Fields Engineering and Technology *and* Sciences

Review of *Technology* Level 3 achievement and Level 3 and 4 unit standards

Unit standards

Field	Subfield	Domain	ID
Engineering and Technology	Design	Design – Computer Graphics	19355
		Design – Graphic Communication	7513-7517, 7519, 7521
		Generic Design	7493-7496
	Technology	Materials Technology	7529, 7530, 7531, 7533, 7534
		Process Technology	7532, 7541, 7542, 7544
		Systems Technology	7549, 7551, 7552
		Technology – General Education	13391, 13394, 13396, 13399, 13402, 13405, 13408, 13413, 14374
Sciences	Home and Life Sciences	Home and Life Sciences – Textile Technology	16841

Achievement standards

Domain	ID	Subject reference
Technology - General Education	90613	Technology 3.1
	90620	Technology 3.2
	90676	Technology 3.4
	90677	Technology 3.5
	90678	Biotechnology 3.6
	90679	Biotechnology 3.7
	90680	Electronics and Control Technology 3.6
	90681	Electronics and Control Technology 3.7
	90682	Food Technology 3.6
	90683	Food Technology 3.7
	90684	Information and Communication Technology 3.6
	90685	Information and Communication Technology 3.7
	90686	Materials Technology 3.6
	90687	Materials Technology 3.7
	90688	Structures and Mechanisms Technology 3.6
	90792	Technology 3.3
Design - Graphic Communication	90734	Graphics 3.1
	90735	Graphics 3.2
	90736	Graphics 3.3
	90737	Graphics 3.4
	90738	Graphics 3.5

The Ministry of Education and NZQA National Qualifications Services have completed a review of the achievement and unit standards listed above.

New Registration date	**December 2012**
Date new versions published	**December 2012**
Planned review date	**December 2016**

Summary of review and consultation process

In 2008 the Ministry of Education (MoE) and NZQA began to review achievement and unit standards in light of the revised New Zealand Curriculum (NZC). This Alignment of Standards (AoS) review also addressed duplication of outcomes, credit parity, fairness, consistency, and coherence. The AoS review was guided by the revised NZC itself and the Standards Review Guidelines. A copy of the NZC is available at: http://nzcurriculum.tki.org.nz/Curriculum-documents/The-New-Zealand-Curriculum.

Teacher subject associations were involved in the review, and draft achievement standards were the focus of wide consultation, especially with secondary schools and teachers. Extensive resources, including student exemplars, were also developed to support these standards, and are available on the MoE and/or the NZQA websites.

The review of unit standards included consultation with tertiary providers to assess continued relevance and likely future use of the standards. Unit standards that duplicate achievement standard outcomes and those without the likelihood of future tertiary use were recommended for expiry.

National consultation was undertaken in 2011, with the results analysed by Research New Zealand. The responses were generally positive.

The review of these Level 3 unit and achievement standards was completed in time for implementation in schools in 2013.

Main changes resulting from the review

- All NZC Level 8 (NZQF Level 3) outcomes derived from the NZC are now assessed using achievement standards, and there are no longer any unit standards linked to the NZC.
- Existing achievement standards were reviewed and new achievement standards were developed to align with the NZC. See table below.
- Grading criteria for achievement standards were reviewed in accordance with the Standards Review Guidelines.
- Level 2 and 3 unit standards in domain *Home and Life Sciences – Textile Technology* were reviewed separately and responsibility for them was transferred to the Apparel and Textile Industry Training Organisation, with the exception of 16841, which is included here.
- Unit standards 7484, 7497, 7518, and 7520 have been reviewed as part of a separate review process and reclassified to the *Generic Design* domain.
- The domains *Design - Computer Graphics* and *Design - Graphic Communication* were designated lapsing.

- Unit standards that recognised similar outcomes as achievement standards or that were no longer aligned to the NZC were designated expiring. The expiry date for these standards was set at December 2014 to provide time for transition arrangements to be made for the qualifications that include the standards. See table below.

For a detailed description of the review of, and the changes to, the Technology standards see the appendix at the end of this report.

Impact on existing organisations with consent to assess

Current consent for			Consent extended to		
Nature of consent	**Classification or ID**	**Level**	**Nature of consent**	**Classification or ID**	**Level**
Field	Sciences	4+	Standard	91626	3
Subfield	Design	3+	Standard	91627, 91628, 91629, 91630, 91231	3
Subfield	Home and Life Sciences	3+	Standard	91626	3
Domain	Design – Computer Graphics	3+	Domain	Design and Visual Communication	3
Domain	Design – Graphic Communication	3+	Domain	Design and Visual Communication	3
Domain	Generic Design	3+	Domain	Design and Visual Communication	3
Domain	Home and Life Sciences – Textile Technology	3+	Standard	91626	3
Domain	Materials Technology	3+	Domain	Construction and Mechanical Technologies	3
Domain	Process Technology	3+	Domain	Processing Technologies	3
Domain	Process Technology	3+	Standard	91609	3
Domain	Technology – General Education	3	Domain	Generic Technology	3
Domain	Technology – General Education	3	Standard	91620, 91621, 91623, 91624, 91625, 91632, 91633, 91634, 91635, 91636, 91637, 91638, 91639, 91640, 91641, 91643	
Standard	7513	3	Standard	91629	3
Standard	7514	3	Standard	91630, 91631	3
Standard	7521	3	Standard	91628	3
Standard	19355	3	Standard	91631	3

Impact on Consent and Moderation Requirements (CMR)

All new achievement standards have been registered on CMR 0233.

Impact on registered qualifications

Key to type of impact	
Affected	The qualification lists a reviewed classification (domain or subfield) in an elective set The qualification lists a standard that has changes to level or credits The qualification lists a C or D category standard
Not materially affected	The qualification lists a standard that has a new title The qualification lists a standard that has a new classification

The following table identifies qualifications developed by other SSBs that are affected by the outcome of this review. The SSBs have been advised that the qualifications require revision.

Ref	Qualification Title	ID	SSB Name
0130	National Certificate in Refrigeration and Air Conditioning (Level 4)	19355	Competenz
1263	National Certificate in Mechanical Engineering Technology (Level 1)	Design – Computer Graphics, Design – Graphic Communication	
1005	National Certificate in Electronics Technology (Level 3)	90613, 90620, 90676, 90677, 90680, 90681, 90684, 90685, 90792	The Skills Organisation
1503	National Certificate in Furniture (Level 3) with strands in Finishing, Machine Operator, Furniture Making, Frame Making, Upholstery, Upholstery Cutting, and Upholstery Sewing	19355	Forest Industries Training and Education Council (FITEC)
1504	National Certificate in Furniture (Level 4) with strands in Furniture Design and Markets, Craft Finisher, Machine Setter, Furniture Maker, Advanced Upholstery, and Computer Numerical Controlled Machinery (CNC)	19355	
0432	National Certificate in Surveying (Assistant) (Level 3)	19355	InfraTrain New Zealand
0453	National Diploma in Surveying (Level 6) with an optional strand in Mine Surveying	19355	
0462	National Certificate in Design (Level 3)	7493-7496, 7513-7517, 7519, 7521, 7529-7534, 7541, 7542, 7544, 7549, 7551, 7552	
0640	National Certificate in Design (Draughting) (Level 2)	7496	
0672	National Certificate in Engineering and Technology (for the Design and Construction Sector) (Level 4)	7493-7496, 7513-7517, 7519, 7521, 7529-7534, 7541, 7542, 7544, 7549, 7551, 7552, 19355	
0682	National Certificate in Design (Technician) (Level 4)	7496, 7517, 7519, 7521, 7533	
1559	National Certificate in Glass and Glazing with strands in Decorative Glass, and Leadlighting	7494	Joinery Industry Training Organisation

1361	National Certificate in Plastics Processing Technology (Production) (Level 1) with strands in General, Injection Moulding, Extrusion, Blow Moulding, Thermoforming, Blown Film Extrusion, Film Conversion, Injection Stretch-Blow Moulding, Rotational Moulding, Film Slitting, and Expanded Polystyrene Moulding	Design – Computer Graphics, Design – Graphic Communication	Plastics and Materials Processing Industry Training Organisation
1362	National Certificate in Plastics Processing Technology (Production) (Level 2) with strands in General, Injection Moulding, Extrusion, Blow Moulding, Pressure Thermoforming, Vacuum Thermoforming, Blown Film Extrusion, Film Conversion, Injection Stretch-Blow Moulding, Rotational Moulding, Expanded Polystyrene Moulding, and Polystyrene Pre-expansion	Design – Computer Graphics, Design – Graphic Communication	
1363	National Certificate in Plastics Processing Technology (Production) (Level 3) with strands in General, and Expanded Polystyrene Moulding	Design – Computer Graphics, Design – Graphic Communication	

Impact of changes on Exclusions List

For transition purposes, the following exclusions will apply for new achievement standards.

Achievement standard	Excluded against each of these standards
91608	13391, 90613, 90620
91609	7544, 13391, 90613, 90620
91610	13391, 90613, 90620
91611	13391, 13405, 13408, 90620
91618	14374, 90792
91620	7531
91621	90687
91622	7534
91623	90687
91624	13413, 90688
91625	13413, 90688
91626	16841
91627	90734
91628	7521, 90735
91629	7513, 90736
91630	7514, 90737, 90738
91631	7514, 7515, 19355, 90737, 90738
91632	90684
91633	13402, 90685
91634	90684
91635	13402, 90685
91636	90684
91637	13402, 90685
91638	90680
91639	90681

Achievement standard	Excluded against each of these standards
91640	13396
91641	90684
91642	13402, 90685
91643	7532, 7542, 13394, 13399, 90679, 90683

Review Categories and changes to classification, title, level, and credits

The following summary shows the changes made to the standards as a result of the review. All changes are in **bold**. Where a new or a new version of an externally assessed achievement standard is registered, the following designation appears after the title **[Externally Assessed]**.

Key to review category	
A	Dates changed, but no other changes are made - the new version of the standard carries the same ID and a new version number
B	Changes made, but the overall outcome remains the same - the new version of the standard carries the same ID and a new version number
C	Major changes that necessitate the registration of a replacement achievement standard with a new ID
D	Achievement standard will expire and not be replaced

Externally assessed achievement standards categorised as category C or D expire at the end of	**December 2012**

Internally assessed achievement standards categorised as category C or D expire at the end of	**December 2013**

Unit standard 19355 – expires at the end of	**December 2015**

All other unit standards categorised as category C or D expire at the end of	**December 2014**

Sciences > Home and Life Sciences > Home and Life Sciences – Textile Technology
Engineering and Technology > Technology > Construction and Mechanical Technologies

ID	Ref	Title	Level	Credit	Review Category
16841		Draft a garment or outfit pattern from a block or blocks	3	6	C
91626	**3.26**	**Draft a pattern to interpret a design for a garment**	**3**	**6**	

Engineering and Technology > Design
Engineering and Technology > Technology

ID	Ref	Domain	Title	Level	Credit	Review Category
90734	3.1	Design - Graphic Communication	Negotiate a brief and a solution by applying a design process	3	5	C
91627	**3.30**	**Design and Visual Communication**	**Initiate design ideas through exploration [Externally Assessed]**	**3**	**4**	

ID	Ref	Domain	Title	Level	Credit	Review Category
7521		Design - Graphic Communication	Produce 2D or 3D models for design and presentation	3	4	C
90735	3.2	Design - Graphic Communication	Plan and produce a presentation to communicate design ideas	3	4	C
91628	**3.31**	**Design and Visual Communication**	**Develop a visual presentation that exhibits a design outcome to an audience**	**3**	**6**	
7513		Design - Graphic Communication	Produce architectural and environmental drawings for presentation	3	5	C
90736	3.3	Design - Graphic Communication	Develop and communicate a solution to an architectural or environmental design brief	3	5	C
91629	**3.32**	**Design and Visual Communication**	**Resolve a spatial design through graphics practice**	**3**	**6**	
7514		Design - Graphic Communication	Produce package design and promotional graphics	3	5	C
90737	3.4	Design - Graphic Communication	Develop and communicate a solution to an engineering or technological design brief	3	5	C
90738	3.5	Design - Graphic Communication	Develop and communicate a solution to a media or technical illustration design brief	3	3	C
91630	**3.33**	**Design and Visual Communication**	**Resolve a product design through graphics practice**	**3**	**6**	
91631*	**3.34**	**Design and Visual Communication**	**Produce working drawings to communicate production details for a complex design [Externally Assessed]**	**3**	**6**	
7515		Design - Graphic Communication	Produce engineering and product design drawings	3	5	C
19355		Design - Computer Graphics	Produce scale production drawings using computer aided draughting (CAD) programs	3	8	C
91631*	**3.34**	**Design and Visual Communication**	**Produce working drawings to communicate production details for a complex design [Externally Assessed]**	**3**	**6**	

***** Please note that these standards appear in this table more than once

Engineering and Technology > Technology

ID	Ref	Domain	Title	Level	Credit	Review Category
90613	3.1	Technology - General Education	Develop a conceptual design to address a client issue	3	8	C
91608*	**3.1**	**Generic Technology**	**Undertake brief development to address an issue within a determined context**	**3**	**4**	
91609*	**3.2**	**Generic Technology**	**Undertake project management to support technological practice**	**3**	**4**	
91610*	**3.3**	**Generic Technology**	**Develop a conceptual design considering fitness for purpose in the broadest sense**	**3**	**6**	
13391		Technology - General Education	Evaluate technological practice and develop and evaluate technological solutions	3	12	C
90620*	3.2	Technology - General Education	Develop a one-off solution to address a client issue	3	8	C
91608*	**3.1**	**Generic Technology**	**Undertake brief development to address an issue within a determined context**	**3**	**4**	
91609*	**3.2**	**Generic Technology**	**Undertake project management to support technological practice**	**3**	**4**	
91610*	**3.3**	**Generic Technology**	**Develop a conceptual design considering fitness for purpose in the broadest sense**	**3**	**6**	
91611*	**3.4**	**Generic Technology**	**Develop a prototype considering fitness for purpose in the broadest sense**	**3**	**6**	
14374		Technology - General Education	Design and model a complex production system	3	6	C
90792	3.3	Technology - General Education	Develop a proposal for a production process for a client	3	6	C
91618	**3.13**	**Generic Technology**	**Undertake development and implementation of a green manufacturing process**	**3**	**6**	

ID	Ref	Domain	Title	Level	Credit	Review Category
7544		Process Technology	Apply project management planning practices in process technology	4	5	C
91609*	**3.2**	**Generic Technology**	**Undertake project management to support technological practice**	**3**	**4**	
13405		Technology - General Education	Construct a prototype of a technological solution using a composite material	3	6	C
13408		Technology - General Education	Incorporate functionally dependent mechanisms into a prototype of a technological solution	3	6	C
91611*	**3.4**	**Generic Technology**	**Develop a prototype considering fitness for purpose in the broadest sense**	**3**	**6**	
7531		Materials Technology	Select, apply, and test joining processes for materials technology	3	5	C
91620	**3.20**	**Construction and Mechanical Technologies**	**Implement complex procedures to integrate parts using resistant materials to make a specified product**	**3**	**6**	
90687	3.7	Technology - General Education	Demonstrate techniques in materials technology	3	4	C
91621	**3.21**	**Construction and Mechanical Technologies**	**Implement complex procedures using textile materials to make a specified product**	**3**	**6**	
91623	**3.23**	**Construction and Mechanical Technologies**	**Implement complex procedures to create an applied design for a specified product**	**3**	**4**	
7534		Materials Technology	Produce product components using computer-aided machining (CAM) in materials technology	3	6	C
91622	**3.22**	**Construction and Mechanical Technologies**	**Implement complex procedures to make a specified product using a Computer Numerical Controlled (CNC) machine**	**3**	**4**	

ID	Ref	Domain	Title	Level	Credit	Review Category
13413		Technology	Construct a prototype of a structure capable of bearing uniformly distributed loads	3	6	C
90688	3.6	Technology - General Education	Explain knowledge that underpins a structures and/or mechanisms technology outcome	3	4	C
91624	**3.24**	**Construction and Mechanical Technologies**	**Demonstrate understanding of a structural system**	**3**	**3**	
91625	**3.25**	**Construction and Mechanical Technologies**	**Demonstrate understanding of a complex machine**	**3**	**3**	
90684	3.6	Technology - General Education	Explain knowledge that underpins an information and communication technology outcome	3	4	C
91632	**3.40**	**Digital Technologies**	**Demonstrate understanding of complex concepts of information systems in an organisation [Externally Assessed]**	**3**	**4**	
91634	**3.42**	**Digital Technologies**	**Demonstrate understanding of complex concepts of digital media**	**3**	**4**	
91636	**3.44**	**Digital Technologies**	**Demonstrate understanding of areas of computer science [Externally Assessed]**	**3**	**4**	
91641	**3.50**	**Digital Technologies**	**Demonstrate understanding of wide area network technologies**	**3**	**4**	

ID	Ref	Domain	Title	Level	Credit	Review Category
13402		Technology - General Education	Develop an information and communication technology product, system, and/or environment	3	6	C
90685	3.7	Technology - General Education	Demonstrate techniques in information and communication technology	3	4	C
91633	**3.41**	**Digital Technologies**	**Implement complex procedures to develop a relational database embedded in a specified digital outcome**	**3**	**6**	
91635	**3.43**	**Digital Technologies**	**Implement complex procedures to produce a specified digital media outcome**	**3**	**4**	
91637	**3.46**	**Digital Technologies**	**Develop a complex computer program for a specified task**	**3**	**6**	
91642	**3.51**	**Digital Technologies**	**Implement procedures for administering a wide area network**	**3**	**4**	
90680	3.6	Technology - General Education	Explain knowledge that underpins an electronics and control technology outcome	3	4	C
91638	**3.47**	**Digital Technologies**	**Demonstrate understanding of complex concepts used in the design and construction of electronic environments [Externally Assessed]**	**3**	**4**	
90681	3.7	Technology - General Education	Demonstrate techniques in electronics and control technology	3	4	C
91639	**3.48**	**Digital Technologies**	**Implement complex interfacing procedures in a specified electronic environment**	**3**	**4**	
13396		Technology - General Education	Customise and integrate a control system into a prototype of a technological solution	3	6	C
91640	**3.49**	**Digital Technologies**	**Implement complex techniques in constructing a specified complex electronic and embedded system**	**3**	**4**	

ID	Ref	Domain	Title	Level	Credit	Review Category
7532		Process Technology	Design, set up, and complete a short run production project in process technology	3	5	C
7542		Process Technology	Create a manufacturing system for short run production in process technology	3	4	C
13394		Technology - General Education	Use biotechnological process to develop and evaluate a product, system, or environment	3	6	C
13399		Technology - General Education	Employ food technology practices to formulate a food product to produce a technological solution	3	6	C
90679	3.7	Technology - General Education	Demonstrate techniques in biotechnology	3	4	C
90683	3.7	Technology - General Education	Demonstrate techniques in food technology	3	4	C
91643	**3.60**	**Processing Technologies**	**Implement complex procedures to process a specified product**	**3**	**6**	

***** Please note that these standards appear in this table more than once

Engineering and Technology > Technology > Materials Technology

ID	Title	Level	Credit	Review Category
7529	Test and select materials for a design task	3	5	D
7530	Use, and care for, fixed machine tools in materials technology	3	5	D
7533	Process materials for alternative or new uses	4	6	D

Engineering and Technology > Technology > Process Technology

ID	Title	Level	Credit	Review Category
7541	Research design problems and present conclusions in process technology	3	4	D

Engineering and Technology > Technology > Systems Technology

ID	Title	Level	Credit	Review Category
7549	Use rotary, reciprocating, and oscillating motion to solve mechanical problems in systems technology	3	5	D
7551	Modify an existing system of control and investigate its market potential for systems technology	4	6	D

ID	Title	Level	Credit	Review Category
7552	Create, and investigate market potential of, an electronic product for systems technology	4	6	D

Engineering and Technology > Technology > Technology - General Education

ID	Ref	Title	Level	Credit	Review Category
90676	3.4	Describe technologists responsibilities to the wider community	3	4	D
90677	3.5	Analyse an existing multi-unit production process	3	4	D
90678	3.6	Explain knowledge that underpins a biotechnology outcome	3	4	D
90682	3.6	Explain knowledge that underpins a food technology outcome	3	4	D
90686	3.6	Explain knowledge that underpins a materials technology outcome	3	4	D
90792	3.3	Develop a proposal for a production process for a client	3	6	D

Engineering and Technology > Technology > Construction and Mechanical Technologies

ID	Ref	Title	Level	Credit	Review Category
91622	**3.22**	**Implement complex procedures to make a specified product using a Computer Numerical Controlled (CNC) machine**	**3**	**4**	**New**
91626	**3.26**	**Draft a pattern to interpret a design**	**3**	**6**	**New**

Engineering and Technology > Technology > Processing Technologies

ID	Ref	Title	Level	Credit	Review Category
91644	**3.62**	**Demonstrate understanding of combined preservation mechanisms used to maintain product integrity**	**3**	**4**	**New**

Engineering and Technology > Design > Design - Graphic Communication

ID	Title	Level	Credit	Review Category
7516	Produce rendered design graphics for presentation	3	5	D
7517	Produce architectural, structural, and interior design drawings	4	6	D
7519	Produce engineering, technological, and systems drawings for graphic communication	4	6	D

Engineering and Technology > Design > Generic Design

ID	Title	Level	Credit	Review Category
7493	Develop a design specification, and produce and implement an investigation plan	3	4	D
7494	Investigate and apply design principles and elements	3	4	D

ID	Title	Level	Credit	Review Category
7495	Apply design development and evaluation techniques	3	4	D
7496	Prepare, plan, and present design project work	3	4	D

Engineering and Technology > Technology > Generic Technology

ID	Ref	Title	Level	Credit	Review Category
91612	**3.5**	**Demonstrate understanding of how technological modelling supports technological development and implementation [Externally Assessed]**	**3**	**4**	**New**
91613	**3.6**	**Demonstrate understanding of material development [Externally Assessed]**	**3**	**4**	**New**
91614	**3.7**	**Demonstrate understanding of operational parameters in complex and highly complex technological systems [Externally Assessed]**	**3**	**4**	**New**
91615	**3.8**	**Demonstrate understanding of consequences, responsibilities and challenges involved in technology**	**3**	**4**	**New**
91616	**3.9**	**Demonstrate understanding of how the fitness for purpose of technological outcomes may be broadly interpreted**	**3**	**4**	**New**
91617	**3.10**	**Undertake a critique of a technological outcome's design [Externally Assessed]**	**3**	**4**	**New**
91619	**3.14**	**Demonstrate understanding of the application of a technical area to a specific field**	**3**	**4**	**New**

Appendix

Development of the Level 3 Technology Achievement Standards

Process of Aligning Standards with the New Zealand Curriculum

The Level 3 matrix and achievement standards have been derived from the achievement objectives at curriculum Level 8 in the Technology learning area of *The New Zealand Curriculum*, from the learning objectives and indicators of progressions the Teaching and Learning Guide for Technology at http://seniorsecondary.tki.org.nz/, and from the Technology Specialist Knowledge and Skills (referred to as the Technology Specialist Body of Knowledge or BoK) at http://technology.tki.org.nz/content/download/11477/36810/version/1/file/Technological-Context-Knowledge-and-Skills-07-2009.pdf.

The Level 3 Technology Matrix

As with Levels 1 and 2, the matrix provides a framework for Level 3 that shows the relationships between the Generic Technology standards and specific technologies standards, as developed from the NZC and the Technology BoK. Teaching and learning programmes, or courses, in Technology can be assessed from anywhere across this matrix. The matrix provides an indication of how knowledge, skill and practice are expected to progress through Levels 6, 7 and 8 of the NZC.

Consistency of step ups across the matrix

The following terms have been agreed to, in principle, as the basis of progression between levels and within standards across grades (AME) in the Construction and Mechanical Technologies, Digital Technologies and Processing Technologies standards.

- Descriptors that differentiate knowledge and skill at NCEA Levels 1, 2 and 3 are: Level 1 – Basic. Level 2 – Advanced. Level 3 – Complex. Explanatory notes unpack these in detail.
- Knowledge related descriptors that differentiate A-M-E are: A – demonstrate understanding. M – demonstrate indepth understanding. E – demonstrate comprehensive understanding. Explanatory notes unpack these in detail.
- Skill related descriptors that differentiate A-M-E are: A – implement procedures. M – skilfully implement procedures. E – efficiently implement procedures. Explanatory notes unpack these in detail.

In the Design and Visual Communication standards, progressions can be summarised as follows:

- Level 1 is focused on the development of general visual and communication skill.
- Level 2 shifts the focus to the application of skills for a purpose and brings in specialist areas of spatial and product design.
- Level 3 focuses on the independent application of design knowledge and skill set to support the ongoing development of the student as emergent designers.

Explanatory notes unpack these in detail.

The A-M-E step ups differ depending on the context but in most cases Merit requires an increase in clarity or skilfulness, or depth of knowledge, and Excellence requires an increase in effectiveness or comprehensiveness of knowledge. Explanatory notes unpack these in detail.

Addressing Duplication
Careful consideration of the unit standards showed that there was either significant duplication with the achievement standards, or the unit standards were rendered redundant by the changes in the curriculum. The unit standards have been designated expiring.

Addressing Credit Parity
1 credit is equivalent to 10 hours of learning and assessment and this has been applied when allocating credits for the standards.

External and Internal Assessment
The majority of Technology achievement standards are internally assessed in recognition that this is the best mode of assessment for the learning being evidenced. Internal assessment allows assessment activities and/or outcomes produced by the students to be more varied and better suits the overall goals of the teaching and learning programme.

A total of nine Level 3 standards are externally assessed across the matrix to ensure that sufficient external credits are available for a range of Technology courses to be endorsed. The externally assessed standards are as follows:

- Generic – 3.5 (91612), 3.6 (91613), 3.7 (91614) and 3.10 (91616)
- Digital Technologies – 3.40 (91632), 3.44 (91636) and 3.47 (91638)
- Design and Visual Communication – 3.30 (91627) and 3.34 (91631).

All achievement standards within the Construction and Mechanical Technologies and Processing Technologies are assessed internally.

Specific Comments – Generic Technology
The nine Generic Technology achievement standards that were derived directly from the Level 6 Technology achievement objectives for Level 1 – 1.1-1.9 (91044-91052), and from the Level 7 Technology achievement objectives for Level 2 – 2.1-2.9 (91354-91362), have been progressed to Level 3 achievement standards as derived from the Level 8 Technology achievement objectives – 3.1-3.9 (91608-91616). Each achievement objective relates to one achievement standard with the exception of *Outcome Development and Evaluation* which has again been separated into two standards – 3.3 (91610) and 3.4 (91611).

Two of the four additional Generic Technology standards added to the Level 1 and 2 Technology matrices have also all been progressed to Level 3. The two design related standards at Level 1 and 2 have been progressed to one standard at Level 3 – 3.10 (91616). This standard focuses on issues associated with the critique of a design. The two manufacturing related standards at Level 1 and 2 have been progressed to one standard at Level 3 – 3.13 (91618). This standard focuses on green manufacturing processes. The design standard is seen as likely to be used to assess learning in any Technology programme. It is likely the manufacturing standard will be most relevant and used across Processing, Construction and Mechanical programmes, although there also are opportunities for use in electronics within Digital Technologies.

Specific Comments – Construction and Mechanical Technologies
All Level 2 implementation achievement standards in Construction and Mechanical Technologies have been progressed to focus on complex procedures as appropriate to Level 3. Complex procedures related to working with resistant and textile materials refer to the scheduling of techniques to achieve required features.

Complex concepts related to products made from resistant or textile materials have progressed to standards focused around particular practices associated with increased complexity. These practices are associated with understanding and using a CNC machine, undertaking applied design, and pattern drafting.

Complex concepts in structures refers to understandings related to how forces act in members of pin jointed structures and in machines refers to understanding lifting machines and the relationships between efficiency and safety.

Specific Comments – Design and Visual Communication
The suite of Design and Visual Communication achievement standards has been progressed to focus on developing the ideas established in the BoK and building on the Level 1 and 2 standards.

Based on feedback from consultation, an additional standard, 3.34 (91631), has been developed that focuses on working drawings. This is an externally assessed standard. Feedback was also received regarding the assessment modes of 3.30 (91627) and 3.31 (91628). In response to this feedback these standards have had their mode changed. 3.30 is now externally assessed and 3.31 is internally assessed.

Specific Comments – Digital Technologies
All Level 2 achievement standards in Digital Technologies have been progressed to focus on complex concepts, procedures, techniques, tasks and/or programs as appropriate to Level 3.

Complex concepts related to information management refer to the relationship between tools, techniques, design elements, and legal and ethical considerations in relation to information management. In the context of information management, complex procedures relate to the development of a relational database.

Complex concepts related to digital media refer to the relationship between tools, techniques, effective and appropriate asset management, file management and naming and other standards and conventions in relation to digital media. Complex procedures related to digital media refer to the use of complex tools and techniques in the development of a digital media outcome that integrates media types.

At Level 3, there is no progression of concepts as such, but rather standards focus on areas of computer science. Level 1 and 2 plans and programs have been brought together at Level 3 where students are required to develop a complex computer program. *A complex computer program* must have a modular structure, an indexed data structure (eg array or list), input and output, procedural structures that combine sequential, conditional and iterative structures, a graphical user interface and event handling, and must include classes and objects. Inheritance is not required.

Complex concepts related to electronics focus on understanding how different sub-systems can be linked so that they work together compatibly in an electronic and embedded system and of the function of components involved. Complex interfacing procedures in electronics refer to the selection, testing and debugging of the hardware and software that allow sensors and actuators to work together compatibly to meet the given specifications for the specified electronic environment.

The infrastructure related standards, which focused on understanding advanced infrastructure concepts and components of local area networks and on administrating local area networks at Level 2, have been progressed to focus on concepts and components of wide area networks and administrating wide area networks at Level 3.

Specific Comments – Processing

Two of the processing standards related at Level 1 and 2 (concepts and procedures) have been progressed to one standard at Level 3. This standard requires both understanding and demonstration of complex procedures.

Complex procedures in processing refer to selecting and sequencing processing operations and tests; and developing health and safety, and quality assurance plans to make a successful product.

The Level 1 and 2 preservation, packaging and storage related concepts have been progressed to focus on an understanding of combined preservation mechanisms that maintain product integrity.