IDENTIFYING THE EDUCATION NEEDS OF THE BUSINESS ANALYST: AN AUSTRALIAN STUDY

Deborah Richards
Macquarie University
deborah.richards@mq.edu.au

Mauricio Marrone
Macquarie University
mauricio.marrone@mq.edu.au

ABSTRACT

The Business Analyst (BA) plays a key role in ensuring that technology is appropriately used to achieve the organisation's goals. This important mediating role is currently in high (unmet) demand in many English-speaking countries and thus more people need to be trained for this role. To determine the educational and/or training needs of a BA we conducted a survey in the Information and Communication Technology industry in Australia. The survey items are based on prior studies of information systems educational requirements and the internationally-developed Skills Framework for the Information Age (SFIA) that has been endorsed by the Australian Computer Society. From the literature we identified three types of skills: soft, business and technical. With the increasing importance of GreenIT and the pivotal role that the BA could play in green decision making, we added a fourth type of skill: green. The survey considers 85 skills, their importance, the level of attainment of that skill, skill gaps and types of skills. Results show that all soft skills were considered to be important with the smallest knowledge gaps. Selected business skills and green skills were seen to be important. Technical skills were considered less important, but also where the largest knowledge gaps existed. Further we asked respondents whether each skill should be acquired via an undergraduate or postgraduate degree and/or industry training and experience. We found that the workplace was considered the most appropriate place to acquire and/or develop all skills, except the ability to innovate. While we found that softskills should be taught almost equally at the undergraduate and postgraduate level, business and green skills were more appropriate in a postgraduate degree. In contrast, technical skills were best acquired in an undergraduate program of study.

Keywords: Business Analyst, Educational Needs, Australia, GreenIT Education,

INTRODUCTION

According to the Australian Computer Society (ACS) (2011), the role of a business analyst is to "assess the overall business and information needs of an organisation. They co-ordinate the design of new IT solutions to improve business efficiency and productivity". For this paper, and since the study is based in Australia, we adopt the definition established by the Australian Computer Society which we explore further in the next section. According to recruiters, skills shortages in ICT are becoming critical with "The most in-demand ICT roles nationally are network engineers (in all states), project managers,

business analysts and developers[6]". This shortage of BAs is also being experienced in other countries such as the UK[7]. Education and training can be used to address skills shortages. To ensure that the skills taught in such a program will address the current gap in industry, it is important to ask industry what knowledge and skills are needed, where they should be acquired and where gaps currently exist. Presentation of an industry-based study asking these questions is the focus of this paper.

Typically, at the undergraduate level, a BA would undertake a degree within the Information Systems (IS) field. We thus focus on the educational needs of a BA within the context of Information Systems programs. The challenge, among others, facing Learning and Teaching (L&T) in the IS field is the dynamic and cross-disciplinary nature of the material to be taught. Due to a rapid change in technologies, L&T in this field must find a balance between teaching the fundamentals which are stable and core and changing course content and delivery to meet the current and future needs for knowledge and skills in the industry. Also, it is essential that the program is coherent, broad, and yet have sufficient depth so that the IS graduate can take on careers requiring them to understand the needs of business, turn those needs into a computer based solution and convey the design of that solution to the technical team.

The definition of the role of a business analyst is elusive. Alexander (1999) argues that this is the least defined IT role. Some find that a business analyst is "largely expected to 'protect' the users and IT staff from each other" (Vashist et al. 2010, p. 2). Others may perceive that business analysts "are responsible for the business and technical analysis and design of the business solution and to manage the soft issues arising from the relationship" (Evans 2004, p. 2). Evans also suggests that there might be some confusion of the title, role and required knowledge of a business analyst.

This study contributes to researchers, educators, employers and practitioners to identify relevant sets of skills enabling professional BAs in the modern technological driven business environment. Via the literature and an industry based survey we seek to identify skill sets and the alignment between the perceived importance of these skills and their knowledge level. Subsequently, our research questions are:

R1: Which skills are viewed by industry as *important* for BAs?

R2: Do BAs have knowledge of and competence in these skill sets?

R3: Is there a *gap* between what BAs perceive as important and their attainment of that knowledge?

R4: Where should the skills identified as important be acquired/learned? (i.e. in an *undergraduate* or *postgraduate* degree or in the *work*-place)

To answer these questions, the next section draws upon the literature to develop a potential set of skills needed by the BA. Our methodology section outlines the survey instrument to measure the importance

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[6] http://www.theaustralian.com.au/careers/skills-shortage-to-become-critical/story-fn717l4s-1226063877709, accessed 5-12-12

[7] KPMG, July 8,2011 http://news.globalcareerlink.com/united-kingdom-news/business-analyst-skills-shortage-continues-as-uk-it-job-market-grows/ accessed 10-8-13

Or http://www.computerweekly.com/news/2240104980/Business-analyst-skills-shortage-continues-as-IT-job-market-grows

and knowledge for each of those skills. Our results and discussion follow, concluding with limitations and future research.

LITERATURE REVIEW

First, we consider an initial definition of the BA role in the Australian context. According to the Australian Computer Society (ACS) (2011), a BA may need to:

- "evaluate business needs, and contribute to the design and development of a business solution;
- work closely with developers and end users to ensure technical compatibility and user satisfaction;
- ensure timelines and budgets are met, and oversee the implementation of a new system;
- write user manuals and provide or co-ordinate training to users of a new system"i.

The Australian Department of Immigration and Citizenship states that the BA position "Identifies and communicates with users to formulate and produce a requirements specification to create system and software solutions[8]". The site goes on to note that "this occupation has a level of skill commensurate with a bachelor degree or higher qualification". So while in the past it may not have been an entry level position, this is changing and it is unclear just what skills may be included in the role and where they should be acquired.

Despite the increasing demand, we could not find industry-based research to understand the skills needed specifically by a business analyst. However, there has been some research concerning the skills that an IS graduate must have when entering the working environment both in Australia and other countries. In the absence of a focus on the BA previously, we have used the set of skills needed by an IS graduate in general to provide a starting point and broader base for our survey of BA specific skills. These studies can be divided into three categories: (1) industry surveys, (2) faculty and students' survey, and (3) job advertisements studies. We cover each of these areas in the next sub-sections.

Industry Surveys

Though universities have tended in the past to concentrate on technical skills to prepare their graduates, research has found that personal characteristics, or "soft skills," are often considered by employees to be more valuable than technical skills. Fang et al. (2005) surveyed 51 U.S. recruiters and found that interpersonal skills (e.g. teamwork, communication) and personal traits (e.g. critical thinking, personal motivation) were regarded as more valuable than IS skills and organizational knowledge.

Research from Bullen et al. (2007) surveyed 77 companies in the U.S. and found that firms required capabilities in project management and the business domain over technical capabilities. Simmons and Simmons (2010) interviewed 20 IS professionals in Fortune 500 businesses, small-to-medium businesses, and non-profit organizations to conclude that an emphasis is placed on negotiation skills, time management, managing cultural differences, outsourcing management, and information assurance as well as technical skills. Aken and Michalisin (2007) developed a comprehensive survey to identify, from an employer's perspective the skills that Management Information Systems (MIS) graduates are lacking. They established four categories of skills: Soft, Business, Technical and Programming. Other researchers, such as Burns et al. (2004), Ferguson (2005), Doucek et al. (2007), Lee et al. (2008) and Litecky (2009) have also surveyed the industry to pinpoint the required skills. The skills they identified can be found in Table 1.

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[8] http://www.immi.gov.au/asri/occupations/i/ict-business-analyst.htm#DESC accessed 5-12-12

Faculty and Student Surveys

Academics and curriculum researchers have been interested in understanding the skills and knowledge that university faculty and students view as important for the workplace. Weber, McIntyre, and Schmidt (2001) compared IS students with the IS industry's perceptions of the importance of various skills. In general, they found that IS students' ratings of the importance of skill and competence were similar to those rated by the industry.

In another study, Medlin, Dave, and Vannoy (2001) surveyed students to understand their views on the importance of technical versus nontechnical skills for a successful IT career. Four categories of skills were included in this study: technical, organizational, creative thinking, and analytical skills. Overall, students rated communication skills the highest, followed by analytical skills, technical skills and organizational skills. The study results showed that the students and the practitioners' views were similar, which indicated that IS professionals need more than technical skills to be successful in the workplace. Csapo and Featheringham (2005) looked at IS alumni's experience once they entered the work place and found, that alumni view communicating skills as crucial to their future career success. Researchers that have compiled a comprehensive list of skills required include Mutch (1996), Calitz (1997), Miertschin et al. (2006), and Beard et al. (2007). These skills are aggregated in Table 1 and used as part of our survey instrument.

Job Advertisement Studies

To examine the development of IS job skills from the early 1980s to the late 1990s, Todd, McKeen, and Gallupe (1995) analysed the number of technical, business and systems phrases in 1,234 job advertisements from four leading newspapers. Three types of IS jobs were included: programmers, systems analysts, and IS managers. The results showed that while the programmers' job requirements had changed very little over the 20 year period and the IS managers' job category remained relatively stable; the systems analysts category showed the greatest change.

More recently, however, Liu, Liu, Koong, and Lu (2003) analysed 300 IS job ads posted on job advertising websites such as Monster and Hot Jobs and suggested that the types of skills is changing. Contemporary programming languages and web development skills had increased in importance. Lee and Han (2008) analysed 837 systems analysts job advertisements posted on the website of 230 Fortune 500 organizations between 2001 and 2003. They found that an equal emphasis was required with regards to skills in design, software development, business and social understanding.

Huang et al. (2009) looked at 241 job ads posted in Monster.com between April 2008 and June 2008 and concluded that there is an overall increase in demand for capabilities in business, specifically in project management, financial analysis, and communication skills. Conversely, Kennan et al. (2007) found that in Australia, job advertisements focused more on technical skills. However, communication skills were mentioned in close to 75% of the ads.

Importance of Skills

The reviewed literature indicates that there is an emphasis on soft skills by industry, which tend to be treated as generic skills or graduate attributes by universities. For example, the ACS (2011) states the BA "career would appeal to people who:
*   have an ability to conceptualise and think creatively;
*   have excellent oral and written communication skills;
*   effective negotiation and customer management skills;
*   sound administrative skills and good analytical and reporting abilities;
*   effective time management and personal organisation skills;
*   an understanding of user needs and a business outcome approach;

- can articulate visions;
- and a logical approach to problem solving and an investigative and inquisitive mind".

Csapo and Featheringham (2005) estimate that "employees spend more than 75 percent of their time communicating in interpersonal situations, as well as on a variety of other levels within the organization and externally" (p. 1). The researchers suggest that this may be a reason why communication and other soft skills may be seen by recruiters as important.

Generally, research has attempted to identify the skills that are needed by IS graduates overall. In addition, a previous study by Rai, Vatanasakdakul and Aoun (2010) investigated the alignment between which IS skills are perceived as important to accountants and their knowledge levels of such technologies.

It is interesting to note that none of the literature surveyed included green-related skills. With sustainability high on the agenda in many nations, graduates who will act as communication bridges between technology specialists and businesses will play a vital and leading role in ensuring a sustainable future for our planet. Other studies, shown in Table 1, suggest that the BA is a communicator, requirements gatherer and solutions architect. The BA thus potentially plays a key role in making sustainable choices, providing direction to business and influencing demand for specific technologies. The authors believe BAs will potentially play a vital role in decisions around environmental sustainability and will need to be educated in this area. In this study, we wanted to test whether current practitioners held such a view. Table 1 shows the extended set of skills and competences, the identify of the authors that have studied (number explained in legend) and the total number of authors (count) that identified the respective skill.

Skills	#	Skill Label	1	2	3	4	5	6	7	8	9	10	11	12	Cou
Soft	1	Ability to learn/lifelong learning						X				X	X		3
	2	Attention to Details		X			X	X							3
	3	Business Problem Solving						X				X			2
	4	Creativity		X	X			X			X				4
	5	Analytical /Critical / Logical thinking				X		X	X	X	X		X		6
	6	General Problem solving		X				X		X	X	X		X	6
	7	Ability to innovate				X		X				X	X	X	5
	8	Conflict resolution			X			X							2
	9	Teamwork				X		X		X					3
	10	Leadership			X			X	X	X	X	X			6
	11	Self-esteem						X		X					2
	12	Negotiation Skills						X						X	2
	13	Customer-oriented outlook/service oriented									X	X			2
	14	Initiative/Motivation to work						X		X	X	X			4
	15	Integrity/Honesty/Ethics						X		X		X			3
	16	Professional Ethics						X		X					2
	17	Responsibility						X		X		X			3
	18	Time Management						X						X	2
	19	General Communication		X	X	X	X		X		X				6
	20	Written Communication						X		X		X			3
	21	Oral Communications						X		X		X	X		4
	22	Training others									X				1
	23	Organization Skills							X	X	X				3
Business	24	Domain/industry specific knowledge					X	X			X				3
	25	Enterprise/organization specific knowledge				X	X	X			X				4
	26	General Business Skills		X	X			X							33
	27	Accounting						X		X		X	X		4
	28	Business Process Design /Re-engineering						X	X	X		X			4
	29	Contracting and legal				X		X	X						3
	30	Finance						X		X		X			3
	31	Marketing						X		X		X			3
	32	Supply Chain Management						X				X			2
	33	Asset and Human Resource Management											X		1
	34	Management theory and practice							X						2
	35	Change Management						X							1
	36	Outsourcing Management						X					X	X	3
	37	User/3rd party Relationship Management						X							1
	38	Working in global or virtual teams					X	X			X		X		4
	39	Project Mgt/Planning/Budgeting/Scheduling	X			X	X	X				X		X	6
	40	Project Risk Management						X							1
	41	Business Intelligence						X							1
	42	Business Strategy			X			X				X			3
	43	Project Integration						X				X	X		2
	44	IT Service Management (e.g. ITIL, MOF)											X		1
	45	IT Governance											X		1
	46	Technology Auditing											X		1

Category	#	Skill	1	2	3	4	5	6	7	8	9	10	11	12	Total
Technical	47	e-Commerce									X		X		2
	48	SDLC/development methodologies			X		X	X			X		X		5
	49	Requirement specification												X	1
	50	Analysis	X		X	X	X	X			X		X		7
	51	Design	X				X	X			X				4
	52	Implementation			X	X	X	X			X		X		6
	53	Testing					X					X		X	3
	54	Integration and deployment									X				1
	55	Software quality assurance									X	X			2
	56	CASE tools					X	X			X		X		4
	57	User-Interface Design					X								1
	58	Web-based Application Development					X						X		2
	59	Programming					X				X	X			3
	60	Applying IT to Business Problems		X			X								2
	61	Customer Relationship Management					X								1
	62	DSS/GDSS					X								1
	63	Enterprise Resource Planning (ERP)					X					X			2
	64	Transaction Processing Systems					X						X		2
	65	Data Mining			X		X	X					X		4
	66	Data Warehousing			X		X	X					X		4
	67	Database Administration					X					X		X	3
	68	Electronic Data Interchange (EDI)					X								1
	69	Online Analytical Processing (OLAP)					X						X		2
	70	Business Continuity Planning (BCP)					X								1
	71	Operating Systems			X		X	X			X				4
	72	Web Application Servers			X						X	X		X	4
	73	Web Servers					X				X	X	X		4
	74	IT Architecture / Standards			X		X	X			X		X		5
	75	Network administration			X			X			X			X	4
	76	Security					X				X	X	X	X	5
	77	Client-Server Architecture			X			X			X	X			4
	78	Printer/Storage									X				1
	79	Voice/Data Telecom			X			X			X		X		4
Green	80	Sustainability Strategy											X		1
	81	Sustainability Management of IT													0
	82	Training for Sustainability Awareness											X		1
	83	Sustainability Assessment											X		1
	84	Sustainability Engineering													0

LEGEND: 1. Mutch 1996; 2. Calitz, Watson, Kock 1997; 3. Burns, Hopper, Yazdifar 2004; 4. Ferguson, 2005; 5. Miertschin et al. 2006; 6. Aken, Michalisin 2007; 7. Doucek and Novotný 2007; 8. Beard et al. 2007 9. Kwoon-Lee et al. 2008; 10. Litecky et al. 2009; 11. SFIA, 2011; 12. Simmons and Simmons 2010

Table 1. Set of BA skills based on the literature

METHODOLOGY

There has been no research that attempts to study the BA's perspective and map the alignment between IS skills importance and knowledge. Therefore, in order to fully understand the skills needed by BAs in Australia, it is important to investigate both knowledge and importance of skills. By identifying a gap between knowledge and its perceived importance, the research will help educators and practitioners to recognize any deficiencies in IT skills needed by BAs. To achieve this objective, we have identified 84 factors based on the set of skills reported in the literature and aligned them with those established by the Skills Framework for the Information Age (SFIA) (2011) guidelines which has been adopted by the ACS for defining employment and educational requirements. Also, informed by the literature, we divided these factors into four categories: Soft, Business, Technical and Green skills. The first three

correspond to Aken and Michalisin's (2007) four categories. We saw programming as a type of technical skill and in itself a small category. Thus, we have subsumed the Programming category into the Technical categeory. Green skills were added to reflect this new and emerging area of concern that did not fit clearly under one of the other categories and we also wanted to specifically identify the perceived need for training in these skills.

This study adopts a quantitative survey approach. A study conducted by Scott and Yates (2002) looked at identifying capabilities that were seen to be most important for the engineering field. In this survey, engineering graduates rated the importance and performance (extent of this being studied in university) of each item for their successful professional practice. Other fields such as accounting (Crebert et al., 2004; Rai, Vatanasakdakul & Aoun (2010) have also used a similar approach.

Preceding the data collection, a pilot survey was carried out to ensure the reliability of the survey instrument. This pilot was conducted by a total of 6 academics, students and business analysts. Their feedback was used to polish the survey and identify any ambiguous skill or trait terminology. As a result of comments from BAs enrolled in our Master of IT who participated in our pilot study, we added the skills Working under pressure, Research skills, and Questioning Skills. Review of the skills before and after the pilot resulted in modification of some of the labels in Table 1 to improve comprehensibility and improve alignment with the terms in SFIA. For example, rather than just the word design, analysis, implementation or testing (skills 50-53 in Table 1), we used the terms software design, software analysis, software implementation and software testing. Programming was dropped as a separate category because it was seen to be covered by software implementation. User/3rd party Relationship Management was relabeled to Stakeholder Relationship Management. We also added Requirements Elicitation to differentiate this skill from Requirements Specification because they involve very different activities and are treated as separate sections and chapters in most textbooks. We dropped General Communication Skills, People Skills and General Business Skills as we had more specific skills in each of these areas already included in our survey and the length of our survey was a concern. This resulted in an amended set of 85 skills.

The online survey was made available in the month of June 2011. An invitational email was sent to members of the Australian Computer Society (ACS), the major professional body for the Australian IT industry. It was distributed initially to the NSW branch to be further distributed by other states. The survey targeted experienced business analysts, those who had been business analysts, and those that managed business analysts, but it was also open to others working in ICT. As the BA is part of an IT team, we thought it was also important to gain an understanding of what others working with BAs also believed the role entailed. This also allowed us to analyse if differences in perception existed. The first part of the survey captured biographical data such as gender, age, experience and their relationship to the BA role.

Following the biographical section, the questionnaire listed the many skills under investigation. These skills were gathered from the literature, and covered the questions and categories as per Table 1. The categories were not identified in the survey, and thus participants were not aware which questions belonged to which category. The research aimed at understanding the importance of each of the skills listed. Importance ratings for each of the skills was on a 4-point Likert scale (0= No importance to 3=Very important). This scale was chosen to eliminate the neutral or undecided answers. The survey also aimed at understanding if the respondents perceived that they possessed these skills. Respondents were asked to self-report their attainment of this skill and we have given this the label of 'knowledge' in the tables. For this answer, a 4-point Likert scale was used (0=No skill to 3=Highly skilled).

We asked where these skills should be taught, where the gaps are. We concluded the survey with the question

Did we miss any skills needed by a business analyst? Where they should be learnt? Any other comments?

The results to each of these questions are presented and discussed next.

RESULTS AND DISCUSSION

Respondents

Out of the 163 IT professionals who began to fill out the survey, 131 completed and provided valid responses. Partially completed surveys were not used in the study. The sample size is 131, unless specified otherwise. Respondents were asked about their company's size and industry, age, gender, and years of work experience. We did not collect data about which state they worked in as this was not considered a variable that would contribute to our understanding. Table 2 shows the profile of the respondents. The Technology, Public and Education and the Financial and Banking sectors represent close to 75% of the industries covered in the survey. Other industries include Manufacturing and Construction, Non-profit, Retail and Distribution. The respondents represented small medium and large companies. The largest population of respondents was between the ages of 30 and 39 (26%), followed by those between 40 and 49 (22.1%). The majority of the respondents were male (78%) with female (22%). The average number of years of experience was 13.26. Of those surveyed, 25.2% were currently Business Analysts and 21.4% worked with Business Analysts. Close to 15% aspired to be Business Analyst and 15.3% had previously been a Business Analyst.

Industry	Percent	Age	Percent	Years of Experience	Percent
Information Media & Telecommunications	24.4	18- 24	9.2	Less than 10	19.2
		25-29	19.8	10 to 20	33.1
Finance & Management Services	26.7	30-39	26	21 and over	46.7
		40-49	22.1		
Public Sector & Education	13.7	50 and above	19.1	Job role	Percent
Other	22.9			I am a Business Analyst	25.2
Manufacturing & Construction	3.8	Gender	Percent	I work with Business Analysts	21.4
Non-profit	0	Male	78	I want to be a Business Analyst	14.5
Retail & Distribution	2.3	Female	22		
Healthcare	2.3			I have been a Business Analyst	15.3
Utility	0.8	Company Size	Percent		
		Less than 500	36	I manage Business Analysts	9.2
		501 to 10,000	32	None of the above	14.5
		More than 10,000	35		

Table 2. Respondents' Profile (n=131)

Empirical Results

An exploratory analysis was conducted for each variable to test for normality. Both the Kolmogorov-Smirnov and the Shapiro-Wilk showed significance for variables of importance of skills ($p<0.001$) and for variables on perceived attainment of skill ($p<0.001$). Due to the data being non-normal, the Mann-Whitney U test was used.

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Perceived Importance and Knowledge

In order to illustrate the gaps between the perceived importance and the perceived knowledge, each of the sets of skills is presented in Figure 1. This figure shows the average score of the perceived importance and knowledge of all skills within each category; Soft skills comprising 24 sub-skills, Business skills comprising 25 sub-skills, Technical comprising 31 sub-skills and Green comprising 5 sub-skills. A further analysis of individual skill items, including the mean values and the ranks of all the skills studied are shown in Table 3. In terms of perceived importance, the Soft skills were perceived to be the most important, with a mean score of 2.57. This is followed by Business skills (2.08), Green skills (1.91) and Technical skills (1.79). In addition, the scores of perceived knowledge also show a similar pattern that Soft skills are the highest (2.45), followed by Business skills (1.95), Green skills (1.7) and Technical skills (1.67).
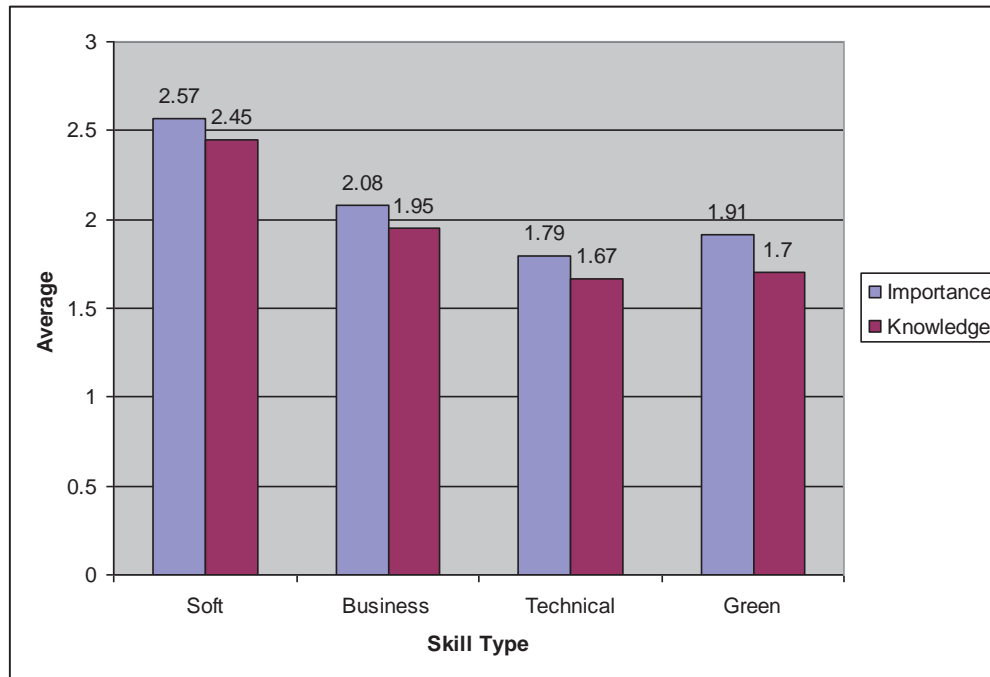

Figure 1. Bar Chart of Importance and Knowledge of Sets of Skills

Moreover, to understand if there is a difference in perception of importance of skills between those that manage BAs, work as BAs or have been BAs and those that are not, Mann-Whitney and Wilcoxon tests were conducted. Results are shown in Table 3. Results show a significant difference in perceptions of the importance of Technical and Green skills between those people (93) directly involved with the BA role (I am, have been, work with, manage BAs) and those (38) that are not ("I want to be a BA", "none of the above"). No difference was observed in the perceptions of these cohorts for knowledge attained or exhibited by BAs.

	Soft Skills		Business Skills		Technical Skills		Green Skills	
	Importance	Knowledge	Importance	Knowledge	Importance	Knowledge	Importance	Knowledge
Mann-Whitney U	1396.5	1262.5	1226	1223	804	947	1327	1656
Wilcoxon W	4882.5	1727.5	4712	1818	3730	3503	5698	2359
Z	-0.087	-0.356	-1.551	-0.652	-2.137	-0.091	-2.242	-0.145
Asymp. Sig. (2-tail)	0.931	0.722	0.121	0.514	0.033*	0.927	0.025*	0.885
Asymp. Sig. (1-tail)	0.4655	0.361	0.0605	0.257	0.0165*	0.4635	0.0125*	0.4425

Table 3: Difference in perceptions between those directly involved with the BA role and others

A further analysis of individual skill items including the mean values and the ranks of all the skills studied are shown in Table 4. Soft skills are rated as one of the most important skills to have as a Business Analyst. The five most highly rated skills are: Ability to Learn/Lifelong Learning, Analytical / Critical / Logical Thinking, Responsibility, Business Problem Solving and Working Under Pressure. Soft skills are considered to be of such high importance that they comprise the top 9 ranked skills and 92% of them are in the top 36%. Top ranking business skills are IT Governance (ranked 10th) and IT Service Management (ranked 12th). The next business skill, Business Process Improvement/Reengineering is ranked 21. The highest ranked technical skill is Integration and Deployment at position 16. Software quality assurance is the next most important technical skill which is ranked 37 followed by other technical skills within rankings in the range 40-85. Green skills, though an emerging area, were comparable in importance to technical skills and not so far behind business skills. The most important green skill was seen to be Sustainability Strategy ranked 33 with Sustainability Engineering and Assessment the least important, ranked 70 and 71, respectively. It appears that the BA role is very broad spanning the strategic, high level decision making and management activities of an organization as well as the activities at the operational and implementation levels.

In terms of perceived knowledge, the respondents rate their knowledge as very high in the Soft skill area. The top 16 rankings of knowledge are in Soft skills with the exception of the technical skill of Integration and Deployment which is ranked 11. This skill is somewhat of an outlier as the next highest ranked technical skill, Requirements Elicitation, is ranked 38. Knowledge attainment for business skills is highest for Organisation Skills and IT Governance, ranked 17 and 18, respectively. The first five skills in which respondents perceived themselves to be stronger were: Responsibility, Working Under Pressure, Time Management, Analytical /Critical / Logical Thinking and Leadership.

The largest gap between perceived knowledge and importance were found in the Technical Skills category which had the top five ranked skills for gaps (Client-Server Architecture, Voice/Data Telecom, Printer/Storage, Information Security and Network Administration). What this result indicates is that even though none of these skills ranked higher than 58/85 in importance for the BA role, the level of knowledge needed was greater than what they possessed. This highlights the challenge of educating IS professionals to be sufficiently broad to be able to fulfill their role as communicators with business and technical stakeholder. Requirements Elicitation was the next gap in this category and ranked 10. In the Soft skills category the biggest gap was in Business Problem Solving (mean=0.35) followed by Ability to Learn/Lifelong Learning (0.3) and were ranked 9th and 12th respectively. In the Business skills category the largest gaps in necessary knowledge were identified in the areas of IT Service Management and IT Governance, ranked 6th and 8th. As these skills were ranked more highly for importance, it seems that these gaps should be addressed most urgently. Stakeholder Relationship Management ranked 11th. The gap in knowledge for the skill Sustainability Strategy was ranked 7th which is not surprising as little training and information would be readily available for the emerging area of Green skills.

Some skill gaps were negative, meaning that respondents saw themselves as having the skills but not needing them for the BA role. Skills with small negative gap values, in increasing order, (<0.15) include: General Problem Solving; Ability to Innovate; Management Theory and Practice; eCommerce; DSS/GDS; IT Architecture/Standards; Self esteem; Database Administration; Project Integration; EDI; Continuity Management. Other skills even less utilised included (in ascending order); Web Servers (-0.28); Training Others (-0.27); and Data Warehousing (-0.41).

Soft Skills	Importance		Knowledge		Gap		Skill acquisition		
	Mean	Rank	Mean	Rank	Mean	Ran	UGrad	PGrad	Work
Ability to learn/lifelong	2.83	1	2.53	10	0.3	13	54.20%	55.70%	83.20%
Analytical /Critical / Logical	2.82	2	2.6	4	0.22	28	59.50%	64.10%	77.90%
Responsibility	2.77	3	2.75	1	0.02	68	48.10%	45.80%	80.20%
Business Problem Solving	2.76	4	2.41	16	0.35	9	30.50%	44.30%	85.50%
Working under pressure	2.76	5	2.72	2	0.04	64	41.20%	44.30%	85.50%
Research skills	2.76	6	2.57	8	0.19	34	67.90%	64.90%	72.50%
Leadership	2.76	7	2.59	5	0.17	39	46.60%	42.70%	85.50%
Time Management	2.74	8	2.71	3	0.03	65	48.90%	45.00%	85.50%
Questioning Skills	2.74	9	2.44	15	0.3	14	59.50%	56.50%	74.80%
Attention to Details	2.72	11	2.47	13	0.25	20	42.00%	41.20%	83.20%
Oral Communications	2.67	13	2.45	14	0.22	29	58.00%	55.70%	81.70%
Integrity/Honesty/Ethics	2.66	14	2.37	19	0.29	15	45.80%	52.70%	74.80%
Professional Ethics	2.66	15	2.58	6	0.08	51	36.60%	38.90%	84.70%
Initiative/Motivation to work	2.63	17	2.57	9	0.06	56	19.80%	21.40%	89.30%
General Problem solving	2.57	18	2.58	7	-0.01	73	58.00%	45.00%	74.80%
Written Communication	2.52	19	2.49	12	0.03	67	41.20%	44.30%	87.80%
Customer-oriented	2.47	20	2.22	26	0.25	21	32.10%	38.20%	84.00%
Teamwork	2.44	22	2.15	31	0.29	17	25.20%	34.40%	82.40%
Negotiation Skills	2.43	23	2.37	20	0.06	57	42.00%	43.50%	81.70%
Conflict resolution	2.33	27	2.18	29	0.15	43	34.40%	47.30%	71.80%
Creativity / Innovation	2.28	29	2.22	27	0.06	59	47.30%	44.30%	72.50%
Ability to innovate	2.25	31	2.26	23	-0.01	71	57.30%	68.70%	49.60%
Self-esteem	2.18	38	2.24	25	-0.06	76	30.50%	43.50%	83.20%
Training others	2.03	47	2.3	21	-0.27	83	27.50%	39.70%	80.90%
Category Average	2.57		2.45		0.13		43.92%	46.75%	79.71%

Business Skills	Importance		Knowledge		Gap		Skill Acquisition		
	Mean	Rank	Mean	Rank	Mean	Ran	UndGra	Upgrade	Work
IT Governance	2.73	10	2.38	18	0.35	8	46.60%	51.90%	78.60%
IT Service Management (e.g.	2.68	12	2.27	22	0.41	6	43.50%	51.10%	76.30%
Business Process	2.45	21	2.16	30	0.29	16	39.70%	46.60%	74.80%
Organization Skills	2.42	24	2.4	17	0.02	69	42.70%	43.50%	84.70%
Stakeholder Relationship	2.4	25	2.09	34	0.31	11	22.10%	34.40%	79.40%
Domain/industry specific	2.37	26	2.25	24	0.12	45	25.20%	38.90%	85.50%
Enterprise/organisation	2.31	28	2.2	28	0.11	46	9.90%	16.00%	87.80%
Project Management /	2.28	30	2.08	36	0.2	33	40.50%	56.50%	80.90%
Project Risk Management	2.23	32	2.07	37	0.16	40	28.20%	48.10%	78.60%
Technology Auditing	2.21	34	2.13	32	0.08	52	58.00%	51.10%	67.20%
Change Management	2.19	35	2.01	39	0.18	36	31.30%	47.30%	77.90%
Working in global or virtual	2.19	36	2.1	33	0.09	50	21.00%	37.40%	77.90%
Business Strategy	2.18	39	1.94	44	0.24	24	21.00%	48.10%	78.60%
Business Intelligence	2.12	41	1.91	46	0.21	31	26.00%	42.70%	79.40%
Business Planning	2.08	44	1.87	53	0.21	32	26.00%	41.20%	76.30%
Asset and Human Resource	1.99	51	1.97	43	0.02	70	60.30%	50.40%	67.90%
Project Integration	1.98	52	2.09	35	-0.11	78	43.50%	40.50%	71.80%
Applying IT to Business	1.88	56	1.66	60	0.22	26	43.50%	41.20%	71.00%
Management theory and	1.81	62	1.91	47	-0.1	77	46.60%	53.40%	73.30%
Supply Chain Management	1.64	68	1.54	69	0.1	47	34.40%	40.50%	68.70%
Outsourcing Management	1.6	73	1.55	68	0.05	62	21.40%	35.10%	74.00%
Contracting and legal	1.59	74	1.5	74	0.09	49	31.30%	37.40%	74.80%
Finance	1.59	75	1.56	67	0.03	66	46.60%	41.20%	67.90%
Marketing	1.56	77	1.48	76	0.08	53	45.00%	41.20%	66.40%
Accounting	1.47	81	1.6	64	-0.13	79	52.70%	42.00%	61.80%
Category Average	2.07		1.95		0.13		36.37%	43.11%	75.26%

Technical Skills	Importance		Knowledge		Gap		Skill acquisition		
	Mean	Rank	Mean	Rank	Mean	Ran	UGrad	PGrad	Work
Integration and deployment	2.65	16	2.49	11	0.16	42	38.90%	48.90%	80.20%
Software quality assurance	2.19	37	2.01	40	0.18	37	30.50%	38.90%	75.60%
Software Implementation	2.13	40	1.87	52	0.26	19	52.70%	36.60%	72.50%
Data Mining and Analysis	2.1	42	1.78	57	0.32	10	30.50%	44.30%	74.80%
Requirement Elicitation	2.09	43	2.04	38	0.05	63	52.70%	42.00%	73.30%
Requirement Specification	2.05	45	1.98	41	0.07	54	32.80%	37.40%	79.40%
Software Analysis	2.03	48	1.89	50	0.14	44	47.30%	42.00%	76.30%
Operating Systems	2.03	49	1.81	55	0.22	30	54.20%	49.60%	76.30%
Online Anaytical Processing	1.98	53	1.92	45	0.06	58	50.40%	48.90%	68.50%
Web-based Application	1.95	54	1.9	48	0.05	60	40.50%	40.50%	71.00%
Web Application Servers	1.95	55	1.9	49	0.05	61	53.40%	38.20%	69.50%
User-Interface Design	1.86	57	1.64	61	0.22	25	30.50%	41.20%	71.00%
Information Security	1.86	58	1.38	81	0.48	4	28.20%	48.10%	63.40%
Network administration	1.85	59	1.43	79	0.42	5	32.80%	44.30%	66.40%
eCommerce	1.83	60	1.84	54	-0.01	72	45.80%	47.30%	64.10%
Client-Server Architecture	1.82	61	1.25	83	0.57	1	29.80%	44.30%	64.90%
Customer Relationship	1.81	63	1.62	62	0.19	35	45.00%	41.20%	67.90%
Software Design	1.8	64	1.62	63	0.18	38	43.50%	43.50%	64.10%
Transaction Processing	1.78	65	1.47	77	0.31	12	38.90%	42.00%	64.10%
Software Testing	1.77	66	1.52	71	0.25	22	54.20%	37.40%	62.60%
Voice/Data Telecom	1.75	67	1.21	84	0.54	2	32.10%	37.40%	67.20%
Printer/Storage	1.63	69	1.12	85	0.51	3	32.10%	42.70%	62.60%
Enterprise Resource Planning	1.61	72	1.45	78	0.16	41	38.20%	35.90%	66.40%
Data Warehousing	1.57	76	1.98	42	-0.41	85	55.70%	42.70%	67.90%
CASE tools	1.51	78	1.29	82	0.22	27	33.60%	38.20%	57.30%
Database Administration	1.48	79	1.52	72	-0.04	75	52.70%	35.90%	68.70%
DSS/GDSS	1.48	80	1.68	59	-0.2	82	47.30%	35.90%	70.20%
IT Architecture / Standards	1.38	82	1.41	80	-0.03	74	42.70%	28.20%	66.40%
Electronic Data Interchange	1.38	83	1.52	73	-0.14	80	45.80%	32.10%	68.70%
Continuity Management	1.34	84	1.49	75	-0.15	81	45.00%	35.10%	69.50%
Web Servers	1.31	85	1.59	65	-0.28	84	46.60%	26.70%	67.20%
Category Average	1.81		1.67		0.14		42.07%	40.23%	68.97%

Green Skills	Importance		Knowledge		Gap		Skill acquistion		
	Mean	Rank	Mean	Rank	Mean	Ran	Undergr	PGrad	Work
Sustainability Strategy	2.23	33	1.87	51	0.36	7	35.10%	52.70	74.00%
Training for sustainability	2.05	46	1.8	56	0.25	23	31.30%	50.40	71.80%
Sustainability Management	2.03	50	1.75	58	0.28	18	34.40%	36.60	78.60%
Sustainability Engineering	1.63	70	1.56	66	0.07	55	26.70%	42.00	68.70%
Sustainability Assessment	1.63	71	1.53	70	0.1	48	24.40%	36.60	71.00%
Category Average	1.91		1.70		0.21		30.38%	43.66	72.82%

Table 4. Importance of each skill, participants' level of competency (knowledge) and the gap, by skill type

In summary, to answer research question 1 (i.e. the skills viewed by the industry as important), we have identified the sets of skills that are important to BAs. The results are quite clear that Soft skills are perceived as the most important attributes for BAs. Almost all soft skills are more important than business, technical or green skills. The results are in line with previous research, particularly the

Analytical /Critical / Logical Thinking skills which are the skills most frequently identified by recent IS studies, refer to Table 1 (e.g. Doucek and Novotný 2007, Beard et al. 2007 Kwoon-Lee et al. 2008, SFIA 2011). Business skills are the next most important set of skills.

Responding to research question 2 (i.e. do they have the knowledge of and competency in these skills), the findings are more mixed across categories. BAs perceive that they have higher ability in the Soft skills compared to either the Business, Technical and Green skills. Respondents ranked their knowledge highest in Integrity/Honesty/Ethics and Professional Ethics. This finding is consistent with the previous studies by Aken and Michalisin (2007), Beard et al. (2007) and Litecky et al. (2007).

This leads us to consider research question 3 (i.e. the difference between perceptions of importance and knowledge). Gaps between importance and knowledge can be found within all skill categories. The biggest gap between skill importance and BA knowledge is in technical skills, however, the knowledge gap for skills that were ranked high in importance should be addressed first. We found IT Governance and IT Service Management to be areas for possible concern. We also found that skill and knowledge gaps should be addressed in the area of Green IS/IT. We recommend that Green related topics be included in the IS curriculum. Green IT content could replace content relating to those skills that showed a negative gap. Alternatively, educators need to make students more aware of how and where these skills can be applied and also some education of employers is required to make them aware of the untapped skills of their employees.

BAs are expected to have knowledge in the Business domain, not just in the Technical area, and they are also required to interact with multiple parties as part of the requirements gathering process and design of systems. Hence, to address skill demands and reduce these gaps, we encourage educational programs to include training in IT Governance, IT Service Management, Stakeholder Relationship Management and Business Problem Solving skills for future BAs. This leads us to consider where our respondents believe these skills should be acquired.

Education and Training needs to Acquire these Skills

We see in the skill acquisition column in Table 4 that all skills, with the exception of Ability to Innovate, should be learnt or extended at work (69-76%). Perhaps respondents felt that at work they had little opportunity to innovate in their current IT positions or that they should have been taught how to nurture this ability before they became more molded into their current work habits.

While the differences between the results in the undergraduate and postgraduate columns are not as great as the differences to be seen in the UG/PG columns with the "work" column, we do see differences for each category and individual skills. In general for soft skills, 43.92% of respondents believe these should be taught in undergraduate courses and this increases only slightly to 46.75% at the postgraduate level. We see the opposite effect for technical skills, where the undergraduate percentage (42.07%) is slightly higher than the postgraduate percentage (40.23%). Larger gaps are found for the other two categories. For business skills the undergraduate percentage is 36.37% compared to 43.11% for postgraduate. We see a similar pattern with green skills (undergraduate 30.38%, postgraduate 43.66%). It seems that greater maturity and probably some work experience make postgraduate study of business concepts more appropriate.

There are numerous interesting individual results that are obscured when looking at category averages. For example, in the case of the technical skill IT Architecture / Standards the percentage of respondents who believed the skills should be acquired at the undergraduate level was 42.70% compared with 28.20% who believed this skill was appropriately taught at the postgraduate level. Other technical skills that respondents believed are better taught as part of the undergraduate curriculum moreso than at the postgraduate level include: Software Implementation (52.70%, 36.60%); Web Application Servers

(53.40%, 38.20%); Software Testing (54.20%, 37.40%); Database Administration (52.70%, 35.90%). The biggest differences between undergraduate and postgraduate percentages in the other direction can be found in the green skills category were Sustainability Strategy (35.10%, 52.70%); Training for Sustainability Awareness (31.30%, 50.40%); and Sustainability Engineering (26.70%, 42.00%).

Skills Missing from the Survey and Further Comments

With 85 skills already listed in our survey and five things to consider for each one, we could not include all possible skills and terms for consideration. We believe the length of the survey impacted the number of willing participants and was the direct reason why only 131/163 respondents chose to complete the survey. To address the possibility that we had missed essential skills we asked our participants if there were any skills missing from our survey and where the skill should be acquired.

Thirty-five participants entered a response to this question in the free text textbox provided. Some of the skills we deemed to be equivalent to skills in our survey. For example, we thought "analyzing the current business status" was overly specific and covered by other skills such as business problem solving and/or business planning. Similarly, we think that "experience in using BA tools" is covered by CASE tools, though we appreciate that this old term may imply such tools are for Software Engineers only. Table 5 lists those skills that seemed sufficiently different to those we had included. Not that the absence of the skill "Software Development Methodologies (Waterfall, Agile, etc)" was an oversight in our online survey and technical skill #48 in Table 1 was SDLC/development methodologies. We also include any Likert scale responses provided regarding the importance, knowledge level or appropriate place to acquire the knowledge if provided by our participant. The first row includes two skills suggested by two respondents and hence importance shows the two different responses.

Missing Skills	Importance	Knowledge	Undergrad	PGrad	Work
Political awareness/influencing skills	2+3	2		X	X
Modelling/Data Modelling	3	3	X	X	
Basic Database Querying (not mining)	1	3	X	X	
Software Development Methodologies (Waterfall, Agile, etc)	3	3	X	X	X
Documentation/Knowledge Sharing and Management skills					
Stress Management					
Bilingual ? for some cases					
Systems Thinking & Design Thinking					
Impact of systems on the society and their interaction					
The Business Analysis Process	3		X	X	X
Language skills (not oral rather, acuity for ambiguity) - extremely important - U/P/W	3		X	X	X
Rapport building	3		X	X	X
Active listening		3	X	X	X
Business risk identification and mitigation		3		X	X
Legal and Regulatory compliance awareness		3		X	X
User Experience Specialist					
Documentation management systems					

Table 5. Additional Skills Identified by Respondents

Some respondents provided a detailed description of what they believe the BA role to be, or further information to clarify their viewpoint and responses to the survey items. We present those comments below as a source of insight into some of our respondents, most of whom are highly experience IT professionals familiar with the BA role. After each comment we provide some information about the person who made the comment.

I expect students would only get a taste of some of these things at undergraduate study level. I also believe that business analysis as a discipline is not something people should go into straight out of university, but that they progress to after acquiring experience in another role (whether IT or line of business).I expect students would only get a taste.
(40 year old male BA with 17 years experience)

Unfortunately many of the thinking and understanding skills required to excel as a Business Analyst aren't taught in Universities. This might be because of the considerable effort required to teach somebody else how to think and understand things. Only one lecturer has taught me skills related to thinking and understanding. This lecturer has exhausted a respectable effort and it has resulted in my extended capabilities.
(18 year old male who wants to be a BA)

The ability to see big picture stuff and look at trends and provide data analysis that is useful. So much is spent of finer points that we dont see the big picture.
(56 year old male BA with 35 years experience)

Many of the skills cannot be 'acquired' – you have them or you don't
(57 year old male BA with 25 years experience)

The successful analyst needs to be able to create solutions out of nothing - using whatever resources are available - often this means nothing more then Excel, Access, VBA and SQL. The majority of analysts cannot participate effectively in discussions because they cannot grasp the data model, or communicate with those who will be writing the SQL at the end of the day.
(32 year old male BA with 3 years experience)

Industry specific skills generally can be learned on the job, although it is beneficial to have knowledge/experience at the U or P stage. Work experience at u or P is not always possible. More technically-based skills such as BI, Network admin, software design etc is better learned at the U or G level, as they are very specialist and detailed. To give you a background of my situation, I completed an undergrad degree in Arts Informatics, majoring in Art History and Theory, Government and International Relations and Information Systems. My first job was at a Financial Services Institution who was also a Wealth Management and Risk product provider. I went from a Policy administrator to Business Analyst role in 3 years, where I focused on management reporting using BI tools. My second role was as a Business Performance Analyst in another Financial Services institution - similarly representing the business in dealing with IT in developing management reporting using BI. My current role now is as a management consultant with an Information Management / BI focus. I'd like to highlight that I believe that there is a generic set of BA skills (eg communication skills, requirements gathering process and documentation etc) that need to be developed in order to be an effective BA. I think that there are many routes to becoming a BA, and by the same token, there are different types of BAs. Once these exist, then BAs should be able to work across industries. Some of the skillsets in the survey above are more for certain

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technical specialists, rather than BAs eg I would expect a software developer to do
software design, not a BA.
(29 year old female)

Wit and humour; diplomacy and tact; intellectual honesty and integrity -- all acquired
and continually honed from the early years (e.g. childhood) onwards
(51 year old female BA with 28 years experience).

The ability to analyse, problem solve and communicate at conceptual, logical and
physical levels - as appropriate to the phase of the project.
(65 year old male with 40 years experience who has been a BA)

Consistent with our quantitative survey findings, we see that the BA role is indeed a complex one where people skills are essential and must be applied in the specific business context. The BA is more likely to interact with others who need to have the appropriate technical skills, but some understanding of these skills is needed to avoid miscommunication and aid communication with the business stakeholders.

FUTURE DIRECTIONS & CHALLENGES

This study sought to answer a number of research questions. As a practical implication of the study, these findings shed light on what should be included in a program of study in Australia aimed at Business Information Systems students and with a specific graduate destination in mind, the BA. Hence this study focussed on Australia with participants being recruited via the ACS and therefore there may be some limitations on the generality of the findings to a broader global context. In particular, the high ranking of Integrity/Honesty/Ethics and Professional Ethics may reflect the Code of Conduct established by the ACS and be a key reason which attracted the individual to become an ACS member, though we noted our findings were similar to other studies. The skills measured in our survey were derived from international frameworks (i.e. SFIA) and other skills found relevant by researchers. However, to provide more internationally validated results, and to determine if differences exist, in the future we may replicate the study drawing on the Association of Information Systems (AIS) or the International Institute of Business Analysis (IIBA). Certainly our study would benefit from increased participant numbers. We observed that earlier questions were (on average) ranked higher than later questions indicating a potential bias. Future studies would need to ensure that the list order is rotated to account for this error. Also, we had to discard one-third of our participants because of non-completion which we think may be due to an exhaustion factor given the large number of questions, however this would need to be tested by researching a smaller subsection of completed and not completed surveys. An option may be to reduce the number of questions by removing those skills that were seen to be unimportant in this study. Finally, we have some concerns whether our participants understand what was meant by sustainability. Perhaps use of the term GreenIT would have been more meaningful. Sustainability is often associated with organisational viability related to competitiveness, not related to preserving the environment. In any case, we believe our findings demonstrate the current lack of agreement, awareness and emphasis in this area that needs to be addressed.

It would potentially be interesting to compare our findings with reputable sources and professional bodies that we had not consulted in the development of our survey. Initially we performed a comparison with the IS2010 Curriculum Guidelines for Undergraduate Degree Programs in Information Systems that was developed by the Association for Computing Machinery (ACM) and the Association for Information System (AIS) (Topi et al. 2010). However, since an IS undergraduate degree is not specific to the role of the BA only, we looked for a more specific set of skills and knowledge. We found that

the IIBA had produced a document for this purpose for its members. We performed a post survey analysis of the BABOK Guide which is described as follows[9]

> A Guide to the Business Analysis Body of Knowledge® (BABOK® Guide) is the collection of knowledge within the profession of Business Analysis and reflects current generally accepted practices. As with other professions, the body of knowledge is defined and enhanced by the business analysis professionals who apply it in their daily work role. The BABOK® Guide describes business analysis areas of knowledge, their associated activities and the tasks and skills necessary to be effective in their execution. The BABOK® Guide is a reference for professional knowledge for business analysis and provides the basis for the Certified Business Analysis Professional™ (CBAP®) and the Certification of Competency in Business Analysis™ (CCBA®) designations.

In the BABOK Guide v.2 the knowledge areas (KAs) relevant for business analysis are divided into the phases: Enterprise Analysis; Elicitation; Requirements Analysis; and Solution Assessment and Validation. Spanning these phases is Business Analysis Planning which are underpinned by the KA Requirements Management and Communication. While the guide is very useful in providing a flow of tasks (for example, as part of the Enterprise Analysis phase we have identify business needs, determine solution approach, define solution scope and develop the business case) and does give a good idea of what a BA needs to do, it does not tell us what knowledge is needed to perform these tasks or where that knowledge should be acquired.

Empowering students with the knowledge, desire and confidence to be drivers of sustainability cannot be done in isolation from the rest of the curriculum. The literature review and survey presented seek to identify what knowledge and skills are required to ensure that they will be successful their careers and responsible citizens. It is important to design a curriculum to allow those identified knowledge and skills to be learned and constructed, progressively via a process of experience and reflection throughout their studies. While not available to use at the time of this study, the literature review of Green IS by Brooks, Wang and Sarker (2012) might suggest other Green skills. Gaining a deep appreciation of sustainability and the role the student can play, cannot be done using traditional teaching methods only and may require alternative teaching strategies such as those suggested by the UNESCO (1998) project on Teaching and Learning for a Sustainable Future: experiential learning, storytelling, values education, inquiry learning, appropriate assessment, future problem solving, learning outside the classroom and community problem solving.

CONCLUSIONS

The emphasis on graduate attributes (also known as graduate capabilities and formerly better known as generic skills) for IS graduates, particularly in the role of BAs, is noteworthy. Through the use of an industry based survey, this study identified skills relevant to the current BA role and compared respondents' perception of the importance of and their ability in each of these skills. Eighty five (85)

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[9]

http://www.iiba.org/imis15/IIBA/Professional_Development/Business_Analysis_Body_of_Knowledge/IIBA_Website/Professional_Development/Business_Analysis_Body_of_Knowledge_pages/Business_Analysis_Body_of_Knowledge.aspx?hkey=d0891e0a-996a-431f-a6f5-a7d644e23a5c accessed 5-12-12

skills were identified and categorised into four skill sets: Technical, Business, Soft and Green skills. Soft skills were perceived to be the most important and the knowledgeable area for BAs, followed by Business, Green and Technical skills. Responding to a public debate on sustainability and green issues, our research confirms that there is currently a lack of awareness of the future role the BA is likely to play in this area. Our research also shows there is a need for training to improve their understanding about these skills and the implications in their careers. Consequently, exploring the area of green IS curriculum could be a potential area for future research.

We suggest that the set of BA skills and knowledge gaps identified in this study can be used by other researchers, teachers, employers and even students to challenge and change current curricula so that Information Systems graduates are better equipped to carry out their pivotal decision making role in a world in which business and technology will continue to change rapidly and a world in need of sustainable solutions.

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