DIGITAL CAREERS IN ENGINEERING

Developed by:

CGF
CONSTRUCTION GROWTH FOUNDATION

Building Institute Aotearoa

BUILT ENVIRONMENT CAREER STREAMS

Ngā ara rerekē o te ao hanga taiao

DIGITAL CAREERS IN ENGINEERING

This guide provides a helpful overview of the digital skills required for built environment engineering careers – including structural, mechanical, electrical, and other specialist engineering disciplines. It's intended to help you understand:

- The digital skills you need for different types of role and at different career stages
- How to develop these skills through education and practice
- How digital capabilities can accelerate your career progression
- Whether digital specialisation might be right for you

This supplementary document should be read alongside the main 'Engineering Career Stream' guide. Together, these guides offer a picture of how digital capabilities are reshaping engineering careers while maintaining the profession's core values of technical excellence, safety, and client service.

WHY DIGITAL SKILLS MATTER IN ENGINEERING

Digital tools already play a significant role in engineering practice. Simulation, modelling and calculation software are used as an integral part of the engineering design process.

More recently, BIM and associated technologies have been playing an increasing role in engineering practice, rapidly changing how engineers develop designs, coordinate with other disciplines, and manage technical information.

Every engineering professional requires digital literacy – from graduate engineers learning to develop models using BIM authoring tools to engineering directors advising clients on digital delivery strategies. While many engineering firms develop digital capability within their existing teams rather than creating dedicated specialist roles, the growing complexity of digital delivery means that specialist digital roles are also beginning to emerge.

Digital adoption in engineering varies considerably across the New Zealand industry and between disciplines. Large multi-disciplinary consultancies typically use integrated BIM workflows, discipline-specific analysis software linked to design models, and common data environments for information exchange. Smaller specialist firms may produce high-quality engineering designs using a combination of analysis software and two-dimensional documentation – but have limited BIM model development.

The degree of digital integration also varies by discipline, with structural and building services engineering generally further advanced in model-based design than some specialist areas.

> **"This digital engineering term kind of came into being, but nobody's completely sure what that actually means. We break it down and say it's information management or modelling or data and analytics or geospatial or computational design or whatever else is further off down the list of specific skills. We see digital engineering more as a function that those people will work together to provide."**
>
> – Keri Niven, Principal, Digital, Aurecon

THE DIGITAL SKILLS LANDSCAPE

Digital skills in engineering include:

Foundational technical capabilities – Discipline-specific analysis and design software, BIM authoring tools, common data environments, document management and version control systems – as well as data literacy for understanding how engineering data is structured, validated, and communicated.

Design development and documentation – Three-dimensional design development with embedded engineering data, model-based outputs and construction

documentation, multi-discipline coordination and clash detection, and digital documentation that meets the same rigour as traditional engineering documentation.

Collaboration and communication – Using common data environments and collaboration platforms to share engineering information, participating in model-based coordination workflows, coordinating engineering deliverables with other disciplines, managing technical queries and design change processes through project platforms.

Strategic design delivery competencies – Developing and implementing BIM standards, evaluating technology and workflow, assessing interoperability between analysis and BIM platforms, developing automation and custom tools, and mentoring team members in digital design methods.

Integration of digital and engineering expertise – Connecting BIM tools with discipline-specific analysis software, using digital platforms to improve coordination between building systems, linking three-dimensional modelling with engineering calculations and regulatory compliance, and ensuring that engineering data supports construction delivery and building operations.

INTEGRATING DIGITAL AND TRADITIONAL SKILLS

Digital skills in engineering don't replace traditional capabilities; they enhance and extend them. Engineers already rely on discipline-specific analysis software and established technical workflows, so building digital capability is less about adopting new tools for the first time and more about extending existing practice.

Digital skills sit on a foundation of quantitative competence, moving engineers into model-based coordination, integrated information management, and data-driven decision-making through collaborative digital workflows.

Digital skills required for engineering careers include:

Design development – BIM authoring tools enable three-dimensional design development with embedded engineering data, replacing two-dimensional drafting for many tasks. Engineers develop design models containing geometric accuracy, material assignments, and embedded design information. However, the quality of model-based engineering still depends on sound engineering principles, understanding of building systems performance, and professional judgement.

Multi-discipline coordination – Multi-discipline model coordination and clash detection reduces on-site paperwork by identifying conflicts between building systems before construction. Engineers participate in coordination processes to resolve spatial conflicts between structural, mechanical, electrical, and other building systems. Effective coordination requires understanding of how different systems interact, and recognition of practical construction constraints.

Technical documentation – Digital documentation and model-based outputs improve the accuracy and consistency of engineering deliverables. Engineers extract drawings, schedules, and quantities from models, understanding the relationship between model content and documentation quality. Professional standards for engineering documentation apply equally to digital deliverables.

Analysis and simulation – Engineers use discipline-specific analysis software as an integral part of their design process. Digital integration extends this through linking analysis software to BIM models, enabling more efficient iteration between design development and performance verification. Understanding the relationship between input assumptions and output reliability remains a core engineering skill.

> **"As an engineer or design manager, you should have an idea about the strengths and weaknesses of software. Even if you're not a digital specialist, you need to understand how digital engineers can fit into your workflow, when you need to work with them, what kind of things you need to work on, and what things can be part of your routine job. You need to be comfortable with these things."**
>
> – Tirth Patel, Civil Engineer; Postdoctoral Fellow, University of Canterbury

Construction support – Common data environments provide structured information exchange between engineering disciplines, architects, and contractors. Reality capture technologies support existing building assessment and as-built verification. Effective construction support depends on engineering knowledge and the ability to interpret and resolve technical issues.

DIGITAL SPECIALISTS IN ENGINEERING

Many engineering firms develop digital capability within their existing teams, rather than creating dedicated digital specialist roles. Smaller firms may designate an individual as the point person for digital matters – often an engineer with strong software skills who takes on this responsibility in addition to their technical role. Larger multi-disciplinary consultancies are more likely to have specialised digital teams.

Engineering already relies on discipline-specific analysis software and established technical workflows, which means that digital specialisation may sit closer to the technical work than in some other career streams. Digital specialists in engineering need a deep understanding of engineering processes and the specific software used in their discipline, rather than general digital skills.

DIGITAL DELIVERY SPECIALIST

Within larger engineering consultancies, digital delivery specialists coordinate BIM implementation, manage model standards, and support engineering teams to work effectively within digital project environments. This role bridges engineering practice and digital delivery requirements.

Core responsibilities

- **BIM standards and implementation** – Developing and maintaining practice-wide BIM standards and templates for engineering disciplines, establishing model development protocols that ensure consistency across projects, and supporting engineering teams to produce model-based deliverables that meet both internal quality standards and client requirements.
- **Multi-discipline coordination** – Coordinating engineering models within multi-disciplinary project environments, managing clash detection and design coordination processes, and facilitating resolution of conflicts between building systems through model-based review workflows.
- **Technology and workflow development** – Evaluating and implementing engineering software and digital tools, developing interoperability workflows between analysis and BIM platforms, creating automation scripts or custom tools that improve engineering productivity, and providing training and support to engineering teams adopting new digital processes.

GIS AND SPATIAL DATA SPECIALIST

Geospatial Information Systems (GIS) have a long history in engineering, particularly in civil and infrastructure work, and their role is expanding in the building and construction sector. GIS and spatial data specialists integrate location-based data with engineering design and project delivery, connecting site-specific information to design models and project management systems.

Core responsibilities

- **Spatial data integration and visualisation** – Integrating geospatial data with BIM models and project information systems, enabling engineering teams to visualise and analyse design data in its spatial context. Developing web-based mapping and spatial visualisation tools that make complex engineering and construction data accessible to project teams.
- **Infrastructure and asset data management** – Supporting engineering teams working on infrastructure and asset management projects by connecting spatial data with asset registers, condition assessment records, and lifecycle information. Developing workflows that link engineering design outputs to asset management systems for operations and maintenance.
- **Platform development and data ecosystems** – Contributing to the development of digital delivery platforms that embed geospatial capability alongside document management, model coordination, and project workflows. Supporting the transition from proprietary, project-siloed data towards open data standards that enable asset owners to integrate project information into their business-as-usual systems.

BUILDING DIGITAL CAPACITY

For engineering professionals, building digital capability requires curiosity and willingness to learn, practical application and continuous skill development. The breadth of engineering disciplines within the built environment means that specific digital tool requirements vary considerably – however, digital capability is expected applies across disciplines.

SELF-DIRECTED LEARNING

Most digital learning happens through curiosity or need-driven learning, rather than formal training programmes. If you enjoy exploring tools and solving problems independently, self-directed learning may be the best approach to develop your capabilities more quickly. Options include:

- **Online tutorials** – free resources for most architectural software, searchable for specific tasks.
- **Software vendor resources** – most major software providers provide free trials or educational licences, as well as structured learning paths.
- **Industry webinars** – regular sessions from software vendors and industry organisations.

FORMAL EDUCATION AND TRAINING

Tertiary education organisations, including vocational providers, wānanga, and universities increasingly include digital construction skills in their programmes.

Institutions offer courses, diploma and degree options that cover digital documentation, BIM model development, digital project delivery concepts, data management and emerging construction technologies.

PROFESSIONAL DEVELOPMENT

Alongside your own exploration of digital tools and skills, it's important to connect with broader digital engineering communities. This not only provides access to a wider range of resources for your self-directed learning, it also gives you insight into how these tools are being applied within the industry – and helps to develop your network for mentoring or other opportunities.

- **Industry conferences** – Such as Building Institute Aotearoa's DigiComm conference with digital streams, vendor-run conferences, and buildingSMART Australasia events.
- **Workshops** – Hands-on technical training sessions, software-specific deep-dive courses, and computational design workshops.
- **User groups** – BIMinNZ and other user groups in major centres, software user communities, as well as informal knowledge sharing.
- **Online communities** – LinkedIn groups, software-specific forums where practitioners share knowledge and solve problems together.

GET THE GUIDE

Use the QR code to download the full Built Environment Digital Career Streams guide and explore the many rewarding pathways in the construction sector.

Or head to the website: **BECareerStreams.nz**

CAREER STORIES

Keri Niven – Principal, Digital, Aurecon

Keri Niven had never planned to work in construction. Starting with a Parks and Recreation degree ("the only way into engineering without doing maths"), she undertook some papers in GIS that gave her head-start in her career. In her first job at a District Council, she did everything from designing pipes to holding stop-go signs on roadworks, and discovered a new appreciation for the built environment.

After working at NIWA on river classification projects and some further specialised study in GIS, Keri's career took a sharp turn when she moved to London. Despite knowing little about construction, she backed herself and her GIS expertise and landed the Systems Lead role for the 2005 London Olympics, responsible for coordinating major venue builds. Her approach was straightforward – "Ask for help, build a good team, and lean on them."

Back in New Zealand, Keri brought her international experience to Aurecon, shifting from traditional GIS work into digital platforms that changed how project teams work together. She helped develop the company's Digital Workspace, now used on projects worldwide, and was seconded to be the digital leader for the East Coast cyclone recovery alliance.

These days, she helps clients link good design and construction practices with asset management, balancing technical solutions with the human element, using what she calls "leadership by influence" to get people to adopt new ways of working.

Keri believes that resilience is an essential characteristic for anyone working in digital roles. "In this field, you've got to be comfortable with constant change," she says. Her advice to others building a career in the digital space is to keep learning, stay hands-on, and avoid becoming someone who only talks about technology without using it – "that's how you become irrelevant."