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## 25. IS Early Career Job Advertisements: A Content Analysis

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### Abstract

*In this paper we examine through the content analysis of job advertisements the required knowledge, skills and competencies demanded of early career information systems graduates. Jobs appropriate for graduates with three or fewer years in the workforce were investigated. The job advertisement data was gathered in 2006. The analysis showed a wide variety of job titles. There was a high demand for technical knowledge and competencies as well as communication skills. A core cluster of IS knowledge and skills emerged which appear to be in demand across a wide variety of jobs. Issues raised include the role of entry level positions in the preparation of their incumbents for future more senior positions.*

**Keywords:** IS Careers, IS Knowledge and skills, IS Job Advertisements

### Introduction

In this paper we focus on IS jobs and IS graduates' knowledge and skills required for these jobs. IS graduates generally come from business school programs that may be named also management information systems (MIS), computer information systems (CIS), or information technology (IT). They are differentiated from computer science, computer engineering, and information science programs (Abraham et al. 2006:p.1148). Student numbers in IS schools at universities in Australia and elsewhere are reported as dropping (Lea 2006) while in contrast employers are facing difficulties in recruiting appropriate qualified graduates (Alexander 2007). A number of reasons have been posited for this, including misperceptions by potential students about the strength of the job market fuelled by reports of off-shoring, and gaps between the perceptions of educators and employers about the knowledge, skills and competencies required of IS graduates. This study focuses on the Australian IS job market and investigates what employers actually state they want in job advertisements (job ads).

The requirements employers express in job ads are a major means by which employers indicate, more or less effectively, what they want from potential employees. The paper investigates a sub-set of the Australian computing job market by analysing ads for positions suitable for recent graduates (defined here as new graduates and those with up to about three years work experience) from university level IS programs. Through the analysis of job ads this paper aims to identify what Australian employers currently require in terms of IS knowledge, skills and competencies as well as any other expressed requirements such as communication skills or personal characteristics. In addition the data analysis aims to throw light on the broad structure of jobs (as represented by the ads) through the identification of

groupings of the knowledge, skills and competencies in the requirements specified by employers.

Several issues determined the focus. Primarily there are conflicting views about the Australian IS job market: while some employers believe that there are not enough new graduates to cater for present and future needs, falling numbers in IS programs in recent years suggest that prospective students are concerned that there are not enough jobs or that the jobs which are available are not to their liking. One concern is that the off-shoring of jobs is impacting and will continue to impact on the opportunities available to new graduates. While this research will not directly address whether there are, and will be for the foreseeable future, too many or too few graduates for the work available, it will indicate the skills and knowledge in demand. This has value for students in selecting courses and for IS academics in planning and delivering them.

A second reason for restricting the analysis to jobs appropriate for recent graduates is the belief that after several years in the workforce, experience and post graduate studies become increasingly important in decisions about the employability of candidates. The findings of other research indicate that different knowledge and skills are valued in higher level positions (Zwieg et al. 2006: p.104). This would be reflected in the content of the ads and lessen the usefulness of the findings of this research for establishing what knowledge, skills and competencies are sought in new graduates. While not claiming to throw light on all aspects of the employment market, job ads are probably the most easily available indicator of the short to mid-term direction of workplace demands for particular knowledge, skills and competencies. They provide a window to what is currently wanted (required as well as preferred) and hence to what employers believe they need for the organization to continue and thrive.

This paper briefly situates the study in the literature, describes the research method, essentially the collection and content analysis of job ads, and then presents the results. It concludes with a consideration of the issues arising, particularly the role of entry level positions in the preparation of their incumbents for future more senior positions.

## **Literature**

A number of American studies have tracked the IS job market over time to identify the direction of change and current employer requirements (Lee 2005; Litecky et al, 2004). An often cited study by Todd, McKeen and Gallupe (1995) surveyed newspaper job ads spanning the 20 years from 1970 to 1990 and found little change in the types of requirements specified for programmers and IS management positions. Systems analysis positions had experienced the greatest change and they remark that contrary to expectations there had been an increase in the specification of required technical knowledge and a slight decrease in requirements for business and systems knowledge (p.1). A subsequent newspaper job ads study which spanned 1988 to 2003 identified a similar trend with the authors finding ongoing evidence of a recruitment gap between employers' articulation of a desire for business knowledge and 'soft skills', and jobs ads concentrating on 'hard skills'. Interestingly they claim that this is due to it being easier to screen for "hard skills" (Gallivan et al. 2004: p.83). In seeking to explain this apparent contradiction Litecky et al. (2004) propose that the hiring process is composed of two stages. They suggest that the first stage scrutinises potential employees against specified technical requirements ('hard skills') stated in job ads, whilst the second stage uses the job interview for the investigation of 'soft skills' such as communication skills for making the hiring decision.

The recent interview-based IT workforce investigation sponsored by the Society for Information Management Advocacy Program remarks on the difficulties ahead as the use of off-shore workers for technical work may have unintended consequences. It argues that this will produce a shortage of people who have had the opportunity to develop the project and business-related skills required for mid-level work. These skills are often developed in entry level work, work which has in the past been more often of a technical nature (Zwieg et al. 2006). Unlike a number of other studies which address employers' demands as a composite, this research distinguished between the demands for entry-level and mid-level positions. The researchers also point out that entry-level positions more often seek the technically skilled with almost all the skills sought being technical ones. When asked about missing skills in recent recruits, employers identified "communication skills" and indicated that new entrants with good "communications skills" were of high value to them (p.104). The researchers argue that the new IT professional should have a balance of technical, business and project skills to prepare them for their careers and that in the present work situation the old model of picking up non-technical skills over time and with experience does not apply (p.106).

A recent American unpublished exploratory study (Marion 2006) using 100 ads from two electronic job listings found once again that a large part of the specified requirements in ads were "technical skills". Marion notes that her findings support the proposition that IS professionals need to understand business culture and operations to function well in their workplace stating that the term "integration" was frequently mentioned in different contexts in the ads. The importance of business and behavioural skills was stressed by Lee et al. (1995) and a decade later Bassellier and Benbasat (2004) conclude that IT professionals need a growing range of non-IT skills (p.691). Interestingly another recent study (Letch and Randolph 2000) indicates that while end-users in functional areas of business are more involved in IS and IT use and development, they do not see their roles extending to the traditional domains of IS professionals such as programming, IS design and systems installation and integration. It would appear therefore, that IS professionals need to know more about business and business and functional professionals need to know more about IT, but the need for high level specialisation remains.

The nature and extent of gaps between the perceptions of IS academics and IS practitioners about the field has also been explored revealing that practitioners appear to value interpersonal skills, understanding of organisations and personal traits more than academics who in turn more highly value software tools (Trauth et al. 1993; Lee et al. 2002). Trauth et al. identified an "expectation gap" between industry needs and academic preparation claiming that IS jobs had been changing and that academic programs had to keep up with this.

Many of these investigations have produced lists of skills and competencies identified as being more or less in demand. With the previous studies in mind, and the need established for educators and potential students to understand what skills and competencies employers actually require at any point in time, this study addresses the following questions:

1. What IS knowledge, skills and competencies and personal characteristics do employers list in current job ads for IS graduates in Australia?
2. Have these changed from those identified in previous studies? If so, how?

The contribution of this work lies primarily in that it addresses demands in the Australian workplace and so will supply information to Australian educators, students and employers.

There are similarities with the design of some American papers – the focus on jobs appropriate for recent IS graduates and a desire to throw light on the mix of skills which are currently in demand. This will allow for comparison. The software to be used in the content analysis enables cluster analysis which allows us to look at relationships between different skills and competencies in addition to counting the frequency with which particular terms occur.

## **Research Method.**

### ***Assumptions and limitations.***

A fundamental assumption of this investigation is that the content of job ads is a valid representation of the labour demands of employers. It is acknowledged that some ads are likely to be more accurate in their specification than others. Reasons for this may include a lack of experience in writing ads and a lack of clarity about what is required. There may also be non job-task factors which influence what is included and excluded such as company policy or state legislation or the desire to attract a high standard of applicant. In addition, ads vary in length and detail though the motivation to keep ads brief because of the cost associated with length is not the concern with electronic ads it is with newspaper ads; as electronic ads are usually charged for on the basis of the duration of their listing.

The study is limited to jobs suitable for recent IS graduates justified on the grounds that IS is a large field and focusing the investigation on a part of it is likely to produce more useful results than a study attempting to analyse all levels of positions. The concern about recent graduate perceptions stated above made this an easy decision.

No study could hope to identify all available jobs at any point in time as jobs are advertised in a wide range of sources and some are filled without public advertisement, by for example word of mouth and the campus and web page recruitment advertising of large companies and employment agencies. However, analysis of ads in widely used publicly available job listings is likely to turn up a fairly representative list of what is available.

### ***Research Design.***

Identifying what employers want from new staff can be approached in a number of ways (Litecky et al, 2004). The unobtrusive method of job ads analysis was chosen for this investigation in the belief that a broad sweep could be achieved with quite limited resources. The identification of jobs appropriate for recent graduates involved both choosing sources for the ads and the selection of ads from them.

Three major Australian online job lists have been used – *JobServe* (<http://jobserve.com.au>), *seek* (<http://seek.com.au>), and *MyCareer* (<http://mycareer.com.au>). These sources are also used by the Commonwealth Department of Education and Workplace Relations (DEWR) in preparation of its monthly ICT vacancy reports as they provide a broad national coverage (Australian Government. Department of Employment and Workplace Relations 2006). The search terms and strategies for the sources are not identical; however, all used the broad term IT&T and all allowed further refinement to express graduate and/or entry level. In addition searching could be done on more specific terms such as Business Analyst. This was done for several terms likely to be in job titles – Consultant, Business Analyst, E-Commerce, ERP, and IS Project Management - and in most cases the position had already been identified in the general search. Other refinements such as geographic restriction were possible but were not used. The choice of the categories under which ads are listed - for example IT&T (Information Technology & Telecommunications), Graduate/EntryLevel - are specified by the

advertisers so misspecification by them could result in ads being missed however it probably would be very few.

Preliminary scanning of the job listings showed that appropriate jobs have a wide variety of titles. In addition reliance on university program names had limited usefulness as there is no uniform language and not all ads specified the qualification required though it appeared from the content that the requirement of “graduate” did not mean absolutely any degree. These two factors limited the use of quick scanning in ad identification.

Generally speaking ads were selected on the basis of their position title and content. Other criteria used in defining appropriate jobs when there was some doubt about eligibility included the nature of the formal qualification where this was stipulated, salary package (minimum \$35,000 to a maximum of approximately \$80,000 per annum) and the required experience and knowledge specified. The researchers attempted to eliminate the duplicate ads but cannot guarantee this as the numbers of jobs scanned was quite large even after the restriction of graduate/entry level was used. (DEWR which scans four weeks of ads gathered over 20,000 under IT&T for the four weeks to mid April 2006 and note that this included some duplication.) (Australian Government. Department of Employment and Workplace Relations 2006). No assumptions can be made with regard to the probable percentage of entry level ads in comparison to the total number of ads. IT&T included ads that covered the broad spectrum of positions and this study focuses on IS positions, specifically entry level positions. In addition the online job lists not only duplicated ads between themselves, but often ads were repeated within the same online job list, even on a daily basis. Thus, we selected the ads on a purposive basis excluding duplicates, according to the criteria listed above. To reiterate, this is not a study of the size of the job market, rather the focus is on the knowledge, skills and competencies specified in ads for entry level IS positions.

The ads were gathered over ten weeks from 12 July to 13 September 2006. A preliminary analysis after 50 ads had been gathered showed that the approach was identifying a range of job titles and requirements. This process of job identification was found to be quite time consuming. As the period of data gathering proceeded it became clear that the same types and mix of ads were recurring. We ceased collection at ten weeks with a final sample size of 400 ads.

Essentially the strategy was to access one of the sources, apply the search terms and work through the entries retrieved in the several hours available for a session. The order of the ads was chronological by placement date with the most recent at the top of the list. In addition to checking the job title and brief description, the fuller description of many ads, which was available on a second screen, had to be read. Two researchers worked together to ensure the ads met the definition of IS expressed in our Introduction. Once an ad was deemed appropriate it was downloaded. In addition the following data was recorded if available: the geographic location of the job, the salary range, the specification of experience or qualifications.

The job titles and ad content was downloaded into Simstat/Wordstat (Provalis Research 2005) a word counting software package which enables the production of an hierarchical dictionary developed from the terms describing the desired knowledge, skills and competencies specified in the ads.

The creation of the user-defined inclusion dictionary to group related words into meaningful categories is a critical step in enabling the most informative use of the software. Words and phrases in the ads are examined and placed within a developing picture of the knowledge, skills and personal characteristics sought in the ads. Whilst the actual words used in the ads are the basis for the dictionary, the sources used in developing major and minor categories included the knowledge of the researchers and their colleagues, various published accounts of IS work such as the *Australian and New Zealand Standard Classification of Occupations* (Australian Bureau of Statistics and Statistics New Zealand 2006) and the coding schemes of a number of IS work studies (Todd et al. 1995; Gallivan et al. 2004; Prabhakar et al. 2005; Marion 2006). Table 1 contains the categories used including examples of dictionary terms under the 17 category labels developed.

Table 1: Content analysis categories

Category Label	Examples of Dictionary Terms
<b>Architecture &amp; Infrastructure</b>	Architecture, infrastructure, technology environment, ITIL
<b>Business Analysis, Systems Analysis</b>	BA, analyse and design, business analyst, business processes, business solutions, business and technology solutions, functional specification, monitor, system specification, system analysis, technical specification
<b>Communication Skills</b>	Articulate, interpersonal skills, negotiation, presentation, oral, written, verbal
<b>Computer Languages</b>	ASP, C+ , C++, Cobol, code, Java, Perl, SML, SQL, UML, VB, Visual Basic
<b>Data &amp; Information Management</b>	Data administration, data analysis, data cleansing, data content management, data integrity, EDI, information management, relational database, warehouse
<b>Enterprise Resource Planning</b>	Enterprise application, enterprise architecture, enterprise enabling, enterprise resource planning, enterprise solutions, ERP. Peoplesoft, SAP
<b>Hardware</b>	Hardware, laptop, MAC, mainframe, PC,
<b>Internet, Intranet, Web</b>	Apache, Coldfusion, Cookie, CSS, Domino, E-business, E-commerce, Extranet, HTML, Web design, XML, XHTML, XSL
<b>IS Development</b>	Analyst programmer, applications design, applications development, development, documentation, J2EE, JEE, lifecycle, .NET, object oriented, quality assurance, re-engineering, testing, visual studio.
<b>IS Project Management</b>	Implementation, project management, scoping
<b>Management</b>	BPO, business intelligence, business strategy, distribution chain, marketing strategy, supply chain.
<b>Networks</b>	Active directory, CISCO, Citrix, DHCP, DNS, IP, LAN, UUCP, Socket programming, VPN, WAN
<b>Operating Systems</b>	Linux, Unix, Windows, Win, XP, NT
<b>Operations, Maintenance &amp; Support</b>	First level support, applications management and support, automation, bugs, change requests, desk top support, customer training, diagnose, disaster recovery, helpdesk, operational maintenance and support, training end users, upgrades
<b>Personal Characteristics</b>	Adaptable, ambitious, attention to detail, business acumen, can do attitude, client relationship, confident, creative, desire to learn, eager to learn, energetic, enthusiastic, flexible, initiative, innovative, intelligent, leadership, organized, passionate, proactive, problem solver, quick learner, team player, relationship builder, self motivated, time management, work ethic, work independently
<b>Security</b>	ACI, audit, firewall, forensic, security, spam, threat
<b>Software Packages</b>	Adobe, Crystal Reports, Excel, Lotus Notes, Microsoft Office, Photoshop, Powerpoint, Visio

Once the dictionary was constructed the dictionary categories were ranked to identify the frequency with which the terms within specific categories were listed in the ads. The next stage of the data analysis involved quantifying the structural characteristics of our set of job ads and looking for relationships, that is, categories which were found together in ads and categories which never or rarely occurred together. By definition, co-occurrence occurs every

time words in two categories appear in the same ads. WordStat offers a number of ways to measure co-occurrence. For this research we choose the similarity measure Jaccard's coefficient, which is based on the occurrences of categories in the ads but does not take into account their frequency. This has the effect of compensating for large differences in counts for commonly occurring terms. The construction of the similarity matrix provides input for the multivariate technique of cluster analysis which is used to identify terms with similar co-occurrence patterns. This technique is part of the SimStat/WordStat software package. Using several methods to explore the data enables a more complete picture of the underlying structure.

The cluster analysis is based on the pattern similarity of the 17 categories in the dictionary. This hierarchical agglomerative clustering begins by joining two terms with the most similar patterns according to the distance criteria (average linkage). Following a similar linkage approach subsequent terms are joined to existing clusters until the one large cluster encompassing all 17 categories is formed. While there is no best number of clusters, the software identifies a 'default' cluster configuration based on the frequency of co-occurrence of terms. Selection of the final cluster solution depends on researcher judgment; however, the resulting clusters should result in high within-cluster homogeneity and high between cluster heterogeneity.

## Results

Four hundred job ads were collected. Almost half the ads were from *seek* (199, 49.8%). Throughout this paper, percentages may not sum to 100 due to rounding. A third came from *JobServe* (133, 33.3%) and the remaining 68 ads (17.0%) from *MyCareer*. *seek* and *JobServe* are dedicated job listing companies whilst *MyCareer* is a part of the Fairfax publishing company which produces newspapers in Sydney and Melbourne and grew out of their classified job ads pages. All three sources claim national coverage. Over half the ads (246, 61.5%) were for positions in the Sydney metropolitan area, 65 (16.3%) were located in the Melbourne metropolitan area with no other geographic area exceeding 10% of the ads.

The software package was run against the content of the ads for the frequency counts and cluster analysis. Table 2 ranks the dictionary categories according to the frequency of their occurrence in the ads. Terms categorised as **IS development** were the most frequently occurring; (in 312 (78.0%) of the ads). Under the category **IS Development**, we have placed the terms indicating programming, applications design and development, documentation, systems lifecycle, quality assurance, re-engineering and testing.

In determining this category as with others, in addition to consulting the literature, academics and students with relevant knowledge and experience were consulted about what should be included. They believed that the skills and competencies listed under **IS Development** would be a part of any IS graduate's toolkit, depending on electives selected and personal interests. The view was that even if graduates did not have hands-on experience in these areas, they would have an understanding of how these skills and competencies would fit in the occupational/business context.

As **IS Development** includes such a wide sweep of activities a further breakdown was undertaken to establish the relative demand for various sub-categories within it. Table 3 includes examples of the dictionary terms included within the sub-categories.



Table 2: Categories ranked by frequency of occurrence

Content Analysis Categories	Ranked	Number of ads	% of ads
IS Development	1	312	78.0%
Personal Characteristics	2	295	73.8%
Communication Skills	3	273	68.3%
Computer Languages	4	204	51.0%
Data & Information Management	5	158	39.5%
Management	6	150	37.5%
Business & Systems Analysis	7	146	36.5%
Internet, Intranet, Web	8	146	36.5%
Operations, Maintenance & Support	9	139	34.8%
Software Packages	10	87	21.8%
Operating Systems	11	78	19.5%
Architecture & Infrastructure	12	62	15.5%
Networks	13	52	13.0%
IS Project Management	14	51	12.8%
Hardware	15	43	10.8%
Enterprise Resource Planning	16	41	10.3%
Security	17	33	8.3%

Table 3: Sub-categories of IS Development

Sub-category Label	Examples of Dictionary Terms
IS Development Broad Terms	Applications design, applications development, documentation, lifecycle, software analysis
Object Oriented	Object Oriented, OO, OOP
Programming	Programmer, programming.
Re-engineering	Reengineering, re-engineering
Testing	Testing, tester, QA, quality assurance, UAT,
Tools, Environments, Technologies	ADO, API, DCOM, J2EE, JEE, .NET, servlet, Visual Studio

The ranked results of the breakdown are included in Table 4. The more detailed analysis revealed that in addition to asking for specific software knowledge and skills, for example skills in **Testing** and/or **Programming**, a large number of the ads included terms which conveyed a broader scope termed here **IS Development Broad Terms**. Approximately three quarters of the 400 ads (298, 74.5%) and 95.5% of the ads providing a word match with terms under the category **IS Development** included terms included in this broad sub-category. None of the terms in the more focused sub-categories occurred in more than half the ads.

Table 4: Ranking of sub-categories of the category IS Development

Sub-categories of IS Development	N. Ads	% Development Ads	% Total Ads
IS Development Broad Terms	298	95.5	74.5
Tools, Environments, Technologies	113	36.2	28.3
Programming	89	28.5	22.3
Testing	48	15.4	12.0
Object Oriented	25	8.0	6.3
Re-engineering	5	1.6	1.3

As with the broader analysis sub-categories are not exclusive as job ads can ask for a mix of knowledge and skills which come from any number of the categories. An ad could have

sought knowledge and skills from more than one subcategory of **IS Development** (e.g. **Testing** and **Programming**) and from components of several other categories as well. Table 2 shows that well over half the ads included terms in **Personal Characteristics** and **Communication Skills**.

Returning to Table 2 in detail, knowing how to use computer languages (**Computer Languages**) arguably one of the more technology oriented categories was the fourth most frequently occurring category (204, 51.0%). The technologically oriented knowledge and skills (represented in these ads as the requirements under **IS Development** and **Computer Languages**) appear to form an important part of the requirements of many employers seeking recent IS graduates. This technology focus in job ads is in keeping with the findings of the literature (Todd et al. 1995; Gallivan et al. 2004) and particularly in the content of early career job ads (Abraham et al. 2006; Zwieg et al. 2006).

No other skills or competency category occurred in more than 50% of ads. The two categories ranked last (**Enterprise Resource Planning** and **Security**) are probably so ranked because many of the positions requiring knowledge and skills in these areas are at a higher level than the positions targeted for investigation in this project. Specifically, positions which have responsibilities for security and enterprise resource planning also have requirements for the type of business knowledge which is generally accepted to come with several years in employment in IS work

**Personal Characteristics** and **Communications Skills** (ranked 2 and 3 respectively) were mentioned in close to 75% of ads. This finding is in line with the literature which reports that employers put high value on various personal characteristics and communication skills. While a limited number of terms convey the ideal of requiring **Communication Skills** (e.g. verbal, speak, write, articulate) this is not so with **Personal Characteristics**. The ads yielded over fifty terms to be included in this category (see Table 1 for a selection of the terms).

The next stage of the data analysis involved looking for relationships, for example which skill categories were found together in ads and which never or not often occurred together. WordStat offers cluster analysis as a method to address this. As discussed in the Method section the cluster analysis is based on the pattern similarity of the 17 categories in the dictionary. Using this approach the default emerged, which was a four cluster picture. These clusters are represented in the dendrogram, which is a graphical display of the clustering process (Figure 1).

The large cluster consists of ten terms—**Business & Systems Analysis, Management, Operations, Maintenance & Support, Communication Skills, Personal Characteristics, IS Development, Computer Languages, Data & Information Management, Internet, Intranet, Web, and Software Packages**. These terms portray a cluster that might be characterized as describing core IS skills and competencies required by employers in job ads for early career IS graduates.

The second cluster consisting of **Architecture & Infrastructure, Hardware, Network, Operating Systems** and **Security**, are all related to the more technical information technology aspects of IS and would thus appear to be a rational grouping, perhaps an additional area in which particular students might choose to specialize.

In addition two categories (**Enterprise Resource Planning** and **IS Project Management**) demonstrated little linking either with each other or with the other categories and are identified by the software as outliers. We have already speculated in the discussion that the low place of **Enterprise Resource Planning** in the ranking table (Table 2) may be because it is more likely the preserve of more senior and experienced staff than the recent graduates on which this study focuses. This is also likely to be the case with **IS Project Management**.

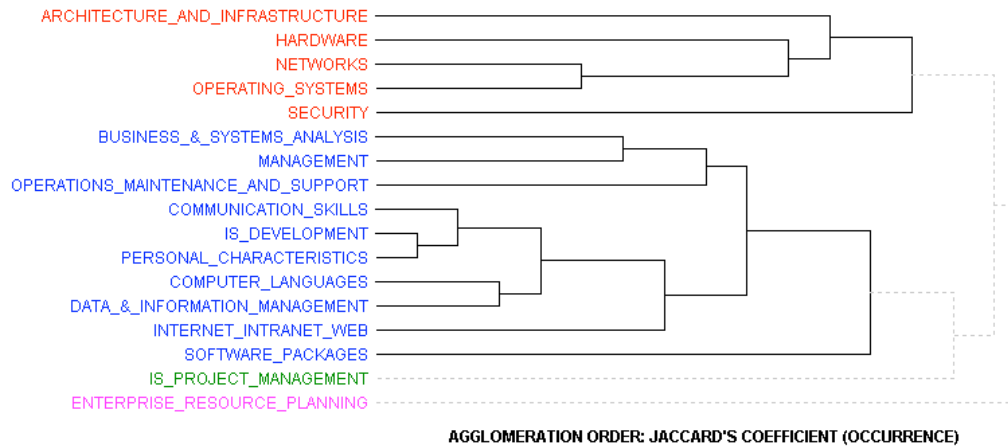


Figure 1: Cluster analysis of the 17 categories

### *Employing organizations*

In addition to specifying their requirements many employing organizations choose to say something about themselves. In addition to comments about aspects such as size and purpose many comments dealt with the organizational environment the new recruit would be entering. Characteristics of the organizational environment were mentioned in 316 (79.0%) of the ads. Terms which the researchers identified as conveying this type of message included 'fast-paced', 'friendly', 'team' and 'vibrant'. It could be argued that in conveying these messages about the workplace the employer was indicating the types of characteristics a potential employee might need to fit into it. The use of team structures was often expressed in the ads as were words which conveyed a dynamic culture. Of course such words do not necessarily represent what a workplace is like and few employers would advertise unattractive workplace characteristics, however they probably represent what management would see as desirable.

### *Qualifications and Experience*

In the Research Method section it was explained that the ad selection process aimed to restrict the selection to IS positions appropriate for recent graduates. This was done through the selection of search terms (e.g. Graduate/Entry Level), use of specific criteria (e.g. salary level) as well as investigation of the content of the ads. In regard to both salary and academic qualifications many ads made no specification. In respect of academic qualifications the omission of this would not necessarily have meant that the employer did not have an expectation that applicants would be graduates. As employers could specify retrieval terms for their ads it is probably fair to assume that if they indicated that they wished their ads to be retrieved from a search using the term 'recent graduate' they believed that that they had covered this point. Two thirds of the ads (269, 67.3%) required academic qualification (see Table 5). Not surprising, in light of the ad selection process only 25 (6.3%) specified that they did not seek any qualifications.

**Table 5: Qualifications required**

Qualifications required	N. total Ads	% Total Ads
<b>Required</b>	269	67.3
<b>Not specified</b>	71	17.8
<b>Either University/TAFE/Microsoft</b>	18	4.5
<b>Not Required</b>	25	6.3
<b>Either Qualifications or Experience</b>	17	4.3
<b>TOTAL</b>	400	100

Analysis of the ad content for the requirement of appropriate work experience (i.e. in IS work) showed that almost half of the ads (194, 48.5%) sought a person with some experience. A further 36 (9.0%) indicated a preference for some experience. While this stated preference is not concerning, the fact that almost half of the position ads retrieved on a search under terms conveying recent graduate required experience is more concerning. Even taking account of the fact that some recent graduates would have had part-time work as students which enabled them to answer the experience requirement the number requiring experience is high. There is no way of knowing what the employers who failed to specify whether experience was required (138, 34.5%) wanted. Only 18 (4.5%) of the 400 ads indicated that experience was not required.

**Table 6: Experience required**

Experience required	N. total Ads	% Total Ads
<b>Required</b>	194	48.5
<b>Not specified</b>	138	34.5
<b>Preferred</b>	36	9.0
<b>Not Required</b>	18	4.5
<b>Either Qualifications or Experience</b>	14	3.5
<b>TOTAL</b>	400	100

### ***Position titles***

For the job searcher the job title is the preliminary identifier as to whether a position may be suitable hence some investigation of titles seemed a necessary step in this project. As already remarked it quickly emerged as the ads were being scanned and selected that there was a wide variety of position titles and that in some cases these were not very informative (e.g. 'IT Graduate'). By contrast some positions had very specific titles (e.g. 'J2EE Developer'). Almost half of the ads had the words 'Junior' (89, 22.3%) or 'Graduate' (92, 23.0%) as part of their title (e.g. 'Junior Business Analyst', 'Graduate Business Analyst'). The most frequently occurring term in a job title was 'Developer' which occurred in 97 (24.3%) of the position titles. In addition it was clear from the description of a number of other positions that developer was implied in the title (e.g. 'Fun with VB' and 'VB.Net' and: 'VB6/VB'). The next most frequently used terms were 'Consultant' or 'Consultancy' occurring in 56 (14.0%) of the ads. The positions under this heading varied, some dealing with technical areas and others having more of a business management focus. No other term appeared in more than 10% of job titles. Programmer, which in some titles was linked with Analyst and in others with specific software (e.g. 'Graduate Programmer VB.Net') occurred in 32 (8.0%) of job titles and was the third most frequently occurring term. A small number of jobs had titles which identified they were 'help desk' positions however there were also positions which included the term 'support' in their titles which appeared likely from the description to be help desk roles possibly bringing the total of this type of work to around 8%. Further analysis of job titles and content of their associated ads may reveal that at least some positions

were poorly titled in respect to the work involved. The researchers speculate that some position titles might be thought to be a turn off for particular applicants, such as 'help desk' though whether this influences potential employers not to use them is not known.

### **Discussion and conclusions**

The purpose of this project was to gain a picture of what Australian employers want in knowledge, skills and competencies in new entrants to the workforce. The job ads revealed a solid demand for what might be considered as core competencies. The competency with the higher frequency of mentions and which also appears centrally in the cluster analysis maps we categorized as **IS Development**. As this was such an inclusive category (including words representing knowledge and skills in areas such as **Testing** and **Programming**) a sub-categorisation was used to illuminate demands. Perhaps not unexpectedly terms categorised under **IS Development Broad Terms** were found in almost all the ads: in 298 (95.5%) of the 312 ads in which there was a word match with terms under the category **IS Development** and 74.5% of the total 400 ads. As **IS Development Broad Terms** included terms such as applications design, documentation and software analysis this is not surprising. Employers would almost certainly expect recent graduates to have gained a sound foundation in these areas during their studies and be able to contribute to work in these areas even if a position was advertised as being primarily focused on for example working with specific software.

**Computer Languages** occurred in more than 50% of the ads. This is interesting as it is a skill which might be more strongly emphasised in computer science programs. While no other technical or professional categories occurred in more than 40% of the ads, many are newer skills categories (such as **Enterprise Resource Planning**, **IS Project Management** and **Security**). These may not currently be receiving a great deal of attention in courses, but appear to be requested by employers, and so perhaps warrants further consideration by educators. In addition, as we noted earlier, positions incorporating these skills may often be at a higher level

**Personal Characteristics** and **Communications Skills** (ranked 2 and 3 in frequency respectively, and also appearing in the centre of the core cluster) were mentioned in close to 75% of ads. When this is seen in conjunction with comments identified in the literature review about the high value employers placed on skills in these areas, it is clear that the education process should be focusing on helping students develop these areas. However, this may be easier said than done, as while communication skills have traditionally fallen within the remit of educational programs, some personal characteristics are harder to foster or teach.

The variety of jobs available was reflected in the large number of titles for positions – Developers, Programmers, Business Analysts, Test Analysts Web Designers, ERP Consultants to name a few. Positions including the term 'Developer' were the most frequently advertised representing almost 25% of the ads. Positions for 'Programmers' were also quite frequent though the rather vaguer terms 'Consultant' and 'Consultancy' occurred more often. Almost half of the ads had the words 'Junior' (89, 22.3%) or 'Graduate' (92, 23.0%) as part of their title which would be a helpful flag for the new graduate seeking to find suitable ads.

Two thirds of the ads (269, 67.3%) specified a requirement for academic qualifications (perhaps not surprising in light of the ad selection process) and only 25 (6.3%) specified that they did not seek any qualifications. Almost half of the ads (194, 48.5%) sought a person with some experience. A further 36 (9.0%) indicated a preference for some experience. As

the search for the ads was structured to identify jobs suitable for recent graduates the high level of requirement and preference for experience is concerning. While some recent graduates would have had part-time work as students the experience requirement is still worrying. While there is no way of knowing what the employers who failed to specify whether experience was required wanted (138, 34.5%) only 18 (4.5%) of the 400 ads indicated that experience was not required. This findings regarding the high number of graduate or junior positions requiring experience provide backup to the calls made in an earlier paper for an experiential business context to be added to IS programs (Abraham et al. 2006).

Many employers (316, 79.0%) choose to say something about themselves. The terms used conveyed messages about the work environment being team based, friendly, vibrant and it seems likely that in flagging these characteristics the employer may have been suggesting that only people who wanted to work in these types of environments should apply.

Recent studies identify IS job requirements as increasingly focussing on project management and business skills and less on technical requirements. While the desire for these particular skills are articulated in interviews with employers (Abraham et al. 2006; Zwieg et al. 2006), they are not well represented in our ads for early career IS professionals. These same recent studies identify a dilemma for academia which is to determine how early career job seekers who are sought for their technical skills can be prepared to move into mid- and senior-level positions. We may speculate that the value of critical thinking and the broader perspective inculcated in a university education increases in value as a career progresses. Therefore further study on the skills and competencies called for in job ads for these more senior positions is warranted.

## References

- Abraham, T., Beath, C.M., Bullen, C., Gallagher, K., Kaiser, K. and Simon, Judith. "IT Workforce Trends," *Communications of the Association for Information Systems* (17), 2006, pp.1147-1170.
- Alexander, H.. "Short-staffed employers boost perks," *The Sydney Morning Herald*. Wednesday, January 10th, 2007, p. 3.
- Association for Computing Machinery, Association for Information Systems, and The Computer Society. *Computing Curricula 2005: The Overview Report*, IEEE Computer Society , Los Alamitos, CA, City, 2005.from [http://www.acm.org/education/curric\\_vols/CC2005-March06Final.pdf](http://www.acm.org/education/curric_vols/CC2005-March06Final.pdf).
- Australian Bureau of Statistics and Statistics New Zealand. *Australian and New Zealand Standard Classification of Occupations*, Canberra, ACT, City Australian Bureau of Statistics and Statistics New Zealand, 2006. Retrieved 10 January 2007, from [http://www.ausstats.abs.gov.au/ausstats/subscriber.nsf/0/B4B626DEB4A0C558CA2571E600092D5A/\\$File/12200\\_2006.pdf](http://www.ausstats.abs.gov.au/ausstats/subscriber.nsf/0/B4B626DEB4A0C558CA2571E600092D5A/$File/12200_2006.pdf).
- Australian Government. Department of Employment and Workplace Relations *Vacancy Report (including the ICT Vacancy Index)*, Canberra, City DEWR, 2006. Retrieved 9 January, 2007, from <http://www.workplace.gov.au/NR/rdonlyres/67D843CE-81C1-43B5-B4C7-0BC0B4CC173E/0/December2006VacancyReport.pdf>.
- Bassellier, G. and Benbasat, I. "Business competence of information technology professionals: Conceptual development and influence on it-business partnerships," *MIS Quarterly* 28(4), 2004, pp.673-694.

- Gallivan, M. J., Truex D.P. III, And Kvasny, L. "Changing patterns in IT skills sets 1988-2003: A content analysis of classified advertising," *The DATABASE for Advances in Information Systems* 35(3), 2004, pp. 64-87.
- Lea, V. "Echoes of the tech wreck fading away," *The Australian*, Tuesday July 18, 2006, p 33.
- Lee, C. K. "Analysis of skill requirements for systems analysts in Fortune 500 organizations," *Journal of Computer Information Systems*, (45:4), 2005, pp. 84-92.
- Lee, D. M. S., Trauth E.M.,and Farwell, D. "Critical skills and knowledge requirements of IS professionals: a joint academic/industry investigation." *MIS Quarterly* 19(3), 1995 pp. 313-340.
- Lee, S., Lee S.; Koh S.; Yen D.; Tang H.-L. "Perception gaps between IS academics and IS practitioners: an exploratory study," *Information & Management* (40:1), 2002, pp. 51-61.
- Letch, N. and Randolph, C. "Do the skills of non-IT business graduates overlap with those of IT specialists?" *Americas Conference on Information Systems*, Long Beach, California, 2002.
- Litecky, C. R., Arnett, K. P. and Prabhakar, B. "The paradox of soft skills versus technical skills in IS hiring," *Journal of Computer Information Systems* (45:1), 2004, pp 69-76
- Marion, L.. *Content Analysis of Information Systems and Information Technology Employment Ads*, Unpublished paper. Philadelphia City, Drexel University, 2006.
- Prabhakar, B., Litecky, C. R. and Arnett, K. "IT Skills in a tough job market," *Communications of the ACM* (48:10):, 2005, pp. 91-94.
- Provalis Research. *Simstat and Wordsta*, software.<http://www.simstat.com>, 2005.
- Todd, P.A., McKeen, J.D. & Gallupe, R.B. "The evaluation of IS job skills: A content analysis of IS job advertisements from 1970-1990," *MIS Quarterly* (19:1), (2005) pp. 1-27.
- Trauth, E. M., Farwell, D. W. & Lee, D.. "The IS expectation gap: Industry expectations versus academic preparation," *MIS Quarterly* (17:3), 1993: pp. 293-307
- Underwood, A.. *Core body of knowledge for information technology professionals*, Sydney, Australian Computer Society, 1997 Retrieved 10 January, 2007, from <http://www.acs.org.au/index.cfm?action=show&conID=200509022309270170>.
- Zwieg, P., Kaiser, K. M., Beath, C.M., Bullen, C. Gallagher, K.P., Goles, T., Howland, J. and Simon, J.C. "The Information Technology Workforce: Trends and Implications 2005-2008," *MIS Quarterly Executive* (5:2), 2006, pp. 101-108.