



## **The Classification of ICT Occupations**

# **The approach proposed for the Australian and New Zealand Standard Classification of Occupations (ANZSCO)**

**Paper for 2004 Asia Pacific Information and Communications  
Technology Technical Meeting, Wellington, New Zealand  
30 November - 1 December 2004**

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### **Introduction**

In recent years, issues of labour market supply and demand in occupations associated with the information and communications technology (ICT) have been major concerns of both governments and private sector in Australia and New Zealand. Policy debate about these issues, however, has not been well informed by good quality statistical information on the occupational structure of the ICT labour market. This has been due in part to the absence of an appropriate framework and agreed terminology for describing and quantifying ICT occupations. This paper describes the work being done as part of development of a new Australian and New Zealand Standard Classification of Occupations (ANZSCO) to address these issues.

The paper firstly provides background information about the development of ANZSCO and the uses of classifications of occupations in Australia and New Zealand. It then discusses some of the policy issues associated with the ICT labour market in Australia and New Zealand and the deficiencies in the data frameworks currently available to inform public debate about these issues. It summarises the process of consultation that has been undertaken to address the issues identified and presents information about the treatment of occupations in ICT in the current draft of the new ANZSCO. It concludes by identifying and discussing the issues that still remain to be resolved.

### **Background**

The Australian and New Zealand Standard Classification of Occupations (ANZSCO) is being developed jointly by the Australian Bureau of Statistics (ABS), Statistics New Zealand (SNZ) and the Australian Department of Employment and Workplace Relations (DEWR). The new classification is intended to replace the Australian Standard Classification of Occupations Second Edition (ASCO SE) which was introduced in 1996 and the New Zealand Standard Classification of Occupations 1999 (NZSCO 99). Both of these classifications are designed to be broadly consistent with the International Standard Classification of Occupations (ISCO-88) released by the International Labour Office in 1998. The new classification will continue to be conceptually consistent with ISCO-88, and to the extent possible will aim to be in harmony both with ISCO-88 and the proposed ISCO-08, currently in the early stages of development.

The new ANZSCO will be used by ABS and SNZ in all relevant censuses and surveys from 2006 onwards. It is planned to implement it in a range of administrative applications as soon as practicable from early 2006 onwards.

The purpose of the new ANZSCO is to provide a consistent and comparable basis for the description and provision of statistical data about occupations in Australia and New Zealand. The two classifications that ANZSCO will replace are currently used not only for the collection and dissemination of statistics from census, household surveys, employer surveys and other sources but also in a wide range of administrative and policy activities in both countries.

These activities include labour market analysis, the monitoring and identification of occupations in demand and skill shortage, the matching of job vacancies with job seekers including automatic vacancy lodgement on Australian Government websites, human resource management by both public and private sector agencies, assessment of visa applications for skilled migration, education and training planning, reporting of workplace accidents and epidemiological research.

### **Development of ANZSCO**

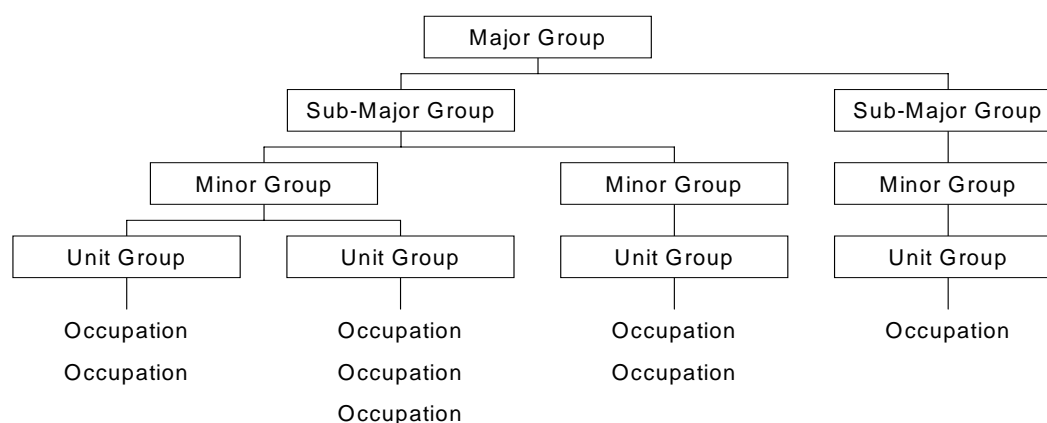
The process of developing the new ANZSCO began in 2002 and will be completed in 2006. This involved the establishment of a joint project team comprising officers from the ABS, SNZ and DEWR. The work is overseen by a Project Board comprising senior executives from all three of these organisations and is supported by reference groups in Australia and New Zealand. These reference groups comprise key users and stakeholders who represent most of the uses of occupation classifications described above.

The development has included three major rounds of user consultation from 2002 through to 2004, the circulation of draft material for comment to a wide range of stakeholders, and public information sessions in major centres in both countries. The development process has also involved seeking advice from a range of informed sources about occupational change in specific areas of the labour market. A number of alternative conceptual models were developed for the classification together with a series of draft classification structures. These were circulated widely for user comment and were also tested using data from ABS and SNZ collections. This approach ensures that all issues impacting on the use and design of the classification are identified and that users of the classification have the opportunity to point out deficiencies and have input to the final product.

The new classification will have a five level hierarchical structure with eight categories at its broadest level and approximately 1,000 categories (termed occupations) at the most detailed level. This is represented schematically in Figure 1 below.

**Figure 1: Hierarchical Levels in ANZSCO**

## Hierarchical Levels



The first round of user consultations conducted in 2002 identified a wide range of issues that needed to be addressed. The need for the coverage of occupations in Information and Communications Technology (ICT) to be updated and expanded in order to provide more relevant and more detailed information about these occupations was among the highest priority issues. Related to this issue was the need for the classification to be updated more frequently than every ten years, as had been the case for the Australian Standard Classification of Occupations. Other important issues included the need for further consideration of the underlying conceptual model for the classification and the need for some alternative views. These alternative views will allow standard aggregations of occupations based on skill specialisation independently of skill level. An alternative view for ICT occupations was identified very early as a priority area.

### **Policy and data problems with ICT occupations**

Consultations with users identified a wide range of policy issues associated with occupations in ICT. The most significant of these relate to the rapid rate of occupational change in ICT and rapid employment growth in the sector. The rapid growth in employment, in terms of total numbers employed and total numbers of job vacancies, is in part a reflection of the increasing dominance of ICT in the economy and in the community more broadly. The rate of occupational change has been driven by frequent emergence and development of new technology requiring new skills and new ways of working.

A result of this rapid growth and rapid rate of change has been the existence of serious skill shortages in ICT most of the time. The ICT labour market has also been characterised, however, by short episodes of over supply in some areas due to fluctuations in the business cycle. The resolution of problems in the ICT labour

market has been identified by governments in Australia and New Zealand at all levels, as well as by the private sector, as a high priority. IT and IT skills in particular are seen as a strategic enabler for continued economic growth.

Closer consideration suggests that there are two different dimensions to the problem. The first relates to the need for ICT skills by users of IT in the workforce and in the community generally. The second relates to those skills required for the production of goods and services in ICT.

The need for ICT skills among the general workforce varies significantly from one job to another and is also changing rapidly over time. For example, until recently registered nurses had little requirement for general skills in the use of information technology, although they frequently needed skills in technology specific to the health field. Increasingly however, nurses are required to exchange patient and diagnostic information electronically within and between hospitals. E-health initiatives in both countries are likely to lead to a further expansion of computer technology into patient management, diagnosis and access to information resources. Since the rate of change in these general ICT skills is so rapid, it is not really possible to address these issues in the context of a standard classification of occupations.

For the second dimension of the problem, relating to the ICT skills required for the production of goods and services directly in ICT, ANZSCO has a major role in providing a framework for the consistent description and measurement of labour market supply and demand issues. These skills are required both in the ICT industry and in a wide range of other industries.

With respect to the identification and description of these occupations both the ASCO SE and NZSCO 99 were seen by users to be badly out of date. For example occupations such as Website Designer and Web Administrator are not separately identified and have been dealt with differently by different users of the classification. It appears that the ICT industry does not use ASCO SE or NZSCO 99 in work force planning or recruitment. In Australia the Department of Employment and Workplace Relations has developed its own modifications of ASCO Second Edition for ICT occupations.

Other problems with the data currently available are associated with the need to differentiate occupations which produce goods and services in ICT from those which use ICT as a tool. The absence of any common terminology or common understanding of occupational structures within the industry has made these problems worse. For example, the job titles and occupational descriptions used by one company in job advertisements and position specifications might be quite different from those used by another company.

In recognition of this problem, an ICT occupational nomenclature working group was established in Australia. The aim of this group was to come up with a consistent national standard set of terminology for jobs in ICT. The ANZSCO team has worked closely with this group to ensure consistency between the new ANZSCO and the conclusions drawn by the group.

## **Overview of the conceptual model for the new ANZSCO**

An outcome of the consultations with users was that the underlying principles used in both ASCO Second Edition and NZSCO as well as in ISCO-88 are still the most appropriate way of structuring and describing the labour market in Australia and New Zealand. ANZSCO will therefore be a skill-based classification and will use the concepts of skill level and skill specialisation to group occupations together.

Skill level is defined as a function of the range and complexity of tasks performed in an occupation and is measured operationally by:

- the level or amount of formal education and training
- the amount of previous experience in a relevant occupation, and the amount of on the job training

required to confidently perform the set of tasks required for that occupation.

Skill specialisation is defined as a function of four factors:

- Field of knowledge required
- Tools and equipment used
- Materials worked on: and
- Goods and services produced or provided.

ANZSCO will differ somewhat from its predecessors in its application of the skill level concept. Previously, skill level was applied at the top or major group level of the classification. This means that each major group contained occupations only at one skill level. In ANZSCO, skill level is applied more flexibly and mainly at the second level of the classification. Each sub major group will be at only one skill level, with some exceptions. The five skill levels defined for ANZSCO are summarised in Attachment 1.

The result of this is a set of 8 major groups at the top level of ANZSCO which are much more intuitively meaningful and useful than those available in ASCO Second Edition (see Figure 2 below).

The change of the application of the skill level concept is reflected in a significant increase in the number of sub major groups compared with ASCO Second Edition and NZSCO99 (See Figure 3 below).

**Figure 2: Comparison of major groups, ASCO SE and ANZSCO**

<b>ASCO 2nd Edition</b>	<b>ANZSCO</b>
Managers and Administrators	Managers
Professionals	Professionals
Associate Professionals	
Tradespersons and Related Workers	Technicians and Trades Workers
Advanced Clerical and Service Workers	Community and Personal Service Workers
Intermediate Clerical, Sales and Service Workers	Clerical and Administrative Workers
Intermediate Production and Transport Workers	Sales Workers
Elementary Clerical, Sales and Service Workers	Machinery Operators and Drivers
Labourers and Related Workers	Labourers
<b>Nine major groups</b>	<b>Eight major groups</b>

**Figure 3: Numbers of groups in classification structures**

<b>Hierarchical Level</b>	<b>ASCO SE</b>	<b>NZSCO 99</b>	<b>ANZSCO (draft)</b>
<b>Major Group</b>	9	9	8
<b>Sub-Major Group</b>	35	25	44
<b>Minor Group</b>	81	99	96
<b>Unit Group</b>	340	260	344
<b>Occupation</b>	986	565	910

### **ICT occupations**

The dominant use of skill level in ANZSCO means that ICT occupations can be found in several of the major groups including Managers, Professionals, and Technicians and Trades Workers. Detail of the classification structure for ICT occupations is provided at Attachment 2.

In order to satisfy the demand for nationally comparable information on occupations from an industry perspective, a system of alternative views has been developed to complement the main structure of the classification. The ICT alternative view in ANZSCO will allow unit groups comprising occupations that directly provide ICT

goods or services to be aggregated in a consistent and standard way. Jobs that require the use of ICT as a tool only, even if this is at quite a high level, are excluded from the ICT alternative view.

In ASCO SE, only three unit groups were defined specifically for ICT occupations. These are Information Technology Managers, Computing Professionals, and Computing Support Technicians.

In the draft new ANZSCO a minor group for ICT managers has been defined in Major Group 1 Professionals. It comprises two occupations: Chief Information Officer and Project Manager.

In major group 2, Professionals, a sub major group, Information and Communication Technology Professionals, has replaced the Computing Professionals unit group. This in turn is broken down into 3 minor groups. The first of these is focussed on systems and software development. The second contains occupations associated with networks and hardware. The third is for database and systems administration and security. These minor groups are broken down further into a number of unit groups and occupations. In addition, in Minor Group 23, Business Professionals, a unit group is provided for ICT Sales Professionals and for ICT Trainers.

In Major Group 3, Technicians and Trade Workers, a minor group has been created for ICT Technicians. In the attached draft this includes a unit group for ICT Support Technicians and a unit group for Telecommunications Technical Specialists. Each of these groups is further broken down into a number of specific occupations. At a lower skill level, a unit group is proposed within Sub Major Group 33, Electrotechnology Trades Workers for Telecommunications Trades Workers. This includes occupations for Telecommunications Technician, Cabler (Telecommunications and Data) and Telecommunications Lines Worker.

This new framework has been developed following extensive consultation with industry through the ICT Occupational Nomenclature Working Group and has been agreed by that group to be a suitable approach for use by industry generally. This classification structure has also been presented to the Computer Technology Industry Association (COMPTIA) Vendor Steering Committee for Australia and New Zealand. It has so far been well received by all who have provided comment.

Although the progress made so far and the amount of goodwill from industry is very encouraging, a number of issues are still to be resolved. These include the correct placement in the classification of the occupation Telecommunications Engineer and a final determination as to the extent to which this occupation differs from the occupation Communication Specialist (IT). There is also concern about the distinction between ICT Support Engineer and ICT Support Technician, currently made in the draft ANZSCO. A number of commentators feel that this distinction, based on skill level, may be good in theory but unrealistic in practice.

The occupations within the unit groups Telecommunications Technical Specialists and Telecommunications Trades Workers have been developed following close consultation with industry representatives and on the basis of industry training

packages. They require further validation from industry before they can be finalised, however.

In addition to this work on the classification structure, definitions of all categories need to be developed and/or circulated to industry specialists for validation and comment. This process of validation/comment will be used to identify any further refinements to the classification.

The ICT labour market is global rather than regional. International comparability of data on ICT occupations is therefore an important aim. Advice from COMPTIA suggests that the approach proposed for ANZSCO may have wide applicability internationally. We will therefore seek to influence the development of ISCO-08 in a direction similar to that used for ANZSCO. If, however, a different approach is adopted for the international standard we will need to consider what consequences there might be for Australia and New Zealand.

Looking to the future it needs to be recognised that the world of ICT occupations will not stand still and that the ANZSCO team will need to maintain close ties with industry to ensure that the classification is kept up-to-date. This will best be achieved by ensuring that the classification is used by the industry in its own activities as well as by government, and by ensuring that a close working relationship between public and private sector is maintained. This may perhaps be an even greater challenge than the development work so far completed.

## **Attachment 1:**

### **ANZSCO Skill Levels**

#### **Skill Level 1**

Occupations at Skill Level 1 have a level of skill commensurate with a Bachelor degree or higher qualification. At least five years of relevant experience may substitute for the formal qualification. In some instances relevant experience and/or on-the-job-training may be required in addition to the formal qualification.

#### **Skill Level 2**

Occupations at Skill Level 2 have a level of skill commensurate with at least one of the following:

NZ Register Diploma, *or*  
AQF Associate Degree, Advanced Diploma or Diploma

At least three years of relevant experience may substitute for the formal qualification. In some instances relevant experience and/or on-the-job-training may be required in addition to the formal qualification.

#### **Skill Level 3**

Occupations at Skill Level 3 have a level of skill commensurate with at least one of the following:

NZ Register Level 4 qualification,  
AQF Certificate 4, or  
AQF Certificate 3 and at least two years of on-the-job training.

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

#### **Skill Level 4**

Occupations at Skill Level 4 have a level of skill commensurate with at least one of the following:

NZ Register Level 2 or 3 qualification, or  
AQF Certificate 2 or 3.

At least one year of relevant experience may substitute for the qualifications listed above. In some instances relevant experience may be required in addition to the formal qualification.

## **Skill Level 5**

Occupations at Skill Level 5 have a level of skill commensurate with completion of one the following:

NZ Register Level 1 qualification,  
AQF Certificate 1, or  
compulsory secondary schooling.

In some instances, none of the above may be required.

# **ICT Classification Structure for ANZSCO – consultation draft**

## **Structure to unit group level**

### **1 MANAGERS**

#### **12 Specialist Managers**

#### **123 Information and Communication Technology (ICT) Managers**

##### **1231 Information and Communication Technology (ICT) Managers**

### **2 PROFESSIONALS**

#### **22 Information and Communication Technology (ICT) Professionals**

#### **221 ICT Business and Systems Analysts and Programmers**

##### **2211 ICT Business and Systems Analysts**

##### **2212 Software and Applications Programmers**

##### **2213 Multimedia Specialists and Web Developers**

#### **222 ICT Network and Hardware Professionals**

##### **2221 Computer Network and Communication Professionals**

##### **2222 ICT Hardware and Support Engineers**

#### **223 Database and Systems Administrators and ICT Security Specialists**

##### **2231 Database and Systems Administrators and ICT Security Specialists**

#### **23 Business Professionals**

#### **232 Human Resource and Training Professionals**

##### **2323 ICT Trainers**

#### **233 Sales, Marketing and Public Relations Professionals**

##### **2333 ICT Sales Professionals**

### **3 TECHNICIANS AND TRADE WORKERS**

#### **31 Science, Engineering and ICT Technicians**

#### **313 ICT Technicians**

##### **3131 ICT Support Technicians**

##### **3132 Telecommunications Technical Specialists**

#### **33 Electrotechnology Trades Workers**

#### **332 Electronics and Telecommunications Trades Workers**

##### **3322 Telecommunications Trades Workers**

# **ANZSCO ICT structure to occupation level**

## **1 MANAGERS**

### **12 Specialist Managers**

#### **123 Information and Communication Technology (ICT) Managers**

##### **1231 Information and Communication Technology (ICT) Managers**

123111 Chief Information Officer (ICT)

Alternative Title: Chief Technology Officer

123112 Project Manager (ICT)

## **2 PROFESSIONALS**

### **22 Information and Communication Technology (ICT) Professionals**

#### **221 ICT Business and Systems Analysts and Programmers**

##### **2211 ICT Business and Systems Analysts**

221111 ICT Business Analyst

221112 Systems Analyst

##### **2212 Software and Applications Programmers**

221211 Analyst Programmer

221212 Developer Programmer

221213 Software Engineer

##### **2213 Multimedia Specialists and Web Developers**

221311 Multimedia Specialist

221312 Web Developer

#### **222 ICT Network and Hardware Professionals**

##### **2221 Computer Network and Communication Professionals**

222111 Network Administrator

222112 Network Analyst

222113 Telecommunications Engineer

Alternative Title: Communication Specialist (IT)

##### **2222 ICT Hardware and Support Engineers**

222211 Hardware and Systems Engineer

[Specialisation: Systems Integrator]

Alternative Title: Hardware Architect (ICT)

222212 Quality Assurance Engineer

222213 Systems Test Engineer

222214 Support Engineer

## **223 Database and Systems Administrators and ICT Security Specialists**

### **2231 Database and Systems Administrators and ICT Security Specialists**

223111 Database Administrator  
[Specialisation: Database Analyst]  
223112 Systems Administrator  
223113 ICT Security Specialist  
[Specialisation: Computer Systems Auditor]

## **23 Business Professionals**

### **232 Human Resource and Training Professionals**

#### **2323 ICT Trainers**

232311 ICT Trainer

### **233 Sales, Marketing and Public Relations Professionals**

#### **2333 ICT Sales Professionals**

233311 ICT Sales Representative  
233312 ICT Business Developer  
233313 ICT Account Manager

## **3 TECHNICIANS AND TRADE WORKERS**

### **31 Science, Engineering and ICT Technicians**

#### **313 ICT Technicians**

##### **3131 ICT Support Technicians**

313111 ICT Customer Support Officer  
Alternative Title: Help Desk Officer  
313112 Hardware Technician  
313113 Web Administrator  
313199 ICT Support Technicians nec

##### **3132 Telecommunications Technical Specialists**

313211 Telecommunications Computer Systems Technicians  
313212 Telecommunications Engineering Technical Officers  
313213 Telecommunications Network Planners

### **33 Electrotechnology Trades Workers**

#### **332 Electronics and Telecommunications Trades Workers**

##### **3322 Telecommunications Trades Workers**

3322-11 Telecommunications Technician  
3322-12 Cabler (Telecommunications and Data)  
3322-13 Telecommunications Linesworker