2014

INVESTIGATING THE ROLE OF BUSINESS ANALYSTS COMPETENCIES INTO STRATEGIC BUSINESS REQUIREMENTS GATHERING

Abdul Babar
University of Technology Sydney, abdul.babar@uts.edu.au

Bernard Wong
Enterprise Strategy Labs, Bernard.Wong@enterprisestrategy.org

Babak Abedin
University of Technology Sydney, babak.abedin@uts.edu.au

Follow this and additional works at: http://aisel.aisnet.org/pacis2014

INVESTIGATING THE ROLE OF BUSINESS ANALYSTS COMPETENCIES INTO STRATEGIC BUSINESS REQUIREMENTS GATHERING

Abdul Babar, Faculty of IT & Engineering, University of Technology Sydney, Sydney, Australia, abdul.babar@uts.edu.au

Bernard Wong, Enterprise Strategy Labs, Sydney, Australia, Bernard.Wong@enterprise-strategy.org

Babak Abedin, Faculty of IT & Engineering, University of Technology Sydney, Sydney, Australia, babak.abedin@uts.edu.au

Abstract

Competency of a business analyst plays a crucial role in requirements elicitation, particularly now when the information systems are developed to support strategic business goals. However, as yet, there has been little research into the relationship between competencies of business analysts and requirements elicitation. In this study, a scenario-based approach has been used for the collection and documentation of requirements from the perspective of ten stakeholders of a business system with the emphasis on strategic goals. The 30 business analysts having senior, intermediate and junior level of competencies were recruited for this purpose. The results indicate that senior business analysts, overall, perform better than intermediate and junior business analysts in relation to pursing key stakeholders for the collection of holistic view of the organisation. Senior business analysts tend to approach senior management of the enterprise to collect strategic business goals whereas the intermediate and junior business analysts appear more focused on middle and operational level management for the collection of technical requirements. The results conclude that the senior business analysts are important to be involved in the crucial activity of requirements elicitation if we want to develop an information system that is supportive to the strategic direction of the organisation.

Keywords: analyst competency, strategic goals, business analysts, requirements gathering.

1   INTRODUCTION

IT projects are failing at a high rate, which is costing the industry trillions of dollars each year (Wallace and Keil 2004; Worthen 2007; Marx 2008; Bishop 2009). There are a number of factors such as budget overrun, lack of planning, inadequate return on investment and so forth to the failures, however poor requirements elicitation has been indicated as a major reason of IT project failures (Qahri-Saremi et al. 2008; Hammer, Huffman et al. 1998; Kamata and Tamai 2007; Cerpa and Verner 2009; Javed, Ullah et al. 2013).

This suggests that business analysts (BAs) are more responsible than project managers for IT project failures thus raising questions on the role of BAs (Brûlé 2005; Damian 2007; Glinz and Wieringa 2007; Shuraida and Barki 2013). Researchers and practitioners have stressed on defining competencies of BAs required for requirements elicitation (Brûlé 2005; Chakraborty, Sarker et al. 2007; Vongsavanh and Campbell 2008; Hilburn, Ardis et al. 2013). For these scholars it can just be difficult for a BAs to perform at peak during requirements elicitation (RE) until unless his or her required competencies are not clearly defined.

A non-academic survey report from IAG consulting indicates that it is highly unlikely that average BAs will be able to deliver on business goals related to financial and cost structuring strategies (Ellis 2009). The report indicates that for 63% of cases, in which a significant change to business processes was primary or secondary consideration for the project, average BAs failed to achieve business targets. In 56% of cases in which cost cutting was a primary consideration for the project, average business analysts failed to achieve the goals. According to the report, overall, the data of 88% of projects show that the process change and cost cutting objectives were achieved effectively with highly competent BAs (Ellis 2009).

Requirements engineering research recognises the importance of collecting strategic goals (Yu 1993; Abedin and Sohrabi 2009; Gordijn and Akkermans 2003; Loucopoulos 2003; Lamsweerde 2004; Dalpiaz, Giorgini et al. 2013). A number of approaches, introduced in RE research, argue that if we want to develop information systems supportive to the strategic direction of the organisations, we have to develop requirements specification in the context of strategic business goals because strategic goals influence so called "completeness" of system requirements (Babar, Cox et al. 2008; Babar, Zowghi et al. 2010). However, many of the RE approaches do not capture strategic goals, and thus undermines the "completeness" of requirements specification (Bleistein 2006). The serious lack with the majority of the RE approaches is that they do not recognise the importance of highlighting competencies of BAs involved in the collection of requirements, particularly the strategic business goals (Yu, Strohmaier et al. 2006; Samavi, Yu et al. 2009; Barone, Yu et al. 2010). Chan et al. (1992) argue that strategic goals do not just exist in the organization. The analysts have to direct their questions to the top management for the collection of strategic business goals. A competent BA who is good at identifying and approaching key stakeholders will collect strategic business goals (Chakraborty, Sarker et al. 2007; Vongsavanh and Campbell 2008; Singh and Woo 2009).

The objective of this study is, therefore, to address this gap by investigating **whether and how the competencies of analysts correlate with the collection of strategic business goals**. The rest of the paper is as follows. Section 2 elaborates on strategic business goals whereas section3 describes competencies of BAs. Section 4 presents a research method adopted for this study. Section 5 describes how the study and data collection was performed. The results are provided in section 6 which is followed by section 7 containing discussion and future work of this study.

2   STRATEGIC BUSINESS GOALS

Strategic business goals, driven from organisations vision and mission, are determinants of business strategies (Nustini 2006). Strategic business goals evolve as the business strategies evolve (Yip and

Johnson 2007; Bharadwaj, Sawy et al. 2013). Most business strategies have enduring and increasing returns for shareholders as strategic business goals (Kaplan and Norton 2004), other would focus on competitive advantage (Henderson and Venkatraman 1993; Birnik and Moat 2008), still others would focus on niche market in their business strategies (Sabherwal, Hirschheim et al. 2001).

Such strategic level goals are formulated and elaborated by the top management of the organization (Luftman 2000; Kaplan and Norton 2004; Kearns and Sabherwal 2006-7; Chan and Reich 2007; Tallon 2008; Lim, Stratopolos et al. 2013). To some researchers such as (Abedin et al. 2012; Snow and Hrebiniak 1980; Hambrick and Lei 1985; Chan and Huff 1992), non-CEO level management often have limited awareness of the measures required to remain competitive in the market. Business executives, in very competitive industries, appear to have a greater awareness of strategic goals (Snow and Hrebiniak 1980). Therefore, Chan (1992) argues that the BAs have to direct questions to the top management for strategic business goals. If the researchers intend to consult other executives, the more senior their rank, the more likely they are to have valid perceptions of firm's strategic direction (Chan and Huff 1992).

Approaching senior management for the collection of strategic business goals is a challenging task due to time constraint. BAs are required to perform this task effectively within the limited time frame and without mistakes (Schenk, Vitalari et al. 1998). Competent BAs with larger knowledge structure can perform collection of strategic goals better than the juniors because error-prone behaviour of junior BAs, comparatively limit their ability to collect strategic goals successfully. Error-proneness among analysts, particularly for the collection of strategic goals, can have drastic impact on the completeness of requirements specification, which has been the issue with many existing RE approaches. The requirements specifications, developed through the approaches, highlight that the focus is on functional and non-functional requirements whereas strategic goals of the systems have been ignored by the approaches (Lamsweerde 2001; Bleistein, Cox et al. 2006; Thevenet and Salinesi 2007). As discussed above, competencies of BAs play crucial role in the elicitation of requirements but unfortunately none of the approaches have highlighted the competencies of the BAs involved in the collection of requirements leading to the project failures.

3   COMPETENCIES OF BUSINESS ANALYSTS

This section looks into the definitions and criteria of competencies of BAs involved in the collection of requirements. Dreyfus and Dreyfus (1982) have proposed the following five general categories of competencies: and Mulder (2011):

5. Brilliance – great talent of superb; star

4. Excellence – delivering outstanding performance; expert/specialist

3. Competence – capacity of independent work; professional

2. Nascence – work under guidance; apprentice

1. Ignorance – work by instructions, novice

Brûlé (2005) have used the above categorises and suggested three levels of competencies for BAs, which is shown in Table 1. A senior BA, as an expert, delivers outstanding performance for complex task (Brûlé 2005), an intermediate BA, as a professional, has the capacity to work independently but with some coaching, however, a junior BA, as an apprentice performs tasks with help (Brûlé 2005). The competency level in Table 1 changes based on particularly the *knowledge* and *skills* of BAs. Knowledge refers to "what is being measured?" and skill looks at "how it is done?" From the perspective of the *knowledge* and *skills* columns, it can be seen that the main difference of the senior's competencies from the intermediate and junior's competencies is that the senior BA is a strategic thinker who with his/her holistic view of the organisation, makes and executes plans for the requirements collections and analysis. Senior BAs always have experience of working on various types of projects which help to lay foundation of strategic thinking (Schenk, Vitalari et al. 1998).

Working with business people to identify their needs and desires, resolve any conflicts and propose best solutions to them make senior BAs prominent from others. As discussed above, these skills help senior BA to identify and approach senior business managers and collect strategic business goals from them with confidence, which can lead to the development of a successful information system.

	Knowledge What is being measured?	Skills How is it being done?	Ability To what degree can it be done?
Senior	Anticipates, quantifies and resolves problems and issues with requirements	✓ Identification of source of requirements ✓ Risk management ✓ Development of priority matrix	Within 5-10% accuracy
Intermediate	Employs facilitation techniques in discussing requirements with clients and users	✓ Brainstorming ✓ JAD sessions ✓ RAD sessions ✓ Nominal group technique ✓ Structured walkthrough	Within 10-25% accuracy
Junior	Assists in requirements gathering using a variety of basic techniques	✓ Interviews ✓ Surveys ✓ Historical data	Within 25-30% accuracy

Table 1.   Competencies breakdown for eliciting requirements (Brûlé 2005)

The intermediate and junior BAs mainly work with defined tools and techniques for the collection and analysis of requirements with the clients. They do not have developed strategic thinking which is crucial to the extraction of strategic business goals (Schenk, Vitalari et al. 1998). Thus, these three types of competencies have been used as a reference point for classification of the BAs involved in this study.

4   RESEARCH METHOD

A study was conducted to evaluate the performance of BAs in relation to the collection of requirements from stakeholders of a system. Historically, requirements are classified into functional requirements (FRs) and non-functional requirements (NFRs) (Jacobson 1992; Chung and Nixon 2000; Jackson 2001). Functional requirements refer to the *what* aspect of a system- what action needs to be performed- whereas non-functional requirements refer to *why* aspect of a system, constraints of a system. Since the information systems have been used to support strategic aspirations of the organisation, the RE literature has consistently highlighted the importance of collecting strategic business goals as they influence functional and non-functional requirement of the system (Dalpiaz, Giorgini et al. 2013). Strategic business goals/requirements would be particularly focused on in this study as they are often the high level reason of developing requirements models (Samavi, Yu et al. 2009; Barone, Yu et al. 2010).

Dozens of business analysts were involved in the collection of requirements from stakeholders of a business scenario of fictitious organisation named *Five Star*. In the RE literature, development of business scenario is widely recognised as effective way of collecting and completing requirements specifications (Yu 1995; Sutcliffs 2003; Damas, Lambeau et al. 2005; Bleistein 2006). Development of a scenario depends on the scope it is addressing and therefore scenarios can be categorized into different levels (Jarke, Bui et al. 1998; Rolland and Grosz 1999; Postmaa and Lieblb 2005). Anthony (1985) has defined scenarios at strategic, tactical and operational levels. Small "chunks of best scenario practice" is possible and they are often better structured. It is however not necessary that the scenarios should be complete as still they can give a reader an intuitive picture of a business system. This is possible when a reader focuses on critical issues of a system without really requiring complete description of the system (Anthony 1985).

4.1   Development of the business scenario

Various ways of developing scenarios have been reported in the literature such as rich picture, images and text (Potts, Takahashi et al. 1994; Rolland and Salinesi 2009). Out of many ways of developing scenarios, narrative structure of scenarios appears to be well appreciated by the research community (Potts, Takahashi et al. 1994; Jarke, Bui et al. 1998; Sutcliffs 2003; Rolland and Salinesi 2009). This is a textual form of a scenario in which scenarios are developed in the form of stories which can be based on one's practical experience (Potts, Takahashi et al. 1994; Jarke, Bui et al. 1998; Sutcliffs 2003). Given the above, the following business scenario was developed based on the authors' experiences representing all the three aspects – strategic, tactical and operational of the system.

"Five Star is in a retail business and has dozens of franchise grocery stores around the world. Its head office is in the United States (US). Most of its daily operations—such as raw material procurement, merchandise production and delivery, product sales and in-store services—are conducted via a comprehensive network of stores and cooperating companies. Progress and success is not possible without understanding and cooperation of local suppliers. Five Star has a comprehensive hierarchy of leadership involved in defining business longer term and short term strategic goals driven from vision and mission of the organisation.

Top management, chief executive officers (CEOs) and business executives, expect the IT system to support the company's strategic direction. The chief information officer (CIO) defines the global IT strategy and local IT strategy. The global IT strategy helps expand the business by opening new stores and creating new partnerships and alliances. The local IT strategy helps stores manage store business more efficiently, including better support for the sale and marketing of products. At the store level, managers expect IT to support supplies and provide better inventory control".

The above scenario highlights a number of stakeholders of the Five Star business system. These stakeholders have viewpoints about the system which can be different from each other.

4.1.1   Development of viewpoints

A viewpoint is essentially described as an idea of a stakeholder about a business system (Finkelsetin, Kramer et al. 1992; Finkelstein and Sommerville 1996; Easterbrook, Yu et al. 2005). It refers to the partial knowledge about the system. Viewpoints have been used in RE for various reasons, including as entities in a system's environment, to represent different classes of users, to distinguish between stakeholder terminologies and to partition the RE process into loosely coupled work pieces (Sommerville and Sawyer 1997; Easterbrook, Yu et al. 2005). Developing the largest and most complex systems necessarily involves many people, each with their own perspective on the system, as defined by their skills, responsibilities, knowledge and expertise (Finkelsetin, Kramer et al. 1992; Sommerville and Sawyer 1997; Easterbrook, Yu et al. 2005). A viewpoint-based approach to RE recognises this concern and argues that the system requirements cannot be discovered from a single perspective. Instead, a number of different viewpoints are needed to collect the requirements effectively (Easterbrook, Yu et al. 2005). It is important to understand that system usage is heterogeneous and there is no such thing as typical users. A viewpoint-based approach organises system requirements from stakeholders at various level in the organisation. Requirements collected from various viewpoints are integrated to form the system requirements specification (Easterbrook, Yu et al. 2005). Thus, 10 key stakeholders were identified from the above business scenario, representing various levels such as strategic, tactical and operational in the organisation. While more stakeholders and viewpoints could be identified, past studies indicate that too many viewpoints leads to the difficulty of managing the information generated and prioritising requirements (Sommerville and Sawyer 1997). These stakeholders include a CIO, an enterprise architect (EA), an accountant, a business executive, a business director, a sales manager, a marketing manager, a store manager, direct users and suppliers. Viewpoints representing the perspective of the stakeholders were developed. Since viewpoint approaches do not provide any criteria for the selection of stakeholders, selection of the 10 stakeholders was based on the experience of a panel of four, two of them were senior lecturers

and the other two were BAs – senior and intermediate. None of these four were involved in RE from the viewpoints to avoid bias in the data collection.

4.2 Research participants

Fifty-two BAs working in various Australian companies were pursued via email and telephone calls to participate this study. In the first contact, the BAs were informed about the importance of the study and how the results of this study can help to reduce IT project failures. They were further informed that the purpose of this study is to investigate the performance of BAs in collecting requirements. It was also indicated that their participation would not take more than two hours of their time. Twenty-five business analysts provided consent in the first contact, and five more became available to participate in this study when a reminder email was sent in the following week.

Number of subjects	Job title	Years of industry experience
14	Senior business analyst	8-12
11	Intermediate business analyst	5-8
5	Junior business analyst	2-4

Table 2.   Proficiency levels of business analysts

Altogether, 30 BAs from various industries participated in this study. Participants were from the following industries: telecommunication, finance, transportation, academia and software. The experts were from companies such as IBM, Hewlett Packard, Commonwealth Bank, ANZ Bank, ING Insurance, AAMI Insurance, Optus and NSW State Transit. These also included males and females in all three categories of business analysts from these industries in Sydney, Australia. Approximately half of the sample was female (52%), and males comprised the remainder (48%). Participants were from various ethnic backgrounds, with approximately 45% being European Australians, 25% Chinese Australians, 15% sub-continental Australians and 10% Japanese Australians. The majority of the senior and intermediate business analysts were in their 30s, some of senior BAs with intermediate BAs were in their 40s, however all the junior and some of the intermediate BAs were in their 20s. In the light of the competency criteria described in section 1.2, 30 business analysts were requested their role details in addition to the number of years of experience. Based on the details, the 30 BAs were categorised into three groups as shown in Table 2.

4.3 Dividing business analysts and stakeholders into two groups

The panel was agreed that consulting 10 viewpoints for the collection of requirements can be more than two hours' work.

Group-A stakeholders		
Stakeholder 1	CIO	Viewpoint 1
Stakeholder 2	EA	Viewpoint 2
Stakeholder 3	Accountant	Viewpoint 3
Stakeholder 4	Business executive	Viewpoint 4
Stakeholder 5	Business director	Viewpoint 5
Group-B stakeholders		
Stakeholder 1	Sales manager	Viewpoint 1
Stakeholder 2	Marketing manager	Viewpoint 2
Stakeholder 3	Direct users	Viewpoint 3
Stakeholder 4	Suppliers	Viewpoint 4
Stakeholder 5	Store manager	Viewpoint 5

Table 3.   Two groups of stakeholders

Therefore, it was decided to divide the stakeholders randomly into two equal groups as well as to divide the analysts into two groups for the collection of requirements from a set of stakeholders. Stakeholders and BAs were randomly placed into two groups. Firstly the ten stakeholders were divided into two groups having five stakeholders in each group as shown in Table 3. Then the 30 BAs were divided into two groups as shown in Table 4. Both groups were at an equivalent level in terms of their competencies. These two groups of subjects were given arbitrary numbers—Group 1 and Group 2—to recognise them in this study.

Group-1	Group-2
7 senior business analysts	7 senior business analysts
6 intermediate business analysts	5 intermediate business analysts
2 junior business analyst	3 junior business analyst

Table 4.   Composition of two groups of subjects

5   CONDUCTING THE STUDY AND DATA COLLECTION

This study was conducted at the University of Technology Sydney (UTS) with the mutual agreement of all 30 BAs regarding the time, date and place. The BAs were given two pages description on the retail company, Five Star, so that they could develop an understanding of the business. This included an introduction to Five Star's business (vision, mission and operations) and the rationale of conducting this study. Participants were given 20 minutes to read the description, which they completed within this timeframe.

In the next step, the BAs were divided into two groups based on their background information, as shown in Table 3. On a random basis, stakeholders in Group-A were assigned to Group-1 of BAs, while Group-B were assigned to Group-2 for requirements gathering. Each subject from both groups had the option to choose between one and five stakeholders from the given set of five stakeholders. For the purpose of this research, each BA was required to collect at least five requirements from his/her dedicated group of five stakeholders. The reason for requesting at least five requirements per stakeholder was to make sure BA could have opportunity for competing requirements gathering within the given two hours. The requirements captured by each BA from a particular stakeholder were called a 'requirements list'. If a BA collected requirements from two stakeholders, it means the subject has developed two requirements lists. The subjects were instructed to keep the lists separate from each other. This was important to assess what was captured, from whom it was captured, and who captured it. Both groups of BAs were given two hours to consult viewpoints and develop requirements lists. The majority of BAs completed the RE in between one and two hours. No unusual events were recorded during this activity.

6   RESULTS

Altogether 84 requirements lists were developed by the two groups of BAs. Of these 84 requirements lists, 45 lists were collected from stakeholders in Group-A and 39 from stakeholders in Group-B. The requirements collection range was between nine and three for all the 84 requirements lists. In the first step, requirements lists, as recommended by (Davis, Overmyer et al. 1993), went through screening test to ensure the development of quality requirements specification . This was followed by analysis of requirements in all the 84 lists to identify strategic business goals as well as functional and non-functional requirements. Performance of the BAs with varied level of competencies in relation to the collection of strategic business goals was analysed in the later part of this section.

6.1 Initial data screening

Each requirement of the 84 lists was assessed by the authors and a research assistant. The research assistant had six years of industry experience as an analyst programmer with a PhD in information system. The requirements were assessed to see whether they made sense or had any ambiguity. The panel used the criteria described in (Sommerville and Sawyer 1997) and removed 38 requirements which were incomplete or unclear. For example, a requirement was 'based on the population item can be provide', which was unclear whether this referred to forecasting demands or home delivery service. Another example of a vague requirement is 'linking software systems with management goals'. Such requirements were excluded from the lists. From the perspective of the BAs, the majority of the vague requirements were from intermediate and junior BAs, 18 (47%) and 13 (34%) respectively whereas only 7 (18%) were from senior BA. Out of 38 vague requirements 25 (66%) were from male BAs across all three competency groups.

6.2 Requirements lists

In this paper, two of 84 requirements lists have been chosen for discussion and analysis. The emphasis of one of these requirement lists is on 'strategic' aspect of the requirements, whereas the emphasis for the second one is on the 'functional' aspect of them. The requirements of this list which were collected from business executive, indicate that the stakeholder wants to *reduce operational cost* by adopting *online* and *ecommerce strategy* (Kaplan and Norton 2004). These strategic goals can have major impact on the business operations of the enterprise. The business executive also has the desire *exceed sales targets* and approach *new markets* by *having service improved* through service level agreement with the IT department. The majority of the requirements in list 2, which were collected from marketing manager, are functional requirements. They are actions per definition of functional requirements, provided in section 4, need to be performed in order to achieve three strategic goals.

	Requirements	Reqs Types
Requirements list 1	Reduce operational costs	Strategic
	Online business strategy	Strategic
	E-commerce strategy	Strategic
	Exceed the sales target of a competitor	Strategic
	Target new markets	Strategic
	Improve service quality	Functional
Requirements list 2	Exceed customer expectations by understanding and responding to their needs and desires.	Strategic
	Conduct market research to know consumer requirements	Functional
	Use multi channels for marketing.	Functional
	Inform customers about new deals.	Functional
	Understand customers buying pattern.	Functional
	Enhance communication and collaboration with partners.	Strategic
	Get access to reliable data.	Functional
	Target new customer markets.	Strategic
	Conduct statistical analysis of consumer data	Functional

Table 5.   Randonly selected two requirements lists

6.3 Role of the business analysts

The section begins with identifying number of stakeholders approached by each BA. The results shown in Table 6 indicate that eight out 15 BAs from group-1 approached three or more stakeholders, whereas seven approached two or one stakeholders for requirements leading to develop altogether 45 requirements lists. Seven out of 15 BAs from group-2 approached three or more stakeholders whereas

rest of the eight BAs approached two or one stakeholders for requirements leading to the development of 39 requirements lists. So, altogether, 84 requirements lists were developed by 30 BAs. An ultimate question arises here *why some analysts approached more stakeholders than others?*

A subsequent question is *does it relate to the level of competency of the analysts?* To answer these questions, the competency data of all the 30 BAs approaching 10 stakeholders for requirements were analysed and developed a graph showing in Figure 1 the level of competency of each BA and the number of stakeholders approached by each BA. A simple excel program was used to observe correlation between the three competency levels of BAs provided in Table 2 and number of stakeholders approached by them. The results indicate that the majority of the BAs who approached three or more stakeholders for requirements are senior BAs. Only a few who approached three or four stakeholders are intermediate and junior BAs.

Group-1 subjects approaching Group-A stakeholders		Group-2 subjects approaching Group-B stakeholders	
Subjects × stakeholders	**Total reqs lists**	**Subjects × stakeholders**	**Total reqs lists**
2 subjects × 1 stakeholder	2 reqs lists	4 subjects × 1 stakeholder	4 reqs lists
5 subjects × 2 stakeholders	10 reqs lists	4 subjects × 2 stakeholders	8 reqs lists
2 subjects × 3 stakeholders	6 reqs lists	3 subjects × 3 stakeholders	9 reqs lists
3 subjects × 4 stakeholders	12 reqs lists	2 subjects × 4 stakeholders	8 reqs lists
3 subjects × 5 stakeholders	15 reqs lists	2 subjects × 5 stakeholders	10 reqs lists
Total	**45**	**Total**	**39**
Grand total = 84 requirements lists			

Table 6:   Subjects' performance in approaching stakeholders

The majority of the BAs who approached two or one stakeholders are junior and intermediate BAs. Female BAs dominated this activity across three groups – senior, intermediate and junior with 70%, 55% and 62% respectively.
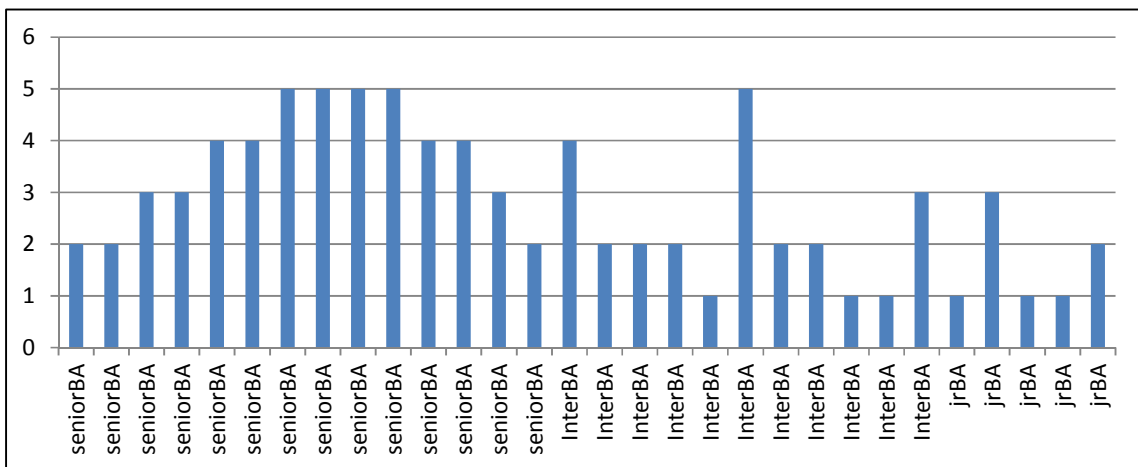

Figure 1:   Competencies of business analysts and the number of stakeholders they appraoched

6.3.1   Interview question

To find out why some BAs, senior, intermediate or junior, approached more stakeholders than others for requirements, each BA was asked an open ended question at the end of data collection **to briefly provide a reason behind your choice of each stakeholder.** The 28 BAs provided the reasons behind their selection of stakeholders, whereas the two BAs – one intermediate and one junior, did not

provide the answer of this question. These two BAs had approached three and two stakeholders for requirements. The majority of the 28 BAs provided a holistic reason of their choice of stakeholders.

Subject/s	Choice of stakeholders	Reasons for choosing stakeholders
4 SBAs 1 IBA	CIO, BE BD, EA, accountant	-All five are key stakeholders. -Need to understand full picture of the system. -All of them are important to understand strategic and operational view of the system.
2 SBA	CIO, BE, BD, accountant	-They are important to know strategic direction of the organisation. -You can know business requirements from them. -EA does not know much about strategic business goals.
1 IBA	EA, CIO, BE, BD	-They were approached to know future targets in relation to expansion of the organisation. Accountant does not appear to be appropriate for such purpose.
1 SBA	SaM, DirU, MaM, StM	-Sales manager and Marketing helped me to understanding the growth and market targets. -Direct user and store manager helped to collect functional requirements of the intended system.
1 SBA	SaM, MaM, StM, supplier	-Helped to understand functional problems with supplier and at the store as well as what is the new customer base with sale targets.
1 SBA	EA, CIO, Accountant	-They were approached to know technological problem. BE and BD do not generally know about it.
2 SBA	SM, MM, storeManager	-They know business requirements of the system, whereas direct user and supplier can not provide business requirements.
1 IBA	EA, CIO, BD	-They are important to know business goals. BE and accountant can provide overlapping information, so they were excluded.
1 JBA	SM, direct user, MM	-They know functionality of the system. Supplier and store manager do not know about it.
1 SBA	BE, Accountant	-They know the strategic business goals, and they are enough.
2 IBA	EA, CIO	-They know about implementation of the system and business goals. Other three do not know much of the system.
1IBA	BM and accountant	-I want to know the future direction of the organisation, on which the system will be developed.
1 JBA	EA and CIO	-They know more about technical aspect of the system than others.
1 SBA 1 IBA	SM, direct user	-They know about the functionality of the system more than others.
1 SBA 1 IBA	Supplier, direct user	-I think they are good enough.
1 IBA 1 JBA	CIO, accountant	-Did not provide any reason.
1 IBA	Direct user	-They are at the heart of the system operations
1 IBA	supplier	-They have clues about future direction of the company

Table 7:   *Responses of the subjects on the selection of stakeholders*

The responses by the BAs, provided in Table 7, indicate that the majority of the senior BAs (including some of the intermediate) were keen to understand the holistic view - strategic and operational of the organisation, for which they approached maximum number of stakeholders. The responses also indicate that senior BAs approach senior management for the strategic business goals, which are the needs and desires of senior management (Lim, Stratopolos et al. 2013). For example, first two sets of BAs in Table 7 met with maximum number of stakeholders to understand the full picture of the business system and they met with stakeholders such as business director and business executive to know strategic business goals of the organisation. In comparison, the responses of the majority of the intermediate and junior BAs indicate that they focused on collecting technical considerations of the system for which they approached less number of stakeholders and considered them enough for the requirements. They do not appear to be keen on collecting strategic business goals. For example, a BA

who approached only one stakeholder – user, described it as the heart of the operations and enough for collecting requirements.

In recent years, collection of strategic business goals, needs and desires of top management, have been recognised important for the comprehensive analysis of the requirements (Samavi, Yu et al. 2009; Singh and Woo 2009; Barone, Yu et al. 2010). Strategic business goals influence on the technical considerations of the system. So, in the light of the responses further investigation into the data was performed for the following questions, *do the requirements lists contain strategic business goals,* if so then *who collected them* and *from whom they were collect*ed?

Next, all the 84 requirements lists were analysed to identify strategic business goals. Definitions and explanations of strategic business goals provided in section 1.1 as the criteria to decide on a strategic requirement were used. Altogether, 260 strategic business goals from the 84 requirements lists produced by 30 BAs were identified. The rest of the requirements were functional and non-functional requirements which are beyond the scope of this study. The graph shown in Figure 2 indicates that BAs with varied level of competency collected strategic business requirements, except a junior BA who did not collect strategic business goals at all. Clearly senior BAs collected higher number of strategic business goals than the intermediate and junior BAs. The results support the responses of BAs provided in Table 7 that senior BAs met with more stakeholders to understand and know the holistic view of the organisation. The 10 stakeholders played a crucial role in this study by representing three main aspects of an organisation – strategic, tactical and operational which have been recognised important for the collection of strategic, functional and non-functional requirements of the system (Anthony 1985).
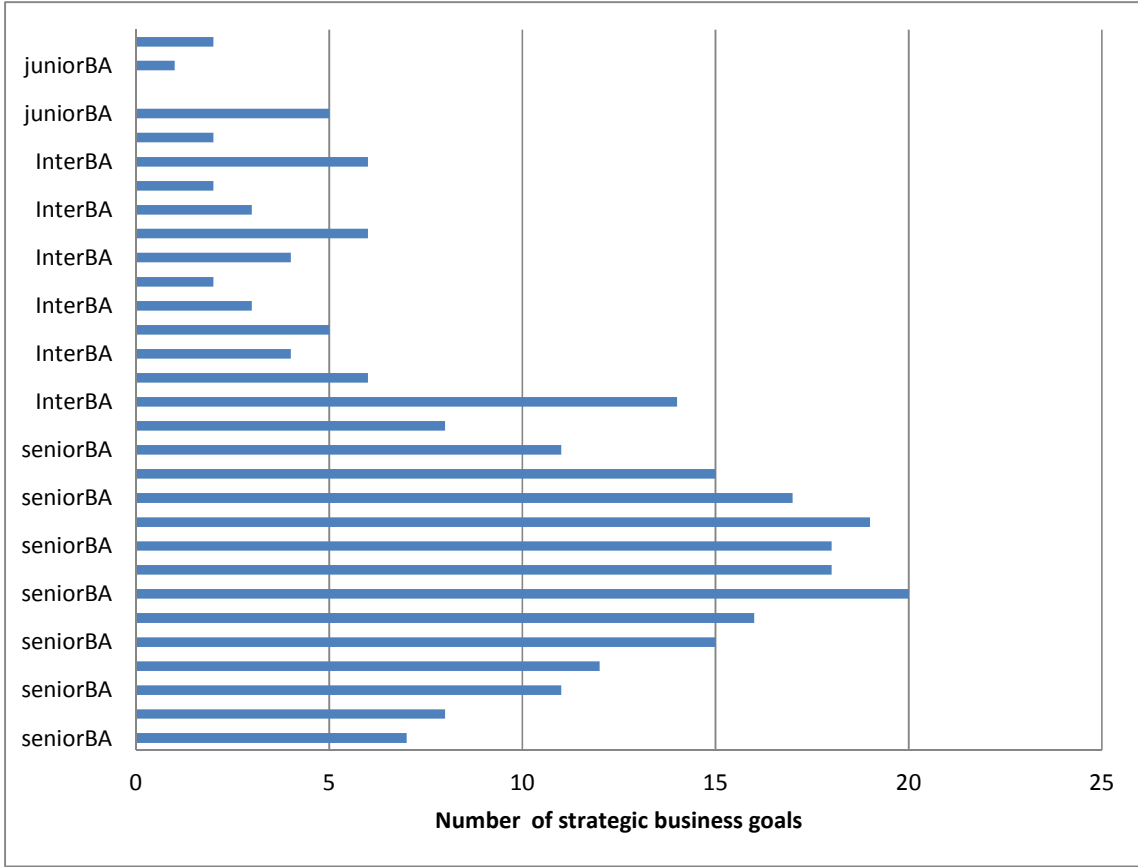

Figure 2:   *Competency level of BAs and collection of SBRs*

In order to find out where these strategic business goals have come from, the 84 requirements lists were analysed to find out how many strategic business goals were generated by each of the 10 stakeholders. The graph shown in Figure 3 indicates that all the 10 stakeholders produced strategic
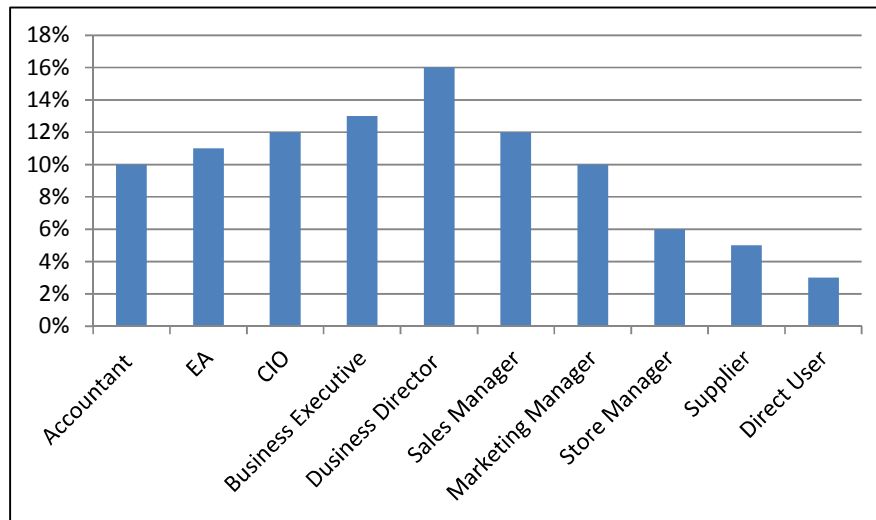

Figure 3:   *Source of strategic business goals*

business goals; however top managers such as business executive and business director were the top producer of strategic business goals. On average each stakeholder supposes to produce 10% strategic business goals. As figure 3 indicates, the store manager, supplier and direct users are well below the average percentage, while accountant and marketing manager are standing on average, and the CIO, business executive, business director and sales managers have produced above the average. These results appear to be consistent with the responses of BAs provided in Table 7 in the way that BAs approached stakeholders such as business director and business executive for the collection of competitive goals whereas many of them approached stakeholders such as direct users for the collection of technical requirements.

7   DISCUSSION AND FUTURE WORK

This research study began by arguing that poor requirements gathering is a major reason of the high rate of IT project failures, therefore the responsibility of the failures rests on the BA/s than the project managers (Shuraida and Barki 2013). Competencies of the BAs in terms of skills, knowledge and ability are not well defined for the majority of the IT projects (Vongsavanh and Campbell 2008). Many of the approaches have been criticised for not be able to collect and address strategic business goals in the requirements specifications (Singh and Woo 2009). Collection and analysis of strategic goals, which are driven from vision of the organisations, is the work of expert BAs who have developed strategic thinking and complete the project effectively (Schenk, Vitalari et al. 1998; Chakraborty, Sarker et al. 2007; Shuraida and Barki 2013).

To address the research question of this paper, a large number of BAs working in various industries were approached to participate in the collection of requirements from the viewpoints representing stakeholders of the system. The competencies of BAs were divided into three well-known categories – senior, intermediate and junior BAs to measure their performance in relation to particularly the collection of strategic business goals. A number of stakeholders were then identified with the understanding that there can be different viewpoints about a system. The BAs were given reasonable flexibility to approach and collect requirements from the stakeholders.

One of the key findings of this study was that the senior BAs approached a larger number of stakeholders for the collection of requirements than intermediate and junior BAs. The reasons provided by the senior BAs indicated that they wanted to capture the holistic view of the organisation, which is the characteristic of competent BAs. The results, shown in figure 1, also have indicated that as the competencies of BAs decrease, in the number of approached stakeholders also decrease. Furthermore, some junior BAs approached only one stakeholder and collected only technical requirements. This may indicate that a requirements elicitation activity can suffer from incompetency of BAs who approach insufficient number of stakeholders and consequently the requirements leading to the project failures. This finding addresses the concern of many RE researchers criticising the existing RE approaches for not being able capture the holistic view of organisation's information system in their requirements models (Marx 2008).

The responses of BAs on the question reported in Table 7 indicate that senior BAs approach senior management for understanding strategic directions of their organisation and for the collection of strategic goals whereas, intermediate and junior BAs mainly approach middle management and operational level staff for the collection of functional and non-functional requirements of a system. This may indicate that senior BAs are more likely than junior BAs to capture strategic business goals of an organisation. This finding helps to understand how the collection of strategic business goals can be improved which is critical to the completion of requirements specification and consequently to the success of IT projects (Lamsweerde 2004; Vongsavanh and Campbell 2008).

Furthermore, this study provides additional insights beyond the role of competencies of BAs. It reveals where the strategic business goals generally come from, in other words who are the sources of strategic business goals. A graph provided in Figure 3 shows the main source of strategic business requirements are business executive, business director representing strategic aspect of the organisation. They have produced the highest number of strategic business requirements. Middle level managers such sales and marketing managers have produced less number of strategic business requirements, while the direct user of the system revealed the lowest percentage of strategic business goals. The results suggest that the more senior their rank, the more likely they are the source of valid strategic goals (Chan and Huff 1992).

By approaching maximum number of available stakeholders, senior BAs appear to be well aware of the source of strategic as well as technical requirements of the system whereas the intermediate and junior BAs appear to be focused on middle and lower level staff for the collection of mainly technical requirements. This may well be a reason explaining why a majority of the existing RE approaches develop requirements models that may not properly capture strategic goals driven from the vision and mission of an organisations (Cox, Bleistein et al. 2006; Yu, Strohmaier et al. 2006).

Finally, the results of this paper show that the competencies of BAs do relate to the collection of strategic goals which are key to the completeness of requirements specification and consequently to the success of the IT project. Senior BAs perform better than intermediate and junior BAs in relation to recognising the source and collection of strategic business goals. RE approaches, ignoring the level of BA' competency required for their projects, runs the risk of missing strategic business goals.

The results of this study appear inconclusive and may not be generalisable to the BA community at large due to two limitations such as: (1) this study created a fictitious business scenario for the collection of requirements. Real life business scenarios of different business sectors need to be considered in future to address this limitation and make the results conclusive. (2) The business scenario used in this study was representing a medium size organisation. Future work of this study is to recognise three main sizes, small, medium and large of the organisations to understand the role of BAs competencies in relation to the collection of requirements, particularly the strategic business goals to provide more conclusive and generalisable results.

References

Abedin, B, Daneshgar, F., D'Ambra J (2012) "Do nontask interactions matter? The relationship between nontask sociability of computer supported collaborative learning and learning outcomes." British Journal of Educational Technology **43**(3): 385-397.

Abedin, B, Sohrabi B (2009). "Graph theory application and web page ranking for website link structure improvement." Behaviour & Information Technology **28**(1): 63-72.

Anthony, R. (1985). Planning and Control Systems: A Framework for Analysis, Division of Research, Graduate School of Business, Harvard University, Boston, Mass.

Babar, A., K. Cox, et al. (2008). "Integrating B-SCP and MAP to manage the evolution of strategic IT requirements." Information and Software Technology **50**: 815-831.

Babar, A., D. Zowghi, et al. (2010). Using Goals to Model Strategy Map for Business IT Alignment BUSITAL 2010, Hammamet, Tunisia.

Barone, D., E. Yu, et al. (2010). Enterprise Modeling for Business Intelligence. 3rd IFIP WG8.1 Working Conference on the Practice of Enterprise Modelling (PoEM2010), Delft, The Netherlands.

Bharadwaj, A., O. A. E. Sawy, et al. (2013). "Digital Business Strategy: Towards a Next Generation of Insights." MIS Quarterly **37**(2): 471-482.

Birnik, A. and R. Moat (2008). "Developing Actionable Strategy." Business Strategy Review **19**(1): 28-33.

Bishop, M. (2009). "2009 Standish Group CHAOS Report: Worst Project Failure Rate in a Decade." 19-07-2011, from http://www.irise.com/blog/index.php/2009/06/08/2009-standish-group-chaos-report-worst-project-failure-rate-in-a-decade/.

Bleistein, S. (2006). B-SCP: An Integrated Approach for Validating Alignment of Organisational IT Requirements with Competitive Business Strategy. CSE. Sydney, University of New South Wales. **PhD:** 192.

Bleistein, S., K. Cox, et al. (2006). "B-SCP: A Requirements Analysis Framework for Validating Strategic Alignment of Organizational IT Based on Strategy, Context, and Process." Information and Software Technology **49**(9): 846-868.

Brûlé, G. (2005). Eight Things Your Business Analysts Need to Know A Practical Approach to Recognizing and Improving Competencies, ESI International Inc.

Cerpa, N. and J. Verner (2009). "Why Did Your Project Fail?" Communication of ACM **52**(12): 130-134.

Chakraborty, S., S. Sarker, et al. (2007). Understanding Analyst Effectiveness in Requirements Elicitation: A Gestalt Fit Perspective. ECIS 2007.

Chan, Y. and S. Huff (1992). "Strategy: An Information Systems Research Perspective." Journal of Strategic Information Systems **1**(4): 191-204.

Chan, Y. E. and B. H. Reich (2007). "IT Alignment: what Have We Learned?" Journal of Information Technology **22**(4): 297-315.

Chung, L. and B. A. Nixon (2000). Non-Functional Requirements in Software Engineering Kluwer Academic Publisher.

Cox, K., S. J. Bleistein, et al. (2006). A Contingency View of Organizational Infrastructure Requirements Engineering. SAC '06 Proceedings of the 2006 ACM symposium on Applied computing, Dijon, France.

Dalpiaz, F., P. Giorgini, et al. (2013). "Adaptive Socio-Technical Systems: A Requirements-Based Approach." Requirements Engineering **18**(1): 1-24.

Damas, C., B. Lambeau, et al. (2005). "Generating Annotated Behaviour Models from End-User Scenario." IEEE Transaction on Software Engineering **31**(12): 1056-1072.

Damian, D. (2007). "Stakeholders in Global Requirements Engineering: Lessons Learned from Practice." Software, IEEE **24**(2): 21-27.

Davis, A., S. Overmyer, et al. (1993). Identifying and Measuring Quality in a Software Requirements Specification. Software Metrics Symposium, 1993. Proceedings., First International, Baltimore, MD , USA.

Easterbrook, S., E. Yu, et al. (2005). Do Viewpoints lead to better conceptual model: An exploratory study. 13th IEEE International Conference on Requirements Engineering.

Ellis, K. (2009). "Business Analysis Benchmark: The Impact of Business Requirements on the Success of Technology Projects." from http://www.iag.biz/images/resources/iag%20business%20analysis%20benchmark%20-%20full%20report.pdf.

Finkelsetin, A., K. Kramer, et al. (1992). "Viewpoints: A framework for integrating multiple perspectives in system development." International Journal of Software Engineering and Knowledge Engineering **2**(1): 31-57.

Finkelstein, A. and I. Sommerville (1996). "The Viewpoints FAQ." BCS/IEE Software Engineering Journal **11**(1).

Glinz, M. and R. J. Wieringa (2007). "Stakeholders in Requirements Engineering, Guest Editor's Introduction." IEEE Software **24**(2): 18-20.

Gordijn, J. and H. Akkermans (2003). "Value Based Requirements Engineering: Exploring Innovative e-Commerce Ideas." Requirements Engineering **8**(2): 114-135.

Hambrick, D. C. and D. Lei (1985). "Towards an empirical prioritisation of contingency variables for business strategy." Academic Management Journal **28**(4): 763-788.

Hammer, T. F., L. L. Huffman, et al. (1998). "Doing Requirements Right the First Time." Crosstalk Journal of Defence Software Engineering: 20-25.

Henderson, J. C. and N. Venkatraman (1993). "Strategic Alignment: Leveraging Information Technology for Transforming Organisations." IBM Sys Journal **38**(2): 472-484.

Hilburn, T. B., M. Ardis, et al. (2013). Software Assurance Competency Model. Carnegie Mellon, Carnegie Mellon University Research Showcase.

Jackson, M. (2001). Problem Frames: analysing and Structuring Software Development Problem. MA, Addison-Wesley.

Jacobson, I. (1992). Object-Oriented Software Engineering: A Use Case Driven Approach, ACM press.

Jarke, M., X. T. Bui, et al. (1998). "Scenario Management: An Interdisciplinary Approach." Requirements Engineering **3**(3-4): 155-173.

Javed, A., M. A. Ullah, et al. (2013). "Factors Affecting Software Cost Estimation in Developing Countries." International Journal of Information Technology and Computer Science(IJITCS) **5**(5): 54-59.

Kamata, M. I. and T. Tamai (2007). How Does Requirements Quality Relate to Project Success or Failure? 15th IEEE International Requirements Engineering Conference.

Kaplan, R. S. and D. P. Norton (2004). Strategy Maps: Converting Intangible Assets into Tangible Outcomes, Harvard Business School Publishing Corporation.

Kearns, G. S. and R. Sabherwal (2006-7). "Strategic Alignment Between Business and Information Technology: A Knowledge-Based View of Behaviors, Outcome, and Consequences." Journal of Management Information Systems / Winter 2006–7 **23**: 3.

Lamsweerde, A. (2004). Goal-Oriented Requirements Engineering: A Roundtrip from Research to Practice. 12th IEEE International Requirements Engineering Conference (RE'04), Kyoto, Japan.

Lamsweerde, A. v. (2001). Goal-Oriented Requirements Engineering: A Guided Tour. In: Proceedings of the 5th IEEE international Symposium on Requirements Engineering, Washington.

Lim, J. H., T. C. Stratopolos, et al. (2013). Senior Executives, IT Reputation Building & Market Valuation. PACIS.

Loucopoulos, P. (2003). The S3 (Strategy-Service-Support) Framework for Business Process Modelling. IN EDER, J., MITTERMEIR, R. & PERNICI, B. (Eds.). Workshop on Requirements Engineering for Business Process Support (REBPS'03), Klagenfurt/Velden, Austria.

Luftman, J. (2000). "Assessing Business-IT alignment Maturity." Communications of the Association for Information Systems **4**(14): 1-50.

Marx, M. (2008). "Project Failure." iSixSigma Magazine **4**(6): 1-6.

Nustini, Y. (2006). "Determinants of a Sustainable Competitive Advantage due to an IT-enabled Strategy." Jurnal Siasat Bisnis **11**(1): 21-36.

Qahri-Saremi, H, Abedin B, Meimand-Kermani A (2008). "Website structure improvement: Quadratic assignment problem approach and ant colony meta-heuristic technique." Applied Mathematics and Computation **195**(1) 285-298.

Postmaa, T. J. B. M. and F. Lieblb (2005). "How to Improve Scenario Analysis as a Strategic Management Tool?" Technological Forecasting & Social Change **72**(2005): 161-173.

Potts, C., K. Takahashi, et al. (1994). Inquiry-Based Scenario Analysis of System Requirements.

Rolland, C. and G. Grosz (1999). Experience with Goal-Scenario Coupling in Requirements Engineering. IEEE 4th International Symposium on Requirements Engineering, Limerick, Ireland.

Rolland, C. and C. Salinesi (2009). Supporting Requirements Elicitation through Goal/Scenario Coupling, Springer Berlin / Heidelberg.

Sabherwal, R., R. Hirschheim, et al. (2001). "The Dynamics of Alignment: Insights from a Punctuated Equilibrium Model." Organisation Science **12**(2): 179-197.

Salinesi, C. and M. Presso (2002). A Method to Analyse Changes in the Realisation of Business Intentions and Stratgies for Information System Adaptation. Proceedings of the sixth International Enterprise Distributed Object Computing Conference, Lausanne, Switzerland.

Samavi, R., E. Yu, et al. (2009). "Strategic Reasoning about Business Models: A Conceptual Modeling Approach." Info System E-business Management **7**(2): 171-198.

Schenk, K. D., N. P. Vitalari, et al. (1998). "Differences Between Novice and Expert Systems Analysts: What Do We Know and What Do We Do?" Journal of Management Information System **15**(1): 9-50.

Shuraida, S. and H. Barki (2013). "The Influence of Analyst Communication in IS Projects." Journal of the Association for Information Systems **14**(9): 482-520.

Singh, S. N. and C. Woo (2009). "Investigating Business IT alignment Through Multi-disciplinary Goal Concepts." Requirements Engineering Journal **14**(3): 177-207.

Snow, C. C. and L. G. Hrebiniak (1980). "Strategy, distinctive competence, and organisational performance." Administrative Science Quarterly **25**(June 1980): 317-336.

Sommerville, I. and P. Sawyer (1997). "Viewpoints: principles, problems, and a practical approach to requirements engineering." Annals of Software Engineering **3**(1997): 101-130.

Sutcliffs, A. (2003). Scenario-Based Requirements Engineering 11th IEEE International Requirements Engineering Conference Monterey California.

Tallon, P. P. (2008). "A Process-Oriented Perspective on the Alignment of Information Technology and Business Strategy." Journal of Management Information Systems **24**(3): 227-268.

Thevenet, L.-H. and C. Salinesi (2007). Aligning IS to Organisation's Strategy: The InStAl Method. CAiSE

Vongsavanh, A. and B. Campbell (2008). The Roles and Skill Sets of Systems vs Business Analysts. ACIS.

Wallace, L. and M. Keil (2004). "Software Project Risks and Their Effects on Outcomes." Communications of the ACM **47**(4): 68-73.

Worthen, B. (2007). "The IT Factor: Tech Staff's Bigger Role." Wall Street Journal **December 4**.

Yip, G. and G. Johnson (2007). "Transforming Strategy." Business Strategy Review **18**(1): 11-15.

Yu, E. (1993). Modelling Organisations for Information Systems Requirements Engineering. IEEE International Symposium on Requirements Engineering, San Diego, CA, USA.

Yu, E. (1995). Modelling Strategic Relationships for Process Engineering. Toronto, University of Toronto, Computer Science Department**:** 124.

Yu, E., M. Strohmaier, et al. (2006). Exploring Intentional Modeling and Analysis for Enterprise Architecture. 10th IEEE International Enterprise Distributed Object Computing Conference Workshops (EDOCW'06). Hong Kong, China, pp. 32.