologies; transport users; public policy
• assess order of magnitude (%) of ITS change by 2035 – reports/experts

Assess skills change
• qualitatively assess types of skills that will change
• assign order of magnitude change from a baseline

Assess skills gaps
• project 55 occupations in demand in 2035 as a baseline (assume no-ITS)
• adjust each baseline projection with an order of magnitude change due to ITS
• conclude gaps in occupations in demand in 2035 for ITS scenarios from baseline
Assess technological change 1 – S curves
Assess technological change 2 - ITS uptake pathways (stylized) to the very long-term
Assess technological change 3 – technologies and participants - link to relevant skills

<table>
<thead>
<tr>
<th>Progress path scenario in the very long-term</th>
<th>Technologies</th>
<th>Transport Users</th>
<th>Public Policy</th>
<th>Connected mobility outcome in the very long-term</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Vehicles</td>
<td>Data Analytics</td>
<td>Infrastructure National</td>
<td>Infrastructure Local</td>
</tr>
<tr>
<td>1. Slow</td>
<td>L</td>
<td>M</td>
<td>L</td>
<td>L</td>
</tr>
<tr>
<td>2. Medium with no incentives</td>
<td>M</td>
<td>M</td>
<td>L</td>
<td>L</td>
</tr>
<tr>
<td>3. Medium with incentives</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>5. Mixed rapid/slow</td>
<td>H</td>
<td>H</td>
<td>L</td>
<td>L</td>
</tr>
</tbody>
</table>

**Vehicles:** L = Low, M = Medium, H = High

**Data Analytics:** L = Low, M = Medium, H = High

**Infrastructure National:** L = Low, M = Medium, H = High

**Infrastructure Local:** L = Low, M = Medium, H = High

**Transport Users:** L = Low, M = Medium, H = High

**Public Policy:** L = Low, M = Medium, H = High

**Connected mobility outcome in the very long-term:**
- Business as usual
- Agencies reluctant to invest/subsidise, businesses see benefits
- Agencies willing to support/invest and businesses and households cautiously support
- Rapid growth in technology and cautious development of confidence.
- Initial novelty/enthusiasm uptake, long term households more reluctant to change, barriers exist due to user convenience and cost.
Assess technological change 4 – quantify change from baseline by 2035

Use autonomous vehicle take-up as metric of change - global reports (incl TSC, ATAP - below):

<table>
<thead>
<tr>
<th>ATAP</th>
<th>2026</th>
<th>2036</th>
<th>2046</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 0 – No Automation</td>
<td>59 – 79%</td>
<td>15 – 38%</td>
<td>5 – 15%</td>
</tr>
<tr>
<td>Level 1 – Driver Assistance</td>
<td>15 – 30%</td>
<td>33 – 40%</td>
<td>5 – 25%</td>
</tr>
<tr>
<td>Level 2/3 – Partial/Conditional Automation</td>
<td>5 – 8%</td>
<td>10 – 20%</td>
<td>10 – 35%</td>
</tr>
<tr>
<td>Level 4 – High Automation</td>
<td>1 – 2%</td>
<td>7 – 17%</td>
<td>N/A</td>
</tr>
<tr>
<td>Level 5 – Full Automation</td>
<td>&lt;1 – 1 %</td>
<td>5 – 15%</td>
<td>25 – 80%</td>
</tr>
<tr>
<td>Cooperative Adaptive Cruise Control</td>
<td>6 – 11%</td>
<td>22 – 52%</td>
<td>60 – 90%</td>
</tr>
</tbody>
</table>
Assess type of skills change 1- drivers and auto technicians to 2035

Commercial drivers:
• slow - same
• rapid - less – eg due to platooning in dedicated lanes

Automotive technicians:
• slow - more – high tech diagnostic
• rapid – more – higher codified skills – brand specific
Assess type of skills change 2 - engineers and ICT to 2035

Engineers – professional & technical:
- slow – more – policy & planning – outcomes focused
- fast – more – multidisciplinary – human centric - collaborative

ICT – professional & technical:
- slow – more – data analytics
- fast – more – collaborative
  - information solutions
  - software solutions - eg for infotainment in car
## Occupation projections with no ITS technology change – BERL model

<table>
<thead>
<tr>
<th>Occupation</th>
<th>1991</th>
<th>2015</th>
<th>2035</th>
<th>%pa</th>
<th>%pa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineer occupation group total</td>
<td>20,223</td>
<td>27,880</td>
<td>39,685</td>
<td>1.3%</td>
<td>1.8%</td>
</tr>
<tr>
<td>ICT occupation group total</td>
<td>20,244</td>
<td>52,025</td>
<td>72,405</td>
<td>4.0%</td>
<td>1.7%</td>
</tr>
<tr>
<td>Driver occupation group total</td>
<td>30,528</td>
<td>47,295</td>
<td>68,105</td>
<td>1.8%</td>
<td>1.8%</td>
</tr>
<tr>
<td>Repair and maintenance occupation group</td>
<td>18,441</td>
<td>22,785</td>
<td>32,420</td>
<td>0.9%</td>
<td>1.8%</td>
</tr>
<tr>
<td>Logistics occupation group total</td>
<td>5,634</td>
<td>6,615</td>
<td>8,360</td>
<td>0.7%</td>
<td>1.2%</td>
</tr>
<tr>
<td>Salesperson occupation group total</td>
<td>2,493</td>
<td>3,455</td>
<td>4,465</td>
<td>1.4%</td>
<td>1.3%</td>
</tr>
<tr>
<td><strong>Total 55 key occupations</strong></td>
<td>95,070</td>
<td>160,055</td>
<td>225,440</td>
<td>2.1%</td>
<td>1.7%</td>
</tr>
</tbody>
</table>
## Occupation projections – with ITS technology change – type and order of magnitude

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Total employment counts 2035</th>
<th>Difference between scenario and base line</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Base line</td>
<td>Scenario one</td>
</tr>
<tr>
<td>Engineer occupation group total</td>
<td>39,685</td>
<td>41,640</td>
</tr>
<tr>
<td>ICT occupation group total</td>
<td>72,405</td>
<td>75,965</td>
</tr>
<tr>
<td>Driver occupation group total</td>
<td>68,105</td>
<td>64,670</td>
</tr>
<tr>
<td>Repair and maintenance occupation group total</td>
<td>32,420</td>
<td>32,175</td>
</tr>
<tr>
<td>Logistics occupation group total</td>
<td>8,360</td>
<td>8,765</td>
</tr>
<tr>
<td>Salesperson occupation group total</td>
<td>4,465</td>
<td>4,465</td>
</tr>
<tr>
<td>Total 55 key occupations</td>
<td>225,440</td>
<td>227,680</td>
</tr>
</tbody>
</table>
Projections – taxi drivers

Baseline Scenario four Scenario one
Projections – IT systems analysts

Baseline
Scenario four
Scenario one
Possible next steps for this research

Update technology change assumptions:
- rate of change
- type for impact on particular occupations
- order of magnitude for particular occupations

Update baseline projections:
- Census 2018 counts for occupations
- Macroeconomic model assumptions
Skills gaps assessment for ITS in 2035

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