



ICT Technologies project

Discussion Paper

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SUMMARY

This document brings together the key themes arising from recommendations and findings of 11 pieces of research commissioned by Innovation and Business Skills Australia (IBSA) relating to their technology based Training Packages (ICT02 - Telecommunications, ICA05 – Information Technology, ICP05 – Printing & Graphic Art and CUF01 – Film, TV, Radio & Multimedia).

The aim of this document is to bring the multitude of recommendations provided in these reports together into a clear work plan to facilitate the development of a Technology Training Package.

This document splits into three sequential sections:

- The first section provides an overview and analysis of the key issues and themes in the reviewed reports. It concludes that the common threads are issues relating to industry currency and the enhancement/inclusion of qualifications in new and emerging areas.
- The second section explores a range of issues and concepts that underpin currency problems and broader policy influences on training package development.
- The final section describes the work plan that is required to build a future technology package.

The research and analysis is approached with the aim of conceptualising an Information Communications Technology (ICT) Skills Framework that is less prone to 'fighting the technology tide' as industry and occupational definition continue to riddle the packages' utility and one that also adds value to the myriad of stakeholders that are influenced by a Technology Training Package.

The research reports commissioned by IBSA and reviewed to underpin this report, all outlined improvements and enhancements that should be made to the packages. The macro recommendations can be grouped into the following categories or themes:

- Issues relating to individual units of competence and qualifications
- Skill sets and flexibility of Training Package application
- Currency maintenance issues.

These issues have been further explored and analysed using multiple methodologies to seek deeper insight into underlying causes and thus potential solutions. Key points arising from our analysis are as follows:

- A functional analysis of technology related competencies identified skills as being:

- Cross industry, such as practical computing skills which are generic skill clusters relevant across all industries.
- Cross sector – occurring across both telecommunications and information technology
- Sector specific – occurring in only one sector.
- There are problems building a future technology package based upon industry boundaries. It is suggested that a future package be underpinned by broader frameworks such as the Australian Standard Classification of Education (ASCED). This would immediately provide portability of skill requirements to be analysed and responded to across industry and across educational sector. It would also provide a methodology for examining duplication and redundancy of skills as well as providing a common framework for guiding ownership of skill development issues.
- Issues relating to improving the ‘fit’ of the package to the needs of industry need to be addressed within the existing Technology Training Packages before developing a ‘new’ Technology Training Package. It is critically important to get the foundation right before building a new package.
- The training package development process would be enhanced by the development of criteria to guide future decisions regarding maintenance and new development requirements.
- Policy changes and influences regarding integrated skills frameworks, rationalisation and skill sets are discussed. These provide the opportunity to increase the utility of packages to industry by explicitly describing clusters of skills (eg vendor certificates) within future packages as well as providing the opportunity to explore the portability of skill sets across industry.

The key steps in the work plan are outlined below. These are expanded upon and further described in the final section of the report.

	Work Plan	Rationale
1	Map current units of competency and named functional groupings to ASCED functional areas	Underpin development with portable currency
2	Clarify rationale and identify cross industry, cross sector and sector specific functions	Rationalisation policy – identification of duplication, gaps etc
3	Decide on merger or otherwise of packages	Rationalisation policy
4	Implement recommendations relating to current stock of units of competency	Clean stock
5	Develop criteria for inclusion of new units/qualifications	Avoid repeat of step 3, forward planning
6	Apply criteria in 5 and prioritise development	Facilitate merging occupations

7	Decide packaging methodologies – license/ vendor/ qualification	Facilitate pathways – upskill, new entrants etc
8	Establish maintenance strategy	Explore linkage that step 1 provides
	Underpin steps 1-8 with change management strategy.	

INTRODUCTION

The vocational training sector is underpinned by an architecture that has what are often described as two 'book ends'. On one side are Training Packages and on the other a quality assurance framework for the registration of training providers. Training Packages describe the assessment outcomes sought for attainment of a competency standard. They also describe national qualifications and guidelines on how assessment of competency should be made. The quality assurance framework focuses on the consistency of training and assessment outcomes.

No discussion on vocational training development issues is complete without some level of the context in which training policy is made. Training research often describes the 'training dynamic' as a myriad of supply and demand issues:

- The demand for 'skills' within a business is naturally driven by a need to comply (in order to operate) or a need to change to a new circumstance (driven by any number of forces).
- The 'demand' for skills in an individual is linked to career aspiration and personal circumstance.
- The 'supply' of skills is often mis-located as being the training system that delivers 'skills' training to individuals. In the supply demand scenario the supplier of skills is more correctly the 'individual' who owns a suite of skills to offer to the market and the deliverer of skills, the training system, sits in a support role to the individual.

This scenario describes the pendulum policy swings that have underpinned the National Training System into what is now a highly regulated system driven strongly by political influence. The political driving forces currently are skills shortages with various workforce development approaches being trialed across Australia, employment pathways and more specifically in the vocational training world, a move to integrated skills frameworks – in essence a 'shopping basket approach' to skills acquisition whereby skills requirements are acquired from a variety of sources based upon individual or business need. This may be individual units, sets of skills or whole qualifications.

Naturally, since competency standards underpin one of the book ends of the whole training architecture, their veracity, and that of the whole system lies in their ability to articulate outcomes that are meaningful to its audience – individuals and businesses, as well as being of utility to training providers. Therefore in a purest sense they should provide coverage of **career aspiration** (provide pathways), **personal circumstance** (be portable, accessible), **business and occupational compliance** (licenses, quality assurance) and **business change** driven by growth/survival aspiration (products, markets, process improvement).

Within this myriad of conflicts and instability we have explored a concept framework for a future technology training package. The foundations to our exploration are based through an analysis, in a sense peer review, of a range of reports developed

for IBSA relating to the 'technology' packages under its coverage, namely ICT02 - Telecommunications, ICA05 – Information Technology, ICP05 – Printing & Graphic Art and CUF01 – Film, TV, Radio & Multimedia. Whilst we have attempted to focus on the telecommunications and information technology packages, any strategic discussion naturally requires comment on the 'bigger picture' in relation to a future package and its fit within the suite of all other packages maintained by both IBSA and more broadly the national training system.

What is a Training Package?

A Training Package is an integrated set of nationally endorsed competency standards, assessment guidelines and Australian Qualifications Framework (AQF) qualifications for a specific industry, industry sector or enterprise.

Each Training Package:

- Provides a consistent and reliable set of components for training, recognising and assessing people's skills, and may also have optional support materials;
- Enables nationally recognised qualifications to be awarded through direct assessment of workplace competencies;
- Encourages the development and delivery of flexible training which suits individual and industry requirements; and
- Encourages learning and assessment in a work-related environment which leads to verifiable workplace outcomes.

(from Training Package Development Handbook, October 2005, Commonwealth of Australia)

It is clear from the definition above that from the Federal Government's perspective Training Packages are clearly products to enable the assessment of skills and provision of qualifications to individuals. Naturally this positions the product as a tool for the training system – which is of course at odds with the development process for packages which focus on shaping products for employers and employees.

The documents reviewed for this research (i.e. the project scope) are as follows:

1. CITT, (2006). *Common Technology Units Final Report*. Innovation and Business Skills Australia: Melbourne.
2. CITT, (2005). *ICT02 Telecommunications Training Package Scoping and Resourcing Review Final Report –V1.5*. Innovation and Business Skills Australia: Melbourne.
3. Herriard Management, (2006), *Scoping Report of New Information Technology Competency Standards Final Report and Recommendations*. Innovation and Business Skills Australia: Melbourne.
4. CITT (2006), *Identification and Development of Digital Reception Technology Competencies Project Report Including Draft Qualifications*. Innovation and Business Skills Australia: Melbourne.

5. CITT (2006), *Telecommunications Report: - Digital TV Reception Qualification, - Telecommunication Apprenticeship, - Radio Technician Training Needs Analysis, - ICT Marketing Strategies*. Innovation and Business Skills Australia: Melbourne.
6. Marson, L, Sutton, R, (C&L Communications Consultants Pty Ltd) (2006). *Broadcast Technology Qualifications and Skillsets*. Innovation and Business Skills Australia: Melbourne.
7. Innovation and Business Skills Australia (2006). *Cultural Industries Projects 2006 Report on Digital Content Discussion Paper*. Innovation and Business Skills Australia: Melbourne.
8. Tidemark (2005). *Review of Film Television Radio and Multimedia Units of Competency and Qualifications Final Recommendations*. Innovation and Business Skills Australia: Melbourne.
9. Innovation and Business Skills Australia (2006), *Unit Requisite report ICA05*. Innovation and Business Skills Australia: Melbourne.
10. Innovation and Business Skills Australia, (2006). *Recommendations for qualification changes to Diplomas and Advanced Diplomas in ICA05* (internal document).
11. Employability Skills in ICT02, ICA05 and CUF01 (database)

The research has also considered the outcomes of IBSA's Rationalisation Project in the context of the Integrated Skills Qualification Framework as well as The High Level Review of Training Packages and concepts and frameworks from other sources as referenced throughout the report.

OUR APPROACH

Developing a workplan for a future Technology Training Package based upon a review of 11 loosely connected documents is not the sort of assignment that comes with an 'off the shelf' methodology.

Our approach was multi-layered involving qualitative and quantitative analysis. The objective of our analysis was to identify and examine key themes and issues raised in the report. We then substantially unpacked some of these themes from a conceptual perspective so as to explore the key building blocks and policy implications. Naturally a review of this nature is necessarily strategic and high level, after all a review of 11 reports needs to tie them together into a single paper not explore the minutiae and create further 'sub reports'. Therefore our aim has been to provide a strategic picture to the implementation of the reports' recommendations rather than create a prioritisation exercise. Our objective is to position a future technology framework as a product with a new 'mindset', not just the same thing substantially added to.

Throughout the report the term technology is used in a generic sense to mean the technical skills described by the commissioned reports. Literally, this may be better termed as 'Data and Communications Technology'.

The methodology we applied involved:

Document review

- Reading through all the above documents with sufficient rigour to fully comprehend their content.

High level Analysis

- Content analysis using Nvivo (leading edge professional qualitative research package) to undertake a thorough content analysis of the documents to 'cut' the documents in a range of ways to provide insights into themes that can be substantiated and cross referenced across documents.

In depth Analysis of concepts and 'building blocks'

- Functional Analysis relating multiple databases from Statistical and Training Frameworks.
- Competency Analysis relating databases from Educational and Occupational Frameworks.
- Job Analysis relating competencies to Functional Areas.
- Integrated skills frameworks and rationalisation issues.

Construct draft conceptual skills framework

- The introduction and discussion of underpinning constructs namely workforce development, competency bureaus, and measurement frameworks.
- Peer review from external (to research team) subject matter experts. The experts included the former general manager of global ICT player, LogicaCMG and the Managing Director a leading pharmacy software development company.

Present to key stakeholders for comment

- A 'virtual' steering committee was established to oversee the project.
- A draft discussion paper (version 0.5 of this document - without the work plan section) was developed as a result of the previous activities. Feedback and comment on the discussion paper from the steering committee was then incorporated and used to inform the work plan and subsequent recommendations.
- Review and input from IBSA personnel to refine the document and key messages.
- Re-presentation of version 1.0 to key the steering committee for their input and comment.
- Recasting of the report in consideration of the viewpoints presented by steering committee members.
- Review and refinement and finally posting of the draft report on the IBSA web site for more general comment and feedback.

Steering Group

A peer review group was established to provide input into the report's development. This group consisted of:

Kevin Fothergill	CITT
Dominic Schipano	CITT
Roy Bradner	Optus
Peter O'Connor	Foxtel
Ros Eason	CEPU
Norbert Haenel	Microsoft
Rod Williams	Telstra
Roy Hill	NSW IT ITAB

ISSUES RAISED IN THE REPORTS

The following table provides an ‘at a glance’ overview of the reports. A fuller summary including the individual recommendations is provided in Appendix 1.

Table 1: Reports at a glance¹

Report title	Overview
CITT (2006), <i>Identification and Development of Digital Reception Technology Competencies Project Report Including Draft Qualifications</i> . Innovation and Business Skills Australia: Melbourne.	This document reports on the status of competencies and need for qualifications to support the training of personnel involved in Digital Reception Technologies, the term given to skills in the installation of Digital Free-to-air, Cable and Satellite Television.
Innovation and Business Skills Australia (2006). <i>Cultural Industries Projects 2006 Report on Digital Content Discussion Paper</i> . Innovation and Business Skills Australia: Melbourne.	This discussion paper examined issues related to skill development in the digital content industry (e.g. games developers, digital effects, animators etc). Among its recommendations is the development of additional qualifications specifically for this sector.
CITT, (2006). <i>Common Technology Units Final Report</i> . Innovation and Business Skills Australia: Melbourne.	The Common Technology Units report sought to identify common and/or similar technology competencies across and within the four Training Packages of ICA05, ICT02 and CUF01 covered by the Innovations and Business Skills Australia (IBSA). Among its recommendations is the development of a common technology competency qualifications framework.
Herriard Management, (2006), <i>Scoping Report of New Information Technology Competency Standards Final Report and Recommendations</i> . Innovation and Business Skills Australia: Melbourne.	This report examines the need for new competency standards in E-security, digital forensics, RFID and grid computing.
CITT, (2005). <i>ICT02 Telecommunications Training Package Scoping and Resourcing Review Final Report –V1.5</i> . Innovation and Business Skills Australia: Melbourne.	This report reviewed the ICT02 package for relevance, gaps & areas requiring change/development as well as reporting on the availability of resources to support training delivery.

¹ Internal IBSA reports and databases are omitted from this table. They list detailed changes to units of competency and pre-requisites. Their recommendations are included in Appendix 1.

<p>Marson, L, Sutton, R, (C&L Communications Consultants Pty Ltd) (2006). <i>Broadcast Technology Qualifications and Skillsets. Innovation and Business Skills Australia: Melbourne.</i></p>	<p>This report explores the need for and recommended the development of qualifications in broadcast technology.</p>
<p>CITT (2006), <i>Telecommunications Report: - Digital TV Reception Qualification, - Telecommunication Apprenticeship, - Radio Technician Training Needs Analysis, - ICT Marketing Strategies.</i> Innovation and Business Skills Australia: Melbourne.</p>	<p>This report examined the need for industry standards, competencies and qualifications for the Digital Reception (Pay TV) and the Radio technician sectors of the Telecommunication industry.</p>
<p>Tidemark (2005). <i>Review of Film Television Radio and Multimedia Units of Competency and Qualifications Final Recommendations.</i> Innovation and Business Skills Australia: Melbourne.</p>	<p>This report provided a review of this training package. It's scope related to this research was limited to broadcast engineering. Nevertheless it provided a useful critique on the pitfalls of training packages more generally, in particular the need for better links between qualifications and the way work is actually organised. The need for much greater flexibility (and limitations) in terms of what units can be selected in given qualifications, & the need for a greater range of units to reflect the complexity of skills and the way these skills are developed.</p>

As shown in Table 1, common issues reported on are discussions relating to amendments to the current packages to meet new and emerging industry needs and the inclusion/amendment of units of competency and qualifications.

The brief for this report required that the findings from commissioned research be analysed and synthesised into a work plan for improving the utility of ICT related training packages. To assist in determining the key themes or threads across the commissioned reports a high level theme analysis was undertaken using Nvivo qualitative analysis software.

The methodology for this analysis was as follows:

1. A thesaurus of terminology was identified from the project brief and from the executive summary of the reports (see Appendix 2);
2. The frequency of thesaurus terms were then identified across the eight reports²; and,

² 11 reports were provided in the project's scope. 3 of which provide a specific listing of detailed changes to units of competency without rationale or discussion for their compilation. These have therefore been omitted from theme analysis, but included in the formulation of the work plan.

3. The results of the analysis were compiled into a matrix that guided the emphasis and focus of the current report. The results are shown in Table 2.

Table 2 clearly shows that issues relating to better meeting 'industry requirements' and those relating to 'qualifications and skill sets' were important across all the reports. Competency duplication and skill currency were also important issues raised in the commissioned reports.

Table 2: Frequency of key thesaurus terms across the reports

Report Title	Combining Training Packages	Duplication Across Training Packages	Industry Requirements	Qualifications and Skill Sets	Skill Currency
<i>Broadcast Technology Qualifications and Skillsets.</i>	5	1	20	21	0
<i>Common Technology Units Final Report</i>	0	18	24	21	0
<i>Cultural Industries Projects 2006 Report on Digital Content Discussion Paper.</i>	1	7	49	33	4
<i>Identification and Development of Digital Reception Technology Competencies Project Report Including Draft Qualifications.</i>	1	0	26	39	4
<i>Review of Film Television Radio and Multimedia Units of Competency and Qualifications Final Recommendations.</i>	0	5	45	0	2
<i>Scoping Report of New Information Technology Competency Standards Final Report and Recommendations.</i>	0	9	93	40	4
<i>Telecommunications Report: - Digital TV Reception Qualification, - Telecommunication Apprenticeship, - Radio Technician Training Needs Analysis, - ICT Marketing Strategies.</i>	2	11	287	40	12
<i>ICT02 Telecommunications Training Package Scoping and Resourcing Review Final Report –V1.5</i>	6	12	5	0	4

Examples of the types of issues discussed in the commissioned reports relating to the themes of 'industry requirements' and 'qualifications and skill sets' are shown in Table 3.

Table 3: Examples of themes within the reports

<i>Theme: Industry requirements</i>	<i>Report</i>
Flexibility <i>What is evident is that the qualifications need some review in terms of greater flexibility and choice of electives.</i>	CITT, (2005). <i>ICT02 Telecommunications Training Package Scoping and Resourcing Review Final Report –V1.5</i> . Innovation and Business Skills Australia: Melbourne.
<i>Need for better links between units and the way work is actually organised (this often relates to a re-organisation of content rather than development of brand new content).</i>	Tidemark (2005). <i>Review of Film Television Radio and Multimedia Units of Competency and Qualifications Final Recommendations</i> . Innovation and Business Skills Australia: Melbourne.
<i>Need for units to have greater rigour and to require application of practical skills in contexts which better reflect the demands of the workplace.</i>	
Occupational Convergence <i>Interactive digital media work is project</i>	Innovation and Business Skills Australia (2006). <i>Cultural Industries</i>

<i>based and collaborative.</i>	<i>Projects 2006 Report on Digital Content Discussion Paper. Innovation and Business Skills Australia: Melbourne.</i>
Changing Occupational & Industry Requirements <i>The changes that are occurring in the application of technology with digital, photonics, wireless and in packet-switched Internet Protocol (IP) networks/Voice Over Internet Protocols (VoIP) highlight the moving feast that is characteristic of the telecommunications industry.</i>	CITT, (2005). <i>ICT02 Telecommunications Training Package Scoping and Resourcing Review Final Report –V1.5.</i> Innovation and Business Skills Australia: Melbourne.
<i>Theme:</i>	<i>Report</i>
Competency <i>The scoping report suggests that there are a significant number of new technical competencies required in order to meet the needs of Australian commercial and social activity over the next seven years.</i>	CITT, (2005). <i>ICT02 Telecommunications Training Package Scoping and Resourcing Review Final Report –V1.5.</i> Innovation and Business Skills Australia: Melbourne.
<i>...leaving competencies unchanged, unless the intent of the skills and knowledge to achieve the intended outcome has changed.</i>	CITT, (2006). <i>Common Technology Units Final Report.</i> Innovation and Business Skills Australia: Melbourne.
Qualification Benchmarking <i>Need for better links between units and the way work is actually organised (this often relates to a re-organisation of content rather than development of brand new content).</i>	Tidemark (2005). <i>Review of Film Television Radio and Multimedia Units of Competency and Qualifications Final Recommendations.</i> Innovation and Business Skills Australia: Melbourne.
Developing Practical Computer Skills <i>Need for units to have greater rigour and to require application of practical skills in contexts which better reflect the demands of the workplace.</i>	Tidemark (2005). <i>Review of Film Television Radio and Multimedia Units of Competency and Qualifications Final Recommendations.</i> Innovation and Business Skills Australia: Melbourne.
<i>The industry, stakeholders and providers generally accept having technology and technical competencies under the one framework, from which all Training Packages can import in accordance with AQF/AQTF importing rules.</i>	CITT, (2006). <i>Common Technology Units Final Report.</i> Innovation and Business Skills Australia: Melbourne.
<i>That IBSA considers developing a 'Common Technology Competency</i>	CITT, (2006). <i>Common Technology Units Final Report.</i> Innovation and

Qualifications Framework', whereby technology units of competencies can be extracted from each package and grouped as a common technology pool for use by all parties.

Business Skills Australia: Melbourne.

In summary, enhancements discussed across the reports can be categorised as being:

1. Specific issues relating to qualifications and units of competency (addition of, duplication of, errors in etc).
2. Challenges to the fundamental underpinning of the product, in terms of its flexibility across industry and ability to describe skill sets as well as qualifications.
3. Challenges to the boundary of the package i.e. requiring enhancement, integration or additional development to cater for the emergence of new areas (of industry) or continuous improvement of the product.

FRAMEWORK BUILDING BLOCKS

The previous section of the report provided a snapshot of the common points raised in the commissioned reports. It presented the case that common points of analysis and recommendation related to better meeting industry requirements, qualifications and skill sets. In presenting a future framework it is important to unpack and examine why eight unique reports from four different authors all came to similar conclusions. On face value it may be because the commissioner of the reports styled their brief in a similar vein or it may be that there is something more deep-rooted in the way training packages are developed and put together. Without such an analysis any further development work is unlikely to be proactive.

This section of the report examines some of the building blocks of training packages and considers some of the policy implications that will impact on a future package. We commence with unpacking the current packages from a functional analysis perspective since this approach was also explored by all the commissioned report authors.

This approach is particularly well advanced and articulated in the Shared Common Units report that groups competencies according to broad factors and explores their duplication and gaps across ‘technical’ packages. A sample of the analysis is shown below in **Table 4**:

Table 4: Units mapped to Broad Factors

Factor Package	Gather	Assess	Design	Plan	Equipment	Cable	Hardware	Software	Programmi	Network	Wireless	Maintenance	Fault	Security	CRM	Use
CUF			4	1	9		2					2				6
ICA	6	5	10	4	21		13	15	11	9	2	7	5	12	1	6
ICT	2		3	7		26	7	2		4	4	7	18			1
Total	8	5	17	12	30	26	22	17	11	13	6	16	23	12	1	13

We have followed this general theme and ‘unpacked’ the methodology for developing functional competency clusters in some detail.

This is necessary for five reasons:

1. Job roles are comprised of a mixture of functions of work (see example provided in Table 9) that are then further described by individual skills that sit under each function,
2. A functional analysis provides a rationale for examining duplication (as argued by other authors)

3. Re-packing competencies according to functional definitions provided by the Australian Bureau of Statistics (ABS) immediately links the skills described in a Training Package to all macro planning and resourcing also underpinned by ABS data.
4. Using an holistic and transparent framework such as that provided by the ABS enables future enhancements to be included with little change to the underlying principles.
5. A functional framework enables the development of a model that allocates ownership of functions (or their derivatives – competency clusters) without the need for industry boundaries.

Functional Job Analysis

Training Packages are developed using functional job analysis methodologies³. The process involves identifying occupational groupings in representative industry sectors; collating data on their key duties, processes and outputs; and, clustering related tasks into units of competency. The packaging of competency units into qualifications reflects the occupational requirements of various job roles. Functional job analysis methodologies should therefore provide a model which could underpin the development of a future technology framework.

It is clear from a review of the reports that the determination of a typology and methodology for the analysis of benchmarking and occupation slippage is vexed with each author proposing a different underpinning framework. A simple example is illustrated in Table 3, where a recommendation raises more questions than it answers e.g. neither ‘the way work is actually organised’ nor ‘demands of the workplace’ are constants that can be measured without the development of an overarching rationale – after all, all workplaces are different.

It is well recognised that Australian Bureau of Statistics frameworks have significant deficiencies in adequately describing occupations in the information and communications technology industries. Nevertheless, these statistical frameworks underpin all Government resource planning and reporting. They are also well integrated with each other allowing for cross analysis of trends and requirements.

The Australian Standard Classification of Education (ASCED) was developed by the Australian Bureau of Statistics as a tool for analysing education and training related information⁴. The ASCED structure provides a robust nomenclature for functional job analysis. This is because ASCED spans all education levels (primary, secondary, vocational and tertiary) and covers qualifications, units of competency, modules and courses of study. The ASCED framework also links to the National Training Information Service (NTIS), Australian & New Zealand Standard Classification of Occupations (ANZSCO) and the Australian Qualifications Framework (AQF) nomenclatures.

³ Heywood I, Gonczi, A. & Hager, P. 1992, A Guide to the Development of Competency Standards for Professions, Research Paper No 7 Department of Employment, Education and Training.
Training Package Development Handbook, Part 2 Endorsed Components, Chapter 1 Research Methodologies, October 2005, © Commonwealth of Australia, 2005, Department of Education, Science and Training.

⁴ Australian Bureau of Statistics (2001), Australian Standard Classification of Education (ASCED), Commonwealth of Australia: Canberra

From an analysis perspective, the ASCED nomenclature provides a robust typology for understanding the relationship amongst clusters of competency units. Within the vocational education sector, for example, ASCED maps:

1. All NTIS competencies to a functional area of education or learning. There are 356 detailed functional areas of education. This mapping allows competencies with the same functional area to be clustered and mapped across Training Packages.
2. Each detailed functional area of education maps to broader level of education qualifications and the AQF. There are 71 narrow fields of education. When these are combined the AQF levels then relate to ANZSCO occupational titles and functions.
3. High level fields of education are related to the Australian and New Zealand Classification of Industry (ANZSIC) classifications. These approximate to the 17 industry classifications contained within the ANZSIC framework.

A functional analysis⁵ of the information and telecommunication technology competency units for Innovation and Business Skill Australia (IBSA) Training Packages is presented in Table 5.

The Information and Communications Technology and Telecommunications Training Packages contain 507 and 298 information and telecommunication competency related competency units (ICT-CU) respectively. ICT competency clusters were also evident in the Printing and Graphic Arts (66 units clustered in Practical Computing Skills and Printing), Business Services (55 units clustering in two main areas Practical Computing Skills and Business and Management) and Film, TV, Radio and Multimedia (24 units with a cluster in Computer Graphics) Training Packages. Smaller skill clusters were evident across the remaining Training Packages.

From a functional perspective a future telecommunications package would actually describe and maintain the competency units related to:

1. Communications equipment, installation & maintenance
2. Communications technologies

Whereas the information technology package would hold those in:

1. Computer engineering
2. Systems analysis and design
3. Database management
4. Operating systems
5. Information technology nec⁶
6. Programming

⁵ Competency units and qualifications were downloaded from the National Centre for Education and Vocational Research internet site. Competency units relating to information and/or telecommunications technology were extracted to gain an understanding of how they embedded in various training packages. Duplicate or superseded competency units were not deleted from the dataset, because they illustrate where 'redundancy' is occurring.

⁶ Not elsewhere classified

7. Decision support systems
8. Security science
9. Practical computer skills

Other skills held in these packages would be imported from their source functions, for example the functional area 'business management' would provide the six units of competency currently described in the telecommunications package belonging to this set. This is discussed further later in the report.

Upon presentation of the ASCED approach to steering committee members two points were noted:

- Underpinning the development of training packages by ASCED functional areas requires little change
- ASCED functional areas are too broad – *“The ABS ASCED approach would be unlikely to provide the enhancements sought, because it does not discriminate sufficiently to distinguish between different competency units. For instance, there are some 200 Telecommunications units, but only 6 or 8 relevant categories in the ASCED classification. And, these classifications place telecommunications into potentially “hostile” categories relevant to electro-technology, or, engineering.”*⁷

Given the clear advantages of underpinning a competency framework with a structure that allows portability and cross referencing of statistical data and the 'minimal effort' required to make this change we recommend that ASCED be used to underpin a future framework. It may also be prudent, in early iterations to include hypothetical 'sub categories' of ASCED that are of more immediate currency to industry stakeholders. An example might be in the ASCED function 'Communications Technologies' that could be artificially sub categorised by IBSA to include any number of specific technologies eg digital, analogue etc without losing the integrity of the basic architecture and the benefits that this would bring.

⁷ Written comment from CITT, received 3/2/2007

Table 5 Innovation and Business Skills Australia – Skills Council Training Packages by Functional Areas

	Business Services Training Package	Entertainment Training Package	Film, TV, Radio And Multimedia Training Package	Museum And Library/Information Services Training Package	Music Training Package	Visual Arts, Craft And Design Training Package	Financial Services Training Package	Information & Communications Technology Training Package	Printing And Graphic Arts Training Package	Telecommunications Training Package	Training And Assessment Package
Enterprise Competencies										1	
Practical Computing Skills	17	1		5			4	72	33	3	
Communications Equipment Installation and Maintenance			5							221	
Communications Technologies										60	
Computer Science nec*			1					1			
Computer Engineering								96	1		
Computer Graphics			12					2	2		
Systems Analysis and Design				1				109	1		
Data Structures											
Database Management	1						1	21			
Information Systems nec*	3							6	1		
Networks and Communications								53			
Operating Systems											
Information Technology nec*	4							42		5	
Electronic Equipment Servicing											
Programming				1				54	2		
Decision Support Systems								3			
Aircraft Maintenance Engineering											
Architecture											
Artificial Intelligence											
Audio Visual Studies					1						
Business and Management nec*	18										
Business Management	5		1				1	4		6	
Cabinet Making											
Carpentry and Joinery											
Communication and Media Studies nec*		0	4								
Conceptual Modelling								4			
Curriculum Studies	1										

	Business Services Training Package	Entertainment Training Package	Film, TV, Radio And Multimedia Training Package	Museum And Library/Information Services Training Package	Music Training Package	Visual Arts, Craft And Design Training Package	Financial Services Training Package	Information & Communications Technology Training Package	Printing And Graphic Arts Training Package	Telecommunications Training Package	Training And Assessment Package
Graphic and Design Studies nec*											
Graphic Arts and Design Studies						2			4		
Human Resource Management											
Journalism			1								
Manufacturing Engineering											
Marketing	2										
Materials Engineering											
Mathematics											
Metal Fitting, Turning and Machining											
Music					6						
Painting, Decorating and Sign Writing											
Personal Management Training	2										
Photography											
Plant and Machine Operations											
Printing									22		
Project Management								1			
Purchasing, Warehousing and Distribution								1			
Quality Management								4			
Sales								2			
Security Science								18			
Sport and Recreation Activities											
Teacher Education nec*											3
Teacher Education: Vocational Education and Training	1										
Work Practices Programmes								2			
Written Communication								3			
Total	55	1	24	7	7	4	6	507	66	298	3

* n.e.c Not elsewhere classified

A functional analysis of IBSA auspiced Training Packages shows that competency units are most frequently related to communications equipment installation and maintenance, and practical computing skills. An inspection of competencies grouped by functional areas helps to identify redundancy, overlap and the scope of work covered by functional areas.

Table 6: Functional Areas and Competencies in IBSA's Training Packages

Functional Area	Competency Unit Frequency	Functional Area	Competency Unit Frequency
Communications Equipment Installation and Maintenance	226	Audio Visual Studies	1
Practical Computing Skills	135	Curriculum Studies	1
Systems Analysis and Design	111	Journalism	1
Computer Engineering	97	Project Management	1
Communications Technologies	60	Purchasing, Warehousing and Distribution	1
Programming	57	Teacher Education: Vocational Education and Training	0
Networks and Communications	53	Data Structures	0
Information Technology nec	51	Operating Systems	0
Database Management	23	Electronic Equipment Servicing	0
Printing	22	Aircraft Maintenance Engineering	0
Business and Management nec*	18	Architecture	0
Security Science	18	Artificial Intelligence	0
Business Management	17	Cabinet Making	0
Computer Graphics	16	Carpentry and Joinery	0
Information Systems nec*	10	Electrical Engineering	0
Graphic Arts and Design Studies	6	Graphic and Design Studies nec	0
Music	6	Human Resource Management	0
Communication and Media Studies nec*	4	Manufacturing Engineering	0
Conceptual Modeling	4	Materials Engineering	0
Quality Management	4	Mathematics	0
Decision Support Systems	3	Metal Fitting, Turning and Machining	0
Teacher Education nec*	3	Painting, Decorating and Sign Writing	0
Written Communication	3	Photography	0
Computer Science nec*	2	Plant and Machine Operations	0
Marketing	2	Sport and Recreation Activities	0
Personal Management Training	2		
Sales	2		
Work Practices Programmes	2		

*

Table 6 also shows that Training Packages auspiced by IBSA contain a high proportion of practical computing competencies. Practical computing competencies

* n.e.c Not elsewhere classified

are clustered around computer operation and using software. Examples include financial management and planning software, introduction to the web, presentation packages, relational database software, spreadsheet packages and word processing packages. The ubiquitous presence of practical computing skills also provides a rationale for developing a technical training package that includes this set that could underpin all other Training Packages.

This mapping shows that some functions are specific to a particular package, i.e. describe specialist skill sets and others more generic. For example, as illustrated in Table 7, competencies relating to the functional area 'practical computer skills' occur across seven training packages, whereas those grouped as programming occur across two packages and communications technologies occur in only the telecommunications package.

Table 7: Occurrence of Units of Competency grouped by ASCED Functional area across IBSA Training Packages⁸

	Film, TV, Radio And Multimedia Training Package	Information And Communications Technology Training Package	Printing And Graphic Arts Training Package	Telecommunications Training Package	Occurrence within IBSA Packages
Practical Computing Skills		72	33	3	7
Business Management	1	4		6	5
Computer Graphics	12	2	2		3
Systems Analysis and Design		109	1		3
Database Management		21			3
Information Systems nec*		6	1		3
Information Technology nec*		42		5	3
Programming		54	2		3
Communications Equipment Installation and Maintenance	5			221	2
Computer Science nec*	1	1			2
Computer Engineering		96	1		2
Graphic Arts and Design Studies			4		2
Enterprise Competencies				1	1
Communications Technologies				60	1
Networks and Communications		53			1
Decision Support Systems		3			1
Communication and Media Studies nec*	4				1
Conceptual Modelling		4			1
Journalism	1				1
Printing			22		1
Project Management		1			1
Purchasing, Warehousing and Distribution		1			1
Quality Management		4			1
Sales		2			1
Security Science		18			1
Work Practices Programmes		2			1
Written Communication		3			1

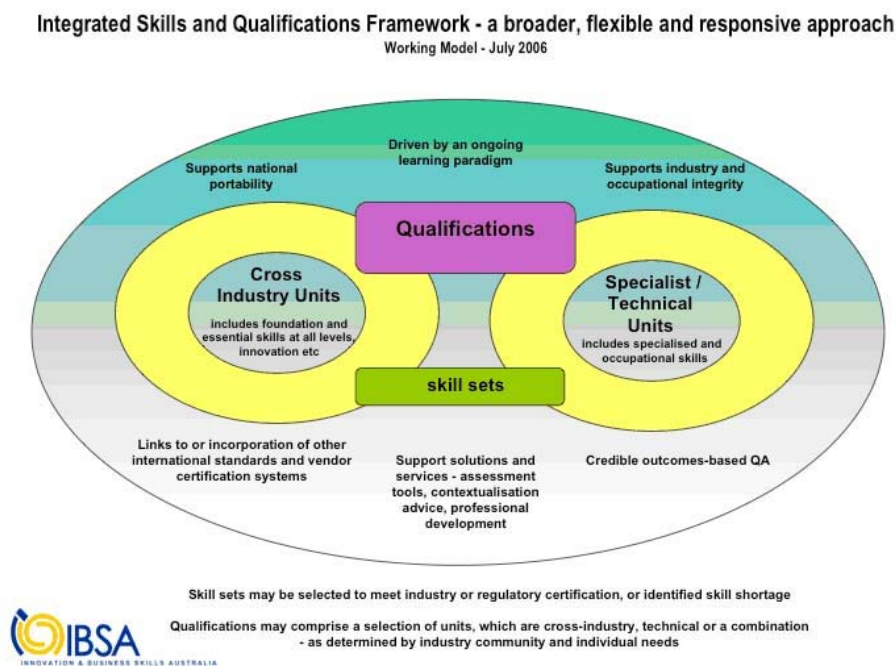
The occurrence of functions across packages can be taken further to provide groupings of units according to their degree of specificity. These notional groupings of units form a consistent organising framework across all IBSA Packages, which while practical in its approach will also form the basis of an Integrated Framework should industry and the National Quality Council (NQC)⁹ support the concept. The

⁸ Non 'technology' packages have been removed for clarity

⁹ The National Quality Council (NQC) was established in December 2005 as part of the new national training arrangements. As a Committee of the Ministerial Council for Vocational and Technical Education, the NQC oversees quality assurance and ensures national consistency in the application of the Australian Quality Training Framework standards for the audit and registration of training providers.

concepts surrounding integrated frameworks are far ahead of any policy deliberations which in itself poses significant problems for those industries starting to move in that direction. Does an industry develop an Integrated Framework, expend resources, goodwill and commitment only to find out that the system and its decision making powers reject the concept and/or its implications. Or does industry wait for policy to be set in incremental steps which when finally pieced together forms the components of an integrated framework for example, specialist qualifications, contextualised units and skills sets.

The notion of an integrated framework is well represented diagrammatically as¹⁰:



The concept of an integrated framework shifts the focus away from Packages per se. That said, any approach will still enable Packages to sit within a Framework should its' industry sectors so chose - the organising structure based on industry and occupational coverage (or a derivation of both – ASCED functional areas) with maximum advantage taken of cross-sector and cross-industry competencies and qualifications. The notional boundaries of Packages will have less and less relevance as a structural reference point for users and VET system administrators but this will occur over time as the concept of Training Packages has almost become a victim of its own success with many stakeholders now wedded to the concept of ownership. Understanding that a framework in no way lessens that ownership does however, require some sophistication and sensitivity in the supporting policy. Feedback from steering committee members would suggest that these sensitivities relate to:

1. Ownership of training packages
2. Qualifications versus skill sets

¹⁰ Source: IBSA web site, extracted 14/02/07 http://www.ibsa.org.au/content/currentprojects/proj_isqf_main.html

3. Industry boundaries and demarcation
4. Specialist versus generalist skill development.

Clearly, the underpinning themes explored in this report provide significant support to a model that has 'units of competency' and 'packaging methodologies' as its critical building blocks, thus supporting the broad concept of an integrated framework.

The 11 packages under IBSA coverage were previously developed by five separate Industry Training Advisory Bodies and therefore included degrees of obvious duplication due to the parallel funding and development processes in place when Packages were first conceived. With a policy shift towards continuous improvement there is now an opportunity to test where commonality of skills exist across the full range of sectors and how these can be reflected at a unit, skill set and qualification level where supported by industry. This work is well underway within IBSA:

"This work has progressed alongside a rigorous rationalisation analysis of the 2139 units of competency and 261 national qualifications under IBSA's coverage. More than anything, IBSA has endeavoured to adopt a different 'mindset' for its work. While meeting its contractual obligations to develop and review individual Training Packages, IBSA has started to test the boundaries about ways to move forward with a more contemporary approach, which provides solutions to current skill development challenges."¹¹

There are however, a series of policy implications if thorough rationalisation - and not just refinement - is to occur both across the IBSA industries and indeed across the 70+ existing Packages. These implications (previously termed sensitivities) are shared by this report.

Rationalisation

Although rationalisation is arguably the number one KPI for Skills Councils, it's not in itself a meaningful outcome, rather a process towards achieving the end game. Less units and qualifications are useful from a resourcing and RTO auditing perspective but represent additional benefits to the overriding goal of *formally recognising common skills and their portability across sectors and industries*.

It is clear that IBSA should not start to pull together units, or for that matter qualifications only to decrease their industry relevance. The agreed approach must focus on the end game that proposed units, qualifications or an integrated framework, must all result in as good as, if not better outcomes for industry.

In looking at the key components needed for effective recognition of common skills, the following elements need to be given effect through sound policy:

- Contextualisation of units
- Skill sets
- Integrated Frameworks

¹¹ http://www.ibsa.org.au/content/currentprojects/proj_isqf_main.html

Further issues include¹²

- Coding protocols
- Revised endorsement criteria
- Data collection
- Specialist versus generalist qualifications

Unit contextualisation

As previously indicated it is clear that some units of competency have application across two or more Training Packages; others have relevance across a number of industry sectors - possibly located in the same Package - while others relate solely to one particular job or occupational stream.

The fine balance between broadening relevance and still ensuring a unit is detailed enough to clearly articulate the skill and knowledge specifications for a given function is a real challenge for developers. It poses many issues¹³:

- *“In bringing together units from previously disparate industries do we create a consultation process so large that a unit becomes the lowest common denominator for agreement?”*
- *Does the consultation process itself become so complex and vast to manage across sectors and industries that it becomes moribund by protocols?*
- *Do we disenfranchise industry to the point where the gains of broader unit recognition are outweighed by its’ decreasing support for the qualifications as a whole?*
- *By what criteria are the skills and knowledge from various sectors brought together under a contextualised model and at what point do we draw the line and reflect context through a separate unit?*

Much has been said about the contextualisation of units and that by incorporating this feature in a unit - and critically, having it reflected on the NTIS - units can be imported by a far greater number of Training Packages. Service Skills Australia supports development of this feature as a matter of urgency but requires:

- *Development of a unit template and guidance in the Training Package development handbook that unambiguously sets out what contextualisation is and what it is not and how it is to be conveyed in a unit*
- *Clear policy for RTOs on the issue of assessment where several different contexts may be included in a unit*
- *Cross Industry Skill Council (ISC) protocols to ensure that where a cross sector unit contains contextualised statements on behalf of other industries outside of the developer’s coverage, it consults with those relevant ISCs in any amendments to the unit*
- *Capacity of the NTIS to both replicate contextualisation advice electronically and in the printed version of the Training Package.”*

Its envisaged that contextualisation would be most used by *cross sector* units (refer Figure 1) for example, in the functional area of ‘programming’ to demonstrate its

¹² Not commented on in this report

¹³ Sourced with permission from Service Skills Australia: Internal policy paper *Training Package Rationalisation – Policy Issues*

context in telecommunications and the different context in say, information technology. If well written, and with clear policy on what contextualisation actually is, the number of sectors or job roles to which a unit will apply is actually self-limiting and need not be unnecessarily restricted i.e. contextualisation is the application of the skills and knowledge within different environments, it may not be used to change performance levels or outcomes – it’s simply a means of providing greater clarity on its application in a given industry.

Cross industry units	Cross sector units	Sector Specific Units
<p>Characteristics:</p> <ul style="list-style-type: none"> ▪ Developed and maintained by other ISCs ▪ Generic and technical in nature ▪ Applicable to the majority of sectors in the Australian economy ▪ Imported by most Training Packages ▪ Sometimes referred to as common, general, generic; core ▪ Duplication – evident in a number of areas eg. Practical computer skills 	<p>Characteristics:</p> <ul style="list-style-type: none"> ▪ Developed and maintained by IBSA ▪ Technical in nature ▪ Applicable to sectors and occupations outside of those for which they were initially developed ▪ Imported by some Training Packages external to IBSA ▪ Duplication – evident in some areas eg. programming 	<p>Characteristics:</p> <ul style="list-style-type: none"> ▪ Developed and maintained by IBSA ▪ Technical in nature ▪ Generally applicable to only the sector/ occupation for which they were developed ▪ Rarely imported by other Training Packages (including those developed by IBSA) ▪ Sometimes referred to as specialist; electives, streams

Figure 1: Potential categories of units within IBSA Training Packages

At a *cross industry* level - where application is intended to span multiple sectors and industries – it is unlikely that units will be heavily contextualised if well developed, as the functional areas of these units tend not to be context dependant unlike cross sector units.

To ensure their relevance however, defined protocols for consultation will be essential for the concept to be supported and the skill specifications meaningful to various industries. The sensitivities surrounding this consultation process and ensuring that units are not stripped of information to reach agreement - and as a result, become specifications of the lowest common denominator of skills and knowledge - is difficult but well worth the benefits if it can be achieved.

Feedback from the steering committee on earlier versions of this report outlined sensitivities regarding the ownership of competency frameworks and training packages in an integrated model. As outlined in Figure 1 ownership of sector specific and cross sector units is not under issue, but it is at the *cross industry* level where Industry Skill Councils need to collaborate. Which individual or group of ISCs should take responsibility for rationalising common categories of units must be a collective decision based on having the industry expertise needed to undertake the work and commitment to a well structured consultation process with all Councils and relevant industries. Of paramount understanding is that such work would not preclude individual industries or sectors from retaining or developing units in those same skill areas if it proved necessary or the outcome of a cross industry approach resulted in reduced relevance to a particular industry.

Analysis of Redundancy of Qualifications and Occupational Slippage

To determine if redundancy is evident within qualifications, relevant data was downloaded from the National Centre for Education and Vocational Research internet site¹⁴. Qualifications relating to information and/or telecommunications technology were pulled out as a subset. This subset was then mapped to ANZSCO and ASCED codes to identify overlap and possible redundancy. Appendix 3 presents the various qualifications as well as their corresponding ASCED and ANZSCO classifications.

There were 162 qualifications pertaining to information and communication technologies. These span areas such as e-business, graphics, information systems and telecommunication specialisations. To determine whether there has been occupational creep or slippage, qualifications were compared with ANZSCO occupational benchmarks¹⁵. Using ICA40405 Certificate IV in Information Technology (Networking) as an example, the corresponding ANZSCO occupational code is 3131 ICT Computing Support Technician. The ANZSCO benchmark illustrated below in Figure 2 suggests that this occupation requires a diploma level qualification or 3 years of experience.

Figure 2: ANZSCO Occupational definition for a Computing Support Technician

UNIT GROUP 3131 ICT SUPPORT TECHNICIANS

ICT SUPPORT TECHNICIANS provide support for the deployment and maintenance of computer infrastructure and web technology and the diagnosis and resolution of technical problems.

Indicative Skill Level:

Most occupations in this unit group have a level of skill commensurate with the qualifications and experience outlined below.

In Australia:

AQF Associate Degree, Advanced Diploma or Diploma (ANZSCO Skill Level 2)

In New Zealand:

NZ Register Diploma (ANZSCO Skill Level 2)

At least three years of relevant experience may substitute for the formal qualifications listed above. In some instances relevant experience and/or relevant vendor certification may be required in addition to the formal qualification.

Tasks Include:

- determining software and hardware requirements to provide solutions to problems
- responding to inquiries about software and hardware problems
- adapting existing programs to meet users' requirements
- installing and downloading appropriate software
- ensuring efficient use of applications and equipment
- implementing computer networks
- designing and maintaining web sites
- repairing and replacing peripheral equipment such as terminals, printers and modems
- may work in a call centre

Occupations:

313111 Hardware Technician
313112 ICT Customer Support Officer
313113 Web Administrator
313199 ICT Support Technicians nec

Occupational slippage can also be gleaned from qualification packaging rules. The packaging rules for the Certificate IV in Information Technology (Networking) for example,

¹⁴ <http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/1220.02006?OpenDocument> (accessed on 10 November, 2006)

¹⁵ As noted on page 12, it is recognised that there are limitations in the ANZSCO coverage of ICT occupations. This methodology is illustrated to demonstrate slippage from a functional analysis, job analysis and benchmark analysis.

can also allow for occupational slippage where up to 2 competency units can be include at the Certificate III level (Figure 3)¹⁶.

Figure 3: Qualification packaging rules for ICA40405 Certificate IV in Information Technology (Networking)

ICA40405 Certificate IV in Information Technology (Networking)
Qualification Structure To attain the ICA40405 Certificate IV in Information Technology (Networking) 20 units must be achieved: <ul style="list-style-type: none">• 16 core units; plus• 4 elective units
Achieve 16 Core Units
Core BSBCMN304A Contribute to personal skill development and learning ICAA4041A Determine and confirm client business expectations and needs ICAB4220A Create scripts for networking ICAB4225A Automate processes ICAD4043A Develop and present a feasibility report ICAD4217A Create technical documentation ICAI4029A Install network hardware to a network ICAI4030A Install software to networked computers ICAI4097A Install and configure a network ICAI4099A Build an intranet ICAI4188A Install and maintain a server ICAS4124A Monitor and administer network security ICAS4127A Support system software ICAT4221A Locate equipment, system and software faults ICAW4214A Maintain ethical conduct PSPPM402B Manage simple projects
Achieve 2 Elective Units Chosen from the Following Sources (Listed in Recommended Order) <ul style="list-style-type: none">• <i>ICA05 Information and Communications Technology Training Package</i> (at Certificate III [maximum of 2 units], Certificate IV or Diploma); and/or• <i>BSB01 Business Services Training Package</i> (at Certificate IV or Diploma)
Achieve 2 Elective Units Chosen from the Following Sources (Listed in Recommended Order) <ul style="list-style-type: none">• any core or elective source listed above; and/or• any other Training Package (at Certificate IV or Diploma) based on documented industry or enterprise needs

Finally occupational creep or slippage can also be determined by examining the functional content of the Certificate IV in Information Technology (Networking). Using ASCED criteria to analyse core competency requirements and thus the ‘functional build’ of the qualification, only 4 units relate directly to the “networks and communication” functional stream. This is shown in Table 8

¹⁶ We are not saying that the packaging rules alone create occupational slippage but that the opportunity to allow this to occur is open to interpretation by the training market.

Table 8: Functional analysis of the core competency requirements for a Certificate IV in Information Technology (Networking) as identified in the ICA Training Package.

ASCED Functional Area & corresponding units of competency	Frequency	Percent
Computer Engineering	1	6.3
ICAI4099A Build an intranet		
Information Systems nec	1	6.3
ICAD4217A Create technical documentation		
Information Technology nec	2	12.5
ICAI4030A Install software to networked computers		
ICAS4127A Support system software		
Networks and Communications	4	25.0
ICAI4029A Install network hardware to a network		
ICAI4097A Install and configure a network		
ICAI4188A Install and maintain a server		
ICAT4221A Locate equipment, system and software faults		
Personal Management Training	1	6.3
BSBCM304A Contribute to personal skill development and learning		
Programming	2	12.5
ICAB4220A Create scripts for networking		
ICAB4225A Automate processes		
Project Management	1	6.3
PSPPM402B Manage simple projects		
Security Science	1	6.3
ICAS4124A Monitor and administer network security		
Systems Analysis and Design	2	12.5
ICAA4041A Determine and confirm client business expectations and needs		
ICAD4043A Develop and present a feasibility report		
Work Practices Programmes	1	6.3
ICAW4214A Maintain ethical conduct		
Total	16	100.0

* n.e.c Not elsewhere classified

To add strength to the argument a recent publication from the National Centre for Vocational and Education Research also suggests employers are looking for far more than what is contained in 'packaged' qualifications¹⁷. Ridoutt et al measured the relationship between performance requirements of a job (employers' perspective) and the number of competencies necessary for jobs to be performed well. These researchers found that employers identified more competencies for satisfactory job performance, than required to obtain a qualification at the AQF level appropriate to

¹⁷ Ridoutt, L., Nicholas, T, Polesel, J. & Selby Smith, C (2005). The Place of Recognised Qualifications in the Outcomes of Training, NCVER, Adelaide.

that job. That is, the competency scope of job roles is greater than that identified by the corresponding qualification^{18 19}.

To illustrate Ridoutt's et al. assertion the Competency²⁰ Navigator™ was administered to an Information Systems Officer. Of the 87 competencies selected, 46 were core (or highly important) to the identified job. The functional profile of the core components of the job is presented in Table 9. This profile suggests skill clusters in the following areas: practical computing skills (10 competency units); systems analysis and design (5 competency units) and work practice programs (6 competency units). In addition there were 10 specialist IT and ICT competency clusters underpinning this job role.

This person selected 46 competencies as core to their job role, which suggests the 20 units required to obtain a Certificate IV qualification does not equate to a 'complete' job role. Again, this suggests that the Certificate may not meet the industry benchmark for information technology job roles.

Table 9: Job Analysis profile and best matched qualification for an Information Systems Officer

Functional Area	Competency Unit
Computer Engineering	Implement system software changes Action and complete change requests
Computer Graphics	Build a graphical user interface
Computer Science nec*	Update web pages
Database Management	Monitor and administer a database Build a database
Industrial Relations	Communicate with workers
Information Systems nec*	Create technical documentation Complete database back-up and recovery Select and utilise technology Complete database back-up and recovery
Information Technology nec*	Ensure site usability for full range of users Conduct operational acceptance tests of websites Select and employ software and hardware tools
Networks and Communications	Locate equipment, system and software faults Install and maintain a server Manage resolution of system faults on a live system Maintain web site performance
Practical Computing Skills	Operate personal computer Design and develop text documents Create and use databases Develop and use complex databases Migrate to new technology Develop keyboard skills Operate a personal computer Send and retrieve information using web browsers and email Use computer operating system Communicate electronically
Programming	Use structured query language to create database structures and manipulate Use development software and IT tools to build a basic website Maintain website performance Apply intermediate programming skills in another language

¹⁸ Ridoutt et al also found that training packages contained most of the competencies required to do a job. This finding suggests that the content of training packages is sufficient for conducting a competency based job analyses at the industry level.

¹⁹ Department of Communications, Information Technology and the Arts (2006). Building Australian ICT Skills: Report of the ICT Skills Foresighting Working Group. Commonwealth of Australia: Canberra

²⁰ The Competency Navigator provides functional job profiles and training needs analysis that can be used for occupational research. The core output contains 4500 job profiles across industries in Australia. Whilst its use in this case is to provide a comparative methodology, the result of this single analysis are overwhelmingly supported by the core output i.e. this is not an isolated case.

*n.e.c Not elsewhere classified

Secretarial and Clerical Studies	Interact with other parties
Security Science	Ensure basic website security
Systems Analysis and Design	Determine and apply appropriate development methodologies Design a website to meet technical requirements Validate quality and completeness of system design specifications Design a database Confirm accessibility of web site design
Work Practices Programmes	Work effectively in an IT environment Communicate in the workplace Contribute to effective workplace relationships Manage effective workplace relationships Communicate in the workplace Maintain ethical conduct
Total * n.e.c Not elsewhere classified	46

Ridoutt et al also found that the use of qualifications varies with the size and industry in which a business operates. Businesses founded in the information technology area were characterised by high levels of enterprise change and innovation are less supportive of qualifications. Instead these businesses require just-in-time skills development.

Finally Ridoutt et al found that employers place different emphasis on competency sets. Those competencies associated with business risk were identified by employers as requiring qualifications, assessment or licensing. Competencies based on enterprise standards and qualifications were often assessed for career or employee development programs. However competencies related to transferable skills and broader job competencies were not captured by existing qualifications. Employers also identified that the scope of national Training Packages included most competencies required for vocational employments.

Summary

The preceding analysis explored a number of underlying issues relating to cited problems with qualifications, units of competency and Training Package structure. Reviewed research shows that National Training Packages cover the scope of most jobs. Qualifications, however, often misalign with job requirements. Typically the qualifications contain fewer competencies than required for satisfactory work performance. Functional job analyses also show that ICT competencies can be clustered and that these be mapped across all Training Packages. Thus a functional job analysis and thus functional grouping of competencies approach to a Training Package framework can support the development of a flexible technology framework which would allow just-in-time training and assessment.

Skill Sets

The issue of skill sets is before the National Quality Council²¹ at the current time with issues being considered by a working group of the Council. From an employer

²¹ The National Quality Council (NQC) was established in December 2005 as part of the new national training arrangements. As a Committee of the Ministerial Council for Vocational and Technical Education, the NQC oversees quality assurance and ensures national consistency in the application of the Australian Quality Training Framework standards for the audit and registration of training providers.

perspective, the concept of skill sets is an attractive option, particularly in the technology industry where the pace of change demands an almost continual updating of skills. From an individual career development perspective they are of value providing they enhance existing qualifications and not denigrate the status of full qualifications. Skill sets should be supported by IBSA where they are defined as part of the relevant Training Package or integrated framework and:

- Provide learners with an avenue to update existing skills to keep pace with new technology and work practices e.g. vendor certification
- Reflect a licensing or regulatory requirement for example, cabling
- Provide a pathway for incremental skills development to enable existing workers to increase their breadth and depth of skills without the burden of full qualifications. Drawn from subsets of full qualifications, these skill sets would result in considerable recognition should the learner subsequently choose to study full qualifications at these higher levels and will start to encourage greater uptake of higher level qualifications. The approach also recognises that for much of the workforce the need is for the actual skills as opposed to the full qualification and that if this can be recognised through formal certification and in AVETMISS²² data, then the issue can start to be addressed.

Many short courses that now take up time and effort to develop, and attract learners unaware that they are not nationally recognised training programs, could be replaced especially those at the higher levels. To ensure the recognition and credibility of skill sets, IBSA should not support the free selection of units using the branding of 'skill sets' by providers and under the guises of 'industry relevance'. This is in reality customised training and needs to be recognised as such.

Several reports urged for either single or multiple competency units to be capable of dual badge-ing for license and/or certification purposes:

“That the Australian Communications and Media Authority, Cabling Provider Rules (CPR) be referred to separately in any future update of ICT02, as well as appearing as part of a qualification”

As part of this research a separate study was conducted into the licensing and regulatory trends in relation to the telecommunications industry. The research identified the following key issues regarding telecommunications industry licensing and regulation:

Statutory licenses

- There are a small number of statutory occupational licenses required in the telecommunications industry, focusing on cabling. These licenses are administered by the Australian Communications and Media Authority (ACMA), but issued by ACMA appointed registrars.
- The National Association of Testing Authorities (NATA) also plays a role in the

²² The Australian Vocational Education and Training Management Information Statistical Standard (AVETMISS) provides a nationally consistent standard for the collection and analysis of vocational education and training information throughout Australia.

recognition of telecommunications testing authorities.

- From a statutory perspective, there are four occupational licenses within the telecommunications industry (ie, licences that have mandatory skill requirements):
 - Open registration for cabling;
 - Lift registration for cabling;
 - Restricted registration for cabling, and
 - Recognised testing authority (telecommunications).
- Outcomes from the ICT02 Telecommunications Training Package are identified as providing pathways to attain the three cabling licenses. Other Training Packages (i.e. Electrotechnology Training Package) and module based training and experience pathways are also identified as providing pathways to licensing.
- The remaining thirteen licenses identified through the research are specific business licenses that seek to control business practice and activity. These do not have any mandatory skill requirements.

Vendor licenses

- Nine vendor specific licenses were identified, six of which do not have skill based eligibility requirements.
- Two recommendations were made relating to vendor's licenses.

Recommendation 1

It is recommended that IBSA engage with those vendors whose licenses include skill requirements to:

- Explore the best way of creating linkages between their skill requirements and IBSA Training Packages; and
- Gain their formal agreement to recognise Training Package outcomes as part of the pathway to their licenses.

Recommendation 2

It is recommended that IBSA consider consolidating its Training Packages to avoid splitting common industry skill sets.

- There are currently no plans for significant reform to telecommunications industry occupational licensing. The ACMA cabling rules (which specify skill requirements for cabling workers) were reviewed in 2005, resulting in no substantial change. The next scheduled review of the cabling rules is for 2008²³.
- A review of selected vendor licensing schemes indicated that, whilst some of them had skill requirements, none of them specified linkages between their requirements and Training Package outcomes. IBSA have undertaken a mapping exercise between CISCO certification and the IT Training Package, identifying common skill requirements²⁴. The development of any new

²³ Personal Communication, Australian Communications and Media Authority.

²⁴ www.ibsa.org.au

Training Packages should describe linkages between skill sets or clusters and vendor certification requirements.

- A brief review of telecommunications occupational licensing on a global level reveals a variety of schemes. New Zealand and the UK do not maintain a licensing scheme for telecommunications cabling. The United States and Canada operate telecommunications licensing schemes in some states and provinces only. Where licensing is required in the US and Canada, minimum competency requirements are placed on licence holders. Germany maintains a system of voluntary registration and in Singapore registration is mandatory.
- In 2005, the Australian Communications Authority (predecessor to the Australian Communications and Media Authority) commissioned a small survey on international cabling practices. The survey looked at cabling practices and regulation in Canada, Germany, New Zealand, the United Kingdom, and the United States. The report intends to help inform discussion about the regulation of customer cabling in Australia [no release date has been set].

Industry Scope

At an industry level a common theme of the reports was the inherent problems of defining a package around an industry (or industries - IT and Telecommunications) that is, itself, increasingly difficult to describe. Three reports discuss what constitutes the telecommunications industry and the vocations that support it becoming less clear. The definition/ boundary creep of the telecommunications industry is well described in the ICT02 Scoping Report by CITT:

In summary, the telecommunications industry will merge squarely with information technology to an extent that the distinction between these two industries will become blurred in the short term but perhaps re-defined within ten years time. Additionally, telecommunications users will experience similar challenges to daily activities such as those experienced by the general community when personal computers became affordable and useful.

While computer use can be an analogy for future telecommunications, our society has not experienced the expected changes in telecommunications. These forecast changes will affect our expectations of social interaction and what activities are appropriate and constructive. It is important to conclude with the reminder that people use technology in a way that suits them and that it is this fact that affects the development of technology and not the converse.

The new industry/ occupational areas described in the various reports as requiring incorporation or similar into new package arrangements include the IT Industry, Broadcast Engineering, Digital Reception, Forensics, Photonics, Wireless, Next Generation Networks, and even Spacecraft Operations. **Clearly, the development of transparent criteria for prioritising and allocating framework coverage needs to be a component of the workplan for a new technology framework.**

Such criteria would provide IBSA with a set of measures to determine whether new areas should be included in their packages. A useful comparative document to guide this work has been prepared by the U. S. Department of Labor, Office of Workforce Investment Skill Assessment Team²⁵, who like IBSA have carriage of occupational skills issues.

Suggested criteria for identifying new and emerging occupations should include:

- The occupation involves significantly different work than performed by job incumbents of other occupations, as determined by existing research and statistical frameworks;
- The occupation is not adequately reflected by the existing skill structure;

These two criteria should be considered together. Proposed occupations that do not perform work that is significantly different from the work of existing occupations should not be considered new and emerging occupations.

Notwithstanding the above, additional information also to be used to identify new and emerging occupations could be:

- The occupation has significant employment;
- The occupation has a positive projected growth rate;
- The occupation has developed due to changes in technology, society, law or business practices;
- The occupation has license or certification requirements;
- The occupation offers education or credentials to its employees;
- The occupation has related professional associations;
- The occupation has related journals or professional publications;
- The occupation is at the appropriate occupation level;
- The occupation has a supporting industrial relations structure or has supporting/ pathway existing occupations.

These guiding criteria (without metrics) have been applied to the new areas for development identified in the commissioned reports by extracting data from those reports relevant to each of the criteria. The results clearly show that insufficient rationale exists, at this stage, to prioritise further development. Further work is required to support resources being applied, particularly in the relation to employment and growth rates.

It is recommended that specific draft metrics relating to the above criteria be developed by IBSA advisory committee structures and subject to industry consultation, then be ratified by the IBSA Board.

²⁵ *New and Emerging (N&E) Occupations Methodology Development Report* - U. S. Department of Labor Employment and Training Administration Office of Workforce Investment Skill Assessment Team Washington, DC, Submitted by The National Center for O*NET Development, March, 2006

Figure 4: Application of rationale for additional development of qualifications in technology packages

Report Title	Occupations Identified	Employment Levels	Projected Growth	Macro Economic Drivers	Licensing	Qualification Attainment	Professional Associations	Professional Publications	Appropriate AQF Level
CITT (2006). <i>Identification and Development of Digital Reception Technology Competencies Project Report Including Draft Qualifications</i> . Innovation and Business Skills Australia: Melbourne	Digital Free-to-air Television Cable Pay Television Satellite Pay Television. Collectively known as Digital Reception Technologies. Page 4	N/A	N/A	Digital Free-to-air Television. Uptake of Cable and Satellite Pay Television page 4/33	N/A	Create Certificate II in Telecommunications (Digital Reception Technology) Certificate III in Telecommunications (Digital Reception Technology)	N/A	N/A	Certificate II in Telecommunications (Digital Reception) Certificate III in Telecommunications. Development of Diploma in Telecommunications (Digital Reception) for design and management level occupations
Innovation and Business Skills Australia (2006). <i>Cultural Industries Projects 2006 Report on Digital Content Discussion Paper</i> . Innovation and Business Skills Australia: Melbourne.	Games Developers. Digital Effects. Animators. Graphic Designers, Programmers and Project Managers. Pages 3, 5 and 6. Post production page 11.	N/A	N/A	Graphic Design industry is merging with Interactive Digital Media. Print Industry reps confirmed that document preparations is now completely digital and PDF documents were a major feature of online publishing	N/A	N/A	N/A	N/A	Specialist qualifications in Game Design, Animation and Digital Effects at AQF V/VI
Herriard Management, (2006). <i>Scoping Report of New Information Technology Competency Standards Final Report and Recommendations</i> . Innovation and Business Skills Australia: Melbourne.	E-security. Digital Forensics, RFID. Grid Computing	N/A	N/A	N/A	Certified Information Systems Security Professional (CISSP) is the most comprehensive and robust body of knowledge to base a well rounded set of competencies for inclusion in the ICT Training Package. Page 9	Anecdotal evidence suggest a need also for an introductory security competency at AQF level 2. Page 9. There is potential to create a Graduate Certificate in IT (E-Security) (Appendix 2 Table 3). Graduate Diploma in IT (E-Security) (Appendix 2 Table 3), page 11 Competency development in the Digital Forensic domain page 14. Advanced Diploma in IT (Digital Forensics) page 15	N/A	N/A	N/A
CITT, (2005). <i>ICT02 Telecommunications Training Package Scoping and Resourcing Review Final Report –V1.5</i> . Innovation and Business Skills Australia: Melbourne.	Cablers			Changes are occurring in the application of technology with digital, photonic, wireless and IP networks and Voice over Internet Protocol (VoIP) Section 1-2	Competency requirements to meet the ACMA Cabling Provider Rules are included in Cert II Cabling. Section 3-2		The Australian Communications and Media Authority section 3-2	N/A	
Marson, L, Sutton, R, (C&L Communications Consultants Pty Ltd) (2006). <i>Broadcast Technology Qualifications and Skillsets</i> . Innovation and Business Skills Australia: Melbourne	Studio Engineer, Transmission (Output) Engineer, Post Production Engineer, Maintenance Engineer, Projects Engineer, Production Engineer L3 Con/Distribution Engineer, Production Engineer L4, Support Engineer, Transmissions Engineer, Technical Specialist Engineer, Supervisory Engineer. page 18					Create a Certificate III and IV in Broadcast Technology page 6 and 8	The Society of Motion Picture and Television Engineers (SMPTE)	N/A	
CITT (2006). <i>Telecommunications Report: - Digital TV Reception Qualification, - Telecommunication Apprenticeship, - Radio Technician Training Needs Analysis, - ICT Marketing Strategies</i> . Innovation and Business Skills Australia: Melbourne.	Digital Reception TV (Pay TV) Technician, Radio Technician					Certificate II in Telecommunications (Digital Reception) Certificate III in Telecommunications (Digital Reception)		N/A	
Tidemark (2005). <i>Review of Film Television Radio and Multimedia Units of Competency and Qualifications Final Recommendations</i> . Innovation and Business Skills Australia: Melbourne.	N/A	Television services 17388, Radio and Television Services undefined, 768		The pace of change in the development an delivery of all forms of media is rapid and there is increasing media convergence.	N/A	N/A	N/A	N/A	N/A

POSITIONING A NEW FRAMEWORK

Previous sections of this report have determined and discussed common areas of concern with the current technology training packages and have also explored several underlying policy and methodological concepts relating to training package development. The purpose of exploring these concepts and issues is to assist the reader to understand the building blocks that need to be considered to build a future technology package. A number of policy issues were also considered in relation to presenting a new framework. Whilst the focus of this report is the 'Technical' training packages, it is difficult to consider any future technology framework without consideration of all other packages, in particular those under the custodianship of IBSA.

Issues around occupational slippage and 'mismatch' have been explored and it is clear that 'today's problems' need to be addressed within the existing ICA and ICT Training Packages before moving on to a future framework (either collectively or individually).

It is clear that many 'technology' skills are required across all industries and are critical enablers of the economy. It is also clear that many skills are highly specialist and required by single sectors and others across sectors.

Discussion questioned the relevance of building a package around an industry and suggested, a package based around functions of work; in this case 'technical' functions.

Therefore the first step in positioning a new framework is to re-organise units of competency into functional areas (thus focusing on content rather than ownership by an industry). This suggests that the telecommunications package should therefore be examined in terms of the functional areas of work that it requires (and from there discrete skills) rather than the technical occupations within it. This will provide a clear picture of the specialist, cross sector and cross industry functions that make up the skill needs of the telecommunications industry (and IT industry if so desired) and thus identify areas of duplication and gaps.

It is also argued in the preceding sections that a functional approach should be built upon consistent national frameworks adopted by the ABS and other Government Agencies. Whilst it is clearly acknowledged that certain outputs of these frameworks, such as occupational definition (ANZSCO) have limitations in the ICT sector, their integration and future portability from a data analysis perspective alone far out-strip arguments to avoid immediate commencement of this work.

In presenting a 'work plan' for a technology framework it is clear from the complexity of the issues discussed that a future work plan should contain two core elements. The first improving the immediate product to build a stronger platform, the second

concerning the future by developing and applying a strategic guide to new development of the product.

Sensitivities in relation to proposed changes have also been discussed and it is therefore also recommended that an overarching change management strategy be developed and applied to guide IBSA's work with this and other packages. Whilst outside of the scope of this report, key elements of a change management plan should include:

- Transparent processes (examples of which are rationales to guide the inclusion of new qualifications, communication strategies etc);
- Development of leadership and ownership amongst stakeholders;
- Planned incremental steps to be cognisant of (and in turn shape) industry culture;
- Evaluation and measurement strategies.

FUTURE WORK PLAN

Clearly, as outlined at length in all of the 11 commissioned reports, much needs to be done to the existing telecommunications and information technology packages. However, without a strategic guide and the incorporation of some structural mechanisms all that will be achieved by implementing all the proposed recommendations will be an historical clean up, by which time a whole new raft of problems will be evident.

Given the very wide audience for these packages it is also clear that any changes need to be both seemingly iterative (i.e. not be radical) and transparent in intent (since skill councils work under consensual models) and also at the same time have regard to the big picture.

Table 10: Future work plan – at a glance

	Work Plan	Rationale
1	Map current units of competency and named functional groupings to ASCED functional areas	Underpin development with portable currency
2	Clarify rationale and identify cross industry, cross sector and sector specific functions	Rationalisation policy – identification of duplication, gaps etc
3	Decide on merger or otherwise of packages	Rationalisation policy
4	Implement recommendations relating to current stock of units of competency	Clean stock
5	Develop criteria for inclusion of new units/qualifications	Avoid repeat of step 3, forward planning
6	Apply criteria in 5 and prioritise development	Facilitate merging occupations
7	Decide packaging methodologies – license/ vendor/ qualification	Facilitate pathways – upskill, new entrants etc
8	Establish maintenance strategy	Explore linkage that step 1 provides
	Underpin steps 1-8 with change management strategy.	

At a high level our proposed work plan is shown in Table 10. It involves a mixture of strategic ‘behind the scenes’ work and a significant body of ‘hands on’ redevelopment work. Each of the stages and rationale are described below:

WORK PLAN 1: Map current units of competency and functional groupings to the ASCED functional areas.

As previously mentioned this initial step is straightforward and has already been conducted to perform the analysis for this report. Adopting the ASCED framework as an underlying architecture does however have implications across all IBSA's packages. This step is not critical to resolving the immediate concerns of the packages but is critical in meeting future policy and planning initiatives. It is therefore a strategic move that will immediately link training package content to all ABS macro planning frameworks as well as provide a transparent methodology to guide ownership and future development activity.

The rationale for such an approach is further supported by other examinations on this matter such as *Building Australian ICT Skills*, DCITA 2006:

Recommendation 2: "The Working Group recommends that the proposed industry leadership group take on improved market intelligence as one of its main activities and work with government to:

- *assist industry to implement a national ICT nomenclature and job description framework consistent with the new Australian and New Zealand Standard Classification of Occupations (ANZSCO) occupational classification";*

WORK PLAN 2: Clarify rationale and identify cross industry, cross sector and sector specific functions

As documented on page 24 a considerable amount of work in this area has already been undertaken by IBSA in response to rationalisation policy imperatives. Similarly specific analysis of the three IBSA 'technology packages' (ICA, ICT & CUF) has already been conducted by CITT in its *Common Technology Units* report. These bodies of work need to be tied together to an integrated platform that will guide both immediate and future work. In the case of IBSA's integrated framework the criteria for labelling as a cross industry, cross sector or sector specific unit needs to be clarified. Our suggestion in Table 7 is based upon occurrence of functions (in other words a grouping of units) across packages. In the case of the *Common Technology Units* report a mapping of nomenclature to a broader framework is required to ensure that detailed work fits into a bigger integration picture. As noted on page 17 nomenclature can follow any agreed industry standard so long as it maps to a broader framework.

WORK PLAN 3: Decide upon the merging of the Information Technology (ICA05) and Telecommunications (ICT02) Training Packages

The movement towards a single technology package that describes both generic 'practical technology application' skills and specific technical skill sets is a key recommendation of the *Common Technology Units* report;

- That IBSA considers developing a 'Common Technology Competency Qualifications Framework', whereby technology units of competencies can be extracted from each package and grouped as a common technology pool for use by all parties.

Common Technology Units Final Report, CITT, July 2006

Our analysis would agree with this recommendation from the perspective of increasingly blurred boundaries between these sectors and the cross clustering of skills required for vendor licensing.

As mentioned consistently throughout this report we suggest building a future framework based on work functions. Under a function based framework the naming of a training package is therefore more to do with semantics than actual description of industry boundary. For example the competencies that 'sit' in the work function *Communications Equipment Installation & Maintenance* will always do so, whether this function is maintained in an ICT, IT or Telecommunications package. This is described on page 16. Thus the combination of packages is more an issue of prioritizing workload and managing the sensitivities relating to industry ownership than a demarcation of content.

This work plan action is therefore one for consideration by IBSA and the resulting outcome will have impact on the following work plan.

Naturally the combination of the packages opens a myriad of very detailed work in relation to redundancy, duplication of competencies and the requirement to add to the competency list. It is outside of the scope of this report to determine whether or not the recommendations of other consultant's report are robust and valid and so these are taken on face value.

WORK PLAN 4: Implement recommendations related to the current stock of competency standards in the Training Package

Recommendations relating to the redundancy, duplication and amendment of the current stock of units and qualifications are detailed across the 11 reports. The need to undertake this work with some immediacy is an issue of product maintenance and utility for both industry and the training system. The allocation of this work (as joined activity, ICA or ICT specific) is dependent upon the outcome of work plan 3.

Those for immediate attention (subject to approval through consultation mechanisms endorsed by IBSA) are;

- Recommendations for qualification changes Certificate I to IV in ICA05
- Recommendations for qualification changes to Diplomas and Advanced Diplomas in ICA05²⁶
- Recommendations in relation to unit requisites in ICA05.
- Recommendations relating to the merging, deletion and amendment of units detailed in the *Common Technology Units* report, namely 77 units to be merged, 6 units rewritten, 70 units deleted.
- ICTTC071C Install Pay TV set top unit and ICTTC106C Locate and rectify Pay TV set top unit faults be revised to reflect recent changes to technology and the addition of digital transmission to free-to-air services.

²⁶ These are detailed in Appendix 1

- Recommendations relating to the incorporation of employability skills into units of competency.

WORK PLAN 5: Develop benchmark criteria for inclusion of new qualifications and/or sectors into Training Packages;

The breadth of the reports commissioned by IBSA and reviewed as part of this analysis would suggest that the Training Packages are highly vulnerable to enhancements and amendments being based upon influence rather than rational criteria. For example, qualifications and additions to both packages are recommended with neither a substantiated case for their development nor likely return on investment from their development. This is illustrated in Figure 4 on page 36. It is therefore strongly recommended that wide consultation occurs to develop robust and scrutinisable criteria and metrics to guide the scope for inclusion (or exclusion) of new competency standards, skill sets and qualifications.

Suggested criteria are discussed on page 35 of this report and it is recommended that these criteria be given metrics developed by IBSA Advisory structures and through consultation mechanisms with industry.

WORK PLAN 6: Apply benchmark criteria to recommendations relating to the addition of new qualifications and prioritise workload.

Once this criteria has been approved then the measures should be used to assess the feasibility of pursuing the following recommendations:

- A qualification be developed at Diploma level or above to cater for the design and management levels of digital reception technology installation.

CITT (2006), *Identification and Development of Digital Reception Technology Competencies Project Report Including Draft Qualifications*. Innovation and Business Skills Australia: Melbourne.

- That consideration be given to specialist qualifications in games design, and animation and digital effects at AQF V/VI.

Innovation and Business Skills Australia (2006). *Cultural Industries Projects 2006 Report on Digital Content Discussion Paper*. Innovation and Business Skills Australia: Melbourne.

- That consideration be given to developing competency standards in E-security, digital forensics and RFID, and further investigations and research into content and structure of supporting qualifications at the Advanced diploma level and also the introduction of vocational graduate qualifications.

Herriard Management, (2006), *Scoping Report of New Information Technology Competency Standards Final Report and Recommendations*. Innovation and Business Skills Australia: Melbourne.

- Recommendation 13 - P2 "That the qualification of Advanced Diploma of Spacecraft Operations using satellite competencies developed by Optus and accredited under current state and territory based requirements and currently accredited outside the package, be included in any future update"

CITT, (2005). *ICT02 Telecommunications Training Package Scoping and Resourcing Review Final Report –V1.5*. Innovation and Business Skills Australia: Melbourne.

- Developing a VET level course for (Radio Technician) installers and maintainers of equipment which appears to be at Certificate 4 (possible entry at Certificate 3)

CITT (2006), *Telecommunications Report: - Digital TV Reception Qualification, - Telecommunication Apprenticeship, - Radio Technician Training Needs Analysis, - ICT Marketing Strategies*. Innovation and Business Skills Australia: Melbourne.

- Two qualifications be developed Certificate II in Telecommunications (Digital Reception) and Certificate III in Telecommunications (Digital Reception)

CITT (2006), *Identification and Development of Digital Reception Technology Competencies Project Report Including Draft Qualifications*. Innovation and Business Skills Australia: Melbourne.

- “A number of new units be developed and a small number of other existing competency units to be adapted to focus specifically on digital reception and/or RF signal technology and added to the ICT02 Training Package under new codes”.

CITT (2006), *Identification and Development of Digital Reception Technology Competencies Project Report Including Draft Qualifications*. Innovation and Business Skills Australia: Melbourne.

- Recommendation 12 - P2 "That the new generation networks and applications voice over internet protocols and broadband be given urgent attention and included as specific competencies in the package rather than being more generally included in the network set of competencies"

CITT, (2005). *ICT02 Telecommunications Training Package Scoping and Resourcing Review Final Report –V1.5*. Innovation and Business Skills Australia: Melbourne.

- Recommendation 7 - P2 "That the competencies relating to mobile handsets be reviewed and updated for industry and that the review be undertaken as a discrete project"

CITT, (2005). *ICT02 Telecommunications Training Package Scoping and Resourcing Review Final Report –V1.5*. Innovation and Business Skills Australia: Melbourne.

- Recommendation 21 - P1 "A Certificate IV Apprenticeship should be specifically included in ICT02 to enable the Telecommunications Industry to provide a multi-skilled technician with a broad range of skills who can install, maintain and alter all telecommunications customer systems and general equipment in customer premises and some linked network locations"

CITT, (2005). *ICT02 Telecommunications Training Package Scoping and Resourcing Review Final Report –V1.5*. Innovation and Business Skills Australia: Melbourne.

- Further investigation is suggested for competencies for IT practitioners, to familiarise them with applications in other industries (such as logistics, health, hospitality etc).

Herriard Management, (2006), *Scoping Report of New Information Technology Competency Standards Final Report and Recommendations*. Innovation and Business Skills Australia: Melbourne.

- As part of the revision of qualifications in CUF01, create a Certificate III in Broadcast Technology by selecting units from different Training Packages.

- As part of the revision of qualifications in CUF01, create a Certificate IV in Broadcast Technology.

Marson, L, Sutton, R, (C&L Communications Consultants Pty Ltd) (2006). *Broadcast Technology Qualifications and Skillsets*. Innovation and Business Skills Australia: Melbourne.

- Progress initial development of a Certificate IV in Broadcast Engineering and retain Diploma and Advanced Diploma qualifications.

Tidemark (2005). *Review of Film Television Radio and Multimedia Units of Competency and Qualifications Final Recommendations*. Innovation and Business Skills Australia: Melbourne.

WORK PLAN 7: Decide upon packaging methodologies for the clustering of skills and qualifications

It is clear that the role of named skill sets in a future package should be reviewed in order to improve the utility of the product for employers and employees. The rationale for this step is clear from both the job analysis (commencing page 27) and skill set discussion (commencing page 31) provided in this report.

This is further supported by a recent research publication *Employers and qualifications: At a glance*, NCVET 2006 that concludes:

Employers value qualifications, but they value skills more highly. They will use accredited training leading to qualifications only under certain circumstances. Employers believe that qualifications provide three main benefits.

- In the recruitment process: qualifications are used as a 'screening' tool but are not the determining factor in choosing a candidate. Employers give more weight to personal qualities and direct industry experience as signs of immediate competence, especially in lower-level occupations.*
- In meeting compliance requirements: qualifications are particularly important for jobs where certain credentials are mandatory. For example, formal qualifications are required in many jobs in the occupational health and safety area, and the trades.*
- In providing career development for existing workers: some employers encourage the pursuit of further skills through qualifications to increase morale, and promote a learning culture within the workplace.*

Employers use and value qualifications differently according to occupation, and enterprise type and size. Employers value qualifications most in those people working in higher-level occupations. Big businesses or enterprises in traditional industry areas (such as manufacturing) value qualifications more than employers in small businesses and enterprises in new, emerging industries (such as information technology), or those undergoing major structural change.

Research using data from the Australian Bureau of Statistics (ABS) shows a difference between employers' beliefs and their actual practices. Although they may indicate that qualifications are not important to them, evidence

reveals that employers are not only more likely to take on employees with qualifications, but also tend to pay them higher wages. This research also shows that those with a certificate level I or II qualification do not seem to experience these same advantages as those with higher-level qualifications.

To be of greatest utility to both the training system and industry a future package must be able to describe skills and skill sets that provide the basis for continuing professional development (across and within industry) and well as building blocks for career enhancement (within technology fields as well as being embedded in other fields).

In terms of the packaging of units into qualifications *Building Australian ICT Skills*, DCITA 2006 noted:

The Working Group suggests that the term 'ICT professional' is now far too generic and fails to provide the necessary context for the ICT work that is performed. This might be addressed by developing a new hybrid description which combines the essential technical aspect of their work i.e. being a 'technologist', with the industry or particular discipline in which the technology is being applied e.g. communications, financial services, health, mining etc. This would generate an entirely new set of occupational descriptions for ICT such as financial services technologist, communications technologist etc. Within these job titles there could also be scope to emphasise their particular field of specialisations, just as occurs now in many areas of medicine and the law. For example, "I'm a financial services technologist specialising in e-security".

This dynamic necessitates a review of how competency sets, once packaged by function i.e. a 'technology package' fit with other like packages. By taking the lead and developing a new technology package in a 'functional' approach, IBSA (given current training package ownership) will be in the position to be custodians of similar functional slices such as 'management & leadership' or 'creativity and innovation'.

In the future this will require a review of how qualifications are packaged in order to provide the appropriate specialist credential required to also keep pace with the fluidity of industries.

Recent policy changes relating to the packaging of units in training packages make it possible to name clusters of skills or describe skill sets²⁷ as well as qualification pathway outcomes. IBSA has completed a substantial body of work in relation to mapping vendor certificates to its training packages. The opportunity now exists for such mapping to be specifically incorporated into future packages, thus offering the user of the packages with a compendium of industry and vocational training pathways.

There are a number of specific recommendations relating to this item that, should the concept be agreed, require consideration:

- It is recommended that IBSA engage with those vendors whose licenses include skill requirements to:

²⁷ Advice on this methodology is described in the Training Package Developers Handbook, DEST, October 2006

- Explore the best way of creating linkages between their skill requirements and IBSA Training Packages; and
Gain their formal agreement to recognise Training Package outcomes as part of the pathway to their licenses.

The Work Lab (2007), *ICT licensing*, (sub report conducted as a component of the research into this report) – Draft.

- Recommendation 4 - P2 "That the power awareness competency ICTTC153A be given a separate section in any revision of ICT02 with sufficient information on application to enable the competency to be delivered as a discrete program meeting the various state and territory basic building site OH&S needs.

CITT, (2005). *ICT02 Telecommunications Training Package Scoping and Resourcing Review Final Report –V1.5*. Innovation and Business Skills Australia: Melbourne.

- “That the Australian Communications and Media Authority, Cabling Provider Rules (CPR) be referred to separately in any future update of ICT02, as well as appearing as part of a qualification”

CITT, (2005). *ICT02 Telecommunications Training Package Scoping and Resourcing Review Final Report –V1.5*. Innovation and Business Skills Australia: Melbourne.

WORK PLAN 6: Explore maintenance strategies.

With all the previous steps in place, the issue of maintenance of currency of a technology framework becomes paramount. This issue is not solely owned by IBSA but is a critical issue for all Skills Councils involved only in continuous improvement of their products without the previous luxury of dedicated reviews of status and currency. As previously argued and outlined in work plan one, underpinning a future competency framework with ASCED functional areas opens immediate linkages with a myriad of other Australian Bureau of Statistics data sets, thus IBSA will be in a position to monitor industry and occupational demand changes and their immediate relationship to functional area coverage and training delivery. Naturally this will require a relatively sophisticated database, but its potential has already been proven by other organisations. Other mechanisms may also be available to IBSA to engage with, for example, as recommended in the ICT Skills for Australia, DCITA 2006 report:

Upgrade of the IT Contract and Recruitment Association placement data collection

The IT Contract and Recruitment Association (ITCRA), in conjunction with Multimedia Victoria, has established an internet based data collection of IT placements with data supplied by 32 of its members. The data is currently published for Victoria only. However, with a relatively small effort the data collection process could be greatly improved to align the data with the new ANZSCO occupation classification and published for all states and territories. Recommendation 3: The Working Group recommends that the Australian Government fund the establishment of an open-access National ICT Skills Tracking and Monitoring System based on the Multimedia Victoria/ITCRA

model. Any information collected should be presented in a manner consistent with recommendation four.

Access to information on ICT skills, occupations and careers

There is currently a lack of public access to data about the ICT skills labour market, largely due to the poor dissemination of the quality data already available. The new Skills Australia (web/online) portal being developed by DEST and DEWR appears to be the most obvious initiative to address this issue. The website will provide information on skill shortages, industry skill needs, future employment growth and education, and training opportunities across all occupations. It will include a specific ICT module.

Recommendation 4: The Working Group recommends that the Australian Government work with key stakeholders to improve access to quality data and analysis on ICT skills and jobs by aggregating and maintaining weblinks and data on the ICT skills market. This would include analysis of ICT labour market trends and projections as well as information on career structure on an upgraded Skills Australia website.

APPENDIX 1: OVERVIEW OF REPORTS

Tidemark (2005). *Review of Film Television Radio and Multimedia Units of Competency and Qualifications Final Recommendations*. Innovation and Business Skills Australia: Melbourne.

This report relates only to the first phase review of the Film Television Radio and Multimedia units of competency and qualifications. The key objectives were to:

- Research the application and examine the suitability, effectiveness and uptake of the existing units of competency and qualifications
- Identify any barriers to, or gaps affecting, full implementation of the units of competency and qualifications
- Identify improvements that should be made to the units of competency and qualifications
- Investigate whether the range and quality of publicly available resource materials developed to support the units of competency and qualifications is appropriate, and to investigate the extent of their take-up.

Many of the issues raised in relation to qualifications are related to three key areas for improvement:

1. Need for better links between qualifications and the way work is actually organised – the issue of ensuring links between qualifications and occupational outcomes
2. Need for much greater flexibility in terms of what units can be selected in given qualifications, but also limitations about which units can be selected at different qualification levels
3. The need for a greater range of units to reflect the complexity of skills and the way these skills are developed
4. Need for more focus on creative / craft skills

Many of the issues raised in relation to units of competency are related to three key areas for improvement:

5. The need for a greater range of units to reflect the complexity of skills and the way these skills are developed
6. Need for much greater flexibility in terms of which units can be selected in given qualifications
7. Need for more focus on creative / craft skills
8. Need for better links between units and the way work is actually organised (this often relates to a re-organisation of content rather than development of brand new content)
9. Need for units to have greater rigour and to require application of practical skills in contexts which better reflect the demands of the workplace

This report has relevance to the ICT Framework in terms of its inclusion of discussion on Broadcast Engineering Qualifications. Whilst the report documented that there had been no uptake of the Diploma of Broadcast Engineering it noted that the qualification (and a new lower level qualification may be more appropriate in the telecommunications package). The themes and general findings of the review of this Training Package are very similar to those focusing more specifically on the ICT and ICA packages.

CITT (2006), *Identification and Development of Digital Reception Technology Competencies Project Report Including Draft Qualifications*. Innovation and Business Skills Australia: Melbourne.

This document reports on the status of competencies for the training of personnel involved in *Digital Reception Technologies*, the term given to skills in the installation of:

- Digital Free-to-air Television
- Cable Pay Television
- Satellite Pay Television

and related services to domestic and commercial customers. It found that the industry currently trains technicians in the installation of vendor-specific technology. Some technicians have recognised training qualifications in cabling and CPE although these are focused on telephony systems as opposed to RF signal systems. The industry has expressed a clear need for a qualification specifically concerned with RF signal technology which can:

1. Give recognition for vendor-specific training delivered in the past
2. Recognise training programs that new recruits will complete at vendor organisations in the future
3. Provide a platform for training in the public sector
4. Provide a career pathway specifically for digital reception installers
5. Address the emerging needs of the digital reception sector as it matures

The report offered the following recommendations:

- Two qualifications be developed and added to the ICT02 (Telecommunications) Training Package
 - Certificate II in Telecommunications (Digital Reception)
 - Certificate III in Telecommunications (Digital Reception)
- Two Competency Units be revised to reflect recent changes to technology and the addition of digital transmission to free-to-air services.
 - ICTTC071C Install Pay TV set top unit and
 - ICTTC106C Locate and rectify Pay TV set top unit faults
- A number of new units to be developed and a small number of other existing competency units to be adapted to focus specifically on digital reception and/or RF signal technology and added to the ICT02 Training Package under new codes.
- A qualification be developed at Diploma level or above to cater for the design and management levels of digital reception technology installation.
- A common set of training resources or a generic industry manual be developed to underpin training and ensure consistent outcomes across all training providers.

Innovation and Business Skills Australia (2006). *Cultural Industries Projects 2006 Report on Digital Content Discussion Paper*. Innovation and Business Skills Australia: Melbourne.

This discussion paper uncovered the following skill development issues:

1. The development of interactive digital media products, applications and services is always a collaborative process
2. Work is predominantly project-based
3. Teamwork is critical - There are two distinct roles in any team – design/content creation and the technical programming that brings the product together on the required delivery platform(s). However, each side needs to understand the other's perspective.

Recommendations

- That revision of multimedia units in CUF01 follow the structure of interactive digital media functional areas and take account of feedback to this discussion paper.
- That the word 'multimedia' in qualifications at AQF III-VI in CUF01 be replaced by 'interactive digital media' in revised qualifications.
- That consideration be given to specialist qualifications in games design, and animation and digital effects at AQF V/VI.
- That the proposals (in Tables Two and Three with regard to ICA05 and ICP051 qualifications) be the subject of further consultation with industry and RTOs as part of IBSA's continuous improvement process. Consultation with RTOs should seek to clarify the basis for diverging views expressed in responses to the discussion paper from TAFE college representatives in different states. Due to the large number of CUF01 units imported into ICA408052, priority be given to investigating how revisions to those units affect the currency of that qualification.
- That IBSA collaborate with existing RTO and curriculum networks to disseminate information and encourage discussion about implementation issues associated with moving towards an integrated framework for qualifications and units of competency under IBSA's coverage.

CITT, (2006). *Common Technology Units Final Report*. Innovation and Business Skills Australia: Melbourne.

The Common Technology Units report sought to identify common and/or similar technology competencies across and within the four Training Packages of ICA05, ICT02 and CUF01 covered by the Innovations and Business Skills Australia (IBSA), and the UEE05 (draft) under EE-oz Skills Council.

The following preliminary recommendations and findings from consultations were:

- That IBSA considers developing a 'Common Technology Competency Qualifications Framework', whereby technology units of competencies can be extracted from each package and grouped as a common technology pool for use by all parties.

- The continuing engagement of Skill Councils with the concept of importing units, rather than their re-creation.
- SME cautioned strongly on leaving competencies unchanged, unless the intent of the skills and knowledge to achieve the intended outcome has changed. In exploring the units careful consideration must be afforded to the preservation of industry and skill differences. While it is critical to identify and address these commonalities, it is equally important to preserve those aspects that differentiate the skills within separate sectors.
- The group agreed that the project has merit, with some good outcomes with wider implications and longer term impact. This project's focus is beyond the broad ISQF framework. ICA and ICT are technically-based with functionality and task outcome drivers as their basis. The group emphasized that any changes to competencies must not lose sight of the intent, function and relevancy to the task.
- Any work must take into consideration the AQF requirements and hierarchy, as it impacts directly on employees' remuneration.
- The industry, stakeholders and providers generally accept having technology and technical competencies under the one framework, from which all Training Packages can import in accordance with AQF/AQTF importing rules.
- The groups further agreed that the make-up of the Common Technology Competency Qualifications Framework may be viewed as an ICT Training Package, with an option of common technology units as a stream.

Herriard Management, (2006), *Scoping Report of New Information Technology Competency Standards Final Report and Recommendations*. Innovation and Business Skills Australia: Melbourne.

This report examines the need for new competency standards in E-security, digital forensics, RFID and grid computing. This study was based on the 2003 report titled "Shared Technology: A Roadmap for Traditional and Emerging Industries to 2008" which identified a number of emerging areas, recent interest in E-security (related to terrorism and more sophisticated computer hackers) and developments in other countries of competency standards and qualifications.

The report recommended:

- That consideration be given to developing competency standards in E-security, digital forensics and RFID, and further investigations and research into to content and structure of supporting qualifications at the Advanced diploma level and also the introduction of vocational graduate qualifications.
- Further investigation is suggested for competencies for IT practitioners, to familiarise them with applications in other industries (such as logistics, health, hospitality etc), along the lines of the recently developed Singapore competencies. Further investigation is suggested for vocational graduate qualifications in IT governance and this may be addressed in another research project related to vocational graduate qualifications.

CITT, (2005). *ICT02 Telecommunications Training Package Scoping and Resourcing Review Final Report –V1.5. Innovation and Business Skills Australia: Melbourne.*

This large project undertaken by CITT examined a range of issues relating to the ICT 02 Training Package. The purpose of the project was to:

1. Undertake research into the relevance of Telecommunications Training Package (ICT02) competency standards; streams/qualifications and resources
2. Identify any gaps in current Training Package content relative to industry need
3. Undertake research into Telecommunications areas of industry change and growth
4. Examine the convergence of information and communication technologies (ICT) within the context of new, emerging and existing telecommunications skills needs
5. Scope the future composition & configuration of the ICT02 within a changing telecommunication industry and identified sectors
6. Report on options to map existing materials and develop new materials, where needed.
7. Identify and research availability of training materials and resources for ICT02 Model Programs in meeting current and new competency standards (e.g. Certificate II and Certificate III Model Programs for use by the industry, schools and RTOs)
8. Provide recommendations for redevelopment/development of training materials and resources

The recommendations were prioritised (P1 being most urgent) and were as follows:

Recommendation 1 – P2

“That the Australian Communications and Media Authority, Cabling Provider Rules (CPR) be referred to separately in any future update of ICT02, as well as appearing as part of a qualification (Assuming this policy of inclusion remains)”

The competency requirements to meet the ACMA CPR requirements are in the ICT02 as virtual industry benchmarks arising from an earlier project concluding in 2000. For ANTA policy reasons these three competencies are included in Cert II (Cabling) and the state and territory training authorities set the hours required. These are relatively high for such stand alone competencies and create confusion among RTO's. Separate reference would assist in the RTO's understanding of the package.

Recommendation 2 – P2

“That the recognition of prior learning for CPR web-based program developed in 2004 –2005 for communications cabers be given specific reference in any updated ICT02”

To assist in being client friendly the RPL CPR project outcome should be included in a specific section of any revised ICT02 that would assist in promotion of the product and help in a one-stop shop approach.

Recommendation 3 – P2

“That model training pathways for the more commonly used Certificate II and Certificate III be included in an update”

To assist the clients in developing their own competency based training programs there should be inclusion of model pathways, such as those developed by the RPL CPR Pathways Project and major industry stakeholders such as the Telecommunications Industry Training Network in 2004 & 2005 which have proved to be such an important guide for the industry,

particularly where there are large numbers of contractors and sub contractors who move between the carriers, other service providers and the cable TV companies.

Recommendation 4 – P2

“That the power awareness competency ICTTC153A be given a separate section in any revision of ICT02 with sufficient information on application to enable the competency to be delivered as a discrete program meeting the various state and territory basic building site OH&S needs. Within qualifications it should be listed as an optional alternative to the current ICTCC100A OH&S competency standard”

As the OH&S training program supporting this competency meets the technical requirement of most state and territory building site entry and other “Green cards” standards it is important that the client be able to separate this competency for use as a discrete training program within the Training Package qualification.

Recommendation 5 – P3

“That consideration be given to including in ICT02, where possible, a matrix chart with each qualification listing the training resources needed to gain the Underpinning Knowledge & Skills for competencies”

The first draft ICT97 contained such matrices and performance modules and had been developed with wide spread input from industry and was widely regarded as extremely user friendly. This product was superseded by the new policies put in place by ANTA around 1997. A common complaint from users, particularly RTO’s is that the information contained in the skills and knowledge register, whilst very comprehensive, is very difficult to align with the competencies in ICT02 from a training program perspective. Some other technical qualification based packages use “module/training resource alignments” extensively and this principle is often suggested as essential for the ICT02.

Recommendation 7 – P2

“That the competencies relating to mobile handsets be reviewed and updated for industry and that the review be undertaken as a discrete project”

There have been a number of changes in industry practices and a number of small businesses have indicated the need for such competencies to be available to meet current demands.

Recommendation 8 – P3

“That accredited training in relation to Telstra and other Carriers be evaluated to better align with National Competencies to training provided through materials that are the proprietary property of the carriers controlling the accreditation”

Carriers are now outsourcing significant parts of their traditional work and this trend is likely to continue into the near future. Some work was undertaken earlier by Telstra and is often used as a reference to deliver training and access competencies required. Some of this earlier work could be utilised in a future project. This would assist in reducing duplicated training particularly as there is a large pool of contractors – estimated to be greater than 2000 nationally – who work for the main carriers and pay TV operators.

Recommendation 9 – P3

“That small business skills or competencies be included in electives for Certificate II to Certificate IV”

Most contractors use a high proportion of sub-contractors who are often highly skilled technically, but ill equipped to run a small business with low margins, high turnover and

erratic cash flow. Other related industries that use contractors such as Construction Property & Services Industry Services Council (CPSISC) and ElectroComms and Energy Utilities Industry Skills Council Ltd (EE-Oz) are developing such competencies and these could be imported if appropriate. Reference for these competencies are, CPSISC 4-6 Project and with EE-Oz Training Package Volume 2, Part 2.1C, Commercial Units.

Recommendation 10 – P3

“That contract management be more specifically targeted in the higher order competencies”

Contract management, particularly for sub-contractors working in the technical stream, is seen as having more importance in the modern work environment. Inclusion of principles of contract management in the lower AQF qualifications would also be useful.

Recommendation 11 – P3

“That project management be more specifically targeted in the higher order competencies”

Project management, particularly for sub-contractors working in the technical stream, is seen as having some importance in the modern work environment. Inclusion of principles of contract management in the lower AQF qualifications would also be useful.

Recommendation 12 – P2

“That the new generation networks and applications voice over internet protocols and broadband be given urgent attention and included as specific competencies in the package rather than being more generally included in the network set of competencies”

VoIP and the NGN are particularly difficult areas to foreshadow skill needs and work undertaken by the ACIF indicates that telecommunications staff with high level IT skills will be a priority requirement for Australia. New Generation Networks, or, similar terms that may be used to describe future telecommunications network configurations, already include the use of broadband in various forms and may include the use of broadband over power lines infrastructure. There are some trials of the broadband over power line technology application presently being undertaken and the ACMA are conducting a study on the possible impact of the technology on current telecommunications infrastructure and investment.

As an aside, there are a number of other technology applications such as Radio Frequency Identification where the future is hard to predict from a training perspective and these applications will need monitoring by IBSA and other training stakeholders, as they are ICT based.

Recommendation 13 – P2

“That the qualification of Advanced Diploma of Spacecraft Operations using satellite competencies developed by Optus and accredited under current state and territory based requirements and currently accredited outside the package, be included in any future update”

Industry experience dictates that, from time to time, there will be programs developed at an enterprise level in conjunction with TAFE, or, private providers for urgent application to meet particular skill needs. The satellite qualification developed with assistance from CITT is current and if included in the national Training Package would allow for more integration, expanded career pathways and possibly better access to some state based funding.

Recommendation 14 – P3

“That the practice known as “embedding” be applied to Certificate II and Certificate III in the Technical Stream”

To overcome some state based funding obstacles, whereby there are difficulties with the funding of only 1 qualification per client and a limited exit point option, Certificate II competencies of a core nature could be included in Certificate III to enable early exit with a qualification, or, better access to funding for trainees who need competencies from Certificate III to be job ready. However, due to VET in schools policy requirements, Certificate II stand alone qualifications should also be made available for delivery in Schools.

Recommendation 15 – P2

“That the ICT02 review include information from the Radio Technician skill reports arising from ACA/ACMA actions in the first instance and later taken over by the Radio Communications Consultative Council Technical Training Working Group. This should be undertaken as a discrete project in view of its’ importance to the emerging wireless technology”

There are requirements for a relatively small number of radio technicians nationally, probably between 100 and 250, however, these are key personnel in the telecommunications network. Due to ageing of the work force and a lack of traineeship and cadetship opportunities, the current skill shortage can only get worse over time. Industry placements for experience purposes and an opportunity to be assessed against relevant competencies are a major imperative.

Recommendation 16 – P3

“That the national Australian Engineering Competency Standards be considered for either alignment with or, possible inclusion in ICT02”

This competency set is outside of the ANTA system, but used in enterprises, such as Telstra, and for classification purposes, training programs and recruitment and is regarded as a benchmark competency set for engineering. The competency set is approved by the Council of Engineers of Australia and in many respects overlaps with the Advanced Diploma and sometimes the Diploma of Telecommunications Engineering.

Recommendation 17 – P2

“That the competencies previously regarded as ACA mandatory “endorsements” ICTTC 009, 10 and 11 and ICTTC 16, 18, 19, 20 and 21 be rationalised, to meet the needs of enterprises and in particular, contractors, in the changed environment arising from Telstra de-regulation and removal of certain monopolies”

ICTTC 009 – Place, secure and terminate structured cabling twisted pair for certification and 011 – Place, secure and terminate co-axial cable, could be considered for merger and treated as “metallic” competencies and form with ICTTC010 – Place, secure and terminate optical fibre cable, the core higher level competencies for modern complex, multi purpose ICT installations.

Recommendation 18 – P3

“Where technical standards form an integral part of a competency, reference should be made to these in the unit descriptors rather than late in the competency in the range statements”

An example of this is technical standards AS/NCS 3080 and ACIF/AS S009 within ICT005 competency standard where they are listed in the range statement but not prominent in the unit descriptor.

Recommendation 19 – P3

“That in competencies that refer to LAN and WAN, consideration be given to the Network, Switching and Transmission components as well as the CPE aspects of the technology”

The LAN and WAN were referenced in the current Training Package, (eg competency standard ICTTC147A), covers administration in some detail but is generalist in most other competencies. LAN and WAN references need to be expanded in CPE and the Network sections so as to include additional technical knowledge of this field. This is also covered in “Soft Switches and Gateways” listed under Engineering in Section 4 page 33 of the report.

Recommendation 20 – P3

“The ICT02 needs to be reviewed and updated to ensure that it remains technically relevant until 2012. The detailed technical report in Section 4 should be used by the reviewer to identify specific actions on competencies and associated underpinning knowledge and skills for the Technical Stream”

In total the report proposed 17 new competencies, a review of 12 existing technical competencies and a list of 11 non-technical competencies to be evaluated.

Recommendation 21 – P1

“A Certificate IV Apprenticeship should be specifically included in ICT02 to enable the Telecommunications Industry to provide a multi-skilled technician with a broad range of skills who can install, maintain and alter all telecommunications customer systems and general equipment in customer premises and some linked network locations”

The current Training Package works well with existing employees but is too hard for new starters. Implementation of a Certificate IV competency based apprenticeship will support more recruitment into the industry and address the skill sets required by telecommunications technicians. Other targeted programs using the competencies in ICT02 could also be developed in future, using experience gained with the Certificate IV Apprenticeship to take advantage of State and Territory funding arrangements for delivery to new entrants.

Recommendation 22 – P3

“That the review of ICT02 include full consideration of how competencies may be assembled in relation to package qualification requirements to:

- Provide greater flexibility and more opportunities to import competencies from other packages.*
- Take into account, State and Territory policies on offering training on a single competency basis, or, on specialised sets that may not make up a current Training Package specified qualification.*
- Provide solutions to the issues arising with emerging and shared technology applications, where the lines between telecommunications, communications, some “electrical” and IT, are not as clear as in the past.*

Innovation and Business Skills Australia, (2006). Recommendations for qualification changes to Certificate 1 to Advanced Diplomas in ICA05 (2 internal documents).

Recommendations for qualification changes Certificate I to IV in ICA05 (To be read in conjunction with requisites advice:

Innovation and Business Skills Australia (2006), *Unit Requisite report ICA05*.
Innovation and Business Skills Australia: Melbourne.

The following recommendations are made for changes to qualifications:

1. ICA10105A: Certificate I in Information Technology add ICAU2231A: Use Computer Operating System to list of electives.
2. ICA20105: Certificate II in Information Technology Remove ICAU1128A: Operate a personal computer from elective list.
3. ICA40805: Certificate IV in Information Technology (Multimedia) ICAA4233A: Determine and apply appropriate development methodologies (requisite for ICAA4058A Apply skills in object-oriented design, ICAB4075A Use a library or pre-existing components) and ICAB4224A Apply Mathematical Techniques for Software Development (ICAB4219A Apply introductory object-oriented language skills), be added to list of Games Development Electives.
4. ICA40205: Certificate IV in Information Technology (Support) Database administration stream. ICAA4233A: Determine and apply appropriate development methodologies should be added to the core of this qualification and the number of electives reduced by one.
5. ICA40605: Certificate IV in Information Technology (Testing) ICAS4127A Support system software, be added to list of electives.
6. ICA40105: Certificate IV in Information Technology (General) recommend adding to Core Networking Units ICAI4029A: Install network hardware to a network

Recommendations for qualification changes to Diplomas and Advanced Diplomas in ICA05

The requisite list should be changed in accordance with the attached listing for "Requisites AQF 5 & 6 ICA05".

1. ICA50105: Diploma of Information Technology (General) Recommend adding to:
Core E-business and Management Units ICAA5156A: Review and plan for risk to business solution providers (a Co-Requisite for ICAI5152A) Core Software Units ICAB5063A: Monitor and support data conversion (a Co-Requisite for ICAB5062A) ICAI5096A: Complete data transition (Co-Requisite for ICAB5062A) Core Multimedia and Websites Units ICAA4142A: Design a website to meet technical requirements (a Pre-Requisite for ICAA5141A)
2. ICA50205: Diploma of Information Technology (Project Management) recommend adding the following units to the elective list: ICAA5056A: Prepare disaster recovery and contingency plans (Co-Requisite for ICAA5156A) ICAA5151A: Gather data to identify business requirements (Co-Requisite for ICAA5148A, ICAA5150A) ICAI4029A: Install network hardware to a network (Co-Requisite for ICAI4097A) ICAS5102A: Establish and maintain client user liaison (Co-Requisite for ICAP6040A, ICAI5088A, ICAA5151A, ICAB5071A, ICAB5073A, ICAB5074A, ICAT5081A, ICAS5105A, ICAS5111A and ICAS5104A) ICAW4027A: Relate to clients on a business level (Co-Requisite for ICAI4091A and a Pre-Requisite ICAS5103A) ICAI4097A: Install and configure a network (Pre-Requisite for ICAS5122A) ICAP4037A: Contribute to the development of a strategy plan (Pre-Requisite for ICAP5036A) ICAS4107A: Manage resolution of system faults on a live system (Pre-Requisite for ICAS5122A) ICAS4116A: Undertake capacity planning (Pre-Requisite for ICAS5199A) ICAS4191A: Maintain website

- performance (Pre-Requisite for ICAS5199A) ICAT5077A: Develop detailed test plan (Pre-Requisite for ICAA5055A)
ICAW4026A: Coordinate and maintain work teams (Pre-Requisite for ICAB5071A, ICAB5074A)
3. ICA50305: Diploma of Information Technology (Systems Administration)
No Changes needed
 4. ICA50405: Diploma of Information Technology (Networking)
Recommend adding the following to the electives list ICAA4233A: Determine and apply appropriate development methodologies (prerequisite for ICAA5151A, ICAA5158A) ICAS4107A: Manage resolution of system faults on a live system (prerequisite for ICAS5123A) ICAS4116A: Undertake capacity planning (prerequisite for ICAA5145A, ICAA5144A) Selection of these units are possible under current packaging rules
 5. ICA50505: Diploma of Information Technology (Database Design and Development) No Changes needed
 6. ICA50605: Diploma of Information Technology (Website Development) No Changes needed
 7. ICA50705: Diploma of Information Technology (Software Development) No Changes needed
 8. ICA50805: Diploma of Information Technology (Systems Analysis and Design)
No Changes needed
 9. ICA60105: Advanced Diploma of Information Technology Recommend adding to streams: -Elective Knowledge Management Units
ICAA5151A: Gather data to identify business requirements (a Co-Requisite for ICAA5148A, ICAA5150A, ICAA5147A and ICAA5146A) ICAA5158A: Translate business needs into technical requirements (a Pre-Requisite for ICAA6157A)
Elective Systems or Software Process Improvement Units ICAA5156A: Review and plan for risk to business solution providers (a Co-Requisite for ICAI5152A, ICAA6149A) ICAS5102A: Establish and maintain client user liaison (a Co-Requisite for both ICAB5068A and ICAT5081A and a Pre-Requisite for ICAP6040A, ICAP6038A, ICAI6187A, ICAB5063A, ICAA6149A and ICAA6157A)
ICAP4037A: Contribute to the development of a strategy plan (a Pre-Requisite for ICAP6038A, ICAP5036A) ICAS4116A: Undertake capacity planning (a Pre-Requisite for ICAS5199A, ICAA5147A) ICAW4026A: Coordinate and maintain work teams (a Pre-Requisite for ICAA6157A, ICAA5138A and ICAI6187A)
Elective Systems Development Units ICAA4142A: Design a website to meet technical requirements (a Pre-Requisite for ICAA5141A) ICAB4135A: Create a simple mark-up language document to specification (a Pre-Requisite for ICAB5180A)
ICAB4170A: Build a database (a Pre-Requisite for ICAB5164A) General Elective Units ICAS4119A: Monitor and administer systems security (a Pre-Requisite for ICAS5118A) ICAS4191A: Maintain website performance (a Pre-Requisite for ICAS5199A) ICAA5056A: Prepare disaster recovery and contingency plans (A Co-Requisite for ICAA5156A) Selection of these units are possible under current packaging rules
 10. ICA60205: Advanced Diploma of Information Technology (Network Security)
Recommend adding to electives:

ICAA5156A: Review and plan for risk to business solution providers (a Co-Requisite for ICAI5152A) ICAA4142A: Design a website to meet technical requirements (a Pre-Requisite for ICAA5141A) ICAD5092A: Update and document operational procedures (a Pre-Requisite for ICAA6052A)
 ICAS4116A: Undertake capacity planning (a Pre-Requisite for ICAA5045A, ICAA5145A, ICAS5199A)
 ICAS4191A: Maintain website performance (a Pre-Requisite for ICAS5199A)
 ICAW4026A: Coordinate and maintain work teams (a Pre-Requisite for ICAI6187A)

Marson, L, Sutton, R, (C&L Communications Consultants Pty Ltd) (2006). *Broadcast Technology Qualifications and Skillsets*. Innovation and Business Skills Australia: Melbourne.

This report explores the need for qualifications in broadcast technology. It recommended:

- As part of the revision of qualifications in CUF01, create a Certificate III in Broadcast Technology by selecting units from different Training Packages.
- As part of the revision of qualifications in CUF01, create a Certificate IV in Broadcast Technology.
- As part of the revision of qualifications in CUF01, determine the most appropriate qualification structure to address skill development needs at AQF IV and above.
- Maintain ongoing contact with IBSA's EE-OZ project as broadcast technology qualifications are being developed.

CITT (2006), *Telecommunications Report: - Digital TV Reception Qualification, - Telecommunication Apprenticeship, - Radio Technician Training Needs Analysis, - ICT Marketing Strategies*. Innovation and Business Skills Australia: Melbourne.

1. The need to identify industry standards, competencies and qualifications for the Digital Reception TV (Pay TV) Technician for the subscription TV sector of the Telecommunication industry;
2. The need for the current training system to include a formal 3 year Apprenticeship of broader Telecommunications skills which encompasses the traditional skills with the new emerging and converging skills of ICT not currently covered by existing Training Packages qualifications and competencies so as to encourage new entrants to the a career in the industry;
3. The Radio sector has identified a need for urgent Radio Technician training to meet current (and future) skill needs of enterprises, Government departments and the industry, thus requiring an analyse the these skill and competencies so as to develop qualifications and possibly an Apprenticeship/cadetship model for this sector;
4. The ICT industry requires information about the various models, opportunities and programs available so there is a need to develop an ICT marketing strategy to enable these new activities and qualifications to be promoted in industry and to inform organisations, industry associations and other

stakeholders of the benefits of these new qualifications, models and arrangements.

APPENDIX 2: THESAURUS OF SEARCH TERMS

Thesaurus for selecting competency sets related to information technology and telecommunications.

Themes	Thesaurus Terms			
Combining Training Packages	amalgamate associate bind blend bond coadjute coalesce commingle combine compound conjoin cooperate couple incorporate interface join link merge mix network put together relate synthesize unify unite	Information technology Telecommunications training AND package		
Duplication Across Training Packages	back-up opportunity option other pick preference recourse redundancy selection substitute	analogue clone companion coordinate correlate counterpart counter script double duplication match parallel reciprocal recurrence repetition replica replication reproduction similarity add Include	accession addition adding adjoining affixing annexation attachment augmentation enlargement extension inclusion increase add include	New AND competency AND standards training AND package
Industry Requirements	alignment arranging assembling assembly composition configuration conformation construction coordination design disposal format	function functioned framework		

Themes	Thesaurus Terms			
	formation forming formulation framework grouping harmony make-up making management method methodology Organism Organizing pattern plan planning regulation running situation standard standardization structure structuring symmetry system unity whole			
Qualifications and Skill Sets	criterion gauge goal measure standard yardstick benchmark shift converge convergence	claim concern condition demand element essential fulfillment fundamental imperative lack must need obligation precondition preliminary preoccupation prepossession prerequisite prescription provision proviso qualification requisite specification OR	qualifications AND industry level new AND technology requirement	

Themes	Thesaurus Terms			
	criterion gauge goal measure standard yardstick benchmark shift converge convergence growth licence employment	business commerce commercial enterprise corporation management manufactory multinational production trade		
Skill Currency	criterion gauge goal measure standard yardstick benchmark shift converge convergence growth licence employment currency viability trend forecast maintain maintenance			

Information Technology ASCED Classifications

020101 Formal Language Theory

020103 Programming

020105 Computational Theory

020107 Compiler Construction

020109 Algorithms

020111 Data Structures

020113 Networks and Communications

020115 Computer Graphics

020117 Operating Systems

020119 Artificial Intelligence

020199 Computer Science, n.e.c.

020301 Conceptual Modelling
020303 Database Management
020305 Systems Analysis and Design
020307 Decision Support Systems
020399 Information Systems, n.e.c.
029901 Security Science
029999 Information Technology, n.e.c.
0313007-0313009 Communications Equipment Installation and Maintenance
080905 Practical Computing Skills

APPENDIX 3: ICT QUALIFICATIONS MAPPED TO FUNCTIONS & OCCUPATIONS

Information technology and telecommunications related Qualifications, mapped to ACSED fields of education and ASCO occupational codes

Qualification Code	Qualification Title	ASCO Occupation	ASCED Field of Education
BSB30601	Certificate III in E-Business		OFFICE STUDIES
BSB41201	Certificate IV in E-Business		BUSINESS AND MANAGEMENT
BSB41301	Certificate IV in E-Business Development		BUSINESS AND MANAGEMENT
BSB51101	Diploma of E-Business		BUSINESS AND MANAGEMENT
BSB51201	Diploma of Strategic E-Business Development		BUSINESS AND MANAGEMENT
BSB51301	Diploma of E-Learning		BUSINESS AND MANAGEMENT
BSB60701	Advanced Diploma of E-Business		BUSINESS AND MANAGEMENT
BSB60801	Advanced Diploma of Strategic E-Business Development		BUSINESS AND MANAGEMENT
CUE60103	Advanced Diploma of Design for Live Production, Theatre and Events		GRAPHIC AND DESIGN STUDIES
CUF20601	Certificate II in Multimedia	Intermediate Service Workers nec	COMPUTER SCIENCE
CUF30601	Certificate III in Multimedia	Visual Arts and Crafts Professionals nec	COMPUTER SCIENCE
CUF50601	Diploma of Broadcast Engineering	Production Assistant (Film, Television or Radio)	COMMUNICATION AND MEDIA STUDIES
CUF50701	Diploma of Multimedia	Visual Arts and Crafts Professionals nec	COMPUTER SCIENCE
CUF60401	Advanced Diploma of Broadcast Engineering	Production Assistant (Film, Television or Radio)	COMMUNICATION AND MEDIA STUDIES
CUF60501	Advanced Diploma of Multimedia	Visual Arts and Crafts Professionals nec	COMPUTER SCIENCE
ICA10101	Certificate I in Information Technology		OFFICE STUDIES
ICA10105	Certificate I in Information Technology		OFFICE STUDIES
ICA10201	Certificate I in Information Technology (E-Consumer)		OFFICE STUDIES

Qualification Code	Qualification Title	ASCO Occupation	ASCED Field of Education
ICA20105	Certificate II in Information Technology		OFFICE STUDIES
ICA20198	Certificate II in Information Technology		INFORMATION SYSTEMS
ICA20199	Certificate II in Information Technology		INFORMATION SYSTEMS
ICA20201	Certificate II in Information Technology (Applications)		INFORMATION SYSTEMS
ICA30105	Certificate III in Information Technology	Computing Support Technician	INFORMATION SYSTEMS
ICA30199	Certificate III in Information Technology (Software Applications)	Computing Support Technician	COMPUTER SCIENCE
ICA30299	Certificate III in Information Technology (General)	Computing Support Technician	INFORMATION SYSTEMS
ICA30399	Certificate III in Information Technology (Network Administration)	Computing Support Technician	INFORMATION SYSTEMS
ICA40105	Certificate IV in Information Technology (General)	Computing Support Technician	COMPUTER SCIENCE
ICA40198	Certificate IV in Information Technology (Client Support)	Computing Support Technician	INFORMATION SYSTEMS
ICA40199	Certificate IV in Information Technology (Client Support)	Computing Support Technician	INFORMATION SYSTEMS
ICA40205	Certificate IV in Information Technology (Support)	Computing Support Technician	INFORMATION SYSTEMS
ICA40299	Certificate IV in Information Technology (Database Administration)	Computing Support Technician	INFORMATION SYSTEMS
ICA40305	Certificate IV in Information Technology (Websites)	Computing Support Technician	OTHER INFORMATION TECHNOLOGY
ICA40399	Certificate IV in Information Technology (Network Management)	Computing Support Technician	INFORMATION SYSTEMS
ICA40405	Certificate IV in Information Technology (Networking)	Computing Support Technician	COMPUTER SCIENCE
ICA40499	Certificate IV in Information Technology (Multimedia)	Computing Support Technician	COMPUTER SCIENCE
ICA40505	Certificate IV in Information Technology (Programming)	Computing Support Technician	COMPUTER SCIENCE
ICA40599	Certificate IV in Information Technology (Technical Support)	Computing Support Technician	INFORMATION SYSTEMS
ICA40605	Certificate IV in Information Technology (Testing)	Computing Support Technician	INFORMATION SYSTEMS
ICA40699	Certificate IV in Information Technology (Programming)	Computing Support Technician	COMPUTER SCIENCE
ICA40705	Certificate IV in Information Technology (Systems Analysis and Design)	Systems Designer	INFORMATION SYSTEMS
ICA40799	Certificate IV in Information Technology (Systems Analysis and Design)	Computing Support Technician	INFORMATION SYSTEMS
ICA40801	Certificate IV in Information Technology (Helpdesk)	Computing Support Technician	INFORMATION SYSTEMS
ICA40805	Certificate IV in Information Technology (Multimedia)	Visual Arts and Crafts Professionals nec	COMPUTER SCIENCE

Qualification Code	Qualification Title	ASCO Occupation	ASCED Field of Education
ICA41001	Certificate IV in Information Technology (Website Administration)		OTHER INFORMATION TECHNOLOGY
ICA41101	Certificate IV in Information Technology (Website Design)		OTHER INFORMATION TECHNOLOGY
ICA50105	Diploma of Information Technology (General)		INFORMATION SYSTEMS
ICA50199	Diploma of Information Technology (Systems Administration)	Systems Manager	INFORMATION SYSTEMS
ICA50205	Diploma of Information Technology (Project Management)		BUSINESS AND MANAGEMENT
ICA50299	Diploma of Information Technology (Software Development)	Software Designer	COMPUTER SCIENCE
ICA50305	Diploma of Information Technology (Systems Administration)	Systems Manager	INFORMATION SYSTEMS
ICA50399	Diploma of Information Technology (Business Analysis)	Applications and Analyst Programmer	INFORMATION SYSTEMS
ICA50405	Diploma of Information Technology (Networking)		COMPUTER SCIENCE
ICA50499	Diploma of Information Technology (Network Engineering)	Systems Manager	INFORMATION SYSTEMS
ICA50505	Diploma of Information Technology (Database Design and Development)		INFORMATION SYSTEMS
ICA50599	Diploma of Information Technology (Multimedia Integration)	Computing Professionals nec	COMPUTER SCIENCE
ICA50601	Diploma of Information Technology (Website Development)		INFORMATION SYSTEMS
ICA50605	Diploma of Information Technology (Website Development)		INFORMATION SYSTEMS
ICA50701	Diploma of Information Technology (Internetworking)		INFORMATION SYSTEMS
ICA50705	Diploma of Information Technology (Software Development)		COMPUTER SCIENCE
ICA50801	Diploma of Information Technology (E-Business Development)		INFORMATION SYSTEMS
ICA50805	Diploma of Information Technology (Systems Analysis and Design)		INFORMATION SYSTEMS
ICA50901	Diploma of Information Technology (Knowledge Management)		INFORMATION SYSTEMS
ICA50905	Diploma of Information Technology (Multimedia)		COMPUTER SCIENCE
ICA51001	Diploma of Information Technology (Database Design and Development)		INFORMATION SYSTEMS
ICA51101	Diploma of Information Technology (Project Management)		BUSINESS AND MANAGEMENT
ICA60101	Advanced Diploma of Information Technology (E-Business Development)		INFORMATION SYSTEMS
ICA60105	Advanced Diploma of Information Technology		INFORMATION SYSTEMS
ICA60201	Advanced Diploma of Information Technology (E-Business Analysis)		INFORMATION SYSTEMS

Qualification Code	Qualification Title	ASCO Occupation	ASCED Field of Education
ICA60205	Advanced Diploma of Information Technology (Network Security)		COMPUTER SCIENCE
ICA60301	Advanced Diploma of Information Technology (E-Learning Development)		INFORMATION SYSTEMS
ICA60401	Advanced Diploma of Information Technology (E-Security)		OTHER INFORMATION TECHNOLOGY
ICA60501	Advanced Diploma of Information Technology (Project Management)		BUSINESS AND MANAGEMENT
ICP50105	Diploma of Printing and Graphic Arts (Digital Production)		MANUFACTURING ENGINEERING AND TECHNOLOGY
ICT20197	Certificate II in Telecommunications	Electrical or Telecommunications Trades Assistant	ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
ICT20202	Certificate II in Telecommunications	Electrical or Telecommunications Trades Assistant	ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
ICT20297	Certificate II in Telecommunications (Cabling)	Electrical or Telecommunications Trades Assistant	ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
ICT20302	Certificate II in Telecommunications Cabling	Electrical or Telecommunications Trades Assistant	ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
ICT20399	Certificate II in Telecommunications (CAN)	Electrical or Telecommunications Trades Assistant	ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
ICT20402	Certificate II in Telecommunications Access Network	Electrical or Telecommunications Trades Assistant	ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
ICT20499	Certificate II in Telecommunications (Call Centres)	Telemarketer	ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
ICT30197	Certificate III in Telecommunications		ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
ICT30202	Certificate III in Telecommunications		ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
ICT30297	Certificate III in Telecommunications (CPE)		ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
ICT30302	Certificate III in Telecommunications Cabling and Customer Premises Equipment		ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
ICT30397	Certificate III in Telecommunications (CAN)	Communications Linesperson	ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
ICT30497	Certificate III in Telecommunications (Cabling)	Communications Linesperson	ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
ICT30599	Certificate III in Telecommunications (Call Centres)	Inquiry Clerk	ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
ICT30699	"Certificate III in Telecommunications (Customer Premises, Cabling and Equipment)"		ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
ICT40197	Certificate IV in Telecommunications		ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
ICT40202	Certificate IV in Telecommunications Engineering		ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
ICT40297	Certificate IV in Telecommunications (CPE)		ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY

Qualification Code	Qualification Title	ASCO Occupation	ASCED Field of Education
ICT40302	Certificate IV in Telecommunications Computer Systems		ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
ICT40397	Certificate IV in Telecommunications (CAN)	Communications Linesperson	ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
ICT40402	Certificate IV in Telecommunications Network Planning	Communications Linesperson	ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
ICT40499	Certificate IV in Telecommunications (Cabling)	Communications Linesperson	ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
ICT40599	Certificate IV in Telecommunications (Call Centres)	Customer Service Manager	ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
ICT50197	Diploma of Telecommunications Engineering		ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
ICT50202	Diploma of Telecommunications Engineering		ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
ICT50299	Diploma of Telecommunications (CPE)		ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
ICT50302	Diploma of Telecommunications Computer Systems		ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
ICT50399	Diploma of Telecommunications (CAN)	Communications Linesperson	ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
ICT50402	Diploma of Telecommunications Photonics		ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
ICT60197	Advanced Diploma of Telecommunications Engineering		ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
ICT60202	Advanced Diploma of Telecommunications Engineering		ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
ICT60302	Advanced Diploma of Telecommunications Computer Systems		ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
MEM30405	Certificate III in Engineering - Electrical/Electronic Trade		ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
MEM30498	Certificate III in Engineering - Electrical/Electronic Trade		ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
PRD30301	Certificate III in Spatial Information Services	Statistical Clerk	GEOMATIC ENGINEERING
PRD50301	Diploma of Spatial Information Services	Earth Science Technical Officer	GEOMATIC ENGINEERING
PRD60101	Advanced Diploma of Spatial Information Services	Earth Science Technical Officer	GEOMATIC ENGINEERING
PRD60301	Advanced Diploma of Spatial Information Services	Earth Science Technical Officer	GEOMATIC ENGINEERING
UTE10102	Certificate I in Electrotechnology	Electrical or Telecommunications Trades Assistant	ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
UTE10199	Certificate I in Electrotechnology (Superseded by UTE10102)	Electrical or Telecommunications Trades Assistant	ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
UTE10202	Certificate I in Sustainable Energy (Electrotechnology)	Electrical or Telecommunications Trades Assistant	ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY

Qualification Code	Qualification Title	ASCO Occupation	ASCED Field of Education
UTE20199	Certificate II in Electrotechnology Business Support		OFFICE STUDIES
UTE20299	Certificate II in Electrotechnology Data Communications	Electrical or Telecommunications Trades Assistant	ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
UTE20399	Certificate II in Electrotechnology Powerline (Vegetation Control)	Electrical or Telecommunications Trades Assistant	ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
UTE20499	Certificate II in Electrotechnology Remote Area Essential Services Operations	Electrical or Telecommunications Trades Assistant	ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
UTE20502	Certificate II in Electrotechnology Servicing (Superseded by UTE20504)	Electrical or Telecommunications Trades Assistant	ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
UTE20504	Certificate II in Electrotechnology Servicing	Electrical or Telecommunications Trades Assistant	ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
UTE20599	Certificate II in Electrotechnology Servicing (Superseded by UTE20502)	Electrical or Telecommunications Trades Assistant	ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
UTE20604	Certificate II in Electrotechnology Technical Support	Electrical or Telecommunications Trades Assistant	ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
UTE20699	Certificate II in Electrotechnology Technical Support (Superseded by UTE20604)	Electrical or Telecommunications Trades Assistant	ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
UTE30104	Certificate III in Electrotechnology Assembly and Servicing		ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
UTE30199	Certificate III in Electrotechnology Assembly and Servicing (Superseded by UTE30104)		ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
UTE30299	Certificate III in Electrotechnology Building Services	Home Improvements Installer	ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
UTE30399	Certificate III in Electrotechnology Business Administration		OFFICE STUDIES
UTE30402	Certificate III in Electrotechnology Communications	General Communications Tradesperson	ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
UTE30499	Certificate III in Electrotechnology Communications (Superseded by UTE30402)	General Communications Tradesperson	ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
UTE30599	Certificate III in Electrotechnology Computer Systems		ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
UTE30699	Certificate III in Electrotechnology Data Communications	Communications Linesperson	ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
UTE30702	Certificate III in Electrotechnology Entertainment and Servicing	Electronic Equipment Tradesperson	ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
UTE30799	Certificate III in Electrotechnology Entertainment and Servicing (Superseded by UTE30702)	Electronic Equipment Tradesperson	ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
UTE30899	Certificate III in Electrotechnology Instrumentation		ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
UTE30999	Certificate III in Electrotechnology Refrigeration and Air Conditioning		ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
UTE31099	Certificate III in Electrotechnology Scanning	Electronic Instrument Tradesperson (Special Class)	ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
UTE31199	Certificate III in Electrotechnology Systems Electrician		ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY

Qualification Code	Qualification Title	ASCO Occupation	ASCED Field of Education
UTE40199	Certificate IV in Electrotechnology Apparatus Servicing		ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
UTE40302	Certificate IV in Electrotechnology Communications	General Communications Tradesperson	ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
UTE40399	Certificate IV in Electrotechnology Communications (Superseded by UTE40302)	General Communications Tradesperson	ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
UTE40499	Certificate IV in Electrotechnology Computer Systems		ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
UTE40599	Certificate IV in Electrotechnology Contracting		ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
UTE40602	Certificate IV in Electrotechnology Entertainment and Servicing	Electronic Equipment Tradesperson	ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
UTE40699	Certificate IV in Electrotechnology Entertainment and Servicing (Superseded by UTE40602)	Electronic Equipment Tradesperson	ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
UTE40799	Certificate IV in Electrotechnology Explosion-protection		ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
UTE40999	Certificate IV in Electrotechnology Instrumentation		ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
UTE41099	Certificate IV in Electrotechnology Radar Systems	Electronic Instrument Tradesperson (Special Class)	ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
UTE41199	Certificate IV in Electrotechnology Refrigeration and Air Conditioning		ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
UTE41202	Certificate IV in Electrotechnology Systems Electrician		ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
UTE41299	Certificate IV in Electrotechnology Systems Electrician (Superseded by UTE41202)		ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
UTE41301	Certificate IV in Electrotechnology Renewable Energy		ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
UTE50199	Diploma of Computer Systems Engineering	Computing Support Technician	ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
UTE50299	Diploma of Electrical Engineering	Electrical Engineering Associate	ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
UTE50399	Diploma of Electronics Engineering	Electronic Engineering Associate	ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
UTE50499	Diploma of Instrumentation and Control Engineering	Electronic Engineering Associate	ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
UTE50599	Diploma of Refrigeration and Air Conditioning Engineering		ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
UTE50601	Diploma of Electrotechnology Renewable Energy		ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
UTE60199	Advanced Diploma of Computer Systems Engineering	Electronics Engineer	ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
UTE60299	Advanced Diploma of Electrical Engineering	Electrical Engineering Associate	ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY
UTE60399	Advanced Diploma of Electronics Engineering	Electronic Engineering Associate	ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY

Qualification Code	Qualification Title	ASCO Occupation	ASCED Field of Education
UTE60499	Advanced Diploma of Instrumentation and Control Engineering	Electronic Engineering Associate	ELECTRICAL AND ELECTRONIC ENGINEERING AND TECHNOLOGY

Competency Unit Code	Competency Unit Title	Training Package	ASCED Functional Area 020113
BSATEC502 A	Manage the establishment and maintenance of a workgroup network	Business Services Training Package	Networks and Communications
BSATEC502 B	Manage the establishment and maintenance of a workgroup network	Business Services Training Package	Networks and Communications
ICAA5045A	Produce network architecture design	Information And Communications Technology Training Package	Networks and Communications
ICAA5144A	Determine best fit topology for a local network	Information And Communications Technology Training Package	Networks and Communications
ICAA5145A	Identify best fit topology for a wide area network	Information And Communications Technology Training Package	Networks and Communications
ICAA5241A	Design an enterprise wireless local area network	Information And Communications Technology Training Package	Networks and Communications
ICAB4235A	Build basic perimeter security into a network	Information And Communications Technology Training Package	Networks and Communications
ICAB4236A	Build security into a virtual private network	Information And Communications Technology Training Package	Networks and Communications
ICAB4239A	Build a small wireless local area network	Information And Communications Technology Training Package	Networks and Communications
ICAB4240A	Build an enterprise wireless network	Information And Communications Technology Training Package	Networks and Communications
ICAB5162A	Install, configure and test a payment gateway	Information And Communications Technology Training Package	Networks and Communications
ICAI3020A	Install and optimise operating system software	Information And Communications Technology Training Package	Networks and Communications
ICAI3101A	Install and manage network protocols	Information And Communications Technology Training Package	Networks and Communications
ICAI4029A	Install network hardware to a network	Information And Communications Technology Training Package	Networks and Communications
ICAI4097A	Install and configure a network	Information And Communications Technology Training Package	Networks and Communications
ICAI4175A	Select and install a router	Information And Communications Technology Training Package	Networks and Communications
ICAI4188A	Install and maintain a server	Information And Communications Technology Training Package	Networks and Communications
ICAI5098A	Install and manage complex networks	Information And Communications Technology Training Package	Networks and Communications

Competency Unit Code	Competency Unit Title	Training Package	ASCED Functional Area 020113
ICAI5172A	Implement backbone technologies in a local area network	Information And Communications Technology Training Package	Networks and Communications
ICAI5173A	Install and configure a single segment local area network switch	Information And Communications Technology Training Package	Networks and Communications
ICAI5174A	Install high end switches in multi switched local area networks	Information And Communications Technology Training Package	Networks and Communications
ICAI5176A	Install and configure router	Information And Communications Technology Training Package	Networks and Communications
ICAITB172A	Install asynchronous transfer mode (ATM) local area network (LAN)	Information And Communications Technology Training Package	Networks and Communications
ICAIT1188A	Install and maintain a server	Information And Communications Technology Training Package	Networks and Communications
ICAITS017A	Maintain system security	Information And Communications Technology Training Package	Networks and Communications
ICAITS017C	Maintain system integrity	Information And Communications Technology Training Package	Networks and Communications
ICAITS020A	Install and optimise system software	Information And Communications Technology Training Package	Networks and Communications
ICAITS020B	Install and optimise system software	Information And Communications Technology Training Package	Networks and Communications
ICAITS020C	Install and optimise system software	Information And Communications Technology Training Package	Networks and Communications
ICAITS107A	Rectify system faults on a live system	Information And Communications Technology Training Package	Networks and Communications
ICAITS107B	Rectify system faults on a live system	Information And Communications Technology Training Package	Networks and Communications
ICAITS114A	Implement maintenance procedures	Information And Communications Technology Training Package	Networks and Communications
ICAITS114B	Implement maintenance procedures	Information And Communications Technology Training Package	Networks and Communications
ICAITS115A	Maintain equipment and software in working order	Information And Communications Technology Training Package	Networks and Communications
ICAITS115B	Maintain equipment and software in working order	Information And Communications Technology Training Package	Networks and Communications
ICAITS116A	Undertake capacity planning	Information And Communications Technology Training Package	Networks and Communications

Competency Unit Code	Competency Unit Title	Training Package	ASCED Functional Area 020113
ICAITS116B	Undertake capacity planning	Information And Communications Technology Training Package	Networks and Communications
ICAITS118A	Manage system security	Information And Communications Technology Training Package	Networks and Communications
ICAITS118B	Manage system security	Information And Communications Technology Training Package	Networks and Communications
ICAITS119A	Monitor and administer systems security	Information And Communications Technology Training Package	Networks and Communications
ICAITS119B	Monitor and administer systems security	Information And Communications Technology Training Package	Networks and Communications
ICAITS123A	Manage network security	Information And Communications Technology Training Package	Networks and Communications
ICAITS123B	Manage network security	Information And Communications Technology Training Package	Networks and Communications
ICAITS124A	Monitor and administer network security	Information And Communications Technology Training Package	Networks and Communications
ICAITS124B	Monitor and administer network security	Information And Communications Technology Training Package	Networks and Communications
ICAITS191A	Maintain web site performance	Information And Communications Technology Training Package	Networks and Communications
ICAITS203A	Choose a web hosting service	Information And Communications Technology Training Package	Networks and Communications
ICAITT084A	Perform stress and loading test of integrated platform	Information And Communications Technology Training Package	Networks and Communications
ICAITT084B	Perform stress and loading test of integrated platform	Information And Communications Technology Training Package	Networks and Communications
ICAS2017A	Maintain system integrity	Information And Communications Technology Training Package	Networks and Communications
ICAS4107A	Manage resolution of system faults on a live system	Information And Communications Technology Training Package	Networks and Communications
ICAS5122A	Identify and resolve network problems	Information And Communications Technology Training Package	Networks and Communications
ICAS5192A	Configure an internet gateway	Information And Communications Technology Training Package	Networks and Communications
ICAS5203A	Evaluate and select a web hosting service	Information And Communications Technology Training Package	Networks and Communications

Competency Unit Code	Competency Unit Title	Training Package	ASCED Functional Area 020113
ICAT4221A	Locate equipment, system and software faults	Information And Communications Technology Training Package	Networks and Communications
PRSSM417A	Commission/decommission networked security system	Asset Security Training Package	Networks and Communications
PRSSM418A	Maintain networked security system	Asset Security Training Package	Networks and Communications
PRSSM419A	Install networked security system	Asset Security Training Package	Networks and Communications
TDTB5501A	Maintain computer based and solid state interlocking equipment	Transport And Distribution Training Package	Networks and Communications
TDTS1101A	Install and test computer based and solid state interlocking equipment	Transport And Distribution Training Package	Networks and Communications
THHGLE18A	Monitor and maintain computer systems	Hospitality Training Package	Networks and Communications
THHGLE18B	Monitor and maintain computer systems	Hospitality Training Package	Networks and Communications
UTTNTD408A	Analyse, interpret and restore network protection systems	Electricity Supply Industry - Transmission And Distribution Training Package	Networks and Communications