DEMAND FOR TELEWORKING WITH A SPECIAL EMPHASIS ON OFFICE SPACE IN SYDNEY CENTRAL BUSINESS DISTRICTS (CBD) REGIONAL MARKETS

J. Oluwoye, B.Goodsir; P. Lister, P. Olomolaiye,

[1] *Unit, Department of Property Studies, University of Technology, Sydney, Australia*
[1] *Property Consultant, Sydney, Australia*

Abstract

Dramatic changes in conventional work practices through the implementation of remote access working, better known as "teleworking" or "telecommuting", is just becoming a reality in Australia. This paper aims to research the impact of advances in information technology on traditional office and also to investigate, examine and determine the impact of teleworking on office space demand in Sydney. A total of 109 questionnaires were sent out to major occupiers of space in the Sydney Central Business Districts (CBD), North Sydney, Parramatta and Chatswood. Companies were surveyed in 1996 and updated in year 2000 using a structured questionnaire, augmented with formal interviews, with a view to provide an indication of the potential impact of teleworking on office space demand. Results of the analysis reveals that the implementation of teleworking will most significantly affect the demand for A and B Grade office space. This is likely to lead to the majority of C and D Grade office space becoming obsolete. The paper concludes that teleworking is still in the early stages of the adoption cycle in Australia. This situation is sure to change as teleworking becomes more widely accepted and cost effective. However, the full impact of teleworking is unlikely to occur in the immediate future as rental costs are not at a level which induces organizations to implement a teleworking programme. This is supported by the fact that lease incentives are still prevalent in current lease agreements.

Keywords: Office Space; Facilities Management; Teleworking; Telecommuting; Office Markets

Introduction

Teleworking has been defined in various ways over recent years. There are no generally accepted definitions of teleworking, different people use it the term with slightly different meaning. There are a variety of terms which have similar meanings, including telecommuting, networking, remote working, flexible working and home working.

Notwithstanding, teleworking is generally distinguished from the broader "home working" by using telecommunications as a means of contact, in place of commuting (*Hooker, 1995*). Teleworking is an innovative work option which sends work to the workers through technology, instead of workers to the work (*Telecom Australia, 1996*). It involves the performance of job-related work, either part or full-time at a site away from the "office", using information and telecommunications technology, for example facsimile, personal computers, modems and the like.

However, concern has also been raised that teleworking could possibly lead to th exploitation of low paid workers leading to "electric sweatshops" as well as creating new disadvantaged working class *(Telecommuting Research Group, 1994)*. This fea has in part been overcome due to the introduction in February 1994 of the "Australian Public Service Home Based Work Interim Award 1994" which is aimed at giving home office workers a legal framework for such things as occupational health and safety and workers compensation *(The Australian, 1994)*.

A problem often faced by teleworkers is that of overwork. This is a common problem as teleworkers often feel privileged and thus put themselves under pressure to produce more than their office counterparts *(Edwards, 1994)*. Many different forms of teleworking exist (i.e. telecottages, telecenters, televillages, hot desking hotelling, satellite offices, etc).

Telecottages are small scale satellite offices usually located in rural areas *(Telecommuting Research Group 1994)* and they are particularly prevalent in the UK. In the UK there were some 130 telecottages as at January 1995 which were both publicly and privately funded. The telecottage is designed to increase local employment as well as provide education and training *(KFH, 1995)*.

Telecenters (Neighborhood Centers) is the generic term covering facilities which are shared and which provide telecommunications and office equipment *(Hodgson, 1994)*. These are offices located in the suburbs or rural centers convenient for commuting, and offer workers and employees a compromise between working at home and working at the central office *(KFH,1995)*. The teleworker still commutes to work, yet not as far as to the traditional office in "CBD locations". The users of telecenters typically come from a diverse range of organizations and the facilities are used on a rental basis *(Spinks, 1991)*. Telecenters provide the social advantages of working in an office and allow the separation of home from the workplace.

Televillages are a combination of residential development with employment opportunities. Housing is designed with optical fiber or coaxial cabling already in place to enable residents to work from home. This form of teleworking places an emphasis on the community and reducing car use. This type of teleworking is in the very early stages of development and the first televillage in Australia is currently being planned by the Harlech Property Group on a site in the Blue Mountains *(KFH, 1995)*.

Hot desking is a term which originated in the US Navy to describe bunks used by different sailors on different watches (the bunks being warm from the previous occupants' use). It is also a term for workstations pre-equipped with all necessary electronic devices. Hot desking is primarily used by shift workers, job sharing and in selected areas of the company where staff spend a majority of their time out of the office, for example sales representatives and auditors *(Shaw, 1994)*.

Hot desking is a system whereby a staff member "reserves" a work space several days in advance through a booking person. This form of teleworking is similar to booking a hotel room but for work purposes *(KFH, 1995)*. Using an automated hotel-like reservation system, offices may be reserved in advance and assigned on a temporary basis.

The term satellite offices typically refers to the employment of telecommuters by a parent organization in fringe urban locations. Staff from the head office and other branch offices can work in a local branch office near their home. Satellite offices allow companies to take advantage of lower overhead costs, staff availability and avoid the costs associated with staff relocation *(Telecommuting Research Group, 1994)*.

Teleworkers are claimed to have increased job satisfaction, which it is suggested motivates the employee and they in turn perform their jobs better and more efficiently. Also employees are faced with less distractions once they are away from the normal office environment. However, profitability is also improved in that services can be made available to customers outside normal hours and there is evidence of reduced absenteeism *(Banaghan, 1996)*. Teleworking also enables people to be ready to work from anywhere in only a matter of minutes *(Meredith, 1995)*.

Claims have also been made that teleworking will lead to reduced staff turnover as employees enjoy a more flexible approach to both their work and lifestyle *(Reid, 1994)*. This is important, for if one considers that if an employee leaves a company a replacement has to be found and properly trained. This process is both costly and time consuming. In fact, Manfood suggests that the first four months of a new employees training will negate the profitability of that employee for nine months *(Manfood, 1992)*. A further benefit of teleworking is that it increases the options available to employers when dealing with maternity and paternity leave.

Security of work related documents is another issue which is of great concern to many employers. A teleworker's home and mobile office is less secure than the traditional company office, both in regard to burglar protection as well as access to unauthorised visitors. As the security associated with Information Technology (IT) continues to make advances this concern will lose its relevance. Despite this, strict protocol will continue to be adopted for all teleworkers, in particular those handling sensitive personal and corporate information *(Reid, 1994)*.

Furthermore, Pantoni (1995) reported that 4% of the workforce in Australia works from home and has predicted that this will grow to 15% in the next decade. There has been very little done by way of empirical studies into the spread of teleworking and the numbers involved in definable telecommuting tasks. Telecom estimates that the home office currently represents 4% of the Australian workforce and is growing at a rate of 15%-17% annually *(Edwards, 1994)*. Measuring home based work is difficult because of inconsistentency in the definition and methodological problems.

A survey conducted by Roy Morgan *(IBC Conference, 1994)* found that 450,000 people describe themselves as self-employed. Goanna Communications (June 1994) estimated the number of teleworkers in Australia to be approximately 250,000 which represents 3.2% of the working population, or about 10% of the office workforce. This estimate includes small business/self-employed workers based at home as well as a large number of unofficial telecommuters who work at home for a minority of their time

Similarly Telecommuting Australia estimates that there are about 250,000 Australian who have replaced commuting with telecommunications over the past decade *(Goanna Communications, May 1994).*

A survey of Australian households found that only 0.1% were involved in formal telecommuting programmes, yet almost 50% performed some office work at home *(BOMA, 1995).*

The most accurate data relating to teleworking is produced by the Australian Bureau of Statistics (ABS) through surveys relating to the topic "Employed Persons at Home [Australia]". Surveys have been conducted by the ABS in 1989, 1992 and 1995, which were completed by 60,000 individuals and from which projections made. The survey sought specific information relating to the amount of time involved in working at home, the type of work, the industry involved, the benefits provided, reasons for working at home, and educational qualifications. It should be noted that the ABS material relates to people working at home, there will be additional groups for mobile workers and those working in satellite or neighborhood work centers which were not captured by the ABS surveys.

Notwithstanding, general face to face contact between work colleagues is lost when people work as teleworkers, and this can reduce the mental stimulation which employees gain from working in the organizations offices. Moreover, due to teleworkers not being in the traditional office for part of the week they lose the feeling of being part of a team.

However, Reid (1994) reported that the greatest benefit from teleworking for most employees will be the savings, both mental and financial as a result of reduced commuting. The most discussed employee benefits of teleworking are increased job satisfaction and life style benefits. Not only are these benefits good for the employee, but as the old management maxim says "a happy worker is a good worker" *(Spinks and Timbrell, 1995).*

Reduced commuting time will result in increasing the amount of time the employee can devote to work related activities, family commitments and/or leisure interests. As the teleworker is not in the normal office they will have greater control over their working environment *(KFH, 1995).*

Aim

The aim of this research paper is to investigate, examine, and determine the likely impact of teleworking on the demand for office space in the various office markets of Sydney.

Research Methods

In order to determine the likely effects of teleworking on the demand for future office space, a survey of major occupiers of space in Sydney CBD and the regional markets of North Sydney, Parramatta and Chatswood was conducted in 1996 and updated in year 2000 through a structured questionnaire, augmented with formal interviews.

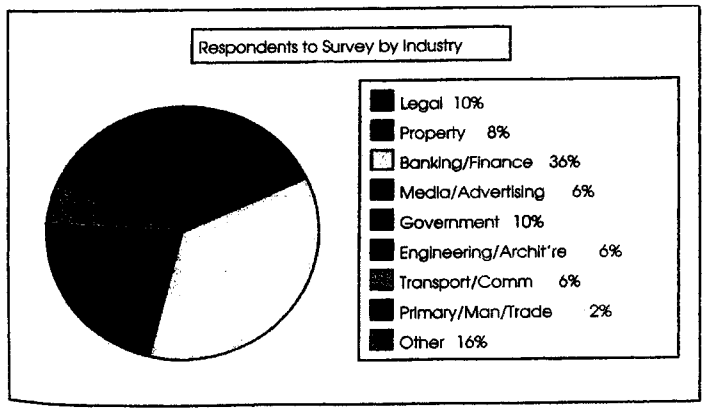
Reference was also made to a questionnaire which was used by the Telecommuters Research Group in 1994, when they examined the effects of teleworking on various organizations.

The main objectives of the questionnaires for this research were to:
(1) identify the industry of the respondents; (2) the number of people employed by the organization and the amount of space leased; (3) the respondents level of knowledge of teleworking; (4) whether the job responsibilities of employees within the organization were suitable to teleworking; (5) what the perceived advantages and disadvantages of teleworking were; (6) what forms of technology are used by the organization; (7) whether the organizations were likely to introduce some form of teleworking in the future, and if so what form of teleworking it was likely to be; (8) identify areas in which employees of the organization reside; and (9) identify the areas in which respondents thought changes to industrial relations were needed in order to allow for the further implementation of teleworking practices.

After thorough examination of the jobs suitable for teleworking it was decided to group the companies into the following industries: legal, property, banking/finance, media/advertising, government, engineering/architecture, transport/communications and primary/manufacturing and trade. These industries were selected as they were considered to be the industries which were most suitable for teleworking. A total of 109 questionnaires were mailed, of which 50 (40%) were returned.

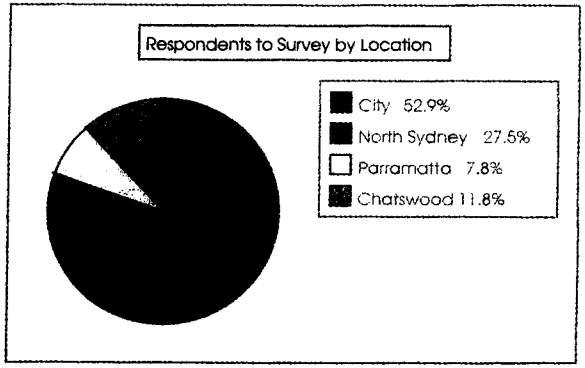
Research Results and Discussion

Answers to Question 1 of the questionnaire were grouped by the respective industries. Graph 1 illustrates the industries represented by the respondents. As one can see from the graph, the majority of responses were from banking and finance organizations, with the smallest representation from primary/manufacturing and trade organizations.



Graph 1

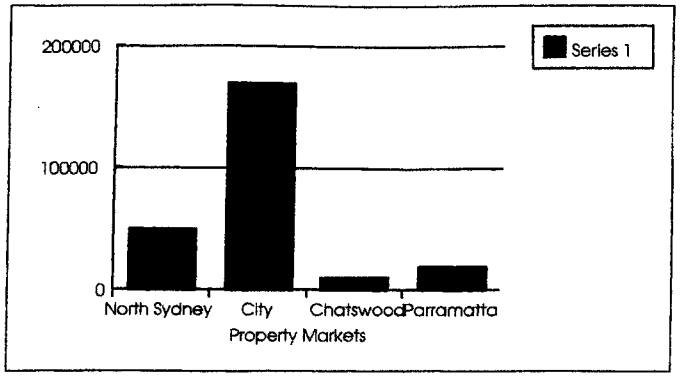
Graph 2 shows the location of the respondent's organizations in respect to the various office markets. As can be seen from the graph, the majority (54%) of respondents occupied office space in the Sydney CBD. The remaining respondents occupied space in North Sydney (26%), Chatswood (12%) and Parramatta (8%). The reason for the low representation of occupants from the Parramatta market was that the majority of organizations contacted were not willing to complete the survey.



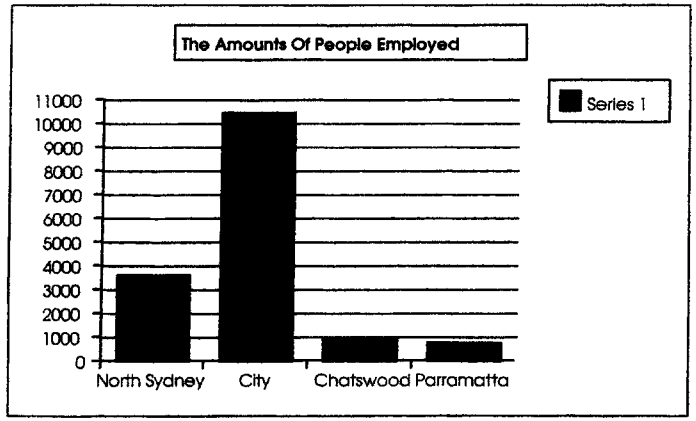
Graph 2

Issue 1: How many people were employed by the organization?
Issue 2: The amount of space which the organization occupied (leased or owned).

The objective of issue 1 and 2 was to identify how many people were employed by the organization to which the questionnaire was sent, and also the amount of space which the organization occupied (leased or owned). Answers to the questionnaire revealed that the respondents occupied a total of 247,006m square. Graph 3 illustrates the amount of space occupied by the respondents in the various office markets.



Graph 3: Space Occupied by Respondents to the survey by Office Markets



Graph 4. Amounts of People Employed

From the information gained regarding the above issues, the authors were able to calculate the Work Space Ratios (WSR's) of the respondents organizations. Table 1 shows the average WSRs of the organizations surveyed by the office markets.

Office Market	Average WSR of Respondents Organizations
Sydney CBD	23.58
North Sydney	16.60
Chatswood	24.33
Parramatta	18.95
Average	**20.85**

Table 1: Average WSR's of Respondents by Office Markets

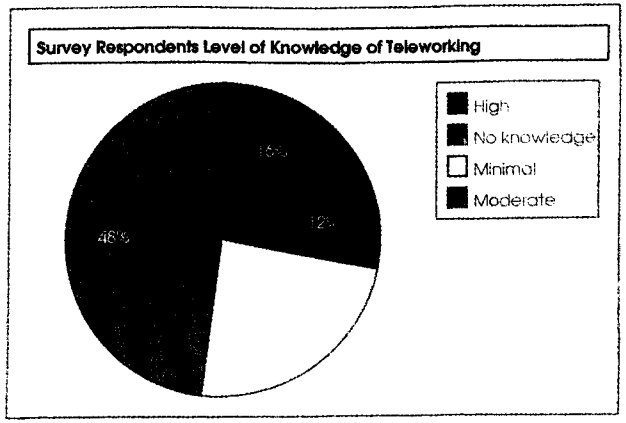
According to a recent article in the Australian Property News (October 10, 1996) the Property Council of Australia claims that the work space ratio (WSR) of tenants in newly completed buildings averages 17.2 m2. A different view is held by BIS Shrapnel, who divides the total NLA in the CBD by the workforce.

Figures based on these calculations reflect a WSR of 22m2. The figures gained from the questionnaire indicate a figure between these two conflicting views, yet more closely aligned with BIS Schrapnel than the Property Council. The questionnaire revealed that the industry group with the lowest WSR to be the banking and finance industry.

This industry had the lowest WSR in all of the office markets, varying from 12.47m square in North Sydney to 16.5m square in the city. As the average WSR's are higher in the organizations surveyed than the WSR's which the Property Council claim are being achieved by recent lettings, it can be assumed that there is potential for space reductions per worker in all of the organizations surveyed. Furthermore, the questionnaire indicated that the majority of employees within the organizations surveyed were full-time.

Issue 3:The respondents level of knowledge of teleworking

Issue 3 aimed at identifying the respondents level of knowledge of teleworking. As all the questionnaires were sent to the person responsible for the organization's property requirements, this question identified the level of knowledge of teleworking in the "market" place. The results of this question are contained in Graph 5. This graph illustrates that 16% claimed to have a high level of knowledge of teleworking and 48% have a moderate level of knowledge of teleworking. Of the remaining respondents 12% claimed to have "no knowledge", and 24% a "minimal" knowledge of teleworking.



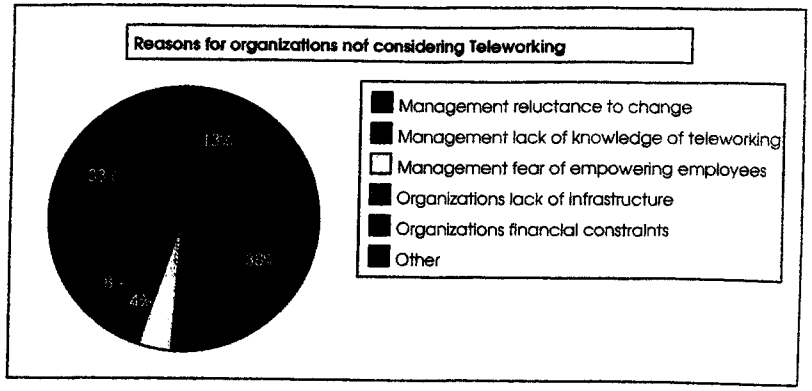
Graph 5: Levels of Knowledge of Teleworking

Of the respondents who indicated that they had "no knowledge" of teleworking, two-thirds of these indicated that it was unlikely that their organization would introduce some form of teleworking in the next 5-10 years. At the other end of the spectrum, all 10% of respondents who indicated that they had a high level of knowledge of teleworking, indicated that their organization was likely to introduce some form of teleworking in the next 5-10 years.

The higher the level of teleworking knowledge, the higher the probability that the organization would introduce some form of it in the future. Based upon these results it can be assumed that there is a direct correlation between the level of teleworking knowledge and the likelihood that the company would introduce some form of teleworking in the next 5-10 years. As 48% of respondents claimed to have a moderate knowledge level of teleworking, an increased knowledge of its uses and its variety of available forms is required prior to this work alternative being implemented on a wider basis.

Issue 4: The organizations surveyed had considered introducing some form of teleworking, and if not, why not?

The objective of issue 4 was to determine whether the organizations surveyed had considered introducing some form of teleworking, and if not, why not? Of the 50 respondents to the questionnaire, 31 indicated that their organization had considered implementing some form of teleworking. Those respondents whose companies had not considered teleworking as an alternative work option were asked to state why. Graph 6 illustrates the reasons identified by respondents as to why their organization had not considered implementing a teleworking programme.



Graph 6: **Organizations not considering Teleworking**

A positive correlation exists between the level of teleworking knowledge and consideration of it as an alternative work option. The second reason identified for lack of consideration of teleworking was management's reluctance to change. This is likely to change with time as management positions become filled by the younger generation. Also as companies become increasingly more competitive and customer focused, all potential avenues for achieving the organizations objectives will need to be considered by management. It was interesting to note that only 8% of respondents claimed financial constraints to be a possible reason for not implementing some form of teleworking.

Of the "other" reasons identified, approximately 50% were because the respondents did not consider teleworking to be appropriate for the type of business in which the organization was involved. Two respondents indicated that the benefits of teleworking had not been shown to outweigh the negatives. These two respondents also expressed the opinion that is very difficult to place a dollar value on the benefits of implementing teleworking within an organization.

This problem can be considered to be a major obstacle facing the further implementation of teleworking with an organization. This is because management is more concerned with the "bottom line", than with the benefits that the employee receives from being involved in a teleworking programmed. Management today requires figures and estimates in dollar terms for all projects and investments prior to entering into any business arrangement. It is the difficulty of placing a dollar value on the benefits to be achieved through teleworking that is holding back its further implementation.

One of the respondents indicated that the favourable lease over its existing premises provided no incentive to evaluate their space requirements. This reason can be considered to be more prevalent than the questionnaire indicates, based upon the fact that the many firms renegotiated their leases in the early 1990's in what was a "lessees market".

Issue 5: The job responsibilities of the organization surveyed could be considered as being suitable to teleworking.

e above issue aimed at identifying whether the job responsibilities of the ganization surveyed could be considered as being suitable for teleworking. 80% of e respondents indicated that the job responsibilities of the majority of employees ıvolved a substantial amount of time working cooperatively in teams. Yet 90% of ıese respondents indicated that their organization was likely to introduce some form ıf teleworking in the next 5-10 years.

The key to using teleworking in a team environment is to organize the work so that most of the individual work is reserved for teleworking days, while the collaboration takes place while everyone is in the office. This might mean for example, that the team decides to have everyone in the office on Tuesdays and Fridays to assure enough time together *(Gordon, 1996)*. From the responses to this question it can be assumed that the employees are still able to work in teams, yet much face to face contact can be replaced by telecommunications contact.

Issue 6: Direct contact between workers was required in order for employees to perform their jobs effectively.

This issue attempted to identify whether direct contact between workers was required in order for employees to perform their jobs effectively. All of the respondents apart from three indicated that the majority of the employees work duties involved direct and regular contact with colleagues in the office. This was to be expected considering that the majority of work decisions are discussed prior to a decision being made. Group discussion and constructive debate occurs in the majority of today's organizations in an attempt to identify the most efficient manner to perform the task.

Issue 7: Staff required access to centralised resources in order to perform the job effectively.

The issue revealed that all but one of the organizations surveyed indicated that staff required access to centralised resources in order to perform the job effectively. This question highlights the importance of information technology in relation to employees being able to effectively perform their job. Based upon the responses to this question it can be assumed that advancements in technology will facilitate the greater implementation of teleworking in all industries.

All the various forms of teleworking involve the employee spending a substantial part of their working time away from the traditional office and thus away from their colleagues. It is because of this that employees must be able to perform part of their work duties independently.

Issue 8: The employees of the respondent organizations could perform their jobs independently.

The aim of issue 8 was to identify whether the employees of the respondent organizations could perform their jobs independently. The results showed that 54% were able to perform their jobs independently. Further analysis revealed that of the respondents 46% of employees could not perform their job independently, 74% of these were of the opinion that their organization would introduce some from of

teleworking in the next 5-10 years. It is thought that this is because the vast majorit of teleworking programmes are on a part-time basis with the employees in the offic 2-3 days a week. This enables employees to work independently part of the time, with the remainder of work time spent in the office discussing work related tasks.

Only 26% of the respondents who thought that staff could not perform most of their work independently indicated that their organization was unlikely to introduce some form of teleworking in the future. This reveals the importance of technology in linking "physically distant" workers so that they can still perform their job effectively.

Prior to the introduction of teleworking within an organization the productivity of staff must be capable of being measured, so that management can effectively compare productivity before and after the implementation of a teleworking program.

Issue 9: The various methods of measuring staff productivity used amongst the organizations surveyed.

The above issue was aimed at identifying the various methods of measuring staff productivity used amongst the organizations surveyed. It must be noted that the various productivity measurement methods listed on responses indicate that 41 of the 50 organizations surveyed currently measure staff productivity, with only nine respondents indicating that staff productivity is not currently being measured.

The most common method of measuring productivity is by the achievement of set goals over a specified time period. This method was used by 83% of those organizations who measure employee productivity. The second most common method of measuring productivity is by the achievement of sales figures/set quotas.

Of the nine respondents who indicated that staff productivity is not currently being measured, five were of the opinion that their organization would "not" introduce some form of teleworking in the next 5-10 years. The results to this question highlight the importance of staff productivity being able to be measured in order for an organization to consider implementing a teleworking programme.

Issue 10: The areas in which the respondents thought that their organization could cut costs as a result of introducing some form of teleworking.

The objective of issue 10 was to identify the areas in which the respondents thought that
their organization could cut costs as a result of introducing some form of telework.
A resounding 88% of respondents thought savings could be achieved.

As may be seen from the table above, the majority of respondents indicated that they thought savings could be experienced through a reduction in rent and electricity. These savings could be perceived to result from a reduction in space requirement (rent) and reduced electricity due to reduced heat loads and lighting at the traditional office as it has less occupants. While energy savings may be experienced at the head office, normally the demand for electricity is merely shifted to another location, be it the home, satellite office or telecenter *(Forester, 1988)*.

The second area in which respondents thought that savings could be achieved related to office furnishings. It is often true that teleworking will result in savings in furnishings costs at the head office, yet office furnishings still need to be provided for all forms of teleworking. Also furniture needs to be provided at the head office for the times when teleworkers are there. The need to have furniture at both the traditional office and the teleworkers other place of work often results in a "duplication of costs". Savings may be achieved when hot desking and hotelling are introduced as the amount of office furnishings required is reduced as not all staff are in office at the same time. Also, each work station must be networked by fiber optic cabling and computer facilities made available.

The third and fourth most common areas in which respondents thought that savings could be achieved were staff turnover/restructure and parking. Savings in staff turnover/restructure are considered to occur as more employees are likely to remain with the firm than change jobs. Savings associated with staff turnover are high, yet are difficult to qualify as the costs of churn, recruitment, training and lost productivity. Savings in parking expenses can be high, when one considers that parking spaces in the CBD cost up to $500 per month per car, and doubly as expensive when fringe benefits tax is taken into account.

Savings in staff facilities are also considered to be prominent when teleworking is introduced. As previously mentioned it is difficult to determine how these savings would be realised, as often teleworking results in a "duplication of costs" due to teleworkers requiring facilities at both the traditional office and the other places where teleworking is performed.

The area in which savings were considered to be minimal was that of costs associated with motor vehicles. This is because the majority of teleworking is done on a part-time basis, and thus motor vehicles are still required for part of the week.

Issue 11: Possible problems which may arise between teleworkers and non-teleworkers.

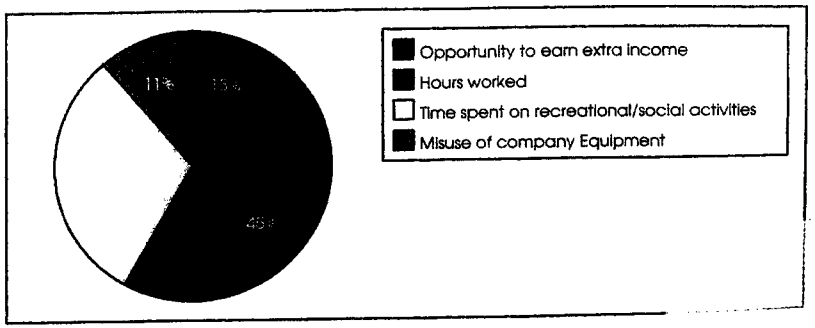
This issue related to identifying possible problems which may arise between teleworkers and non-teleworkers. The responses were fairly evenly distributed with 56% of respondents of the opinion that potential problems between these workers could arise.

Of the respondents who indicated that potential problems could arise between teleworkers and non-teleworkers, 82% though that problems would arise from employees feeling rejected because they had not been offered the chance to telework. This problem can be overcome by management clearly explaining the qualities required of a teleworker. This approach will receive preferential treatment, while only one respondent thought that the workload faced by teleworkers could increase.

Only five of the respondents indicated that they thought teleworking could lead to jealousy among non-teleworkers as they could perceive that teleworkers had a better deal. Respondents also expressed the thought that teleworking could reduce teamwork, and that this could lead to a rift between employees. This is because workers may feel that they do not have the influence that they used to have when they worked in the traditional office.

Issue 12: Respondents considered teleworkers could be less disciplined in their work practices when compared with non-teleworkers.

The objective of issue 12 was to identify whether respondents considered teleworkers could be less disciplined in their work practices when compared with non-teleworkers. The responses indicate that 62% of those surveyed thought that teleworkers could be less disciplined than their non-teleworking colleagues, while 38% did not consider discipline among teleworkers to pose a problem. Of the options available to the respondents, 94% thought that the hours worked by teleworkers could pose a problem. The amount of time spent on recreational and social activities was also an area of general concern. However, these prospective problems can be mitigated by the implementation of a through screening process of potential teleworkers. The opportunity to earn extra income and the misuse of company equipment were not considered to be an area of major concern. The results of this question are shown in Graph 7.



Graph 7: Areas of Less Discipline

Issue 13: The opinion that the introduction of some form of teleworking would reduce staff turnover.

Issue 13 sought to identify whether respondents were of the opinion that the introduction of some form of teleworking would reduce staff turnover. This question was party answered in issue 12 which focused on possible savings in overheads through the implementation of a teleworking programme.

As previously mentioned there is a perception that teleworking causes increased loyalty in a firm due to teleworking being offered to employees. Responses to this question indicated that 60% of respondents were of the opinion that teleworking would result in decreased staff turnover. The results of this question indicated that possible savings through lower staff turnover as a result of teleworking cannot be considered marginal.

Issue 14: The introduction of teleworking would be likely to increase the administration workload at the departmental level.

The objective of issue 14 was to determine whether the introduction of teleworking would be likely to increase the administration workload at the departmental level. The responses to this question bode well for teleworking as, if the introduction of teleworking does not result in increased administrative workload then it is another reason why the introduction of teleworking within the organization should be considered.

Issue 15: Areas of technology which the organizations use, and whether advancements in technology would facilitate the introduction of some form of teleworking.

Issue 15 aimed at identifying those areas of technology which the organizations use, and whether advancements in technology would facilitate the introduction of some form of teleworking. Of the respondents 94% indicated that developments/advancements in technology would allow for the implementation of teleworking within their organization.

Table 2 shows the forms of technology which the respondents consider able to facilitate the further implementation of teleworking in the future.

Forms of technology which facilitate teleworking	No. Of Times boxes ticked
Computer link/modem	43
Subscriber access databases	21
E-mail/Voice-mail	37
Interactive TV	7
Video/Audio conferencing	24
Video Phones	29

Table 2 :Which Technology Will Help Facilitate the Implementation of Teleworking

The majority of respondents indicated that computer linked modem was the most influential form of technology involved in a teleworking programme. As the computers continue to become more versatile, efficient, maneuverable and cost efficient, organizations will be more inclined to implement some form of teleworking. E-mail/Voice mail was also considered important as this is one way in which social isolation can be overcome, and to allow group input to occur.

Video phones are an area of technology which is yet to become prevalent in today's business environment. Advancements in this area are considered to be very important, as they will overcome the loss of face to face contract between workers which is one of the major limitations of teleworking. Video conferencing is also considered to be very important, as are subscriber access databases.

Results from this question indicate that advancements in all areas of technology will facilitate the implementation of teleworking programmes on a wider scale.

Issue 16: Whether the respondent's organizations were likely to introduce some form of teleworking in the future.

The objective of issue 16 was to determine whether the respondents organizations were likely to introduce some form of teleworking in the future. The results indicate that 80% of the organizations who responded to the survey were of the opinion that would introduce some form of teleworking in the future.

Conclusion

Teleworking is still in the early stages of the adoption cycle in Australia. This situation is sure to change as teleworking becomes more widely accepted and cost effective. In the medium term more organizations will be enticed to adopt some form of teleworking as a viable work alternative. This will be due to the constant demand for business to improve profitability through productivity gains and to reduce overheads. The increasing cost of CBD office space, and the development of affordable technology will further facilitate teleworking.

Trends in relation to increased competitiveness, worsening traffic congestion, cheaper technology and growing community concern for the environment, are all factors which support the introduction of teleworking from both a business and social perspective. All of these factors influence the quality, quantity, location and type of workspace accommodation required.

From the responses to the questionnaire it can be concluded that those industries which are most suitable to teleworking can be classified as the service industries. These service industries include finance, property and business services and government to some extent.

The majority of respondents to the questionnaire classified their knowledge of teleworking as "moderate". There was found to be direct link between the knowledge of teleworking and whether the organization was likely to implement some form of it in the future. It is clear that the level of knowledge of teleworking amongst management needs to increase prior to this form of work being implemented on a wider basis. This view was supported by the fact that the majority of organizations who had not considered implementing a teleworking programme stated that lack of knowledge was one of the reasons.

The full impact of teleworking is unlikely to occur in the immediate future as rental costs are not at a level which induce organizations to implement a teleworking programme. This is supported by the fact that lease incentives are still prevalent in current lease agreements.

As technological advancements continue and the price of information technology becomes more affordable, organizations will be presented with an increasing number of work alternatives aimed at meeting their needs. Teleworking provides organizations with an alternative in which both the employer and employee can benefit.

REFERENCES

Australian Bureau of Statistics (1995) *Persons Employed at Home*, Catalogue No. 6275.0, September.

Banaghan, M. (1996) Teleworking saves money trials show. *Business Review Weekly*, pp. 74-76, April 15.

Building Owners and Managers Association (1995) *Sydney Office Space Use Study.*

Edwards, M. (1994) *Motivating and Managing a Virtual Team - Management Styles for Teleworking*, IBC Conferences.

Hodson, Noel. (1992) *The Economics of Teleworking*, BT Research Laboratories.

Knight Frank Hooker (KFH) (1995) *Office Demand Series - Hot Desking and the Virtual Office*, Occasional Paper No.3, November.

Knight Frank Hooker (KFH) (1995) *Office Demand Series – Telecommuting*, Occasional Paper No.2, October.

Manfood, P.E. (1992) *Home Work -How to Hire, Manage and Monitor Employees who Work at Home*, Chicago, Illinios: Probus Publishing Company.

Meadowbank Telecommuting Research Group (1994) *Telecommuting - Is it the Future?*

Management Advanced Certificate, Meadowbank College of TAFE, 3rd Year.

Reid, A. (1994) *Teleworking - A Guide to Good Practice*, NCC Blackwell, Reprinted.

Shaw, S. (1994) *Hot Desking and Space Intensification: Preparing the Central Office for Telecommuting*, Telecommuting - AIC Conference, Sydney, September.

Spinks, J. & Timbrell, P. (1995) *Telecommuting - Working at the Speed of Light*, Information Systems Divisions Toshiba (Australia) Pty Ltd.

Telecom Australia Handout (1996) *Telecommuting - The New Management Frontier*.

Newspaper Articles

Lynch, A. (1994) Teleworking Security Risks are often overstated. *The Australian*, 6/12/94, p.27.

Lynch, A. (1994) Union push to widen teleworking acceptance. *The Australian*, 25/10/94, p.30.

COBRA 2002

PROCEEDINGS OF THE RICS FOUNDATION CONSTRUCTION AND BUILDING RESEARCH CONFERENCE

5th and 6th September 2002 School of Property and Construction
The Nottingham Trent University

Published by:

The RICS Foundation
12 Great George Street
Parliament Square
London, SW1P 3AD

In association with:

The Nottingham Trent University
Nottingham, NG1 4BU

© RICS Foundation, The Nottingham Trent University and the contributors
First published 2002

ISBN COBRA 2002: 1-84233-074-8

FOREWORD

COBRA has proved its worth since it was first held in 1995 and has maintained its popularity. During this period the Royal Institution of Chartered Surveyors has re-structured and divisions have been replaced by faculties.

COBRA has been adopted by the RICS Foundation, and now encompasses a broader research context than was originally anticipated.

This COBRA conference reflects this broader research context with papers on a wide range of subjects, posing particular problems for the editor.

Within the UK Construction Industry at this time, representative groups are seeking to achieve improvement in processes that are rooted in traditionalism. Collaborative procurement strategies enabling the integration of design and construction are seen as enabling continuous measurable improvement and facilitating innovation.

The importance of relevant research to the initiation and testing of innovative solutions is indisputable and the papers in these proceedings are evidence of the quality of the current research activity.

The editor wishes to express his sincere thanks to those who have helped in the work of the conference, particularly the referees who contributed so much and Mrs Celia Payne who patiently put the proceedings and conference together.

Professor Roy Morledge
School of Property and Construction
The Nottingham Trent University
August 2002

The Editor acknowledges with thanks those who reviewed the papers, who included:

Peter Barrett, University of Salford
Martin Betts, University of Salford
Ranko Bon, University of Reading
Paul Bowen, University of Capetown
David Churcher, BSRIA
Chris Fortune, Heriot-Watt University
Paul Gallimore, The Nottingham Trent University
Adelaide Gray, The Nottingham Trent University
Margaret Greenwood, University of West of England
Cliff Hardcastle, Glasgow Caledonian University
Andy Hey
Peter Hibberd, Joint Contracts Tribunal
Mike Hoxley, Anglia Polytechnic University
David Jaggar
John Kelly, Glasgow Caledonian University
John Lane, The Nottingham Trent University
John Mansfield, The Nottingham Trent University
John Moohan, The Nottingham Trent University
Roy Morledge, The Nottingham Trent University
Paul Nicholson
Stephen Pryke, South Bank University
Peter Ramsey,Dawber, The Nottingham Trent University
John Reyers, The Nottingham Trent University
Asif Sharif
Brian Sloan, Napier University
James Sommerville, Glasgow Caledonian University
Sara Wilkinson, Sheffield Hallam University

The organisers of COBRA also wish to acknowledge with thanks the generous support of the Head of the Construction management Division of the School of Property and Construction, The Nottingham Trent University, Professor Paul Gallimore

© RICS Foundation, The Nottingham Trent University and the contributors

All rights reserved. No part of this publication may be reproduced stored in a retrieval system, transmitted or utilised in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without the prior permission in writing from the individual authors.

TABLE OF CONTENTS

MANAGEMENT 11

THE THREE WHEELS OF BEST VALUE: A SERVICE FOCUSSED APPROACH TO THE MEASUREMENT OF BEST VALUE 12
Kirsty Hunter and John Kelly Glasgow Caledonian University)

APPLYING DR DEMING'S DYNAMIC CONTROL MODEL TO PROJECT COST COST CONTROL 28
Paul Watson and Richard Davis (Sheffield Hallam University)

A STUDY COMPARING US CONSTRUCTION DELIVERY SYSTEMS BASED ON BUSINESS AND MANAGEMENT PRINCIPLES 37
Dean T. Kashiwagi and Mukaram Mohammed (Arizona State University)

THE APPLICATION OF QUALITY FUNCTION DEPLOYMENT IN THE IT/CONSTRUCTION INDUSTRIES 54
James Sommerville[(1)], Nigel Craig[(2)] ([(1)] Glasgow Caledonian University, , [(2)]Sysnet, Glasgow

CONSTRUCTION COALITIONS AND THE EVOLVING SUPPLY CHAIN MANAGEMENT PARADOX: PROGRESS THROUGH FRAGMENTATION? 66
Stephen Pryke (South Bank University)

THE OPTIMIZATION OF VALUE ENGINEERING AS A STRUCTURAL COMPONENT OF THE CONSTRUCTION PROCUREMENT PROCESS 83
(Dean T Kashiwagi and Bharti Khiyara (Arizona State University)

LIFE-CYCLE ASSESSMENT AS A TOOL AND PHILOSOPHY 96
L Flanagan (University of Brighton)

A WHOLE LIFE COSTING APPLICATION FOR THE OPTIMUM DESIGN OF CONSTRUCTION ASSETS 108
M. Kishk, A. Al-Hajj[1], R. Pollock[1], G. Aouad[2] and N. Bakis[2] (The Robert Gordon University, [2]The University of Salford)

A FACTOR APPROACH TO THE ANALYSIS OF RISKS INFLUENCING CONSTRUCTION COST FLOW FORECAST 120
Henry A. Odeyinka and John G. Lowe (Glasgow Caledonian University)

DEVELOPING A METHODOLOGY FOR THE EXAMINATION OF MOTIVATION 132
Chris Hill (Sheffield Hallam University)

A SYSTEMATIC APPROACH TO MANAGING BUDGET RISK DURING PROJECT APPRAISAL 141
Simon Jackson and Roger Flanagan (University of Reading)

BUILDING SURVEYING 153

ASSESSMENT OF FLOOD DAMAGE TO DOMESTIC PROPERTIES: SURVEYORS' PERCEPTIONS OF FLOOD CHARACTERISTICS 154
R Soetanto, D G. Proverbs, J Nicholas (University of Wolverhampton)

THE CONSERVATION AND REPAIR OF HISTORIC DECORATIVE BRICKWORK 169
Gerard Lynch [1] David Watt Belinda Colston (De Montfort University)

DEFECTS AND REWORK IN SOUTH AFRICAN CONSTRUCTION PROJECTS 182
B Rhodes[(1)] and JJ Smallwood [(2)] ([(1)]Jeffares & Green Incorporated Consulting Engineers,;[(2)] University of Port Elizabeth)

PORTABLE TEST EQUIPMENT FOR BUILDING SURVEYS – A STUDY OF CURRENT PRACTICE 197
Mike Hoxley and Alan Coday (Anglia University)

SHORT LIFE VS LONG LIFE BUILDING COMPONENTS CONTROVERSY – ASSESSMENT OF LIFE CYCLE COST AND DURABILITY OF SYSTEM BUILT SCHOOL BUILDINGS 209
Ghasson Shabha (University of Central England)

FLOODING IN BUILDINGS: ASSESSMENT, LIMITATION, AND REHABILITATION 217
Paul Wordsworth, David Bithell, (Liverpool John Moores University)

BUSINESS AND MARKETS 231

AN INVESTIGATION OF THE FACTORS THAT AFFECT INTERNATIONAL MARKET ENTRY DECISIONS 232
Irem Dikmen and M. Talat Birgonul, (Middle East Technical University)

STRATEGIC CLIENT BRIEFING: STAKEHOLDER EXPERIENCE 243
Jim Smith (The University of Melbourne, Australia)

PROPERTY ILLIQUIDITY: THE EFFECTS OF DEPRECIATION AND OBSOLESCENCE ON RETURNS AND VALUES 259
Jon Robinson and Richard Reed (The University of Melbourne)

DECISION CRITERIA FOR PERIODIC PREQUALIFICATION IN THE UK CONSTRUCTION INDUSTRY 273
Donny M Mangitung, Margaret W Emsley (UMIST)

AN ANALYSIS AND EVALUATION OF THE STRUCTURE OF THE CONSTRUCTION INDUSTRY IN PORTUGAL 286
Francisco Loforte Ribeiro and Jorge Lopes (Instituto Superior Técnico, Universidade Técnica de Lisboa)

CASE STUDIES OF THE STATE OF HAWAII AND UTAH IMPLEMENTATION OF PERFORMANCE BASED CONTRACTING 297
Richard Byfield, and Dean Kashiwagi (Arizona State University)

PERFORMANCE IMPROVEMENT IN SOUTH AFRICAN CONSTRUCTION 310
J J Smallwood (University of Port Elizabeth)

A SURVEY OF ATTITUDES TO DISPUTE RESOLUTION IN SOUTH KOREA 321
Lorraine Gaytten and Chan Ho Yoon (University of Central England)

FACILITIES MANAGEMENT AND ENVIRONMENT 331

BOUNDARY DECISIONS IN RELATION TO MECHANICAL BUILDING SERVICES MAINTENANCE 332
A. J. Bridge (Queensland University of Technology)

THE SUSTAINABLE RE-USE OF HISTORIC URBAN INDUSTRIAL BUILDINGS: INTERIM RESULTS AND DISCUSSION 345
Karen Holyoake, David Watt (De Montfort University)

TOWARDS AN UNDERSTANDING OF SUSTAINABILITY IN SOCIAL HOUSING PROJECTS 358
Kate Carter, Chris Fortune (Heriot-Watt University)

SUSTAINABLE DEVELOPMENT AS A STRATEGY FOR DELIVERING INTERPROFESSIONAL EDUCATION 369
Tony Westcott, Tony Selman (University of the West of England, Bristol)

IT AND LEGAL 379

DEMAND FOR TELEWORKING WITH A SPECIAL EMPHASIS ON OFFICE SPACE IN SYDNEY CENTRAL BUSINESS DISTRICTS (CBD) REGIONAL MARKETS 380
J. Oluwoye, B.Goodsir; P. Lister, P. Olomolaiye, (University of Technology, Sydney):

THE EXPLOITATION OF IT FOR TEAMWORKING: CAN CONSTRUCTION COMPANIES LEARN FROM THE MANUFACTURING AND FINANCIAL SECTORS? 397
Charles Egbu[1], Catherine Gaskell[2]and Jaki Howes[2] [(1)] Glasgow Caledonian University,[2] Leeds Metropolitan University)

WEB-BASED VALUE CHAINS IN CONSTRUCTION: AN INTELLIGENT E-BUSINESS APPROACH FOR SME 405
Francisco Loforte Ribeiro (Universidade Técnica de Lisboa)

ELECTRONIC TENDERING: IS IT DELIVERING? A UK AND EUROPEAN PERSPECTIVE 414
Tony Westcott and Peter Mayer (University of the West of England Bristol)

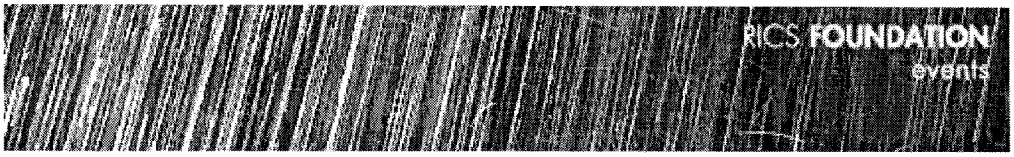
AN INVESTIGATION INTO LIABILITY AND INSURANCE RELATED TO THE BUILT HERITAGE 428
John Revers (Nottingham Trent University)

TABLE OF KEYWORDS

KEYWORD(S)	AUTHOR(S)	PAGE
Alternate construction delivery processes	Kashiwagi, Mohammed	37
Approach	Ribeiro	405
Architectural conservation	Lynch, Watt, Colston	169
Architectural conservation	Holyoake, Watt	345
Assessment Framework	Wordsworth, Bithell	227
Assessment methodology	Shabha	209
Automation	Kishk, Al-Hajj, Pollock, Aouad, Bakis	108
Best Value	Kashiwagi, Mohammed	37
Best value	Hunter, Kelly	12
Best value implementation	Byfield, Kashiwagi	297
Boundary Decisions	Bridge	332
Brickwork	Lynch, Watt, Colston	169
BS EN ISO 9001:2000	Watson, Davis	28
Budget	Jackson, Flanagan	141
Building services	Bridge	332
Client briefing	Smith	243
Commercial building surveys	Hoxley, Coday	197
Commercial stock condition surveys	Hoxley, Coday	197
Competitive advantage	Dikman, Birgonal	232
Conservation	Reyers	428
Conservation science	Lynch, Watt, Colston	169
Construction	Egbu, Gaskell, Howes	397
Construction	Ribeiro	405
Construction	Ribeiro, Lopes	286
Construction	Westcott	414
Construction business practices	Kashiwagi, Mohammed	37
Construction cost flow	Odeyinka, Lowe	120
Construction industry	Smallwood	310
Construction industry	Sommerville, Craig	54
Construction management at risk	Kashiwagi, Mohammed	37
Constructionline	Mangitung, Emsley	273
Continuous improvement	Watson, Davis	28
Contractor	Odeyinka, Lowe	120
Cost	Jackson, Flanagan	141
Decision criteria	Mangitung, Emsley	273
Defects	Rhodes, Smallwood	182
Depreciation	Robinson, Reed	259
Design-build	Kashiwagi, Mohammed	37
Dispute resolution	Gaytten, Ho Yoon	320
Domestic building surveys	Hoxley, Coday	197
Domestic properties	Soetanto, Proverbs, Nicholas	154

Dynamic control	Watson, Davis	28
E-business	Ribeiro	405
Electronic tendering	Westcott	414
Embodied energy	Flanagan	96
Estimating	Jackson, Flanagan	141
Europe	Westcott	414
European Foundation for Quality Management	Watson, Davis	28
Excellence Model	Watson, Davis	28
Facilities management	Oluwoye, Goodsir, Lister, Olomolaiye	380
Factor analysis	Odeyinka, Lowe	120
Finance	Egbu, Gaskell, Howes	397
Flood damage assessment	Soetanto, Proverbs, Nicholas	154
Flooding	Soetanto, Proverbs, Nicholas	154
Flooding	Wordsworth, Bithell	217
Flooding rehabilitation	Wordsworth, Bithell	217
Fragmentation	Pryke	66
Gauged brickwork	Lynch, Watt, Colston	169
Germany	Westcott	414
Heritage	Reyers	428
History of best value procurement issues	Byfield, Kashiwagi	297
Homebuyers' surveys	Hoxley, Coday	197
Illiquidity	Robinson, Reed	259
Indefinite delivery indefinite quantity (IDIQ)	Kashiwagi, Mohammed	37
Indicators	Smallwood	310
Industrial buildings	Holyoake, Watt	345
Information technology (IT)	Egbu, Gaskell, Howes	397
Insurance	Reyers	428
Integrated databases	Kishk, Al-Hajj, Pollock, Aouad, Bakis	108
International construction	Dikman, Birgonal	232
Interprofessional education	Westcott, Selman	369
Intersubjective	Hill	132
IT industry	Sommerville, Craig	54
Job order contracting	Kashiwagi, Mohammed	37
Joinery profiles	Flanagan	96
Liability	Reyers	428
Life cycle cost	Shabha	209
Life cycle costing	Kishk, Al-Hajj, Pollock, Aouad, Bakis	108
Life-cycle assessment	Flanagan	96
Local government	Hunter, Kelly	12
Management	Sommerville, Craig	54
Manufacturing	Egbu, Gaskell, Howes	397
Mean response analysis	Odeyinka, Lowe	120
Methodology	Hill	132
Motivation	Hill	132
Multi-Stakeholder	Smallwood	310
Neural networks	Dikman, Birgonal	232
Obsolescence	Robinson, Reed	259
Office markets	Oluwoye, Goodsir, Lister, Olomolaiye	380
Office space	Oluwoye, Goodsir, Lister, Olomolaiye	380
Organisation	Ribeiro, Lopes	286
Performance	Smallwood	310
Performance	Ribeiro, Lopes	286
Performance information	Kashiwagi, Mohammed	37

Performance information procurement system (PIPS)	Kashiwagi, Mohammed	37
Periodic prequalification	Mangitung, Emsley	273
Portable test equipment	Hoxley, Coday	197
Procurement	Carter, Fortune	358
Project inception	Smith	243
Property	Robinson, Reed	259
Public services	Hunter, Kelly	12
PVC-U	Flanagan	96
QFD	Sommerville, Craig	54
Quality	Sommerville, Craig	54
Quality management	Rhodes, Smallwood	182
Quantity surveyor	Soetanto, Proverbs, Nicholas	154
Repair work	Soetanto, Proverbs, Nicholas	154
Research methods	Carter, Fortune	358
Rework	Rhodes, Smallwood	182
Risk	Reyers	428
Risk	Jackson, Flanagan	141
Risk Management	Jackson, Flanagan	141
Risk variable	Odeyinka, Lowe	120
Rubbing bricks	Lynch, Watt, Colston	169
Schools liaison	Westcott, Selman	369
Securitisation	Robinson, Reed	259
Semiology	Hill	132
SME	Ribeiro	405
Social network analysis	Pryke	66
South Korean Construction Industry	Gaytten, Ho Yoon	320
Strategic needs analysis	Smith	243
Structure	Ribeiro, Lopes	286
Supply chain management	Pryke	66
Sustainability	Carter, Fortune	358
Sustainable development	Westcott, Selman	369
Sustainable re-use	Holyoake, Watt	345
System building	Shabha	209
Teamworking	Egbu, Gaskell, Howes	397
Teamworking	Westcott, Selman	369
Telecommuting	Oluwoye, Goodsir, Lister, Olomolaiye	380
Teleworking	Oluwoye, Goodsir, Lister, Olomolaiye	380
Tools and techniques	Hunter, Kelly	12
Total quality management (TQM)	Watson, Davis	28
UK	Westcott	414
Urban regeneration	Holyoake, Watt	345
Value engineering	Kashiwagi, Khiyara	83
Value management	Hunter, Kelly	12
Whole life costing	Kishk, Al-Hajj, Pollock, Aouad, Bakis	108



COBRA - for construction professionals

CALL FOR PAPERS - COBRA 2003

University of Wolverhampton with the RICS Foundation

1-2 September 2003

You are invited to submit a research paper for COBRA 2003, the construction and building research conference, held this year by the University of Wolverhampton with the RICS Foundation. The conference will take place from 1-2 September 2003 at the University of Wolverhampton.

The proceedings will be published during the conference and a copy will be presented to all delegates.

Click here to access the papers presented at COBRA 2002.

ASSESSMENT PANEL

The Call for Papers is being structured so that all abstracts and completed papers are reviewed by an expert review panel, who include:

- Dr Adarkwah Antwi, University of Wolverhampton
- Professor Allan Ashworth, Cardiff University
- Akintola Akintoye, Glasgow Caledonian University
- David Baldry, University of Salford
- Martin Betts, University of Salford
- Charles Egbu, Glasgow Caledonian University
- Chris Fortune, Heriot-Watt University
- Cliff Hardcastle, Glasgow Caledonian University
- Mike Hoxley, Anglia Polytechnic University
- John Kelly, Glasgow Caledonian University
- Peter Lawther, Royal Melbourne Institute of Technology University
- Martin Loosemore, University of New South Wales
- Roy Morledge, Nottingham Trent University
- Professor Paul Olomolaiye, University of Wolverhampton
- Keith Potts, University of Wolverhampton
- David Proverbs, University of Wolverhampton
- Brian Sloan, Napier University
- James Sommerville, Glasgow Caledonian University
- Sara Wilkinson, Sheffield Hallam University

The Panel reserves the right to reject abstracts and completed papers or seek their amendment.

LATEST NEWS

Final preparat: underway for tl International Convention on U Development anc Management ...mo

Professor Terr from Queenslanc University of Technology's Sc Construction Management ...mo