

Design Consultancy and Software Supplier Interaction

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Abbreviations

BSC	Building Services Consultancies
CIBSE	Chartered Institute of Building Services Engineers



UCL

Design Consultancy and Software
Supplier Interaction

Abstract

This paper explores the principal drivers, success and negatives associated with design consultancy and software supplier interaction. I contend that principal drivers have not been adequately investigated in interaction literature. This paper argues that client pressure is the most influential factor driving design consultancy and software supplier interaction. It also highlights that many other principal drivers expressed in past research are client dependent. Success and negatives associated with any alliance are reliant on a plethora of individual factors, some independent, some interrelated, but all of equal importance. The paper offers the recommendation that design consultancies need to be proactive in establishing linkages and feedback channels with their clients, promote cross organisational learning, and to educate one another. This will increase the effectiveness of their interaction with software suppliers.

Keywords: Design consultancy and software supplier interaction; principal drivers; success factors; negative factors; client pressure; interrelated; feedback channels.

Word Count – 11,000

2 Introduction

2.1 Rationale for the research

Since the early twentieth century, the topic of organisational development through innovation has been investigated. Schumpeter (1911) stressed that innovation was a driver for change and economic growth. More recently the innovative process has attracted intense research interest. However, in the construction industry, specifically design consultancy there has of yet been limited discussion on the principal drivers that ignite innovation. The knowledge base on which both production and innovation are founded has, in general, become much broader, covering more and different types of knowledge (Granstrand *et al*, 1990). As a consequence, organisations increasingly discover that their in-house knowledge is not sufficient for efficient production or innovation (Cowan *et al*, 2007). This has driven design consultancies to seek interaction with software suppliers to generate innovation that markets and clients demand.

The construction industry has been criticised for its slow adoption of emerging technologies (Yang *et al*, 2007). This is because of the complexity and size of the tasks, benefits of innovation can be rather intangible (Mitropoulos *et al*, 2000), and as Amor *et al* (2000) note, it is difficult to reconcile the different views and information needs of the various disciplines involved in the design process. However, it is believed that in recent years this trend has been changing. Greater demands for more cost-effective and schedule-efficient projects have led to new project delivery processes, many of which exploit technologies that serve to either automate or integrate tasks (Yang *et al*, 2007). At the forefront of these technological innovations within the construction industry are the design consultancies. In a highly competitive construction industry, driven by client and market demands plus increased profitability, the best consultancies are constantly searching for proven technologies that offer competitive advantage.

Within consultancy based organisations, the advantages come from greater specific software programmes to aid their designs. To gain that extra advantage in the marketplace, organisations have to target alliances with software suppliers, rather than simply purchasing software that is generic to the industry. The distribution of the design data in an integrated design environment is a basic requirement, reflecting the fragmented nature that characterises the construction industry. Inter-organizational networks have spread rapidly, reflecting a shift toward a global business environment, characterized by escalating R&D costs, increasing product complexity, reduced product life-cycles, difficulties in managing technological change and a greater amount of resources and knowledge required to innovate (Cousins *et al*, 2007). There has been no comprehensive industry-wide study on the principal drivers that lead consultancies to interact with software suppliers.

2.2 Research goals

The aims of this paper are all related to the interaction between design consultancies and software suppliers. There are three main question areas associated with this report. Question one firstly aims to discover if there are any principal drivers influencing design consultancies to interact with software suppliers. Question two aims to investigate whether design consultancies have any specific factors that make them choose to alliance with any particular software supplier. Finally, question three asks design consultancies to underline the most critical negative factors associated with software supplier interaction. The hope is to formulate conclusions that will help design consultancies achieve improved interaction in the future.

2.3 Outline methodology of the research

Being such an opinionated topic and with so many variables that individuals may have conflicting opinions on, it was important to generate a methodology that would provide qualitative results of significance. To do this, it was important to do a wide literature search on the topics related to the interaction between design consultancies and software suppliers. Therefore, this would highlight a broad range of principal factors, success and negatives associated with design consultancies to supplier interaction. From the literature review, a survey questionnaire can be created to target opinions from design consultancy individuals on the topic. Once evaluated, this quantitative information can be integrated into a number of interview questions that can be used to collect qualitative data. The information collected and analysed can be compared with previous research and conclusions declared.

2.4 Report Contents

This paper is organised into six chapters. The following chapter consists of a literature review highlighting past research and opinions on related topics to the principal drivers, success and negatives associated with design consultancy and software supplier interaction. In Chapter 4 the methodology is explained and justified in collecting topical information from a design consultancy sector. Chapter 5 analyses the results quantitatively initially, then investigated qualitatively and finally summarised. The conclusions, recommendations, limitations and further research are presented in Chapter 6.

3 Literature

3.1 Introduction

This paper analyses factors driving design consultants to interact with software suppliers. The following chapter is devoted to a brief overview encompassing old and recent literature in order to determine the principal drivers towards successful design consultancy and software supplier interaction. The literature review will focus on four main factors. Firstly it will target the strategic and market drivers; the strategic and performance criteria drivers; and the technical improvement criteria drivers. Secondly, it will target compatibility factors associated with any prospective software supplier alliance plus drivers towards successful interaction. The final emphasis will highlight factors that restrict potential interaction between design consultancies and software suppliers. A summary of the opinions and views discovered will highlight the main issues associated within the literature review at the end of this chapter.

3.2 Drivers towards Interaction

Innovation is principally driven by a number of main factors; client satisfaction; market conditions; and the search for increased profitability. Innovation is widely recognized as a driving force of economic growth, providing the means by which organisations compete and explaining in large part why industries thrive or decline (Gann, 2003). Gann (2003) states that organisations involved in construction operate within a dynamic environment in which rapid changes in the economy and society are creating demands for new types of buildings and structures. Organisations' abilities to improve their products, processes, services and operating practices by developing and implementing innovation strategies relates directly to economic performance (Gann, 2003). However, Salter and Torbett (2003) argue that organisations need to look beyond measures of financial performance of the project to explore the design process in the context of inter-project learning, client satisfaction and user needs. Others have suggested that an organisation's propensity to form alliances depends on the organisation's strategic and social position (Eisenhardt *et al*, 1996); technical, commercial, and social capital (Ahuja, 2000); and its resources and external environment (Park *et al*, 2002).

Large developers, clients and contractors are exerting pressures to improve the ways in which complex engineering and construction projects can be delivered on time, within budget and to a specified quality. They also wish to improve lifecycle performance characteristics and enhance flexibility to meet unforeseen changes in demand (Gann *et al*, 2000). Client feedback is an excellent indicator for the advantages of innovation in a project. The difficulty here for the design consultancy is that there is a time lag between completion and feedback may prove too long to support effective innovation (Salter and Torbett, 2003). Therefore, an organisation must have the foresight and relationships in place to forecast the clients' future demands. Due to the

fact that consultancies are highly dependant on software packages, they therefore are investigating the benefits of partnering with software suppliers, thereby generating tailored software packages that meet these enhanced client and market requirements. It's not just the pressure from the client that has to be considered here. Arguments from Rothaermel and Deeds (2004) and Rochford and Redelius (1992) have highlighted that there has to be initiative displayed by the consultancy. Going that extra step by generating mechanisms for functional groups to meet the client and discuss deficiencies and future requirements (Rochford and Redelius, 1992), help achieve an enhanced final product (Rothaermel and Deeds, 2004).

In order to develop a fruitful new idea or concept the organisation needs to systematically monitor market needs (Maidique, 1984). However, organisations need to match technological capabilities the market demands (Johns, 1988; Cooper, 1994), although in a project based environment, knowledge gained from partners is likely to be invaluable. These demands in technology innovation also can influence the shape of the organisation (Woodward, 1980). Gann *et al* (2000) indirectly responds to this market pressure, by stating that design consultancies are reliant upon projects to drive the production of complex software developments. Organisations compete in their quest for secure orders to deliver these new product advances, and thus gain an advantage in the marketplace (Gann *et al*, 2000). Williamson (1985) also points out organisations are motivated to integrate with suppliers to overcome market failure. Thus they must monitor the marketplace from a number of angles before making the decision to form an alliance in the hope of accruing market power (Porter and Fuller, 1986) and to enter new markets and technologies (Kogut, 1991).

In a construction market place, Salter and Torbett (2003) argues that the competitive justification of fees demanded from increasing client pressure is forcing design organisations (consultancies) to begin looking at performance measures that highlight the value and efficiency of their design activities. Hampson and Tatum (1997) states a technology strategy can positively influence competitive performance. Gann *et al* (2000) also focuses on competition, stating that forces of change emanate from within construction itself as organisations challenge to win orders and deliver new products and services. Incremental innovation handled systematically provides organisations with the steady streams of new, improved, and varied products they need to grow and stay competitive (Harvard Business Essentials, 2003). It is difficult, however, for a single organisation to possess all the resources, knowledge and capabilities required to innovate effectively (Harrison *et al*, 2001), and thus organisations are increasingly involved with suppliers in the product development process as one means of coping with the problems (Cousins *et al*, 2007). Rothaermel *et al* (2008) state the importance of horizontal partnerships between established organisations in existing technologies to generate market power and market expansion.

Maintaining a reputation for technical expertise can be expensive, but it is often essential to demonstrate to clients and other project team members that the organisation has the resources available to handle complex problems that might emerge during design and construction (Gann *et al*, 2000). Maintaining a reputation increases emphasis on core competencies and the possession of 'best in class'. Strategic alliances have been promoted as an opportunity for two

organisations to combine and create synergistic entity (Nohrai *et al*, 1991; Dyer and Singh, 1998). Therefore, a strategic interdependence perspective on interaction suggests that dependencies create conditions that favour interaction, and that organisations interact with those partners who can best provide the complementary assets and skills they need (Rothaermel *et al*, 2008). Creating partnerships has produced a better understanding of quality across projects (Whysall *et al*, 2008). New product development has become increasingly important to the long-term success and growth of the business (Brown *et al*, 1995; Clark and Fujimoto, 1991) as it enhances innovation (Shan *et al*, 1994). Relationships within an organisation's network, particularly with suppliers, can become a valuable source of innovation and profits (Cousins *et al*, 2007).

3.3 Compatibility and Successful Interaction

Pioneering research into the question of who allies with whom has drawn on resource dependence theory and suggested that organisations enter into relationships motivated by strategic interdependencies (Oliver, 1990). Integrating suppliers into the design and development process has been found to facilitate learning, speed capability development and minimize exposure to technological uncertainties (Anand *et al*, 2000; Eisenhardt *et al*, 1996), share risks (Ohmae, 1989), access complementary assets (Arora *et al*, 1990; Rothaermel, 2001), enhance legitimacy (Baum *et al*, 1991), and improve early performance (Baum *et al*, 2000). Effective supplier integration can lead to vast improvements in quality, cost and new product development cycle time (Hartley *et al*, 1997; Ragatz *et al*, 1997). Project based consultancies rely upon combining technical expertise from other organisations in order to deliver their own technical capabilities more effectively (Gann *et al*, 2000).

The organisation's motivation to engage in a development exercise through interaction with the software supplier is to gain access to their productive resources, in this case the technical expertise (Cantner *et al*, 2007). Therefore consultancies reliant on software packages to aid their design must look to integrate with the most suitable technically proficient partner and learn from one another (Hamel *et al*, 1989). Each partner has certain areas of strength that may compensate for the weaknesses of their potential interaction partner (Rothaermel *et al*, 2008) and build new competencies (Hennart, 1991). Complementarily involves the creation of immediate value for the combined entity. Speed of the alliance formation process is key, and at a premium. Under these conditions it is advantageous to form partnerships early with promising new software supplier partners (Rothaermel *et al*, 2008). Forming a partnership early may also be in the best interest of the design consultancy organisation because this can pave the way to market access (Shan *et al*, 1994); enhance the new venture's legitimacy as the established partner's reputation spills over through affiliation (Stuart *et al*, 1999); and general success of innovation (Hartley *et al*, 1997; Ragatz *et al*, 2002). However, Rothaermel *et al* (2008) also promote the benefits of older, incumbent software suppliers by stating they can offer greater competence and greater likelihood of interaction success.

Gann *et al* (2000) argues that in many project-based organisations (design consultancies), project teams have limited contact with senior management, are based off-site and work in teams with many other organisations. Therefore, although the senior managers will be the individuals responsible of making the ultimate decision to innovate with supplier involvement, they will require feedback from the workers at the boundaries of the organisations. Management of innovation is complicated by the discontinuous nature of the project-based production in which, often, there are broken learning and feedback loops (Gann *et al*, 2000). It is critical for them to understand the performance in design to effectively shape routines to promote innovation with suppliers (Salter *et al*, 2003). This then creates future value and profits at the interface of the project team.

Effective interaction driving towards innovation will only be as effective as the management in place (Salter *et al*, 2003). Supplier interaction in software development entails collaborative and interdependent work efforts (Ellram *et al*, 1995), with mutual planning and problem solving (Maloni *et al*, 1997). Once a partnership has been formed between a consultancy and a software supplier, the management has to generate a strategic plan to meet the brief effectively. New knowledge is often fragmented, vague and widely dispersed throughout the organisations involved in the partnership (Zahra *et al*, 1999). Therefore successful integration requires processes that facilitate the utilization and transfer of supplier knowledge into new products or service. Dyer *et al* (1998) advocate specific socialisation mechanisms that increase frequency and intensity of interactions between design consultancy and software suppliers, which help develop partner specific absorptive capacity. This then would allow higher levels of software integration with suppliers (Ragatz, *et al*, 2002). High levels of supplier integration improve coordination, increase interactions between various groups involved in the innovation process, encourage joint problem solving, cross-learning and lead to successful technology commercialisation (Zahra *et al*, 2002).

The extent to which technical competencies are specialised and are located in different places within and between partners affects how they can be deployed, ultimately affecting project performance, the ability to deliver value to clients, and organisational profits (Gann *et al*, 2000). Therefore, the organisation's innovation strategy needs to extend beyond the immediate boundaries if incremental software advances are to be managed effectively. Here, technological overlap as a basis of common technological understanding, reciprocity as a prerequisite of knowledge exchange, and the expected value of research cooperation are the major factors to be considered (Canter *et al*, 2007). By increasing levels of supplier integration, Petersen *et al* (2003) argues that this is associated with improvements along many dimensions important to the success of the new product, and in addition helps organisations meet the associated technological and market demands. Gann *et al* (2000) adds that an efficient functioning of the entire network alliance relates to the performance and competitiveness of the innovation being produced. Typical benefits include higher quality, lower costs, improved reliability and functionality, and quicker time to the market (Primo *et al*, 2002).

A critical issue for the consultancy concerns the decision of when to partner with a software technology organisation. Ideally, the consultancy will choose to alliance with the supplier early

in the innovation process, before it becomes too established, too legitimate, too attractive to others, and too powerful (Rothaermel *et al*, 2008). Exploitation of an innovation ideally should be planned early so that the returns are maximized; efforts directed (Gray *et al*, 2007) and improve early performance (Baum *et al*, 2000). Other measures of risk management are to retain information crucial to systems integration within their sphere of control, rather than by transferring know-how between temporary coalitions of organisations with whom they collaborate (Gann *et al*, 2000). However, these measures are perhaps aimed away from supplier integration and have more relevance in consultant/contractor relationships.

3.4 Negative Factors

Although a focus on complementary assets, skills, and knowledge may provide a relatively straightforward explanation of interaction between some organisations, such a perspective potentially ignores how organisations overcome the uncertainties associated with such partnerships (Kale *et al*, 2000). Market risk and a high level of uncertainty typically characterize the initiation of any alliance of partnership (Hamel *et al*, 1989). The creation of an alliance involves a very careful assessment on the part of each partner as to what the partner and the alliance might offer and whether the benefits of the alliance exceed the potential downside risks (Rothaermel *et al*, 2008).

Technological developments are notoriously difficult to cost as investment benefits in technology are often subtle, indirect and varied (Tidd *et al*, 1997). However, maintaining a reputation for technical expertise might be expensive, but it is often essential to demonstrate to clients and other project team members that the organisation has the resources available to handle complex problems that might emerge during design and construction (Gann *et al*, 2000). Gann *et al* (2000) also highlights the fact that unlike business processes that are ongoing and repetitive, project processes have a tendency to be temporary and unique. This therefore highlights that radical innovations aimed at project processes usually present non-routine features that do not lend themselves easily to systematic repetition throughout the whole portfolio of projects a consultancy is working on at any one time. According to the Harvard Business Essentials (2003), projects dedicated to radical innovation are risky, expensive, and usually take years to produce tangible results. This is not ideal in a constantly fluctuating construction environment. This can limit opportunities for process improvement, standardisation and economies of scale. Therefore organisations pursue incremental innovation as it's cheaper, safer and more likely to produce reasonable results.

The benefits gained from involving suppliers must also exceed the risk that suppliers will share the knowledge with competitors (Dyer *et al*, 1998). These risks can be mitigated by retaining information crucial to systems integration within their own sphere of control, rather than by transferring know-how between temporary coalitions of organisations with whom they collaborate (Gann *et al*, 2000). These returns maybe in the form of higher returns on the investment in the new product, thereby generating higher client and market satisfaction, reduced time to the market and achieving market share growth (Cousins *et al*, 2007). However,

it must be noted that the simple involvement of suppliers in product development does not automatically guarantee that the transfer of new knowledge and subsequent capability development will occur (Cousins *et al*, 2007).

Choosing a partner early allows the incumbent organisation to lock in partnerships with the best new technology organisations before they begin to work with other, rival, incumbent organisations. Waiting too long can create two problems: the window of opportunity for capitalizing on the new set of ideas and technologies may have passed, or its value may be undermined; and rival incumbent organisations may be able to capitalize on their own opportunities to work with new technology partners – thus the potential competitive advantage presented by the new technology organisation is ceded to a rival (Rothaermelet *et al*, 2008). Finally, due to its inherent nature, new software technology is fundamentally different from existing embedded software technology. As a consequence, Dosi (1988) believes that any new (even incremental advances) software technology will find it difficult to internalise it completely within an organisation and especially in a design team.

3.5

Summary

The literature review highlights many agreeing, conflicting and paralleled opinions. Perhaps the most definitive conclusion from the literature is that the client is of paramount importance. Although client satisfaction is highlighted as a single factor driving design consultancies towards software supplier interaction, there are numerous other secondary factors that have a close association. Discussions on the ability to generate mechanisms to collect feedback; market needs and desires; and pressures to form competitive fees are also all client specific. Equally important are the economic issues associated with software supplier interaction. The ability to remain competitive through new product development is related to the economic success of the organisation through long-term success and growth of business. Ideally the organisation wants an explicit return on investment and a healthier reputation for technical expertise, which again finally relates back to client satisfaction.

Successful interaction and compatibility of prospective partners highlights numerous areas for investigation. Both partners go into an alliance hoping to learn; share risks; and enhance legitimacy. However to achieve these desires there have to be mechanisms in place between the partners. There are arguments that there have to be effective feedback loops in place between the senior management and the workers at the boundary of the organisation. There needs to be mutual planning and problem mechanisms deployed by the management that can tackle the difficulties of fragmented information. The management of the entire network (including the client) is important to the performance and competitiveness of the innovation being produced. Promoting increased levels of integration improve interaction. Additionally early interaction with a supplier can lead to maximised returns and improved early performance.

Risks associated with supplier interaction typically grow from uncertainty. There is market uncertainty, cost uncertainty, and partner uncertainty. Going into an alliance driving towards a

new innovative product can be hard for consultancies to visualise without seeing any tangible results. This added to the length of the production process and constantly fluctuating construction market can discourage consultancies to interact with suppliers. Then there is the supplier themselves. Simple involvement of the supplier does not guarantee a successful transfer of knowledge or a finalised product that is easy to integrate into the consultancy workforce, nor does it guarantee a product that competitors can't access.

4 Research design and methodology

4.1 Scope of the chapter

The following will outline the methodology used to capture information relevant to the report question.

4.2 Statement of research aim

The aim of this report is to determine the drivers towards building services consultancy and software supplier integration. The research will be focused on the angle of opinion from the consultancy side. Initially through a questionnaire survey and then reinforced by interviews, the paper will aim to discover the principal reasons why building services consultancies are driven to form partnerships with software suppliers.

4.3 Justification of questionnaire reinforced by interviews

The topic under investigation requires information to be collected both quantitatively and qualitatively. Therefore, two modes of data collection are necessary. From the literature review the questionnaire can be used to explore all the quantitative research. Closed questions can then be used to prioritise the principal factors from the participants' attitudinal responses. Once analysed, the findings from the questionnaire can then be qualitatively reviewed through open ended interview questions. The interviewee sample will be discussed later in this report. This process aims to transform a dilution of information into a concentration of principal factors associated with design consultancy and software supplier interaction.

4.4 Rationale of the research questionnaire survey

The structure of the questionnaire is defined by five parts.

Part one has twelve questions related to business activity. This introductory section aims to create options to collect different research samples. The questions are closed and the respondents are asked to select one option (apart from question 10). See appendix chapter *10.1.1* for the full list of questions.

Part two focuses on the factors driving design consultancies towards software supplier interaction. It has three ordinal attitudinal questions based on the Likert scale. Respondents were asked to answer with either; Little Influence; Some Influence; Quite Influential; Influential; or Very Influential. See appendix chapter *10.1.2* for the full list of questions.

Part three focuses on the competencies the software supplier possesses that drives design consultancies to interact with them. It has one ordinal attitudinal question based on the Linkert scale. Respondents were asked to answer with either; Little Importance; Some Importance;

Quite Important; Important; or Very Important. See appendix chapter 10.1.3 for the full list of questions.

Part four focuses on the negatives that would restrict a design consultancy from interacting with a software supplier. It has one ordinal attitudinal question based on the Linkert scale. Respondents were asked to answer with either; Not Critical; Not very Critical; Quite Critical; Critical ; or Very Critical. See appendix chapter 10.1.4 for the full list of questions.

Part five offers the respondent the opportunity to partake in a telephone interview and leave other comments.

4.5

The research sample

The participants in this study were all from building services consultancy organisations. To minimise the risk of receiving any ambiguous results there was a two stage procedure. Firstly, the online questionnaire was sent to all organisations currently listed on the Chartered Institute of Building Services Engineers (CIBSE) directory of practices and firms. This number currently stands at 189 organisations. An email was sent to each organisation asking the receiver to distribute to all their employees. Of course, this is a critical moment because it depends purely on the eagerness of the organisational gatekeeper to forward on the email. Therefore the strategy was to send an initial email, followed up by a secondary polite reminder three weeks later. The online survey was open for six weeks before it was closed to start analysing the results. The second procedure to guarantee responses from only building services individuals was the structure of questions in part one of the questionnaire survey. Part one of the survey is intended to develop an indication of the kind of individual that has taken the survey. Consisting of twelve questions, it generates various research samples to analyse. For the purposes of this report, question one filtered out any respondents who were not in the field of design consultancy. This is the target audience.

Answer Options	Response Percent Composition	Response Count
Design Consultancy	88.1	1330
Management Consultancy	8.2	124
Contractor	2.3	34
Developer	0.5	8
Product Supplier	0.3	4
Software Supplier	0.6	9

Table 1 - Q1: Which one of the following professions best describes where you work?

Table 1 confirms that 88.1% of all survey respondents are professionals in design consultancy. Other professions selected are now filtered out of the sample leaving 1330 respondents to conduct the survey. With the filtered respondents accounted for, the next step is to decide how the results will be analysed. The way in which part one was constructed means that there are various matrixes of analysis. Question 2 focuses on the respondents' position within the organisation; Question 3 focuses on years of experience within the profession; Question 4 focuses on the turnover of the respondents' organisation; Question 5 focuses on the kind of office the respondent works in; and Question 6 focuses on whether the respondents' organisation has an internal research and development department. The decision taken was to use the results from Question 2 as the next filter. This decision was made because it was felt that by taking a sample of individuals at varying levels of expertise and responsibility, a richer source of analysis could be conducted. Therefore produce different opinions on the principal drivers towards interaction assumed by different levels of employee. To further simplify the sample, the decision was made to combine certain positions to create four levels of opinion. Firstly, the results from the whole Design Consultancy respondents to create a mean average for comparison; secondly, the results from the directors and partners would be combined; thirdly, the results from the senior and engineer/consultant respondents; and finally the results from the graduates and trainees. Please see Table 2 for the number of respondents at each level.

Answer Options	Response Percent Composition	Response Count
Total Design Consultancy	100	1330
<i>Director</i>	<i>11.2</i>	<i>149</i>
<i>Partner</i>	<i>1.1</i>	<i>14</i>
Director/Partner Level	12.3	163
<i>Senior</i>	<i>21.5</i>	<i>286</i>
<i>Engineer/Consultant</i>	<i>50.5</i>	<i>672</i>
Senior/Engineer/Consultant Level	72	958
<i>Graduate</i>	<i>11.2</i>	<i>149</i>
<i>Trainee</i>	<i>2.8</i>	<i>37</i>
Graduate/Trainee Level	14	186
<i>Administration</i>	<i>1.7</i>	<i>23</i>

Table 2 - Sample of Respondents' Level¹

From the sample, there are a healthy number of respondents at each level. 12.3% or 163 respondents of the sample are directors or partners; 72% or 958 respondents are seniors, engineers or consultants; and 14% or 186 respondents are graduates or trainees.

¹ Based on Survey Questionnaire. Please see Appendix Chapter 10.2.2.

Administration respondents are filtered out of the rest of the survey. These results give an indication of the structural balance within building services consultancies.

4.6

Method of analysis

With the respondent sample chosen, the method of analysis must be discussed. Part Two, Three and Four encompassing questions 13 to 17 are closed questions. Each question has a list of factors that the respondent will rank individually using an ordinal Linkert ranking scale. For example, in question 13 there is a long list of factors associated with the Strategic/Market position. The respondent is asked to mark the opinion representing his/her degree of influence they have on driving towards consultancy software interaction. Table 3 illustrates the coding frame between the numbers and answers.

Answer Options	Little Influence (1)	Some Influence (2)	Quite Influential (3)	Influential (4)	Very Influential (5)	AVG
Status/Market Share	47	145	235	206	47	3.09
Cost effectiveness (compared with market risks)	23	85	204	254	119	3.53
Competitive Advantage	12	63	136	299	172	3.82

Table 3 – Example of the ordinal Linkert ranking scale

This then generates a mean average for each factor which then can be analysed against all other factors to decipher the order of influence. For the mean average to be calculated, refer to equation below:

$$\text{Mean Average} = \frac{[(\sum (1) \times 1) + (\sum (2) \times 2) + (\sum (3) \times 3) + (\sum (4) \times 4) + (\sum (5) \times 5)]}{\sum [(1) + (2) + (3) + (4) + (5)]}$$

Once the results have been analysed, a number of open-ended questions will be formulated to use in interviews. The interviews will be conducted from respondents who said 'yes' to question 19.

5 Analysis of the results

5.1 Scope of the chapter

The following chapter analyses the results from the survey, prepares interview questions and finally combines the survey and interview responses together for final analysis.

5.2 Analysis of the results

From the 189 organisations contacted with CIBSE membership, and through the filter programme, there were 1330 respondents. However, the completion rate of the survey was 52.6%. This is considered as a healthy percentage and coupled with the high number of respondents creates a collection of inferential results. All parts of the survey questionnaire analyses responses from members of the building services consultancy sector. Please refer to the appendix chapter 10.2 for the questions to the results.

5.2.1

Question 9

This question is an introductory question to determine the respondent's organisation investment plan in software product development. The respondents were asked to select one of four possible answers; To increase; To decrease; To remain stable; and Don't know.

Answer Options	TOTAL BSC	DIRECTORS	CONSULT	GRAD
	Response Percent	Response Percent	Response Percent	Response Percent
Don't know	56.1	35.2	59.4	59.3
To increase	26.3	34	23.8	29.7
To remain stable	16.6	29	16.1	9.9
To decrease	0.9	1.9	0.7	1.1
<i>answered question</i>	<i>1311</i>	<i>162</i>	<i>945</i>	<i>182</i>
<i>skipped question</i>	<i>19</i>	<i>1</i>	<i>13</i>	<i>4</i>

Table 4 - Responses to Question 9

Comments:

1. The majority of respondents didn't know what their organisations investment plan was. This would indicate that most of the respondents had no influence or experience in software product development.
2. Unsurprisingly, directors had the lowest percentage of 'Don't know' answers. The majority of directors who replied positively declared that their organisation's investment plan is to increase. A small percentage only declared that they were looking to decrease investment in software product development.
3. The samples that responded positively believed that investment increase in software product development is the most common organisational plan. This reinforces the theory that this topic of design consultancy and software supplier interaction is a highly important field of research.

5.2.2

Question 10

This is an introductory question to rank four factors associated with the respondent's organisational philosophy, in order of importance. Selections of choices were developed from the literature review. The choices were; to deliver higher quality to the client; to create enhanced reputation in the industry; to achieve a greater share of the market; and to achieve modest growth. The respondent ranked these statements in importance to their organisations philosophy in a nominal scale. See results below.

Answer Options	TOTAL BSC	DIRECTORS	CONSULT	GRAD
	Rating Average	Rating Average	Rating Average	Rating Average
To deliver higher quality to the client	3.08	3.3	3.05	3.06
To create an enhanced reputation in the industry	2.62	2.64	2.6	2.72
To achieve a greater share of the market	2.42	2.45	2.45	2.27
To achieve modest growth	1.88	1.69	1.9	1.94
<i>answered question</i>	<i>1288</i>	<i>162</i>	<i>923</i>	<i>182</i>
<i>skipped question</i>	<i>42</i>	<i>1</i>	<i>35</i>	<i>4</i>

Table 5 - Responses from Question 10

Comments:

1. Unanimously, all samples declare that delivering higher quality to the client is their organisational philosophy. There is quite a clear margin between this and the second placed factor, enhanced reputation.
2. It could be argued that client satisfaction and organisation reputation are interrelated. One only strengthens the other. However, the sample of respondents believes that impressing the client is the premium factor.

5.2.3

Question 11

This is related to question 10. It is more bespoke to the explicit drivers that influence design consultancies. The respondents were asked to select the best statement that describes how their organisation is driven. The options were; Client Driven; Market Driven; and Technology Driven. The results are summarised below.

Answer Options	TOTAL BSC	DIRECTORS	CONSULT	GRAD
	Response Percent	Response Percent	Response Percent	Response Percent
Client Driven	67.2	64.2	67.1	69.8
Market Driven	28.4	35.2	28.2	24.7
Technology Driven	4.4	0.6	4.7	5.5
<i>answered question</i>	<i>1292</i>	<i>159</i>	<i>930</i>	<i>182</i>
<i>skipped question</i>	<i>38</i>	<i>4</i>	<i>28</i>	<i>4</i>

Table 6 - Responses to Question 11

Comments:

1. The results reinforce the client influence on consultancies. The results are unanimous that organisations are more client driven than either market or technology influences.
2. It is interesting to note that the graduate response rate to client driven is higher than the other samples. This is considered unusual due to the fact that younger, less experienced employees would have less exposure to clients than the other employees.

5.2.4

Question 12

The final question in part one refers to the importance of investing in software development enterprises and whether the respondents see it important to long term success and growth of their organisations. See results below.

Answer Options	TOTAL BSC	DIRECTORS	CONSULT	GRAD
	Response Percent	Response Percent	Response Percent	Response Percent
Yes	65.2%	72.2%	63.4%	67.4%
No	17.2%	19.8%	18.2%	10.9%
Don't know	17.7%	8.0%	18.4%	21.7%
<i>answered question</i>	<i>1303</i>	<i>162</i>	<i>935</i>	<i>184</i>
<i>skipped question</i>	<i>27</i>	<i>1</i>	<i>23</i>	<i>2</i>

Table 7 - Responses to Question 12

Comments:

1. The results clearly express that individuals working in the building services consultancy industry believe that interaction with software suppliers is highly important to the long term success and growth of their organisations.
2. A question arises here regarding the respondents who replied 'No'. Results show that respondents who work in organisations with less than £2m turnover replied 54.5% 'Yes' and 24.2% 'No'. This would indicate that smaller organisations don't value investment in software development as critically as larger organisations.

5.2.5

Question 13

This question is related to the strategic/market position criteria influencing design consultancies to drive towards software supplier interaction. Here, the respondents were asked to select one of five choices for how influential each factor is. The choices were, using the ordinal Linkert ranking scale; (1) Little Influence; (2) Some Influence; (3) Quite Influential; (4) Influential; or (5) Very Influential. The mean average was then taken to determine a descending list of scores for four samples within the building services consultancy sector: Total Building Services Consultancies (TOTAL BSC); Directors and Partners (DIRECTORS); Seniors, Engineers and Consultants (CONSULT); and Graduates and Trainees (GRAD).

Answer Options	TOTAL BSC	DIRECTORS	CONSULT	GRAD
	Rating Average	Rating Average	Rating Average	Rating Average
Competitive Advantage	3.82	4.07	3.74	3.88
Contractor/Client Satisfaction	3.78	3.83	3.75	3.95
Profitability	3.78	3.89	3.76	3.73
Cost effectiveness (compared with market risks)	3.53	3.61	3.51	3.43
Added Value/Justification of fees	3.47	3.63	3.44	3.40
Competitive pressure from the market	3.38	3.25	3.41	3.30
Economies of Scale	3.18	3.35	3.14	3.15
Enter new Markets	3.09	3.01	3.09	3.18
Status/Market Share	3.09	3.10	3.07	3.15
Stakeholder Satisfaction	3.03	3.06	3.04	2.91
Mergers and Acquisitions (creating a larger organisation)	2.79	2.50	2.84	2.89
Avoid Rivals benefiting from potential gains	2.71	2.72	2.68	2.85
<i>answered question</i>	<i>699</i>	<i>115</i>	<i>500</i>	<i>75</i>
<i>skipped question</i>	<i>631</i>	<i>48</i>	<i>458</i>	<i>111</i>

Table 8 - Responses to Question 13

Comments:

From analysis of the results shown in Table 8, the following picture emerges:

1. Taking the mean average of ratings over all twelve factors individually related to strategic/market position criteria, it would appear that there are three principal drivers in this field. However, the four samples are in disagreement concerning the top driver. Total BSC and directors share the opinion that competitive advantage is the principal driver. However, the respondents from professional roles not as senior declare that profitability and contractor/client satisfaction are the most influential.
2. Competitive advantage, contractor/client satisfaction and profitability have a significantly higher average than any of the other factors, and this is shared by all the samples.

3. In general the director sample has made all factors more influential than the other samples. However, the one factor they rank a lot lower than the others is mergers and acquisitions.
4. A high number of skipped responses.

Most Influential Factors

1. Contractor/Client Satisfaction
2. Competitive Advantage
3. Profitability

Least Influential Factors

1. Avoid Rivals benefiting from potential gains
2. Mergers and Acquisitions (creating a larger organisation)
3. Stakeholder Satisfaction

5.2.6

Question 14

This question is related to the strategic/performance position criteria influencing design consultancies to drive towards software supplier interaction. Here, the respondents were asked to select one of five choices for how influential each factor is. The choices were, using the ordinal Linkert ranking scale the same as in question 13.

Answer Options	TOTAL BSC	DIRECTORS	CONSULT	GRAD
	Rating Average	Rating Average	Rating Average	Rating Average
Technical capability/excellence	4.01	4.17	4.00	3.86
To set the benchmark as a best practice standard/To be best in class	3.74	3.85	3.70	3.83
Enhance performance on the management of projects	3.68	3.76	3.65	3.68
Professional reputation	3.68	3.73	3.66	3.70
<i>answered question</i>	<i>682</i>	<i>111</i>	<i>490</i>	<i>72</i>
<i>skipped question</i>	<i>648</i>	<i>52</i>	<i>468</i>	<i>114</i>

Table 9 - Responses to Question 14

Comments:

From analysis of the results shown in Table 9, the following picture emerges:

1. Technical capability/excellence is considered the most influential strategic/performance indicator when driving towards interaction.
2. All factors have mean average values of over 3.5 which would indicate that they are all relatively influential. Therefore, due to the similarity of the results, it can be assumed that all the factors in this field could potentially be interrelated, and the consultancy is looking for a portfolio rather than any single one influential factor.
3. A high number of skipped responses.

Most Influential Factor

1. Technical capability/excellence

5.2.7

Question 15

This question is related to the technical improvements criteria influencing design consultancies to drive towards software supplier interaction. Here, the respondents were asked to select one of five choices for how influential each factor is. The choices were, using the ordinal Linkert ranking scale the same as question 13.

Answer Options	TOTAL BSC	DIRECTORS	CONSULT	GRAD
	Rating Average	Rating Average	Rating Average	Rating Average
Respond in a more timely manner to client changes	3.67	3.73	3.66	3.62
Improve clarity in communication/interpretation of information	3.60	3.57	3.61	3.57
Ease integration and adaptability with other design team members	3.57	3.57	3.59	3.47
Reduce complexity in the design	3.46	3.48	3.45	3.43
Cope better with customised requirements	3.44	3.25	3.48	3.41
Schedule more effectively	3.31	3.25	3.31	3.29
Reduce requirements for 'translation software'	3.27	3.20	3.28	3.23
Define project scope more clearly	3.17	2.96	3.20	3.19
Meeting differentiation	2.89	2.80	2.86	3.08
<i>answered question</i>	<i>684</i>	<i>110</i>	<i>491</i>	<i>74</i>
<i>skipped question</i>	<i>646</i>	<i>53</i>	<i>467</i>	<i>112</i>

Table 10 - Responses to Question 15

Comments:

From analysis of the results shown in Table 6, the following picture emerges:

1. The results indicate unanimous agreement between samples of the individual factors ranking order.
2. The most influential technical factor that consultancies drive towards is the ability to reduce the time to respond to client changes. This could be linked with the briefing process if the software decreases prospective changes.
3. In addition, the ability to improve clarity in communication and interpretation of the information is regarded as an influential factor.
4. Meeting differentiation is considered the least influential factor. Does this mean that the consultancies consider differentiation the opposite to the clarity of the information?
5. A high number of skipped responses.

Most Influential Factors

1. Respond in a more timely manner to client changes

2. Improve clarity in communication/interpretation of information

Least Influential Factors

1. Define project scope more clearly
2. Meeting differentiation

5.2.8

Question 16

This question is related to the importance of competencies embedded within the software supplier driving design consultancies towards interaction. The factors expressed here are related to the organisation itself, the people within the firm and existing relations. Here, the respondents were asked to select one of five choices for how important each factor is. The choices were, using the ordinal Linkert ranking scale; (1) Little Importance; (2) Some Importance; (3) Quite Important; (4) Important; or (5) Very Important. The mean average was then taken to determine a descending list of scores for four samples within the building services consultancy sector: Total Building Services Consultancies (TOTAL BSC); Directors and Partners (DIRECTORS); Seniors, Engineers and Consultants (CONSULT); and Graduates and Trainees (GRAD).

Answer Options	TOTAL BSC	DIRECTORS	CONSULT	GRAD
	Rating Average	Rating Average	Rating Average	Rating Average
The competence of joint venture partner team members	3.93	4.24	3.87	3.80
The reputation of the firm	3.91	4.00	3.89	3.88
Expertise of prospective joint venture partner firms	3.88	4.18	3.85	3.59
Existing levels of trust with intended joint venture partners	3.85	4.04	3.84	3.57
Perceived reliability of prospective joint venture partners	3.82	4.07	3.80	3.53
Experience of senior joint venture managers in terms of judgement, intuition and experience (of similar situations)	3.74	3.81	3.73	3.64
Existing relationships	3.72	3.87	3.70	3.58
Opportunity to share risk	3.62	3.69	3.64	3.38
Existing knowledge capture and management structures	3.43	3.36	3.43	3.49
Existing information sharing mechanisms	3.38	3.15	3.43	3.36
The possibility of opportunistic behaviour by prospective joint venture partners	3.27	3.16	3.28	3.32
<i>answered question</i>	<i>632</i>	<i>105</i>	<i>449</i>	<i>69</i>
<i>skipped question</i>	<i>698</i>	<i>58</i>	<i>509</i>	<i>117</i>

Table 11 - Responses to Question 16

Comments:

From analysis of the results shown in Table 7, the following picture emerges:

1. There is quite some conflict of opinion in these set of results. Overall the most important factors are the competence of joint venture partner team members, the reputation of the firm and the expertise of prospective joint venture partner firms.

2. The sample of directors ranks the factors with higher averages than the other samples. They especially find factors like existing levels of trust and reliability as key issues. This indicates that in their jobs, they rely on trust and reliability between *individuals* in their work environments. Graduates don't find this as significant due to their limited interaction with individuals in their infancy of their career.
3. The possibility of opportunistic behaviour ranks as the least important factor. This is an interesting result, especially in the construction industry encompassed by high levels of competition.
4. A high number of skipped responses.

Most Important Factors

1. The competence of joint venture partner team members
2. The reputation of the firm
3. Expertise of prospective joint venture partner firms

Least Important Factors

1. The possibility of opportunistic behaviour by prospective joint venture partners
2. Existing information sharing mechanisms
3. Existing knowledge capture and management structures

5.2.9

Question 17

This question is related to the factors that restrict design consultancy interaction with software suppliers. Here, the respondents were asked to select one of five choices for how critical each factor is. The choices were, using the ordinal Linkert ranking scale; (1) Not Critical; (2) Not Very Critical; (3) Quite Critical; (4) Critical; or (5) Very Critical. The mean average was then taken to determine a descending list of scores for four samples within the building services consultancy sector: Total Building Services Consultancies (TOTAL BSC); Directors and Partners (DIRECTORS); Seniors, Engineers and Consultants (CONSULT); and Graduates and Trainees (GRAD).

Answer Options	TOTAL BSC	DIRECTORS	CONSULT	GRAD
	Rating Average	Rating Average	Rating Average	Rating Average
Development can be expensive	3.56	3.67	3.57	3.28
Degree of priority given to our problem by supplier	3.47	3.72	3.46	3.14
Uncertain outcomes	3.46	3.58	3.47	3.14
Training required to benefit from supplier interaction	3.40	3.38	3.45	3.12
The risk involved is hard to calculate	3.29	3.23	3.31	3.17
Reluctance to adopt technology	3.20	3.23	3.18	3.18
Potential adversarial or opportunistic behaviour	3.09	3.09	3.09	2.98
Fear of de-skilling employees through enhanced automation in the software	2.83	2.53	2.89	2.89
<i>answered question</i>	<i>614</i>	<i>103</i>	<i>436</i>	<i>66</i>
<i>skipped question</i>	<i>716</i>	<i>60</i>	<i>522</i>	<i>120</i>

Table 12 - Responses to Question 17

Comments:

From analysis of the results shown in Table 8, the following picture emerges:

1. There are four reasons that principally stand out from the rest. This would indicate that consultants consider a number of factors equally when assessing potentially critical negatives.
2. Development can be expensive is the principal factor restricting interaction with software suppliers. However, it is not unanimous. Directors consider that degrees of priority given to their problem by the supplier is the highest ranked problem. This is a return to the trust issue already expressed by the directors' sample in question 16.
3. Graduates and Trainees underscore the other three samples significantly. Their overall responses to all of the factors are much lower, therefore implying that they don't see the issues as critical.
4. Fear of de-skilling employees through enhanced automation is considered the least significant restriction. Especially from the directors, they don't see this as a critical

issue. Perhaps this is because they are thinking of *ex ante* restrictions primarily and see this problem as *ex post*.

5. A high number of skipped responses.

Most Critical Factors

1. Development can be expensive
2. Degree of priority given to our problem by supplier

Least Critical Factors

1. Fear of de-skilling employees through enhanced automation in the software
2. Potential adversarial or opportunistic behaviour

5.3

Interview questions and responses

From the results collected from the questionnaire survey there is an opportunity for further investigation. The interviewees were a selection of individuals from the building services consultancy sector comprising of three directors, three engineers and four graduates. See Table 13 for details of interviewees.

Position	Job Role
Director	Business unit director from a London regional office in large UK-wide consultancy organisation.
Regional Director	Technical director from an Edinburgh office in large UK-wide consultancy organisation. Specialising in project reviews.
Associate Director	Responsible for lighting design in projects in a Leeds regional office in large UK-wide consultancy organisation.
Senior Engineer	Senior mechanical engineer from a Newcastle office in large UK-wide consultancy organisation.
Consultant	Sustainability consultant from a Manchester regional office in a large UK-wide consultancy organisation.
Engineer	Electrical engineer from a London regional office in a large UK-wide consultancy organisation.
Graduate Engineer	Graduate mechanical engineer from a London regional office in a large UK-wide consultancy organisation.
Graduate Consultant	Graduate mechanical engineer from a London regional office in a large UK-wide consultancy organisation.
Graduate Engineer	Graduate electrical engineer from a St. Albans regional office in a large UK-wide consultancy organisation.
Trainee	Trainee summer placement mechanical engineer from a London regional office in a large UK-wide consultancy organisation.

Table 13 - Sample of interviewee individuals

The following interview questions have been constructed from the questionnaire results and observations.

Question 1

Client satisfaction is considered one of the most important strategic drivers towards software supplier interaction. However, also as influential are competitive advantage and profitability. Can you please outline what constitutes to competitive advantage and also profitability?

Profitability was described as a number of factors. The director sample identified profitability as the ability to speed up the design process at a decreased cost to the organisation. This could be done by claiming back profits from the purchase cost over time. Directors also highlighted that through increased profitability the organisation could offer increased salaries to prospective talent. The consultant sample also highlighted the ability to decrease the design time, but also to achieve this speed smartly through efficiency confidence and the reliability of the new product. The graduate sample highlighted profitability as the ability to win an increased number of jobs. In addition the ability to produce drawings quicker (making sure it is correct) and then sell them on for more than it cost the organisation.

Competitive advantage was described by the director sample as the ability of the organisation to be cheaper in the market place, offering new skills that competitors can't and producing cutting edge analysis. The consultant sample describe competitive advantage as being at the forefront of the market; offering new solutions that competitors can't; having evolving software that competitors don't have; and handling new software to current applications. The graduate sample declares that competitive advantage is the ability to deliver on time easier and faster plus coordinate with other design team members at an earlier stage of the design. In doing this they pass the saving onto the client, undercutting competitors. In addition they state that an increased level of visual attractiveness of the product is important.

Question 2

Technical capability is considered the most influential factor in performance criteria. Is this because if you are looking to interact, they must possess skills that you don't?

The director sample doesn't agree wholly with this. They state that the ease of use of the software is more important than the technical capabilities. This is because in design consultancy, and especially in building services, the designs they produce are never highly accurate and that they prefer to provide many options than one precise result. To do this, the organisation must understand their technical needs and requirements. Consultants are perhaps more influenced by the product in their hands. Because they are the ones going to be using it, they declare that there needs to be technical support in place from the supplier in the early stages of its integration to make best use of its functionality. The graduate sample is also interested in the technical support from the supplier. They go further by declaring that teaching seminars and feedback questionnaires are important to improve the technical capability.

Question 3

The results show that being able to adapt to client changes is the most influential technical improvement factor. How important is it to design software that can respond to changes in design?

Directors state that it is very important. Changes occur all the time, so the consultancy has to be able to provide alternative options and recommendations in a timely manner. Also they state that new software has to be able to adapt to new codes of practice constantly changing. The consultants declare that it is perhaps better for the organisations to deliver incremental innovative advances to the clients, thus not changing the requirements too drastically and not increasing their expectations. In addition, to interact with the supplier to help meet the client changes. Graduates see client changes as extremely important. Everything that we do is to standards; therefore the software must be up to date. However, they also agree that too much change in the software can have a detrimental effect on meeting the client change requests. Because projects go on for years, too much change in software advances can make it more difficult to meet the iterations.

Question 4

When choosing a prospective partner, there seems to be a number of issues that are of equal importance (competence/expertise/reputation/trust/reliability). Why do you think this is?

Directors claim that they are very important issues. They all have equal standing, and there will be no profits if one factor is weak. Projects challenge the software; therefore weakness in one factor can spill over to the others. Consultants claim that they are looking for the *whole package* in a software supplier. There are a plethora of factors that a consultancy will look for and the ones noted in the question are similar and interrelated. Ultimately they are looking for delivery from the supplier. Graduates stated that the question took longer to answer as the options were all interrelated and *buzz words*. There needs to be an accurate reflection and needs more time to think about responding. They also state that different people want different things, and different levels of employee want different attributes.

Question 5

Can you give some examples of negative experiences of past partnerships?

Directors have the most experience to answer this question. They state that problems have arisen in the past because new updates are not compatible with older versions. In addition they make to observation that the older you are, the less inclined you are to adapt to the changes. Problems have also evolved through the purchasing side, i.e. not being able to accurately price the innovation taking place. Consultants agree with the opinion of new software revisions not being backward compatible. They also state that suppliers bring out new updates too frequently and make the consultancy buy it every time. This speed of revision updates can lead to lack of clarity and quality in the product because the supplier has not invested enough time in evaluating the market and the environment. This devalues the core competencies of the original software. Graduates state that the technical people have *too much* interaction and don't allow the employee to learn the software.

Question 6

From the results, the factors restricting interaction are clustered and there is no obvious one critical factor. Why do you think this is?

Directors state that all the factors are important. When asked about why the fear of deskilling employees was not so critical they said that most people can't forecast the future and can't see automation becoming the dominant force in design. The consultants' state that software is developed to do separate things and that they are not designed for the same application. They also add that the majority of design consultancy individuals who responded to the survey have not been exposed to the design software side and that the risk is predominantly on the supplier side as it is their core business. Graduates agree that all the factors are important. They also

state that no one has the time to weigh up all the factors, therefore they are similarly ranked. Others say that because none of the factors are highly restrictive, they all are equally critical.

Question 7

Do you see the organisation holistically or the individuals as the most crucial factors to successful interaction?

Directors have conflicting opinions here. One stated that the individuals were the most important because they are the ones where business relationships will develop. Another director stated that there needs to be consideration of both and that the organisation represents the brand, and the individuals represent the organisation. Similarly, the consultants are split in opinion. One consultant stated a 50/50 split as people can be non committal, and another consultant declared that the organisation is the most crucial. This is because individuals can't be relied on, whilst you can rely on the organisation to have the individuals in place. There is also contradictory response from the graduates. They state that individuals have to be working as a team, and the skills they bring make up the organisation. However, they also believe that the brand comes first, and that individuals can tarnish the organisation by leaving for example.

Question 8

Why do you think the questionnaire completion was only 50%?

The responses were all similar to this question. Time constraints; respondents not being experienced enough to answer the questions; lack of interest; can't answer in confidence; and can't answer constructively were all reasons highlighted by the interview sample.

5.4

Final summary

Strategic market position, strategic performance and technical improvement criteria all highlight the influence of the client. Industry incumbents specifically reinforced these findings, especially drawing attention to the importance of successful client change execution. Therefore, clients are not only the principal driver towards design consultancy and software supplier interaction, but they also have a significant influence (be it tacitly) on the technical improvements required.

To be successful, the organisation must still stay competitive and generate profitability. The construction industry is an extremely fragile environment where consultancy profits and losses can be determined by the smallest of changes in technology, management and/or project structure. Therefore, to reduce risks associated with innovation practices, the software advances are generally incremental rather than radical to avoid massive financial damage in development and implementation.

To gauge how incremental any development should be is hard to forecast. Feedback channels and efficient information exchanges need to be in place to measure an appropriate level of advancement in the software. In achieving this balance the consultancy will have effective and efficient interaction with the software supplier, increase its reputation in the industry and most importantly maintain high levels of client satisfaction.

Successful interaction cannot be attributed to one or two principal factors. The small differences in importance of the factors highlight this. Consultancies when looking to interact make that decision on a plethora of factors, often significantly interrelated. A weakness in one factor can have an adversarial effect on the whole interaction process independent of strength in other areas.

No principal negative factor was identified restricting design consultancy and software supplier interaction. All the factors were considered independent, but critical to any successful interaction. Qualitative analysis highlighted incumbent negative experiences that were all associated with the supplier problems.

6 Conclusion

6.1 Report Aim

This report has investigated the principal drivers, success and negatives associated with design consultancy and software supplier interaction. The aim was to gather a series of quantitative opinions from the UK Building Services Consultancy sector; develop the analysis into qualitative evidence through interviews within the industry.

6.2 Comments on the research objectives

This report has produced quantitative results highlighting the principal drivers, success and negatives associated with design consultancy and software supplier interaction. Through incumbent interviews within the building services consultancy, a richer source of qualitative findings have been generated and listed below.

Principal Drivers

- Qualitatively, the principal drivers influencing design consultancies to interact with software suppliers explicitly reinforce the legitimacy of the opinions in the literature review.
- The findings have been strengthened with opinions from a broad spectrum of individuals within the building services consultancy sector.
- Although reinforcing past research in terms of individual drivers, the belief is that the client is the major influence on these principal drivers. For example, a consultancy driving towards increased competitive advantage is doing so to impress existing and prospective clients.
- Through the qualitative interview process, the importance and influence that the client radiates in the proliferation of consultancy innovation strategy is clearly visible.
- The report has highlighted one of the most enervating issues associated with the construction industry, the client change.

Successful Interaction Factors

- The literature review opinions have been reinforced, however, through qualitative research the paper has failed to highlight any principal factors.
- Qualitative research however has determined that consultancies require a plethora of successful interaction factors before committing to an alliance.
- The factors highlighted in the report are seemingly interrelated and lack individual clarity.
- Respondents found it hard to offer an accurate response to many of the factors due to this clarity issue.

- The general consensus was the need for improved communication measures and feedback across the whole horizontal partnership, including the client.

Negative Factors

- Investigation into the factors restricting interaction has failed to highlight any fundamental hierarchy.
- Instead, the array of factors has been found to have individual similarity of criticality.
- Strength in one factor will not mitigate weakness in another.
- Consultancies demand proficiency and thrift in all factors mentioned to avoid interaction negativity.

In conclusion the client is the principal driver influencing design consultancy and software supplier interaction. For interaction to take place there is a complexity of factors that require careful investigation before a committed alliance can be formed. The whole report emphasises the importance of communication across horizontal cross border relationships. The consultancy needs to maintain strong feedback links and information exchange mechanisms with both client and supplier alike.

6.3

Personal recommendations

The relationship between the design consultancy and software supplier needs to explore the idea of including the client in the innovation process. At the moment the client is acting as the paramount influence on the consultancy to integrate with the software supplier. Personal recommendations would include:

- The potential to provide better quality designs lies with integrated teams and well educated clients. Nominated individuals from all the organisations involved need to work in collective groups to learn from one another, driving to create a far more complete specific software product.
- Expanding horizontally to embrace the client business desires must include linkages between the technical resources of the software supplier and the design competence of the consultancy. This could be instigated at the briefing stage of any prospective software development.
- Consultancies need to be proactive and involve their clients, but also have to educate them about the design process. Similarly, consultancies must study client behaviour and forecast their desires and produce tailored designs accordingly.
- The management in place needs to understand the knowledge flows between the client, design consultant and software supplier, promoting feedback, cross-organisational learning and trust strengthening. This will be achieved through appropriate group structuring.

The eventual goal for the consultancy will be higher client satisfaction, increased competitiveness in the market, profitability and enhanced technical expertise generated through

efficient interaction with software suppliers and clients. The successful consultancies will be the ones which are capable of making incremental cultural changes whilst maintaining design and technical core strengths. Their success will ultimately be measured by the success of their clients.

6.4

Limitations of the research

The sample analysis was intended to capture opinions from different levels of employee. However, individuals have varying experience levels. For example one consultant might have twenty years of experience, whilst another one will only have two years. Directors and partners specialise in differing disciplines, be it business, managerial or technical. In addition, the research sample consists of individuals from varying sizes of organisations with different turnovers where opinion of factor influence/importance may differ significantly. Therefore, although the research was quantitative, it perhaps lacks certain qualitative consistencies. Also highlighted from the interviews was the ability of the respondents to answer the questions with confidence. The majority of design consultants have no relationships whatsoever with their software providers and are not involved in the decisions to invest in innovation. A lot of responses are based on assumptions rather than experience. Added to these limitations is the response percentage composition of the questionnaire. Overall the completion percentage was 52%, and in some of the later questions it was below 50%. From the interviews the reasons flagged up were time constraints, lack of interest and inexperience of the subject.

6.5

Further research

It is acknowledged that client pressure is the principal factor driving design consultancies towards software supplier interaction.

Therefore, the next step for further research would be to investigate possible case studies where client involvement in software product design has been successful. Perhaps there will be limited cases specific to the construction industry, but there have been being studies done in other industries, for example in the manufacturing sector. This would form a solid background to the possibility of introducing direct client involvement into a leading design consultancy that is currently interacting with software suppliers. Measurements of success/failure can then be recorded as the collaborative group is ignited in action.

Research into the problem of the client change is required (as design incompetence is only one of many factors leading to the need for change), as designers are and will continue to be held accountable for prevarication, although it may be software defects at fault. Mitigation against this problem will influence the consultancy to drive towards safeguarding their design processes with improved software technology. Research into the briefing process between organisations would be the obvious next step.

7 Acknowledgements

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10 Appendix

10.1 Questionnaire

10.1.1 Part one

Question 1: Which one of the following professions best describes where you work?

- Design Consultancy
- Management Consultancy
- Contractor
- Developer
- Product Supplier
- Software Supplier

Question 2: Which one of the following would best describe your position in your organisation?

- Administration
- Engineer/Consultant
- Director
- Senior
- Partner
- Graduate
- Trainee
- Other

Question 3: How many years experience do you have in your current profession?

- Less than 1 year
- 1-3 years
- 3-5 years
- 5-10 years
- More than 10 years

Question 4: Please indicate the approximate turnover of your organisation:

- <£2m
- £2-10m
- £10-100m

- £100m +
- Don't know

Question 5: Please indicate what best describes the office you work in:

- Regional office of a UK-wide organisation
- National HQ of a UK-wide organisation
- Area/Regional (sub-national) office of an international organisation
- National office of an international organisation
- Area/Regional (supra-national) office of an international organisation
- International HQ of an international organisation

Question 6: Does your organisation have one or more internal Research and Development departments (regardless of actual departmental name)?

- Yes
- No
- Don't know

Question 7: Do you rely on specific software packages to create/aid your design?

- Yes
- No

Question 8: Do you believe interaction between the user (your organisation) and the supplier would lead to a more efficient product?

- Yes
- No
- Don't know

Question 9: What is your organisations investment plan in software product development?

- To increase
- To remain stable
- To decrease
- Don't know

Question 10: Please rank the following statements in order of importance to your organisations philosophy:

- To achieve modest growth
- To achieve a greater share of the market
- To deliver higher quality to the client

- To create an enhanced reputation in the industry

Question 11: What statement best describes the way in which your organisation is driven?

- Technology Driven
- Client Driven
- Market Driven

Question 12: Do you see investing in new product development enterprises as important to long-term success and growth to your organisation?

- Yes
- No
- Don't Know

10.1.2

Part Two

Question 13: How influential do you consider the following Strategic/Market Position criteria when driving towards consultancy supplier interaction?

- Status/Market Share – defined as the importance to have a significant status in the market place.
- Cost effectiveness (compared with market risks) – defined as the ability to reduce costs by creating efficient software through higher software supplier integration.
- Competitive Advantage – defined as the ability to improve competitiveness against rivals.
- Added Value/Justification of fees – defined as clear pricing or accurate estimating thanks to improved software efficiency.
- Stakeholder Satisfaction – defined as the ability to satisfy stakeholders through the prospects of software innovation.
- Profitability – defined as the ability to generate higher profits through software supplier interaction.
- Competitive pressure from the market – defined as the competitive impacts rivals have on influencing the consultancy to interact with software suppliers.
- Mergers and Acquisitions (creating a larger organisation) – defined as the ability for consultancies to innovate thanks to increased levels of financial and resource depth.
- Contractor/Client Satisfaction – defined as the ability to please the contractor/client through innovative and efficient software improvements.
- Avoid Rivals benefiting from potential gains – defined as the ability to take advantage of any innovation before it becomes holistic to the market.
- Economies of Scale – defined as the cost advantages that the consultancy obtains from software supplier interaction.

- Enter new Markets – defined as the prospect to enter new markets through software supplier interaction.

Question 14: How influential do you consider the following Strategic/Performance Position criteria towards consultancy software supplier interaction?

- Technical capability/excellence – defined as competence and expertise a software supplier possesses.
- Professional Reputation – defined as the professional reputation a software supplier has in its market place.
- To set benchmark as best practice standard/To be best in class – defined as the software supplier's ethos in targeting innovation development.
- Enhance performance on the management of projects – defined as the ability to understand what product the consultancy desires and understand how it will be integrated into the project interface without adversarial disruption.

Question 15: How influential do you consider the following Technical Improvements criteria when driving towards consultancy software supplier integration?

- Schedule more effectively – defined as the ability to schedule projects with increased accuracy through innovative developments caused by software supplier integration.
- Improve clarity in communication/interpretation of information – defined as the ability to generate designs through software have enhanced clarity to other design team members/clients/contractors.
- Ease of integration and adaptability with other design team members – defined as the ease of design transfer from consultancy to other design team members for modification or submittal.
- Reduce complexity in the design – defined as the ability for the software to reduce complexity and potential errors in the consultants design.
- Meeting differentiation – defined as the ability for the software to adapt to innovations in the future.
- Respond in a timelier manner to client changes – defined as the ability to reduce delays in the project programme caused by client changes.
- Reduce requirements for 'translation software' – defined as the ability to eradicate the need for software packages that change the format to meet end users software requirements.
- Define project scope more clearly – defined as the ability define project scope easier at an earlier stage.
- Cope better with customised requirements – defined as the ability to meet bespoke architectural and engineering design solutions.

10.1.3

Part 3

Question 16: Before embarking on a joint innovation venture, how important do you consider the following?

- The reputation of the firm – defined as the professional reputation a software supplier has in its market place.
- Existing relationships – defined as any established relationships currently in place between the two parties.
- Existing levels of trust with intended joint venture partners – defined as the embedded trust already generated between the partners.
- The possibility of opportunistic behaviour by prospective joint venture partners – defined as the threat of bounded rationality and opportunism associated with the partner.
- The competence of joint venture partner team members – defined as the ability of individual members across the team to integrate and communicate effectively with others.
- Experience of senior joint venture managers in terms of judgement, intuition and experience (of similar situations) – defined as strength of joint venture experience the prospective partner possesses through its senior managers.
- Existing knowledge capture and management structures – defined as the ability to capture tacit knowledge and then pass it on as explicit.
- Opportunity to share risk – defined as the ability to share the risks between partners as the innovation develops through interaction.
- Perceived reliability of prospective joint venture partners – defined as the reliability of the prospective partner to aid the consultancy when required.
- Expertise of prospective joint venture partner firms - defined as competence and expertise a prospective partner possesses.

10.1.4

Part Four

Question 17: How critical do you consider the following statements in restricting consultancy interaction with software suppliers?

- Development can be expensive – defined as the financial costs associated ex ante and ex post of any future software supplier interaction.
- Uncertain outcomes – defined as the inability to forecast the success of any future software supplier interaction.
- The risk involved is hard to calculate – defined as the inability to forecast the risks of any future software supplier interaction.

- Potential adversarial or opportunistic – defined as the inability to forecast how the future partner will act once interaction has commenced, especially in an opportunistic manner.
- Degree of priority given to our problem by the supplier – defined as inability to forecast how committed the future software supplier will be to any partnership formed.
- Fear of de-skilling employees through enhanced automation in the software – defined as the prospect of employees losing key technical expertise by using a more automated angled piece of software in the design process.
- Reluctance to adopt technology – defined as the fear that employees in-house and throughout design teams fail to adapt to any new technological software created.
- Training required benefiting from supplier interaction – defined as any significant training periods required for employees to reach a competent standard in using any new technological software.

10.1.5

Part five

Question 18. Do you believe Consultancy Software Supplier Interaction is an important topic of investigation in the construction industry?

- Yes
- No
- Don't know

Question 19: Will you be available for a telephone interview?

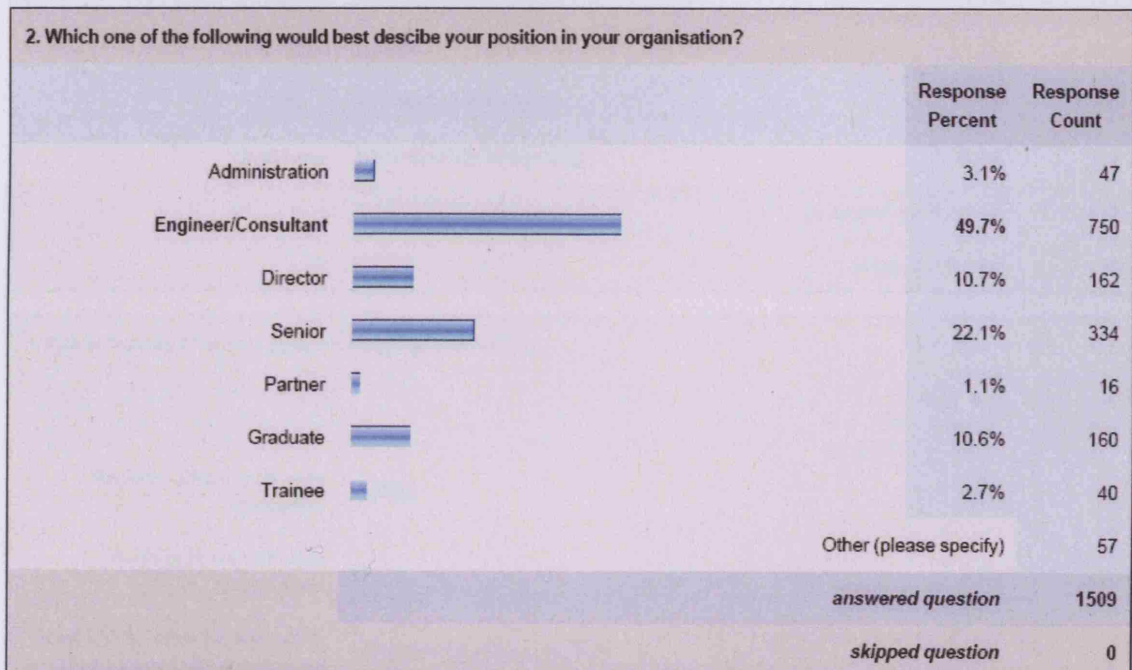
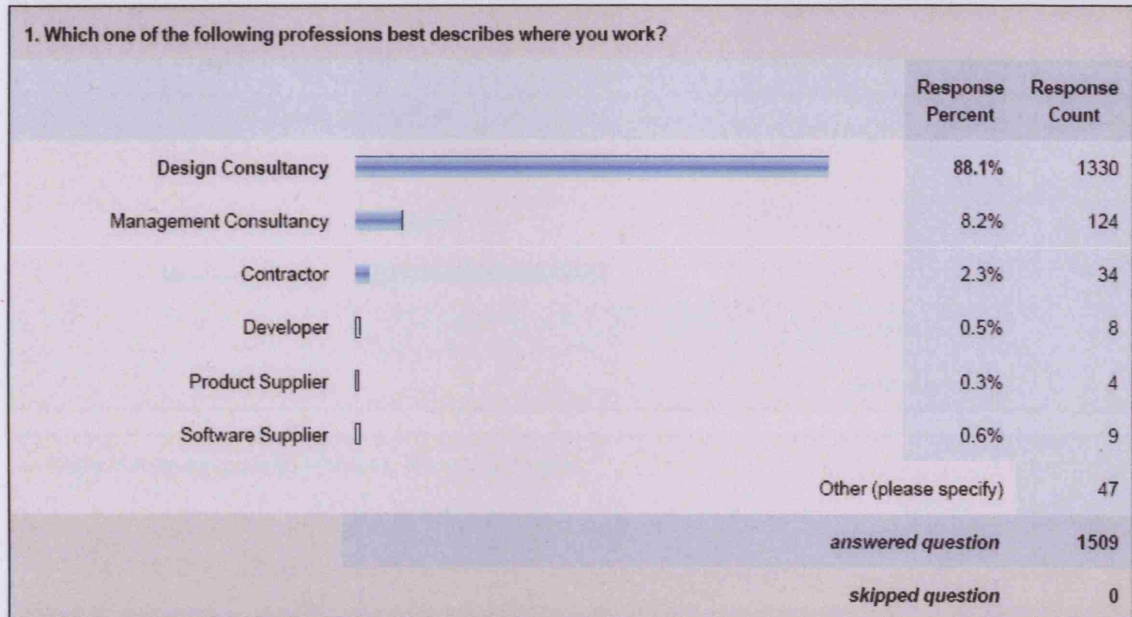
- Yes
- No

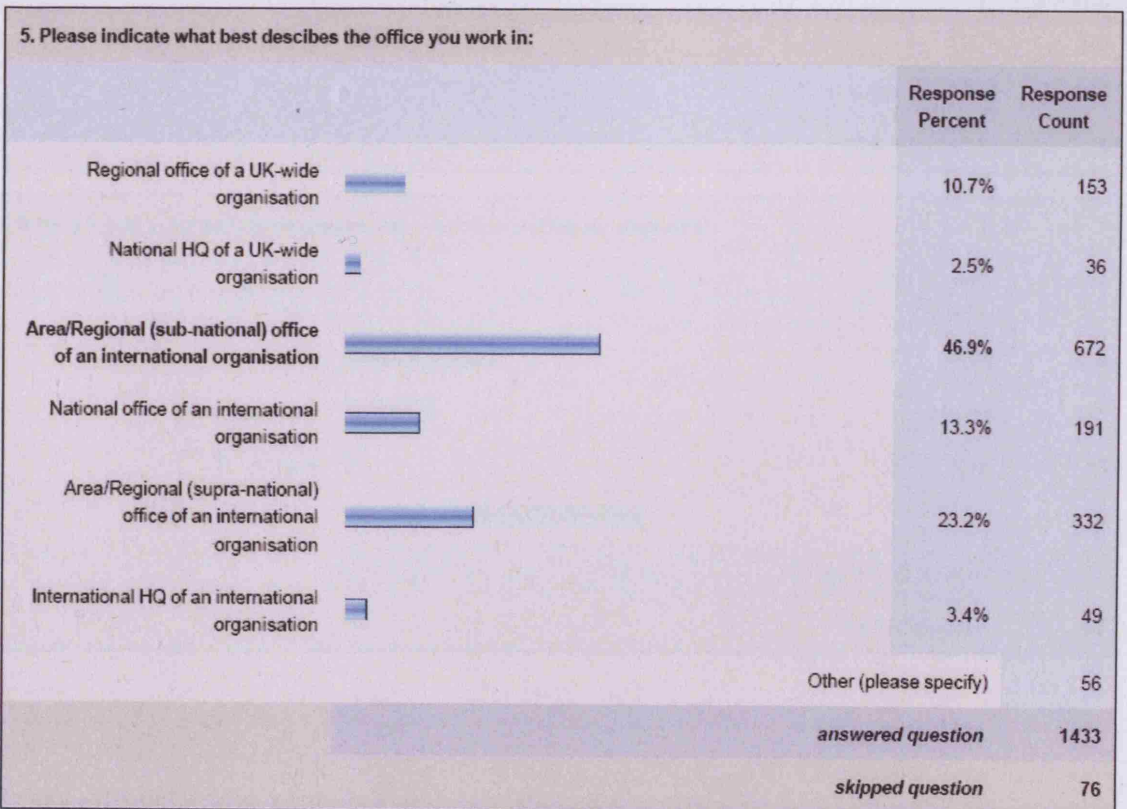
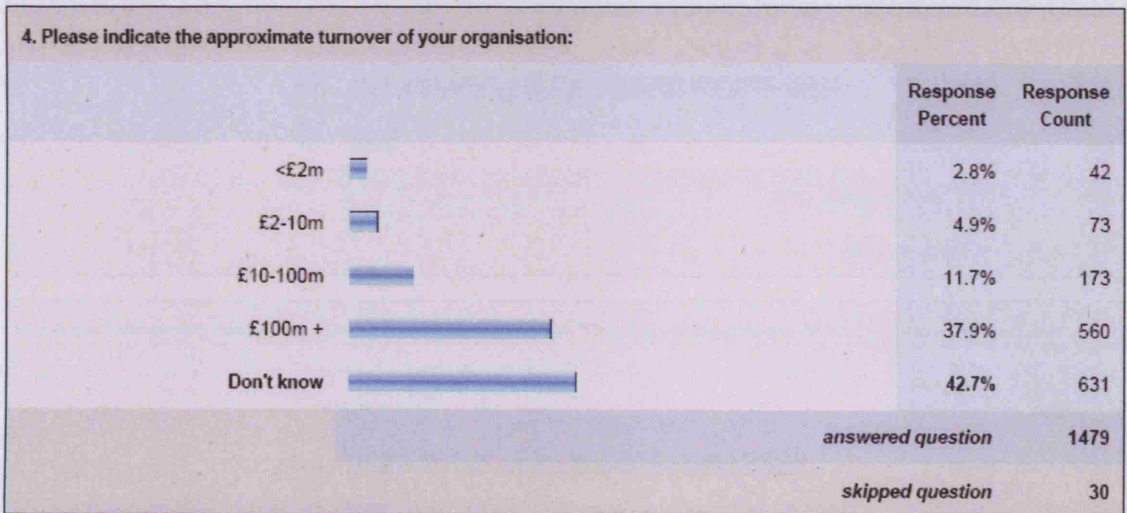
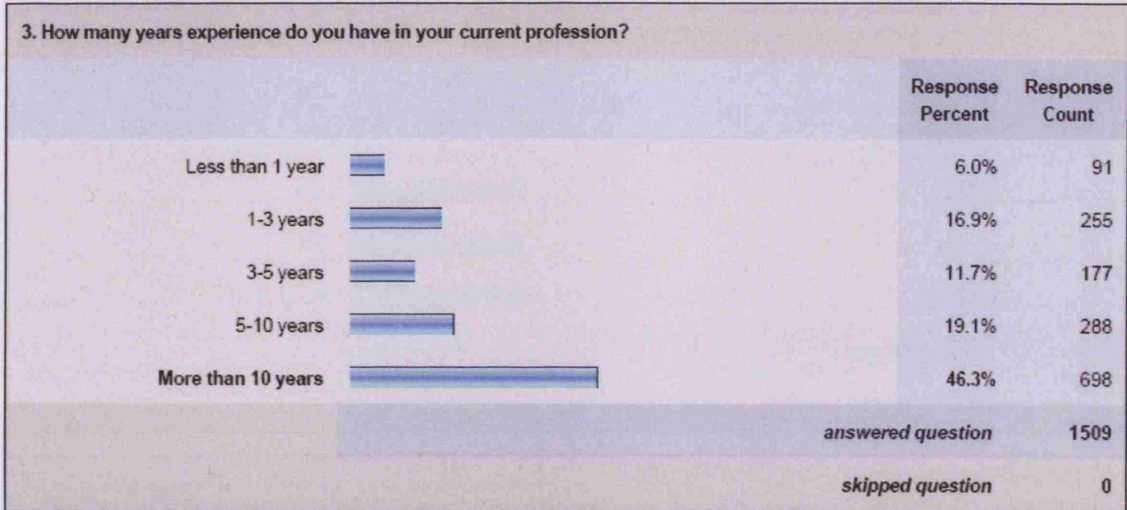
10.2

Questionnaire Survey Results


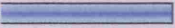
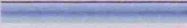
10.2.1

Total Results







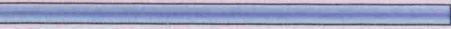


6. Does your organisation have one or more internal Research and Development departments (regardless of actual departmental name)?

	Response Percent	Response Count
Yes 	32.5%	485
No 	32.2%	480
Don't know 	35.3%	526
<i>answered question</i>		1491
<i>skipped question</i>		18



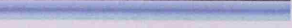
7. Do you rely on specific software packages to create/aid your design?

	Response Percent	Response Count
Yes 	91.8%	1349
No 	8.2%	120
<i>answered question</i>		1469
<i>skipped question</i>		40

8. Do you believe that interaction between the user (your organisation) and the supplier would lead to a more efficient product?

	Response Percent	Response Count
Yes 	84.6%	1251
No 	5.4%	80
Don't Know 	10.0%	148
<i>answered question</i>		1479
<i>skipped question</i>		30




9. What is your organisations investment plan in software product development?

	Response Percent	Response Count
To increase 	27.3%	405
To remain stable 	16.6%	247
To decrease	0.8%	12
Don't know 	55.3%	820
<i>answered question</i>		1484
<i>skipped question</i>		25




10. Please rank the following statements in order of importance to your organisations philosophy.

	1	2	3	4	Rating Average	Response Count
To achieve modest growth	12.3% (163)	14.2% (189)	22.6% (300)	50.9% (675)	1.88	1327
To achieve a greater share of the market	20.6% (274)	24.1% (321)	34.1% (455)	21.2% (283)	2.44	1333
To deliver higher quality to the client	50.9% (698)	20.0% (274)	14.8% (203)	14.4% (197)	3.07	1372
To create an enhanced reputation in the industry	17.0% (226)	41.3% (550)	27.8% (370)	14.0% (187)	2.61	1333
<i>answered question</i>						1462
<i>skipped question</i>						47

11. What statement best describes the way in which your organisation is driven?

	Response Percent	Response Count
Technology Driven 	5.2%	76
Client Driven 	67.1%	983
Market Driven 	27.8%	407
Other (please specify)		19
<i>answered question</i>		1466
<i>skipped question</i>		43

12. Do you see investing in new software product development enterprises as important to long-term success and growth to your organisation?

	Response Percent	Response Count
Yes 	65.2%	964
No 	17.1%	253
Don't know 	17.7%	261
<i>answered question</i>		1478
<i>skipped question</i>		31

13. How influential do you consider the following Strategic/Market Position criteria when driving towards consultancy software supplier interaction? Please place a tick on the appropriate cell.

	Little Influence	Some Influence	Quite Influential	Influential	Very Influential	Response Count
Status/Market Share	7.4% (57)	20.9% (161)	34.2% (263)	30.3% (233)	7.3% (56)	770
Cost effectiveness (compared with market risks)	3.5% (27)	12.5% (97)	30.0% (233)	36.9% (287)	17.1% (133)	777
Competitive Advantage	1.9% (15)	8.9% (69)	20.5% (159)	44.6% (345)	24.0% (186)	774
Added Value/Justification of fees	5.0% (39)	14.6% (114)	26.3% (205)	38.2% (298)	15.9% (124)	780
Stakeholder Satisfaction	10.8% (84)	20.9% (162)	30.5% (236)	28.4% (220)	9.4% (73)	775
Profitability	3.0% (23)	9.3% (72)	20.1% (155)	41.8% (323)	25.8% (199)	772
Competitive pressure from the market	5.3% (41)	14.6% (113)	29.4% (227)	39.2% (303)	11.5% (89)	773
Mergers and Aquisitions (creating a larger organisation)	19.5% (152)	24.3% (189)	24.7% (192)	20.7% (161)	10.8% (84)	778
Contractor/Client Satisfaction	3.2% (25)	12.2% (95)	18.3% (142)	32.7% (254)	33.5% (260)	776
Avoid Rivals benefiting from potential gains	16.3% (126)	26.8% (207)	31.1% (240)	20.9% (161)	4.9% (38)	772
Economies of Scale	6.2% (48)	21.1% (163)	31.6% (244)	31.8% (246)	9.3% (72)	773
Enter new Markets	9.0% (70)	23.4% (181)	27.4% (212)	29.6% (229)	10.6% (82)	774
					<i>answered question</i>	791
					<i>skipped question</i>	718

14. How influential do you consider the following Strategic/Performance Position criteria when driving towards consultancy software supplier interaction? Please place a tick on the appropriate cell.

	Little Influence	Some Influence	Quite Influential	Influential	Very Influential	Response Count
Technical capability/excellence	1.6% (12)	6.0% (46)	17.2% (132)	41.3% (317)	33.9% (260)	767
Professional reputation	3.1% (24)	12.3% (94)	22.8% (175)	36.5% (280)	25.3% (194)	767
To set the benchmark as a best practice standard/To be best in class	2.5% (19)	11.0% (84)	21.9% (167)	38.7% (296)	25.9% (198)	764
Enhance performance on the management of projects	2.7% (21)	11.7% (90)	23.4% (179)	40.7% (312)	21.4% (164)	766
					<i>answered question</i>	770
					<i>skipped question</i>	739



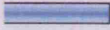
15. How influential do you consider the following Technical Improvements criteria when driving towards consultancy software supplier interaction? Please place a tick on the appropriate cell.						
	Little Influence	Some Influence	Quite Influential	Influential	Very Influential	Response Count
Schedule more effectively	4.8% (37)	16.1% (123)	31.2% (239)	37.1% (284)	10.7% (82)	765
Improve clarity in communication/interpretation of information	2.9% (22)	10.6% (82)	29.6% (228)	39.6% (305)	17.3% (133)	770
Ease integration and adaptability with other design team members	2.3% (18)	11.7% (90)	27.8% (213)	43.5% (334)	14.6% (112)	767
Reduce complexity in the design	4.9% (38)	13.9% (107)	27.5% (212)	38.6% (297)	15.1% (116)	770
Meeting differentiation	9.8% (74)	23.9% (181)	37.1% (281)	25.5% (193)	3.8% (29)	758
Respond in a more timely manner to client changes	2.6% (20)	10.7% (82)	24.6% (189)	43.0% (331)	19.1% (147)	769
Reduce requirements for 'translation software'	6.2% (47)	18.7% (143)	31.0% (237)	31.3% (239)	12.8% (98)	764
Define project scope more clearly	8.9% (68)	17.6% (135)	29.2% (224)	33.2% (255)	11.1% (85)	767
Cope better with customised requirements	3.3% (25)	14.5% (111)	28.2% (216)	43.1% (330)	11.0% (84)	766
					<i>answered question</i>	776
					<i>skipped question</i>	733

16. Before embarking on a joint innovation venture, how important do you consider the following? (Please tick the appropriate cell)						
	Little Importance	Some Importance	Quite Important	Important	Very Important	Response Count
The reputation of the firm	1.3% (9)	6.8% (49)	19.7% (141)	42.0% (301)	30.2% (216)	716
Existing relationships	2.5% (18)	9.2% (65)	24.5% (174)	39.6% (281)	24.1% (171)	709
Existing levels of trust with intended joint venture partners	2.4% (17)	6.0% (43)	22.6% (161)	42.3% (301)	26.7% (190)	712
Existing information sharing mechanisms	3.8% (27)	11.7% (83)	37.2% (264)	36.1% (256)	11.3% (80)	710
The possibility of opportunistic behaviour by prospective joint venture partners	4.8% (34)	17.1% (121)	31.6% (224)	36.7% (260)	9.9% (70)	709
The competence of joint venture partner team members	1.7% (12)	6.1% (43)	21.2% (150)	39.1% (277)	32.0% (227)	709
Experience of senior joint venture managers in terms of judgement, intuition and experience (of similar situations)	2.2% (16)	8.8% (63)	23.5% (167)	42.1% (300)	23.3% (166)	712
Existing knowledge capture and management structures	3.1% (22)	11.6% (82)	33.7% (239)	40.5% (287)	11.1% (79)	709
Opportunity to share risk	2.2% (16)	10.8% (77)	28.4% (202)	39.9% (284)	18.7% (133)	712
Perceived reliability of prospective joint venture partners	1.4% (10)	6.3% (45)	27.0% (192)	39.3% (280)	26.0% (185)	712
Expertise of prospective joint venture partner firms	1.8% (13)	6.6% (47)	21.4% (152)	41.2% (292)	28.9% (205)	709
				<i>answered question</i>		717
				<i>skipped question</i>		792



17. How critical do you consider the following statements in restricting consultancy interaction with software suppliers?

	Not critical	Not very Critical	Quite Critical	Critical	Very Critical	Response Count
Development can be expensive	2.3% (16)	11.2% (77)	30.7% (211)	40.6% (279)	15.3% (105)	688
Uncertain outcomes	2.3% (16)	13.1% (90)	35.5% (244)	35.5% (244)	13.7% (94)	688
The risk involved is hard to calculate	1.9% (13)	17.3% (119)	39.8% (274)	31.5% (217)	9.4% (65)	688
Potential adversarial or opportunistic behaviour	4.2% (29)	22.8% (157)	39.6% (273)	25.8% (178)	7.5% (52)	689
Degree of priority given to our problem by supplier	2.8% (19)	10.3% (71)	36.2% (250)	37.8% (261)	12.9% (89)	690
Fear of de-skilling employees through enhanced automation in the software	9.7% (67)	32.6% (225)	30.4% (210)	21.3% (147)	6.1% (42)	691
Reluctance to adopt technology	6.3% (43)	17.0% (116)	37.1% (254)	30.3% (207)	9.4% (64)	684
Training required to benefit from supplier interaction	4.1% (28)	12.2% (84)	35.8% (246)	35.8% (246)	12.2% (84)	688
<i>answered question</i>						697
<i>skipped question</i>						812

18. Do you believe Consultancy Software Supplier Intergration is an important topic of investiagtion in the construction industry?

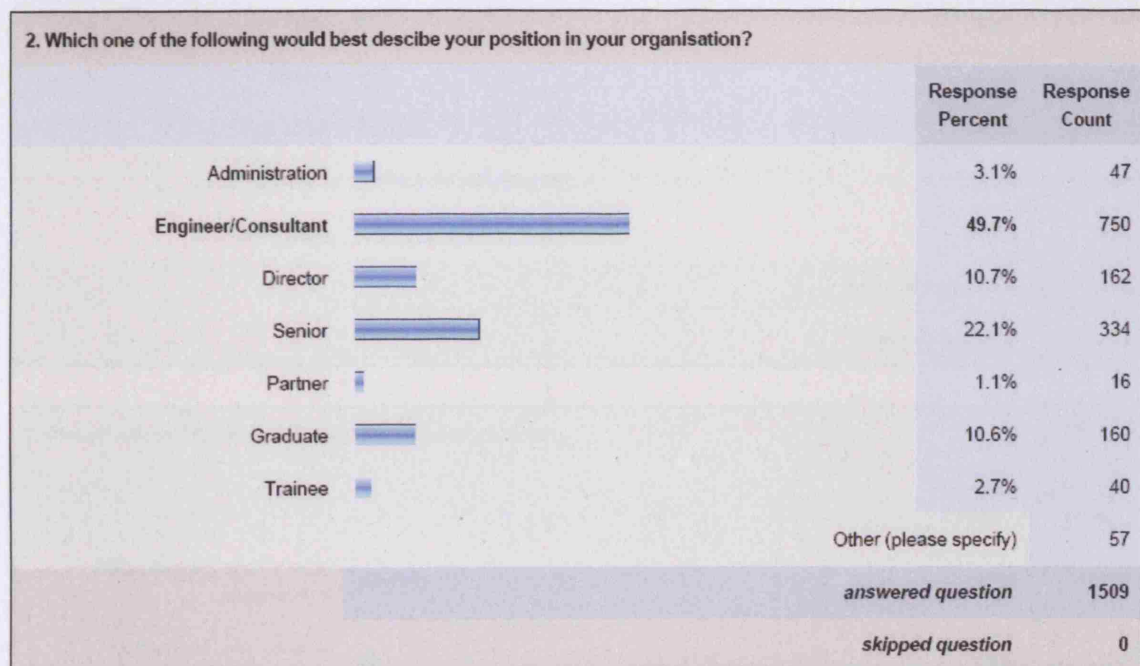
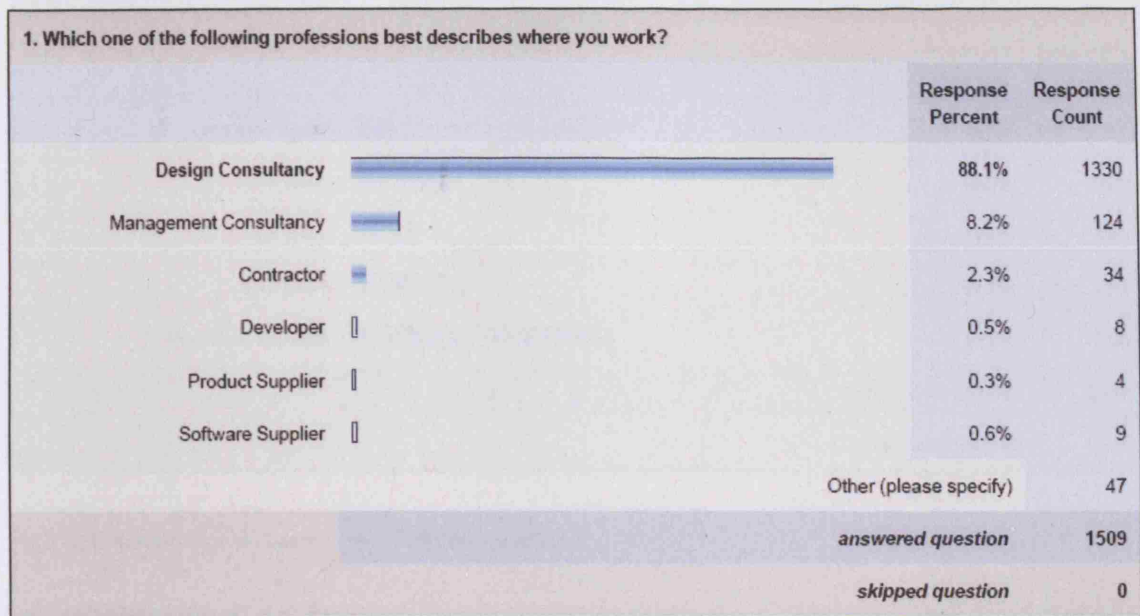
	Response Percent	Response Count
Yes 	68.0%	494
No 	12.5%	91
Don't know 	19.4%	141
<i>answered question</i>		726
<i>skipped question</i>		783

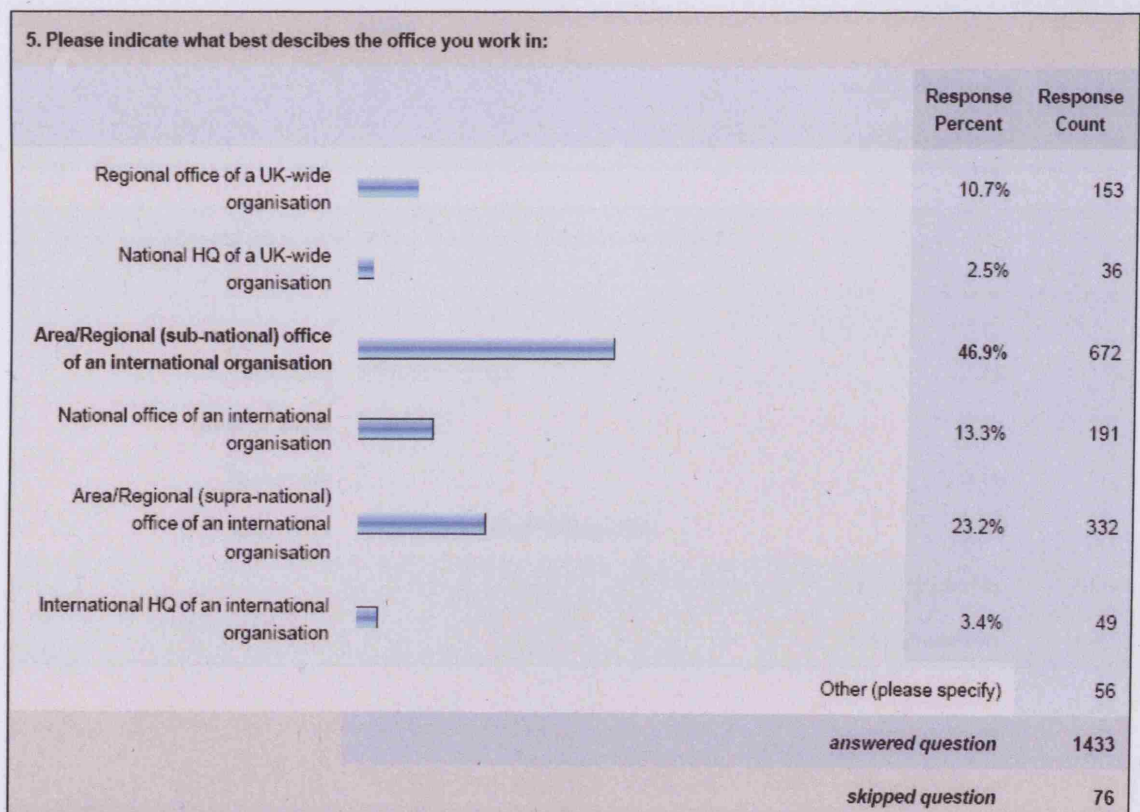
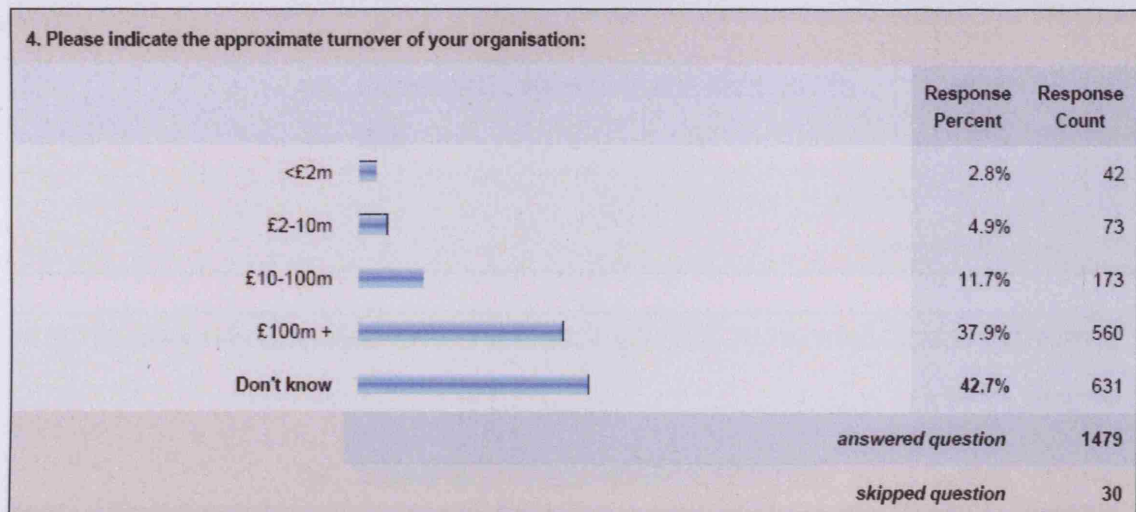
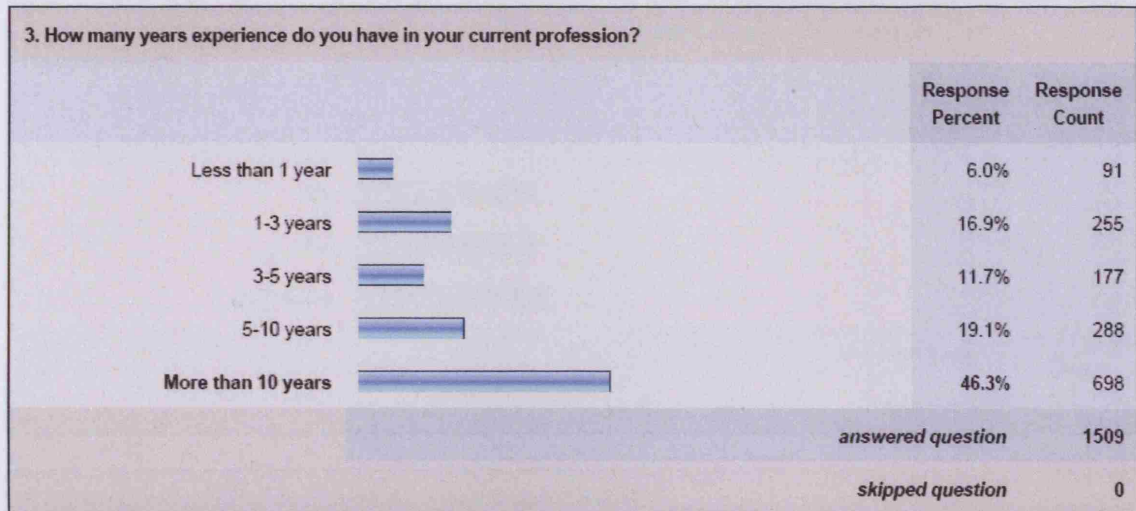
19. Will you be available for a telephone interview?

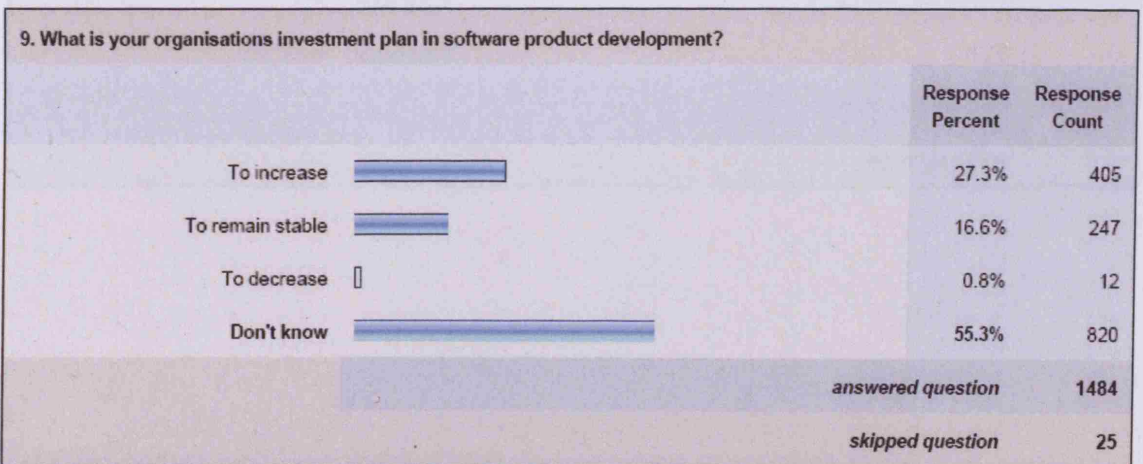
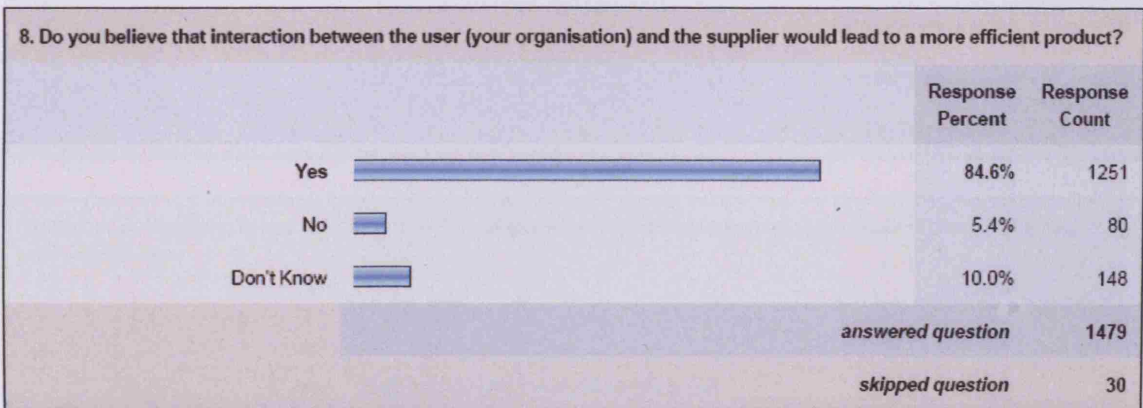
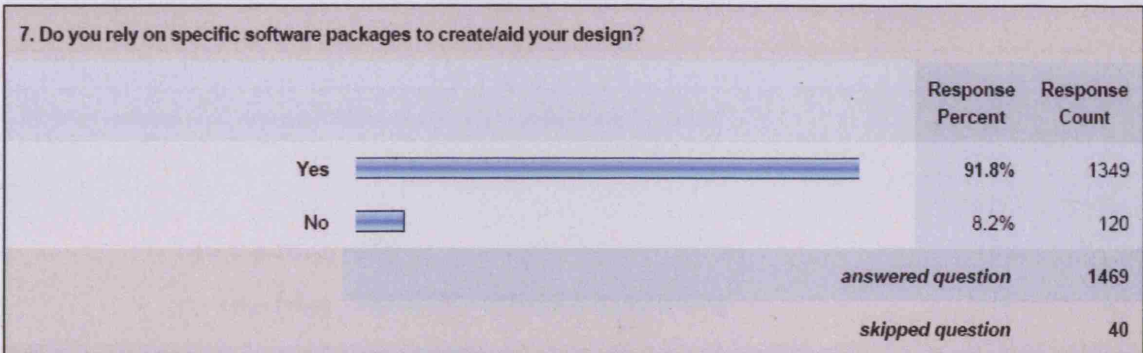
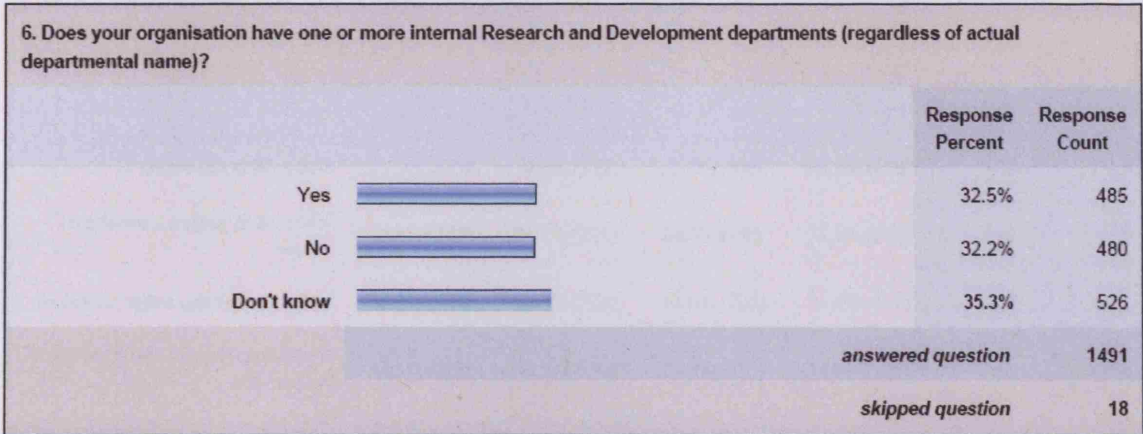
	Response Percent	Response Count
Yes 	8.8%	64
No 	91.2%	663
If yes, please leave your details below		57
<i>answered question</i>		727
<i>skipped question</i>		782

10.2.2

Design Consultancy Results













10. Please rank the following statements in order of importance to your organisations philosophy.

	1	2	3	4	Rating Average	Response Count
To achieve modest growth	12.3% (163)	14.2% (189)	22.6% (300)	50.9% (675)	1.88	1327
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<i>answered question</i>						1462
<i>skipped question</i>						47

11. What statement best describes the way in which your organisation is driven?

	Response Percent	Response Count
Technology Driven 	5.2%	76
Client Driven 	67.1%	983
Market Driven 	27.8%	407
Other (please specify)		19
<i>answered question</i>		1466
<i>skipped question</i>		43

12. Do you see investing in new software product development enterprises as important to long-term success and growth to your organisation?

	Response Percent	Response Count
Yes 	65.2%	964
No 	17.1%	253
Don't know 	17.7%	261
<i>answered question</i>		1478
<i>skipped question</i>		31

13. How influential do you consider the following Strategic/Market Position criteria when driving towards consultancy software supplier interaction? Please place a tick on the appropriate cell.

	Little Influence	Some Influence	Quite Influential	Influential	Very Influential	Response Count
Status/Market Share	7.4% (57)	20.9% (161)	34.2% (263)	30.3% (233)	7.3% (56)	770
Cost effectiveness (compared with market risks)	3.5% (27)	12.5% (97)	30.0% (233)	36.9% (287)	17.1% (133)	777
Competitive Advantage	1.9% (15)	8.9% (69)	20.5% (159)	44.6% (345)	24.0% (186)	774
Added Value/Justification of fees	5.0% (39)	14.6% (114)	26.3% (205)	38.2% (298)	15.9% (124)	780
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Profitability	3.0% (23)	9.3% (72)	20.1% (155)	41.8% (323)	25.8% (199)	772
Competitive pressure from the market	5.3% (41)	14.6% (113)	29.4% (227)	39.2% (303)	11.5% (89)	773
Mergers and Aquisitions (creating a larger organisation)	19.5% (152)	24.3% (189)	24.7% (192)	20.7% (161)	10.8% (84)	778
Contractor/Client Satisfaction	3.2% (25)	12.2% (95)	18.3% (142)	32.7% (254)	33.5% (260)	776
Avoid Rivals benefiting from potential gains	16.3% (126)	26.8% (207)	31.1% (240)	20.9% (161)	4.9% (38)	772
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Enter new Markets	9.0% (70)	23.4% (181)	27.4% (212)	29.6% (229)	10.6% (82)	774
					<i>answered question</i>	791
					<i>skipped question</i>	718

14. How influential do you consider the following Strategic/Performance Position criteria when driving towards consultancy software supplier interaction? Please place a tick on the appropriate cell.

	Little Influence	Some Influence	Quite Influential	Influential	Very Influential	Response Count
Technical capability/excellence	1.6% (12)	6.0% (46)	17.2% (132)	41.3% (317)	33.9% (260)	767
Professional reputation	3.1% (24)	12.3% (94)	22.8% (175)	36.5% (280)	25.3% (194)	767
To set the benchmark as a best practice standard/To be best in class	2.5% (19)	11.0% (84)	21.9% (167)	38.7% (296)	25.9% (198)	764
Enhance performance on the management of projects	2.7% (21)	11.7% (90)	23.4% (179)	40.7% (312)	21.4% (164)	766
					<i>answered question</i>	770
					<i>skipped question</i>	739




15. How influential do you consider the following Technical Improvements criteria when driving towards consultancy software supplier interaction? Please place a tick on the appropriate cell.						
	Little Influence	Some Influence	Quite Influential	Influential	Very Influential	Response Count
Schedule more effectively	4.8% (37)	16.1% (123)	31.2% (239)	37.1% (284)	10.7% (82)	765
Improve clarity in communication/interpretation of information	2.9% (22)	10.6% (82)	29.6% (228)	39.6% (305)	17.3% (133)	770
Ease integration and adaptability with other design team members	2.3% (18)	11.7% (90)	27.8% (213)	43.5% (334)	14.6% (112)	767
Reduce complexity in the design	4.9% (38)	13.9% (107)	27.5% (212)	38.6% (297)	15.1% (116)	770
Meeting differentiation	9.8% (74)	23.9% (181)	37.1% (281)	25.5% (193)	3.8% (29)	758
Respond in a more timely manner to client changes	2.6% (20)	10.7% (82)	24.6% (189)	43.0% (331)	19.1% (147)	769
Reduce requirements for 'translation software'	6.2% (47)	18.7% (143)	31.0% (237)	31.3% (239)	12.8% (98)	764
Define project scope more clearly	8.9% (68)	17.6% (135)	29.2% (224)	33.2% (255)	11.1% (85)	767
Cope better with customised requirements	3.3% (25)	14.5% (111)	28.2% (216)	43.1% (330)	11.0% (84)	766
				<i>answered question</i>		776
				<i>skipped question</i>		733

16. Before embarking on a joint innovation venture, how important do you consider the following? (Please tick the appropriate cell)						
	Little Importance	Some Importance	Quite Important	Important	Very Important	Response Count
The reputation of the firm	1.3% (9)	6.8% (49)	19.7% (141)	42.0% (301)	30.2% (216)	716
Existing relationships	2.5% (18)	9.2% (65)	24.5% (174)	39.6% (281)	24.1% (171)	709
Existing levels of trust with intended joint venture partners	2.4% (17)	6.0% (43)	22.6% (161)	42.3% (301)	26.7% (190)	712
Existing information sharing mechanisms	3.8% (27)	11.7% (83)	37.2% (264)	36.1% (256)	11.3% (80)	710
The possibility of opportunistic behaviour by prospective joint venture partners	4.8% (34)	17.1% (121)	31.6% (224)	36.7% (260)	9.9% (70)	709
The competence of joint venture partner team members	1.7% (12)	6.1% (43)	21.2% (150)	39.1% (277)	32.0% (227)	709
Experience of senior joint venture managers in terms of judgement, intuition and experience (of similar situations)	2.2% (16)	8.8% (63)	23.5% (167)	42.1% (300)	23.3% (166)	712
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Opportunity to share risk	2.2% (16)	10.8% (77)	28.4% (202)	39.9% (284)	18.7% (133)	712
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Expertise of prospective joint venture partner firms	1.8% (13)	6.6% (47)	21.4% (152)	41.2% (292)	28.9% (205)	709
				<i>answered question</i>		717
				<i>skipped question</i>		792



17. How critical do you consider the following statements in restricting consultancy interaction with software suppliers?

	Not critical	Not very Critical	Quite Critical	Critical	Very Critical	Response Count
Development can be expensive	2.3% (16)	11.2% (77)	30.7% (211)	40.6% (279)	15.3% (105)	688
Uncertain outcomes	2.3% (16)	13.1% (90)	35.5% (244)	35.5% (244)	13.7% (94)	688
The risk involved is hard to calculate	1.9% (13)	17.3% (119)	39.8% (274)	31.5% (217)	9.4% (65)	688
Potential adversarial or opportunistic behaviour	4.2% (29)	22.8% (157)	39.6% (273)	25.8% (178)	7.5% (52)	689
Degree of priority given to our problem by supplier	2.8% (19)	10.3% (71)	36.2% (250)	37.8% (261)	12.9% (89)	690
Fear of de-skilling employees through enhanced automation in the software	9.7% (67)	32.6% (225)	30.4% (210)	21.3% (147)	6.1% (42)	691
Reluctance to adopt technology	6.3% (43)	17.0% (116)	37.1% (254)	30.3% (207)	9.4% (64)	684
Training required to benefit from supplier interaction	4.1% (28)	12.2% (84)	35.8% (246)	35.8% (246)	12.2% (84)	688
						<i>answered question</i> 697
						<i>skipped question</i> 812

18. Do you believe Consultancy Software Supplier Intergration is an important topic of investigation in the construction industry?

	Response Percent	Response Count
Yes 	68.0%	494
No 	12.5%	91
Don't know 	19.4%	141
		<i>answered question</i> 726
		<i>skipped question</i> 783

19. Will you be available for a telephone interview?

	Response Percent	Response Count
Yes 	8.8%	64
No 	91.2%	663
		If yes, please leave your details below 57
		<i>answered question</i> 727
		<i>skipped question</i> 782

10.2.3

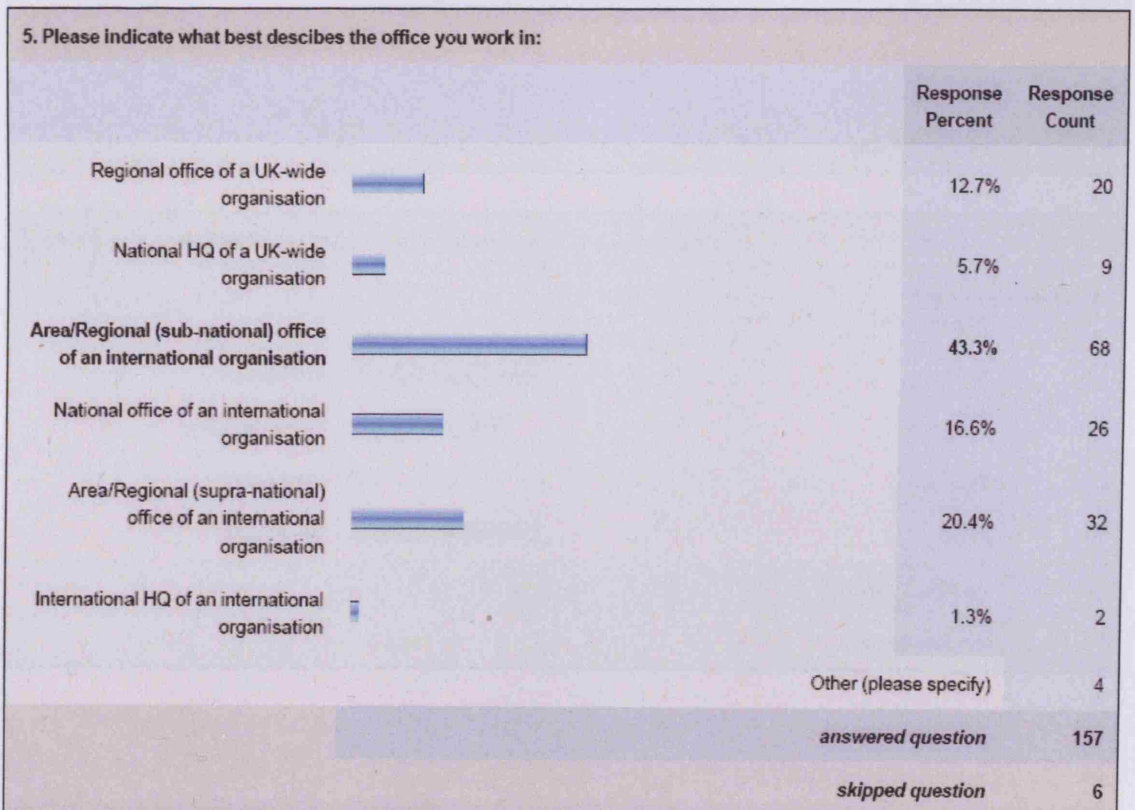
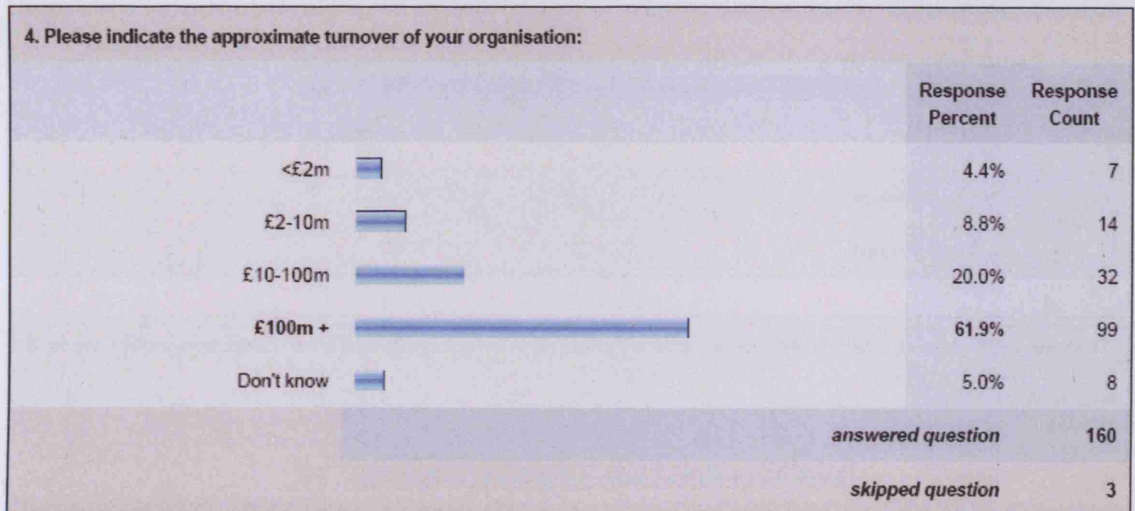
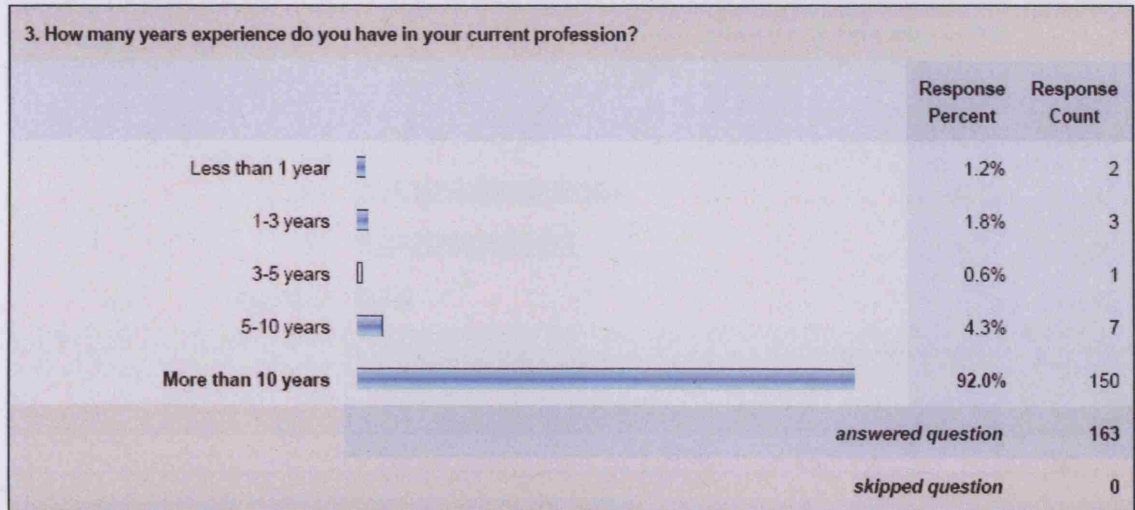
Directors/Partner Sample

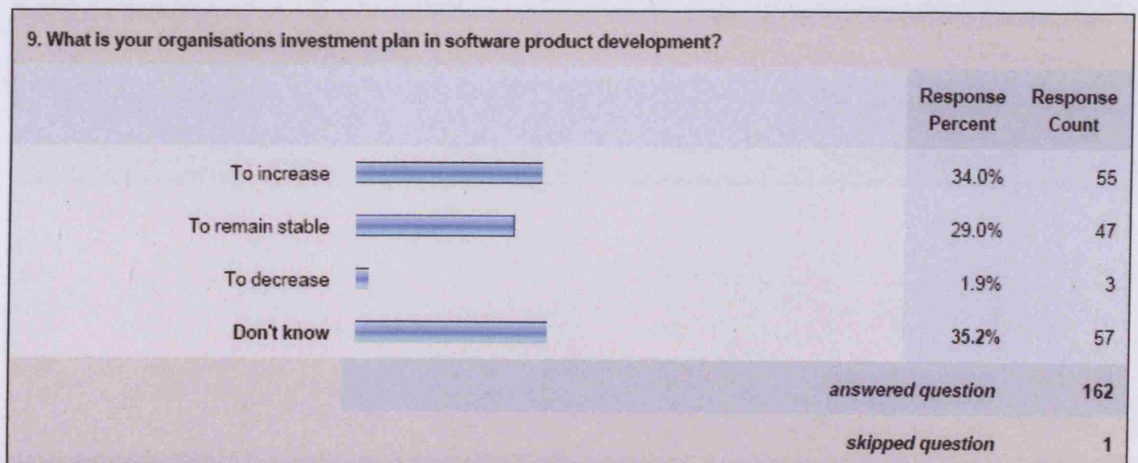
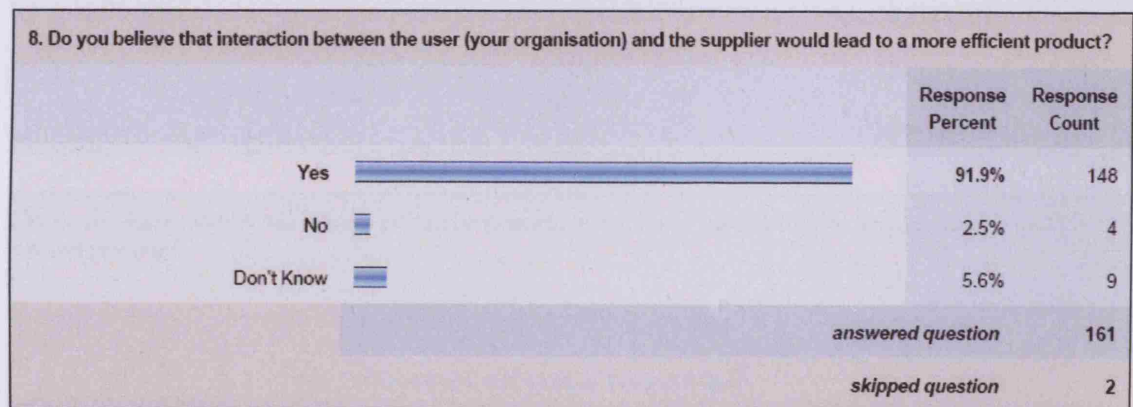
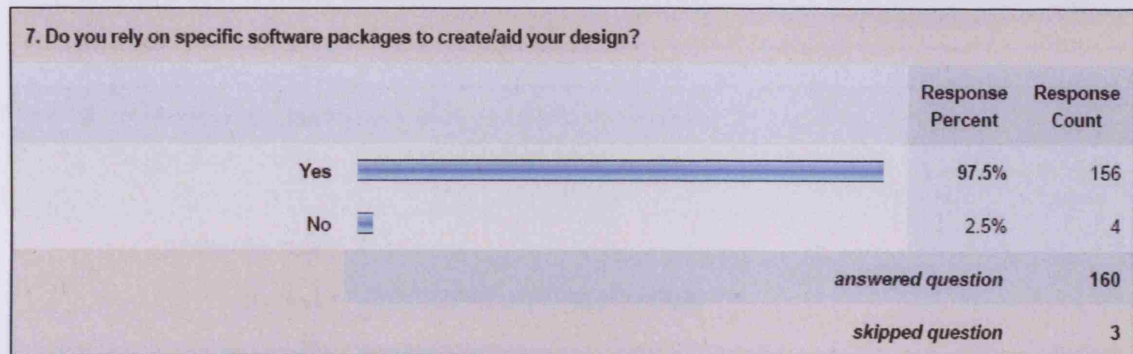
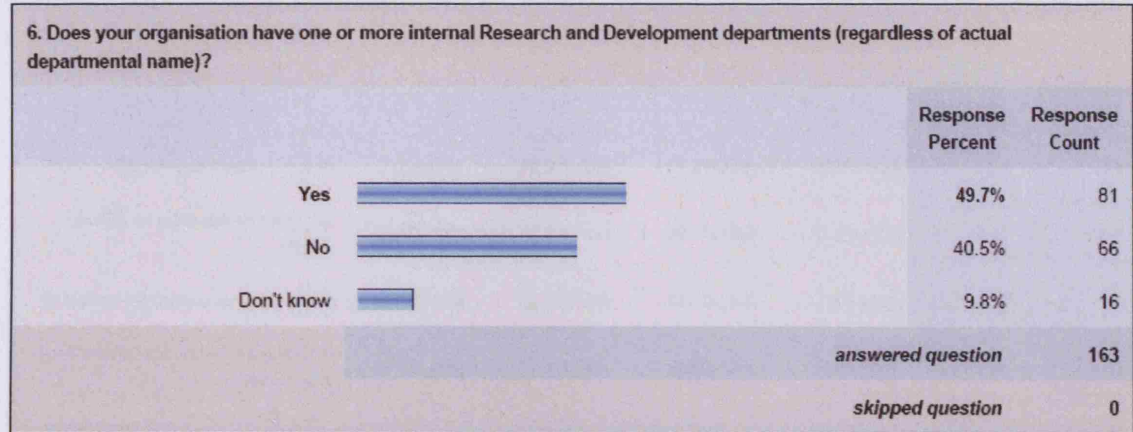
1. Which one of the following professions best describes where you work?

	Response Percent	Response Count
Design Consultancy	100.0%	163
Management Consultancy	0.0%	0
Contractor	0.0%	0
Developer	0.0%	0
Product Supplier	0.0%	0
Software Supplier	0.0%	0
Other (please specify)		6
<i>answered question</i>		163
<i>skipped question</i>		0

2. Which one of the following would best describe your position in your organisation?

	Response Percent	Response Count
Administration	0.0%	0
Engineer/Consultant	0.0%	0
Director	91.4%	149
Senior	0.0%	0
Partner	8.6%	14
Graduate	0.0%	0
Trainee	0.0%	0
Other (please specify)		5
<i>answered question</i>		163
<i>skipped question</i>		0











10. Please rank the following statements in order of importance to your organisations philosophy.

	1	2	3	4	Rating Average	Response Count
To achieve modest growth	7.1% (11)	14.9% (23)	18.2% (28)	59.7% (92)	1.69	154
To achieve a greater share of the market	20.0% (30)	27.3% (41)	30.7% (46)	22.0% (33)	2.45	150
To deliver higher quality to the client	57.8% (89)	22.1% (34)	12.3% (19)	7.8% (12)	3.30	154
To create an enhanced reputation in the industry	17.0% (25)	37.4% (55)	38.1% (56)	7.5% (11)	2.64	147
<i>answered question</i>						162
<i>skipped question</i>						1

11. What statement best describes the way in which your organisation is driven?

	Response Percent	Response Count
Technology Driven 	0.6%	1
Client Driven 	64.2%	102
Market Driven 	35.2%	56
Other (please specify)		4
<i>answered question</i>		159
<i>skipped question</i>		4

12. Do you see investing in new software product development enterprises as important to long-term success and growth to your organisation?

	Response Percent	Response Count
Yes 	72.2%	117
No 	19.8%	32
Don't know 	8.0%	13
<i>answered question</i>		162
<i>skipped question</i>		1

13. How influential do you consider the following Strategic/Market Position criteria when driving towards consultancy software supplier interaction? Please place a tick on the appropriate cell.

	Little Influence	Some Influence	Quite Influential	Influential	Very Influential	Response Count
Status/Market Share	5.3% (6)	24.8% (28)	28.3% (32)	38.1% (43)	3.5% (4)	113
Cost effectiveness (compared with market risks)	1.8% (2)	10.5% (12)	27.2% (31)	46.5% (53)	14.0% (16)	114
Competitive Advantage	0.0% (0)	6.2% (7)	14.2% (16)	46.0% (52)	33.6% (38)	113
Added Value/Justification of fees	4.4% (5)	12.3% (14)	21.1% (24)	40.4% (46)	21.9% (25)	114
Stakeholder Satisfaction	9.8% (11)	23.2% (26)	28.6% (32)	27.7% (31)	10.7% (12)	112
Profitability	1.8% (2)	8.8% (10)	16.7% (19)	43.9% (50)	28.9% (33)	114
Competitive pressure from the market	7.9% (9)	16.7% (19)	28.9% (33)	35.1% (40)	11.4% (13)	114
Mergers and Acquisitions (creating a larger organisation)	21.9% (25)	31.6% (36)	27.2% (31)	13.2% (15)	6.1% (7)	114
Contractor/Client Satisfaction	0.9% (1)	15.8% (18)	13.2% (15)	39.5% (45)	30.7% (35)	114
Avoid Rivals benefiting from potential gains	11.5% (13)	31.0% (35)	33.6% (38)	22.1% (25)	1.8% (2)	113
Economies of Scale	3.5% (4)	16.8% (19)	31.0% (35)	38.1% (43)	10.6% (12)	113
Enter new Markets	7.8% (9)	27.0% (31)	30.4% (35)	26.1% (30)	8.7% (10)	115
				<i>answered question</i>		115
				<i>skipped question</i>		48

14. How influential do you consider the following Strategic/Performance Position criteria when driving towards consultancy software supplier interaction? Please place a tick on the appropriate cell.

	Little Influence	Some Influence	Quite Influential	Influential	Very Influential	Response Count
Technical capability/excellence	0.9% (1)	4.5% (5)	11.7% (13)	42.3% (47)	40.5% (45)	111
Professional reputation	1.8% (2)	9.9% (11)	24.3% (27)	41.4% (46)	22.5% (25)	111
To set the benchmark as a best practice standard/To be best in class	5.5% (6)	9.1% (10)	12.7% (14)	40.0% (44)	32.7% (36)	110
Enhance performance on the management of projects	2.7% (3)	11.7% (13)	18.0% (20)	42.3% (47)	25.2% (28)	111
				<i>answered question</i>		111
				<i>skipped question</i>		52

15. How influential do you consider the following Technical Improvements criteria when driving towards consultancy software supplier interaction? Please place a tick on the appropriate cell.


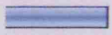
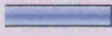
	Little Influence	Some Influence	Quite Influential	Influential	Very Influential	Response Count
Schedule more effectively	5.5% (6)	20.2% (22)	27.5% (30)	37.6% (41)	9.2% (10)	109
Improve clarity in communication/interpretation of information	1.8% (2)	10.9% (12)	32.7% (36)	37.3% (41)	17.3% (19)	110
Ease integration and adaptability with other design team members	2.8% (3)	14.8% (16)	21.3% (23)	44.4% (48)	16.7% (18)	108
Reduce complexity in the design	4.5% (5)	16.4% (18)	21.8% (24)	40.9% (45)	16.4% (18)	110
Meeting differentiation	12.4% (13)	25.7% (27)	34.3% (36)	24.8% (26)	2.9% (3)	105
Respond in a more timely manner to client changes	0.9% (1)	10.0% (11)	24.5% (27)	44.5% (49)	20.0% (22)	110
Reduce requirements for 'translation software'	7.3% (8)	17.4% (19)	34.9% (38)	28.4% (31)	11.9% (13)	109
Define project scope more clearly	13.8% (15)	21.1% (23)	28.4% (31)	28.4% (31)	8.3% (9)	109
Cope better with customised requirements	3.6% (4)	20.0% (22)	27.3% (30)	45.5% (50)	3.6% (4)	110
					<i>answered question</i>	110
					<i>skipped question</i>	53

16. Before embarking on a joint innovation venture, how important do you consider the following? (Please tick the appropriate cell)						
	Little Importance	Some Importance	Quite Important	Important	Very Important	Response Count
The reputation of the firm	1.9% (2)	5.7% (6)	15.2% (16)	44.8% (47)	32.4% (34)	105
Existing relationships	3.8% (4)	6.7% (7)	18.1% (19)	41.9% (44)	29.5% (31)	105
Existing levels of trust with intended joint venture partners	2.9% (3)	4.8% (5)	14.3% (15)	41.9% (44)	36.2% (38)	105
Existing information sharing mechanisms	4.8% (5)	14.3% (15)	46.7% (49)	29.5% (31)	4.8% (5)	105
The possibility of opportunistic behaviour by prospective joint venture partners	6.8% (7)	18.4% (19)	32.0% (33)	37.9% (39)	4.9% (5)	103
The competence of joint venture partner team members	1.9% (2)	2.9% (3)	9.5% (10)	41.0% (43)	44.8% (47)	105
Experience of senior joint venture managers in terms of judgement, intuition and experience (of similar situations)	3.8% (4)	8.6% (9)	16.2% (17)	45.7% (48)	25.7% (27)	105
Existing knowledge capture and management structures	4.8% (5)	12.4% (13)	34.3% (36)	39.0% (41)	9.5% (10)	105
Opportunity to share risk	3.8% (4)	8.6% (9)	24.8% (26)	41.0% (43)	21.9% (23)	105
Perceived reliability of prospective joint venture partners	2.9% (3)	5.7% (6)	8.6% (9)	47.6% (50)	35.2% (37)	105
Expertise of prospective joint venture partner firms	1.9% (2)	2.9% (3)	14.3% (15)	37.1% (39)	43.8% (46)	105
					<i>answered question</i>	105
					<i>skipped question</i>	58


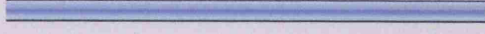
17. How critical do you consider the following statements in restricting consultancy interaction with software suppliers?

	Not critical	Not very Critical	Quite Critical	Critical	Very Critical	Response Count
Development can be expensive	1.0% (1)	10.8% (11)	25.5% (26)	46.1% (47)	16.7% (17)	102
Uncertain outcomes	0.0% (0)	8.0% (8)	40.0% (40)	38.0% (38)	14.0% (14)	100
The risk involved is hard to calculate	2.0% (2)	13.9% (14)	48.5% (49)	30.7% (31)	5.0% (5)	101
Potential adversarial or opportunistic behaviour	2.9% (3)	18.4% (19)	49.5% (51)	25.2% (26)	3.9% (4)	103
Degree of priority given to our problem by supplier	1.0% (1)	5.8% (6)	34.0% (35)	38.8% (40)	20.4% (21)	103
Fear of de-skilling employees through enhanced automation in the software	15.7% (16)	36.3% (37)	28.4% (29)	18.6% (19)	1.0% (1)	102
Reluctance to adopt technology	6.1% (6)	18.2% (18)	35.4% (35)	27.3% (27)	13.1% (13)	99
Training required to benefit from supplier interaction	4.0% (4)	9.9% (10)	41.6% (42)	33.7% (34)	10.9% (11)	101
					<i>answered question</i>	103
					<i>skipped question</i>	60

18. Do you believe Consultancy Software Supplier Intergration is an important topic of investiagtion in the construction industry?

	Response Percent	Response Count
Yes 	63.2%	67
No 	17.9%	19
Don't know 	18.9%	20
	<i>answered question</i>	106
	<i>skipped question</i>	57

19. Will you be available for a telephone interview?

	Response Percent	Response Count
Yes 	13.1%	14
No 	86.9%	93
	If yes, please leave your details below	11
	<i>answered question</i>	107
	<i>skipped question</i>	56

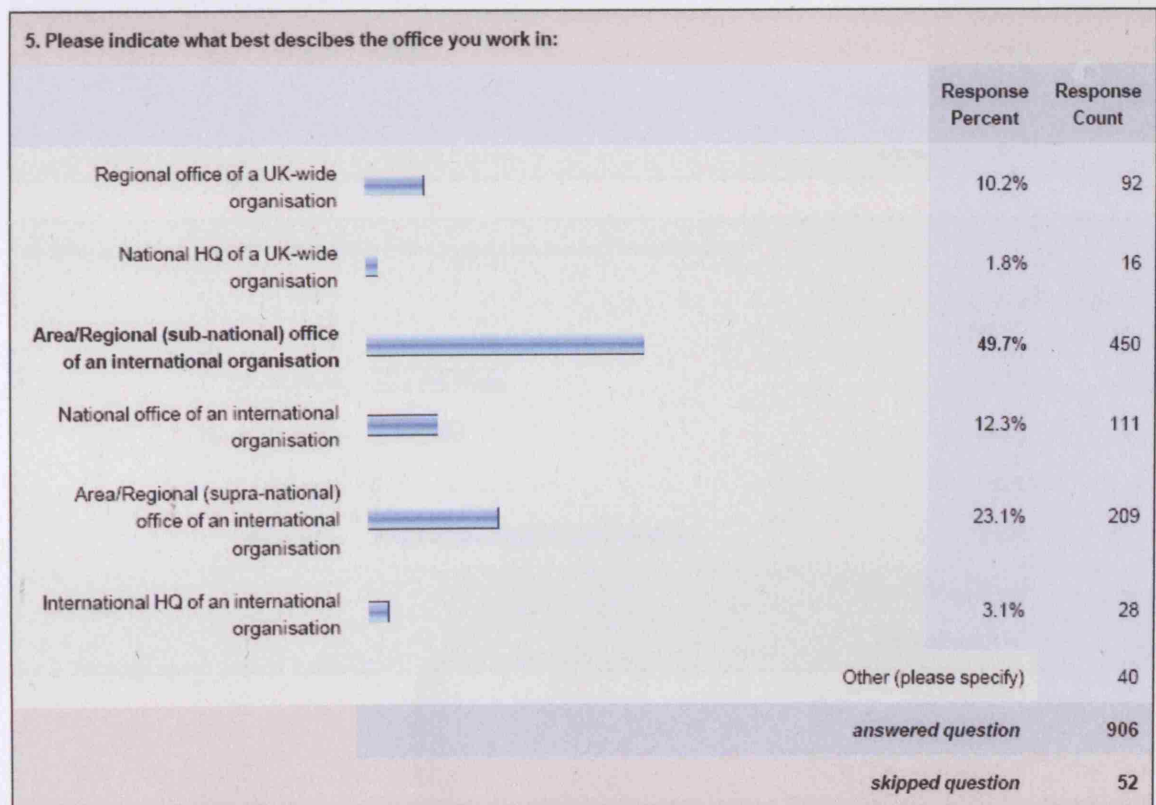
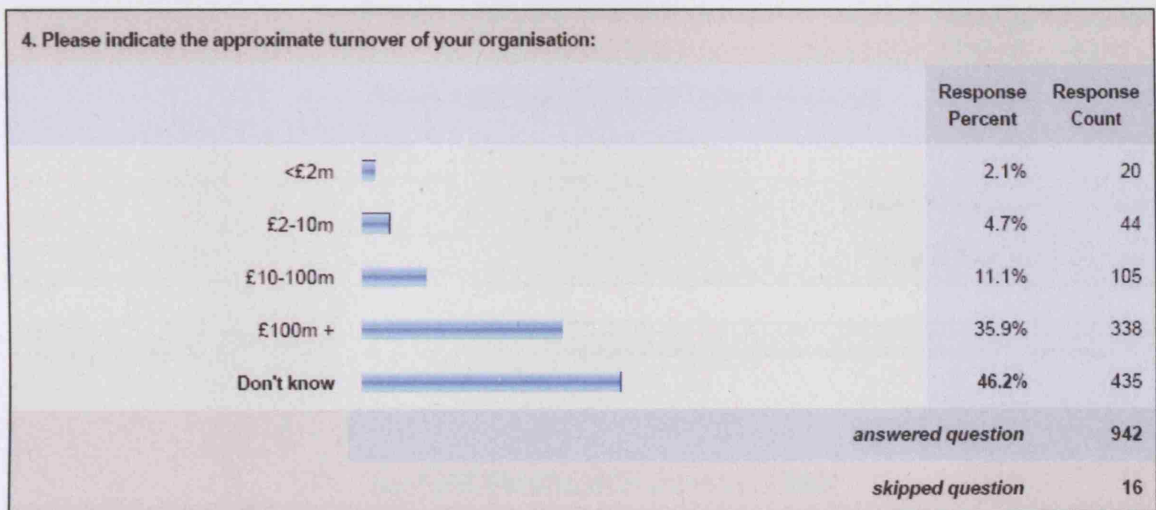
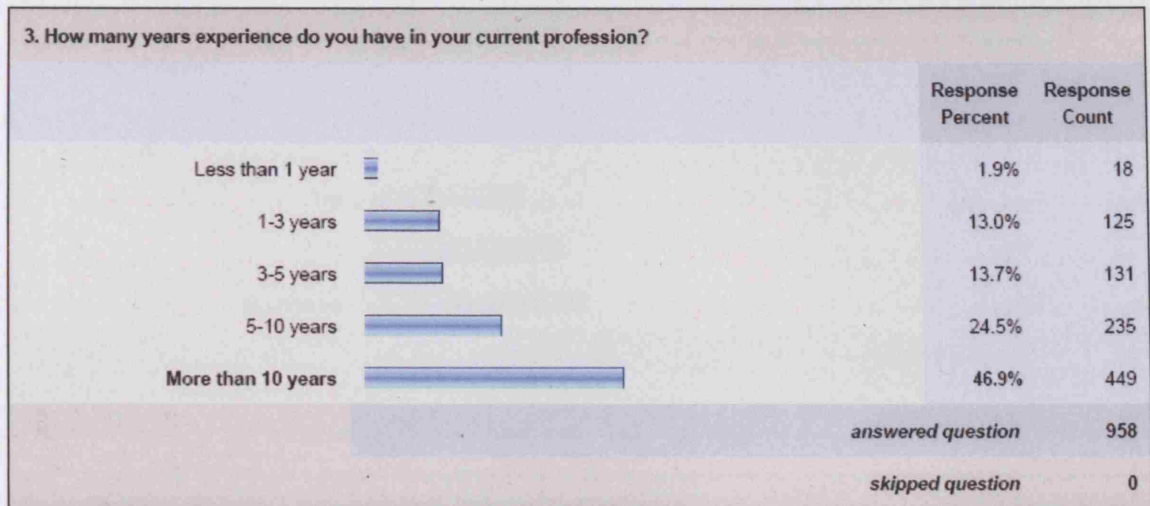
Seniors/Engineers/Consultants Sample

1. Which one of the following professions best describes where you work?




	Response Percent	Response Count
Design Consultancy	100.0%	958
Management Consultancy	0.0%	0
Contractor	0.0%	0
Developer	0.0%	0
Product Supplier	0.0%	0
Software Supplier	0.0%	0
Other (please specify)		22
<i>answered question</i>		958
<i>skipped question</i>		0

2. Which one of the following would best describe your position in your organisation?



	Response Percent	Response Count
Administration	0.0%	0
Engineer/Consultant	70.1%	672
Director	0.0%	0
Senior	29.9%	286
Partner	0.0%	0
Graduate	0.0%	0
Trainee	0.0%	0
Other (please specify)		32
<i>answered question</i>		958
<i>skipped question</i>		0






6. Does your organisation have one or more internal Research and Development departments (regardless of actual departmental name)?

	Response Percent	Response Count
Yes 	27.3%	259
No 	33.9%	321
Don't know 	38.8%	367
<i>answered question</i>		947
<i>skipped question</i>		11





7. Do you rely on specific software packages to create/aid your design?

	Response Percent	Response Count
Yes 	92.8%	867
No 	7.2%	67
<i>answered question</i>		934
<i>skipped question</i>		24

8. Do you believe that interaction between the user (your organisation) and the supplier would lead to a more efficient product?

	Response Percent	Response Count
Yes 	84.3%	794
No 	5.5%	52
Don't Know 	10.2%	96
<i>answered question</i>		942
<i>skipped question</i>		16




9. What is your organisations investment plan in software product development?

	Response Percent	Response Count
To increase 	23.8%	225
To remain stable 	16.1%	152
To decrease 	0.7%	7
Don't know 	59.4%	561
<i>answered question</i>		945
<i>skipped question</i>		13


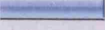

10. Please rank the following statements in order of importance to your organisations philosophy.

	1	2	3	4	Rating Average	Response Count
To achieve modest growth	12.8% (107)	14.3% (119)	23.1% (193)	49.8% (416)	1.90	835
To achieve a greater share of the market	20.6% (174)	24.2% (204)	34.3% (289)	20.9% (176)	2.45	843
To deliver higher quality to the client	49.9% (433)	20.2% (175)	14.9% (129)	15.1% (131)	3.05	868
To create an enhanced reputation in the industry	17.3% (146)	40.3% (340)	27.5% (232)	14.8% (125)	2.60	843
<i>answered question</i>						923
<i>skipped question</i>						35

11. What statement best describes the way in which your organisation is driven?

	Response Percent	Response Count
Technology Driven 	4.7%	44
Client Driven 	67.1%	624
Market Driven 	28.2%	262
Other (please specify)		10
<i>answered question</i>		930
<i>skipped question</i>		28

12. Do you see investing in new software product development enterprises as important to long-term success and growth to your organisation?

	Response Percent	Response Count
Yes 	63.4%	593
No 	18.2%	170
Don't know 	18.4%	172
<i>answered question</i>		935
<i>skipped question</i>		23

13. How influential do you consider the following Strategic/Market Position criteria when driving towards consultancy software supplier interaction? Please place a tick on the appropriate cell.

	Little Influence	Some Influence	Quite Influential	Influential	Very Influential	Response Count
Status/Market Share	7.6% (37)	21.9% (106)	33.7% (163)	29.1% (141)	7.6% (37)	484
Cost effectiveness (compared with market risks)	3.5% (17)	12.7% (62)	30.3% (148)	35.9% (175)	17.6% (86)	488
Competitive Advantage	2.3% (11)	9.8% (48)	22.1% (108)	43.4% (212)	22.3% (109)	488
Added Value/Justification of fees	4.5% (22)	15.4% (76)	26.4% (130)	38.7% (191)	15.0% (74)	493
Stakeholder Satisfaction	10.8% (53)	21.5% (105)	30.1% (147)	27.8% (136)	9.8% (48)	489
Profitability	3.3% (16)	8.9% (43)	21.6% (105)	40.6% (197)	25.6% (124)	485
Competitive pressure from the market	5.4% (26)	14.4% (70)	26.6% (129)	40.8% (198)	12.8% (62)	485
Mergers and Acquisitions (creating a larger organisation)	20.5% (100)	22.7% (111)	22.3% (109)	21.3% (104)	13.1% (64)	488
Contractor/Client Satisfaction	4.1% (20)	12.9% (63)	20.1% (98)	30.1% (147)	32.8% (160)	488
Avoid Rivals benefiting from potential gains	18.4% (89)	26.8% (130)	29.1% (141)	20.2% (98)	5.6% (27)	485
Economies of Scale	6.4% (31)	22.8% (111)	30.4% (148)	31.0% (151)	9.4% (46)	487
Enter new Markets	9.5% (46)	23.5% (114)	25.8% (125)	30.7% (149)	10.5% (51)	485
					<i>answered question</i>	500
					<i>skipped question</i>	458

14. How influential do you consider the following Strategic/Performance Position criteria when driving towards consultancy software supplier interaction? Please place a tick on the appropriate cell.

	Little Influence	Some Influence	Quite Influential	Influential	Very Influential	Response Count
Technical capability/excellence	1.4% (7)	5.9% (29)	17.6% (86)	41.2% (201)	33.8% (165)	488
Professional reputation	3.3% (16)	12.9% (63)	22.3% (109)	37.1% (181)	24.4% (119)	488
To set the benchmark as a best practice standard/To be best in class	1.6% (8)	12.1% (59)	23.9% (116)	38.9% (189)	23.5% (114)	486
Enhance performance on the management of projects	2.5% (12)	11.5% (56)	24.5% (119)	41.6% (202)	20.0% (97)	486
					<i>answered question</i>	490
					<i>skipped question</i>	468

15. How influential do you consider the following Technical Improvements criteria when driving towards consultancy software supplier interaction? Please place a tick on the appropriate cell.

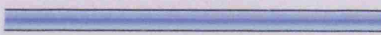

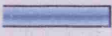
	Little Influence	Some Influence	Quite Influential	Influential	Very Influential	Response Count
Schedule more effectively	5.0% (24)	16.6% (80)	30.8% (149)	37.3% (180)	10.4% (50)	483
Improve clarity in communication/interpretation of information	2.7% (13)	9.9% (48)	29.7% (144)	39.6% (192)	18.1% (88)	485
Ease integration and adaptability with other design team members	2.1% (10)	11.2% (54)	26.9% (130)	45.7% (221)	14.3% (69)	484
Reduce complexity in the design	5.4% (26)	13.4% (65)	27.4% (133)	38.4% (186)	15.5% (75)	485
Meeting differentiation	10.4% (50)	24.2% (116)	37.3% (179)	24.8% (119)	3.3% (16)	480
Respond in a more timely manner to client changes	2.7% (13)	11.1% (54)	23.3% (113)	43.1% (209)	19.8% (96)	485
Reduce requirements for 'translation software'	6.2% (30)	19.3% (93)	28.8% (139)	32.1% (155)	13.7% (66)	483
Define project scope more clearly	8.7% (42)	17.8% (86)	28.6% (138)	34.6% (167)	10.4% (50)	483
Cope better with customised requirements	3.3% (16)	13.5% (65)	27.7% (133)	43.2% (208)	12.3% (59)	481
					<i>answered question</i>	491
					<i>skipped question</i>	467

16. Before embarking on a joint innovation venture, how important do you consider the following? (Please tick the appropriate cell)						
	Little Importance	Some Importance	Quite Important	Important	Very Important	Response Count
The reputation of the firm	1.1% (5)	7.4% (33)	20.8% (93)	42.6% (191)	28.1% (126)	448
Existing relationships	2.5% (11)	9.3% (41)	26.2% (116)	39.8% (176)	22.2% (98)	442
Existing levels of trust with intended joint venture partners	1.8% (8)	5.8% (26)	24.2% (108)	42.8% (191)	25.3% (113)	446
Existing information sharing mechanisms	3.6% (16)	11.7% (52)	35.2% (156)	37.2% (165)	12.2% (54)	443
The possibility of opportunistic behaviour by prospective joint venture partners	4.5% (20)	18.2% (81)	32.0% (142)	35.1% (156)	10.1% (45)	444
The competence of joint venture partner team members	1.4% (6)	6.8% (30)	23.3% (103)	40.3% (178)	28.3% (125)	442
Experience of senior joint venture managers in terms of judgement, intuition and experience (of similar situations)	1.3% (6)	9.4% (42)	25.8% (115)	41.1% (183)	22.2% (99)	445
Existing knowledge capture and management structures	2.3% (10)	13.1% (58)	34.6% (153)	39.6% (175)	10.4% (46)	442
Opportunity to share risk	2.0% (9)	10.8% (48)	28.2% (125)	39.6% (176)	19.4% (86)	444
Perceived reliability of prospective joint venture partners	0.7% (3)	6.3% (28)	29.6% (132)	39.2% (175)	24.2% (108)	446
Expertise of prospective joint venture partner firms	1.6% (7)	7.2% (32)	22.2% (98)	42.8% (189)	26.2% (116)	442
					<i>answered question</i>	449
					<i>skipped question</i>	509


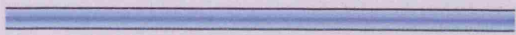
17. How critical do you consider the following statements in restricting consultancy interaction with software suppliers?

	Not critical	Not very Critical	Quite Critical	Critical	Very Critical	Response Count
Development can be expensive	2.6% (11)	10.9% (47)	30.2% (130)	40.0% (172)	16.3% (70)	430
Uncertain outcomes	2.8% (12)	11.6% (50)	35.6% (153)	35.8% (154)	14.2% (61)	430
The risk involved is hard to calculate	2.1% (9)	18.3% (79)	36.7% (158)	32.5% (140)	10.4% (45)	431
Potential adversarial or opportunistic behaviour	4.6% (20)	23.9% (103)	36.9% (159)	26.7% (115)	7.9% (34)	431
Degree of priority given to our problem by supplier	3.0% (13)	10.9% (47)	35.5% (153)	38.3% (165)	12.3% (53)	431
Fear of de-skilling employees through enhanced automation in the software	8.6% (37)	30.9% (133)	30.6% (132)	23.2% (100)	6.7% (29)	431
Reluctance to adopt technology	6.5% (28)	16.8% (72)	36.9% (158)	31.1% (133)	8.6% (37)	428
Training required to benefit from supplier interaction	4.2% (18)	10.9% (47)	34.1% (147)	37.8% (163)	13.0% (56)	431
					<i>answered question</i>	436
					<i>skipped question</i>	522

18. Do you believe Consultancy Software Supplier Intergration is an important topic of investiagtion in the construction industry?

	Response Percent	Response Count
Yes 	68.1%	311
No 	12.9%	59
Don't know 	19.0%	87
	<i>answered question</i>	457
	<i>skipped question</i>	501

19. Will you be available for a telephone interview?

	Response Percent	Response Count
Yes 	7.5%	34
No 	92.5%	422
If yes, please leave your details below		33
	<i>answered question</i>	456
	<i>skipped question</i>	502

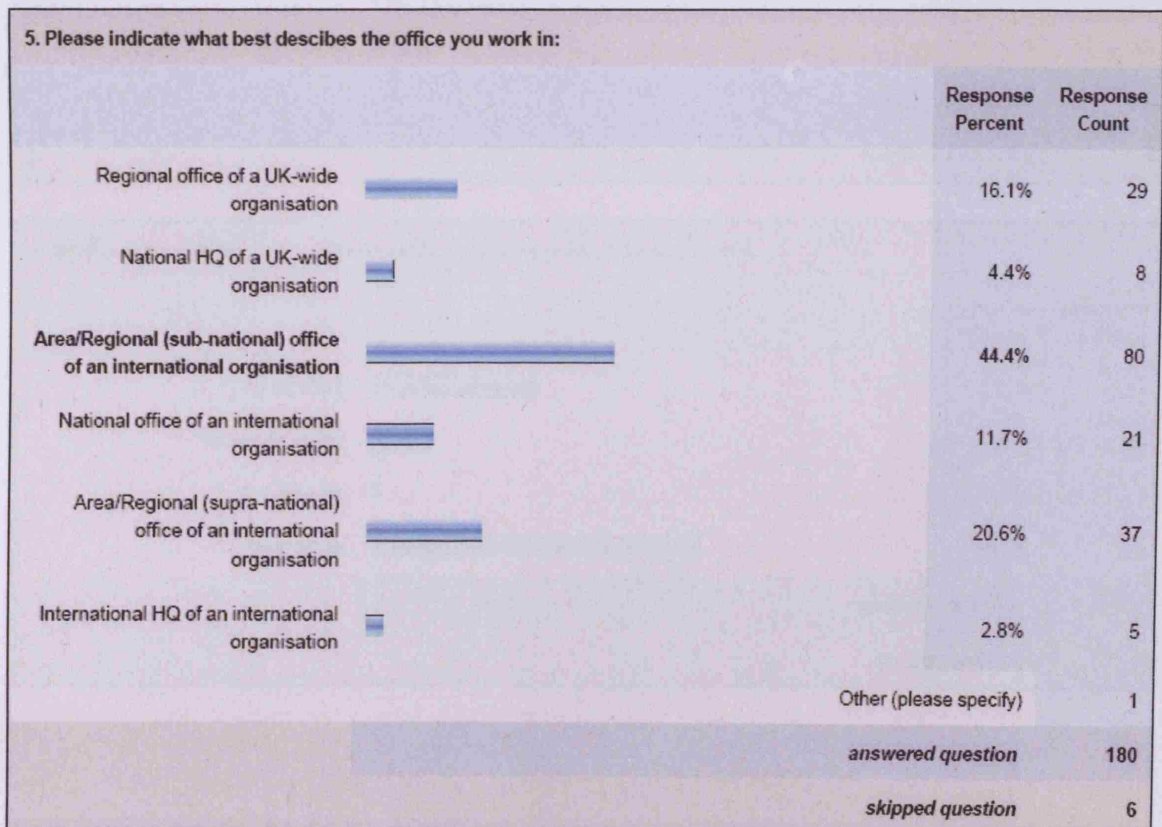
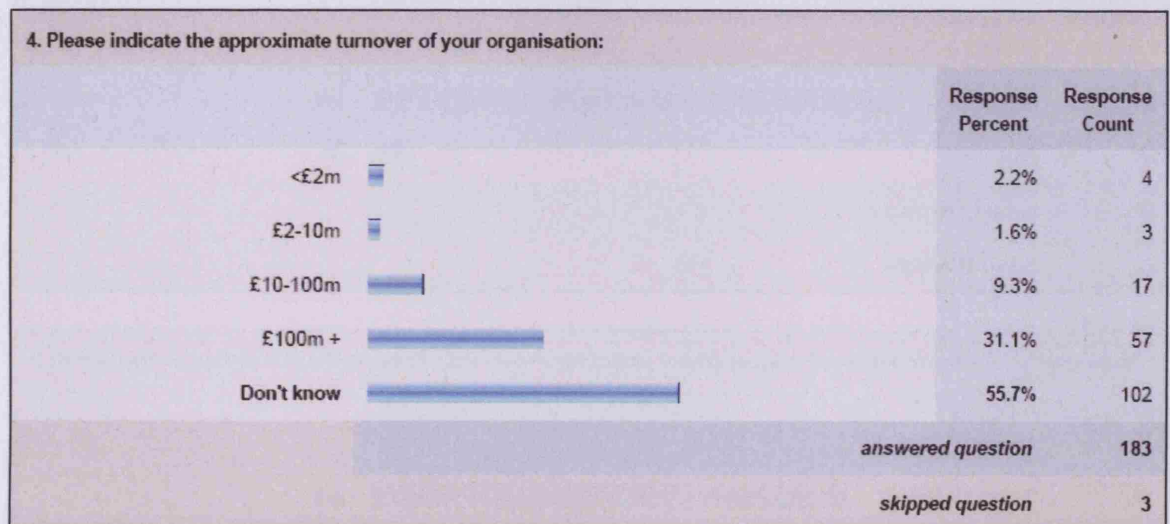
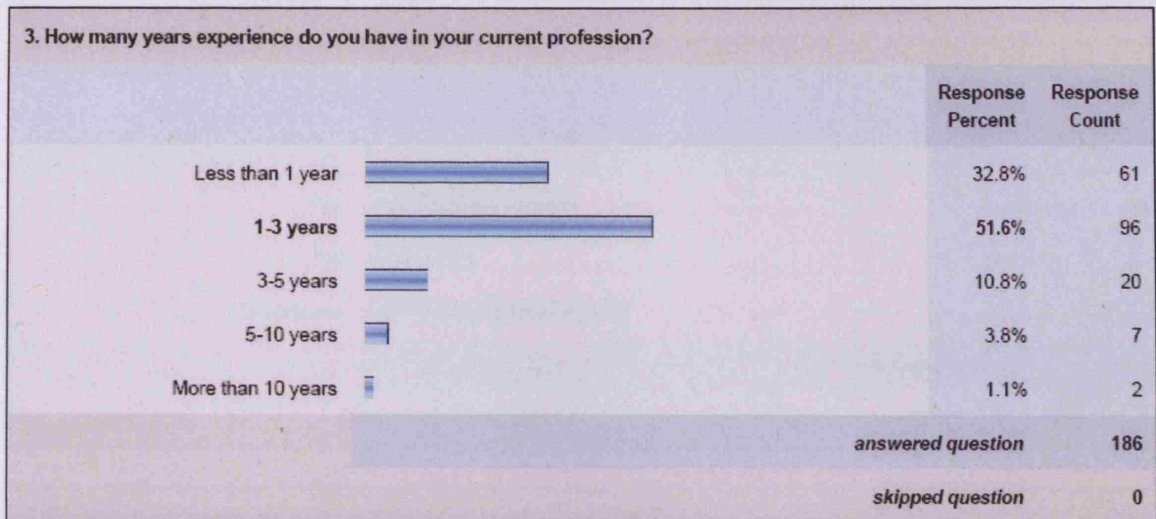
Graduate/Trainee Sample

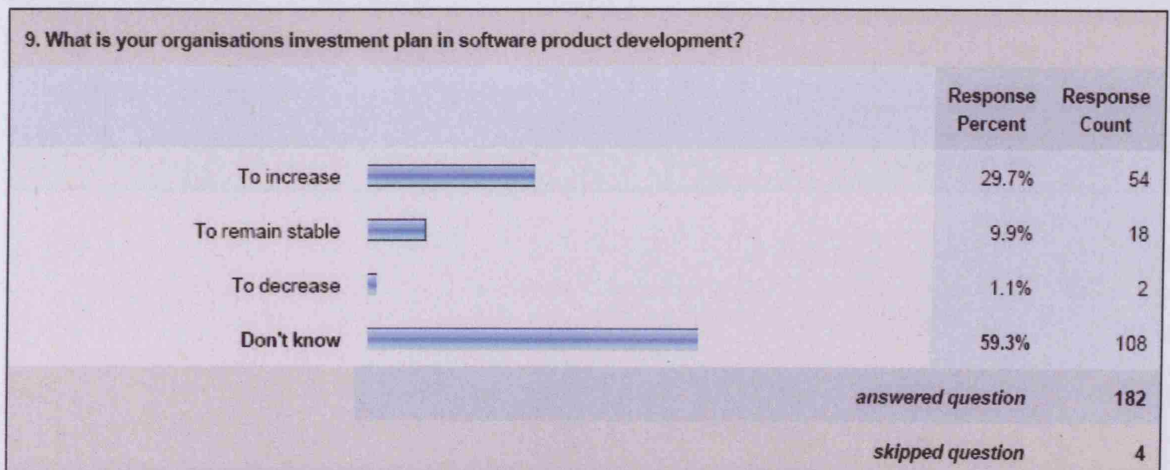
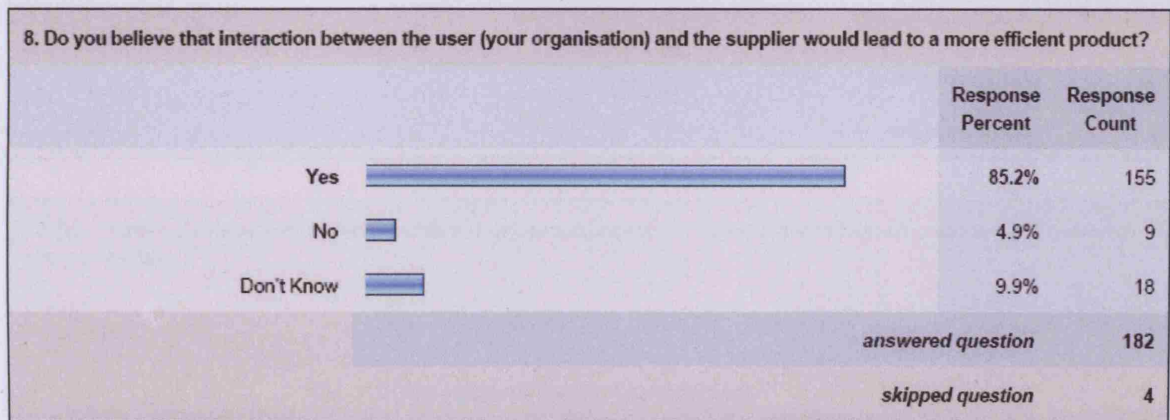
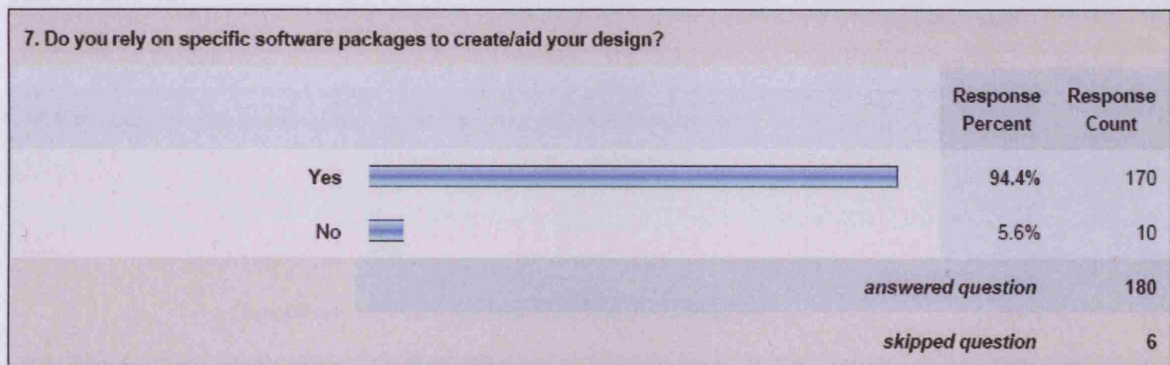
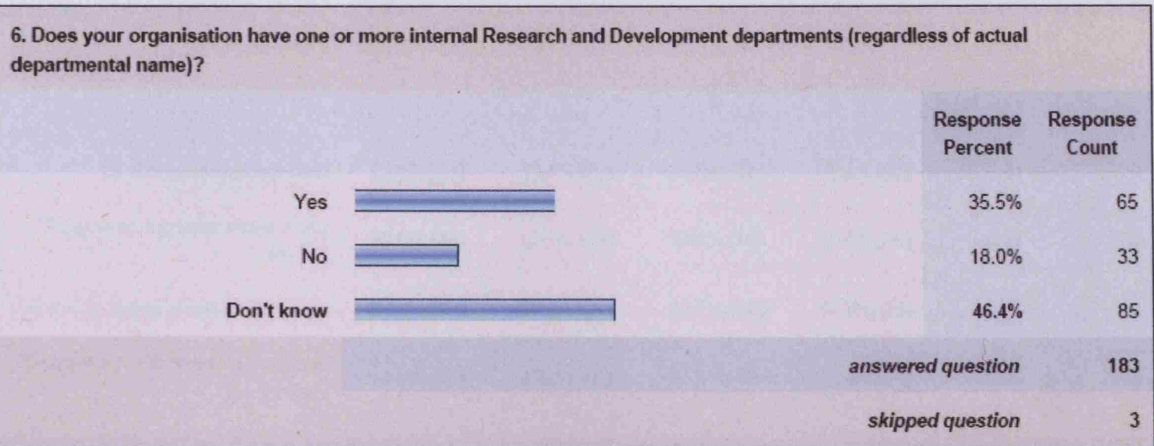
1. Which one of the following professions best describes where you work?

	Response Percent	Response Count
Design Consultancy	100.0%	186
Management Consultancy	0.0%	0
Contractor	0.0%	0
Developer	0.0%	0
Product Supplier	0.0%	0
Software Supplier	0.0%	0
Other (please specify)		1
<i>answered question</i>		186
<i>skipped question</i>		0

2. Which one of the following would best describe your position in your organisation?

	Response Percent	Response Count
Administration	0.0%	0
Engineer/Consultant	0.0%	0
Director	0.0%	0
Senior	0.0%	0
Partner	0.0%	0
Graduate	80.1%	149
Trainee	19.9%	37
Other (please specify)		9
<i>answered question</i>		186
<i>skipped question</i>		0











10. Please rank the following statements in order of importance to your organisations philosophy.

	1	2	3	4	Rating Average	Response Count
To achieve modest growth	13.1% (23)	15.4% (27)	24.0% (42)	47.4% (83)	1.94	175
To achieve a greater share of the market	14.9% (26)	20.1% (35)	42.0% (73)	23.0% (40)	2.27	174
To deliver higher quality to the client	52.3% (92)	18.2% (32)	12.5% (22)	17.0% (30)	3.06	176
To create an enhanced reputation in the industry	19.3% (34)	46.6% (82)	21.0% (37)	13.1% (23)	2.72	176
<i>answered question</i>						182
<i>skipped question</i>						4

11. What statement best describes the way in which your organisation is driven?

	Response Percent	Response Count
Technology Driven 	5.5%	10
Client Driven 	69.8%	127
Market Driven 	24.7%	45
Other (please specify)		2
<i>answered question</i>		182
<i>skipped question</i>		4

12. Do you see investing in new software product development enterprises as important to long-term success and growth to your organisation?

	Response Percent	Response Count
Yes 	67.4%	124
No 	10.9%	20
Don't know 	21.7%	40
<i>answered question</i>		184
<i>skipped question</i>		2

13. How influential do you consider the following Strategic/Market Position criteria when driving towards consultancy software supplier interaction? Please place a tick on the appropriate cell.

	Little Influence	Some Influence	Quite Influential	Influential	Very Influential	Response Count
Status/Market Share	4.1% (3)	14.9% (11)	48.6% (36)	27.0% (20)	5.4% (4)	74
Cost effectiveness (compared with market risks)	5.4% (4)	14.9% (11)	31.1% (23)	28.4% (21)	20.3% (15)	74
Competitive Advantage	1.4% (1)	11.1% (8)	15.3% (11)	43.1% (31)	29.2% (21)	72
Added Value/Justification of fees	5.5% (4)	12.3% (9)	32.9% (24)	35.6% (26)	13.7% (10)	73
Stakeholder Satisfaction	12.0% (9)	20.0% (15)	37.3% (28)	26.7% (20)	4.0% (3)	75
Profitability	4.1% (3)	10.8% (8)	18.9% (14)	40.5% (30)	25.7% (19)	74
Competitive pressure from the market	2.7% (2)	10.8% (8)	44.6% (33)	37.8% (28)	4.1% (3)	74
Mergers and Aquisitions (creating a larger organisation)	9.3% (7)	22.7% (17)	41.3% (31)	22.7% (17)	4.0% (3)	75
Contractor/Client Satisfaction	2.7% (2)	10.8% (8)	16.2% (12)	29.7% (22)	40.5% (30)	74
Avoid Rivals benefiting from potential gains	8.1% (6)	27.0% (20)	41.9% (31)	17.6% (13)	5.4% (4)	74
Economies of Scale	5.4% (4)	17.6% (13)	40.5% (30)	29.7% (22)	6.8% (5)	74
Enter new Markets	4.1% (3)	24.3% (18)	32.4% (24)	28.4% (21)	10.8% (8)	74
					<i>answered question</i>	75
					<i>skipped question</i>	111

14. How influential do you consider the following Strategic/Performance Position criteria when driving towards consultancy software supplier interaction? Please place a tick on the appropriate cell.

	Little Influence	Some Influence	Quite Influential	Influential	Very Influential	Response Count
Technical capability/excellence	2.8% (2)	8.3% (6)	19.4% (14)	38.9% (28)	30.6% (22)	72
Professional reputation	4.2% (3)	8.5% (6)	26.8% (19)	33.8% (24)	26.8% (19)	71
To set the benchmark as a best practice standard/To be best in class	2.8% (2)	11.3% (8)	19.7% (14)	32.4% (23)	33.8% (24)	71
Enhance performance on the management of projects	2.8% (2)	11.1% (8)	25.0% (18)	37.5% (27)	23.6% (17)	72
					<i>answered question</i>	72
					<i>skipped question</i>	114

15. How influential do you consider the following Technical Improvements criteria when driving towards consultancy software supplier interaction? Please place a tick on the appropriate cell.




	Little Influence	Some Influence	Quite Influential	Influential	Very Influential	Response Count
Schedule more effectively	2.8% (2)	12.5% (9)	44.4% (32)	33.3% (24)	6.9% (5)	72
Improve clarity in communication/interpretation of information	5.4% (4)	6.8% (5)	28.4% (21)	44.6% (33)	14.9% (11)	74
Ease integration and adaptability with other design team members	2.7% (2)	10.8% (8)	36.5% (27)	36.5% (27)	13.5% (10)	74
Reduce complexity in the design	2.7% (2)	13.5% (10)	35.1% (26)	35.1% (26)	13.5% (10)	74
Meeting differentiation	5.6% (4)	13.9% (10)	48.6% (35)	30.6% (22)	1.4% (1)	72
Respond in a more timely manner to client changes	4.1% (3)	6.8% (5)	26.0% (19)	49.3% (36)	13.7% (10)	73
Reduce requirements for 'translation software'	4.1% (3)	16.4% (12)	39.7% (29)	31.5% (23)	8.2% (6)	73
Define project scope more clearly	6.8% (5)	13.5% (10)	40.5% (30)	32.4% (24)	6.8% (5)	74
Cope better with customised requirements	2.7% (2)	13.5% (10)	31.1% (23)	45.9% (34)	6.8% (5)	74
					<i>answered question</i>	74
					<i>skipped question</i>	112

16. Before embarking on a joint innovation venture, how important do you consider the following? (Please tick the appropriate cell)						
	Little Importance	Some Importance	Quite Important	Important	Very Important	Response Count
The reputation of the firm	1.4% (1)	7.2% (5)	21.7% (15)	40.6% (28)	29.0% (20)	69
Existing relationships	2.9% (2)	10.1% (7)	33.3% (23)	33.3% (23)	20.3% (14)	69
Existing levels of trust with intended joint venture partners	4.4% (3)	8.8% (6)	30.9% (21)	36.8% (25)	19.1% (13)	68
Existing information sharing mechanisms	2.9% (2)	11.6% (8)	42.0% (29)	33.3% (23)	10.1% (7)	69
The possibility of opportunistic behaviour by prospective joint venture partners	4.3% (3)	11.6% (8)	37.7% (26)	40.6% (28)	5.8% (4)	69
The competence of joint venture partner team members	2.9% (2)	10.1% (7)	20.3% (14)	37.7% (26)	29.0% (20)	69
Experience of senior joint venture managers in terms of judgement, intuition and experience (of similar situations)	2.9% (2)	11.6% (8)	24.6% (17)	40.6% (28)	20.3% (14)	69
Existing knowledge capture and management structures	4.3% (3)	7.2% (5)	34.8% (24)	42.0% (29)	11.6% (8)	69
Opportunity to share risk	2.9% (2)	11.6% (8)	39.1% (27)	37.7% (26)	8.7% (6)	69
Perceived reliability of prospective joint venture partners	2.9% (2)	10.3% (7)	36.8% (25)	30.9% (21)	19.1% (13)	68
Expertise of prospective joint venture partner firms	2.9% (2)	10.1% (7)	29.0% (20)	40.6% (28)	17.4% (12)	69
					<i>answered question</i>	69
					<i>skipped question</i>	117



17. How critical do you consider the following statements in restricting consultancy interaction with software suppliers?

	Not critical	Not very Critical	Quite Critical	Critical	Very Critical	Response Count
Development can be expensive	3.1% (2)	12.3% (8)	46.2% (30)	30.8% (20)	7.7% (5)	65
Uncertain outcomes	3.0% (2)	27.3% (18)	30.3% (20)	31.8% (21)	7.6% (5)	66
The risk involved is hard to calculate	1.5% (1)	18.2% (12)	50.0% (33)	22.7% (15)	7.6% (5)	66
Potential adversarial or opportunistic behaviour	3.1% (2)	18.5% (12)	56.9% (37)	20.0% (13)	1.5% (1)	65
Degree of priority given to our problem by supplier	4.6% (3)	13.8% (9)	47.7% (31)	30.8% (20)	3.1% (2)	65
Fear of de-skilling employees through enhanced automation in the software	10.6% (7)	24.2% (16)	34.8% (23)	25.8% (17)	4.5% (3)	66
Reluctance to adopt technology	3.0% (2)	16.7% (11)	47.0% (31)	25.8% (17)	7.6% (5)	66
Training required to benefit from supplier interaction	7.7% (5)	18.5% (12)	33.8% (22)	33.8% (22)	6.2% (4)	65
<i>answered question</i>						66
<i>skipped question</i>						120

18. Do you believe Consultancy Software Supplier Intergration is an important topic of investiagtion in the construction industry?

	Response Percent	Response Count
Yes 	70.4%	50
No 	8.5%	6
Don't know 	21.1%	15
<i>answered question</i>		71
<i>skipped question</i>		115

19. Will you be available for a telephone interview?

	Response Percent	Response Count
Yes 	2.8%	2
No 	97.2%	70
<i>If yes, please leave your details below</i>		1
<i>answered question</i>		72
<i>skipped question</i>		114

10.3

Interview Responses*Question 1*

Client satisfaction is considered one of the most important strategic drivers towards software supplier interaction. However, also as influential are competitive advantage and profitability. Can you please outline what constitutes to competitive advantage and also profitability?

Director Sample

Profitability – Speeds up process, costs less, purchase cost, gain out of the many uses.

Competitive Advantage – Cheaper, more competitive in the market, offering new skills that competitors can't, cutting edge analysis, sophistication of software, advantage over competitors.

Consultant Sample

Profitability – Less time, do things that couldn't be done before, smarter, quicker, efficient, increased confidence to rely on the system.

Competitive Advantage – Software evolving, competitors can't keep up, handling new software to current applications, being at the forefront, offer solutions, perceive to deliver things that offers can't.

Graduate Sample

Profitability – Help win new jobs, hard to quantify, produce drawings that can sell for more than they cost to produce, produce drawings quicker, but making sure they are right.

Competitive Advantage – Easier, faster, always on time, Deliver on time, visually attractive, bespoke designs, better quality, more information at early stages, pass savings onto the client, undercut competitors.

Question 2

Technical capability is considered the most influential factor in performance criteria. Is this because if you are looking to interact, they must possess skills that you don't?

Director Sample

Not just the case. Ease of use of the software is important. Speed up user and understand is more important than drastically fantastic tool, everything we do is not that accurate, so not needed to be precise, understanding your needs.

Consultant Sample

Once decided what the software can do, support required for the best use, technical support, make best use of functions. Procuring a piece that you can't do better. Cost is influential.

Graduate Sample

Yes, agree. Seminars, how to use, give out cards. Experts in, develop questionnaires of what is missing.

Question 3

The results show that being able to adapt to client changes is the most influential technical improvement factor. How important is it to design software that can respond to changes in design?

Director Sample

Really important. Change occurs all the time. Alternative options, give clients greater options and recommendations, codes of practice change all the time, so software must accommodate it.

Consultant Sample

Useful, software hasn't developed/hasn't reinvented themselves, big steps forward, smaller incremental, more subtle. Slight edge on 3D designs, rapid production of images, greater clarity to the client. Clients requirements changed, expectations are higher, we drive ourselves. Meet the needs, get involved with suppliers to improve the system.

Graduate Sample

Extremely, everything we do is working to standards. Must be up to date. Depending on severity of the change. Constantly being updated. Some software have too much changing with too many add-ons that are not compatible. Projects go on for years, so many iterations, and drawings need to change.

Question 4

When choosing a prospective partner, there seems to be a number of issues that are of equal importance (competence/expertise/reputation/trust/reliability). Why do you think this is?

Director Sample

Sub-contract. Cost. Pay a maintenance, pay for upgrades, how many users. Ease of installation. Reliability. Technical support. Projects that challenge the software. IF ones weak, you won't use it. Some projects are long and don't need updates. All equal standing, no point having one factor.

Consultant Sample

Looking for the whole package, must be responsible. Can't be any one thing. Has to be a plethora of factors. Similarly worded and interlinked. Trust/knowing that they can deliver.

Graduate Sample

Interrelated, buzz words. Had to take longer on the question. Accurate reflection needs some thinking about. All equally important. Different people want different things. Different levels want different attributes. Contractual trust relationships.

Question 5

Can you give some examples of negative experiences of past partnerships?

Director Sample

Modify old information. Past software has been a problem because upgrades have not been compatible. User interface. Barriers are the staff, but translators have improved. Older you are, the less flexible you are. Purchasing has been hard to quantify.

Consultant Sample

New software is not backward compatible. Different revisions of software make you buy the new software. Overall, changes too much. Software can be bad in terms of bolt on packages. Wasn't user friendly. They did revise it however. Re-issue the product, but haven't really focussed on the development properly. Trying to branch into other markets can dissolve the core competence of existing software.

Graduate Sample

Needs to be more interaction with the technical people. Training is required on new technologies.

Question 6

From the results, the factors restricting interaction are clustered and there is no obvious one critical factor. Why do you think this is?

Director Sample

All important things. Got the head start. People don't realise that designs will become automated in the future.

Consultant Sample

Software is developed to do separate things, bigger publications, different issues. Not the same application. Not many people would know who responded to the survey. People haven't been exposed to the design software side. Risks are on the suppliers side.

Graduate Sample

All very important. No one has the time to weigh up all the factors, therefore all similarly ranked. Big cost needs a massive return. There isn't much restriction, that's why they are all equal.

Question 7

Do you see the organisation holistically or the individuals as the most crucial factors to successful interaction?

Director Sample

Bit of both. Product (Brand) and then the people who can train. Individuals are the one who deliver and form business relationships with.

Consultant Sample

50/50 as a few people can be non-committal. Can't rely on individuals. Have to rely on the organisation to have the individuals in place. Personal opinion guided by the individuals.

Graduate Sample

Individuals working as a team. Skills that they bring. Individuals make up the organisation. The brand comes first, but individuals can tarnish the organisation. Have to side with the organisation as people can leave.

Question 8

Why do you think the questionnaire completion was only 50%.

Director Sample

Don't know the subject. Lose interest.

Consultant Sample

People who have not been exposed to the topic can't answer in confidence. Can't answer constructively, so why answer?

Graduate Sample

Time constraints, not interested in the subject. Can't prioritise.