NEEDS ANALYSIS
Review of Information and Communication Technology (ICT) Qualifications
Compiled for the Steering Group by New Zealand Qualifications Authority (NZQA) National Qualifications Services (NQS)

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NEEDS ANALYSIS
Review of Information and Communication Technology (ICT) Qualifications 2013

Part 1:
SUMMARY OF STRATEGIC NEED
(includes proposed suite of Computing and IT qualifications)

Part 2:
BACKGROUND REPORT
(supporting evidence and process)
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PART A: SUMMARY OF STRATEGIC NEED

STRATEGIC NEED FOR PROPOSED COMPUTING & IT QUALIFICATIONS

Currently there is a wide range of qualifications in information and communication technology (ICT) with many apparently similar qualifications at the same level. One purpose of the mandatory review was to reduce the duplication and proliferation of qualifications on a national scale, and to ensure that qualifications are useful, relevant and valuable to current and future learners, employers, and other stakeholders.

The current nationwide review of all sub-degree ICT qualifications is being led by the Steering Group appointed by owners of current ICT qualifications and by peak bodies. In consultation with stakeholders, the Steering Group has developed the proposed structure of fourteen qualifications for ICT to replace most of the 222 current ICT qualifications that are part of the review.

A. JUSTIFICATION FOR PROPOSED QUALIFICATIONS – SOME KEY ISSUES

There is a distinct need in New Zealand for the proposed computing and IT qualifications, at both the national level, and also at the specific sector and industry needs level. The ‘ICT sector’ is different from the ‘IT workforce’, but there are overlaps with many people working in IT positions in non-ICT businesses, and vice-versa. The focus of this review is to develop qualifications which will equip people with the skills needed for IT related positions, either as a technical professional or as a proficient user of a range of computing and digital technologies, whether that is in an ICT sector business, other business organisations, or the community.

Given the complexity of the review, the lack of consistency and cohesion amongst existing qualifications and the perception that they did not currently meet industry needs (as a whole), the Steering Group built the new qualifications landscape from the ground up – first identifying needs and roles in industry, then developing qualifications to meet this need. This ensured that the Steering Group could be satisfied that significant need existed for the proposed qualifications.

The needs analysis report considered the current and future needs of IT and was compiled to inform the decisions of the Steering Group when designing the future range of computing and IT qualifications. There was comprehensive investigation and analysis to quantify existing and future focused needs in terms of supply and demand, both. The conclusions reached are exemplified in the summary, and highlight the strategic need for IT qualifications and the specific needs of learners and employers.

The stakeholder profile reflects the breadth of the sector and those that have been engaged through the review process. Stakeholder views have been incorporated into the needs analysis to explore and refine the specific demand and needs of the sector in relation to the level of qualifications that are within the scope of this review.

Data has been obtained from a wide range of sources including Statistics New Zealand, Ministry of Education ‘Education Counts’, industry sector reports prepared by Ministry of Business Innovation and Employment (MBIE) that reflect government policy priorities and future projections; and a section considering possible job roles and job vacancy data.

There is significant evidence of need in New Zealand for people skilled in IT, and indications that current qualifications are not fully addressing this need. A range of IT jobs remain on the long term skill shortage list produced by MBIE (Immigration section); a range of IT jobs are in the
Forbes 'top jobs in demand' lists produced internationally; and job vacancy data provides further evidence of the need for graduates skilled in IT. It is also an area of priority interest for Government.

There were some specific needs and issues that became apparent during the process of researching and compiling the needs analysis, and the resultant proposed qualifications aim to address these where possible.

- NZ needs more skilled IT workers – these can either be imported or developed in NZ. The proposed suite of qualifications is intended to address this need at the sub-degree level, and qualify people to work in a range of IT roles and/or equip them to progress their career, or prepare them for further study.

- Range of job roles – As many IT professional job roles require degree qualifications, the review undertook an industry survey to identify key job roles that may be suitable for graduates of qualifications within the scope of the review. These roles are reflected in the employment pathways of proposed qualifications.

- Schools & IT - Current learners that are still at secondary school are likely to be well catered for with digital technology achievement standards as preparation for the traditional university degree pathways into the IT profession. What is not so well catered for is the large number of learners that have not progressed through this pathway and have an interest in the IT area and need an opportunity to explore their aptitude and suitability to gain qualifications that may enable them to obtain IT roles.

- Practical ‘hands-on’ approach to learning - Stakeholder feedback raised concerns about the need to ensure that a highly practical and ‘hands-on’ approach could be taken within programmes designed towards the proposed qualifications, so they would adequately engage the targeted learners that may be looking for an alternative pathway to the more traditional academic approach to a career in IT.

- Gender imbalance – fewer women in IT as a profession roles (approx. 75-80% male dominated); whilst recognised as too big an issue for this review to resolve in isolation, the review did explore ways to address this and have included less technically-focused Information Systems qualifications that may have a stronger appeal to women. Women are well represented in the 'IT as a Tool' computing user range of qualifications.

- Global IT industry, and links to internationally recognised industry vendor certifications - Feedback to the review indicated support for the proposed suite of IT qualifications to provide opportunities for linkages to international vendor certifications. However, the overall message from feedback was in support of these certifications ‘dropping out’ of broader NZ qualifications through programme design. Also, that these regularly updated international vendor certifications should not just be repackaged as an NZ qualification for funding purposes, but be available as an opportunity for providers to include in their design of current programmes towards the proposed new NZ IT qualifications to meet the needs of the sector. The proposed qualifications are worded in a way that allows enough flexibility for a range of programmes to be developed with potential linkages to current internationally recognised industry certifications.

- Wānanga and the Education Act - An issue that must be relevant to all reviews and still requires resolving is around how additional learning associated with Mātauranga Māori
will be best achieved within the suite of new qualifications to ensure Wānanga can meet their requirements under the Education Act. This review has started to consider options which may involve additional outcomes being included, and/or consideration of optional endorsements or some other structural changes in the next stage.

- **Up-skilling** – In a sector that has a very fast pace of change, the issue of up-skilling is very important. The review considered this and proposes a short Level 6 Certificate qualification to enable existing practitioners to update their skills; and to assist people re-entering the IT workforce. This is designed to meet a specific need in the sector and is not seen as a replacement for more detailed qualifications required to adequately prepare people for roles in the sector. Entry requirements are intended to restrict access to those with relevant practical experience. There will be further discussion around whether strands or specific technical areas will require separate credentialing and how best to achieve this in the next stage of development.

Further development work will be undertaken in the next phase following 'approval to develop', and there will be additional opportunities for stakeholders to be involved and to provide feedback and suggest any changes that they think are required. Graduate profile outcomes and other parts of the qualifications will be refined following evaluator feedback, and where mandatory stakeholder concerns still exist, reconsideration of structural aspects may occur (e.g. strands, optional endorsements).

The Steering Group believe that further stakeholder engagement and sector meetings in the next phase will assist in allaying concerns about the transition to the proposed new qualifications. Details of the proposed suite of computing and IT qualifications will follow the next section, which provides further evidence of need – IT industry and business needs; Learners needs; Māori and Pasifika needs.

**B. EVIDENCE OF NEED**

**B.1 IT Industry and Business Needs**

There is a distinct need in New Zealand for the proposed computing and IT qualifications, at both the national level, and also at the specific sector and industry needs level. The 'ICT sector' is different from the 'IT workforce', but there are overlaps with many people working in IT positions in non-ICT businesses, and vice-versa. The focus of this review is to develop qualifications which will equip people with the skills needed for IT related positions, either as a technical professional or as a proficient user of a range of computing and digital technologies, whether that is in an ICT sector business, other business organisations or the community.

The needs analysis report considers the current and future needs of IT and was compiled to inform the decisions of the Steering Group when designing the future range of computing and IT qualifications. There was comprehensive investigation and analysis to quantify need in terms of supply and demand, both existing and with a future focus. The conclusions reached are exemplified in the summary, and highlight the strategic need for IT qualifications and the specific needs of learners and employers.

Further detail in the needs analysis includes an overview of the sector, skills and competencies for the sector, analysis of the current situation (existing qualifications, usage data, trends); a ‘future focus’ section which includes available projections of future demand for occupations and qualifications, and is supported by the sector profile, and employment and vacancy data analysis.
The analysis of IT specialty areas provides information on the process of designing these IT qualifications, along with survey feedback and proposed qualifications considered as part of the review.

The key findings emphasising the strategic need for these qualifications follows:

- It is difficult to establish precise future demand for IT related employees, but there is evidence from published employment and occupation data and job vacancy trends of continuing demand for skilled professionals in the IT sector.

- A large number of IT related positions remain on the long term skills shortage list, although many are related to degree-qualified occupations. Employment and education pathways are a key component of new qualifications at levels 1-6, and industry surveys have been undertaken to confirm suitable types of job roles for graduates of proposed level 1-6 Certificate and Diploma qualifications.

- A focus on improving technical and management skills of IT professionals and digital literacy of society is likely to enhance the productivity of New Zealand.

- There is evidence that technology fluency or digital literacy will join creative problem solving and collaboration as essential core skills required for study, work, and life in the 21st century. There is evidence of a need to master a range of skills including navigating and confidently using information, media, and technology skills; to enable a person to be successful and safe in the information age.

- There seem to be two distinct audiences for IT related qualifications.
  - ‘IT as a Tool’ – for enhancing computing and digital literacy capabilities and productivity improvements;
  - ‘IT Professionals’ – for the technical skills to develop software and applications, and find IT solutions for current and future issues and opportunities, and the related infrastructure requirements.

- The needs analysis identifies very high usage data for ‘IT as a Tool’ computing qualifications, as demonstrated by both national qualification and TEC funded course completion data. Demand at lower levels is likely fuelled by fees free provision by TEOs. The needs analysis also identifies that literacy, numeracy and digital literacy is expected of graduates of these qualifications; and the need to improve productivity in New Zealand. The needs analysis has further detail in the digital literacy area in the ICT Sector Industry Profile section on Computing and Society.

- There is evidence of demand for a progressive suite of computing ‘user’ qualifications from level 2 to level 4, based on current supply and demand, and the need for New Zealand to improve productivity and digital literacy skills to be a connected citizen. The needs of this sector are intended to be met by the proposed qualifications which focus on the underpinning skills and knowledge needed by people in business and the community. Organisations and communities will benefit from having people who are qualified with relevant technology skills that can contribute to improving performance and productivity.

- It is expected that a high proportion of IT jobs will require regular up-skilling due to the pace of change in the sector. Training people for an unknown future will involve
identifying the skills and core competencies that can form the basis of designing and using emerging technologies that can't yet be anticipated.

- Well-developed IT and business skills are required for high performing workplaces and for businesses to gain competitive advantage. Skills and knowledge include a range of technical skills and abilities including personal attributes that may be relevant in a large range of businesses, not just IT businesses. Improving management skills, in particular people management, are needed to lift productivity.

- Skills identified as most in need of improvement by industry groups were customer service and sales skills, team working skills, oral communication, followed by computer skills. The suite of level 2 to 4 computing Certificates is intended to address the need to improve computer skills in business and the community, and drive productivity improvements by using technology more effectively.

- Emphasis on the need for “soft skills”. Graduates should be good with people, able to work in teams and able to solve their own problems.

- Changing nature of skills required including an emphasis on skills associated with “knowledge work” e.g. cognitive skills such as abstract reasoning, problem solving, communication and collaboration with clients and colleagues.

- Skills and knowledge should be applied to a workplace or other real or realistic context. Some employers have suggested the need for relevant work experience as part of a qualification.

- Designing the landscape for IT qualifications requires a future focus approach, and determining what is needed and how best to provide solutions to meet the different needs of identified and relevant stakeholders, including the specific needs of Māori and Pasifika learners.

- The needs of Māori and Pasifika learners have been considered as part of the review, with an initial consensus that for IT this will not impact the design of new qualifications other than to ensure that the context allows for a range of programmes to be developed to meet specific needs of many potential learner groups, including Māori and Pasifika learners. There may be further consideration in the next stage to ensure that Wānanga can meet their obligations under the Education Act within the range of proposed qualifications.

- According to Ministry of Education figures, there were 41,740 enrolments in IT in 2011, with 48% in Certificates (11,910) or Diplomas (8,720); with more than half of the enrolments being in degrees or post graduate qualifications. 75% of all Information Technology qualification completions in 2011 were at Certificate and Diploma level (5,443 of the total 7,236 ICT completion); with 26% at degree level. Further information is contained in the analysis of the current situation section on ‘demand’ in the needs analysis.

- Gender – IT professionals tend to be younger and male, and are generally highly qualified (many with degrees). Only a third of enrolments in bachelor degrees are females; whereas for lower level Certificate qualifications, there are twice as many females...
enrolled as males. The review concluded that women are well represented in the ‘computing user’ levels of qualifications, but are under-represented in the more technical IT qualifications. The review recognised that this was too big an issue for the review to resolve on its own, but determined it should consider how to design qualifications that may be more attractive to women in the IT professional area. As a result, Information Systems qualifications are included and they are expected to have a stronger appeal to women, as they prepare learners for roles in business analysis, user experience, project management and database administration which are areas that appear more attractive to many women.

- Forecast growth - In the Skills Challenge Report (p41), the New Zealand Department of Labour forecast that the strongest growth in demand (averaging 6% p.a.) is for people with intermediate level vocational qualifications across a wide range of occupations in the next 10 years, driven particularly by management and professional occupations. Technicians and Associate Professional occupations are expected to grow by 1.3%pa (39,000) over 10 years; and this is likely to include IT professionals.

- Productivity - New Zealand is reported\(^1\) as having both a low level of productivity and one of the lowest rates of productivity growth in the OECD, and this raises concerns. One of the topics announced for detailed investigation by the Productivity Commission in the services sector is ‘addressing barriers\(^2\) to the successful application of ICTs’. This may identify how ICT can improve productivity in New Zealand, and will hopefully identify improvements that may cross into non-ICT sector business operations due to the impact technology and IT have on most aspects of New Zealand business entities and society. There may be significant productivity gains to be made by the application of improved digital technology skills across the work force.

The proposed IT qualifications consider the strategic need for computing and IT qualifications, and place particular emphasis on ensuring the qualifications encompass the need for:

- flexible qualifications that allow programmes to be developed that can adapt to change and meet new demands
- well developed IT skills including a wide range of technical skills and abilities including personal attributes that may be relevant in a large range of businesses
- graduates with sound technical and cognitive skills such as logic and reasoning; processing and analysis; attention skills; evaluation
- graduates that are good with people, able to work in teams and able to solve their own problems - better team work and people management skills can raise productivity
- incorporating ‘soft skills’ such as communication skills in all contexts; along with professional practice

The proposed qualifications are designed with flexibility to allow programmes to be developed in a range of contexts and to meet specific needs.

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\(^2\)
B.2 Learners needs

The needs of learners are covered in the Learner profiles section of the Needs Analysis. Understanding the needs of the different learner groups should ensure the new qualifications enable programmes to be developed to meet the particular needs of different target markets.

The learner profiles section identifies several market segments for IT qualifications. Different drivers will influence the choices of each segment and need to be taken into consideration when designing qualifications, and to allow for the range of programmes that may be developed by different providers to meet the requirements of the proposed qualifications.

- students wanting to gain a full IT qualification prior to entering the workforce (domestic, international, secondary/tertiary, full time/part time, Maori, Pasifika);
- employees wanting to gain or finish a full IT qualification to advance their careers i.e. those already in the workforce, who may be employer sponsored or part time self-funded learners;
- employees needing to up-skill in a specific area of IT. May be employer sponsored or part time self-funded learners;
- those seeking employment who might need specific skills to enter an IT or business environment. May be second chance learners, up-skilling or re-training adults;
- employers and SME owners wishing to improve productivity and profitability of their business (may be up-skilling themselves or employees, gap filling, mentored).
- iwi, hapu, and communities wanting to reduce the technology literacy gap (digital skills a key aspect of life skills)

The proposed qualifications are designed with flexibility to allow programmes to be developed in a range of contexts to meet the specific needs of the identified target market.

B.3 Māori and Pasifika needs

The review requires a future focus and will meet the specific needs of Māori and Pasifika. This aligns with key priorities set in The Tertiary Education Strategy 2010 – 2015, with a direct focus on two key priorities:

- Increasing the number of Māori enjoying success at higher qualification levels
- Increasing the number of Pasifika enjoying success at higher qualification levels.

Within The Tertiary Education Strategy 2010 – 2015 there is also an expectation that the tertiary sector will "enable Māori to enjoy education success as Māori".

A significant 27,632 Māori and 11,929 Pasifika students completed ICT qualifications in 2011 - 29% of all ICT qualification completions. A significant number of total ICT course and qualification completions, particularly at levels 2 and 3, are from Te Wānanga o Aotearoa (TWoA) learners, and further detail on this is contained in the usage section of the needs analysis.

In 2012, 2,974 EFTs were enrolled on computing programmes in the TWoA (14.5% of all TWoA enrolments). ICT qualifications are important in meeting the aspiration and needs of the iwi, hapū and communities that Wānanga serve, as indicated by the large number of learners engaging in the TWoA suite of computing and IT qualifications.
Wānanga nominated a member of the Steering Group governing the ICT review, and four TWoA nominees were appointed to work groups for the review, and the input provided from TWoA to consultation documents and the needs analysis has been welcomed. A range of other work group members also represented the interests of Māori and Pasifika learners and providers.

TWoA feel that addressing the needs of Māori at a qualification level is vital, and that qualifications developed must enable TWoA to meet obligations as a Wānanga under the Education Act (1989, section 162(4)(b)(iv)). This will be achieved by enabling teaching and research that maintains, advances, and disseminates knowledge and develops intellectual independence, and assists the application of knowledge regarding āhuatanga Māori (Māori tradition) according to tikanga Māori (Māori custom).

Ako Aotearoa research A model for successful Māori Learners in workplace settings demonstrated that “establishing strong and mutually respectful mentoring relationships was one of the key factors in the learner’s success. Other key characteristics of Māori learners were their preference for working in teams and their discomfort with standing out from their peers. The research was undertaken by Kahui Tautoko Consulting and involved numerous and intensive interviews with learners, trainers and employers that often extended over many months.”

Many Māori and Pasifika learners have the additional aim of integrating language and culture to the IT learning and qualifications. The computing and IT needs of Māori and Pasifika and all cultural groups are embedded into the proposed suite of qualifications, which enables a broad range of programmes to be developed.

The proposed qualifications are designed to allow programmes to be developed in a range of contexts, and the strategic purpose statement of each qualification recognises the need for graduates to be able to operate both globally and in New Zealand’s bicultural and multicultural environment. Wānanga were consulted throughout the development process, and opted not to create a separate suite of qualifications under the Mātauranga Māori Evaluative Quality Assurance (MM EQA) process for ICT qualifications.

Where additional learning needs to be separately recognised or credentialed, the Steering Group determined that this should not delay the submission for application for approval to develop the proposed qualifications, and that potential solutions would be considered further in stage 2 of the development process, along with a number of other suggested changes to the detail contained in the draft qualifications.

The following will describe the proposed suite of qualifications, firstly considering the ‘IT as a Tool’ computing user qualifications, and then the ‘IT as a Profession’ areas proposed.

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C. PROPOSED SUITE OF COMPUTING AND IT QUALIFICATIONS

The proposed qualifications structure is designed to meet the needs of a wide range of learners, employers and other stakeholders; and to be achievable in a range of contexts. The qualifications are designed to be sustainable for the future and provide the skills needed to improve performance and productivity; and contribute to growth.

The proposed qualifications are designed to recognise generalist skills and knowledge relevant to many contexts, and also include specialist areas to allow for separate credentialing in specific IT Professional areas.

The Review proposes a suite of fourteen (14) new ICT qualifications – six certificates and eight diplomas. The new qualifications are designed to recognise generalist ICT skills and knowledge and also specialist areas, and be achievable in different contexts and to enable graduates to pursue the intended educational and employment outcomes.

The proposal suggests two streams – ‘IT as a tool’ computing user qualifications (usage of computers and computing devices) and ‘IT as a Profession’ information technology qualifications (development towards professional IT roles), which also include a ‘bridging’ transition qualification to enable people to gain skills to equip them for the more technical aspects required of the IT professional suite of qualifications. This is in addition to the education pathway from the ‘IT as a Tool’ qualifications, to the ‘IT as a Profession’ suite of qualifications.

The proposed Computing (user) qualifications includes three computing certificates:

- NZ Certificate in Computing (User Fundamentals) (Level 2) (40 credits)
- NZ Certificate in Computing (Intermediate User) (Level 3) (60 credits)
- NZ Certificate in Computing (Advanced User) (Level 4) (60 credits)

The proposed 11 Information Technology (professional) qualifications include three IT certificates and eight diplomas:

- NZ Certificate in Information Technology (Level 4) (60 credits)
- NZ Certificate in Information Technology (Level 5) (40 or 60 credits)
- NZ Diploma in Information Technology (Level 5) (120 credits)
- NZ Diploma in Information Systems (Level 5) (120 credits)
- NZ Diploma in Web Design and Development (Level 5) (120 credits)
- NZ Certificate in Information Technology (Practitioner) (Level 6) (40 credits)
- NZ Diploma in Systems Administration and Networking (Level 6) (120 credits)
- NZ Diploma in Software Implementation and Support (Level 6) (120 credits)
- NZ Diploma in Database Administration (Level 6) (120 credits)
- NZ Diploma in Information Systems [with strands in Business Analysis, User Experience, IT Project Management, Applied] (Level 6) (120 credits)
- NZ Diploma in Software Development (Level 6) (240 credits)
Further development and consistency work will occur following the application for ‘approval to develop’, to refine the graduate profile outcomes, clarify conditions and other requirements applicable for each qualification, and ensure consistency across the suite of ICT qualifications.

In addition to the proposed 14 qualifications, at some later stage specialist strands or qualifications may be developed to be added to the range. Consideration may include:

- Optional endorsements to allow for additional learning e.g. to enable Wānanga to meet their requirements of the Education Act
- Strands e.g. NZ Certificate in Information Technology (Practitioner) (Level 6) - Some suggestions for this include Server Administration, Network Administration, Database Administration, and Network Security; and it is intended to further explore the best qualification structure and design issues further in the next stage of development
- Others that emerge during the next stage of development

The original landscape of ICT qualifications and draft qualifications developed has been adapted and the version proposed for further development is informed by substantial stakeholder feedback. The approach is intended to meet the identified need for flexible learner pathways and responds to:

- issues identified in the analysis of current qualifications and their use
- needs identified in the literature search and wider needs analysis
- needs identified from ICT industry consultation feedback around job roles and qualification needs
- feedback from industry, sector and working groups to proposed qualifications
- specific feedback from TWoA expressing concern about flexibility to the requirements for Wānanga under the Education Act.

Following is more detail about each of the 14 qualifications in the proposed suite.

<table>
<thead>
<tr>
<th>NZQF Level</th>
<th>IT as a Tool</th>
<th>IT as a profession</th>
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<tbody>
<tr>
<td>1</td>
<td>General education review</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>NZ Certificate in Computing (User Fundamentals) (40 credits)</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>NZ Certificate in Computing (Intermediate User) (60 credits)</td>
<td>3</td>
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<tr>
<td>4</td>
<td>NZ Certificate in Computing (Advanced User) (60 credits)</td>
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<tr>
<td>5</td>
<td>NZ Diploma in Information Technology (120 credits)</td>
<td>5</td>
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<tr>
<td>6</td>
<td>NZ Diploma in Systems Administration and Networking (120 credits)</td>
<td>6</td>
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<tr>
<td>7</td>
<td>NZ Cert/Dip in IT Security</td>
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<tr>
<td></td>
<td>NZ Diploma in Software Implementation and Support (120 credits)</td>
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<td>NZ Diploma in Database Administration (120 credits)</td>
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<td>NZ Diploma in Software Security</td>
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<td></td>
<td>NZ Cert/Dip in Software Testing</td>
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C.1 ‘IT as a Tool’ – Proposed Computing User Qualifications

The ‘IT as a Tool’ computing qualifications are designed to cover the usage of computers and other technology in a home, work or community setting. The focus is intended to be on the technical skills for using computers and other technology rather than non-technical (soft) skills. These Certificates are expected to provide a good grounding in the use of computers, the Internet and other technology and devices.

These qualifications have been developed to be delivered as stand-alone qualifications to equip learners with skills as users of a range of digital technologies, and/or be packaged with qualifications in other disciplines to allow broader industry specific programmes to be developed.

The qualifications are expected to be delivered and obtained in a range of contexts. They may also show linkages or pathways to international certifications in this space such as the International Computer Driving Licence (ICDL) run globally by the not-for-profit ECDL Foundation, and Certiport Internet and Computing Core Certification IC² programmes.

The proposed ‘IT as a Tool’ landscape has been designed to provide Certificates in Computing, with progression from fundamentals through to advanced user. It is not intended to cover the foundation basics of digital literacy, which are intended to be catered for in the Foundation Education or General Education mandatory qualification review.

The landscape proposes three qualifications at Levels 2 through 4 for ‘IT as a Tool’:

- NZ Certificate in Computing (User Fundamentals) (Level 2) (40 credits)
- NZ Certificate in Computing (Intermediate User) (Level 3) (60 credits)
- NZ Certificate in Computing (Advanced User) (Level 4) (60 credits)

There has been some discussion around the most appropriate title for these qualifications, and feedback has been relatively neutral around the titles with those supporting changes suggesting a stronger link in the title to show that these qualifications are intended for users of technology, and this has been reflected in the amended titles.

Several rounds of consultation were undertaken in the development of these qualifications. In the last stakeholder feedback, 78.5% of those with a view supported these qualifications being developed and made available in New Zealand; and agrees (68%) that the proposed suite of ICT qualifications adequately addresses the needs of learners preparing for an IT related career or further study in Information Technology (with some of the reasons others didn’t agree being addressed subsequent to this survey).

There was strong agreement (80% of those with a view) that the Computing qualifications have the right balance of technical user skills and tools primarily, as opposed to other ‘soft’ skills. Many of the reasons some chose not to support these qualifications have subsequently been addressed, so the actual level of support is likely to be far higher.

Further detail about each of these qualifications follows. Please note that credit allocations to graduate profile outcome statements are not required at this stage, and where included in the draft qualifications, they are for indicative purposes only.
C.1.1 **NZ Certificate in Computing (User Fundamentals) (Level 2)**

This Certificate is intended to cover a range of introductory digital technology skills, and prepare learners with skills to beginner/intermediate level, covering the fundamentals of computing, and may include concepts such as essentials tools to be a digital citizen and operate computers and other devices, including essential basics in productivity software and online activity. Learners will gain a broad range of IT capability and confidence to use a range of technical devices.

Stakeholder feedback to consultation on the draft qualification strongly agreed (74%) that this qualification adequately addresses the needs of organisations and learners, and those going on to use computers and technology at work, home and society. Again, some of the reasons some didn’t support this have been subsequently addressed.

C.1.2 **NZ Certificate in Computing (Intermediate User) (Level 3)**

This Certificate is intended to cover a range of digital technology skills, and prepare learners with skills to effectively use productivity software essentials such as word, spread-sheets and presentation, and possibly the use of other applications such as web or image editing, database, and project or financial management software tools.

Whilst the level 2 qualification is designed to equip learners to use a range of digital devices and applications, the level 3 qualification also expects to equip learners to do so for a wider range of applications for a specified purpose, and with relevant quality outputs to professional standards. Graduates of the level 3 qualification are also expected to be equipped to progress to the level 5 ‘IT as a profession’ qualifications, except for the Software Development qualification (which requires discreet mathematics skills, and the **NZ Certificate in Information Technology (Level 4)** or equivalent preparation).

Stakeholder feedback to consultation on the draft qualification strongly agreed (81% of those with a view) that this qualification adequately addresses the needs of organisations and learners, and those going on to use computers and technology at work, home and society.

There was also agreement (70% of those with a view) that this qualification adequately prepares learners to proceed to either the level 4 NZ Certificate in Computing (Advanced User), or to the IT career pathway and the NZ Certificate in Information Technology (Level 4).

C.1.3 **NZ Certificate in Computing (Advanced) (Level 4)**

This Certificate is intended to look at more advanced use of productivity software and other tools and technical devices. It may provide opportunities for specializing in particular areas, and may consider including some further aspects of ‘IT as profession’ preparation.

This qualification was seen as important for learners that want to gain advanced technical user skills, and was seen as a pathway into work or higher level qualifications. It is suitable preparation for graduates to progress to Information Technology, Information Systems or Web design/development qualifications.
There was initially some concern about whether there is a need for a level 4 qualification focusing on end user, and it was decided that there was a space for this and a different preparatory qualification ‘Certificate in IT Essentials’ now renamed \textit{NZ Certificate in Information Technology (Level 4)}.

This qualification is designed to extend the professional capabilities of advanced users of technology for either employment or further study. This is distinct from the role of the ‘\textit{NZ Certificate in Information Technology (Level 4)}’ qualification, which is to prepare learners for further IT study by providing core essentials for learners to cope with the academic and technical demands of higher level IT professional qualifications.

Stakeholder feedback to consultation on the draft qualification strongly agreed (76\% of those with a view) that this qualification adequately addresses the needs of organisations and learners, and those going on to use computers and technology at work, home and society.

\textbf{C.2 ‘IT as a Profession’ – Proposed Qualifications}

The ‘IT as a Profession’ Qualifications are intended to provide a solid grounding and introduction to the IT Profession. The suggested qualifications landscape has three broad pathways:

- **Information Technology**, covering the more technical aspects of the industry such as networking, technical work including helpdesk functions, and database administration. This includes the Certificate and Diploma in Information Technology at level 5; with progression into specialty qualifications at level 6 in systems administration and networking, software implementation and support, and database administration.

- **Information Systems**, covering the more process-oriented side of the profession and leading into careers in Business Analysis, IT Project Management, User Experience (UX) and potentially Database Administration or Management. This would likely be a more attractive pathway for less technically minded individuals who still wanted to enter the IT industry, and there is evidence of a strong need for this in IT. There are information systems diploma qualifications proposed at level 5 and 6, with the level 6 qualification providing stranded options in a range of specialties. The database administration qualification can also pathway from information systems at level 5.

- **Software Development**, implemented in various contexts and leading into programming careers, and preparing learners for further study and specialisation in Software Testing and Software Security. The primary qualification is the level 6 qualification in software development, and there is also a level 5 qualification in the web design and development area.

The proposed landscape includes a bridging qualification at level 4 to prepare learners for further IT study; an entry-level Certificate at level 5 with an expectation of providing a common core and a taste of the range of IT options; and a suite of qualifications in the identified broad pathways.
The qualifications are expected to be delivered and obtained in a range of contexts. Feedback to the review indicated support for the proposed suite of IT qualifications to provide opportunities for linkages to international vendor certifications, such as those offered by CompTIA, Microsoft, Cisco, RedHat, etc.

However, the overall message from feedback was in support of relevant certifications ‘dropping out’ of broader NZ qualifications through programme design. Also, that these regularly updated international vendor certifications should not just be repackaged as an NZ qualification for funding purposes, but be available as an opportunity for providers to include in their design of current programmes towards the proposed new NZ IT qualifications to meet the needs of the sector. The proposed qualifications are worded in a way that allows enough flexibility for a range of programmes to be developed with potential linkages to current internationally recognised industry certifications.

Please note that credit allocations to graduate profile outcome statements are not required at this stage, and where included in the draft qualifications, they are for indicative purposes only.

Stakeholder feedback to consultation strongly supports (78.5% of those with a view) these qualifications being developed and made available in New Zealand; and agrees (62% - 4.36/7) that the proposed suite of ICT qualifications adequately addresses the needs of learners preparing for an IT related career or further study in Information Technology.
C.2.1 NZ Certificate in Information Technology (Level 4) (60 credits)

The NZ Certificate in Information Technology (Level 4) is designed as a bridging qualification for those with no or very little preparatory education such as the digital technologies achievement standards at school, limited or no practical experience in IT, or as a pathway from the 'IT as a Tool' Qualifications to the 'IT as a Profession' Qualifications.

This Certificate is proposed to cover the core concepts of IT and serve as an introductory course prior to the Level 5 qualifications. Under this model, those intending to continue on to the Level 5 Certificate or Diplomas but with no IT experience or background skills might complete this Certificate, to better equip them with the essential skills to cope with the academic and technical requirements of the higher level suite of IT qualifications. It may also assist learners to identify which IT educational pathway to continue with, having been introduced to a range of areas to help determine a suitable IT specialisation to progress to.

Stakeholder feedback to consultation on the draft qualification agreed (63% of those with a view) that this qualification adequately addresses the needs of learners requiring a preparatory Certificate before pursuing further IT study. Earlier industry-based consultation had strong support.

There was also agreement (70% of those with a view) that the level 3 NZ Certificate in Computing (Intermediate User) adequately prepares learners to proceed to either the level 4 NZ Certificate in Computing (Advanced User), or to the IT career pathway and the level 4 NZ Certificate in Information Technology.

C.2.2 NZ Certificate in Information Technology (Level 5) (60 credits)

The NZ Certificate in Information Technology (Level 5) is intended to provide the foundational content for those wishing to practice within the field of IT, giving learners a taste of each area plus core areas that feed into the Diploma qualifications. This might include the fundamentals of computing concepts and practice including basics such as installation and configuring PCs, Laptops and other devices; basic networking; configuring operating systems, email, and mobile devices; help desk and tech support as well as introductory concepts of software development; professional practice, communications, and problem solving skills.

A programme of study for this Certificate might align with CompTIA A+ Certification, but with additional content around ethics, professional practice and organisational structure matters (such as that found in the Institute of IT Professionals’ Professional Knowledge Curriculum), communication essentials, and a basic introduction to software development and information systems.

Those completing this Certificate should be prepared for an entry level role in Information Technology or for further study; and have a clearer idea about which IT educational pathway to continue with, having been introduced to a range of areas to help determine a suitable IT specialisation to progress to.

The Certificate is intended to meet the supply and demand needs of learners and industry in providing the short/sharp training that is required to enable learners to remain up to
date in a sector that operates in an ever changing landscape. The intent is to produce a graduate profile that is sufficiently generic and flexible enough to enable a range of programmes and internationally recognised vendor certifications to be aligned to the certificate, through programme design.

Stakeholder feedback to consultation on the draft qualification agreed (67.5% of those with a view) that this qualification adequately addresses the needs of the IT industry and learners.

Stakeholder feedback, from the PTE sector in particular, raised concerns about the need to ensure that a highly practical and ‘hands-on’ approach could be taken in programme design towards this Certificate, to ensure it would adequately engage the targeted learners that may be looking for an alternative pathway to the more traditional academic approach to a career in IT.

Concern was also expressed about the size of the qualification, as it would not suit the current 12-week full time delivery model adopted by some PTEs. However the Steering Group agreed that 60 credits are appropriate to enable programmes to be designed to cover the range of content expected to meet the graduate profile outcomes.

C.2.3 NZ Diploma in Information Technology (Level 5) (120 credits)

The NZ Diploma in Information Technology is intended to provide options for the more technical aspects of the industry. Those who have started out on a Certificate pathway could potentially upgrade to the full Diploma, having developed some soft skills such as communication, teamwork, problem solving, and an understanding of ethics and professional practice; and to obtain further depth in the technical areas. The Diploma has been developed to provide a broad, generalist understanding of IT, as there is seen to be significant overlap in the technical skills required to prepare for a range of IT employment pathways, such as:

- **Networking**, which might (for example) align to the Network+ vendor certification;
- **Computing Technician**, more advanced concepts and practices around servicing computers and other technology;
- **Help Desk and Tech Support**, exploring communication and work flow concepts around help desks and providing tech support

The generalist NZ Diploma in Information Technology has been designed to equip learners with the soft skills and technical content to meet the needs of a range of potential IT roles.

From a pathway perspective, learners might exit to industry as a computing technician, help desk and technical support or other support role having completed this Diploma, or carry on to the more specialised Level 6 Diplomas.

Stakeholder feedback to consultation on the draft qualification strongly agreed (85% of those with a view) that this qualification adequately addresses the needs of the IT industry and learners. Earlier industry-based consultation also had strong support.
C.2.4 NZ Diploma in Information Systems (Level 5) (120 credits)

The NZ Diploma in Information Systems is intended to provide an option for the more process-focused areas of the profession, such as those preparing for Business Analysis, Project Management and User Experience (UX) related roles.

The review has identified a significant gender imbalance, with fewer women in IT Professional roles (approx. 75-80% male dominated). Whilst recognised as too big an issue for this review to resolve, the review did explore ways to address this and have included information systems qualifications that may have a stronger appeal to women.

Those who have started out on a Certificate pathway could potentially upgrade to the full Diploma, having developed some soft skills such as communication, teamwork, problem solving, and an understanding of ethics and professional practice; and to obtain further depth in the process areas such as business analysis, IT project management, user experience, and data administration.

The NZ Diploma in Information Systems has been developed to provide a broad, generalist understanding of IS, as there is seen to be significant overlap in the technical skills required to prepare for a range of IS employment pathways. It is designed to equip learners with the soft skills and technical content to meet the needs of a range of potential IS roles.

From a pathway perspective, learners might exit to industry in a range of entry level IS roles such as application administrators, project administration, process mapping, records management or other support roles having completed this Diploma, or carry on to further develop a specialised area in the Level 6 NZ Diploma in Information Systems.

Stakeholder feedback to consultation on the draft qualification strongly agreed (76% of those with a view) that this qualification adequately addresses the needs of the IT industry and learners. Earlier industry-based consultation also had strong support.

C.2.5 NZ Diploma in Web Design and Development (Level 5) (120 credits)

Sector feedback identified there may be a need for a one year qualification in web development at Level 5, and the Steering Group asked the working group to consider this in more detail. It was proposed that this qualification include some design principles but primarily focus on the ‘back end’ web development with some ‘front end’ web design, and include implementation.

The NZ Diploma in Web Design and Development includes some of the soft skills and core content common across all IT qualifications, then forks into more in-depth web software development combined with implementing a web design (e.g. usage of web content management systems and basic HTML, CSS and scripting). This qualification covers concepts and execution of web and interface design, plus the implementation of this through CM type systems and mark-up language such as HTML, style sheets etc.

The NZ Diploma in Web Design and Development has been developed to provide graduates with sufficient IT knowledge, practices and technical skills to enter into employment in a role in customisation of web content management system solutions, or in a graphic design organisation, or to proceed to further study.
Stakeholder feedback to consultation on the draft qualification agreed (72% of those with a view) that this qualification adequately addresses the needs of the IT industry and learners. Earlier industry-based consultation also had strong support.

There was also feedback on the need for a 120 credit level 6 web development qualification, but the Steering Group (SG) determined that the proposed NZ Diploma in Software Development already provided the scope for a focus on web development context at level 6.

The SG is also aware that the mandatory review of Creative Arts is developing qualifications in the web design space, and that this will need to be checked for overlaps and intent of purpose in the next stage, prior to approval to list.

C.2.6 NZ Certificate in Information Technology (Practitioner) (Level 6) (40 credits)

Sector feedback identified there is a need for a short qualification that enabled IT practitioners to update their knowledge and specialist skills in a specific area of IT practice, in response to the constantly changing needs and demands of the dynamic IT environment.

The NZ Certificate in Information Technology (Practitioner) is intended to meet the supply and demand needs of learners and industry in providing the short, sharp training that is required to enable learners to remain up to date in a sector that operates in an ever changing landscape. The intent is to produce a graduate profile that is sufficiently generic and flexible enough to enable a range of programmes and internationally recognised vendor certifications to be aligned to the certificate, through programme design.

Further development work will be required to determine what qualifiers or optional endorsements may be required to more clearly identify the context the qualification has been obtained in. Some suggestions for this include Server Administration, Network Administration, Database Administration, and Network Security; and it is intended to further explore the best qualification structure and design issues further in the next stage of development.

Stakeholder feedback to consultation on the draft qualification agreed (68% of those with a view) that this qualification adequately addresses the needs of the IT industry and learners. Stranding this qualification will likely increase this level considerably.

Consultation feedback also highlighted concerns around the proposed structure only enabling a learner to be funded once for this qualification, when up-skilling may be required every few years with the pace of change and need to develop and enhance skills required to meet emerging areas within the sector. It was decided that this should not delay submission for approval to develop the qualification, but that the issue should be raised to alert evaluators that this may evolve to a stranded qualification in the next stage of development.
C.2.7 NZ Diploma in Systems Administration and Networking (Level 6) (120 credits)

The NZ Diploma in Systems Administration and Networking is intended to provide a pathway from the NZ Diploma in Information Technology (Level 5), and focus on extending the knowledge and technical expertise to equip learners to specialise in systems administration and networking.

The Diploma will share some of the core skills required of all IT graduates at Level 6, and include specialised learning such as networking, scripting, systems, data storage and security, and IT business continuity. It would also further equip graduates for roles such as IT technician, help desk or desktop support, junior network engineer, junior systems administrator, junior network support, or junior applications support analyst.

Network and Computer Systems Administrators were ranked six on the international Forbes Top Jobs for 2013 list, which is based on occupations with the most jobs added since 2010. Network Administrators, Network Analysts, and Computer Systems Administrators were also occupations identified on the NZ Long Term Skill Shortage list, suggesting on-going demand for graduates skilled in this area.

Stakeholder feedback to consultation on the draft qualification agreed (71% of those with a view) that this qualification adequately addresses the needs of the IT industry and learners.

C.2.8 NZ Diploma in Software Implementation and Support (Level 6) (120 credits)

The NZ Diploma in Software Implementation and Support is intended to provide a pathway from the NZ Diploma in Information Technology (Level 5), and focus on extending the knowledge and technical expertise to equip learners to specialise in software implementation and support. It is designed for those seeking roles which assist during the installation or upgrade of systems or applications including client side or cloud based implementation and application support.

The Diploma will share some of the core skills required of all IT graduates at Level 6, and include specialised learning including a range of professional and technical software implementation, advice and support skills to enter into employment in, or advance a career in, software implementation and support. It would also further equip graduates for roles such as IT Technician, held desk roles, or applications support analyst.

Stakeholder feedback to consultation on the draft qualification strongly agreed (81% of those with a view) that this qualification adequately addresses the needs of the IT industry and learners.
C.2.9 **NZ Diploma in Database Administration (Level 6) (120 credits)**

The **NZ Diploma in Database Administration** is intended to provide a pathway from the **NZ Diploma in Information Technology (Level 5) or the NZ Diploma in Information Systems (Level 5)**, and focus on extending the knowledge and technical expertise to equip learners to specialise in database administration.

The Diploma will share some of the core skills required of all IT graduates at Level 6, and include specialised learning such as a range of professional and technical data modeling, database systems, business intelligence, infrastructure and database performance monitoring and tuning skills, to enter into employment or advance a career in database administration.

Database Administrators were number 15 on the international Forbes Top Jobs for 2013 list, which is based on occupations with the most jobs added since 2010; and Database Administrator was also an occupation identified on the NZ Long Term Skill Shortage list, suggesting on-going demand for graduates skilled in this area.

Stakeholder feedback to consultation on the draft qualification agreed (73% of those with a view) that this qualification adequately addresses the needs of the IT industry and learners.

C.2.10 **NZ Diploma in Information Systems (Level 6) (120 credits) (with strands in Business Analysis, User Experience, IT Project Management, Applied)**

The **NZ Diploma in Information Systems (with strands in Business Analysis, User Experience, IT Project Management, and Applied IS)** is intended to provide general and more specialised options for the process-focused areas of the profession, such as those preparing for Business Analysis, Project Management and User Experience (UX) related roles.

This Diploma qualification is intended to provide a pathway from the **NZ Diploma in Information Systems (Level 5)**, and focus on extending the knowledge and technical expertise along with the soft skills, to equip learners to specialise in a range of IS roles.

The chosen strands are intended to help address the need for specialised business analysts and IT project managers identified in the needs analysis and from industry feedback.

From a pathway perspective, learners might exit to industry in a range of IS roles dependent on the chosen specialisation, such as junior application administrators, IT project management or administration, process mapping, records management, junior business analyst or systems analyst, or a range of roles at the human computer interface such as user interface designer or tester, front end developer, HCI support or developer.

The review has identified a significant gender imbalance, with fewer women in IT Professional roles (approx. 75-80% male dominated).Whilst recognised as too big an issue for this review to resolve, the review did explore ways to address this and recognised that information systems qualifications may have a stronger appeal to women.
ICT Project Managers, and various types of business analysts were also occupations identified on the NZ Long Term Skill Shortage list, suggesting on-going demand for graduates skilled in this area.

Stakeholder feedback to consultation on the draft qualification strongly agreed (81% of those with a view) that this qualification adequately addresses the needs of the IT industry and learners.

C.2.11 NZ Diploma in Software Development (Level 6) (240 credits)

The Software Development pathway pursues core concepts and practice around the development of software in multiple contexts. Sector and industry feedback from consultation suggests that a longer Diploma is required to prepare learners for a software development pathway, and the proposed qualification is 240 credits (equivalent of 2 years full time).

Software Developers (Applications and systems software) were number one on the international Forbes Top Jobs for 2013 list, which is based on occupations with the most jobs added since 2010. Developer programmers and software applications programmers, web developers were also occupations identified on the NZ Long Term Skill Shortage list, suggesting on-going demand for graduates skilled in this area. These roles are generally filled by degree qualified graduates, however this review has identified that a longer diploma qualification may equip graduates for entry level positions in this field.

The *NZ Diploma in Software Development* is intended to include the core content common across all IT qualifications, then fork into more in-depth software development theory and practice. The Diploma generalises the outcomes to enable a course to focus on one of several contexts such as (for example) general Application Development, Web Development, Games Development, Mobile Apps Development, or other areas that may emerge in future.

A stranded qualification is not being suggested – rather, the outcomes, skills and attributes might be identical for these contexts, just applied in a different manner, and a graduate may enter into employment in a junior developer or tester role in a range of organisational contexts, or proceed to further study.

There was stakeholder feedback on the need for a 120 credit level 6 web development qualification, but the Steering Group (SG) determined that the proposed NZ Diploma in Software Development already provided the scope for a focus on web development context at level 6. There was also feedback requesting this qualification be split into two x 120 credit qualifications, but industry feedback resisted this in support of the larger 240 credit qualification seen as a minimum for the breadth and depth expected.

The SG is also aware that the mandatory review of Creative Arts is developing qualifications in the web design space which may include a level 6 web development qualification, and that this will need to be checked for overlaps and intent of purpose in the next stage, prior to approval to list.

Stakeholder feedback to consultation on the draft qualification strongly agreed (76% of those with a view) that this qualification adequately addresses the needs of the IT industry and learners. Many of those opposed did not oppose a software development qualification, but were providers who would prefer a one-year model that industry did not support.
NEEDS ANALYSIS
PART B: BACKGROUND REPORT

Review of Information and Communication Technology (ICT) Qualifications 2013
EXECUTIVE SUMMARY

The needs analysis is a research document to inform and support the decisions required for the mandatory review of information and communications technology (ICT) qualifications, at levels 1-6 on the New Zealand qualifications framework. The review aims to reduce the duplication and proliferation of qualifications on a national scale, and to ensure that qualifications are useful, relevant, easy to understand, and valuable to current and future learners, employers and other stakeholders. The needs analysis report will provide evidence of investigation, analysis and consultation to inform the decisions of the Steering Group when designing the future range of ICT qualifications, and will support the application to list new qualifications.

An analysis of the existing ICT qualifications under review is covered in the body of the report, including an analysis of clusters of qualifications and incorporating some future-focus comments where available. A detailed list of qualifications in the review is included as Appendix 1.

The ICT sector is different from the IT workforce – but there are overlaps. Many people work in IT positions in non-ICT businesses, and vice-versa. This is covered in more detail in analysis of the sector section 4. It is estimated there are twice as many people working in ICT occupations outside the ICT industries, as within.

Statistics New Zealand conclude that jobs in the computer systems design (CSD) part of the IT industry increased by 78% between 2000 and 2010, and the industry had the equal highest rate of product innovation in NZ in 2011. It also stated that most CSD companies exported their goods and services in 2011 and that CSD businesses invest heavily in their future growth.

There are a number of significant reports on the ICT sector, and the involvement of the Ministry of Business, Innovation and Employment (MBIE) in these is an indication of Government interest and awareness of the importance of this sector to New Zealand. Findings from these reports are included in the body of this needs analysis.

A large number of ICT related positions remain on the long-term skills shortage list, but most of these are related to degree-qualified occupations. It is difficult to establish precise future demand for ICT related employees, but there is evidence from published employment and occupation data and job vacancy trends of continuing demand for skilled professionals in the ICT sector.

This needs analysis report has considered projections of future demand for occupations and qualifications along with relevant external environment factors, research that is available on ICT business and workforce related needs and trends. The needs of Māori and Pasifika learners have been considered as part of the review, with a general consensus that for ICT this will not impact the design of new qualifications other than to ensure that the context allows for a range of programmes to be developed to meet specific needs of many potential learner groups, including Māori and Pasifika learners.

The demand for skills in management occupations in New Zealand is projected to grow more rapidly than other occupational categories over the next 10 years, and this is likely to include the ICT area. The ageing population is expected to constrain the labour force and economic growth, and sharpen the focus on developing and utilising the existing skills of the workforce. It is expected that a high proportion of jobs will require regular up-skilling, which may largely be on the job. Personal traits and soft skills such as communication skills and attitudes are going to be increasingly important.

New Zealand needs to better utilise skills, and particularly raise management capability. The low level of growth in labour productivity is seen as an indicator of under-utilisation of skills. National and international research shows that improving management skills, in particular people-management skills, is needed to lift productivity. A focus on improving management skills of IT professionals and digital literacy of society is likely to further enhance the productivity of New Zealand.
The external environment in which we operate is changing and developing rapidly, and there is a need to change to meet its new demands. To continue to be relevant we are going to need to anticipate the unknown challenges of the future. Planning will be for future learning for future ICT and related businesses. The issues faced by businesses and managers, their mode of operation, and the nature of management and governance are likely to be transformed.

Training people for an unknown future will involve identifying the skills and core competencies that can form the basis of designing and using emerging technologies that can't yet be anticipated. IT professionals tend to be avid information seekers, striving to gain new skills and keep skills current, and many train for career certification or specialist exams. As technology is ever evolving, there is a consistent need for training the IT workforce to build new skills. Informal training sessions such as webinars, online community networks, lunch and learn sessions continue to be popular for staying current with the changing landscape.

Designing relevant and flexible ICT qualifications to meet the needs of learners and the demands of a diverse range of businesses presents challenges. The business qualifications review findings highlighted a tension between the government strategy of increasing the achievement of higher levels of qualifications (which by their nature are lengthy), and businesses with an expressed need for qualifications that are shorter and highly focussed. This is also likely to be relevant for the ICT sector, to keep up with the pace of change and the introduction of innovations in the industry. There is also an indication from industry feedback that shorter qualifications may be less likely to deliver the range of technical skills and capabilities expected to work in the ICT professional sector, particularly in software development roles.

A number of key themes have emerged from findings in the preparation of this needs analysis. These factors need to be considered when designing the landscape of new ICT qualifications. There seem to be two distinct audiences for IT related qualifications.

1. ‘IT as a Tool’ – for enhancing computing and digital literacy capabilities and productivity improvements;
2. ‘IT Professional’ – for the technical skills to develop software and applications, and find IT solutions for current and future issues and opportunities, and the related infrastructure requirements.

Some of the key findings and trends that became apparent follow.

Learners

- The needs of learners are diverse and range from those wanting to achieve a full qualification prior to entering work, to those already in work and needing to access learning around a small group of learning outcomes.
- Understanding the needs of the different learner groups should ensure the new qualifications enable programmes to be developed to meet the particular needs of different target markets.
- The learner profiles section identifies several market segments for ICT qualifications. Different drivers will influence the choices of each segment and need to be taken into consideration when designing qualifications.
  - students wanting to gain a full ICT qualification prior to entering the workforce (domestic, international, secondary/tertiary, full time/part time, Māori, Pasifika);
  - employees wanting to gain a full ICT qualification i.e. those already in the workforce, who may be employer sponsored or part time self-funded learners, ;
  - employees needing to up-skill in a specific area of ICT. May be employer sponsored or part time self-funded learners;
  - people seeking employment who might need specific IT skills and/or to improve digital literacy, to enter an ICT or other business environment. May be second chance learners, up-skilling or re-training adults;
  - employers and SME owners wishing to improve productivity and profitability of their business (may be up-skilling themselves or employees, gap filling, mentored);
  - Communities wanting to reduce the technology literacy gap, providing opportunities to develop digital skills as a key aspect of life skills.
• Compatibility with funding sources (TEC & Studylink) is important to students for affordability and accessibility to qualifications and training which leads to employment.
• Qualifications enabling international students to meet Immigration requirements for ‘study to work’ visas, and student/graduate access to work in New Zealand.
• Businesses cite a lack of time and relevance of training as the main obstacles to training.

ICT Skills
• There is evidence that technology fluency or digital literacy will join creative problem solving and collaboration as essential core skills required for study, work and life in the 21st century.
• Skills identified in the Skills Challenge Report as most in need of improvement by industry groups were customer service and sales skills, team working skills, oral communication, followed by computer skills. Computing skills will be catered for with a suite of ‘IT as a tool’ qualifications – see section 11.
• There is evidence of a lack of skilled staff, particularly highly skilled staff, and of education provision and employer needs being misaligned. Clarifying the skill needs of the ICT workforce and businesses is crucial.
• The categories of current qualifications for ICT tend to be clustered in three areas – (1) IT as a Tool: users of IT to create or do other things; (2) IT as a profession: 2 areas (i) development related to software; and (ii) digital infrastructure – hardware related design, build and maintain networks and operating systems. The review has identified a need for a less technical ‘information systems’ pathway focussing primarily on process-related areas of IT such as business analysis, user experience and project management.
• The skills and knowledge required for ICT professionals are presented in the SFIA framework which is a coherent body of knowledge for the IT professional in the ICT sector; and the Digital Technologies categories from schools are also relevant in preparing future ICT learners and workers. Mapping of outcomes in the new IT Professional qualifications may be linked to a skills framework (SFIA) – see section 6
• Skills and knowledge for ICT include a range of technical skills and abilities including personal attributes that may be relevant in a large range of businesses.
• Improving management skills, in particular people-management, are needed to lift productivity. There is evidence of the need to improve a range of business related skills for IT professionals. Increasingly they are expected to be innovative and creative solution finders and to have not just IT technical skills but abilities in people and relationship management; business analysis and communication skills to write business cases; sales and marketing skills; and contract negotiation.
• Emphasis on the need for “soft skills”. Graduates should be good with people, able to work in teams and able to solve their own problems.
• Changing nature of skills required includes an emphasis on skills associated with “knowledge work” e.g. cognitive skills such as abstract reasoning, problem solving, communication and collaboration with clients and colleagues.
• Skills and knowledge should be applied in a workplace or other real or realistic context. Some employers are suggesting the need for relevant work experience as part of a qualification.

Qualifications
• There is a considerable overlap or similarity between some existing qualifications, including significant embedding of national qualifications in local qualifications.
• There are a number of vendor-related qualifications in the sector whose outcomes also need to be considered in the design of future ICT qualifications.
• Changes to foundation education from 2013 will influence level 2, as may the digital technologies curriculum in schools. Digital technology achievement standards are included in many of the vocational pathways proposed, and further consideration could be given to ICT related pathways/learning.
• Many of the existing ICT qualifications are only offered by one or two organisations. Demand for computing qualifications at lower levels is undeniable, although it appears to
be fuelled by fees-free provision by TEOs, and by completions from secondary school students meeting national computing qualification requirements as part of NCEA.

- Designing qualifications for a diverse area such as ICT presents challenges and will require a high degree of flexibility. A consideration of overlaps with other qualification reviews is also required, for example Business qualifications (BusAdminTechnology, Management, Project management), Creative arts qualifications (Computer graphics and other digital design related qualifications), Electro-technology qualifications (Technicians) to name a few.
- There is need for vocationally oriented qualifications for those wanting to pursue a career in ICT, and outcomes need to be applicable in the workplace.
- There is demand for a progressive suite of qualifications, and based on the number of local qualifications that embed other ‘small’ qualifications, there can be a number of similar core skills in a range of these qualifications.
- There is tension between the government strategy of increasing the achievement of higher levels of ‘lengthy’ qualifications, and businesses with an expressed need for training that is shorter and highly relevant.
- A high proportion of the IT professional workforce is degree qualified. Employment and education pathways are a key component of new qualifications at levels 1-6. Industry surveys have been undertaken to confirm suitable types of job roles for graduates of proposed level 1-6 Certificate and Diploma qualifications.
- Future qualifications and programmes may need to be quite different from current ones in both their process as well as their content, to be effective and appeal to students. Qualifications will need to:
  o be relevant and meaningful to the learners
  o be useful in terms of their work practice, and personal or community application
  o be designed to anticipate and adapt to the unknown challenges of the future
  o prepare learners to cope with uncertainty and change
  o be accessible using technology and practices appropriate for the new generations of learners, and in a variety of contexts.
- There is a need to consider smaller sized qualifications, or limited credit programmes (LCPs) covering a group of learning outcomes targeted particularly at people already in work or those wishing to up-skill or change careers. Programmes could be developed as stair-cased pathways to the achievement of qualifications in order to focus on immediate needs for learners but with the opportunity to collect these toward the achievement of a larger qualification.
- Some graduate outcomes may need to be quite broad to be able to accommodate the needs of specific industries.
- Qualifications and learning programmes need to be flexible for learner pathways and application in a range of learning contexts.
- Relying on specific jobs as we know them now is no longer adequate to inform curriculum development. A very close relationship with industry and link to ICT skills frameworks is needed to prepare for future needs, and to ensure graduate success in labour markets.

Designing the landscape for ICT qualifications requires a future focus approach, and determining what is needed and how best to provide solutions to meet the different needs of identified and relevant stakeholders, including the specific needs of Māori and Pasifika learners.

This needs analysis background report has being compiled to inform the decisions of the Steering Group when designing the future range of ICT qualifications, and includes analysis and findings from the literature search; trends, peak body and industry input from surveys, and it will include stakeholder feedback as the review progresses.

The qualification outcome statements for each qualification will detail the distinctness of each in the proposed basket of new qualifications, and proposed linkages between them, along with education and employment pathways.

A summary of the strategic need for new computing and IT qualifications, including a summary of the proposed qualifications, will be prepared prior to submission for ‘application for approval to develop’, and will be included as a separate ‘Part A’ to accompany this background report.
1. SCOPE

The needs analysis is a research document to inform and support the decisions required for the mandatory review of information and communication technology (ICT) qualifications, at levels 1-6 on the New Zealand qualifications framework, that are listed as part of the mandatory review (see appendix 1). The project excludes the review of ICT qualifications at degree level or above, and qualifications in other areas that may have some links to ICT. However the intention is to maintain communication and connection with other reviews that are related to the ICT review project.

Links to other review projects

The ICT review has links to/synergies with a number of other mandatory reviews, including:

- Creative Arts Qualifications Review - for computer graphics, and digital technology related design qualifications (2013 - NQS – Marcia Isles)
- Business Qualifications Review - for business administration and technology (BAT) related computing user of digital technologies qualifications; team leader/management and project management qualifications (commenced Q1 2012 - NQS – Michel Norrish)
- General Education Qualifications Review - for foundation learning may include basic digital literacy/technology related computer use in qualifications (Ako Aotearoa/NQS)
- Telecommunications Qualifications Review - (commenced Q3 2011 – Skills Organisation - Kharen Hope)
- Contact Centre Sector Qualifications review – for call centre qualifications (Q1 2012 – Skills Organisation - Glenn Nicholson)
- Engineering qualifications review – (Competenz – Bill Sole)

There are a number of other reviews that may include aspects of IT ‘user’ tools specific to their industry sector, and these are outside the scope of this review.

The project scope includes:

- the examination of current and probable future job roles, training and qualifications needs across the IT sector, including pathways into and through the sector; and
- the design and development of a proposed suite of ICT qualifications to meet the needs identified; through approval to develop, to listing on the NZQF.

The needs analysis report will support the application to develop and list new qualifications, as evidence of investigation, analysis and consultation. It will provide evidence in support of the proposed qualifications, and will respond to the following evaluative questions:

KEQ D1: How well has the need for the qualification(s) been established?
KEQ D2: How well do the qualification’s strategic purpose, graduate profile and general design address the identified needs of employers, industry and/or communities (i.e. relevant stakeholders)?

The needs analysis will quantify need in terms of supply and demand factors, identifying gaps and potential strategic benefits for learners, employers, industry and communities.

The needs analysis will include analysis of material from the literature search and other published information on the ICT sector; and will rely on contributions from individual Steering Group members, from owners of current qualifications, from industry surveys, and from other stakeholders. It will include feedback from consultations designed to fill gaps in information
available and to encourage stakeholder engagement in the review process. It will have a future focus and be comprehensive, and take into consideration:

- The current position and recent trends in ICT qualifications, including similarities among current qualifications
- Supply and demand factors, and how they relate to each other
- Current and future needs of general and specialist ICT audiences, including the general public from the context of digital literacy/computing user related qualifications
- Current and future employment pathways
- Current and future education pathways, including pathways from secondary schools and academic pathways to universities (and vendor endorsed certifications)
- Current external environment related to ICT education in New Zealand, including a link back to Government drivers for education, expectations and required outcomes
- Current and/or future skill and competency requirements in ICT, including an international perspective (SFIA)
- Current and/or future business & ICT skill needs for Iwi and Hapū, and Pasifika
- ICT education body of knowledge and/or curriculum
- Trends and/or models used in ICT education in New Zealand and Internationally
- Modes of delivery including e-learning, distance learning, workplace learning and assessment around ICT and related businesses

The role and needs of ICT in the community will also be considered. The needs of Māori and Pasifika learners are being considered as part of the review, with a general consensus that for ICT this will not impact the design of new qualifications other than to ensure that the context allows for a range of programmes to be developed to meet specific needs of many potential learner groups, including Māori and Pasifika learners.

Consultation will also be undertaken to confirm the need and strategic fit, and sufficiency of demand of the proposed new qualifications.

2. METHODOLOGY

Overview

To assist in developing a better understanding of the ICT qualifications market, a combination of primary and secondary research has been undertaken.

A literature search was undertaken to determine evidenced and perceived trends in the ICT educational market that may influence the future landscape for ICT qualifications in New Zealand.

Discussions with Ministry of Business, Innovation and Employment (MBIE), Statistics NZ, and ICT sector peak bodies.

Detailed review of existing data sources, includes:

- Review of job trends in the industry – employment and vacancy analysis;
- Occupational Outlook Report produced by MBIE and Careers NZ;
- ICT Sectors Report produced by MBIE (Draft);
- Profession research underway jointly by IITP and AUT University’s Centre for Research in Information Systems Management (CRISM);
- Current qualifications including their usage and demand;
- Outcomes from the creation of the Digital Technologies Achievement Standards in school, associated bodies of knowledge;
• Statistics from Statistics NZ and MBIE Labour (was Dept of Labour) Skills Shortage reports and others;
• Analysis of ANZSCO occupational code data
• Other research and information which can be identified

Where the data available is found to be inadequate in any specific area to provide a sufficient evidential basis to meet the outcomes, the Institute of IT Professionals may conduct an indicative survey as needed. Two surveys have been undertaken between April and June 2013 – a provider survey and an industry survey to obtain input regarding specific gaps identified e.g. IT Professional roles suitable for graduates of Certificate and Diploma qualifications within the scope of the review.

An analysis of the existing ICT qualifications that are part of the review, at levels 1 to 6 on the New Zealand Qualifications Framework (NZQF) has been undertaken. Analysis and interpretation of information from the NZQA database, from the Tertiary Education Commission (TEC) course enrolment and completion information, and from information provided by stakeholders was undertaken. Analysis and interpretation of data from the Ministry of Education (MoE) ‘Education Counts’ database, was also undertaken.

Consultation with industry peak body representatives and other stakeholders was undertaken where gaps in information were identified, and to determine the need for specialist qualifications that may result from the review.

Plan

Following is the plan for the research process for the needs analysis.
1. Identify and plan methodology, prepare brief, and seek involvement of contractor to prepare needs analysis. Seek alternatives. December 2012- February 2013.
3. Requirements identified and preliminary research sources scoped for the needs analysis. Communications and meetings with industry peak body representative (IITP) and other Government agencies interested in ICT sector (MBIE – including Labour, Immigration) to identify further sources relevant to the ICT Review. Contributions requested from Steering Group members. February/April 2013.
4. Information gathering and data analysis of appropriate resources. Clarification of suitable categories to cluster existing qualifications for analysis. Communication with leads from other qualification reviews that may have synergies with ICT review, around findings from their reviews that may impact and inform the ICT review. December 2012 – April 2013.
5. Preparation of needs analysis content, and needs analysis presentation to the first ICT Steering Group meeting on 9 April 2013. Introduction to the needs analysis, including how and why it is required as part of the review; initial findings from analysis of existing data including possible cluster categories, supply and demand; and identification of gaps. Feedback and input to the project sought, included clarification of the forward process to fill gaps and complete the draft needs analysis report for consultation.
6. Steering Group confirm the future direction of the needs analysis, including providing input from the members on industry roles and needs for ICT qualifications at NZQF levels 1-6. April/May 2013.
7. Survey of providers seeking input to the review, particularly around what qualifications prepare students for, specific need of learners including Māori and Pasifika learners, educational and employment pathways, evidence of industry need for specific qualifications, and thoughts on potential structures for the ICT qualifications review. CITRENZ April-May 2013
8. Industry roles and needs consultation prepared by IITP to inform skills map for qualifications. 20 May/7 June 2013.
9. Analysis of feedback from provider survey data and employer/industry input re roles.
Incorporate findings into the needs analysis report. May-June 2013.

10. Updated findings reported to the Steering Group meeting 11 June. Feedback from the Steering Group on any gaps that need filling before material made available to working groups. June/July 2013.

11. Workforce and proposed qualifications map prepared for consultation. May-June 2013

12. Draft needs analysis prepared and endorsed by the Steering Group, and made available for workgroups and consultation. June 2013

13. Incorporate feedback from consultation with stakeholders and working groups to the draft needs analysis report by July 2013.

14. Prepare table of existing qualifications with additions and alterations since commencement of review, and proposed change of status when available (links to NZQF6 forms)

15. Prepare final written needs analysis report by 31 October 2013

16. Prepare addendum – Strategic need for proposed ICT qualifications - October 2013

17. Submit final needs analysis, in support of application to develop new ICT qualifications, by 14 November 2013.

The needs analysis will be a living document during the review process. A draft has been made available to stakeholders during the work group development phase. Feedback from various surveys and new discoveries may be added to the document during the review process. The needs analysis is a mandatory requirement and will be finalised in October in support of the submission of the application for approval to develop qualifications by 14 November 2013.

Limitations and assumptions

Assumptions
- Data would be available relating to the analysis of existing ICT qualifications;
- Full participation and timely responses from stakeholder and industry groups.

Limitations
- Obtaining reliable and complete data relating to qualification or course completions;
- Confidentiality of usage information, due to commercially sensitive nature of data;
- TEC sourced data only provides information from funded providers, so shows an incomplete picture;
- MOE Education Counts analysis limited to data provided from surveys e.g. Single Data Returns Survey of tertiary providers; and classifications of field of study by NZSCED codes;
- Destination data (education and employment pathways) may need to be sourced from providers and qualification owners, and may not be provided in time to inform the review;
- Limitation of access to member only research that may have informed the review;
- Stakeholder feedback to the Steering Group received after the preparation of the needs analysis.

3. BACKGROUND INFORMATION

3.1 Introduction

The 2008-09 Targeted Review of Qualifications (TRoQ) found that the qualifications system was difficult for learners, employers and industry to understand, and a package of seven changes was recommended by the review⁴, and an extract is included as appendix 2. One of the TRoQ recommendations required the mandatory reviews of qualifications, of which the Information and Communication Technology qualifications review is one. The other TRoQ recommendations were implemented in 2010.

Qualifications in Information and Communication Technology (ICT) at levels 1-6 on the New Zealand Qualifications Framework (NZQF), excluding university qualifications, were scheduled for review in 2013 as part of the nation-wide mandatory review of qualifications. Currently there is a wide range of qualifications in ICT with many apparently similar qualifications at the same level. The scope of the ICT qualifications review excludes those qualifications with links to other review projects – see scope for further details.

The mandatory review is to reduce the duplication and proliferation of qualifications on a national scale, and to ensure that qualifications are useful, relevant, easy to understand and valuable to New Zealand’s IT industry, employers, business in general, current and future learners, and other stakeholders.

The ICT qualifications review is being jointly led by the Institute of IT Professionals (IITP) as an independent professional body of the IT sector, and NZQA National Qualification Services. The purpose of the Steering Group, nominated by representatives of owners of current ICT qualifications and by national peak bodies, is to provide leadership and direction for the development of cohesive New Zealand ICT qualifications which are strategically relevant to New Zealand’s people and communities and their aspirations. A list of Steering Group members is attached as appendix 3.

The Steering Group has requested a comprehensive needs analysis to inform the review of ICT qualifications at levels 1-6 on the New Zealand Qualifications Framework (NZQF). The needs analysis must be broad enough to inform and support the development of the full range of ICT qualifications, and will be used as the evidential basis for demand when creating the new suite of ICT related qualifications.

3.2 Overview

The review of ICT qualifications at levels 1-6 on the NZQF needs to consider identifying future business direction and workforce needs in respect of the broader ICT context, and understanding the needs of a digital society. This will involve knowing the current workforce and concerns around digital literacy, through data collection and analysis, and bridging the gap – identifying and addressing workforce and community issues through the development of appropriate qualifications and training.

Forming and building clear educational pathways for those entering or advancing within the ICT profession is an essential component of addressing the IT skills shortage the sector has faced for some time. The review should lead to a coherent structure between qualifications on the NZQF to make it easier for aspiring professionals to determine the best educational pathways to the career choice they wish to pursue, and for those within industry to determine “where to go from here” regarding up-skilling or retraining.

New Zealand needs a workforce with capability and capacity to deliver, which is well positioned to respond quickly to change. Understanding the learner is also important – knowing what motivates career decisions, along with recognition and transfer of skills across employers and borders.

New Zealand businesses need to find ways to enhance productivity, spur innovation and reduce costs to their organisation, and having well trained and capable staff making the most of available technology can go a long way towards this.

Increasingly in the 21st century, employees expect to work from anywhere, at any time, with any device. In the flexible workplace, organisations need to balance the promise of greater productivity with the security concerns increased access creates. People need to be able to respond to change and adapt to new innovations.
The secondary schools Digital Technologies body of knowledge is structured around five strands, and any new landscape will need to be consistent with and/or map to this, and demonstrate clear education pathways for learners. The post-school sector of New Zealand society also needs to be considered, and digital literacy and computing skills are important and will be considered as part of this review. Digital citizens in the 21st century need to be able to use a range of digital devices.

Hon Steven Joyce has stated that “The effective implementation of Vocational Pathways will contribute to achieving the Better Public Services education targets of 85 per cent of young people attaining NCEA level 2 or equivalent and 55 per cent of 25 to 34 year olds gaining a level 4 or above qualification.”

Due to the pace of change in the ICT sector, this analysis puts less focus on a current roles perspective, except where that is how data is captured and presented in literature e.g. career profiles; job classifications such as ANZSCO occupational codes which are detailed in appendix 5. This analysis expresses a future-focused skills and competencies requirements approach for the industry and qualifications, and uses the Skills Framework for the Information Age (SFIA) as the framework for the ICT industry to inform the review and design of a new suite of ICT qualifications. The SFIA framework is covered in more detail under skills and competencies for the ICT sector, and in appendix 6.

There are many possibilities for a career in ICT and Computing, including office administration, IT support, network and systems administration, help desk and technical support, computing technician, implementation/application support roles, some form of software development role, business analysis, user experience to name a few.

There is also a need to prepare learners for a range of jobs that are not yet envisaged, developing a skill set that will enable graduates to embrace change and have the technical capability to adapt to new innovations and related requirements. The global ‘big data’ trends suggest an increasing need for skills in analysis and interpretation of data to obtain meaning and find trends which will add business value. Developing practical capacity for innovating, designing and implementing solutions for real world problems is desirable, and there is evidence of the need to consider internships or practical work applications for some qualifications.

The IITP ICT-Connect project\(^5\) is introducing school children across New Zealand to a future in IT, and has the potential to positively influence senior secondary school students in choosing to study ICT at the tertiary level. This initiative is designed to make ICT an interesting subject in schools, and help bridge the skills gap and help youth into employment.

At the NetHui internet conference, Hon Steven Joyce acknowledged the apparent current worldwide shortage of ICT skills and challenged everyone in the industry to evangelise ICT jobs/careers to students and families.

Immigration New Zealand regularly update the essential skills in demand lists\(^6\) to help ensure NZ’s skills needs are met by facilitating the entry of appropriately skilled migrants to fill identified skill shortages. There are three lists – long-term, immediate and Canterbury skill shortage lists.

There are currently no ICT related listings on the immediate skill shortage list or the Canterbury Skill Shortage list, but there are a range of ICT related positions on the long term skills shortage list. The long term skills shortage list for this sector includes ICT, Electronics and


\(^6\) Immigration NZ – reviewing the essential skills in demand lists [http://www.immigration.govt.nz/migrant/general/generalinformation/review.htm]
Telecommunications occupations mainly requiring degree qualified people with relevant work experience.

A range of occupations (ANZSCO codes) including analysts, developers, ICT engineers and customer support officer are on the Immigration NZ Long Term Skill Shortage list. See appendix 7 for the range of ICT occupations on the NZ Long Term Skill Shortage List as at March 2013.

3.3 Stakeholder Profile

The wider sector has a diverse Stakeholder Profile, and the review has been undertaken in cooperation with current owners of ICT qualifications and with a diverse range of other stakeholders, including national peak bodies and industry organisations, with a steadily growing number of interested stakeholders on the email consultation list. The stakeholders being consulted include:

- Mandatory stakeholders – current qualification owners;
- Current and prospective providers that include ITPs, PTEs, Māori and Pasifika providers, secondary schools; and their respective peak bodies and consultation networks;
- Students, learners and graduates;
- Industry organisations including professional and industry groups, and the broad ICT community these industry groups reach (e.g. IITP, NZRise, Software NZ, CITRENZ, NZAPEP, NZACDITT, NZICT) as well as other informal user groups and networking associations;
- Designated agencies, including Government agencies such as Ministry of Education, Tertiary Education Commission, NZQA, Education NZ; Ministry of Business, Innovation & Employment (Labour and Immigration NZ); Ministry of Pacific Island Affairs; Ministry of Social development;
- Other organisations and people who express an interest, including community groups, 2020 Communications Trust, employers and ITOs.

Stakeholders and interested parties have been encouraged to be involved and share their thoughts on the future of ICT qualifications in New Zealand. There are over 1,000 people on the consultation list for the ICT review; and they were invited to share communications about the review with their respective networks.

A key stakeholder profile is included as appendix 4.
4. ICT SECTOR INDUSTRY PROFILE

People and businesses in New Zealand are increasingly reliant on information technology, and this section will look at the industry from the IT professional and the IT user perspective. The ICT industry analysis will focus mainly on the ICT sector, but first we look more specifically at computing and society, and current thinking around digital literacy.

4.1 Computing and Society – digital literacy and working in a digital world

There is evidence that technology fluency or digital literacy will join creative problem solving and collaboration as essential core skills required for study, work and life in the 21st century.

However Minister Tariana Turia announced7 “Research shows that 20% to 30% of New Zealanders lack access to digital tools or the ability to use them”. Being digitally literate is no longer merely optional - it is an essential life skill. Government is investing in community based initiatives to increase digital literacy and connection.

The Education and Science Committee reported to the New Zealand Government on the Inquiry into 21st Century learning environments8 in December 2012. The report contained a number of useful observations and findings about a digital society and what is required to help New Zealanders become confident digital citizens.

With the dynamic nature of a fast changing digital environment, transformational change may be needed to develop and maintain digital literacy skills. Whilst this may be embedded in learning for children going through the school system, there are clear gaps in capability for those that have had constrained access or exposure to digital technologies or completed school before the move to teaching these skills as core.

Digital literacy is more than just technical competence – it’s about the skills that will equip the NZ workforce and society for the future. There is some mention of skill sets that need to be mastered – navigating and confidently using information, media and technology skills.

Digital citizenship is described as the ability to fully participate in the digital world being fundamental, and that this involves a combination of both technical and social skills that enable a person to be successful and safe in the information age. Digital literacy has become an essential skill requirement to be a confident, connected, actively involved citizen and lifelong learner.

NetSafe, in consultation with New Zealand teachers, has produced the following definition of a New Zealand digital citizen. A digital citizen:

- is a confident and capable user of ICT
- uses technologies to participate in educational, cultural, and economic activities
- uses and develops critical thinking skills in cyberspace
- is literate in the language, symbols, and texts of digital technologies
- is aware of ICT challenges and can manage them effectively
- uses ICT to relate to others in positive, meaningful ways
- demonstrates honesty and integrity and ethical behaviour in their use of ICT
- respects the concepts of privacy and freedom of speech in a digital world
- contributes and actively promotes the values of digital citizenship.

This is one definition of the skills that could underpin the New Zealand workforce of the future.

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There are a number of challenges identified, and these may impact on the design and delivery of proposed qualifications.

- Teaching and learning approaches will need to be increasingly flexible to respond to the pace of technological developments and future changes.
- In order for teachers to facilitate digital literacy, they themselves must be digitally literate. There may be an opportunity for up-skilling teachers in digital literacy through professional learning and development, and pedagogy of digital learning.
- Parents may require more opportunities to be involved with their children’s learning; and their own digital literacy could be enhanced and supported by children.

A wide variety of ICT skills are needed to ensure that our future workforce is able to meet the needs of the business sectors that will deliver economic growth in the 21st century.

Statistics NZ gather data on household use of ICT which may inform the discussion. This includes data available around access and use of computers, the internet and mobile phones in NZ households, and helps understand how ICT is changing NZs economy and society. There is also data on the use of ICT goods and services through the Business Operations Survey 2012\(^9\). This includes levels of computer and internet use; Internet connections, activities and sales; and the benefits of and barriers to ICT use.

The Australian Government, through the Departments of Industry, Innovation, Science, Research and Tertiary Education, Employment and Workplace Relations; is funding the development of a new framework for employability skills. In the Australian ‘Core skills for work’ framework\(^10\) document, working in a digital world is considered one of the ten key skill areas. The approach, definitions, terms, and performance features inform the discussion on working in a digital world, and many other core skills areas which are covered in section 6.

Working in a digital world refers to the capacity to connect to other people, information and contexts for work-related purposes using digital systems and technology. It involves understanding concepts and language associated with the digital world and the capacity to understand and work with emerging/accepted etiquette and risks associated with online environments. It also involves identifying how digital technology and digitally based systems can extend, enhance or make possible specific aspects of a role or task, and create new opportunities.

The document refers to 'Digital world' as the global environment in which digital technology enables multiple connections between people, rapid access to and transfer of information, the visualisation and analysis of data, the ability to connect with others, sharing information, and collaborating and building relationships that are not limited by time and location. Digital technologies include any products or combination of products that will store, retrieve, manipulate, transmit or receive information electronically in a digital form, e.g. devices, applications, software.

Designing qualifications to equip learners with the skills needed to live and work in the digital world is a requirement of the ‘IT as a tool’ component of the review, in addition to the more obvious ‘IT as a profession’ focus. The proposed qualification landscape has been designed to provide Certificates in Computing, with progression from fundamentals through to advanced user. It is not intended to cover the foundation basics of digital literacy, which are intended to be catered for in the foundation or general learning area qualification reviews. Ako Aotearoa have been contracted to create the graduate profiles for foundation education, which may include foundation digital literacy, with initial consultation undertaken to 9 September 2013.

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\(^10\) Core skills for work – draft framework. Australian Departments of Industry, Innovation, Science, Research and Tertiary Education, Employment and Workplace Relations; Retrieved from Ithaca Group 14 June 2013
4.2 ICT Industry Analysis

According to New Zealand Trade and Enterprise (NZTE\textsuperscript{11}), New Zealand’s information and communication technologies (ICT) industry includes areas as diverse as wireless infrastructure, health IT, digital content, payments, geospatial, telecommunications and agricultural technology.

Information technology means telecommunications as well as computer information processing that helps produce, manipulate, store, show, and communicate or disseminate information.

Grant Burley, Absolute IT director, says the ICT sector is “a $20 billion growth industry employing more than 40,000 people and nipping at the heels of agriculture as the country’s main export earner”. (http://www.scoop.co.nz/stories/print.html?path=BU1211/S00737/flying-new-zealands-ict-flag.htm)

In the ICT Supply Survey by Statistics NZ\textsuperscript{12}, the OECD defines ICT goods and services as those that fulfil or enable the function of information processing and communication by electronic means. Alternatively, ICT goods may also use electronic processing to detect, measure, and/or record physical phenomena, or control a physical process.

The key facts indicate that ICT goods and services were worth almost $23 billion in 2012, 17% more than in 2010. One-third of the $1.6 billion earned from New Zealand’s ICT exports came from sales of electronic components and devices. ICT services generated $12.6 billion in 2012 - two thirds from communication services. The remaining one third comes mainly from IT support ($1.6B up 18%), IT design consulting and development (up 15% to $1.5B). IT support, IT design, consulting and development, and hosting and infrastructure have continued to grow over the past two survey periods.

It is estimated that more than half of all New Zealanders have smartphones which can access information from almost anywhere in the country; computers are being replaced by tablets which have become an educational requirement in some schools, and TVs can connect to the internet.

The Canterbury Development Corporation (CDC) ICT Sector Workforce Survey (2012\textsuperscript{13}) identified that the ICT sector is characterised by a highly educated workforce where an estimated 65% of employees have a degree (level 7) or higher, and over 65% are employed as professionals or managers.

Key findings of the CDC survey included the lack of skilled staff, particularly highly skilled staff, and education providers and employer needs being misaligned. The report also identified strong future demand for employees, particularly for medium to large businesses. The most in-demand roles are in programming and development, help desk & IT support, electronics and engineering, and sales and marketing.

Some of the ICT industry firms surveyed for the CDC project felt that tertiary institutions are not currently training people with the skills organisations need, and consider internships and a strong schools programme as key talent attraction strategies. Better links with education institutions was seen as a key strategy to overcoming skills shortage barriers in Christchurch.

Recommendations from the report included encouraging the increased development of home grown talent by guiding the education community to grow the right talent to meet industry skill demand. In response to a tight labour market, the most likely response was to lift salaries and upskill existing employees, with recruiting overseas or outsourcing being other options.

\textsuperscript{11} NZTE http://www.nzte.govt.nz/en/export/
An ICT Sector Report is being prepared by the Ministry of Business, Innovation and Employment (MBIE). It provides an overview of the New Zealand ICT sector, sector definitions, key themes and trends in data. This review will not focus on qualifications for the ICT manufacturing or telecommunications sectors as these are covered by other reviews, however some of the ICT sector data will include figures related to these sectors. Some of the preliminary findings from the MBIE ICT sector report include:

- NZs ICT sector is more innovative and internationalised than the economy as a whole.
- Twice as many ICT firms produce innovations ‘new to world’ than the NZ average and the source of most of their ideas for innovation come from existing staff, customers and business networks. High barriers to innovation include cost, lack of management resources and appropriate personnel.
- The ICT sector includes activities which are also classified as part of high tech manufacturing and knowledge intensive services.
- IT services has enjoyed significant growth in employment and number of firms, reflecting the integration of IT systems into all areas of business.
- NZs ICT manufacturing sector is small, but export intensive. Both export and employment growth have slowed significantly in recent years, but there are individual firms doing well.
- The ICT sector is more strongly connected internationally than New Zealand firms generally; a quarter (24%) of ICT firms have some foreign ownership; 11% of firms have overseas holdings.
- ICT workforce quality – more workers in ICT have tertiary qualifications than the New Zealand average; the perception of their quality has been improving.
- Access to labour – the ICT sector has more difficulty recruiting labour than the NZ average, with technicians and managers the most difficult.
- The NZ ICT sector is shaped by and responds to international trends including:
  - The rapid movement towards cloud computing and the accompanying move to software/platforms/storage and other enablers being provided as a ‘service’
  - The continued rise of mobile data and technologies, including tablets, smart phones and other BYODs
  - ‘big data’ - the move towards capturing, manipulating and benefitting from very large data sets, in areas as broad as consumer behaviour, astronomy and traffic management.
- Employment growth by the major sub-sector ICT, driven by IT services, has nearly returned to 2002-08 levels after negative growth in 2009-10. IT services (software and computer services) employed 29,145 in 2012 (Source: Statistics NZ Business Demographics database).
- ICT wages/salaries are 40% higher than the NZ average and have been increasing at close to or more than the average rate since 2009 (Source: Statistics NZ annual enterprise survey 2012).
- Financial performance – profitability has declined in the last three years.

IT Services is a sector of ICT that is covered in more detail.

- IT Services is made up of six sub-sectors covering a wide range of activities. These IT software and computer services include computer system design and related services, software publishing, data processing and web hosting services, electronic information storage, electronic and precision equipment repair and maintenance, other goods and equipment rental and hiring.
- The number of IT services firms has grown, driven by ‘computer system design’, with an additional 3000 jobs since 2010 (Statistics NZ Business Demography Statistics 2012).
- Employment growth in IT services has been driven by firms of all sizes – employment by firms in the 20-49 employee range has doubled.
- Exports of IT services generated $1.1 billion in 2011 – one third of this was ‘computer services’, and over half are exported to Australia and USA. Research services and
management consultancy services are also likely to generate large export income, but those values are confidential.

Statistics New Zealand has produced a range of reports and information on the ICT sector. One such report in the Economic News 28 August 2012 "IT is it: economy’s appetite for computer skills grows" observed that the computer systems design (CSD) industry has become increasingly important in creating jobs and export earnings for New Zealand, noting that people who design systems are in hot demand. Most of the growth in self-employed workers in New Zealand from 2000-2010 is attributed to growth in CSD self-employed workers.

The CSD part of the IT industry has provided significantly more jobs compared with other industries over the past decade particularly for those who classify themselves as self-employed. The computer systems design industry also has the highest rate of product innovation in NZ, which maintains their competitiveness in the global economy.

The report concluded that “The CSD industry has been a standout performer in the New Zealand economy during the 2000s. The industry has experienced very strong employment growth, amongst both employees and the self-employed. Its rate of innovation and exporting are up with the best in the country. Further, the workforce is young, highly educated and well paid, and they are concentrated in Wellington and Auckland. The CSD industry is well-positioned to benefit from the increasing use of technology in the economy. “

For the purpose of this qualifications review, a limitation with focusing on the ICT sector is that the focus is on the sector rather than on people who work in the IT area in organisations other than the specified ICT sector areas. To capture this, we will explore the employment information available for ICT related areas in the employment and vacancy data analysis (section 5).

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5. EMPLOYMENT AND VACANCY DATA ANALYSIS

When we consider employment, we will try to focus on all IT professionals, whether they work within a designated ‘ICT sector’ workplace or in an IT role in organisations outside the ICT sector industries. It is important to recognise that much of the data gathered for the ‘ICT sector’ generally considers only ‘ICT sector’ businesses, which is too limiting when considering the IT workforce, which operates both within and outside the ICT sector industries.

The ICT workforce and ICT sector overlap, and the following diagram depicts an estimate of people working in ICT occupations or in the ICT industry in 2010. This shows that there are twice as many people in ICT occupations outside the ICT industry as within.

The following diagram depicts the ICT workforce relationship, based on Department of Labour estimates from modelling 2006 Census data.
The ICT workforce is made up of a wide range of roles. The following diagrams show trends in vacancy and employment statistics from 2007-2012, and they are categorised using the ANZSCO occupation classification codes. An ICT extract of ANZSCO codes is included as appendix 5, along with estimates of the numbers employed in 2010 by job title, pro-rata from census data 2006.

The following diagram portrays the ICT Occupations Labour Statistics 2007-12 showing trends in the numbers employed for existing job roles.

The Forbes Top Jobs for 2013\textsuperscript{15} includes six ICT roles in the top 15, and is based on occupations with the most jobs added since 2010.

1. Software Developers (Applications and systems software)
4. Computer Systems Analysts
6. Network and Computer Systems Administrators
8. Information Security Analysts, Web developers and Computer network architects
11. Computer programmers
15. Database Administrators

Most of the 15,000 jobs that were available in New Zealand late 2012 were said to be mismatched to the skills of the jobless and many job seekers. According to the Seek jobs website, the jobs most in demand were in information technology (IT) and engineering.

However, over the year to February 2013, skilled job vacancies decreased in most industries, with the strongest decrease of 18.7% in the information technology industry.

There has been some volatility in the ICT job market, and the number of jobs advertised on the Seek ICT website declined during 2012. There is an increase in Seek ICT job advertisements in the first half of 2013, however these are still below previous years levels. Tight economic times can lead to less mobility in the job market, as people choose to remain in existing positions. There appears to be an undiminished demand for people with the requisite ICT skills.

Garry Roberton prepared an analysis of trends in the ICT job advertisements in New Zealand\textsuperscript{16}, which show a continuing decline in IT job advertisements throughout 2012; and a similar pattern for 2013\textsuperscript{17}.

\textsuperscript{16}Garry Roberton, December 2012. \textit{NZ ICT Tertiary Education & Job Series December 2012} retrieved from \url{http://www.citrenz.ac.nz/?wpfb_dl=29}

\textsuperscript{17}Garry Roberton, August 2013. \textit{ICT Trends : Unemployment and the ICT job market} retrieved from Newsline \url{http://www.iitp.org.nz/newsletter/article/479?utm_source=email}
The analysis includes ICT job advertisements through Seek and Trademe for all of New Zealand, with regional breakdowns and filters for jobs by Industry Certifications (Microsoft, Linux, Cisco), IT Management Certifications (PMP, Prince, ITIL), by programming language (Java, .NET, PHP, C#), by role (programmer/developer, system support, helpdesk, network [all categories], mobile [apps], ‘cloud’ related categories. The article includes a selection of diagrams showing trends.

The following table provides a comparison of a range of ICT roles from the AbsoluteIT Salary Survey. Whilst many of these roles require a Bachelor degree qualification, a number of these roles are ones identified as being suitable for a graduate of Diploma qualifications within the review scope.

![Graph showing ICT roles and salaries](image)

The Careers NZ website provides career resources on the information technology industry, including types of jobs and training for the industry, and how to get into the industry. It recommends useful school subjects including mathematics and digital technologies, along with physics and graphic design for some positions.

It suggests that jobs in information technology may be for people if they are interested in:
- working with computer hardware and software
- analysing and solving computer-related problems
- digital media, the Internet and communications
- gaming, animation, or designing websites
- business development or management.

Most of the jobs in ICT professional areas require degree qualifications, although many require diploma or trade certificate qualifications. The Careers NZ website provides information on the types of jobs and opportunities that may be available in the ICT sector. This includes a summary of some jobs with details about the job, personal requirements and how to get into the particular job, along with projected job opportunities outlook.

This has been summarised in a table included as appendix 8, including the following jobs:

---

There appears to be a continuing demand for suitably qualified and experienced IT personnel. An area of potential need for this review is to consider qualifications that will create training and education opportunities to re-engage disenfranchised youth. The degree pathways are already well established into the ICT related professions, however there is evidence of a need to provide opportunities for those who haven’t followed the traditional academic pathway to degree qualifications, to be equipped to enter the IT profession from a more vocational approach which is a context the proposed Certificate and Diploma qualifications will allow for.

6. SKILLS AND COMPETENCIES FOR THE ICT SECTOR

There is a strong demand for skilled IT employees and the growth in this industry is showing few signs of slowing down. Increasingly computing and ICT is firmly embedded in almost every aspect of our fast paced lives. This high-performing industry seeks responsive collaborators with analytical minds and critical thinking capacity.

The following diagram depicts the ‘ICT Profession Ecosystem’.

![ICT Profession - Ecosystem Diagram](source: IITP - ICT Skills Mapping Workshop)
6.1 Soft skills and core skills for work

There are a number of soft skills identified that are in high demand in a high-tech world\(^{19}\), including an ability to communicate professionally; listening skills; maintaining a good attitude; critical thinking; teamwork and collaboration.

In her recent article\(^{20}\), Mary Shacklett identified 10 highly valued soft skills for IT professionals. These provide an opinion that may help inform the discussion around soft skills in ICT qualifications that are developed, and a full version is available as appendix 10.

She states that today’s IT professional needs a combination of technical expertise and an expanding range of soft skills. Whilst there may be varying demands for IT technical skills depending on the organisation need, there is a clear need for soft skills, and the ones she identified that companies want to see in IT professionals today are:

- Deal making and meeting skills (working with people);
- great communication skills (read, write, speak clearly and effectively);
- a sixth sense about projects (instinctive);
- ergonomic sensitivity (understand non-technical user needs);
- great team player;
- political smarts & relationship building;
- teaching, mentoring and knowledge sharing (listening & patience);
- solution finding - resolving grey issues;
- vendor management (admin and management skills);
- contract negotiation skills & legal knowledge

The steering group also contributed industry input to the discussion on skill requirements, and the key themes to emerge included the importance of thinking and solution finding skills; communication skills including writing; willingness to upskill to remain ‘current’ with technical developments; curiosity, courage and empathy to meet the challenges of fast paced change.

There are a number of opinions available that outline the characteristics and some of the skills required that may lead to success in an IT role. Jack Wallen identified key qualities needed to overcome the adversities and become a successful IT pro in his article 10 things you gotta have to succeed in IT\(^{21}\); April 2011. The key qualities identify the importance of problem solving; resilience; life, business and marketing skills; on top of the expected technical capabilities.

He describes the following 10 qualities in more detail in his article, to help people determine if they are likely to be suited to a career in IT. The qualities include: thick skin, persistence, youth, patience, skills, ability to improvise, good sense of PR, connections, desire to learn, and passion.

\(^{19}\) Tech Republic: Scott Lowe  Soft skills in high demand in a high-tech world,  October 2011  

\(^{20}\) Tech Republic: Mary Shacklett 10 highly valued soft skills for IT pros,  July 2012  
http://www.techrepublic.com/blog/10things/10-highly-valued-soft-skills-for-it-pros/3353?tag=content;siu-container

\(^{21}\) Tech Republic: Jack Wallen – 10 things you gotta have to succeed in IT,  April 2011  
http://www.techrepublic.com/blog/10things/10-things-you-gotta-have-to-succeed-in-it/2421?tag=content;siu-container
Core Skills for Work Framework – Australia

Generic or core or employability skills are the non-technical skills and knowledge necessary for effective participation in work. The draft Australian Core Skills for Work Framework\(^{22}\) is designed to clearly define a set of generic non-technical skills, knowledge and understandings to meet the requirements for successful participation in the workforce.

The framework is comprised of ten skills areas grouped into three clusters or broad categories. The framework identifies focus areas and specific performance features (what someone knows, understands and can do at each stage), and recognises that there are a range of influencing factors to be considered.

The framework structure overview follows:

<table>
<thead>
<tr>
<th>Skills Clusters</th>
<th>Skill Areas (10)</th>
<th>Focus area</th>
<th>Stages 1 to 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Navigate the world of work</td>
<td>1a. Manage career and work life</td>
<td>Identify work options; gain work; develop relevant skills and knowledge</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1b. Work with roles, rights and protocols</td>
<td>Work with roles and responsibilities; operate within legal rights and responsibilities; recognise and respond to protocols</td>
<td></td>
</tr>
<tr>
<td>2. Interact with others</td>
<td>2a. Communicate for work</td>
<td>Respond to communication systems, practices and protocols; speak and listen; understand, interpret and act; get the messages across</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2b. Connect and work with others</td>
<td>Understand self; build rapport; cooperate and collaborate</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2c. Recognise and utilise diverse perspectives</td>
<td>Recognise different perspectives; respond to and utilise diverse perspectives; manage conflict</td>
<td></td>
</tr>
<tr>
<td>3. Get the work done</td>
<td>3a. Plan and organise</td>
<td>Plan and organise workload and commitments; plan and implement tasks</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3b. Make decisions</td>
<td>Establish decision making scope; apply decision making processes; review impact</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3c. Identify and solve problems</td>
<td>Identify problems, apply problem solving processes; review outcomes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3d. Create and innovate</td>
<td>Recognise opportunities to develop and apply new ideas; generate ideas; select ideas for implementation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3e. Work in a digital world</td>
<td>Use digitally based technologies and systems; connect with others; access, organise and present information; manage risk</td>
<td></td>
</tr>
</tbody>
</table>

The framework uses a developmental approach encompassing five stages – novice, advanced beginner, capable, proficient and expert; and recognises that both context and experience contribute to the stage of performance. A range of influencing factors is also described, as are detailed definitions of the skill areas, including working in a digital world.

\(^{22}\) Core skills for work – draft framework. Australian Departments of Industry, Innovation, Science, Research and Tertiary Education, Employment and Workplace Relations; Retrieved from Ithaca Group 14 June 2013
Following is an extract from Table 3 of the document, which defines the ten skill areas by cluster.

<table>
<thead>
<tr>
<th>1. Navigate the world of work</th>
<th>2. Interact with others</th>
<th>3. Get the work done</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1a. Manage career and work life</strong>&lt;br&gt;This Skill Area is about managing decisions throughout life about how, when and where to work. It involves the capacity to identify work and career options, to gain work or career advancement, and to undertake learning appropriate to work needs and goals.</td>
<td><strong>2a. Communicate for work</strong>&lt;br&gt;This Skill Area is about using communication skills to achieve work outcomes. It involves the capacity to recognise communication protocols and etiquette, use communication systems and processes, understand messages and get messages across to others.</td>
<td><strong>3a. Plan and organise</strong>&lt;br&gt;This Skill Area is about identifying and completing the steps needed to undertake tasks and manage workloads. This involves the capacity to organise self and information, plan and implement tasks, and plan and organise workloads.</td>
</tr>
<tr>
<td><strong>1b. Work with roles, rights and protocols</strong>&lt;br&gt;This Skill Area is about understanding work roles and workplace rights and expectations. It involves the capacity to identify and manage responsibilities, recognise and respond to legal rights and responsibilities, and to recognise and respond to expectations and accepted practices of work situations.</td>
<td><strong>2b. Connect and work with others</strong>&lt;br&gt;This Skill Area is about building the work-related relationships needed to achieve an outcome within a workgroup, or achieve goals through team based collaborations. It involves the capacity to understand others and build rapport, which in turn involves understanding one’s own values, goals, expectations and emotions, and making choices about regulating one’s own behaviour, taking the needs of others, and the often implicit social rules of the context, into account.</td>
<td><strong>3b. Make decisions</strong>&lt;br&gt;This Skill Area is about making a choice from a range of possibilities. It involves the capacity to use different decision-making approaches and reflect on the outcomes of decisions.</td>
</tr>
<tr>
<td><strong>2c. Recognise and utilise diverse perspectives</strong>&lt;br&gt;This Skill Area is about the capacity to recognise and respond to differing values, beliefs and behaviours, to draw on diverse perspectives for work purposes and to manage conflict when it arises.</td>
<td><strong>3c. Identify and solve problems</strong>&lt;br&gt;This Skill Area is about identifying and addressing routine and non-routine problems in order to achieve work objectives. This involves the capacity to anticipate or identify problems, take steps to solve problems and reflect on the outcomes.</td>
<td><strong>3d. Create and innovate</strong>&lt;br&gt;This Skill Area is about creating, applying and recognising the value of new ideas to solve problems, improve or develop new processes, products or strategies, or provide new benefits. It involves the capacity to challenge perceptions of how things are, and how they might be, and to recognise areas where a new approach might create an opportunity. It also involves the use of formal processes to generate, and select from, a range of new ideas.</td>
</tr>
<tr>
<td><strong>3e. Work in a digital world</strong>&lt;br&gt;This Skill Area refers to the capacity to connect to other people, information and contexts for work-related purposes using digital systems and technology. It involves understanding concepts and language associated with the digital world and the capacity to understand and work with emerging/accepted etiquette and risks associated with online environments. It also involves identifying how digital technology and digitally based systems can extend, enhance or make possible specific aspects of a role or task, and create new opportunities.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The framework model may be very relevant when considering the core skills for qualifications.

The Performance Features Table 3e – *Work in a digital world* is included as appendix 11, and similar tables are available within the document for each of the skill areas.
6.2 Technical IT skills - The Skills Framework for the Information Age (SFIA)

The Skills Framework for the Information Age (SFIA) provides standardised definitions of information technology skills and levels. A summary chart can be found on the SFIA website www.sfia-online.org, and further information on levels and definitions is contained in appendix 6.

SFIA makes a clear distinction between skills and technological matters; is compatible with a variety of ways of working; is not tied to any group of products; can be understood by technical managers, HR managers and other users of the framework. Use of SFIA should help create a common language of IT skills development and deployment for all stakeholders.

SFIA's intellectual content comes from a broad open consultancy process, focussed on the practical management of IT professionals in the workplace. It is a serious management tool produced by experienced managers and practitioners in information technology. SFIA is used in over 100 countries. It supports management systems in corporations, governments and charities; defines membership grading in professional bodies; provides mappings for well-known certification bodies such as ISACA and CompTIA; is used as a guide by training companies; and underpins curricula at Universities; on several continents.

SFIA defines 96 professional IT skills, organised in six categories, each of which has several subcategories, and each skill has a 4-digit code allocated. It also defines seven levels of attainment, each of which is described in generic, non-technical terms.

<table>
<thead>
<tr>
<th>Competency categories</th>
<th>Competency sub-categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategy and architecture</td>
<td>Information strategy</td>
</tr>
<tr>
<td></td>
<td>Advice and guidance</td>
</tr>
<tr>
<td></td>
<td>Business strategy &amp; planning</td>
</tr>
<tr>
<td></td>
<td>Technical strategy and planning</td>
</tr>
<tr>
<td>Business change</td>
<td>Business change implementation</td>
</tr>
<tr>
<td></td>
<td>Business change management</td>
</tr>
<tr>
<td></td>
<td>Relationship management</td>
</tr>
<tr>
<td></td>
<td>Skills management</td>
</tr>
<tr>
<td>Solution development and implementation</td>
<td>Systems development</td>
</tr>
<tr>
<td></td>
<td>Human factors</td>
</tr>
<tr>
<td></td>
<td>Installation and integration</td>
</tr>
<tr>
<td>Service management</td>
<td>Service strategy</td>
</tr>
<tr>
<td></td>
<td>Service design</td>
</tr>
<tr>
<td></td>
<td>Service transition</td>
</tr>
<tr>
<td></td>
<td>Service operation</td>
</tr>
<tr>
<td>Procurement and management support</td>
<td>Supply management</td>
</tr>
<tr>
<td></td>
<td>Quality and conformance</td>
</tr>
<tr>
<td>Client interface</td>
<td>Sales and marketing</td>
</tr>
<tr>
<td></td>
<td>Client support</td>
</tr>
</tbody>
</table>

Each skill has an overall definition, and an “at-level” definition for each of the levels at which it can be recognised.

The SFIA Foundation 'Working with SFIA 5 – The common language of IT' is helpful in describing SFIA and how it works. It states SFIA provides a language that is a foundation for consistent, unambiguous and clear definitions of IT based skills.

SFIA
- gives recognisable descriptions of the professional skills needed by people working in IT
- contains a set of consistent levels of attainment
- clearly distinguishes professional skills from technical knowledge
- integrates flexibly with an organisation’s existing ways of working
- is available free of charge from The SFIA Foundation – a non-profit organisation
- is maintained and updated by a process of open consultation – by the IT industry, for the IT industry

The foundation of SFIA is a set of generic business skills that make up SFIA’s seven levels of responsibility.

Each level has a full definition expressed in terms of Autonomy, Complexity, Influence and Business skills. In addition to the full description, each level also has a memory-jogging tag that conveys the spirit of the level. The levels cover from starter to senior IT manager and world-leading technologist.

The SFIA skills context states that IT professional capability comes from a combination of professional skills, behavioural skills, and knowledge. Experience and qualifications validate that overall capability. Professional skills map to the framework, and the skills will be defined for a range of levels.

<table>
<thead>
<tr>
<th>Skill level (Tag)</th>
<th>Generic definitions of levels</th>
<th>Specific professional skill</th>
</tr>
</thead>
<tbody>
<tr>
<td>7 set strategy/inspire/mobilise</td>
<td>definition of level 7</td>
<td>definition of the skill at level 7</td>
</tr>
<tr>
<td>6 initiate/influence</td>
<td>definition of level 6</td>
<td>definition of the skill at level 6</td>
</tr>
<tr>
<td>5 ensure/advice</td>
<td>definition of level 5</td>
<td>definition of the skill at level 5</td>
</tr>
<tr>
<td>4 enable</td>
<td>definition of level 4</td>
<td>definition of the skill at level 4</td>
</tr>
<tr>
<td>3 apply</td>
<td>definition of level 3</td>
<td></td>
</tr>
<tr>
<td>2 assist</td>
<td>definition of level 2</td>
<td></td>
</tr>
<tr>
<td>1 follow</td>
<td>definition of level 1</td>
<td></td>
</tr>
</tbody>
</table>

Source: IITP - ICT Skills Mapping Workshop
SFIA can be used as a tool for measuring current capability and planning for future demand. It enables precise descriptions of the skills required in jobs and roles. For example, a job description for a competent IT service technician might include requirements for these skills at level 3:

- CHMG  Change Management
- USUP  User support
- CFMG  Configuration management
- SYSP  Systems software
- ITOP  IT Operations

These skills and competencies can be used to design qualifications and training to meet these requirements. The following diagram matches skills to a Senior Solution Developer role profile:

![Senior Solution Developer Role Profile Diagram](Source: IITP - ICT Skills Mapping Workshop)

IITP have mapped some of the main ICT roles on to SFIA levels as shown in the following:

![How the main roles map on to SFIA levels](Source: IITP - ICT Skills Mapping Workshop)
The following diagram demonstrates how SFIA skills may be mapped to a Business analyst team, showing the entry and more senior levels.

<table>
<thead>
<tr>
<th>SFIA Category</th>
<th>SFIA Sub-Category</th>
<th>SFIA Skill</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategy &amp; Planning</td>
<td>Advice &amp; Guidance</td>
<td>5 5 5</td>
</tr>
<tr>
<td></td>
<td>Technical specialism</td>
<td>5 6 7</td>
</tr>
<tr>
<td>Business/IS strategy and Planning</td>
<td>Business process improvement</td>
<td>5 6</td>
</tr>
<tr>
<td>Dev &amp; Implementation</td>
<td>Systems Development</td>
<td>3 4 5 6 6</td>
</tr>
<tr>
<td></td>
<td>Business Analysis</td>
<td>3 4 5 6 6</td>
</tr>
<tr>
<td>Data Analysis</td>
<td>Media Creation</td>
<td>2 3 4 5 5</td>
</tr>
<tr>
<td>Service Delivery</td>
<td>Education &amp; Training</td>
<td>Development &amp; Training</td>
</tr>
<tr>
<td>Use</td>
<td>User</td>
<td>5 5 5</td>
</tr>
</tbody>
</table>

**Behavioural Competencies**

- Committing to the Customer: 1 2 3 4
- Going Further for Results: 2 2 3 3 3
- Working Together for the Business: 1 2 2 3 3
- Changing for the Future: 1 2 3 4 5
- Having an Influence: 1 2 2 3 4
- Leading by Example: 1 1 2 3
- Creating a Learning Environment: 1 1 2 2 3
- Being Progressive: 1 1 2 3
- Making Sound Business Judgements: 2 2 2 3 4

A similar approach may be undertaken for a range of roles relevant for qualifications developed for this review.

SFIA is described in brief in appendix 5, which also covers how it is proposed that qualification outcomes and roles may be mapped to SFIA to ensure standardisation of language between qualifications and industry. Further information is available from the SFIA website - see [www.sfia-online.org](http://www.sfia-online.org).

An analysis has been undertaken to map SFIA to the NZQF levels. The SFIA and NZQF level descriptors are organised in a different way with different emphases, to reflect the differences in purpose and focus. The NZQF levels attempt to describe entire qualifications based on learning and/or performance, while the SFIA levels are more tightly focused on individual performances within the ICT industry.

In general, although the SFIA framework and NZQF level descriptors are developed for different purposes, they correspond quite closely, especially at the lower levels. From levels 3-4, it would appear that the SFIA descriptors call for increasingly higher levels of performance than the NZQF descriptors. At these levels it is advisable therefore to think of the alignment between the SFIA level and the equivalent and next level in the NZQF i.e. SFIA level 4 corresponds to NZQF levels 4-5). The NZQA Level Descriptors table is included as appendix 12.
6.3 Digital technologies - schools

There are five categories created for the Digital Technologies Achievement Standards in schools. These categories are Digital Information, Digital Infrastructure, Digital Media, Electronics, and Programming and Computer Science. Note that Electronics is outside the scope of this review, as it is part of the 2011 Electrical/Electro-technology review (The Skills Organisation).

The Body of Knowledge for these five strands at secondary level is covered in appendix 13 – Secondary schools digital technologies. Digital technologies focus on understanding, developing and using digital software, hardware and electronic systems across a range of contexts including school, the home and wider community settings.

The schools’ digital technology curriculum can prepare children for a future in the IT profession, and to pursue a range of further academic or employment options. There is a challenge to determine how to prepare learners that have not been exposed to the new digital technologies curriculum for higher level study in the IT field.

6.4 CITRENZ ‘Blue Book’

The New Zealand polytechnic sector own and manage a range of ICT qualifications that are available throughout New Zealand.

Computing and Information Technology Research and Education New Zealand (CITRENZ) accredits institutions to deliver these qualifications, and to develop their own programmes using the modules available from the “Blue Book” – CITRENZ curriculum document.

Further details are available from the CITRENZ website http://www.citrenz.ac.nz/?page_id=137

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7. ANALYSIS OF THE CURRENT SITUATION

There is a range of ICT qualifications and training products currently available to learners, and these are delivered in various mediums including online, face to face, as short courses and qualifications.

There are currently qualifications for both the “IT user” and the “IT professional”. Some of these are linked to international vendor certifications (e.g. CompTIA, Cisco, Microsoft MCITP); some provide a pathway to higher level study and/or become an exit qualification for some learners (e.g. from longer degree qualifications).

Additionally there a range of ‘foundation learning’ options which may include aspects of IT or digital literacy, some of which are available through community offerings, and some which cater specifically for people with a limited knowledge of computers and the internet. There are also international vendor qualifications in the digital literacy space, including the KiwiSkills operated International Computing Driver License (ICDL) and e-Citizen programmes; and the Certiport IC^3 global programmes.

The Government’s Network for Learning (N4L) Company is bringing digital education into schools while actively encouraging schools to promote ICT as a creative and rewarding career pathway. The New Zealand Curriculum for secondary school has led to new digital technologies achievement standards which are designed to prepare students for careers in IT, and there are also vocational pathways being developed that provide alternative pathways for learners that may include IT.

At a tertiary level, funding has been boosted for digital technology courses and Government is working with training institutes to ensure graduates are delivering the skills needed by industry.

The number of qualifications within the scope of the review increased from 213 to 222 during the review process. The analysis of the current situation is largely based in the original number, as the additions did not significantly impact the findings.

7.1 Existing ICT qualifications

An analysis of the current ICT qualifications was undertaken, with key findings and issues to be considered presented to the first Steering Group meeting held on 9 April. The analysis can assist with informing the proposed ‘landscape’ for qualifications, and literature search findings and analysis of other sources of data further inform and support the process and decisions.

The analysis has considered and identified similarity in the following:
- owners and providers of qualifications
- numbers of qualifications
- level of qualifications
- size of qualifications (number of credits)
- ‘categories’ of qualifications
- existing ‘programme of study’ e.g. unit standards, ITP CITRENZ ‘Blue Book’\(^25\) ICT papers, PTE vendor certifications such as CompTIA, Cisco, Microsoft
- titles of qualifications, overview of content, and usage where available.

7.1.1 Supply

There are 213 ICT qualifications on the NZQF that are part of the review.

There are 55 qualification owners of the existing 213 ICT qualifications in the review.
- 19 ITPs own 94 qualifications - two to nine qualifications each
- 32 PTEs own 106 qualifications - nearly half of these (and a quarter of all ICT quals - 49) are owned by 3 PTEs; and 21 PTEs own just one qualification

• 3 Wananga own 9 qualifications
• NZQA – NQS owns 4 qualifications, with many providers delivering (see usage information in demand section)
• Nearly a quarter of the qualifications (49) are owned by 3 PTEs - one PTE owns 24 qualifications (AMES) and others own 11 & 14 (NZ School of Education & Information Technology Training Institute).

There are only one or two organisations accredited to deliver many of the ICT qualifications, and there are indications of similarity between existing qualifications.

Analysis of qualifications by levels and credit value

• 62.5% (133) of ICT qualifications are at higher levels - 71 at Level 5 and 62 at Level 6
• Less than a third are mid-level (62 = 29%) – 35 @ Level 3 and 27 @ Level 4
• There are few qualifications at the lower levels – only 8.5% (18). 1 @ level 1 and 17 @ level 2

• Qualifications of 120 credits at level 5, which is the equivalent of one year of full time study, are most common (31% - 65/213);
• There are 65 qualifications of 120 credits, with 30 at level 5, 23 at level 6;
• There are 33 qualifications at 60 credits. Level 3 & 4 both have 10, with 6 at level 2 and 5 at Level 5;
• 9 qualifications at 240 credits or more – includes 7 @ 240 credits which may be exit qualifications from degrees or require more detailed programmes of study;
• Level 3 & 4 most likely to be between 45 and 70 credits
  - 60% of quals at level 3 between 45 and 70 credits – 21 quals;
  - 63% of quals at level 4 between 60 and 65 credits – 17 quals.

120 credits is a standard one year full time programme. The size of a qualification (number of credits) impacts the flexibility of usage, and may be influenced by funding policy. Demand from international students may be impacted by changes in 2012 to ‘study to work’ visas, which now require a minimum of 2 years of full time study (240 credits), although this can be progressive e.g. 120 credit level 5 qualification and then 120 credit level 6 qualification.
Grouping of qualifications by possible categories

Analysis of the range of existing ICT qualifications has involved grouping them into categories based on similarity of title or content. The groups are intended as a guide to possible disciplines based on existing supply and demand information, and are a combination of ‘plain language’ and schools ‘digital technology’ categories.

Following are the categories, with an indication of what has been grouped together.

- **User application – Digital media and information** – includes computing user and digital literacy; web and e-business/commerce; helpdesk; combination with development/programming introduction qualifications.
- **Development – Programming and Computer Science** – includes development software including applications; development and infrastructure, including ICT; development and helpdesk and web qualifications.
- **Digital infrastructure** – includes hardware related infrastructure including networks, systems, engineering, IT; and infrastructure technicians and helpdesk qualifications.

Following is a summary of the qualifications by category and level.

**Categories of ICT qualifications by level**

<table>
<thead>
<tr>
<th>Level</th>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
<th>Level 4</th>
<th>Level 5</th>
<th>Level 6</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>User’ applications - Digital media &amp; information</td>
<td>1</td>
<td>16</td>
<td>33</td>
<td>12</td>
<td>4</td>
<td>8</td>
<td>74</td>
</tr>
<tr>
<td>Development - Programming and computer science</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>7</td>
<td>32</td>
<td>32</td>
<td>74</td>
</tr>
<tr>
<td>Digital infrastructure</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>8</td>
<td>34</td>
<td>23</td>
<td>65</td>
</tr>
<tr>
<td>Total</td>
<td>1</td>
<td>16</td>
<td>36</td>
<td>27</td>
<td>70</td>
<td>63</td>
<td>213</td>
</tr>
</tbody>
</table>

**Duplication and similarities**

The analysis of ICT qualifications within this review identifies considerable similarity between a significant number of the qualifications, and an opportunity to reduce duplication in some areas and to reduce the total number of ICT qualifications in the future.
To summarise the key findings, there are many similarities in the core components of the ICT qualifications. Some local qualifications embed national qualifications and/or vendor certifications, and many of the level 5 and 6 ICT qualifications are degree ‘exit’ qualifications.

The level 2 and 3 ICT/computing qualifications tend to be entry level with a focus on digital literacy, some embedding language, literacy and numeracy (LLN), and some combining the ‘user’ side with introductory ‘IT professional’ learning. At level 4 there is a leaning towards advanced ‘user’ and foundation ICT for IT professionals, and preparation for higher level study.

These factors should be considered when determining the graduate profiles and requirements for the new ICT qualifications.

6.1.2 DEMAND

Enrolment and completion figures for 2011 from the Ministry of Education

An analysis of the Ministry of Education data in ‘Education Counts’ provides insights to demand data on enrolment and completions in ‘Information Technology’ (NZSCED classification), and a demographic ‘profile’ of the students/learners (domestic/international students, full time/part-time, age, gender etc).

Participation (enrolments) and Qualification Completions

- 75% of all Information Technology qualification completions are at undergraduate Certificate and Diploma level (5,443). There were 7,236 IT qualification completions in 2011, 75% at Certificate or Diploma level, and 26% at Degree level.

- 41,740 enrolments in Information Technology in 2011, with 47% or 19,440 at bachelor degree level. 2,240 or 5% at graduate Certificate or Diploma level, and 970 or 2% at Masters or Doctorate level.

- 20,630 or 48% were undergraduate enrolments in Certificates (11,910) or Diplomas (8,720).

Note: Students can enrol in more than one field

- **Computer Science** made up 62% or 25,980 of total Information Technology enrolments, and half of these were at Certificate and Diploma level. There were 2,723 computer science qualification completions (38% of total IT completions), and 70% or 1,917 of these were at Certificate or Diploma level, with 822 or 30% at degree or post graduate level.

- **Information Systems** accounted for 48% or 19,890 of total Information Technology enrolments, and 9,530 or 48% of these were at Certificate and Diploma level. There were 2,312 Information Systems qualification completions (32% of total IT completions), and 58% or 1,354 of these were at Certificate or Diploma level, with 978 or 42% at degree or post graduate level.

- **Other Information Technology** accounted for 26% or 10,670 of total Information Technology enrolments, and 9,530 or 48% of these were at Certificate and Diploma level. There were 2,656 other information technology qualification completions (37% of total IT completions), and 88% or 2,344 of these were at Certificate or Diploma level, with 319 or 12% at degree or post graduate level.

- **Office studies** accounted for 23% or 30,380 of total management and commerce enrolments in 2011, and these were nearly all at Certificate and Diploma level. There were 8,812 Office Studies qualification completions (27% of total Management and Commerce completions – 32,267), and all of these were at Certificate or Diploma level (56% at level 3).
Gender

IT professionals tend to be younger and male, and are generally highly qualified (many with degrees). ICT is characterised as being dominated by males with an under-representation of females in ICT professional roles. Three-quarters of respondents in the IITP/AUT research\(^{26}\) were male, and about 85% of respondents to the industry survey were male.

An analysis of Education Counts data on enrolments in ICT qualifications has been undertaken to explore the gender balance. For level 4 Certificates, there is an almost equal balance between male and female enrolments, although fewer females are doing computer science. For all other levels the variance is quite extreme.

For lower level certificate qualifications, there are twice as many females enrolled as males. This trend is reversed for Diploma qualifications, where twice as many males as females are enrolled.

Although outside the scope of this review, it is interesting to note that for higher level qualifications there is more of a gender imbalance. Just over a third of enrolments in Bachelor degrees are female, and less than a quarter of enrolments in Masters degrees or Doctorates are female, and only 16% of post-graduate certificate and diploma enrolments and honours degrees are females.

We can conclude from this that women are well represented in the ‘computing user’ levels of qualifications, but are underrepresented in the more technical IT qualifications. The review may consider how to design qualifications that may be more attractive to women in the IT professional area.

\(^{26}\) IITP & AUTs Centre for Research in Information Systems Management (CRISM) findings from the inaugural annual survey on the careers of IT Professionals in NZ October 2012
International students
There was a drop of 6% from 98,660 to 92,995 in total international student enrolments in 2012. International enrolments are a significant market segment, with tuition fees in 2012 contributing over $700m to the New Zealand economy.

There were 76,089 international fee paying students enrolled in tertiary study in NZ in 2012. From the full year export education levy figures for 2012, 3,449 or 4.5% of international fee paying students studied information technology in 2012, with an additional 2,829 studying engineering, which may include some ICT specialists.

There were 137,922 qualification completions in 2011, 120,842 domestic and 17,080 international. Nearly a third of the qualification completions were learners in the 20-24 years age group (43,568); followed by nearly 30% in the 25-39 years age group.

Ethnicity and age
Looking at all learners (not ICT specific), the majority of the domestic and international students completing qualifications in 2011 were European, with significant numbers of Māori and Asian students as well.

A significant 27,632 Māori and 11,929 Pasifika students completed qualifications in 2011 - 29% of all completions.

The review requires a future focus and will meet the specific needs of Māori and Pasifika. This aligns with key priorities set in The Tertiary Education Strategy 2010 – 2015, with a direct focus on two key priorities:

- Increasing the number of Māori enjoying success at higher qualification levels
- Increasing the number of Pasifika enjoying success at higher qualification levels.

Within The Tertiary Education Strategy 2010 – 2015 there is also an expectation that the tertiary sector will “enable Māori to enjoy education success as Māori”.

The proposed qualifications are designed to allow programmes to be developed in a range of contexts, and the strategic purpose statement of each qualification recognises the need for graduates to be able to operate both globally and in New Zealand’s bicultural and multicultural environment. Wānanga were consulted throughout the development process, and opted not to create a separate suite of qualifications under the Mātauranga Māori Evaluative Quality Assurance (MM EQA) process for ICT qualifications.

Additional views are contained in appendix 21 – Te Wānanga o Aotearoa. Qualifications developed must enable TWoA to meet obligations as a Wānanga under the Education Act (1989, section 162(4)(b)(iv)). This can be achieved by teaching and research that maintains, advances, and disseminates knowledge and develops intellectual independence, and assists the application of knowledge regarding āhuatanga Māori (Māori tradition) according to tikanga Māori (Māori custom).
Trends for Wananga - ICT Enrolments and completions

In 2012, 20,494 EFTs were enrolled in the Te Wānanga o Aotearoa (TWoA), and of these, 2,974 EFTS (14.5%) were enrolled on computing programmes. ICT qualifications are important in meeting the aspiration and needs of the iwi, hapū and communities that Wānanga serve, as indicated by the large number of learners engaging in the TWoA suite of computing and IT qualifications.

A key principle around these qualifications is the importance placed on re-engaging second chance learners and providing pathways to higher qualifications that assist in both their personal and professional development.

TWoA provided projections of computing EFTS across level 2 to level 5, as an indication of future demand for ICT qualifications through until 2016.

Source: TWoA feedback to landscape consultation - Level 2-5 computing EFTS projections

A significant number of total ICT course and qualification completions, particularly at levels 2 and 3, are from TWOA learners. This also emphasises the importance of IT qualifications to this significant target market.

Trends for ITP sector - ICT Enrolments and completions

The polytechnic sector ICT enrolments were down approximately 9% in 2012 on the 2011 enrolments for ICT certificates, diplomas and degrees; and were down 37% on the 2002 peak ICT enrolment figure. There were just under 2,500 enrolment EFTS in ITPs in 2012, well down on the peak of nearly 4,000 EFTS in 2002.

Tertiary diploma and degree completions²⁷ as a percentage of EFTS enrolled 2005-2010 show a declining percentage of completions to enrolments.

Diploma Completions as a percentage of EFTS Enrolled, 2005 - 2010

Diploma enrolments (EFTS) increased by 36 per cent between 2007 and 2010. However, between 2009 and 2010 enrolments declined by 2.4 per cent, while the completion rate fell by 10 per cent during the same period.

Degree Completions as a percentage of EFTS Enrolled, 2005 - 2010

Degree enrolments (EFTS) increased by 14 per cent between 2007 and 2010. Between 2009 and 2010 enrolments increased by a further 8 per cent, with a 2 per cent fall in the completion rate (the completion rate fell by 6% between 2007 and 2010).
Usage of existing qualifications

Demand for existing ICT qualifications is being analysed by considering the ‘usage’ information from results reported to NZQA and TEC. The usage figures do not show the full picture, as TEC only gathers reported information from funded providers. The TEC sourced completion data covers 58% of the qualifications in the review, and there is usage data on the NZQA owned National qualifications in the review. As privately funded course and qualification data is not included in the figures, it may partly explain lower results for qualifications at higher levels.

The following table shows course and qualification completion data by level, and the number of qualifications that data was obtained for, in proportion to the total.

### Course and qualification completion data for ICT qualifications from TEC and NZQA data

<table>
<thead>
<tr>
<th>Level</th>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
<th>Level 4</th>
<th>Level 5</th>
<th>Level 6</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total course completions *</td>
<td>59</td>
<td>19,911</td>
<td>53,623</td>
<td>6,919</td>
<td>5,415</td>
<td>3,050</td>
<td>88,977</td>
</tr>
<tr>
<td>Total qualification completions</td>
<td>1</td>
<td>5,144</td>
<td>5,205</td>
<td>1,485</td>
<td>1,434</td>
<td>234</td>
<td>13,503</td>
</tr>
<tr>
<td>Number of qualifications data available for</td>
<td>1/1</td>
<td>9/16</td>
<td>22/36</td>
<td>21/27</td>
<td>39/70</td>
<td>34/63</td>
<td>124/213</td>
</tr>
</tbody>
</table>

* Course completion figures excludes National Qualification unit standard completions, but Qualification completion data does include National Qualifications

The key findings show that there were 88,977 course completions and 13,503 qualification completions reported. Most were for ‘user’ qualifications – particularly at level 3 (one 33,246 and one 8960 course completions).

The following provides a further breakdown of usage information by level and the ‘category’ of qualification. There is usage data for 62% of the ‘user’ qualifications, and these are the ones with the highest course and qualification completion numbers.

### Number of ICT qualifications from TEC data

<table>
<thead>
<tr>
<th>Level</th>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
<th>Level 4</th>
<th>Level 5</th>
<th>Level 6</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application/User - Digital media and information</td>
<td>1/1</td>
<td>9/16</td>
<td>20/33</td>
<td>9/12</td>
<td>1/4</td>
<td>6/8</td>
<td>46/74</td>
</tr>
<tr>
<td>Development - Programming and computer science</td>
<td>0</td>
<td>0</td>
<td>2/3</td>
<td>6/7</td>
<td>20/32</td>
<td>20/32</td>
<td>48/74</td>
</tr>
<tr>
<td>Infrastructure - Digital Infrastructure</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>6/8</td>
<td>18/34</td>
<td>8/23</td>
<td>30/65</td>
</tr>
<tr>
<td>Total</td>
<td>1/1</td>
<td>9/16</td>
<td>22/36</td>
<td>21/27</td>
<td>39/70</td>
<td>34/63</td>
<td>124/213</td>
</tr>
</tbody>
</table>

The following graphs show that most of the usage information for TEC funded course and qualification completions relates to qualifications designed for ‘users’ of technology.
National qualifications usage

National Qualifications are available to learners through a range of providers throughout New Zealand. The following table shows qualification completions for Certificates at levels 2, 3 and 4, and for the level 5 Diploma, between 2008 and 2012.

The cumulative qualification completions for the National Certificate and Diploma qualifications in computing at levels 2 to 5 show over 40,674 completions in the 5 years 2008-2012. The most completions were at level 2 (nearly half – 20,211 or around 4,000pa) and level 3 (36% - 14,668 – declining from over 3,000pa to below 2,500pa).

Following is an overview of national qualification usage by provider type, with both a comparison over the 5 years 2008-2012, and for completions reported in 2012.

Some of the key findings include:
- Only PTEs report level 5 national diploma qualification completions;
- ITPs have relatively steady numbers of completions across the years;
- Over the 5 years 2008-12, Wananga have the greatest qualification completion figures at levels 2, 3, & 4 (48%-64% of total). It peaked 2010-11, with a significant reduction in 2012;
• Schools show a massive increase in completions in 2012 – likely due to the introduction of a new system to auto-check for qualification completions that ‘drop out’ of other NCEA study;
• Qualification completion data by level and year for each provider category is analysed and included in appendix 9.

Following is an analysis of digital technologies achievement standards and computing unit standards that may be considered the ‘components’ of national qualifications.

The analysis is an extract from the 2011 and 2012 academic year, in domain ‘Computing’ by sector, domain and level. It includes both unit and achievement standards.

Digital technologies (DT) achievement standards (ASs) have been progressively introduced by levels, with Level 1 introduced in 2011, Level 2 in 2012, and Level 3 in 2013. There was expected to be a reduction in secondary school use of other computing unit standards (USs) as the digital technology achievement standards were rolled out, and the alignment of standards involved expiring some unit standards.

The table shows that around 53,000 students did computing standards in each of 2011 and 2012 (2011 – 53,977 and 2012 – 52,917); and there were over 200,000 successful results recorded each year (208,130 in 2011, and 207,484 in 2012).

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Domain</td>
<td>L e v e l</td>
<td>Total entries achieved or better results</td>
<td>Total students with one or more achieved or better results</td>
<td>Total AME results</td>
</tr>
<tr>
<td>Digital Technologies</td>
<td>1</td>
<td>20,508</td>
<td>7,992</td>
<td>22,905</td>
</tr>
<tr>
<td>Digital Technologies</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>9,326</td>
</tr>
<tr>
<td>Total Digital Technologies</td>
<td></td>
<td>20,508</td>
<td>7,992</td>
<td>32,331</td>
</tr>
<tr>
<td>Generic Computing</td>
<td>1</td>
<td>15,987</td>
<td>8,991</td>
<td>13,276</td>
</tr>
<tr>
<td>Generic Computing</td>
<td>2</td>
<td>32,810</td>
<td>11,857</td>
<td>18,090</td>
</tr>
<tr>
<td>Generic Computing</td>
<td>3</td>
<td>14,793</td>
<td>6,459</td>
<td>12,422</td>
</tr>
<tr>
<td>Generic Computing</td>
<td>4</td>
<td>287</td>
<td>264</td>
<td>272</td>
</tr>
<tr>
<td>Generic Computing</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Generic Computing</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Generic Computing</td>
<td>7</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total Generic Computing</td>
<td></td>
<td>63,877</td>
<td>23,396</td>
<td>44,060</td>
</tr>
<tr>
<td>Software Development - Programming</td>
<td>1</td>
<td>524</td>
<td>524</td>
<td>481</td>
</tr>
<tr>
<td>Software Development - Programming</td>
<td>2</td>
<td>808</td>
<td>808</td>
<td>176</td>
</tr>
<tr>
<td>Software Development - Programming</td>
<td>3</td>
<td>402</td>
<td>402</td>
<td>311</td>
</tr>
<tr>
<td>Software Development - Programming</td>
<td>4</td>
<td>25</td>
<td>25</td>
<td>0</td>
</tr>
<tr>
<td>Software Development - Programming</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Software Development - Programming</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Software Development - Programming</td>
<td>7</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total Software Development - Programming</td>
<td></td>
<td>1,759</td>
<td>1,689</td>
<td>968</td>
</tr>
<tr>
<td>Total all three domains above</td>
<td></td>
<td>86,144</td>
<td>28,069</td>
<td>77,259</td>
</tr>
</tbody>
</table>
Total numbers of computing students reduced for secondary between 2011 and 2012 (from 28,069 to 26,033), likely due to the uptake of ASs and reduction of USs; and increased for tertiary (25,908 to 26,884).

Other findings include:

- Generic computing at levels 1 to 3 still provides the bulk of results and students – over 98% of tertiary results are for generic computing, with small numbers doing software development, and none for digital technology achievement standards;
- The numbers taking software development USs appears to be reducing in both groups. There are more secondary than tertiary students doing software development USs – may change in 2013 with ASs at Level 3. This may be a reflection on ‘computer programming’ generally being part of a degree qualification (non-unit standard);
- Over half the school students in digital technologies at Level 1 appear to continue and achieve at Level 2;
- The total number of results reduced for secondary between 2011 and 2012 (from 86,144 to 77,259); and increased for tertiary (121,986 to 130,225).

The existing software development and generic computing unit standards are likely to change as a result of qualifications reviews and new outcomes for qualifications.

8. LEARNER PROFILES

The needs of learners are diverse and range from those wanting to achieve a full qualification prior to entering the workforce to those already in work and needing to access learning around a small group of learning outcomes, to those wanting to improve their digital literacy and productivity in various aspects of community and work life.

Not all students want, or are able, to pursue a pre-determined qualification or pathway. There will always be the need for a significant vocationally oriented qualification for those wanting to pursue a career in ICT. The following are some of the factors influencing the choices that people make in relation to the options available to them:

- students wanting to gain a full ICT qualification prior to entering the workforce
- employees i.e. those already in the workforce, wanting to gain or finish a full ICT qualification to advance their careers
- employees needing to up-skill in a specific area of ICT
- those seeking employment who might need specific skills to enter an ICT or business environment
- employers and SME owners wishing to improve productivity and profitability of their business
- iwi, hapu, and communities wanting to reduce the technology literacy gap (digital skills a key aspect of life skills)
- IT is a growth area of employment, and tends to pay quite well.

It is important to try to understand the learner groups to ensure the new qualifications enable programmes to be developed to meet the particular needs of different target markets. There are several segments of the market which may include:

- **Employer sponsored learners**
  This segment seeks training and/or qualifications designed for workplaces or for workplace sponsored students. Workplace based learning and recognition of practical experience is significant here. Significant need to remain current in IT.
o **Up-skilling adults**
This segment is made up of mature students, some of whom may have technical qualifications already, but who are now seeking specific ICT qualifications. Generally part time learners who are in the workforce, and may consider a pathway that includes some recognition of experience, although often not just wanting to be credentialed but to learn new ways to do things. Learners wanting to diversify into a new work area may be included here, as may those updating their training to remain ‘current’ in IT.

o **Second chance learners**
This segment of the market is generally made up of adults that left school with few or no academic qualification, that are now seeking a qualification. This may include learners who are re-entering the workforce and who have traditionally not engaged with aspects of ICT, and may include the current government priority demographic of Māori youth, and also women over 30 years. There are also digital literacy, language literacy and numeracy issues that need to be considered when designing qualifications for this segment.

o **Students**
This segment of the market is generally made up of full time students, seeking an ICT qualification prior to entering the workforce. Work relevant learning and programmes that meet student loan requirements are factors for this segment of the market.

o **International students**
International students make up a significant proportion of learners. Changes to immigration rules surrounding the study to work visas last year may impact on demand for qualifications by this sector of the market. Two years of study is now required – either as one qualification or a level 5 and level 6 qualification. There is a need to ensure that English language capability is integrated into the learning.

o **Secondary school students**
This segment of the market is generally made up of year 11-13 digital technology students, and may include students that select vocational sector pathways. There may be two distinct groups of students. Those that follow the academic pathway through the new digital technologies standards to progress to degree ICT qualifications or vocational pathways in the manufacturing and technology sector for example, which includes most of the digital technology achievement standards as sector related standards.

In many schools there are also the students that are disengaged from traditional academic pathways and are instead offered options that have a more practical applied ‘ICT user’ approach to learning. The youth guarantee initiative doesn’t specifically include ICT as a sector, but vocational sector pathways include a range of areas that could be part of IT pathways such as in the manufacturing and technology sector pathway; and digital literacy, and/or ICT user areas such as creative design or foundation business administration qualification areas.

o **Māori and Pasifika learners**
Learners may be in the groups above, but have the additional aim of integrating language and culture to the ICT learning and qualifications.

Ako Aotearoa research 28 A model for successful Māori Learners in workplace settings demonstrated that “establishing strong and mutually respectful mentoring...

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relationships was one of the key factors in the learner’s success. Other key characteristics of Māori learners were their preference for working in teams and their discomfort with standing out overly much from their peers. The research was undertaken by Kahui Tautoko Consulting and involved numerous and intensive interviews with learners, trainers and employers that often extended over many months."

Additional views on learner profiles are contained in appendix 21 – Te Wānanga o Aotearoa.

9. FUTURE FOCUS

The MBIE Short term employment prospects 2012-2015 report draws on macro-economic forecasts by Treasury and the Reserve Bank and updates employment prospects information which is used to inform MBIE advice relating to immigration priorities, and priority setting for tertiary education and industry training.

The report indicates that the global economic outlook remains sluggish, and that employment in New Zealand will increase gradually. Employment is expected to increase by 86,800 jobs (all – not just ICT) between 2012 and 2014, largely associated with the Canterbury rebuild, and this is well below the pre-recession employment growth rate of about 2.8%. This growth figure excludes job opportunities that arise as workers retire and detach themselves from the labour force, and the Ministry estimates additional ‘replacement’ demand of about 50,000 jobs per year over the coming years.

![Forecast Employment Growth (annual % change)](image)

Source: HLFS, Statistics New Zealand; MBIE – Labour forecasts

Growth in demand for employment in highly skilled jobs (managers and professionals) will be consistently high over the forecast period accounting for about 40% of the overall employment growth.

In general, New Zealand vacancy and employment data supports the international findings, with a range of ICT jobs showing good job prospects (see section 5 for employment and vacancy data analysis).

The Inquiry into the 21st century learning environments and digital literacy report identifies that there is a general awareness that the ICT industry in New Zealand is experiencing a significant labour shortage, and that many occupations in the ICT sector are included in the Long-Term Skill Shortage List prepared by the Ministry of Business, Innovation and Employment (Labour).

Submitters to the inquiry suggested that the future growth and success of the ICT sector will require more students who are excited by, and motivated to pursue a career in the ICT sector, to ensure that our future workforce is able to meet the needs of the business sectors that will deliver economic growth in the 21st century.

In the report, digital literacy is framed in a context of knowledge, skills and understanding in the 21st century, and it is suggested that the definition of digital literacy should be aligned to the skills that will underpin the New Zealand workforce of the future.

Training people for an unknown future will involve identifying the skills and core competencies that can form the basis of designing and using emerging technologies that we can’t yet anticipate.

The internet of things (IoT) is a reality and the machine to machine (M2M) ecosystem is emerging. Since the dawn of microelectronics there has been a notion of interconnected smart devices, and the technology and networks are ready now. Connectivity matters for people and commerce, with artificial intelligence, sensors and interconnectivity, becoming part of our default future. We need to prepare people with the capability to interpret the massive amounts of data the IoT will generate.

IT professionals tend to be avid information seekers, striving to gain new skills and keep skills current, and many train for career certification or specialist exams. As technology is ever evolving, there is a consistent need for training the IT workforce to build new skills. Informal training sessions such as webinars, online community networks, lunch and learn sessions continue to be popular for staying current on the changing landscape.

Further views on the future trends and challenges for ICT are contained in appendix 14: Tech Republic trends and future focus; and in appendix 15: 2013 Horizon K12 report.

The external environment in which we operate is changing and developing rapidly, and we need to change to meet its new demands. More than that, to continue to be relevant we are going to need to anticipate the unknown challenges of the future, and train people with the skills to adapt to an evolving environment. A major change is taking place in communication technology, and this will drive new ways of doing business. The ICT sector will need to prepare skilled graduates that are able to interpret the changing landscape and take advantage of as yet unknown new technologies and make progressive things happen where the parameters of practice will be constantly changing.

Planning will be for learning for future ICT and related business. The need for good business practice will never be greater. We need to anticipate that teaching and the learning environment will be changed, businesses will need to adapt to meet the effects of energy and other resource shortages and changes in the natural environment; our society will be different demographically, culturally and organisationally; and businesses will increasingly operate globally, collaboratively and virtually. The issues faced by businesses and managers, their mode of operation, the nature of management and governance, and the expectations of the IT professional are likely to be transformed.

Hierarchical structures in businesses are being replaced by project teams, task forces, networked and virtual organisations31. Competence may sit with teams rather than individuals. Consultants may be working with several different and even competing organisations or teams. The structure of companies is ever changing, with services being contracted out to subsidiaries or independent specialists. Supply chains are increasingly complex and global.

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Significant changes in the workforce have been predicted for some time as jobs adapt to technological changes and external economic factors. The New Zealand Department of Labour\(^{32}\) has predicted that Management occupations would experience the highest level of growth of all of the occupational groups over the next 10 years.

Detailed projections for specific occupational classifications, which may be relevant for the ICT sector, are:

- Management occupations are projected to grow most rapidly over the next 10 years, an increase of 62,000 jobs over 10 years (1.7%pa)
- Technicians and Associate Professional occupations are expected to grow by 1.3%pa (39,000) over the next 10 years
- Clerical occupations are expected to remain at their current level, continuing a longer term decline in share of jobs in the labour market. A slight increase of 0.1% means approximately 20,000 additional jobs between 2009-2019.

The Business Qualifications Review needs analysis states that relying on specific jobs as we know them now is no longer adequate to inform curriculum development; therefore a very close relationship with industry is needed to identify future needs, and to ensure graduate success in labour markets. The value of such a relationship is demonstrated in a case study from the Copenhagen Business School where research partnerships, student projects in industry, advisory boards, the use of external examiners, and alumni were all used to gain continuous input to curriculum development. Close links and input from the ICT industry seem crucial to ensure an appropriate range of graduates suitably prepared for productive employment in ICT and business sectors in New Zealand.

The ageing population is expected to constrain the labour force and economic growth, and sharpen the focus on developing and utilising the existing skills of the workforce. It is expected that a high proportion of jobs will require regular up-skilling, which may largely be on the job, and personal traits such as communication skills and attitudes are going to be increasingly important. With the pace of change in technology, regular up-skilling in IT is essential.

There is a clear link between findings in the review and the goals of the Government through the work of the Productivity Commission\(^{33}\), which states that lifting productivity is partly influenced by:

- Investment and other strategic choices made by organisations (e.g. using new and smarter technology), which depend on the quality of governance and management
- the attitude and effort of employees toward on-going training, finding business improvements and helping beneficial change
- the quality of education and the attitude of students to the value of learning and skill development.

New Zealand is reported\(^{34}\) as having both a low level of productivity and one of the lowest rates of productivity growth in the OECD, and this raises concerns. One of the topics announced for detailed investigation by the Productivity Commission in the services sector is ‘addressing barriers\(^{35}\) to the successful application of ICTs’. This may identify how ICT can improve productivity in New Zealand, and will hopefully identify improvements that may cross into non-ICT sector business operations due to the impact technology and IT have on most aspects of New Zealand business entities and society. There may be significant productivity gains to be made by the application of improved digital technology skills across the work force.


\(^{35}\)
The Business Qualifications Needs Analysis surmises the need to consider smaller sized qualifications or limited credit programmes (LCPs) covering a group of learning outcomes targeted particularly at people already in work or those wishing to up skill or change careers. These could be developed as staircased pathways to the achievement of IT qualifications in order to focus on immediate needs for learners but with the opportunity to collect these toward the achievement of a larger qualification.

The Skills Challenge Report (p20) also states that New Zealand needs to better utilise skills, and that the low level of growth in labour productivity is an indicator of under-utilisation of skills. The level of capital, technology and innovation in a firm may influence skill utilisation, and reasons for sluggish productivity growth include the need to raise management capability. Improving people management would be an effective way to better utilise the skills of existing staff and boost their productivity levels, as would filling some of the skills gaps in the knowledge intensive sectors such as ICT.

In the Skills Challenge Report (p41), the New Zealand Department of Labour has forecast that the strongest growth in demand (averaging 6% p.a.) is for people with intermediate level vocational qualifications across a wide range of occupations in the next 10 years, driven particularly by management and professional occupations.

The following table shows the projected annual percentage growth in occupational demand, grouped by qualification type, 2009-2019.

<table>
<thead>
<tr>
<th>Occupational demand projections grouped by qualification 2009-2019</th>
<th>annual % growth</th>
<th>annual % growth</th>
<th>annual % growth</th>
<th>annual % growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clerks</td>
<td>-2.6%</td>
<td>-6.7%</td>
<td>-2.2%</td>
<td>-2.0%</td>
</tr>
<tr>
<td>Managers</td>
<td>-2.9%</td>
<td>-2.4%</td>
<td>-6.3%</td>
<td>-4.6%</td>
</tr>
<tr>
<td>Professionals</td>
<td>+0.9%</td>
<td>+2.6%</td>
<td>-1.5%</td>
<td>-2.9%</td>
</tr>
<tr>
<td>Technicians &amp; associate professionals</td>
<td>+6.5%</td>
<td>+6.8%</td>
<td>+6.3%</td>
<td>+5.9%</td>
</tr>
<tr>
<td>- skilled vocational</td>
<td>+4.9%</td>
<td>+7.8%</td>
<td>+7.7%</td>
<td>+6.5%</td>
</tr>
<tr>
<td>- intermediate vocational</td>
<td>+2.8%</td>
<td>+2.2%</td>
<td>+1.2%</td>
<td>+2.1%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>+0.1%</td>
<td>+1.7%</td>
<td>+1.4%</td>
<td>+1.3%</td>
</tr>
</tbody>
</table>

Source: Skills Challenge Report p.41 – table 12

The report (p8) also comments on the changing nature of skills required, including a conceptual framework of skills and productivity (p8), and greater emphasis on skills associated with “knowledge work” e.g. cognitive skills such as abstract reasoning, problem solving, communication and collaboration with clients and colleagues.

The report (p30) also mentions employers’ perspectives on skill levels that need to be improved, with particular mention of ‘soft skills’ including customer service and sales skills, team working skills, oral communication, and management/supervisory skills.

The literature around educating for ICT is diverse. What is clear is that the business world appears to be placing a greater emphasis on the need for “soft-skills” suggesting that graduate outcomes should include some reference to being able to work constructively with clients/customers and internal staff, and this will be relevant for IT qualifications.
To be effective and appeal to students, future qualifications and programmes of study may need to be different in their process as well as their content. They need to be made meaningful to the learners and useful in terms of their work practice, and they need to be designed to prepare learners to cope with uncertainty and change.

Qualifications will need to be capable of adaptation to meet changing circumstances – will need in short to embrace and welcome change. They will need to be accessed using communication and relationship practices appropriate for the new generations of learners. Academics and teachers need to provide guidance through the avalanche of information, rather than being guardians of knowledge. The qualifications need to provide learners with the confidence, ICT and business skills, understanding of possibilities and parameters, disciplines and ethical principles – in short the capability of getting there.

Over the next decade New Zealand’s ethnic makeup is going to change fairly dramatically and New Zealand will be hugely more multicultural than it is now. This will lead to many, as yet unknown, challenges. This will need to be considered in the design of the future structure of ICT qualifications in New Zealand.

The Māori economy has been the subject of a number of reports, and is a growing contributor to the overall economy. There is potential to lift the performance of the Māori economy, and building IT capability may contribute to achieving this. The proposed computing and IT qualifications are intended to grow and develop the Māori workforce and to contribute to the Māori economy.

ICT qualifications are important in meeting the aspiration and needs of the iwi, hapū and communities. Additional information on Māori business and the Māori economy is contained in appendix 22; and appendix 21 provides information from Wānanga including addressing the needs of Maori and projections for computing related EFTS which anticipate around 2,500 EFTS per annum for the next 3 years.

Some key areas that need to be addressed include determining sufficient supply and demand for the future range of ICT qualifications. Decisions will be required around what is ‘similar/different’ between a qualification with strands and a ‘specialist’ stand-alone qualification. e.g. Diploma in IT (Systems and Network Administration) compared with Diploma in Systems and Network Administration. Development must allow for the range of different learner needs, and ensuring that each qualification allows a variety of programmes of study to be developed to meet the requirements.

In the Tertiary Education Commission (TEC) guidance on funding for foundation education at levels one and two, there is clarification around Government’s policy objectives, how the TEC will allocate funds, along with eligibility and reporting requirements for foundation education funded provision. It also states that foundation skills include not just literacy, language and numeracy (LLN, which includes digital literacy), but also life and communication skills that prepare learners for further study or for entering/re-entering the workforce. This is likely to impact the current level 2 computing qualifications, and is relevant in the discussion around digital literacy for foundation learning. Further information is contained in appendix 16.

Ako Aotearoa is leading the ‘Foundation Graduate Profiles’ project, which is intended to develop a set of general graduate profiles for foundation learners studying for qualifications at Levels 1 and 2 on the NZQF. The foundation basics of digital literacy are intended to be catered for in the foundation or general learning area qualifications reviews. However the ICT review has identified a need for a level 2 computing qualification to develop essential basics in the use of computers and other devices to beginner/intermediate level.

36 Appendix 14 provides an extract of the TEC document on foundation education funding http://www.tec.govt.nz/Funding/investment-plans/Plan-guidance-for-2013/Levels-One-and-Two-Supplementary-Plan-Guidance/
10. DESIGNING QUALIFICATIONS FOR THE FUTURE

Reviews of qualifications
The mandatory review of qualifications is occurring as a result of TRoQ. The NZQA website has a range of information that may be relevant in providing insights to reviews, and further detail and links are covered in appendix 17: Mandatory deliverables.

The key components of the initial application for approval to develop a qualification, in addition to the title, level and credits, are the strategic purpose statement, proposed outcome statement (graduate profile, education pathway, employment pathway), and strategic need for the new qualification. Demonstrating a need for any new qualification is key, and being able to show the assessed needs of a sector or industry is an important part of the needs analysis.

The aim is to have useful and relevant qualifications for society. As long as the review focuses on what is important for the future of the ICT sector and embraces that in the structure and design of the new qualifications, then an appropriate suite of new qualifications can emerge.

The mandatory review of ICT qualifications will propose a suite of qualifications - and have binding results which will impact existing local and national qualifications and their owners.

The qualifications that are developed are in the public domain (not owned) and providers will have to gain approval to develop a programme towards the new qualification/s to still be able to deliver beyond the expiry date of the existing qualifications they own. What is currently called a 'local qualification' will be better considered as an option to develop into a 'programme of study' towards the new qualifications that the review is developing, and TEOs will need to go through the process of gaining programme approval.

Programmes
Each existing qualification owner will need to apply for approval of a 'programme' of study towards the new qualifications that are being developed and listed as a result of the review. The 'programmes' may look much like existing local qualifications, adapted to the new qualification requirements, and may be designed by individual providers or cooperatively with others. It is in the programmes that TEOs retain the uniqueness of the offerings, which can be contextualised to suit a specific target market. Thinking about the range of potential programmes from a variety of providers that may lead to the same qualification, should help with understanding the importance of writing appropriate outcomes for the suite of new qualifications, to enable a range of approaches to be taken to meet learner needs and still achieve the same qualification.

Considerations
Qualifications and programmes may need to be different in their process as well as their content, to be effective and appeal to students.

Qualifications will need to be:
- relevant and meaningful to the learners;
- useful in terms of their work practice;
- designed to anticipate and adapt to the unknown challenges of the future;
- preparing learners to cope with uncertainty and change;
- accessible using technology and practices appropriate for the new generations of learners, and in a variety of contexts.

Considerations for designing the future landscape for ICT qualifications include determining:
- What is needed? Taking a future focus is important, informed by the analysis of research and trends from the literature search and preparation of the needs analysis, and findings from peak body and stakeholder feedback.
• Who is the target market and how well will each proposed qualification meet a target markets needs? Consider the similar and different requirements for workplace learners, international and domestic students, full time/part time learners, Māori and Pasifika learners, secondary-tertiary pathway learners, second chance learners; and ensure each qualification allows a variety of programmes of study to be developed to meet the requirements.

• How many qualifications in total? What to do with ‘outliers’ – qualifications that don’t fit the basket of new qualifications.

• Level and size range of qualifications – consideration of 40-45, 60 & 120 credit qualifications across a range of levels. Is there still a place for a 240 credit qualification at some level/s, or for smaller modules which can build to larger qualifications? What about strands or optional endorsements? Be mindful of education pathways and cross crediting.

• How should the future ‘generalist’ and ‘specialist’ qualifications be determined? Decisions around what is ‘similar/different’ between a generic qualification with strands and a ‘specialist’ qualification. e.g. Diploma in IT (Systems Administration and Networking) compared with Diploma in Systems Administration and Networking.

• Political and economic drivers, and the match of these to the ‘structure’ of what is proposed. TEC, Studylink, MoE, Immigration policy impacts on learners.

• Confirmation of sufficient supply of learners and demand from end users is required.

The qualification strategic purpose statement and outcome statements for each qualification will detail the distinctness of each in the proposed basket of new qualifications, and proposed linkages between them.

Strategic purpose statement (why and for whom - supported with evidence)
• Why do we need this qualification?
• How can we justify it?
• For whom?
• How does it contribute to the needs of NZ today and tomorrow?

Graduate profile (at the appropriate NZQF level – see descriptors)
• Outcome statements (8-12) that reflect what a graduate can do, know and understand (skills, knowledge, understanding and attributes) in a range of contexts; describes the range of functions and/or scope of practice of the graduate
• Education pathways – to and from the qual
• Employment pathways – types of positions a graduate will be prepared for.
Note any suggested compulsory elements, significant issues, conditions etc.

Initial documentation must include:
• Strategic purpose statement
• Graduate profile
• Education and employment pathways
• ‘Titles’ of new qualifications
  o Qualifications with any designators and qualifiers (designator should relate to NZSCED classification where possible)
    – main disciplinary emphasis e.g. Information Technology
    – Qualifiers e.g.
      • discipline [sub-field]
      • strand [1+ specialties]
      • focus [Applied, Advanced, Introductory].
Needs analysis

The needs analysis report is compiled to inform the decisions of the Steering Group when designing the future range of ICT qualifications.

The needs analysis is linked to the review of, and requirements for listing, ICT Qualifications on the NZQF.

- The needs analysis is a research document that helps inform and support the decisions to be made. It is a requirement of the application for listing new qualifications at level 1-6 to the NZQF, and must provide evidence of investigation, analysis and consultation – demonstrating the need for any proposed qualifications.
- The needs analysis must quantify need in terms of supply and demand, identifying gaps, identifying potential strategic benefits for learners, employers, industry and communities.
- There must be consultation to confirm the need and strategic fit, sufficiency of demand, and the potential life span of the new qualification.

Any application to develop and list new NZQF qualifications must be supported by a needs analysis when submitted for evaluation.

KEQ2: How well does the qualification’s strategic purpose match the needs of identified and relevant stakeholders?

#3. Enquiry questions:

- How well have stakeholder (learner, employer, industry, community) needs been incorporated into the qualification design?
- To what extent does the needs analysis identify the cultural and social aspirations of Māori and Pasifika, and how well are these reflected in the purpose of the qualification?
- To what extent does the evidence provided confirm a valid need for the qualification?

Next we will consider the approach to developing the new ICT qualifications.
11. ANALYSIS OF ICT SPECIALTY AREAS – designing ICT qualifications for the future

11.1 ICT Review Process

The process of reviewing and developing the IT qualifications will follow this general approach to determine:

1. What are the needs of industry?
2. Who needs to be involved and consulted?
3. What should be present in all IT-related qualifications?
4. What categories and specialisations of qualifications are needed?
5. How should these qualifications be structured to capture the above?
6. How can these qualifications be best aligned for good educational and employment pathways?
7. What landscape of qualifications coherently delivers the above?
8. Is there stakeholder support for the proposed landscape of qualifications?
9. What working groups will be required to be established to develop qualifications to reflect identified needs?
10. How well do the developed qualifications meet the identified needs and receive stakeholder endorsement?
11. What qualifications will be submitted for approval to develop?
12. What working groups will be required to develop post-approval qualifications following feedback from NZQA evaluation?

This process has been applied to design a landscape of IT qualifications, that working groups have then developed into the new suite of IT qualifications under guidance from the steering group.

A summary of requirements for application to develop qualifications is contained in appendix 17 (Mandatory Deliverables). The review plan should be read in conjunction with the needs analysis, and a summary of timelines and deliverables is included as appendix 20. An extension was granted for the review, with a revised deadline for ‘application for approval to develop qualifications’ of 14 November 2013.

There have been four key consultations with industry and other stakeholders during the first stage ‘approval to develop’.
1. Providers – high level information gathering to gain provider views on a range of matters related to the review of ICT qualifications

2. Industry - to determine the range of jobs/employment pathways that may be available to graduates of IT qualifications at less than degree level (which is perceived by many as a minimum entry requirement for a large number of IT positions)

3. All stakeholders – proposed landscape of qualifications

4. All stakeholders – draft qualifications

Working groups were convened to develop the proposed landscape of qualifications. It would have been preferable to reconvene some groups following the final consultation round to refine qualifications prior to submission of the suite of IT qualifications for ‘approval to develop, however time restraints meant this wasn’t possible. The Steering Group intends to ask Working Groups to consider some minor tweaks, and additional work group sessions have been planned to undertake further development work and refinement in the next stage of the process.

The timelines for further development may be influenced by the evaluator feedback, availability of Steering Group and work group members to convene, and the progress of complementary reviews and access to their draft qualifications where there is some overlap with proposed IT qualifications.

The intention is to undertake further development work and stakeholder consultation in the next phase, and to submit qualifications for listing by the third quarter 2014.

11.2 Survey feedback

The Steering Group has sought input and guidance from the wider IT industry as to industry needs around diploma and certificate qualifications in New Zealand. In particular, input was sought on the roles needed for current and future IT Professionals with certificate or diploma level qualifications. The needs analysis had identified that many roles required bachelor degree qualifications, and it seemed prudent to determine what roles the sector may consider relevant for graduates within the scope of this review.

A short industry consultation was undertaken 27 May/7 June 2013 on the roles identified for those completing IT related Certificate and Diploma qualifications. There were a total of 158 submissions received, with 31 of these self-identified as working for an educational institution of one kind or another. The quantitative results from the IT industry responses only, did not materially differ from those of all respondents.

The survey results can be summarised as follows.

- For **Certificate level qualifications**, there was moderate but not conclusive value seen in qualifications covering Computer technician, Helpdesk and Tech Support, Network/Systems Administration, and Implementation/Application Support roles, and there was not perceived value in a certificate covering some form of software developer role.

- For **Diploma level qualifications**, there was conclusive perceived value seen in qualifications covering the Computer Technician, Helpdesk and Tech Support, Network/Systems Administration, Implementation/Applications Support and some form of Software Developer roles. The types of activities envisioned for software developers who have undertaken a 12-24 month diploma in software development are by and large similar to the "Associate" level suggested at earlier Steering Group meetings.
There was quite strong support for alignment of some vendor certificates with the qualifications being considered. There were various suggestions in the ‘other areas of IT’ area. These include consideration of software testing, business analysis and IT security, IT project management, and database administration.

On behalf of the Steering Group, a provider survey was undertaken during April/May 2013, as high level information gathering to gain provider views on a range of matters related to the review of ICT qualifications. The intended participants were computing schools from ITPs, PTEs, Wananga and any other educational organisations with an interest in the review.

There were 45 submissions, and feedback provided an indication of key learner groups, what the different levels of qualifications should be preparing learners for, the types of roles current graduates obtain, pathways at lower levels, evidence of specific needs from industry, and challenges for the future. There was also an opportunity to consider approaches to potential new programmes, core skills and vendor certifications.

Provider feedback indicated preparation for higher level study and entry level employment were the main things Certificate and Diploma qualifications would be preparing learners for, and there was less support for certificates than diplomas. Key learner groups were identified as second chance learners or those changing careers, school leavers, Māori and/or Pasifika learners, and international students. There was feedback on the specific needs of Māori and Pasifika learners emphasising the need for practical application, relationship building, and language, literacy and numeracy (LLN) to be allowed for in the design of qualifications and related programmes. Soft skills were seen as important, and some concern was raised about gender imbalance.

Further details on both the industry and provider surveys can be found on the review webpage.

Findings from the surveys have been taken into consideration when designing the proposed landscape of new ICT qualifications.

### 11.3 Consultation feedback

Following investigations to determine the needs for the sector including the likely job roles for graduates of qualifications within the scope of this review, in June 2013 the Steering Group proposed a landscape of new qualifications.

The Proposed ICT qualifications landscape consultation document outlined the proposed ICT Certificate and Diploma qualifications to be developed for the New Zealand Qualifications Framework (NZQF), and these went to broad stakeholder consultation 21 June-12 July 2013.

Stakeholder feedback on the draft landscape consultation generally supported the proposed landscape of ICT qualifications to be developed. Further information on the feedback is summarised in appendix 18, and this resulted in a number of minor changes being made to the original qualification landscape proposal.

A working group brief was prepared incorporating Steering Group direction following the feedback from the consultation on the proposed ICT qualifications landscape, and working groups were convened late July to develop the draft qualifications. The Steering Group considered the draft qualifications develop by the working groups, and determined that further work was required for some of the proposed qualifications, and a work group was reconvened early September to undertake the additional work.

A further consultation was undertaken 25 September – 16 October 2013 to obtain stakeholder feedback and endorsement for the proposed draft qualifications, before being submitted for ‘approval to develop’.
Stakeholder feedback supported the further development of the draft qualifications, and the submission for approval to develop. Further information on the feedback is summarised in appendix 19, and this resulted in a number of minor changes being made to the draft qualifications before submission for approval to develop, including some changes to the titles of five qualifications. Further details are captured in Part A, the summary of strategic need.

11.4 Pathways - Skill Profiles for key IT roles

This review considers two distinct streams of IT, being usage of computers and computing devices by the general public (often referred to as Digital Literacy), and the qualifications for those intending to enter the IT profession. The following will overview the two streams and consider the main roles for graduates of level 1-6 qualifications.

‘IT as a tool’ – pathways for ‘users' of technology

As technology is integrated in almost every aspect of daily life, the range of uses for ‘IT as a tool’ is very broad across society. Links to the schools digital technologies curriculum are also expected in this area.

Digital literacy is important for equipping all New Zealanders (workforce and society) for living now and in the future. Being able to participate in the digital world is seen as fundamental, and digital literacy skills are essential to create confident, connected and actively involved lifelong learners.

The 'IT as a tool' component of the review considers qualifications for users of technology. This includes digital literacy and the confident and competent use of computing technology and devices, the Internet, user applications, operating systems and other commonly used applications in the workplace, community or home.

There are a huge variety of roles that may result from 'IT as a tool' training, as technology is integrated into many aspects of life. ‘IT as a Tool’ may lead to roles that contribute to operational activities and improve productivity, enable innovative design and solutions to problems to meet a variety of requirements. The confident and capable use of digital technologies may also lead to roles that require those skills to be applied to various industry specific systems in a range of non-ICT business areas such as health, primary industries, banking, tourism, various sales and marketing sectors, and customer service roles to name a few.

Confident and capable users of technology are more likely to have a skill set and confidence that allows them to adapt to change and embrace opportunities which new and emerging technologies may provide.

‘IT as a Profession’ – pathways for the IT professional

This section outlines the main graduate roles for those graduating from Certificates and Diplomas considered to focus on ‘IT as a Profession’, i.e. those that are likely to continue on to a job within the IT industry either within the ICT sector or as an IT professional in other organisations. The ‘IT as a profession’ roles were developed following significant industry consultation.

It’s important to note that graduates may move on to other, more advanced, roles within industry over time, however this would be the target roles for graduates of Certificate and Diploma qualifications within the scope of this review.

There are several ‘IT as a profession’ roles identified and these include Computing Technician, Helpdesk and Technical Support, Network/System Administrator, Implementation and Application Support, Database Administrator, Software Developer (associate level), Business Analyst, IT Project Manager, Software Testing Professional, IT Security Professional.
A brief description of some of the roles for graduates of the proposed IT qualifications follow, and some of these roles are defined in more detail using the SFIA Framework in Appendix 6.

1 Computing Technician
Computing Technicians diagnose, repair, install, assemble and maintain computers and other technology devices. This might include hardware, peripherals, software and other equipment. A Computing Technician at this level would generally deal with computers and devices in a home or small office environment as well as basic networking and in some cases SME network/server support. A technician may also work under supervised conditions in a larger office or network environment. There is some crossover between a senior technician and a Systems Administrator.
The Level 5 NZ Diploma in Information Technology is proposed to equip a learner for this role.

2 Helpdesk and Technical Support
Helpdesk and technical support officers often provide the first line of support, usually by telephone and internet/email. As well as providing basic technical support on software, installations, hardware or other relevant areas (depending on the organisation), helpdesk and technical support teams must document issues and resolutions.
Verbal and written communication skills are of paramount importance.
The Level 5 NZ Diploma in Information Technology is proposed to equip a learner for this role.

3 Network/Systems Administrator
Network and Systems Administrators maintain networks and operating systems, ensuring well-functioning and secure information systems. In a Cloud Computing environment, network and system administrators are responsible for monitoring performance and conducting maintenance of a Cloud environment.
Network Administrators generally deal with the functioning and security of networks whereas Systems Administrators are concerned with operating systems and other infrastructure.
Someone pursuing this role may start with the proposed Level 5 NZ Diploma in Information Technology and then progress to the proposed Level 6 NZ Diploma in Systems Administration and Networking.

4 Implementation and Application Support
An Implementation and Application Support role provides assistance during the installation or upgrade of systems or applications, and may provide on-going day to day support of systems. Implementation and Application Support roles will often conduct client-side or cloud-based installation, setup, training and early support for bespoke or other software and resolve any issues that might arise.
Someone pursuing this role may start with the Level 5 NZ Diploma in Information Technology, and then progress to the proposed Level 6 NZ Diploma in Software Implementation and Support.

5 Database Administrator
A database administrator (or DBA) is a person responsible for the installation, configuration, upgrade, administration, monitoring and maintenance of databases in an organisation. The role includes the development and design of database strategies, system monitoring and improving database performance and capacity, and planning for future expansion requirements. They may also plan, coordinate and implement security measures to safeguard the database.
The proposed level 5 NZ Diploma in Information Technology or NZ Diploma in Information Systems may prepare a learner for the proposed Level 6 NZ Diploma in Database Administration, which is intended to equip someone for this role.
6 **Software development**
Most software development roles require a bachelor degree or higher, but it is believed that there is a diploma pathway suitable for an entry level developer. A software developer at Diploma level may design, code, test, correct, and document simple programs, and would likely assist in the implementation of software which forms part of a properly engineered information and communication system. It should be noted that there is likely to be a differential between someone completing a Diploma and a Bachelor degree in software development or engineering.

Based on industry feedback, it is suggested that a software development role would require a longer (2 year) diploma, and the proposed Level 6 NZ Diploma in Software Development is intended to meet this need.

7 **Business Analyst**
A Business Analyst is an internal consultancy type role that has responsibility for investigating business systems, identifying options for improving business systems and bridging the needs of the business with the use of IT.

The proposed Level 6 NZ Diploma in Information Systems (Business Analysis) is intended to equip someone for this role, and the learner would complete the proposed level 5 NZ Diploma in Information Systems first.

8 **IT Project Manager**
An IT project manager has responsibility for the planning and execution of a project, in this case specifically within the context of IT projects. Industry consultation has shown a clear need for a focus on Project Management, especially within the IT context.

The proposed Level 6 NZ Diploma in Information Systems (IT Project Management) is intended to equip someone for this role, and the learner would complete the proposed level 5 NZ Diploma in Information Systems first.

9 **Software Testing Professional**
Testing Professionals conduct detailed and systematic testing of software to ensure it meets requirements; works as expected, can be implemented consistently and satisfies the needs of stakeholders.

It is suggested that an education to employment pathway for a Testing Professional may include completing a Diploma in Software Testing following completion of the proposed Level 6 NZ Diploma in Software development.

10 **IT Security Professional**
Security considerations are expected to be a key factor in all IT related qualifications. Depending on the type of security role, an education to employment pathway for a Security Professional might include progressing from a software or hardware IT Diploma, going on to complete either IT Security or Software Security Diploma qualifications, likely to be at level 7.

Appendix 6 includes a mapping of SFIA skills to some of these IT roles.

The review has identified this range of ICT professional roles that may be undertaken by graduates of certificate or diploma qualifications designed as part of this review, and considered education and employment pathways for testing and security roles.

However the proposal for new qualifications is designed to consider a much broader application to developing core skills and capabilities that can be adapted and applied to emerging technologies as new innovations evolve.
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Prime Minister’s Results for New Zealanders


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TEC Student Achievement Component funded provision at levels 1 and 2  [http://www.tec.govt.nz/Funding/Fund-finder/Student-Achievement-Component/Levels-1-and-2/](http://www.tec.govt.nz/Funding/Fund-finder/Student-Achievement-Component/Levels-1-and-2/)


## Appendix 1: ICT qualifications in the review – by level and credits

Information and Communication Technology – 221 (213+8) qualifications in review by level and credits Oct 2013

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<td>Diploma in Computer Networking</td>
<td>Christchurch Polytechnic Institute of Technology</td>
<td>6</td>
<td>240</td>
</tr>
<tr>
<td>CH4023</td>
<td>Diploma in Information and Communications Technology (Applied)</td>
<td>Christchurch Polytechnic Institute of Technology</td>
<td>6</td>
<td>240</td>
</tr>
<tr>
<td>MA7009</td>
<td>Diploma in Information and Communications Technology (Applied)</td>
<td>Universal College of Learning (UCOL)</td>
<td>6</td>
<td>240</td>
</tr>
<tr>
<td>NE4706</td>
<td>Diploma in Information Technology</td>
<td>Nelson Marlborough Institute of Technology</td>
<td>6</td>
<td>240</td>
</tr>
<tr>
<td>PC4015</td>
<td>Diploma in Information Technology</td>
<td>AIS St Helens</td>
<td>6</td>
<td>240</td>
</tr>
<tr>
<td>WC3052</td>
<td>Diploma in Information and Communications Technology (Level 6)</td>
<td>Tai Poutini Polytechnic</td>
<td>6</td>
<td>240</td>
</tr>
<tr>
<td>112789</td>
<td>Diploma in Information Technology</td>
<td>New Zealand School of Education Limited</td>
<td>6</td>
<td>270</td>
</tr>
<tr>
<td>111558</td>
<td>Diploma in Computing (with strands in Support and Operations, and Support and Software Development)</td>
<td>New Zealand School of Education Limited</td>
<td>6</td>
<td>280</td>
</tr>
</tbody>
</table>

222 Total number of Qualifications in ICT review
APPENDIX 2: TARGETED REVIEW OF QUALIFICATIONS

The Targeted Review of Qualifications at levels 1-6 on New Zealand’s ten-level qualifications framework commenced in 2008. The review aimed to ensure that New Zealand qualifications are useful and relevant to current and future learners, employers and other stakeholders.

The Targeted Review was a key deliverable of NZQA’s Statement of Intent 2009-2011. The review was initiated in response to concerns raised by employers, employees and unions about the clarity and relevance of qualifications, particularly vocational qualifications.

The 2008-09 review found that the qualifications system was difficult for learners, employers and industry to understand because it:

- was not relevant to some employers and industry
- was not user-friendly, and the status of qualifications was unclear
- contained a large number of similar qualifications which made distinguishing between qualifications and identifying education/career pathways difficult.

A package of seven changes was recommended by the review and approved by the NZQA Board for implementation. These were to:

1. Establish a unified New Zealand Qualifications Framework (NZQF)
2. Require the use of existing quality assured qualifications, and change the design rules for National and New Zealand qualifications to allow for more inclusion of local components
3. Require mandatory periodic reviews of qualifications to determine whether they are still fit for purpose
4. Strengthen and standardise qualification outcome statement requirements
5. Introduce a mandatory pre-development assessment stage for qualification developers
6. Strengthen industry involvement in qualification development
7. Provide clear information about whether a qualification is active, inactive or closed.

All recommendations, apart from change 3, were implemented in 2010. Change 3 to require periodic reviews of qualifications commenced in early 2011. For more information see Reviews of Qualifications.

Overall, the changes streamline and simplify the qualifications system. The establishment of the NZQF as a single location for all qualifications has made it easier to find information about qualifications. The provision of information about the status of every qualification has reduced the number of available qualifications. The new requirements for listing qualifications on the NZQF will prevent the duplication and proliferation of qualifications.

Involved parties

The Ministry of Education, NZQA, the Tertiary Education Commission and Department of Labour worked with the Industry Training Federation, Business New Zealand and the Institutes of Technology and Polytechnics New Zealand, the New Zealand Council of Trade Unions, the Private Training Establishment sector and Te Tauihu o Nga Wananga on the Targeted Review of the Qualifications System.

Some key findings from the Employers opinions of Certificates and Diplomas on the NZ register of quality assured qualifications were:

---

The majority of respondents indicated that they used prospective employees’ qualifications to assist them in the hiring process. In addition, the majority of respondents thought it was important for applicants to have formal qualifications.

Most respondents thought qualification developers understood the needs of their industry, thought that qualifications for their specific industry were relevant for their business, and thought that qualifications provided employees with the keys skills for their specific business.

Some key findings from the Learners’ experiences of Certificates and Diplomas on the NZ register of quality assured qualifications were:

- Learners generally felt the skills and knowledge that they were gaining from their qualification were useful. The skills identified as the most useful were those that were practical and applicable to employment, yet transferable into other skill set areas.

- Learners generally find information about qualifications from the internet and from people who work at tertiary education organisations. However, learners do not spend a lot of time comparing qualifications across different providers. Most commonly, they choose a provider and then seek information about that provider’s qualifications.

- Generally, learners chose their specific qualification because it was accessible in terms of cost, location and time. An exception to this pattern of choosing behaviours were industry trainees, who did not have a choice about which qualification they chose because study is part of their work training.

Key documents and useful links


**February 2011:** NZQA announces the [Policy for reviews of qualifications](http://www.nzqa.govt.nz/assets/About-us/Consultations-and-reviews/TROQ/report-learners.pdf)

NZQA has developed a policy for reviews which spells out their purpose, the roles and responsibilities of both NZQA and qualification developers, the timeframe, costs and review process. The policy also spells out what can happen as the result of review and how any challenges to the process or disputes over results will be addressed.


The practical guidelines, designed to assist qualification developers and NZQA analysts, aim to make the qualification approval process clear and transparent.

They provide detailed information and guidance on the requirements for level 1-6 qualifications to be listed on the NZQF. They should be read in conjunction with the policy document, [The New Zealand Qualifications Framework (PDF, 303KB)](http://www.nzqa.govt.nz/assets/About-us/Consultations-and-reviews/TROQ/report-employers.pdf) (version 2, published April 2011).

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The guidelines also describe how decisions will be reached to approve applications. Qualification developers need to follow the NZQA template: Application for approval to develop a qualification at levels 1-6 (PDF, 732KB).

Guidelines for review of qualifications at levels 1 to 6 on the NZQF: http://www.nzqa.govt.nz/assets/Studying-in-NZ/New-Zealand-Qualification-Framework/guidelines-review-qualifications.pdf. The webpage guidelines for reviews of qualifications has information, templates, related practice notes and links to other documents. There is also a link to Q&A about the qualification reviews; and policy for reviews of qualifications.

Guidelines for approval of qualifications at levels 1-6 on the NZQF http://www.nzqa.govt.nz/assets/Studying-in-NZ/New-Zealand-Qualification-Framework/guidelines-listing-nzqf-applications.pdf - which has details on the principles and processes involved in developing and listing new qualifications, meeting the requirements for listing, assessment of applications, key evaluation questions etc.

Application for approval to develop a qualification at Levels 1-6 http://www.nzqa.govt.nz/assets/Studying-in-NZ/New-Zealand-Qualification-Framework/approval-develop-qualification.doc

New Zealand Qualifications Framework (NZQF) rules

- Qualification listing and operational
- Programme approval and accreditation
- Offshore programme delivery
- Industry training programmes

The mandatory review of qualifications is occurring as a result of TRoQ. The NZQA website has a range of information that may be relevant in providing insights to the 'big picture':

- guidelines for approval of qualifications which has details on the principles and processes involved in developing and listing new qualifications, meeting the requirements for listing, assessment of applications, key evaluation questions etc.
- policy for reviews of qualifications
- Q&A about the qualification reviews
- guidelines for reviews of qualifications (info, templates, related practice notes and links to other documents)
- guidelines for listing qualifications on the NZQF (outlines the process, etc), and
- NZQF rules – for qualification listing, programme approval and accreditation, offshore programme delivery and industry training programmes
Programme approval and provider accreditation

NZQA has developed Guidelines for approval of programmes of study leading to qualifications listed on the New Zealand Qualifications Framework and accreditation of tertiary education providers (PDF, 393KB).

These Guidelines apply to programmes leading to a qualification listed at levels 1-6 and certificates and diplomas at level 7 on the NZQF. The Guidelines provide programme owners, education providers and quality assurance body analysts with information and guidance about both how to meet the criteria for programme approval (Section 2) and for accreditation (Section 3) to deliver a programme leading to a qualification listed on the NZQF. They set out the requirements and describe how decisions will be reached to approve applications.

Programme approval confirms that a programme leading to a qualification listed on the NZQF is aligned with the qualification outcomes and is based on clear and consistent aims, content, and assessment practices, as per the criteria for programme approval.

Qualifications listed on the NZQF at levels 1-6 contain a specification which provides the mandatory and optional conditions for programmes leading to the award of the qualification.

Qualification and programme approval may occur at the same time.

Following a qualification review and/or the approval of new qualifications, programme owners will need to review their programmes and map them against the qualification outcomes. Programmes owners will also need to show the self-assessment of their programme or revised programme and ensure that key evaluation questions, as outlined in the Guidelines, can be answered.

Once approved, changes you make to a course may need NZQA approval. See Changes to approvals and accreditations.

APPENDIX 3: ICT Qualifications Review Steering Group

The following make up the Steering Group for the ICT qualifications review.

<table>
<thead>
<tr>
<th>Nominating Organisation</th>
<th>Name and organisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>IITP NZ (Chair)…………………</td>
<td>Paul Matthews, IITP</td>
</tr>
<tr>
<td>Industry nominees (4):</td>
<td></td>
</tr>
<tr>
<td>Software NZ………………..</td>
<td>Gareth Cronin, Orion Health</td>
</tr>
<tr>
<td>NZRise ........................</td>
<td>Mindi Clews, Equinox Ltd</td>
</tr>
<tr>
<td>CITRENZ .........................</td>
<td>John Ascroft, Jade Software Corporation</td>
</tr>
<tr>
<td>NZAPEP ........................</td>
<td>Jacob Samuel, Concerto Networks</td>
</tr>
<tr>
<td>Educational Provider Nominees (3)</td>
<td></td>
</tr>
<tr>
<td>CITRENZ ........................</td>
<td>Samuel Mann, Otago Polytechnic</td>
</tr>
<tr>
<td>NZAPEP ........................</td>
<td>Margie Sorensen, Information Technology Training Institute – ITTI</td>
</tr>
<tr>
<td>Te Wānanga o Aotearoa ..........</td>
<td>Damian Adamski, TWOA</td>
</tr>
<tr>
<td>NZACDITT - ICT Teacher Nominee ...</td>
<td>John Creighton, Burnside High School</td>
</tr>
<tr>
<td>NZQA – NQS ........................</td>
<td>Rod Bentham, NZQA - NQS</td>
</tr>
</tbody>
</table>

The following also attend Steering Group meetings in a non-voting capacity:

  Professional Advisor ......................... Ken Simpson, Unitec
  (Appointed by QAD, NZQA)

  NQS Project Team Lead ...................... Diana Garrett, NZQA - NQS

**APPENDIX 4: Stakeholder Profile**

<table>
<thead>
<tr>
<th>Key stakeholders</th>
<th>Reason for inclusion</th>
<th>Nature of involvement</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Current ICT qualification owners</strong></td>
<td>Mandatory stakeholders - owners of existing ICT qualifications included in the Mandatory review</td>
<td>Steering Group nominees for Governance of review; participation in working groups; respondents to review consultations; input to needs analysis</td>
</tr>
<tr>
<td><strong>ITPs, PTEs, Māori and Pasifika providers, secondary schools; and their respective peak bodies and consultation networks</strong></td>
<td>Current and prospective providers, delivering IT qualifications across NZ. Supply side and awareness of current demand.</td>
<td>Steering Group nominees for Governance of review; participation in working groups; respondents to review consultations; input to needs analysis</td>
</tr>
<tr>
<td><strong>Students, learners and graduates</strong></td>
<td>Represent ‘customer’ demand for available qualifications</td>
<td>Express voice of ‘demand’ for ICT qualifications; usage data; some destination information; respondents to review consultations</td>
</tr>
<tr>
<td><strong>Industry organisations including professional and industry groups, and the broad ICT community these industry groups reach (e.g. IITP, NZRise, Software NZ, CITRENZ, NZAPEP, NZACDITT, NZICT) as well as other informal user groups and networking associations</strong></td>
<td>Represent industry and IT professional sector voice, and that of professionals; employers in the sector; provider representative bodies</td>
<td>Steering Group nominees for Governance of review; participation in working groups; respondents to review consultations; input to needs analysis</td>
</tr>
<tr>
<td><strong>Designated agencies, including Government agencies such as Ministry of Education, Tertiary Education Commission, NZQA, Education NZ; Ministry of Business, Innovation &amp; Employment (Labour and Immigration NZ); Ministry of Pacific Island Affairs; Ministry of Social development</strong></td>
<td>Designated agencies that may have an interest in the review and an interest in the outcomes.</td>
<td>Source of information for preparation of the needs analysis; oversight responsibilities for some aspect of ICT industry; respondents to review consultations</td>
</tr>
<tr>
<td><strong>Other organisations and people who express an interest, including community groups, 2020 Communications Trust, employers and ITOs.</strong></td>
<td>Broader stakeholders expressing an interest in the review. May offer vendor Certifications; operate in the broader community; employers outside of the ICT sector; ITOs which develop qualifications and training that may include aspects of IT</td>
<td>Respondents to review consultations participation in working groups; input to needs analysis.</td>
</tr>
</tbody>
</table>
Appendix 5: ANZSCO Occupation Codes – and workforce size data

The following data\(^{41}\) is held to be a good indicator of both current job titles and the numbers employed both in 2006 and, pro rata, in 2010.

<table>
<thead>
<tr>
<th>Occupation (ANZSCO)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>135111 Chief Information Officer</td>
<td>54</td>
</tr>
<tr>
<td>135112 ICT Project Manager</td>
<td>4,680</td>
</tr>
<tr>
<td>135199 ICT Managers nec</td>
<td>0</td>
</tr>
<tr>
<td>223211 ICT Trainer</td>
<td>813</td>
</tr>
<tr>
<td>224213 Health Information Manager</td>
<td>282</td>
</tr>
<tr>
<td>224214 Records Manager</td>
<td>159</td>
</tr>
<tr>
<td>224611 Librarian</td>
<td>4,299</td>
</tr>
<tr>
<td>225211 ICT Account Manager</td>
<td>12</td>
</tr>
<tr>
<td>225212 ICT Business Development Manager</td>
<td>27</td>
</tr>
<tr>
<td>225213 ICT Sales Representative</td>
<td>1,605</td>
</tr>
<tr>
<td>232414 Web Designer</td>
<td>642</td>
</tr>
<tr>
<td>261111 ICT Business Analyst</td>
<td>408</td>
</tr>
<tr>
<td>261112 Systems Analyst</td>
<td>6,678</td>
</tr>
<tr>
<td>261211 Multimedia Specialist</td>
<td>45</td>
</tr>
<tr>
<td>261212 Web Developer</td>
<td>990</td>
</tr>
<tr>
<td>261311 Analyst Programmer</td>
<td>804</td>
</tr>
<tr>
<td>261312 Developer Programmer</td>
<td>6,924</td>
</tr>
<tr>
<td>261313 Software Engineer</td>
<td>210</td>
</tr>
<tr>
<td>261399 Software and Applications Programmers nec</td>
<td>5,136</td>
</tr>
<tr>
<td>262111 Database Administrator</td>
<td>1,629</td>
</tr>
<tr>
<td>262112 ICT Security Specialist</td>
<td>351</td>
</tr>
<tr>
<td>262113 Systems Administrator</td>
<td>2,742</td>
</tr>
<tr>
<td>263111 Computer Network and Systems Engineer</td>
<td>882</td>
</tr>
<tr>
<td>263112 Network Administrator</td>
<td>1,191</td>
</tr>
<tr>
<td>263113 Network Analyst</td>
<td>153</td>
</tr>
<tr>
<td>263211 ICT Quality Assurance Engineer</td>
<td>150</td>
</tr>
<tr>
<td>263212 ICT Support Engineer</td>
<td>573</td>
</tr>
<tr>
<td>263213 ICT Systems Test Engineer</td>
<td>270</td>
</tr>
<tr>
<td>263299 ICT Support and Test Engineers nec</td>
<td>132</td>
</tr>
<tr>
<td>263311 Telecommunications Engineer</td>
<td>486</td>
</tr>
<tr>
<td>263312 Telecommunications Network Engineer</td>
<td>639</td>
</tr>
<tr>
<td>313112 ICT Customer Support Officer</td>
<td>5,910</td>
</tr>
<tr>
<td>313113 Web Administrator</td>
<td>279</td>
</tr>
<tr>
<td>313199 ICT Support Technicians nec</td>
<td>1,839</td>
</tr>
<tr>
<td>313211 Radio-communications Technician</td>
<td>18</td>
</tr>
<tr>
<td>313212 Telecommunications Field Engineer</td>
<td>21</td>
</tr>
<tr>
<td>313213 Telecommunications Network Planner</td>
<td>6</td>
</tr>
<tr>
<td>313214 Telecommunications Tech Officer or Technologist</td>
<td>57</td>
</tr>
<tr>
<td>342312 Communications Operator</td>
<td>273</td>
</tr>
<tr>
<td>342313 Electronic Equipment Trades Worker</td>
<td>1,182</td>
</tr>
<tr>
<td>342314 Electronic Instrument Trades Worker (General)</td>
<td>9</td>
</tr>
<tr>
<td>342315 Electronic Instrument Trades Worker (Special Class)</td>
<td>27</td>
</tr>
<tr>
<td>342411 Cabler (Data and Telecommunications)</td>
<td>111</td>
</tr>
</tbody>
</table>

\(^{41}\) Source: ETITO 2011 report on ICT provided by The Skills Organisation
Australia and New Zealand Standard Classification of Occupations

<table>
<thead>
<tr>
<th>ANZSCO code</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>2611</td>
<td>ICT Business and Systems Analysts</td>
</tr>
<tr>
<td>2612</td>
<td>Multimedia specialists and web developers</td>
</tr>
<tr>
<td>2613</td>
<td>Software and applications programmers</td>
</tr>
<tr>
<td>2621</td>
<td>Database and Systems Administrators, and ICT Security Specialists</td>
</tr>
<tr>
<td>2631</td>
<td>Computer Network Professionals</td>
</tr>
<tr>
<td>2632</td>
<td>ICT Support and Test Engineers</td>
</tr>
<tr>
<td>2633</td>
<td>Telecommunications Engineering Professionals</td>
</tr>
<tr>
<td></td>
<td>IT roles</td>
</tr>
<tr>
<td>261111</td>
<td>ICT Business Analyst</td>
</tr>
<tr>
<td>261112</td>
<td>Systems Analyst</td>
</tr>
<tr>
<td>261211</td>
<td>Multimedia Specialist</td>
</tr>
<tr>
<td>261212</td>
<td>Web Developer</td>
</tr>
<tr>
<td>261311</td>
<td>Analyst Programmer</td>
</tr>
<tr>
<td>261312</td>
<td>Developer Programmer</td>
</tr>
<tr>
<td>261313</td>
<td>Software Engineer</td>
</tr>
<tr>
<td>261399</td>
<td>Software and Applications Programmers nec</td>
</tr>
<tr>
<td>262111</td>
<td>Database Administrator</td>
</tr>
<tr>
<td>262112</td>
<td>ICT Security Specialist</td>
</tr>
<tr>
<td>262113</td>
<td>Systems Administrator</td>
</tr>
<tr>
<td>263111</td>
<td>Computer Network and Systems Engineer</td>
</tr>
<tr>
<td>263112</td>
<td>Network Administrator</td>
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<tr>
<td>263113</td>
<td>Network Analyst</td>
</tr>
<tr>
<td>263211</td>
<td>ICT Quality Assurance Engineer</td>
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<tr>
<td>263212</td>
<td>ICT Support Engineer</td>
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<td>263213</td>
<td>ICT Systems Test Engineer</td>
</tr>
<tr>
<td>263299</td>
<td>ICT Support and Test Engineers nec</td>
</tr>
<tr>
<td>263311</td>
<td>Telecommunications Engineer</td>
</tr>
<tr>
<td>263312</td>
<td>Telecommunications Network Engineer</td>
</tr>
</tbody>
</table>
Appendix 6: Skills Framework for the Information Age (SFIA) – Skill and Competency Description levels and sample definitions for IT-specific roles

This Appendix outlines the Skills Framework for the Information Age (SFIA) in brief and how qualification outcomes and roles will be mapped to SFIA to ensure standardisation of language between qualifications and industry. See www.sfia-online.org for more.

The internationally developed *Skills Framework for the Information Age* (SFIA) provides a broad competency and skills framework for those practicing in IT. SFIA provides standardised definitions of skills and levels. SFIA is the most widely used IT skills competency framework in the world. Originally developed in the UK, SFIA is widely used in Australia and increasingly in New Zealand.

SFIA defines 96 professional IT skills, organised in six categories, each of which has several subcategories. It also defines seven levels of attainment, each of which is described in generic, non-technical terms. Each skill has an overall definition, and an “at-level” definition for each of the levels at which it can be recognised. The ‘at level’ definitions are included in the roles below.

**General SFIA Levels**

SFIA defines 7 general levels of competency and responsibility, ranging from “follow” to “set strategy, inspire, mobilise”.

**Level 7** is the highest strategic level of IT, generally a CIO or CEO level position. As well as the general level definitions, SFIA provides plain-English skill definitions at each of the relevant levels for each skill. Most skills only cover a subset of levels as any one skill is generally not relevant to all levels.

**Level 6** has authority for an area of work, setting organisational objectives, and influencing policy - a significant part of an organisation. Complex and strategic work, initiating and leading technical and business change. High level customer and supplier influence.

**Level 5** is regarded as the “Professional” level, generally for a senior IT Professional with responsibility for providing advice that will impact a project or organisation, or overseeing a substantial project and the work of others.

**Level 4** is regarded as someone who works under general direction in a framework. Good level of operational business skills, with influence at account level, and works on a broad range of complex activities.

**Level 3** is regarded as a “Technologist” level; a junior IT professional who has an educational and experiential background to be responsible for their own work.

**Level 2** is generally for someone that uses some discretion and has a wider circle of interaction than level1, especially in a speciality. Works on a range of tasks and proactively manages personal development.

**Level 1** is generally the entry-level for IT, generally for someone with no qualifications and following a simple script for work. Basic capability to complete tasks under close supervision.

The general definitions for SFIA Levels 1-4 are contained in Appendix D.

**SFIA Definitions of Levels of Responsibility (Levels 1-4)**

This section includes the first 4 of 7 general SFIA level definitions, expressed in terms of Autonomy, Complexity, Influence and Business skills.
<table>
<thead>
<tr>
<th>SFIA Level</th>
<th>Autonomy</th>
<th>Influence</th>
<th>Complexity</th>
<th>Business Skills</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1 Follow</strong></td>
<td>Works under supervision. Uses little discretion. Is expected to seek guidance in unexpected situations.</td>
<td>Interacts with immediate colleagues.</td>
<td>Performs routine activities in a structured environment. Requires assistance in resolving unexpected problems.</td>
<td>Uses basic information systems and technology functions, applications, and processes. Demonstrates an organised approach to work. Learns new skills and applies newly acquired knowledge. Follows code of conduct and organisational standards. Has sufficient communication skills for effective dialogue with colleagues. Contributes to identifying own development opportunities.</td>
</tr>
<tr>
<td><strong>2 Assist</strong></td>
<td>Works under routine direction. Uses minor discretion in resolving problems or enquiries. Works without frequent reference to others.</td>
<td>Interacts with and may influence immediate colleagues. May have some external contact with customers, suppliers and partners. May have more influence in own domain.</td>
<td>Performs a range of varied work activities in a variety of structured environments. Contributes to routine problem resolution.</td>
<td>Understands and uses appropriate methods, tools and applications. Demonstrates a rational and organised approach to work. Is aware of health and safety issues. Identifies and negotiates own development opportunities. Has sufficient communication skills for effective dialogue with customers, suppliers and partners. Is able to work in a team. Is able to plan, schedule and monitor own work within short time horizons. Absorbs technical information when it is presented systematically and applies it effectively.</td>
</tr>
<tr>
<td><strong>3 Apply</strong></td>
<td>Works under general direction. Uses discretion in identifying and resolving complex problems and assignments. Usually receives specific instructions and has work reviewed at frequent milestones. Determines when issues should be escalated to a higher level.</td>
<td>Interacts with and influences department/project team members. Has working level contact with customers and suppliers. In predictable and structured areas may supervise others. Makes decisions which may impact on the work assigned to individuals or phases of projects.</td>
<td>Performs a broad range of work, sometimes complex and non-routine, in a variety of environments. Applies methodical approach to problem definition and resolution.</td>
<td>Understands and uses appropriate methods, tools and applications. Demonstrates an analytical and systematic approach to problem solving. Takes the initiative in identifying and negotiating appropriate personal development opportunities. Demonstrates effective communication skills. Contributes fully to the work of teams. Plans, schedules and monitors own work (and that of others where applicable) competently within limited deadlines and according to relevant legislation and procedures. Absorbs and applies technical information. Works to required standards. Appreciates the wider field of information systems, and how own role relates to other roles and to the business of the employer or client.</td>
</tr>
<tr>
<td><strong>4 Enable</strong></td>
<td>Works under general direction within a clear framework of accountability. Exercises substantial personal responsibility and autonomy. Plans own work to meet given objectives and influences team and specialist peers internally. Influences customers at account level and suppliers. Has some responsibility for the work of others and for the allocation of resources.</td>
<td>Influences team and specialist peers internally. Influences customers at account level and suppliers. Has some responsibility for the work of others and for the allocation of resources.</td>
<td>Performs a broad range of complex technical or professional work activities, in a variety of contexts. Investigates, defines and resolves complex problems.</td>
<td>Selects appropriately from applicable standards, methods, tools and applications. Demonstrates an analytical and systematic approach to problem solving. Communicates fluently orally and in writing, and can present complex technical information to both technical and non-technical audiences. Facilitates collaboration between stakeholders who share common objectives. Plans, schedules and monitors work to meet time and quality targets and in accordance with</td>
</tr>
</tbody>
</table>
Sample SFIA Definitions for IT-specific roles

Following are SFIA skill definitions for five of the IT-specific roles defined as required by industry now and into the future. A brief description of these roles is included in the body of the report, and the following provides an example of some of the key SFIA skills for the identified roles.

Computer Technician (Desktop focus)

**HSIN3: Systems installation/decommissioning (Level 3)**
- Installs or removes hardware and/or software, using supplied installation instructions and tools including, where appropriate, handover to the client.
- Conducts tests, corrects malfunctions, and documents results in accordance with agreed procedures.
- Reports details of all hardware/software items that have been installed and removed so that configuration management records can be updated.
- Provides assistance to users in a professional manner following agreed procedures for further help or escalation.
- Maintains accurate records of user requests, contact details and outcomes.
- Contributes to the development of installation procedures and standards.

**ASUP2: Application support (Level 2)**
- Assists in the investigation and resolution of issues relating to applications.
- Assists with specified maintenance procedures.

**SSUP2: Sales support (Level 2)**
- Communicates effectively with customers by telephone and in person.
- Assists in the provision of customer service, including technical advice and guidance on matters bearing on the successful use of products and services.
- Assists in devising solutions to customer requirements and solves straightforward problems.

**CSMG3: Client services management (Level 3)**
- Acts as the routine contact point.
- Assists with the development of and applies client services standards to resolve or escalate clients’ service problems.

Helpdesk and Technical Support

**USUP3: Service desk and incident management (Level 3)**
- Receives and handles requests for support following agreed procedures.
- Responds to requests for support by providing information to enable incident resolution and promptly allocates unresolved calls as appropriate.
- Maintains records and advises relevant persons of actions taken.

**CSMG3: Client services management (Level 3)**
• Acts as the routine contact point.
  • Assists with the development of and applies client services standards to resolve or escalate clients’ service problems.

ASUP2: Application support (Level 2)
• Assists in the investigation and resolution of issues relating to applications.
• Assists with specified maintenance procedures.

Network or Systems Administrator
NTAS3: Network support (Level 3)
• Identifies and resolves network problems following agreed procedures.
• Uses network management software and tools to collect agreed performance statistics.
• Carries out agreed network maintenance tasks.

ITOP3: IT Operations (Level 3)
• Carries out agreed operational procedures, including network configuration, installation and maintenance.
• Uses network management tools to collect and report on network load and performance statistics.
• Contributes to the implementation of maintenance and installation work.
• Uses standard procedures and tools to carry out defined system backups, restoring data where necessary.
• Identifies operational problems and contributes to their resolution.

SCTY3: Information security (Level 3)
• Applies and maintains specific security controls as required by organisational policy and local risk assessments to maintain confidentiality, integrity and availability of business information systems and to enhance resilience to unauthorised access.
• Contributes to vulnerability assessments.
• Recognises when an IT network/system has been attacked internally, by a remote host, or by malicious code, such as virus, worm or Trojan etc., or when a breach of security has occurred.
• Takes immediate action to limit damage, according to the organization’s security policy, which may include escalation to next level, and records the incident and action taken.
• Demonstrates effective communication of security issues to business managers and others.
• Performs basic risk assessments for small information systems.

SCAD3: Security administration (Level 3)
• Investigates minor security breaches in accordance with established procedures. Assists users in defining their access rights and privileges, and operates agreed logical access controls and security systems.
• Maintains agreed security records and documentation.

Implementation and Application Support
ASUP3: Application support (Level 3)
• Identifies and resolves issues with applications, following agreed procedures.
• Uses application management software and tools to collect agreed performance statistics.
• Carries out agreed applications maintenance tasks.

RELM3: Release and deployment (Level 3)
• Uses the tools and techniques for specific areas of release and deployment activities.
• Administers the recording of activities, logging of results and documents technical activity undertaken.
• May carry out early life support activities such as providing support advice to initial users.
SSUP2: Sales support (Level 2)
- Communicates effectively with customers by telephone and in person.
- Assists in the provision of customer service, including technical advice and guidance on matters bearing on the successful use of products and services.
- Assists in devising solutions to customer requirements and solves straightforward problems.

ICPM3: Information content publishing (Level 3)
- Specifies and creates content management processes to meet the needs of users.
- Uses agreed tools to make finished material available on appropriate platforms.

TEST1: Testing (Level 1)
- Executes given test scripts under supervision.
- Records results and reports issues.
- Develops an understanding of the role of testing within system development, as a tool for design improvement as well as a validation process.

CFMG2: Configuration management (Level 2)
- Applies tools, techniques and processes for administering information (such as the tracking and logging of components and changes) related to configuration items.

Associate/Web Developer

PROG2: Programming/software development (Level 2)
- Designs, codes, tests, corrects, and documents simple programs, and assists in the implementation of software which forms part of a properly engineered information or communications system.

DTAN2: Data analysis (Level 2)
- Applies data analysis and data modelling techniques to establish, modify or maintain a data structure and its associated components (entity descriptions, relationship descriptions, attribute definitions).

REQM2: Requirements definition and management (Level 2)
- Uses established techniques as directed to identify current problems and elicit, specify and document business functional, data and non-functional requirements for simple subject areas with clearly-defined boundaries.
- Assists in more complex requirements activities and with the processes for establishing agreed baselines for change and managing the assessment and application of requested changes to those requirements.

TEST1: Testing (Level 1)
- Executes given test scripts under supervision.
- Records results and reports issues.
- Develops an understanding of the role of testing within system development, as a tool for design improvement as well as a validation process.

DBDS2: Database/repository design (Level 2)
- Translates and implements simple development project requirements into physical database structures.
- Assesses proposed changes to object and data structures and implements these changes in physical databases.
- Assists in database management system support activities for operational database systems.

The SFIA definitions of levels of responsibility for SFIA levels 1 to 4 are covered in the following table.
Appendix 7: Long term skills shortages – Immigration New Zealand

Immigration New Zealand regularly update the essential skills in demand lists\(^{42}\) to help ensure NZ’s skills needs are met by facilitating the entry of appropriately skilled migrants to fill identified skill shortages. There are three lists – long-term, immediate and Canterbury skill shortage lists.

There are no ICT related listings on the immediate skill shortage list or the Canterbury Skill Shortage list, but there are a range of ICT related positions on the long term skills shortage list.

Long term skills shortage list for this sector includes ICT, Electronics and Telecommunications occupations mainly requiring degree qualified people, with relevant work experience.

A range of occupations (ANZSCO) including analysts, developers, ICT engineers and customer support officer are on the Immigration NZ Long Term Skill Shortage list.

- Specialist Managers nec (Management & Project Management staff) (135112)
- ICT Project Manager (135112),
- Organisation and Methods Analyst (224712),
- ICT Business Analyst (261111),
- Systems Analyst (261112),
- Multimedia Analyst (261211),
- Web Developer (261212),
- Analyst Programmer (261311),
- Developer Programmer (261312),
- Software Engineer (261313),
- Software Tester (261314),
- Software and Applications Programmers nec (261399),
- Database Administrator (262111),
- ICT Security Specialist (262112),
- Systems Administrator (262113),
- Computer Network and Systems Engineer (263111),
- Network Administrator (263112),
- Network Analyst (263113),
- ICT Quality Assurance Engineer (263211),
- ICT Support Engineer (263212),
- ICT Systems Test Engineer (263213),
- ICT Support and Test Engineers nec (263299),
- Telecommunications Engineer (263311),
- Telecommunications Network Engineer (263312),
- ICT Customer Support Officer (Technical advice and Consultancy) (313112)

\(^{42}\) Immigration N – reviewing the essential skills in demand lists
http://www.immigration.govt.nz/migrant/general/generalinformation/review.htm
### Appendix 8: Job Opportunities in Information technology industry - Careers NZ

<table>
<thead>
<tr>
<th>Job title</th>
<th>Job Description</th>
<th>Job opportunities</th>
<th>Numbe rs (2012)</th>
<th>Pay</th>
<th>How to get into this job</th>
<th>Personal Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business Analyst</td>
<td>Business analysts research the systems and procedures an organisation uses, and decide if, and how, computer applications and systems could be used to improve business efficiency and productivity.</td>
<td>Good – on long term skill shortage list</td>
<td>9,453</td>
<td>1-5 years experience $50,000-$70,000 pa; Senior &gt;5 years experience $70,000 - $100K pa</td>
<td>One or both: A tertiary qualification in computing, information science, or business computing; Relevant certification in areas such as Information Technology Infrastructure Library (ITIL)</td>
<td>Business analysts need to be: logical, methodical, patient, and good listeners; able to work well under pressure to meet deadlines; skilled at design and planning; good at communicating orally, and in writing; skilled at project management; skilled at analysing and problem-solving; good at presenting information.</td>
</tr>
<tr>
<td>Computer Systems Technician</td>
<td>Computer systems technicians assemble, install, maintain and repair computer hardware, software and related equipment.</td>
<td>Good – increasing due to growing computer use</td>
<td>10,260</td>
<td>$55K pa; with experience $71K-$82,000 pa</td>
<td>One or both: Relevant certification with well-known companies such as Microsoft or Cisco; A tertiary qualification in computing or information science.</td>
<td>Computer systems technicians need to be: able to work independently, and as part of a team; able to work well under pressure; logical, accurate, and practical; prepared to continue learning new computer skills; able to solve problems, particularly technical ones; good at communicating.</td>
</tr>
<tr>
<td>Database/Systems Administrator</td>
<td>Database/systems administrators plan, develop, maintain, manage and administer organisations’ database management systems, operating systems and security policies and procedures.</td>
<td>Good – on long term skills shortage list</td>
<td>5,987</td>
<td>$45-$60Kpa; Senior with 6+ years experience $80-$126K pa</td>
<td>One or both: A relevant certification with well-known companies such as Microsoft or Cisco; A tertiary qualification in computing, information science or business computing.</td>
<td>Database/systems administrators need to be: able to communicate well, as they need to relay complex information about computers in easily understood terms; methodical and accurate; understanding, adaptable, and patient; good at problem-solving and time-management; able to work well under pressure; good at planning and organising.</td>
</tr>
<tr>
<td>Helpdesk Operator</td>
<td>Helpdesk operators provide assistance for computer users who are having difficulty with their system.</td>
<td>Good – growing demand for computer support</td>
<td>8,950</td>
<td>$35-$50K pa; with experience $40K-$65K pa</td>
<td>To become a helpdesk operator you need to have knowledge of various software applications, and technical knowledge</td>
<td>Helpdesk operators need to be: polite, patient and friendly; able to work well under pressure and meet.</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Job title</th>
<th>Job Description</th>
<th>Job opportunities</th>
<th>Numbe rs (2012)</th>
<th>Pay</th>
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</tr>
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<tbody>
<tr>
<td></td>
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<td></td>
<td>about computers and how they function. One or both: A tertiary qualification in computing, information science or business computing Certification with well-known companies such as Microsoft services about computers and how they function. One or both: Relevant certification with well-known companies such as Microsoft or Oracle Excellent knowledge of computer program languages and principles is essential for becoming a programmer. This knowledge can be gained through informal practical experience, but programmers usually have qualifications. Programmers gain many skills on the job and attend a wide range of courses to update their knowledge and techniques.</td>
<td>Programmers need to be: methodical, accurate and patient adaptable able to work well under pressure able to get along well with others able to find information online and from manuals skilled in analysing computer software and systems good at planning, organising and problem-solving good at writing and communicating orally.</td>
</tr>
<tr>
<td>Programmer</td>
<td>Programmers write, test, develop and maintain computer software programs.</td>
<td>Good</td>
<td>8,949</td>
<td>$45-$60K pa; with experience $60K-$80K pa</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Web Designer</td>
<td>Web designers plan, design, develop and prepare information for websites. They aim to make websites visually appealing, functional, and easy to use.</td>
<td>Average – only gradual growth</td>
<td>655</td>
<td>$30-$40K pa; with experience $50K-$70K pa</td>
<td>No specific qualifications are needed to become a web designer, but employers usually prefer you to have a certificate, diploma or degree in one of the following: web design graphic or media design computer science or a similar area</td>
<td>Web designers need to be: Accurate imaginative and creative open to new ideas, concepts and technological advances able to work well under pressure and unsupervised skilled at relationship and project management' good at writing, and communicating.</td>
</tr>
<tr>
<td>Website Administrator</td>
<td>Website administrators set up and maintain the hardware and software required to run websites, and co-ordinate and maintain the creation of content.</td>
<td>Good</td>
<td>353</td>
<td>$30-$60K pa; with experience $60K-$85K pa</td>
<td>To become a website administrator a degree in computer sciences or a related field is useful. Courses in computing, marketing and communications may also be useful.</td>
<td>Website administrators need to be: Creative patient and accurate, with an eye for detail methodical and well organised good at organising, problem-solving and maths skilled at project management</td>
</tr>
<tr>
<td>Job title</td>
<td>Job Description</td>
<td>Job opportunities</td>
<td>Number (2012)</td>
<td>Pay</td>
<td>How to get into this job</td>
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</table>
| Information and Communication Technology Manager | Information and communication technology (ICT) managers plan and supervise the computer and information technology services in an organisation. | Good – job growth area and expected to continue | 6,291         | $100 - $200K pa | Degree or diploma in information technology, and relevant work experience | ICT managers need to be:  
  - able to communicate well, as they need to relay complex information about computers in easily understood terms  
  - mature and responsible  
  - logical  
  - able to make good judgements  
  - able to work well under pressure  
  - able to lead and motivate their support staff. |
| Project Manager                               | Project managers manage projects for one or more organisations, usually with the purpose of initiating or improving an aspect of business. Responsibilities are broad and include managing the strategic, financial, operational and technological implications of the project to ensure a successful outcome. | Good – ICT project management is on the long term skill shortage list | 20,086        | $55K - $135K pa | There are no specific entry requirements to become a project manager. However, some employers prefer you to have a diploma or degree in project management, or in an area you might specialise in, such as engineering or information and communication technology (ICT). A degree in business and/or management may also be useful. | Project managers need to be:  
  - Organised accurate, with an eye for detail  
  - able to lead others  
  - excellent at communicating and negotiating  
  - skilled in writing and presentation  
  - innovative, but also able to make practical decisions  
  - able to relate well to a wide range of people  
  - motivated  
  - able to work well under pressure. |
| Software Architect                            | Software architects analyse an organisation's software and design, oversee the development of a new software system, and ensure it will assist the overall business of an organisation. | Good – on long term skills shortage list | ?             | $88K - $108K pa | A tertiary qualification in a computer-related field. Qualifications in business-related fields are also strongly recommended. Expected to have at least 10 years ICT experience, including working in a senior position. | Software architects need to be:  
  - able to lead others  
  - able to work through problems logically and methodically and have good analytical skills  
  - skilled at computer programming  
  - creative and adaptable  
  - able to work well under pressure as they need to meet deadlines  
  - skilled at oral and written communication and have good presentation skills. |
| Web                                            | Web developers                                                                   | Good -            | 1,311         | $35-$50K       | To become a web                                               | Web developers need to                                                             |

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<table>
<thead>
<tr>
<th>Job title</th>
<th>Job Description</th>
<th>Job opportunities</th>
<th>Numbe (2012)</th>
<th>Pay $/pa; with experience</th>
<th>How to get into this job</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Developer</td>
<td>plan, produce and maintain websites using web programming languages, software applications, and databases.</td>
<td>Web developers are needed to create new sites and also maintain and improve existing ones.</td>
<td></td>
<td>$60K-$80K</td>
<td>developer a tertiary qualification in computer science, information systems, or web development is useful.</td>
<td>accurate and methodical, able to accept criticism, able to work well under pressure and unsupervised, skilled at relationship and project management, skilled at problem-solving, good at writing, and communicating.</td>
</tr>
<tr>
<td>Test analyst</td>
<td>Test analysts prepare tests for new computer software and systems, analyse the results, identify any problems, and help come up with solutions to fix them.</td>
<td>Good – due to a shortage of workers. Growth in employment is expected to continue.</td>
<td>1,619</td>
<td>$40-$80K $70K-$120K</td>
<td>To become a test analyst you usually need a degree in computing, information science or business computing. Test analysts gain many skills on the job and may attend a wide range of courses to update their knowledge and skills.</td>
<td>methodical, accurate and patient, able to work well under pressure and meet deadlines, able to work well as part of a team, and with minimal supervision, skilled at problem-solving, skilled at verbal and written communication.</td>
</tr>
<tr>
<td>Network engineer</td>
<td>Network engineers design, install, and configure computer systems, and the software and hardware that run them. Systems can range from a connection between two offices in one building, to a global network connecting offices across the world.</td>
<td>Good – due to a shortage of workers. Growing occupation. Growth in employment is expected to continue.</td>
<td>3,092</td>
<td>$50-$60K $70K-$100K</td>
<td>To become a network engineer you usually need a diploma or degree in computing, information science or business computing. Network engineers gain many skills on the job and may attend a wide range of courses to update their knowledge and skills.</td>
<td>methodical, accurate and patient, able to work well under pressure, and meet deadlines, able to work well as part of a team, and with minimal supervision, skilled at problem-solving, skilled at verbal and written communication.</td>
</tr>
</tbody>
</table>
Appendix 9: National Qualification Completion Analysis

An analysis of National qualification completion data for 2008-2012 is covered in the body of the report (section….).

There are four national qualifications in computing:

#0010 National Certificate in Computing Level 2 43 credits
#0011 National Certificate in Computing Level 3 46 credits
#0236 National Certificate in Computing Level 4 60 credits
#0302 National Diploma in Computing Level 5 120 credits

Following is an analysis of national qualification completions by level and year for each provider category.
Appendix 10: Soft skills – 10 Highly Valued Soft Skills for IT Pros

Mary Shacklett contributed the following analysis of 10 highly valued soft skills for IT professionals to TechRepublic. These provide an opinion that may inform the discussion around soft skills in ICT qualifications that are developed.

Today’s IT professional needs a combination of technical expertise and an expanding range of soft skills.

So what are the soft skills areas that companies want to see in IT professionals today?

1. Deal making and meeting skills
   IT is a matchup of technology and people to produce products that run the company’s business. When people get involved, there are bound to be disagreements and a need to arrive at group consensus. IT’ers who can work with people, find a common ground so projects and goals can be agreed to, and swallow their own egos in the process if need be are in high demand.

2. Great communication skills
   The ability to read, write, and speak clearly and effectively will never go out of style — especially in IT. IT project annals are filled with failed projects that were good ideas but poorly communicated.

3. A sixth sense about projects
   There are formal project management programs that teach people PM methodology. But for most people, it takes several years of project management experience to develop an instinct for how a project is really going. Natural project managers have this sixth sense. In many cases, it is simply a talent that can’t be taught. But when an IT executive discovers a natural project manager who can “read” the project in the people and the tasks, this person is worth his/her weight in gold.

4. Ergonomic sensitivity
   Because its expertise is technical, it is difficult for IT to understand the point of view of a nontechnical user or the conditions in the field that end users face. A business analyst who can empathize with end users, understand the business conditions they work in, and design graphical user interfaces that are easy to learn and use is an asset in application development.

5. Great team player
   It’s easy for enclaves of IT professionals to remain isolated in their areas of expertise. Individuals who can transcend these technical silos and work for the good of the team or the project are valued for their ability to see the big picture. They are also viewed as candidates for promotions.

6. Political smarts
   Not known as a particularly politically astute group, IT benefits when it hires individuals who can forge strong relationships with different constituencies throughout the company. This relationship building facilitates project cooperation and success.

7. Teaching, mentoring, and knowledge sharing
   IT’ers able to teach new applications to users are invaluable in project rollouts. They are also an asset as teaching resources for internal IT. If they can work side by side with others and provide mentoring and support, they become even more valuable — because the “real” IT learning occurs on the job and in the trenches. Central to these processes is the willingness to share and the ability to listen and be patient with others as they learn.

8. Resolving “gray” issues
   IT likes to work in binary (black and white). Unfortunately, many of the people issues that plague projects are “gray.” There is no right or wrong answer, but there is a need to find a place that

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8. Resolving “gray” issues
   IT likes to work in binary (black and white). Unfortunately, many of the people issues that plague projects are “gray.” There is no right or wrong answer, but there is a need to find a place that
everyone is comfortable with. Those who can identify and articulate the problem, bring it out in the open, and get it solved are instrumental in shortening project snags and timelines.

9. **Vendor management**

   Few IT or MA programs teach vendor management — and even fewer IT’ers want to do this. But with outsourcing and vendor management on the rise, IT pros with administrative and management skills who can work with vendors and ensure that SLAs (service level agreements) and KPIs (key performance indicators) are met bring value to performance areas where IT is accountable. They also have great promotion potential.

10. **Contract negotiation**

   The growth of cloud-based solutions has increased the need for contract negotiation skills and legal knowledge. Individuals who bring this skills package to IT are both recognized and rewarded, often with highly paid executive positions.
Appendix 11: Work in a digital world – Performance Features Table 3e
Core Skills for Work – Framework

<table>
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<tr>
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</thead>
<tbody>
<tr>
<td>Use digitally based technologies and systems</td>
<td>Begins to understand the purpose of some commonly used digital tools</td>
<td>Understands the purpose and some specific functions of some common digital tools used in work contexts</td>
<td>Understands the purposes, specific functions and key features of common digital systems and tools and operates them effectively to complete routine tasks, adapting some functions to improve personal efficiency</td>
<td>Considers purpose, needs and limitations when selecting devices and applications for different tasks</td>
<td>Actively identifies systems, devices and applications with potential to meet current and/or future needs</td>
</tr>
<tr>
<td></td>
<td>Identifies some appropriate hardware/software for immediate tasks</td>
<td>Uses the main features and functions of these digital tools to complete own tasks</td>
<td>Recognises and uses common symbols and terminology associated with the digital world</td>
<td>Is beginning to monitor trends and identify applications and innovations from other contexts that may be useful</td>
<td>Considers the strategic and operational potential of digital trends to achieve work goals, enhance work processes, create opportunities, pose threats and enhance or reduce risks</td>
</tr>
<tr>
<td></td>
<td>With assistance, is learning to perform basic functions related directly to own tasks e.g. uses email, undertakes basic Internet searches, manipulates screens</td>
<td>Recognises a small set of design and operating principles and applies these when learning how to use upgrades or new digital tools with the same purpose</td>
<td>Recognises some general design and operating principles of digital tools and uses these to help when adopting upgrades, new technologies with similar purposes or when troubleshooting</td>
<td>Utilises a broad range of features within applications to improve personal productivity, optimising software functions for specific purposes</td>
<td>Experiments with the possibilities of new systems, devices, applications, apps etc before conducting a more sophisticated analysis of benefits, costs and risk</td>
</tr>
<tr>
<td></td>
<td>Recognises and uses some terms and symbols with some understanding of their meaning e.g. application, file</td>
<td>Uses a small number of troubleshooting strategies independently and seeks assistance as required</td>
<td>Reflects on the ways in which digital systems and tools are used, or could be used, to achieve work goals, and begins to recognise strategic, as well as operational, applications</td>
<td>Recognises and uses a wide range of relevant language and symbols</td>
<td>Demonstrates a sophisticated understanding of principles, concepts, language and practices associated with the digital world, and uses these to troubleshoot and understand the uses and potential of new technology</td>
</tr>
</tbody>
</table>
| | With guidance, begins to use some basic troubleshooting strategies e.g. turns off and on again | Troubleshoots routine issues and knows when to ask others for assistance | Understands key principles and concepts underpinning the design and operation of digital systems and tools and applies these when troubleshooting existing technology, and when seeking to understand the potential of new technology | "
<table>
<thead>
<tr>
<th>Performance Features</th>
<th>Stage 1</th>
<th>Stage 2</th>
<th>Stage 3</th>
<th>Stage 4</th>
<th>Stage 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connect with others</td>
<td>Begins to link to those in immediate work context via common digital systems, devices and tools, e.g. smartphone, PDA Intranet, email, SMS</td>
<td>Uses digital systems, search engines and common digital tools to connect with others in immediate work context on matters related to own role e.g. Uses electronic messaging to seek immediate information or advice from peers or supervisor</td>
<td>Establishes and maintains online connections with others as an integral part of role, using a variety of digital tools and media to interact, collaborate and create</td>
<td>Explores ways of connecting to others within and beyond the work context in order to access diverse perspectives and build on collective intelligence</td>
<td>Actively identifies, creates, and utilises linkages to enhance knowledge sharing, idea creation, individual and collective engagement and work outcomes</td>
</tr>
<tr>
<td></td>
<td>Begins to recognise and apply some basic conventions of online etiquette</td>
<td>Recognises and applies some conventions of online etiquette</td>
<td>May use online forums, blogs and social networking sites to connect with work peers or discuss work related issues, following online etiquette appropriately</td>
<td>Communicates information and ideas to an expanding range of audiences, considering the nature and potential reach of various linkages and the benefits and limitations of different kinds of electronic channels, and paying close attention to online etiquette</td>
<td>Demonstrates a sophisticated understanding of expectations, social protocols and online etiquette, intuitively selecting the appropriate channel, content, and tone for diverse purposes and audiences</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Performance Features</th>
<th>Stage 1</th>
<th>Stage 2</th>
<th>Stage 3</th>
<th>Stage 4</th>
<th>Stage 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access, organise, and present information</td>
<td>A Novice performer in working in a digital world: Follows simple, step by step instructions for using digital technology to enter, store and retrieve information directly relevant to role e.g. enters details into electronic timesheet, stores electronic records, enters basic key words into a search engine to find information.</td>
<td>An Advanced Beginner in working in a digital world: Follows routine procedures for using digital technology to enter, store and retrieve information directly relevant to role e.g. enters and accesses customer information in a database, enters and reads data from electronic monitoring and control systems.</td>
<td>A Capable performer in working in a digital world: Uses familiar digital systems and tools to access, organise, analyse and display information relevant to role e.g. accesses and filters information using search engines, data bases, or spreadsheets, uses computer-based applications to present information.</td>
<td>A Proficient performer in working in a digital world: Uses a range of digitally based technology and applications to access and filter data, extract, organise, integrate and share relevant information in increasingly effective ways e.g. uses statistical analysis applications, participates in user forums and online communities of practice. Considers new ways to model, visualise, interact with and present complex information e.g. uses project management or process-modelling software.</td>
<td>An Expert performer in working in a digital world: Uses a broad range of strategies to store, access and organise virtual information, recognising that design choices will influence what information is retrieved, and how it may be interpreted and used e.g. makes decisions about information to be captured in a database and the kinds of reports required. Uses digital tools to access and organise complex data and analyse multiple sources of information for strategic purposes e.g. Filters and synthesises meaningful information, patterns and commonalities from multiple streams of data, models complex scenarios.</td>
</tr>
<tr>
<td>Manage risk</td>
<td>With guidance, follows security instructions e.g. security procedures, privacy requirements May need to be reminded to use back up procedures.</td>
<td>Begins to recognise distinctions between personal and work related use of digital devices, connections Implements basic security requirements related to own tasks With assistance, may recognise some issues about the transparency and accessibility of information relevant to own role.</td>
<td>Understands the importance of secure information and privacy in relation to own work, and begins to take personal responsibility for identifying and managing risk factors e.g. Uses security protection and routinely backs up data Recognises some issues about the transparency and accessibility of information in relation to own role, and some of the benefits and drawbacks of being digitally connected to others and takes some steps to manage associated risks e.g. checks email addresses before sending.</td>
<td>Uses digital technologies and systems safely, legally and ethically when gathering, storing, accessing and sharing information, with a growing awareness of the permanence and transparency of all activities Pays attention to when, how and why a device is connected to other sites, what information is being passed and whether it is protected Manages and maintains files securely in a variety of storage media and formats and is beginning to actively establish, maintain and monitor electronic paper trails.</td>
<td>Recognises broader positive and negative implications of new technologies for ways of working e.g. synergies and conflicts associated with increased transparency, the permanency of records, self-documentation of work done, location, collaboration, interests, accountability, online profiles and personas Pays close attention to the nature of connections, establishing who is directly or indirectly linked to whom and in what ways, and evaluating associated benefits and risks Is acutely aware of the importance of understanding, monitoring and controlling access to digitally stored and transmitted information.</td>
</tr>
</tbody>
</table>
Appendix 12: NZQF Level Descriptor Table

The table below provides a detailed description of each level in terms of learning outcomes, using common domains and dimensions of progression. Knowledge, skills and application describe what a graduate at a particular level is expected to know, do and be. The term application encompasses responsibility, behaviours, attitudes, attributes and competence.


<table>
<thead>
<tr>
<th>LVL</th>
<th>KNOWLEDGE</th>
<th>SKILLS</th>
<th>APPLICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Basic general and/or foundation knowledge</td>
<td>Apply basic solutions to simple problems</td>
<td>Highly structured contexts Requiring some responsibility for own learning Interacting with others</td>
</tr>
<tr>
<td>2</td>
<td>Basic factual and/or operational knowledge of a field of work or study</td>
<td>Apply known solutions to familiar problems</td>
<td>General supervision Requiring some responsibility for own learning and performance Collaborating with others</td>
</tr>
<tr>
<td>3</td>
<td>Some operational and theoretical knowledge in a field of work or study</td>
<td>Select and apply from a range of known solutions to familiar problems</td>
<td>Limited supervision Requiring major responsibility for own learning and performance Adapting own behaviour when interacting with others Contributing to group performance</td>
</tr>
<tr>
<td>4</td>
<td>Broad operational and theoretical knowledge in a field of work or study</td>
<td>Select and apply solutions to familiar and sometimes unfamiliar problems</td>
<td>Self-management of learning and performance under broad guidance Some responsibility for performance of others</td>
</tr>
<tr>
<td>5</td>
<td>Broad operational or technical and theoretical knowledge within a specific field of work or study</td>
<td>Select and apply a range of solutions to familiar and sometimes unfamiliar problems</td>
<td>Complete self-management of learning and performance within defined contexts Some responsibility for the management of learning and performance of others</td>
</tr>
<tr>
<td>6</td>
<td>Specialised technical or theoretical knowledge with depth in a field of work or study</td>
<td>Analyse and generate solutions to familiar and unfamiliar problems</td>
<td>Complete self-management of learning and performance within dynamic contexts Responsibility for leadership within dynamic contexts</td>
</tr>
<tr>
<td>LVL</td>
<td>KNOWLEDGE</td>
<td>SKILLS</td>
<td>APPLICATION</td>
</tr>
<tr>
<td>-----</td>
<td>---------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>7</td>
<td>Specialised technical or theoretical knowledge with depth in one or more fields of work or study</td>
<td>Analyse, generate solutions to unfamiliar and sometimes complex problems Select, adapt and apply a range of processes relevant to the field of work or study</td>
<td>Advanced generic skills and/or specialist knowledge and skills in a professional context or field of study</td>
</tr>
<tr>
<td>8</td>
<td>Advanced technical and/or theoretical knowledge in a discipline or practice, involving a critical understanding of the underpinning key principles</td>
<td>Analyse, generate solutions to complex and sometimes unpredictable problems Evaluate and apply a range of processes relevant to the field of work or study</td>
<td>Developing identification with a profession and/or discipline through application of advanced generic skills and/or specialist knowledge and skills Some responsibility for integrity of profession or discipline</td>
</tr>
<tr>
<td>9</td>
<td>Highly specialised knowledge, some of which is at the forefront of knowledge, and a critical awareness of issues in a field of study or practice</td>
<td>Develop and apply new skills and techniques to existing or emerging problems Mastery of the field of study or practice to an advanced level</td>
<td>Independent application of highly specialised knowledge and skills within a discipline or professional practice Some responsibility for leadership within the profession or discipline</td>
</tr>
<tr>
<td>10</td>
<td>Knowledge at the most advanced frontier of a field of study or professional practice</td>
<td>Critical reflection on existing knowledge or practice and the creation of new knowledge</td>
<td>Sustained commitment to the professional integrity and to the development of new ideas or practices at the forefront of discipline or professional practice</td>
</tr>
</tbody>
</table>

**Diploma Qualifications**

<table>
<thead>
<tr>
<th>Diploma</th>
<th>Purpose</th>
<th>Outcomes</th>
</tr>
</thead>
</table>
| Level 5 | A diploma at level 5 qualifies individuals with theoretical and/or technical knowledge and skills within a specific field of work or study. | A graduate of a level 5 diploma is able to:  
- demonstrate broad operational or technical and theoretical knowledge within a specific field of work or study  
- select and apply a range of solutions to familiar and sometimes unfamiliar problems  
- select and apply a range of standard and non-standard processes relevant to the field of work or study  
- demonstrate complete self-management of learning and performance within defined contexts  
- demonstrate some responsibility for the management of learning and performance of others |
| Level 6 | A diploma at level 6 qualifies individuals with theoretical and/or technical knowledge and skills in specialised/strategic contexts. | A graduate of a level 6 diploma programme is able to:  
- demonstrate specialised technical or theoretical knowledge with depth in a field of work or study  
- analyse and generate solutions to familiar and unfamiliar problems  
- select and apply a range of standard and non-standard processes relevant to the field of work or study  
- demonstrate complete self-management of learning and performance within dynamic contexts  
- demonstrate responsibility for leadership within dynamic contexts. |
Appendix 13: Secondary Schools Digital Technologies – skills, competencies

8. Secondary Schools Digital Technologies - Categorisation of Skills, Competencies and Qualifications

Digital technologies focus on understanding, developing and using digital software, hardware and electronic systems across a range of contexts including school, the home and wider community settings. Students develop understandings and skills related to producing quality digital outcomes or environments.

There are five categories created for the Digital Technologies Achievement Standards in schools. These categories are Electronics, Digital Information, Digital Infrastructure, Digital Media, and Programming and Computer Science. Note that Electronics is outside the scope of this review, as it is part of the 2011 Electrical/Electro-technology review (The Skills Org).

The Body of Knowledge for these five strands at secondary level is as follows. Note that the tertiary qualification framework will follow on from this:

1. **Electronics**
   - a. Demonstrate an understanding of the devices, concepts and standards underlying the design and construction of electronic and embedded software systems.
   - b. Be able to assemble, program, test, debug and modify electronic and embedded software systems
   - c. Be able to design, construct and populate functional PCB circuits
   - d. Be able to design and analyse systems to solve problems using electronic and software elements

2. **Digital Information**
   - a. Demonstrate an understanding of the role of digital tools and systems for managing information.
   - b. Be able to use digital tools to design and construct systems to manage information for a specific purpose

3. **Digital Infrastructure**
   - a. Demonstrate an understanding of digital infrastructure: hardware, software, networks, and their components
   - b. Be able to design, and evaluate the performance of, a digital infrastructure
   - c. Be able to build, configure and maintain digital hardware and networks, including installing software

4. **Digital Media**
   - a. Demonstrate an understanding of the types of digital media, and how they are created.
   - b. Be able to create and publish a quality digital media product using appropriate media tools.

5. **Programming and Computer Science**

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45 Electronics is outside the scope of this review but is included here for context.
a. Demonstrate an understanding of concepts across Computer Science and Software Engineering
b. Be able to understand, select and design data types, data structures, algorithms, and program structures for a program to meet specified requirements, and evaluate user interfaces.
c. Be able to read, understand, write, and debug software programs using an appropriate programming language, tools, and software development process.

These are described in more detail in the context of secondary education through the Technology Body of Knowledge at:

Maybe include a matrix of the ASs and how they link to the digital technology body of knowledge. Request to Bryan 25 March....

**Digital technologies**

Digital technologies focus on understanding, developing and using digital software, hardware and electronic systems across a range of contexts including school, the home and wider community settings. Students develop understandings and skills related to producing quality digital outcomes or environments.

**Indicators of progression**

Indicators of progression have been developed for each digital technologies component. These describe the achievement objective, offer teacher guidance, and provide indicators of expected student performance/understanding at levels 6, 7, and 8. Learn more: Technology Online: Curriculum support indicators of progression – digital technologies

**The components of digital technologies**

**Knowledge of digital information management**

This component focuses on the knowledge, skills, and competencies that people need to locate, evaluate, and present digital information efficiently, effectively, and ethically.

**Create a digital information outcome**

This component requires students to manipulate and combine data using information management tools to create an outcome.

**Knowledge of digital media**

Digital media focuses students on understanding how different media types integrate to create digital content for the web, interactive digital platforms, and print.

**Create a digital media outcome**

This component requires students to construct a digital media outcome that integrates media types and incorporates original content.

**Knowledge of computer science and software engineering**

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This component focuses on the concepts and tools that are needed to write programs that run quickly, are easy to use, and produce effective output. It also requires an understanding of the limitations of computers.

Design a software program structure
Designing a software program structure requires students to apply software practices to construct an algorithm to achieve an outcome.

Construct a software program
Constructing a software programme requires student to develop, test, and debug a software program that achieves the tasks describe by an algorithm.

Knowledge of electronic environments
Knowledge of electronic environments focuses on the integration of electronic components and techniques to design electronic environments.

Develop an electronic environment
This component requires students to integrate electronic components and techniques to assemble and test an electronic environment.

Assemble and test electronic and embedded systems
This component requires students to create a specified system by successfully integrating hardware and software, and applying testing and debugging techniques.

Knowledge of digital infrastructure
Knowledge of digital infrastructure focuses on how to build, install, maintain, and support computers, networks, and systems so that they are secure and efficient. It includes understanding how the physical components of a system, the security of the system, and the processes and technologies work together to allow people and organisations to use the system.

Design a digital infrastructure system
Designing a digital infrastructure system requires student to use techniques to select, assemble, configure, and install hardware and software components for a specified purpose.
### Specialist Categories of Technological Knowledge and Skills – Digital Technologies Extract (sorted by ICT review categories)

*Digital Technologies* focuses on applying and knowing about computer science, electronic and digital applications. 
*It is envisaged these standards will provide assessment tools for current school courses such as: computing, digital media, information management, and electronics etc.*

<table>
<thead>
<tr>
<th>Level 1 – Digital Technologies</th>
<th>Level 2 – Digital Technologies</th>
<th>Level 3 – Digital Technologies</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Digital media and information management</strong></td>
<td><strong>Development &amp; Computer Science</strong></td>
<td><strong>Infrastructure</strong></td>
</tr>
<tr>
<td>AS91070 Demonstrate understanding of basic concepts of information management 3 credits External</td>
<td>AS91367 Demonstrate understanding of advanced concepts relating to managing shared information within information systems 3 credits External</td>
<td>AS91632 Demonstrate understanding of complex concepts of information systems in an organisation 4 credits External</td>
</tr>
<tr>
<td>AS91071 Implement basic procedures to produce a specified digital information outcome 4 credits Internal</td>
<td>AS91368 Implement advanced procedures to produce a specified digital information outcome with dynamically linked data 6 credits Internal</td>
<td>AS91633 Implement complex procedures to develop a relational database embedded in a specified digital outcome 6 credits Internal</td>
</tr>
<tr>
<td>AS91072 Demonstrate understanding of basic concepts of digital media 3 credits Internal</td>
<td>AS91369 Demonstrate understanding of advanced concepts of digital media 4 credits Internal</td>
<td>AS91634 Demonstrate understanding of complex concepts of digital media 4 credits Internal</td>
</tr>
<tr>
<td>AS91073 Implement basic procedures to produce a specified digital media outcome 4 credits Internal</td>
<td>AS91370 Implement advanced procedures to produce a specified digital media outcome 4 credits Internal</td>
<td>AS91635 Implement complex procedures to produce a specified digital media outcome 4 credits Internal</td>
</tr>
<tr>
<td>AS91074 Demonstrate understanding of basic concepts from computer science 3 credits External</td>
<td>AS91371 Demonstrate understanding of advanced concepts from computer science 4 credits External</td>
<td>AS91636 Demonstrate understanding of areas of computer science 4 credits External</td>
</tr>
<tr>
<td>AS91075 Construct a plan for a basic computer program for a specified task 3 credits Internal</td>
<td>AS91372 Construct a plan for an advanced computer program for a specified task 3 credits Internal</td>
<td>AS91637 Develop a complex computer program for a specified task 6 credits Internal</td>
</tr>
<tr>
<td>AS91076 Construct a basic computer program for a specified task 3 credits Internal</td>
<td>AS91373 Construct an advanced computer program for a specified task 3 credits Internal</td>
<td>AS91638 Demonstrate understanding of complex concepts used in the design and construction of electronic environments 4 credits Internal</td>
</tr>
<tr>
<td>AS91077 Demonstrate understanding of basic concepts used in the design and construction of electronic environments 3 credits Internal</td>
<td>AS91374 Demonstrate understanding of advanced concepts used in the construction of electronic environments 3 credits Internal</td>
<td>AS91639 Implement complex interfacing procedures in a specified electronic environment 4 credits Internal</td>
</tr>
<tr>
<td>AS91078 Implement basic interfacing procedures in a specified electronic environment 3 credits Internal</td>
<td>AS91375 Implement advanced interfacing procedures in a specified electronic environment 3 credits Internal</td>
<td>AS91640 Implement complex techniques in constructing a specified complex electronic and embedded system 4 credits Internal</td>
</tr>
<tr>
<td>AS91079 Implement basic techniques in constructing a specified electronic and embedded system 3 credits Internal</td>
<td>AS91376 Implement advanced techniques in constructing a specified advanced electronic and embedded system 3 credits Internal</td>
<td>AS91641 Demonstrate understanding of wide area network technologies 4 credits Internal</td>
</tr>
<tr>
<td>AS91080 Demonstrate understanding of the common components of basic digital infrastructures 3 credits Internal</td>
<td>AS91377 Demonstrate understanding of local area network technologies 3 credits Internal</td>
<td>AS91642 Implement procedures for administering a local area network 4 credits Internal</td>
</tr>
<tr>
<td>AS91081 Implement basic procedures for servicing a personal computer system 4 credits Internal</td>
<td>AS91378 Implement procedures for administering a local area network 4 credits Internal</td>
<td>AS91643 Implement procedures for administering a wide area network 4 credits Internal</td>
</tr>
</tbody>
</table>

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Appendix 14: Tech Republic trends and future focus

Ten business trends for 2013

“The world is far faster, more chaotic and reactionary than just five years ago. The need for greater flexibility and agility in a tougher world market will see changes including:

- Accelerating virtualisation with a greater number of part time employees and a rise in the number of new, small, specialised companies to exploit their niche capabilities
- A wider workforce dispersion within and without countries will change business needs, demands, and modes of management and delivery beyond the established outsourcing model.
- Far fewer full-time employees and the old management structures and supports wane as they are recognised to be out of step with ‘the new stable economy’.
- A rapid growth in online business and transactions and an increasing contraction of the off-line sector will occur as the old struggles to keep costs down and profitability up versus online.
- Electronic marketing skewing markets by driving more traffic and customers toward fewer select products - i.e. the attraction of the fashionable/best.
- Manufacturing, supply and logistics will begin a migration toward a new mode of far greater dispersion and integration to satisfy ‘green’ energy and material supply limitation.
- Business modelling, war gaming and decision support will be ever more necessary as the old management methods developed well over 100 years ago fall foul of the non-linear environment.
- Big data is just a manifestation of these changes and the realisation that the money will be made by exploiting the meta data that defines customer and market behaviour past, present & future.
- IT departments will continue to decline as they are seen as increasingly irrelevant with more capable workforces making a unilateral declaration of independence, adopting BYOD, and striking out as independent workers.
- Information/analysis departments will be born and suffer extreme difficulty in finding the info scientists, analysts, modellers, and innovative thinkers that will be required to power up business.

In support of all this will be a rise of a number of key technologies and operational changers:

- The cloud will transit from toy to necessity with services and new security systems emerging to support an increasingly mobile, transitory, and flexible workforce of mobile and agile people.
- BYOD will become the default mode with the days of companies being dominant providers of all IT equipment and support begins to decline.
- Artificial Intelligence services will be born as providers sell their services online to a workforce hungry for up to date information, wisdom and advice beyond human ability.
- Virtual IT departments/tech support is going to be a new sector that will grow rapidly to meet the needs of a workforce focussed on getting more done, with less, in a much shorter time."

47 Peter Cochrane, Ten business trends for 2013 – and four ways they affect you. TechRepublic
Tech trends for 2013

The IT sector is characterised by innovation and fast pace of change. Leaders need to be smart about decisions they make and leverage next-generation tools and strategies. TechRepublic identified ‘Tech Trends to watch out for in 2013’.

- Cloud inter-operability will take the spotlight – hybrid cloud environments that may mix public/private approach
- Worldwide economic struggles will direct the data centre world – fewer physical data centres with the shift to private clouds
- BYOD and virtualization will collide – evolution of smart-phone, tablet, laptop and other mobile devices will begin leveraging virtualisation technologies (virtual identities – but potential security and identity challenges.
- Cloud outages by major web hosts will gain momentum
- Cyber security – how to protect people on the internet

Digital technologies provide a platform to achieve results. User experience for the future needs to be aggregated, contextual and accessible from mobile, desktop and cloud interfaces.

Appendix 15: 2013 Horizon.K12: The Interim Results

This project considers emerging technologies, trends and challenges in ICT.

The NMC is pleased to announce the interim results of the 2013 Horizon.K12 Project\(^{49}\), as presented at the 2013 CoSN Conference in San Diego. The Horizon Project Advisory Board voted for the top 12 emerging technologies as well as the top ten trends and challenges that they believe will have a significant impact on teaching, learning, and creative inquiry in global K-12 education over the next five years. These initial results will be compiled into an interim report, known as the "Short List," and described in further detail.

The "Time-to-Adoption Horizon" indicates how long the Advisory Board feels it will be until a significant number of schools are providing or using each of these technologies or approaches broadly.

Near-Term Horizon: One Year or Less
* BYOD (Bring Your Own Device)
* Cloud Computing
* Mobile Learning
* Online Learning

Mid-Term Horizon: Two to Three Years
* Adaptive Learning and Personal Learning Networks
* Electronic Publishing
* Learning Analytics
* Open Content

Long-Term Horizon: Four to Five Years
* 3D Printing
* Augmented Reality
* Virtual and Remote Laboratories
* Wearable Technology

Top 10 Trends (alphabetical order)
* The abundance of resources and relationships made easily accessible via the Internet is increasingly challenging us to revisit our roles as educators.
* As the cost of technology drops and school districts revise and open up their access policies, it is becoming increasingly common for students to bring their own mobile devices.
* Customized learning is increasingly a goal for schools.
* Education paradigms are shifting to include online learning, hybrid learning, and collaborative models.
* The focus of assessments is shifting from "what you know (can memorize)" to "what you can do (portfolio)."
* Openness — concepts like open content, open data, and open resources, along with notions of transparency and easy access to data and information — is becoming a value.
* People expect to be able to work, learn, and study whenever and wherever they want.
* Schools are beginning to move away from textbooks to web resources and open source books.
* Social media is changing the way people interact, present ideas and information, and communicate.
* There is a new emphasis in the classroom on more challenge based, active learning.

Top 10 Challenges (alphabetical order)
* The demand for personalized learning is not adequately supported by current technology or practices.
* Divides persist.
* Faculty training still does not acknowledge the fact that digital media literacy continues its rise in importance as a key skill in every discipline and profession.
* Innovating pedagogy is a complex process that requires research into impacts, responsive state of mind to technology changes, and understanding what pedagogical strategies can make innovation in pedagogy possible.
* K-12 must address the increased blending of formal and informal learning.
* Ongoing professional development needs to be valued and integrated into the culture of the schools.
* Many activities related to learning and education take place outside the walls of the classroom and thus are not part of traditional learning metrics.
* New models of education are bringing unprecedented competition to the traditional models of education.
* Too often it is education’s own processes and practices that limit broader uptake of new technologies.
* We are not using digital media for formative assessment the way we could and should.

Note: There is also an NMC Horizon Project – Regional Analysis Report: Technology Outlook - New Zealand Tertiary Education 2011-16
APPENDIX 16: TERTIARY EDUCATION COMMISSION: FUNDING & FOUNDATION LEARNING

The Tertiary Education Strategy provides the overall framework within which funding decisions are made, ensuring that funding supports TEOs to deliver on the government’s outcome priorities.

Each fund has specific eligibility criteria that define which TEOs may apply for that funding. Criteria are specified in a funding determination by the Minister of Education according to section 159L of the Education Act 1989.

The TEC have released guidance for TEOs seeking funding for foundation education at levels one and two. The Foundation Focused Training Opportunities programmes50 are targeted towards learners at the highest risk of long-term benefit dependency with an explicit focus on improving literacy and numeracy skills, including digital literacy.

The TEC Student Achievement Component51 sets out the policy objectives, explains how the TEC will allocate funds, along with eligibility and reporting requirements for Student Achievement Component (SAC) for levels 1 and 2 foundation education funded provision.

The approach is to make sure that TEC investment reflects the Governments policy objectives for SAC funded provision at levels one and two, which seeks to:

a. provide people who do not already have essential foundation skills with a low-cost way to gain them;
b. provide progression to higher-level study and skilled employment;
c. build the language, literacy and numeracy skills of eligible students;
d. enable beginning students to learn English or te reo Māori; and

“Foundation skills” in this context means not just literacy, language and numeracy (LLN, which includes digital literacy), but also life and communication skills that prepare learners for further study or for entering/re-entering the workforce.

From 2013, all SAC provision at levels 1 and 2 must be targeted at learners who need it most. This means the majority of learners enrolled in a level 1 or 2 qualification must have little or no prior qualifications at the point of enrolment.

To be eligible, learners should have:

No or low levels of qualifications i.e. learners must not have NCEA level 2, School Certificate or other equivalent qualifications equal to Level 2 on the New Zealand Qualifications Framework (NZQF). Learners with NCEA level 1 are eligible (Te Reo and ESOL language programmes are exempt from this learner eligibility requirement).

The new prior achievement criterion seeks to ensure government funding is better targeted to learners with no or low prior achievement, and with literacy and numeracy needs. Over time, no more than 10% of learners enrolling in a level 1 or 2 SAC-funded qualification will have a qualification at level 2 on the New Zealand Qualifications Framework.

50 TEC Foundation Focused Training Opportunities programmes http://www.tec.govt.nz/Funding/Fund-finder/Foundation-Focused-Training-Opportunities/
51 Student Achievement Component funded provision at levels 1 and 2 http://www.tec.govt.nz/Funding/Fund-finder/Student-Achievement-Component/Levels-1-and-2/
To reflect these objectives, from 2013 onward, the TEC has set new quality standards and eligibility requirements for all delivery at levels one and two. An increasing proportion of SAC investment in NZQF levels one and two will be allocated via a competitive process, starting with approximately one third of level one and two funding in 2013.

Further information and documentation associated with the competitive process is published on the TEC website.

More information regarding the competitive allocation process is available in:

- Levels 1 and 2 Supplementary Plan Guidance
- Supporting Information for 2013 and 2014 SAC Levels 1 and 2 competitive process
Appendix 17: Mandatory deliverables

Requirements and guidelines

All qualifications must be consistent with the general listing requirements outlined in Section 3 of The New Zealand Qualifications Framework.

New qualifications at Levels 1-6 must also meet the requirements outlined in Section 4 of this document, if they are to be listed on the NZQF.

NZQA offers guidelines for approval of qualifications at Levels 1-6 for listing on the NZQF.

To assist qualification developers in considering their approach to managing consistency, NZQA has a discussion paper on ensuring consistency of qualification outcomes.

Summary of requirements for application to develop qualifications

Approval to develop a qualification

Applications for approval to develop a qualification must include the following information and evidence:

- Qualification title, type, level and credit value
- New Zealand Standard Classification of Education (NZSCED) code (it may also include the Directory of Assessment Standards classification)
- A statement of strategic purpose
- A qualification outcome statement (including graduate profile, and education and employment pathways)
- Identification of any duplication with existing qualifications on the NZQF
- Explanation of need for qualification and evidence of confirmation of need
- The Stakeholder Profile for the qualification
- Description of stakeholder involvement and evidence of support
- Name and legal status of the qualification developer

The process and templates for submitting applications to NZQA can be found on the NZQF page of the NZQA website.

Listing qualifications on the NZQF

Qualification developers must seek approval to develop and list qualifications on the New Zealand Qualifications Framework (NZQF) from the relevant quality assurance body.

The development of New Zealand qualifications at Levels 1-6 and their subsequent listing on the NZQF involve two distinct stages.

1. Application to develop

Initially, developers apply to NZQA for approval to develop a qualification. This stage ensures all new qualifications are relevant and do not duplicate those already on the NZQF.

NZQA requires the following forms and information at this stage:
- NZQF1 - Application for Approval to Develop a Qualification at Levels 1-6
- NZQF2 - Involvement in Pre-Development Stage Stakeholder Attestation

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Along with:
- a needs analysis, and
- evidence showing how decisions were made, so the quality assurance body analyst can understand how agreement was reached on the qualification detail – “the story”.

To report results of the qualifications review process, complete and submit:
- NZQF5: Report of the Qualifications Review
- NZQF6: Outcomes of a Qualifications Review: Changing the status of current qualifications
  Qualification owners need to complete NZQF6 to confirm their acceptance of the proposed new suite of qualifications arising from the review.

**About stakeholder attestations**

Stakeholder attestations are required from all stakeholders directly involved in the qualification development. They provide evidence of the support for the qualifications and the extent of collaboration and involvement by stakeholders.

Link to: details about submitting an application for approval to develop a qualification.

**2. Application for approval**

The second stage occurs once the qualification has been developed and involves applying for NZQA approval. Once approved, that qualification is listed on the NZQF.

To submit an application for approval of a qualification, the following forms must be completed and information provided:

- NZQF3 - Application for Approval of a Qualification at Levels 1-6
- NZQF4 - Involvement in Qualification Development Stakeholder Attestation

Link to: details about submitting an application for approval of a qualification.

Once a qualification is registered on the NZQF, an institution that proposes providing a programme of study or training that leads to the newly listed qualification must apply to NZQA for approval of the programme. Details on programme approval and provider accreditation are available on the NZQA website, including new guidelines.
Appendix 18: ICT Qualifications Landscape Consultation Feedback July 2013

Stakeholder feedback on the landscape consultation, 21 June – 12 July 2013, generally supported the proposed landscape of ICT qualifications to be developed. However there were a few issues raised that required further consideration. The key issues, with Steering Group (SG) response, include:

- **Siloing at level 5**
  Concern about over-specialising too early and a preference for a more general IT diploma at level 5.
  
  SG agreed to removal of strands/specialties in level 5 Diplomas.

- **Too many separate qualifications at level 6**
  Concern that too many specialisations were proposed at level 6, and a preference for qualifications to be developed to equip learners for more than one job role, due to the similar base knowledge and skills required.
  
  SG agreed to replace specialty IS qualifications with strands in level 6 IS Diplomas.

- **Level 7 degree pathways**
  Education pathway progression and the importance of diplomas providing pathways to degree qualifications.
  
  SG acknowledged this would be covered under employment pathways.

- **Web qualification at level 5**
  Concern that the only web development option was within the proposed two year/240 credit level 6 NZ Diploma in Software Development.
  
  SG agreed web development was appropriate to remain within the proposed 240 credit diploma, and to brief the work group on developing a web development/design qualification at level 5.

- **Software development**
  Extremes of views from degree minimum to a short vendor certification related option.
  
  SG discussed the possibility of having two one year Diploma qualifications, but determined that one year at level 5 would not be adequate to prepare a learner for a career in programming related roles. The SG agreed that there was sufficient industry support for a 2 year qualification, and that this option would be developed.

- **Alignment with vendor certifications**
  • Support for considering how vendor certification may align with proposed NZ qualifications.
    
    SG agreed to mention of relevant vendor certifications where these were identified, and most likely to be clarified in phase 2 of development.
  
  • Variable support for shorter NZ qualifications to enable IT professionals to up-skill and be credentialed to keep current in an industry with a fast pace of change.
    
    SG agreed to develop a Certificate at level 6 to recognize the need for up-skilling IT practitioners.

- **Flexibility**
  Seeking reassurance that there will be sufficient flexibility in qualification design to allow for a range of teaching and course delivery methods, and to consider direct entry to level 6 qualifications where suitable prior knowledge and experience is evidenced.
  
  SG acknowledged that the direction to the working groups was to ensure that the draft qualifications were developed in a way that allowed programmes to be developed to enable delivery in a range of contexts; and that suitable prior knowledge and other entry requirements would be clarified further in stage 2.
There were a number of other issues raised which were also considered, such as the structure of qualifications and whether the current general rules around qualifications on the NZ Qualifications Framework allowed for the level of flexibility some providers sought. When considering the qualifications we ask that you consider whether the above issues have been adequately addressed.

**Proposed landscape that went to consultation June/July 2013:**

<table>
<thead>
<tr>
<th>NZQF Level</th>
<th>IT as a Tool</th>
<th>IT as a profession</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>NZ Certificate in Computing Fundamentals</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>NZ Certificate in Computing</td>
<td>3 NZ Certificate in IT Essentials</td>
</tr>
<tr>
<td>4</td>
<td>NZ Certificate in Computing (Advanced)</td>
<td>4 NZ Certificate in IT Essentials</td>
</tr>
<tr>
<td>5</td>
<td>NZ Diploma in Information Technology (optional strands)</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>NZ Diploma in IT (Networking)</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>NZ Cert/Dip in IT Security</td>
<td>7</td>
</tr>
</tbody>
</table>

**Proposed landscape that went to working groups following consultation June/July 2013:**
Appendix 19: ICT Qualifications Consultation Feedback October 2013

Stakeholder feedback on the draft qualifications consultation, 25 September – 16 October 2013, generally supported the draft qualifications and supported them to be developed.

There were a number of concerns raised, and some of these have been addressed and some have been held over as they were more appropriately considered in the next stage of development. All submissions were considered in detail by the project team and Steering Group.

The key issues, with Steering Group (SG) response, include:

- **Support for qualifications**
  There was strong support for the proposed qualifications through the multiple consultation processes. The first and second consultation drove the development of the qualifications and included significant industry input and support. The third consultation was predominantly with providers and included moderate to strong support. Where support was moderate, the SG considers the additional issues raised and made a number of changes as outlined below.
  
  The SG agreed sufficient evidence of support exists to proceed to the “Approval to Develop” stage.

- **Changes to qualification titles**
  Several recommendations were made to change the titles of some of the qualifications, including making it clearer that the ‘tools’ qualifications were intended for ‘users’; showing level rather than ‘essentials’ in the transition qualification; and clarifying the systems and networking title.
  The SG agreed to a number of these as follows.
  
  - Changing from “NZ Diploma in Systems and Network Administration (L6)” to “NZ Diploma in Systems Administration and Networking (L6)”
  - Changing from “NZ Certificate in IT Essentials (Level 4)” to “NZ Certificate in Information Technology (Level 4)”.
  - Changing from “NZ Certificate in Computing” qualifications to:
    - “NZ Certificate in Computing (User Fundamentals) (Level 2)”
    - “NZ Certificate in Computing (Intermediate User) (Level 3)” and
    - “NZ Certificate in Computing (Advanced User) (Level 4)”.

- **Level 5 Certificate in IT**
  The ITENZ submission, supported by others, raised concerns about the L5 Certificate in IT; the lack of hands-on nature for it; the compulsory inclusion of some programming; and also suggested reducing the size to 40 credits.
  
  SG discussed this in detail and this was also the subject of an additional meeting of a subset of the SG. After this considerable discussion, the SG concluded that, given the content, purpose and outcomes specified through the detailed process to date, and agreed by the Steering Group, this qualification should remain at 60 credits. The SG also agreed that mention of the hands-on nature of learning should be reinforced in the documentation for application for approval to develop; and that the Chair of the SG would respond directly to ITENZ regarding the submission and decisions made.

- **Up-skilling**
  There is a proposed NZ Certificate in Information Technology (Practitioner) at Level 6 for experienced practitioners looking to up-skill. There is some concern at the TEC policy of only funding a qualification once (or once within a period of time) meaning only one chance for a learner to up-skill within the framework. Some submissions suggested that (around) 4 strands be included to enable up-skilling in different areas (e.g. “Server Administration”, “Network Security”, “Database Administration” and “Network Security”).
  
  SG discussed this and agreed that it required further consideration but shouldn't delay the
submission for stage 1. The SG agreed that advice re the intent to explore strands or other potential structural changes to this qualification to better meet the intent would be undertaken in the next stage of development, and mention of this should be included in the documentation for approval to develop.

- **Software development**
  Extremes of views from degree minimum to a short vendor certification related option, and a number of submissions supporting 2 x 1 year qualification options.

  SG had discussed the possibility of having two one year Diploma qualifications at several stages throughout the process, but re-determined that the strong view from industry was that one year at level 5 would not be adequate to prepare a learner for a career in programming related roles. The SG agreed that there was strong evidence of industry support for a 2 year qualification, and that this was the most appropriate option.

- **Generalisation/Specialisations**
  IT: There was one submission in particular that was against the generalisation of qualifications at Level 5, and a request for the addition of a specialist network engineering and computer technician qualification.

  SG noted that the change to a more generalised Level 5 was made following a significant amount of earlier feedback that level 5 was too early to specialise, and agreed to retain qualifications as proposed. SG believed that an additional qualification was not necessary and that the concern that this wouldn’t “fit” an existing qualification could be addressed at the programme level. The next stage of qualifications development would address additional contexts such as this.

  Web: Several submissions were seeking a level 6 web development qualification

  The SG agreed the proposed qualifications would meet this need, with the opportunity to choose a web development context in the NZ Diploma in Software Development (Level 6). The SG were made aware of the Creative Arts MRoQ developing draft web design and development qualifications at both Levels 5 & 6 which were yet to go to consultation, and agreed to keep in touch with this review as it progresses.

  Teacher education: Concern about equipping teachers to teach ICT

  The SG agreed to suggest to the Teacher Education Review for a qualification to educate teachers of and in ICT given there was clear evidence of a need.

- **Vendor certification references**

  There was concern about naming these in documentation and the qualifications, given how quickly these change, and recommendation to include more generic wording in qualification documents to protect from outdating.

  SG agreed to remove mention of specifics and replace with “qualification may also equip learners to attempt ‘optional’ internationally recognised industry vendor certifications at the appropriate level and area of specialty”.

- **Needs analysis and Māori specialisations**

  There is continuing dialogue with the Wānanga over input to the needs analysis and ensuring the outcomes and other details of the ICT qualifications allow the Wānanga to deliver them while meeting the requirements of the Education Act.

  The SG agreed that any decision on the inclusion of additional graduate profile outcome statements should not delay the submission for application for approval to develop the qualifications. This issue was being considered across reviews and would likely be considered further in stage 2 of the development process.
- **Learner needs**  
  How well qualifications meet learner needs is a very important issue, and while it has been considered at each stage, we should continue to test against it.  
  *SG agreed to continue to consider this as a priority in the next stage of review.*

- **Level 7 degree pathways**  
  A number of submissions raised concern about education pathway progression and the importance of diplomas providing pathways to degree qualifications. This was a general concern and no submission raised a specific issue in relation to this.  
  *SG acknowledged this would be covered under employment pathways, and consider further as part of the next stage of development.*

- **Employment pathways**  
  Some submissions expressed concern that some Employment Pathways were overly broad or unrealistic for graduates at the particular level. An example was the Level 5 Certificate in Information Technology.  
  *SG agreed to generalise the L5 Certificate in IT Employment Pathway and adopt other suggestions from the consultation. SG industry members would review before submission, and further minor refinement could occur in the next stage of development.*

- **Lack of understanding of process and general review requirements**  
  There is some concern following discussions and some submissions that many providers don’t understand the purpose of the TRoQ/MRoQ and the new structure of qualifications across the board – i.e. with customisation and detail happening at the Programme level rather than the Qualification level. Many of the submissions express concern based on this misunderstanding. The SG and its participant organisations need to consider how best to address this issue, however it is an issue that needs to be considered across reviews.  
  *SG agreed to support constituent organisations such as ITENZ, CITRENZ and IITP working together on symposium-type events in the new year. This would also be raised as a concern within the review documentation.*

- **Detail wording feedback on draft qualifications**  
  There were a number of submissions providing detailed feedback proposing changes to the wording of graduate profile outcome statements or other parts of the draft qualifications.  
  *SG agreed to the project team making any minor wording adjustments that clarify the matters but don’t change the overall intentions from the SG and Working Group process; and agreed that any more significant wording changes be considered by WGs in the next stage of development.*

The following shows the landscape of draft qualifications that went to consultation, and the revised qualifications map incorporating agreed changes and showing what is being submitted for approval to develop.

Note that this landscape shows some possible Level 7 qualifications. Level 7 was outside the scope of this Review, however was considered in brief for consistency. No qualifications at Level 7 have been developed.
Proposed qualifications that went to consultation September/October 2013:

<table>
<thead>
<tr>
<th>NZQF Level</th>
<th>IT as a Tool</th>
<th>IT as a profession</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>General education review</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>NZ Certificate in Computing Fundamentals (40 credits)</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>NZ Certificate in Computing (60 credits)</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>NZ Certificate in Computing (Advanced) (60 credits)</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>NZ Certificate in Computing (Intermediate User) (60 credits)</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>NZ Certificate in Computing (Advanced User) (60 credits)</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>NZ Certificate in IT Essentials (60 credits)</td>
<td>7</td>
</tr>
</tbody>
</table>

Possible pathways... Bachelor Degrees (Level 7); Industry Certifications (Level 5, 6, 7)

Proposed Computing and IT Qualifications Map – November 2013 (to ‘approval to develop’)

<table>
<thead>
<tr>
<th>NZQF Level</th>
<th>IT as a Tool</th>
<th>IT as a profession</th>
</tr>
</thead>
<tbody>
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</table>

Possible pathways... Bachelor Degrees (Level 7); Industry Certifications (Level 5, 6, 7)
# ICT Qualifications Review – Summary of Timelines and Deliverables - 2013

<table>
<thead>
<tr>
<th>Pre-trigger</th>
<th>March</th>
<th>April</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>August</th>
<th>Sept</th>
<th>by 27 Sept</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milestones</td>
<td>Joint leads determined</td>
<td>Review TRIGGER</td>
<td>27th March</td>
<td>Review plan (by 27 June)</td>
<td>Preparations - application to develop new IT qualifications</td>
<td>Proposals submitted for approval</td>
<td>NZQF 1; NZQF 5; Needs analysis; review report</td>
<td>NZQF 2; Stakeholder endorsement (IITP)</td>
</tr>
<tr>
<td>Activities</td>
<td>Review scope &amp; qualifications confirmed</td>
<td>Stakeholder consultation list conf</td>
<td>Skills map for qualifications; Industry roles clarified</td>
<td>Draft review plan to SG for endorsement</td>
<td>Draft review plan to SG for endorsement</td>
<td>Consultation feedback and finalise WG brief for new qualifications</td>
<td>SG endorsement of qualifications</td>
<td></td>
</tr>
<tr>
<td>Deliverables</td>
<td></td>
<td></td>
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</tbody>
</table>

## SG Meetings

- **SG Meeting 1:** 10 April 10:30 - 3:00
- **SG Meeting 2:** 22 May 9:30 - 2:30
- **SG Meeting 3:** 21 June 10:30 - 5:00
- **SG Meeting 4:** Early July (9 or 10) Teleconference?
- **SG Meeting 5:** Mid July (16-18) Teleconference?
- **SG Meeting 6 & 7:** 6 August - WC 6th Aug; (7) late Aug - early Sept
- **SG meeting 8:** Early-mid Sept
- **SG meeting 9:** Mid late Sept (dealt if required)

## About: Decisions/ endorsements

- Develop draft Governance approach and terms of reference
- Draft terms of reference for consultation; invitations to nominate for Governance body
- (3) Scene setting, gap-identifying
- (2) Finalise graduate roles industry survey
- (2) Review plan sign off; Endorse needs analysis draft for consultation; landscape dev & endorse for consultation; Working group process & guidelines; Consultation and core planning
- (6) Confirm working groups and draft WG brief
- (5) Consultation feedback and finalise WG brief for qualifications landscape development

## Follow-up

- Appoint Steering Group members from nominations - IITP
- Provide survey - high level info gathering; job role info; gathering re industry SG members
- Industry survey; Draft review plan; Draft needs analysis
- Consultation documents for draft needs analysis; Draft landscape planning
- Confirm working groups appointed to develop qualifications according to SG brief
- Confirm landscape draft for new qualifications; development; approve WG brief

## Needs Analysis

- Review Plan
- Communications
- Provider survey 15 April - 22 May high level info gathering
- Webpage update with draft TRG & Governance approach - Update contact info; advised of trigger
- Webpage update with landscape; Compositions; Invitations for nominations for ITSA members
- Webpage update - minute of 1st SG meeting; draft full consultation feedback report
- Webpage update landscape consultation; WG ep + responses; Consultation; industry job roles & needs
- Webpage update - summary of consultation feedback re proposed landscape
- Webpage update - draft new qualifications consultation; Stakeholder endorsement forms
- Webpage update with SG endorsement for new qualifications
- Webpage update - summary of consultation feedback re proposed new IT quals

## Stakeholder & Consultation

- **Surveys:**
  - Provider survey 15 April - 22 May high level info gathering
  - Industry survey 27 May - 6 June industry job roles & needs

- **Consultations**
  - Monitory stakeholders re options for review (IITP - late June 2013)
  - Web & email consultation - Proposed approach re ITQ, to IITP
  - Process classified; info gap filling from NA - surveys proposed
  - Draft landscape preparation
  - New qualification landscape & planning & approval feed for consultation
  - Confirm work groups & their meeting brief; Late June/early July
  - SG endorse draft quals for consultation - late July/Aug
  - SG endorse draft quals for consultation - late July/Aug post consultation decision re endorse or modify qual
  - SG sign-off revised draft qualifications for further work or to finalise

## Compliance

- Draft consultation re proposed landscape, with draft needs analysis
- Full consultation for feedback on draft new quals (2-3 weeks)
- Draft consultation re proposed landscape, with draft needs analysis
- Full consultation for feedback on draft new quals (2-3 weeks)
- Full consultation for feedback on draft new quals (2-3 weeks)
- Finalise proposed quals for SG sign-off and submission

## Stakeholders

- Industry survey input
- Feedback to consultation on draft quals landscape; Expressions of interest to be involved in WGs
- Stakeholder consultation for feedback on draft new quals - 2 weeks
- Stakeholder consultation for feedback on draft new quals

## Working Groups

- Working Group expressions of interest 21 June - 5 July
- Working groups established week of 9-12 July
- WGs meet to develop new suite of IT quals 2 days 23/31 July
- MG will be reconvened to further develop new quals following feedback

## Quality Development

- Requests for input to needs analysis
- Provider survey input
- Industry survey input
- Feedback to consultation on draft quals landscape; Expressions of interest to be involved in WGs
- Stakeholder consultation for feedback on draft new quals - 2 weeks
- Stakeholder consultation for feedback on draft new quals

## ICT RoQ Needs Analysis - Nov 2013.docx

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APPENDIX 21: Te Wānanga o Aotearoa (TwoA)

Introduction to Te Wānanga o Aotearoa learners
Te Wānanga o Aotearoa (TwoA) is a multi-sited tertiary provider that has supplied input to the ICT needs analysis to ensure key considerations for TwoA communities and learners have been addressed. Iwi, hapu and communities have aspirations to up-skill digital immigrants to become digital native, and TwoA have a particular concern for areas of society that don’t have access to computers in homes, and how these learners are to be transitioned and supported.

TwoA also emphasise the importance of addressing the needs of those without existing qualifications, described as second chance learners, which include Māori youth under 25 years, and Māori women over 30 years; and particularly those that are re-entering the workforce and who may not have traditionally engaged with aspects of ICT.

Background to Te Wānanga o Aotearoa
Te Wānanga o Aotearoa (TwoA) was founded in 1983 in response to a recognised need for an organisation to provide education to those who had not fared well in the mainstream education system. Initially established as the Waipa Kōkiri Arts Centre, the organisation provided educational opportunities for those without educational qualifications.

In 1988, tertiary status was gained by the organisation as the Aotearoa Institute and, in 1989, changes to the Education Act allowed the institute to become a Wānanga. A Wānanga is described in the Education Act (1989, section 162(4)(b)(iv)) as being “characterised by teaching and research that maintains, advances, and disseminates knowledge and develops intellectual independence, and assists the application of knowledge regarding āhuatanga Māori (Māori tradition) according to tikanga Māori (Māori custom)”.

The three wānanga are designated under the Education Act 1989 as unique organisations who offer quality education based on Māori principles and values. There is a significant difference in size and offerings between wānanga.

Further exploration of the concept of wānanga is contained in the next section.

Waitangi Tribunal – The Concept of a Wānanga
The following is from the Report on the Aotearoa Institute claim concerning Te Wānanga o Aotearoa – Chapter 2: The Concept of a Wānanga, includes the definition of a wānanga provided in section 162(4)(b)(iv) of the Education Act 1989 (as added by section 36 of the Education Amendment Act 1990):

A wānanga is characterised by teaching and research that maintains, advances, and disseminates knowledge and develops intellectual independence, and assists the application of knowledge regarding āhuatanga Māori (Māori tradition) according to tikanga Māori (Māori custom).

The Tribunal went on to explain that, although wānanga are iwi-based and iwi-initiated institutions, they are open to everybody, regardless of ethnicity:

53 The Report on the Aotearoa Institute claim concerning Te Wānanga o Aotearoa – Chapter 2: The Concept of a Wānanga, retrieved 1 November 2013 [link to Waitangi Tribunal report]
Wānanga, like their cousins – universities, polytechnics, and colleges of education – are providers of education that teach all who wish to learn. The difference between these institutions lies not only in what they teach but also in how they teach it. In other words, the difference lies in the system or 'cultural mindset' of delivery.

This means that 'Māori studies' as taught in universities ‘focuses on studying Māori society from a Pākehā perspective, while mātauranga Māori is about studying the universe from a Māori perspective’

The Tribunal concluded that:

Wānanga is an ancient process of learning that encompasses te reo and mātauranga Māori. Wānanga embodies a set of standards and values. As a verb, ‘to wānanga’ is to make use of mātauranga Māori in all its forms in order to teach and learn. It is clear that te reo Māori and mātauranga Māori are taonga. Wānanga is given life by these taonga, and in the reciprocal nature of the Māori world, wānanga also serves to give life to te reo and mātauranga. Each is dependent on the others to nurture, sustain, and develop.

The Tribunal found that wānanga, ‘as a system of learning, and a repository of mātauranga Māori, is a taonga in its own right’. Yet, it does not exist in isolation from te reo and mātauranga Māori:

Modern institutions claiming status as wānanga and calling themselves wānanga need to demonstrate that they recognise and incorporate the set of values and standards embodied by wānanga. Whether they do will in the end be judged by the communities they serve.

The Tribunal therefore considers that the task of a wānanga is to teach by Māori methods and in a Māori way all those who wish to learn by those methods and in that way. Rather than defining a closed – or any – set of subjects, or a closed – or any – set of targeted learners, āhuatanga Māori describes a Māori method of teaching that facilitates a community to give expression to its values and principles. Those principles will have been established by the community the wānanga serves.

**Government Expectations of Wānanga**

TWoA advise that the Government expects Wānanga to:

- Create and share new Māori knowledge that contributes to whanau, hapu and iwi prosperity, and New Zealand’s economic, social, cultural and environmental development.
- Make an increasing contribution to sector-wide leadership through advancing mātauranga Māori at all qualification levels and across all fields of study.
- Enable students to complete a range of sub-degree, degree and postgraduate qualifications, with clear study paths to higher levels of learning through a Māori paradigm.

The kaupapa (philosophy) of the TWoA includes the statements

- To provide holistic education opportunities of the highest quality for Māori, peoples of Aotearoa and the world
- To provide a unique Māori cultural learning environment
- To provide practical learning experiences
- To provide support, encouragement and guidance to all learners in their pursuit of personal development, learning and employment
- To encourage all learners to learn and achieve to their fullest potential
Its vision maintains that it will:

- provide education that best fits the aspirations of this generation, enhances the dreams of future generations and prepares for understanding the essence of past generations
- equip people with knowledge of our heritage, our language, our culture so they can handle the world at large with confidence and self-determination
- empower ones potential for learning as a base for progress in the modern world

The success of Te Wānanga o Aotearoa has resulted largely from relationships with iwi, hapū and communities and its commitment to community development. In addition to centres of education, campuses also operate as community centres: they are places where people come together to discuss issues, solve problems and move forward together. It is therefore imperative that obligations under the Act can be met within the new qualification framework.

Addressing the needs of Māori and Pacifika

TWoA have provided input to assist in answering the key evaluative question:

_To what extent does the needs analysis identify the cultural and social aspirations of Māori and Pasifika, and how well are these reflected in the purpose of the qualification?_

In feedback to the review, TWoA generally agree that the areas covered in the qualifications suit the needs of the sector. TWoA expressed some concerns about omissions from the draft needs analysis around consideration for TWoA communities and learners, and provided some material to assist in filling the gaps.

There are a significant number of Māori (27,632) and Pasifika (11,929) students who completed qualifications in 2011. The review requires a future focus and will meet the specific needs of Māori and Pasifika, which aligns to seven key priorities set in The Tertiary Education Strategy 2010 – 2015, with a direct focus on two key priorities:

- Increasing the number of Māori enjoying success at higher qualification levels
- Increasing the number of Pasifika enjoying success at higher qualification levels.

Within The Tertiary Education Strategy 2010 – 2015 there is also an expectation that the tertiary sector will “enable Māori to enjoy education success as Māori”.

TWoA disagree with the general consensus expressed in the ICT qualifications that it is only in the range of programmes of study that the needs of potential learner groups, including Māori and Pasifika learners, are met. Their view is that New Zealand Qualifications are by their title identified as located in Aotearoa New Zealand and must meet the requirements for approval and accreditation on the NZ Qualifications Framework. TWoA considers it the responsibility of the qualification developers to consider the obligations under the Treaty of Waitangi, as well as acknowledging that the context of the qualifications should include acknowledgement of Māori, and other cultures.

TWoA feels that addressing the needs of Māori at a qualification level is vital. Qualifications developed must enable TWoA to meet obligations as a Wānanga under the Education Act in the way in which education is delivered and contributes to Māori knowledge and development.

Trends for Wananga - ICT Enrolments and completions

In 2012, 20,494 EFTs were enrolled in the Te Wānanga o Aotearoa (TWoA), and of these, 2,974 EFTS (14.5%) were enrolled on computing programmes. ICT qualifications are important in meeting the aspiration and needs of the iwi, hapū and communities that Wānanga serve, as indicated by the large number of learners engaging in the TWoA suite of ICT qualifications.
A key principle around these qualifications is the importance placed on re-engaging second chance learners and providing pathways to higher qualifications that assist in both their personal and professional development.

TWoA provided projections of computing EFTS across level 2 to level 5, as an indication of future demand for ICT qualifications through until 2016.

**TWoA Computing EFTS across levels 2-5 – projections 2013-2016**

<table>
<thead>
<tr>
<th>Year</th>
<th>2012 (actual)</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2,974</td>
<td>2,533</td>
<td>2,405</td>
<td>2,470</td>
<td>2,518</td>
</tr>
</tbody>
</table>

Source: TWoA feedback to landscape consultation - Level 2-5 computing EFTS projections

A significant number of total ICT course and qualification completions, particularly at levels 2 and 3, are from TWOA learners. This also emphasises the importance of IT qualifications to this significant target market.

**Appendix 22 provides background from the Business Qualifications Review on Māori Business and the Māori Economy, and this is seen to have some relevance to the IT review as well. The proposed ICT qualifications are intended to grow and develop the Māori workforce and to contribute to the Māori economy.**

**The Education Act 1989**

TWoA feel that addressing the needs of Māori at a qualification level is vital. Qualifications developed must enable TWoA to meet obligations as a Wānanga under the Education Act (1989, section 162(4)(b)(iv)) by teaching and research that maintains, advances, and disseminates knowledge and develops intellectual independence, and assists the application of knowledge regarding āhuatanga Māori (Māori tradition) according to tikanga Māori (Māori custom).

In their mid-October feedback on the draft qualifications, TWoA recommended that a graduate profile outcome statement be included at each level which allows TWoA to meet the Wānanga Act as an explicit graduate profile outcome, and offered to assist in the creation of these graduate profile outcomes.

Wānanga nominated a member of the Steering Group governing the ICT review, and four TWoA nominations were appointed to work groups for the review, and the input provided from TWoA was welcomed.

The Steering Group determined that at this stage of the development process, any decision on the inclusion of additional graduate profile outcome statements should not delay the submission for application for approval to develop the qualifications, and that it would be considered further in stage 2 of the development process along with a number of other suggested changes to the detail contained in the draft qualifications.
APPENDIX 22: Māori Business and the Māori Economy

The Māori economy has opened the doors to new ways of thinking about how Māori manage and participate in business. Māori economy indicators provide opportunities for new ways of thinking about how Māori conduct business, underpinned by Māori practice and concepts.

“Traditionally focused on primary industry, our tribal businesses are increasingly looking to diversify portfolios: telecommunications; property; carbon forestry; digital technology; and of course, power generation.” “Our businesses include partnerships with government, private companies and overseas investors. Māori businesses and entrepreneurs are working together both domestically and internationally on major economic initiatives.”

The Māori economy has been the subject of a number of reports (the Māori Economic Taskforce, and Te Punī Kōkiri), and its improvement is part of the focus of the Māori Trustee. It is important for the wider business environment to come to terms with the fact that Māori, and the Māori economy, are a great contributor to the overall economy ($37 billion in 2010) and are part of the solution to the current economic situation in New Zealand. Ngai Tahu is the South Island’s largest company and Treaty of Waitangi settlements continue to provide a platform for tribal and Māori led growth. Pita Sharples commented that “NZ Inc is that much stronger with Māori as an integral part of it. This is our unique edge we have over the rest of the world.”

In the short to medium term there is significant potential to lift the performance of Māori enterprises and collective ventures (iwi, Māori trusts and incorporations) as key contributors to the Māori economy. Growing the Māori economy will increase the resilience and growth of the New Zealand economy with significant flow-on benefits from a societal perspective. The responsibility for achieving these gains lies not just with Māori or government alone. To be successful, Māori must take a leadership role with the involvement of the private sector and the enabling arms of government.

“The intent is to develop a strategy and supporting initiatives to improve economic development outcomes for whānau, hapū and iwi Māori … to think about building the capability of our people across the board – our mokopuna, our rangatahi, our pakeke, our kaumātua. Education, training, and improved labour market participation are significant areas of focus to lift Māori household incomes and therefore improve Māori socio-economic well-being. These are inter-generational initiatives which require transformational changes in behaviour, the results of which will be seen over the long-term.”

As Māori businesses are now becoming major players in the New Zealand economy, it is important for tomorrow’s leaders to know how and why the philosophies of Māori businesses differ from that of our mainstream businesses. Victoria University Business School goes on to say that studying Māori Business is a unique way of understanding Māori issues and getting a one-of-a-kind commerce degree that sets you apart. Graduates in Māori Business are invaluable

57 “The fundamental role of the Māori Trustee organisation is to work with owners to protect and build their land and other assets, and to assist the overall improvement of the Māori economy.” Role of the Māori Trustee (http://www.maoritrustee.co.nz/role-of-the-maori-trustee).
60 Te Rangi, Tame. (2012). Strategic & Relationship Advisor – Te Rūnanga o Ngāti Whātua; Māori Business Working Group; Whakaruruhau Chair – Whakairo; and Whakaruruhau – Māori Governance.
in all areas of government, in the private sector, and in the Māori organisations that are emerging as an important part of New Zealand's commercial and cultural landscape.

At the initial qualification development hui, the Māori Business Qualifications Working Group (MBQWG) identified, that training providers need to be encouraged to offer programmes which offer the Mātauranga Māori Quality Assurance Mark, and where appropriate, qualifications should be submitted under the Mātauranga Māori Evaluative Quality Assurance model. The MBQWG recognised that this pathway will help advance the use of mātauranga Māori and meet the needs and aspirations of ākonga, their whānau, hapū, and iwi; and is vital if we are serious about accelerating Māori learner success.

The development of the Māori Business and Management qualifications should be underpinned by concepts of: whanaungatanga; manaakitanga; whakapapa; wānanga; rangatiratanga; and whānau, hapū, iwi, hapori. It is critical that these concepts are also expressed in the programmes leading to the award of these qualifications, through appropriate levels of tikanga and te reo, to advance Māori business leadership.

The qualifications should encourage training providers to create programmes that examine the business aspects of Māori in business, but graduates should have knowledge of te reo Māori and tikanga Māori so they can engage fully with Māori and Māori organisations. Tikanga and reo must be implicit (or explicit where appropriate – eg wānanga, marae-based PTEs, Māori PTEs) aspects of the qualification for it to be uniquely and genuinely Māori, and to provide context; however, they should not create barriers to achieving Māori business qualifications. The intent of the development of Māori qualifications should be to create business qualifications that are Māori in nature and Māori in benefit, that non-Māori would also participate in and benefit from.62

The purpose of Māori Business qualifications must be to provide business entities with people who have attained a breadth and depth of sustainable, transformational capabilities predicated upon a valid Māori worldview. They must allow people to advance their knowledge and skills in business, and to work with Māori in different environments.

The Māori Business Qualifications Working Group (MBQWG) identified the need to take into account the broad range of people encompassed under the descriptor “Māori”, and their equally broad and unique range of needs. They recommended that

- any Māori business qualifications must be distinguishable from other business qualifications, based on te reo Māori and tikanga Māori
- that the qualifications developed should be of value to Māori, across the board (whānau, hapū, iwi, hapori and the ākonga)
- qualifications developed should involve skills and knowledge predicated on a Māori world view, and that Māori business qualifications at Level 3 through 6 were needed
- training providers should be encouraged to offer programmes which offer the Mātauranga Māori Quality Assurance Mark, to advance mātauranga Māori and meet the needs and aspirations of ākonga, their whānau, hapū, and iwi.

\[
\text{Ka rere ana te wai o te awa} \\
\text{ki roto i te moana, ka ngaro}
\]

The fresh river waters that run into the ocean become lost in its vastness.63

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63 Lake, Te Aramau (Ngāti Tama). In her doctoral thesis (He Maramara mō te Ahi: Exploring the Possibilities for Treaty Partnerships (2003)), Helen Potter offers the following: *Perhaps the most immediate interpretation is that of a warning, that to accept the identities offered by and through neo-liberal discourse is to become disconnected and lost.*
## Appendix 23: Proposed Computing and IT Qualifications

**Proposed Computing and IT Qualifications Landscape - November 2013**

<table>
<thead>
<tr>
<th>NZQF Level</th>
<th>IT as a Tool</th>
<th>IT as a profession</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>General education review</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>NZ Certificate in Computing (User Fundamentals) (40 credits)</td>
<td>-</td>
</tr>
<tr>
<td>3</td>
<td>NZ Certificate in Computing (Intermediate User) (60 credits)</td>
<td>-</td>
</tr>
<tr>
<td>4</td>
<td>NZ Certificate in Computing (Advanced User) (60 credits)</td>
<td>NZ Certificate in Information Technology (Level 4) (60 credits)</td>
</tr>
<tr>
<td>5</td>
<td>NZ Diploma in Information Technology (120 credits)</td>
<td>NZ Certificate in Information Technology (Level 5) (60 credits)</td>
</tr>
<tr>
<td>6</td>
<td>NZ Diploma in Systems Administration and Networking (120 credits)</td>
<td>NZ Diploma in Info Systems (120 credits)</td>
</tr>
<tr>
<td></td>
<td>NZ Diploma in Software Implementation and support (120 credits)</td>
<td>NZ Diploma in Info Systems (strands in BA, UX, ITPM, Applied) (120 credits)</td>
</tr>
<tr>
<td>7</td>
<td>NZ Cert/Dip in IT Security</td>
<td>NZ Diploma in Software Development (240 credits)</td>
</tr>
</tbody>
</table>

**Possible pathways......**

* Bachelor Degrees (Level 7); Industry Certifications (Level 5, 6, 7)