CONCORE TŪHURA

Digital Insights: Towards a Future Ready Workforce in Construction

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1. EXECUTIVE SUMMARY

New Zealand's construction and infrastructure sectors are experiencing a digital transformation that demands urgent action to upskill the workforce. Exploring the skills needed was a top priority for ConCOVE and several of our projects highlighted gaps in the skills of our workforce. Specifically, from ConCOVE's broad portfolio of research, 11 projects were identified containing digital skills insights. Combined, these reveal that digital skills are no longer optional but essential for New Zealand's construction and infrastructure workforce competitiveness. These findings provide valuable direction for new Industry Skill Boards (ISBs) to embed digital competencies into vocational education and training.

2. INTRODUCTION

New Zealand's construction and infrastructure sectors are at a turning point. The industry is now being reshaped by digital technologies that are changing how we design, build, and maintain the built environment. From Building Information Modelling (BIM) to artificial intelligence, simulation training, and digital twins, the skills required of tomorrow's workforce are evolving rapidly, and the pace of change shows no signs of slowing.

This report brings together insights from a portfolio of research commissioned by ConCOVE Tūhura to explore what these changes mean for Aotearoa's workforce. It highlights some of the key themes that were continuously highlighted in our research. It also surfaces the opportunities and challenges of embedding digital capability across training systems, qualification frameworks, and workplace practice.

3. CRITICAL DIGITAL SKILLS IDENTIFIED

There were four top critical skills identified, that highlighted significant gaps in current training and upskilling. These were:

Building Information Modelling (BIM) emerged as the highest-priority digital skill (87/100 rating) across multiple projects, enabling real-time access to 3D models, improved coordination, and seamless integration between design, construction, and handover phases.

Augmented reality and simulation technologies show transformative potential, with welding simulation achieving 56% reduction in training time and enabling safer, more personalised learning experiences with real-time feedback.

Artificial intelligence in assessment represents an emerging critical capability, with research demonstrating AI can generate baseline assessments that meet NZQA standards and create personalised assessments for diverse learners. AI fundamentally inverts traditional assessment development, enabling rapid generation while requiring enhanced review processes for quality control.

Digital infrastructure tools including trenchless technologies, digital twins for building performance monitoring, IoT integration, and drone-based surveying are reshaping civil construction and infrastructure work.

4. WORKFORCE TRANSFORMATION INSIGHTS

In addition to identifying critical skills shortages, three of our projects identified insights that could have a transformative impact on workforces:

The prefabrication study revealed that technology can offset workforce demand by up to 20%, while the quarrying project emphasised human-machine integration requiring reskilling programs for AI and automation. The civil construction research identified simulator training as essential for heavy equipment operation, offering safer, cheaper alternatives to traditional training methods.

The Amotai future-focused skills project specifically identified opportunities for Māori and Pasifika businesses in digital construction technologies, highlighting BIM for subcontractors as a key growth area with 783 Māori and Pasifika construction businesses registered, yet significant upskilling opportunities remain to capitalise on emerging green construction technologies.

5. INCLUSIVE DIGITAL APPROACHES

Multiple projects highlighted digital equity barriers and the potential for a digital divide as these technologies grow in importance. In particular requiring device access, assistive technologies (speech-to-text, visual organisers), and culturally responsive training design. The neurodiversity project highlighted universal design for learning principles, while TTM and upskilling Māori projects stressed collaborative learning approaches and Treaty of Waitangi integration.

6. STRATEGIC RECOMMENDATIONS FOR INDUSTRY SKILLS BOARDS (ISBS)

The new Industry Skills Boards present an opportunity to strengthen digital skills across the construction and infrastructure sectors using standard setting levers. In particular, there are six ways that ISBs could help drive New Zealand's digital future in the construction and infrastructure industries.

1. Embed digital competencies in qualification standards

As standard setters, ISBs should integrate BIM fundamentals, data management, and digital collaboration requirements into existing and new qualifications. Align standards with industry frameworks (ISO 19650, NZ BIM Handbook) and specify digital competency requirements that training providers must deliver. Establish clear assessment criteria for digital skills and create pathways for micro-credentials and industry-recognised digital certifications.

2. Advocate for AI-Enhanced assessment standards

Promote the integration of AI in assessment design and delivery within qualification frameworks. Establish standards for AI-generated personalised assessments that accommodate diverse learning needs while maintaining assessment integrity. Reiterate to TEC the potential for AI to enhance assessment quality and accessibility, particularly for neurodivergent learners and priority groups.

3. Advocate for simulation-based training standards

Use industry voice to promote simulation training standards for high-risk, high-cost environments. Establish qualification requirements that recognise simulator-based competencies for welding, heavy equipment operation, and safety scenarios. Communicate to TEC the industry need for funding support for simulation equipment and the evidence of significant time savings and improved safety outcomes.

4. Address SME and Māori/Pasifika digital needs through standards

Recognise through qualification design that SMEs and Māori/Pasifika businesses need flexible, accessible digital training pathways. Create modular qualification structures that allow for incremental digital skill development. As mentioned previously, the Amotai project identifies 783 registered Māori and Pasifika construction businesses with significant opportunities for BIM upskilling and green technology adoption.

5. Ensure inclusive digital standards

Design qualification standards that accommodate diverse learning needs through portfolio-based assessments and multiple pathway options. Embed requirements for assistive technologies and culturally responsive delivery methods. Advocate to TEC for funding that addresses digital equity barriers including device access and digital literacy support.

6. Create integrated digital qualification pathways

Move beyond isolated digital modules to integrated qualification frameworks that progress learners from basic digital literacy through to advanced digital competencies. Establish clear progression routes and transfer mechanisms between qualifications that recognise prior digital learning.

7. IMPLEMENTATION PRIORITIES

ConCOVE's research provides a clear roadmap to realise the benefits of digital technologies.

Immediate actions (one – three years):

- Review and map digital competency requirements across current qualification standards
- Establish industry advisory groups to define sector-specific digital skill needs, including Māori and Pasifika business requirements
- Develop qualification frameworks that embed BIM and digital collaboration requirements
- Advocate to TEC for funding support for AI assessment tools and simulation equipment

Medium-term goals (three – five years):

- Create comprehensive digital competency standards aligned with industry needs
- Establish recognition pathways for existing digital skills and international qualifications
- Develop AI-enhanced assessment frameworks that support personalised learning
- Advocate for TEC funding models that address SME digital training challenges and support Māori/Pasifika business development

Long-term vision (10 – 20 years):

- Position New Zealand qualifications as internationally recognised for digital competency
- Create seamless digital skills progression pathways across all sector qualifications
- Establish ongoing industry feedback mechanisms to keep standards current with technology evolution.

8. ADDRESSING IMPLEMENTATION CHALLENGES

Our projects revealed several barriers that could stifle the take up of digital technologies.

Technology resistance and change management: Multiple projects revealed resistance from experienced practitioners who don't see technology's value. ISBs can address this by establishing qualification standards that require digital competency demonstration, creating clear industry expectations for digital skills and advocating to TEC for funding that supports technology adoption by training providers.

Funding and resource constraints: Funding was identified as the primary barrier across projects. ISBs should use their industry voice to advocate to TEC for sustained funding models, particularly for expensive simulation equipment, AI assessment platforms, and digital infrastructure. Communicate industry evidence such as KiwiRail's $5 return for every $1 invested in digital systems, and advocate for funding approaches and investment that support SME clustering and shared digital resources.

Digital equity and inclusion barriers: The TTM, neurodiversity, and upskilling Māori projects highlighted significant digital inequities. ISBs should embed inclusive design principles into qualification standards, requiring training providers to offer assistive technologies and culturally responsive delivery methods. The AI assessment research demonstrates potential for personalised assessment delivery that can better accommodate diverse learning needs.

Integration and coordination challenges The civil construction study highlighted the problem of "pilot initiatives without coherent strategy." ISBs can address this through their standard-setting role by creating integrated qualification frameworks that move beyond isolated digital modules. Use industry voice to advocate for coordinated approaches across the training provider network and ensure qualification standards drive systematic rather than ad-hoc digital skills development.

9. RECOMMENDATIONS FOR FUTURE RESEARCH

There are still areas that would benefit from additional research and insights which ISBs may also want to consider. Specifically:

- Longitudinal impact studies: Track how digital training interventions affect productivity, safety, and workforce retention over 5–10 years.
- Equity-focused research: Explore tailored digital pathways for Māori, Pasifika, SMEs, and neurodiverse learners.
- Technology foresight scanning: Establish rolling foresight studies on AI, robotics, and digital twins to anticipate new training needs.
- Comparative international analysis: Benchmark New Zealand's digital skill development against other small advanced economies (e.g., Singapore, Denmark, Ireland).
- Measuring ROI of digital training: Develop frameworks that quantify returns on investment in simulation, BIM, and AI-enhanced learning, encouraging further investment.

10. CONCLUSION

Digital transformation is not just about adopting new tools; it's about reshaping the workforce to thrive in a rapidly evolving landscape. By embedding digital competencies across training and qualifications, supporting SMEs and Māori/Pasifika businesses, addressing digital equity barriers, overcoming resistance and investing in new technologies, New Zealand can position itself as a global leader in construction and infrastructure innovation.