
Industry View of ICT Roles and Skills Needs in Canterbury

Mehdi Asgarkhani

CPIT
City Campus, Madras Street
Christchurch
AsgarkhaniM@CPIT.ac.nz

Alison Young

CPIT
City Campus, Madras Street
Christchurch
YoungA@CPIT.ac.nz

This quality assured paper appeared at the 1st annual conference of Computing and Information Technology Research and Education New Zealand (CITREnz2010) incorporating the 23rd Annual Conference of the National Advisory Committee on Computing Qualifications, Dunedin, New Zealand, July 6-9. Samuel Mann and Michael Verhaart (Eds).

Abstract

This paper elaborates on the ICT skills needs within both Canterbury region and New Zealand. ICTs play a crucial role in today's knowledge-based economy. Organizations heavily rely on ICT solutions to develop and grow business. There is an increasing need for ICT skills within organizations – so as to benefit from the use of ICT tools and solutions. A focus group of industry representatives participated in this study – to identify the need for roles and skills within the ICT sector. It appears that there are consistencies in both the need for roles and the use of development platforms for the Canterbury region and all regions of New Zealand. That is to say, ICT qualifications designed to address national needs should address majority of ICT needs within the Canterbury region.

Keywords

ICT Skills, ICT Roles, Canterbury Region, Development Platforms

Introduction

Information and Communication Technologies (ICTs) play a crucial role in today's knowledge-based economy – often characterized by diffusion of information, communication and knowledge. The use of ICTs has accelerated economic transformation from industrial to

knowledge-based economy. Within the last decade, rapid developments of ICTs have created many opportunities for developing innovative ICT and web based information management solutions to allow for innovative ways of business development and growth. As a consequence, investment on ICTs in most organizations has become the largest component of capital expenditure. In the United States alone, the annual capital expenditure on ICT equipment and infrastructure in the recent years exceeded \$2 trillion. What's more, there has been a dramatic increase in the percentage of ICT capital expenditure (of the total business investments) in the last decade (in some cases as high as 40% of the total investment on business - source: US Department of Commerce, Bureau of Economic Analysis, National Income and Product Accounts).

Although there have been different views on the impact of investment in ICTs on economic growth and developments, a majority of economists and sociologists recognize the positive correlation between use of ICTs and economic growth. Productivity can be improved by organizations' capacity to develop and exploit knowledge and thus achieve economic success. E-technologies and ICT solutions have been increasingly contributing to the development of solutions to allow for increased productivity and improved service. ICTs have also contributed significantly towards GDP growth within most countries. A deep decline in ICT prices has motivated increasing investment in ICTs - which has in turn enabled organizations to establish technology platforms that allows for effective use of ICT solutions within both private and public sectors. A recent research initiated by the European Commission Enterprise and Industry

Directorate General shows that from 1995 to 2004 the GDP growth as a consequence of ICTs was 3.4% in USA, 2.9% in the UK and 2.1% in European Union (EU15).

New Zealand is not exempt from being part of the broader global economic and technological developments. Within the past decade, ICT solutions have played a major role as business enablers within New Zealand organizations. Some researchers may argue that small countries being remote from major centers of global economic activities may be in greater need of ICT solutions to remain connected and competitive. New Zealand organizations increasingly depend on advanced ICT solutions and skilled ICT personnel to make progress and grow. What's more, to protect investment in ICT solutions, organizations have been increasingly relying on skilled ICT staff in order to maximize the benefits of ICTs across the organization. We have witnessed a growing demand for knowledgeable ICT workers.

In recent years there has been ongoing debate so as to what is being considered as valuable and/or effective ICT skill(s). Additionally, it is widely argued that a successful ICT worker needs to not only be highly skilled but also be able to respond effectively (and in a timely fashion) to the ever changing body of knowledge associated with the industry. In other words, ICT workers are required to be able to learn and upgrade skills on an ongoing basis.

In late 2009, in reviewing the effectiveness of the portfolio of ICT qualifications at CPIT, it was decided to look at industry needs of key ICT skills and attributes that contribute to success within the ICT sector. It was

intended that the outcome of the study would assist in identifying the effectiveness of ICT qualifications within the institution and help to identify possible changes in revamping the portfolio of out qualifications.

A focus group of industry representatives that constitute the ICT qualifications local advisory committee participated in this study – which was completed in late January 2010.

This paper elaborates on the outcome of this study.

Research Design and Methodology

The research questions considered for this study are as follows:

- Which ICT occupations (roles) are in high demand in Canterbury and how does the demand in Canterbury compare with that of New Zealand wide demand?
- Which development platforms are currently in use and which are likely to be in demand within the next 2-3 years?
- What other ICT skills are seen as being critical for graduates to possess in order to be successful ICT workers within the sector?

It was decided to look at ICT roles (skills) frameworks and standards in order to develop our list of roles for this study. A number of frameworks (such as Skills Framework for Information Age SFIA and Australian and New Zealand Standard Classification of Occupations ANZSCO) were taken into consideration. We decided to adopt ANZSCO occupations reference – as it seemed more relevant to New Zealand market.

The methodology considered for the first Phase of this project was to survey a focus group of ICT

professionals who have considerable experience in recruiting ICT personnel for their organizations. The members of the Local Advisory Committee who represent a wide range of organizations within the Canterbury region were chosen as a focus group for conducting this study.

A questionnaire made of three categories o questions was sent to potential participants. The first category listed ANZSCO ICT occupations. Participants were advised to rate these occupations as they perceive the need for the occupation. The rating was done for both Canterbury and nationally. For both categories the participants were asked to rate both current and future needs. The rating could range from zero (no need for those roles so no jobs related to the role) to three (there is a perceived need for the role and it is expected that many jobs will exist in relation to that particular role).

The second category consisted of a list of development tools and platforms. Participants were asked to tick to indicate if there is current or future use for the particular tool and platform.

Finally, participants were asked to list five key skills that are in need within their organizations.

Findings

The average ratings for various ICT roles are outlined in Table 1.

- The most highly rated skills over a 2-year horizon in Canterbury are Business Analyst,

Analyst Programmer, Software and Application Programmer, ICT Security Specialist, Network Administrator, ICT support Engineer and ICT project manager.

- In the long term (5-year horizon), the most highly rated skills are: Business analyst, systems analyst, network administrator and ICT support engineer. There seems to be a high degree of consistency in ratings for the short and long term needs for roles.
- For all regions of New Zealand, the most highly rated ICT roles over a 2-year timeline were considered to be Systems Analyst, Analyst Programmer, Database Administrator, ICT Support Engineer and ICT Project Manager.
- Over a 5-year timeline, the highly rated roles (most needed roles) are Multimedia Support, Analyst Programmer, Network Administrator, ICT Support Engineer, ICT Project Manager, Web Developer and Software Tester.

Overall, there is some consistency in perceived needs for roles within Canterbury and nationally. In other words, looking at the top 10 rated roles, short and long terms, within Canterbury and nationwide, we will observe consistency – even though the order of ratings may be slightly different. This is a significant outcome as it suggests that ICT qualifications that target the highly rated roles can prepare graduates to work in the sector both in Canterbury and nationwide.

Table 1. Summary of results

ANZSCO Occupation Reference	ICT Occupation	Canterbury region	
		Rating Short Term (2-year horizon)	Rating Long term (5 Year-horizon)
261111	ICT Business Analyst (BA or Business Consultant)	2	2.3
261112	Systems Analyst	1.8	2.3
261211	Multimedia specialist (Multimedia developer, multimedia programmer)	1.3	2
261212	Web Developer (Web programmer)	1.6	2
261311	Analyst Programmer (Programmer analyst)	2	2
261312	Developer Programmer (Application developer, ICT developer or ICT programmer)	1.8	2
261313	Software Engineer (Software architect or Software designer)	1.6	1.6
261314	Software Tester	1.8	1.8
261399	Software and Application Programmers (if not classified in other roles above)	2	2 Only ONE response
262111	Database Administrator	1.8	2
262112	ICT Security Specialist (Security administrator)	2	2
263112	Network Administrator	2	2.3
263113	Network Analyst	1.5	1.8
263211	ICT Quality Assurance Engineer (Quality analyst, Quality manager or Quality specialist)	1.5	1.3
ANZSCO Occupation	ICT Occupation	Canterbury region	
		Rating	Rating

Reference		Short Term (2-year horizon)	Long term (5 Year-horizon)
263212	ICT Support Engineer (Support analyst or Support architect)	2	2.3
263213	ICT Systems Test Engineer (Systems tester or Test Analyst)	1.2	1.7
263299	ICT Support and Test Engineers (if not classified elsewhere)	1	1
263311	Telecommunications Engineer	1.2	1.5
263312	Telecommunications Network Engineer (communications consultant, Communications specialist, Telecommunications consultant or Telecommunication specialist)	1.4	1.4
NA	IT Project Manager	2	2 Only ONE response
NA	Solutions Architect	1	2 One response only
NA	Enterprise Architect	1	2 One response only

Next the current and projected use of development platforms were assessed. The top 10 highly rated development platforms currently are: HTML, Java Script, Java, ASP.NET, Sql Server, XML&XSLT, Jade, C#&C#.NET, Oracle and MS Development Tools. The top 10 highly rated platforms of the future are: HTML, Java Script, Delphi, Java, Sql Server, XML&XSLT,

SharePoint, Oracle, J2EE and C#&C#.NET. It can be seen that there is a high degree of consistency in perceived current and future needs for development tools. That is to say, ICT qualifications which train graduates for development tools in use currently can still be relevant for the future (2-3 years) use of development platforms.

Next participants were asked to list five highly desirable skills of an ICT graduate. The responses covered not only technical skills but broader soft skills and attributes. A summary of chosen desired skills (and attributes) is outlined below:

- Business understanding to give contact to requirements
- Communication and social skills (mentioned on 4 occasions)
- Capability to learn
- Basic programming skills (mentioned on 2 occasions)
- Work ethics
- Maturity in relationships
- Problem solving
- Technical skills
- Personality
- Business acumen
- Personal efficiency
- Basic financial skills
- Basic ICT knowledge
- Networking skills
- Web technologies
- Knowledge of server management
- Design and coding skills
- Software orientated architecture

- Management, best practice and standards
- ITIL, secure managed and IT SME
- Critical thinking and analysis
- Understanding of business models and processes

There seems to be a significant emphasis on business understanding and communications skills. In other words, typical employer would like an ICT graduate to be not only technically competent but also possess personal attributes and skills that enable a graduate to link to business needs and be able to communicate with a wide range of clients.

Conclusions

This study involved establishing industry needs of key ICT skills and attributes - that contribute to success within the ICT sector. It is intended to take into consideration the outcome of the study in identifying possible changes in the process of revamping the portfolio of our qualifications. A focus group of industry representatives that constitute the ICT qualifications local advisory committee participated in this study - which was completed in late January 2010.

Three research questions were considered:

- Which ICT occupations (roles) are in high demand in Canterbury and New Zealand wide?

References

Asgarkhani, M., & Wan, J. (2008). A pilot study of current trends in Information and Communication Technology (ICT) education within the tertiary sector. *Contemporary Management Research*, 4(4), 291-304.

- Which development platforms are currently in use and which are likely to be in demand within the next 2-3 years?
- What other ICT skills are seen as being critical for graduates in order to be successful as ICT workers?

ANZSCO was adopted as reference for the list of ICT roles to be considered in this study - as it seemed more relevant to New Zealand market.

Some consistency existed in perceived needs for roles within Canterbury and nationally. This is a significant outcome as it suggests that ICT qualifications that target the highly rated roles can prepare graduates to work in the sector both in Canterbury and nationwide.

It was also evident that there is a high degree of consistency in perceived current and future needs for development tools. In other words, ICT qualifications which train graduates for development tools in use currently can still be relevant for the future (2-3 years) use of development platforms.

Further studies are recommended in order to:

- Involve bigger focus groups to verify the outcome of this study
- Compare the outcome with what is currently being delivered through ICT qualifications within the tertiary sector.

Asgarkhani, M. 2005. Digital Government and its Effectiveness in Public Management reform: A Local Government Perspective. *Journal of Public management review*, 7 (3), pp 465-488.

- Asgarkhani, M. 2003. A Strategic Approach to Knowledge Management and Learning in the Information Age. Proceedings of the 2nd European Conference on e-Learning - Glasgow, pp 59-70.
- Baltac, V. (2008). European universities and ICT industry. E-Government; ICT Professionalism and Competences; Service Science. IFIP International Federation for Information Processing, Volume 280; Antonino Mazzeo, Roberto Bellini, Gianmario Motta; (Boston: Springer), pp. 81-94.
- Baroudi, J. J. (1985). The impact of role variables on IS personnel work attitudes and intentions. MIS Quarterly, 9(4), 341-356.
- Bartol, K. M., & Martin, D. C. (1982). Managing information systems personnel: a review of the literature and managerial implications. MIS Quarterly, Special Issue, 49-70.
- Benbasat, I., Dexter, A. S., & Mantha, R. W. (1980). Impact of organizational maturity on information system skill needs. MIS Quarterly, 4(1), 21-34.
- Bekesi E., Hanson M., (1998) Technical skills in Software Development: the Responsiveness of an IS Degree Programme to Changing Industry Needs, The New Zealand Journal of Applied Computing and Information Technology, February, 2;2 pp. 7 - 15)
- Burns, O.M., Case, T. and Dick, G.N. 2001. Student Attitudes towards Distance Education: A Comparison of Views in Australia and the US. Proceedings of the 12th Australian Conference on Information Systems.
- Cappelli, P. (2001). Why is it so hard to find Information Technology workers? Organizational Dynamics, 30(2), 87-99.
- Clear, T, (1998) New Zealand Polytechnic Business Computing Programmes, Graduate Profiles, The New Zealand Journal of Applied Computing and Information Technology, February, pp. 118 - 130)
- Dechawatanapaisal, D. 2005. HRM as Enablers of Learning Work Behaviour: Perspectives from Thai ICT Professionals. [online], <http://rphrm.curtin.edu.au/2005/issue1/enablers.html>
- European Commission Enterprise and Industry Directorate-General, Brussels. 2006 (30 June 2006). Effects of ICT Capital on Economic Growth. [online] <http://ec.europa.eu/enterprise/ict/policy/doc/ict-cap-eff.pdf>
- Evans., N. 2003. Informing Clients in Education about Instructional Offerings and Careers in the ICT Industry. [online], <http://proceedings.informingscience.org/IS2003Proceedings/docs/073Evans.pdf>
- Gallagher, S. and Newman, A. 2002. Critical Success Factors to Growing Fully Online Distance Learning Programs. [online], <http://www.eduventures.com/pdf/distance.pdf>
- Gregorian, V. 2002. Succeeding in the 21st Century – What Higher Education must do to address the gap in Information and Communication Technology

- Proficiencies. [online],
www.calstate.edu/ls/ICTwhitepaperfinal.pdf
- Hagan, D. (2004). Employer satisfaction with ICT graduates. The Sixth Australasian Computing Education Conference (ACE 2004).
- Harper, J. 2003. Information and Communications Technology Industry – Northern Territory. [online],
http://www.nt.gov.au/dcis/it/docs/industry_development/final_report_ict_survey_2002.pdf
- Hasanali, F. 2002. Critical Success Factors for Knowledge Management Systems. [online],
http://www.kmadvantage.com/docs/km_articles/Critical_Success_Factors_of_KM.pdf
- Hsieh, C. and Chen, K. 2003. Critical Success Factors for Implementing a Corporate Knowledge Management System. [online],
<http://www.sbaer.uca.edu/research/2003/swdsi/Papers/050.pdf>
- Pye, J. and the Marchmont Observatory. 2000. Promoting workplace learning with ICT: Modes and Models for organizational Change. [online],
<http://www.leeds.ac.uk/educol/documents/00001611.htm>
- Kozma, Robert B. 2005. ICT, Education Reform and Economic Growth. [online],
download.intel.com/education/wsis/ICT_Education_Reform_Economic_Growth.pdf
- Lauden, K.C. and Laudon, J.P. 2006. Management Information Systems, 9th Edition, Person Prentice Hall.
- Laudon, K.C. and Laudon, J.P. 2005. Essentials of Management Information Systems, 6th Edition, Person Prentice Hall.
- Lee D. S. Trauth E., Farwell D. (1995) Critical skills and Knowledge requirements of IS Professionals: a Joint Academic Industry Investigation, MIS Quarterly, September, pp. 313 – 340
- OECD Information Technology Outlook. 2006. Information Technology Outlook 2006 Highlights, [online]
<http://www.oecd.org/dataoecd/27/59/37487604.pdf>
- OECD. DSTI/ICCP/IE - 10/FINAL - Directorate for Science, Technology and Industry. Committee for Information, Computer and Communication Policy. 2005. New Perspectives on ICT Skills and Employment. [online]
<http://www.oecd.org/dataoecd/26/35/34769393.pdf>
- Robson, W. 1997. Strategic Management & Information Systems – 2nd Edition, Prentice Hall
- The ICT skills foresighting working group. 2006. Building Australian ICT skills. [online], http://www.e-scc.org/docs/Building_Australian_ICTskills.pdf
- Young, A., Senadheera, L., & Clear, T. (2001). Trends in Knowledge, Skills and Abilities: An Industry Perspective. NZ Journal of Applied Computing & IT, 5(1), 77-83.

Young, A., Clear, T., & Senadheera, L. (1999, 4-7 July). Knowledge Skills and Abilities demanded of graduates in the new learning environment. Paper presented at the The 12th annual Conference of the NACCQ, Dunedin centre, Dunedin.

Zyngier, S. 2003. The Role of Technology in Knowledge Management Strategies in Australia: Recent Trends. Journal of Information & Knowledge Management, Vol. 2, No. 2 pp165-178.

Monin DJ. and PJ. Dewe, Skills In An Environment Of Turbulence: A Survey Of Information Systems

Professionals In New Zealand, Proceedings of the 1994 ACM SIGCPR Conference, 1994 ACM Inc. Broadway New York