The influence of the leading firms on the exploitation of IT in the Irish construction industry

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ABSTRACT

The problem of how construction industries around the world can exploit the potential of Information Technology (IT) for the benefit of participants has been the focus of attention for various individuals, enterprises, institutions and governments in recent years. Consideration of how the Irish construction industry should approach this problem has been limited to date. Although it is recognised that there are a number of existing and potential influences, this paper considers the role that the current leading firms in the Irish construction industry can and should play in order that the industry as a whole exploits IT over the next five years. It is proposed that if the Irish construction industry is to progress quickly in relation to exploiting IT, these leading firms need to develop their own appropriate IT strategies. They should subsequently use their considerable influence on the many firms that they do business with to develop complementary IT strategies. The rate at which the current leading firms can exploit IT and persuade others to do so is considered. Reference is also made to the results of a 1998 survey of the leading architectural, consulting engineering, quantity surveying and contracting firms in the Irish construction industry.

Keywords: IT, exploitation, Irish construction industry, leading firms, influence, survey, strategy.

INTRODUCTION

Probably the single biggest agent of change in business processes over the past fifteen years has been the introduction, use and development of Information Technology (IT). This is probably also true for the construction industry, but many observers suggest that this industry has not introduced, used or developed IT to anything like the extent to which it could or should [e.g. Betts, 1999]. This general belief of an industry not exploiting IT, in spite of the perceived benefits, has encouraged a number of individuals, enterprises, institutions and governments around the world to consider the problem of how the construction industry should attempt to do so.

Consideration of the problem from an Irish perspective, focussing specifically on the Irish construction industry, has been limited to date. That is not to say however that participants in the Irish construction industry cannot learn from the deliberations and findings of others in relation to other industries and countries. A number of these countries (e.g. UK, France, Australia, Denmark, Finland) have established specific national centres for IT in their construction industries to help address the problem and these centres appear to be having a positive influence. No such centre has been established to date in Ireland. A specific independent centre for the encouragement and co-ordination of approaches to improving the exploitation of IT in this country would be beneficial for the Irish construction industry. It is possible that the proposed supervisory board referred to in the final report of the Technology Foresight Construction and Infrastructure Panel [Forfas, 1999], in partnership with the existing Forum for the Construction Industry [DoE, 1997] may fulfil that role. In the meantime

there is much that we can learn from the existing international research and experience.

A feature of IT, which can be a problem, is the potential for purchasers and users to get carried away with the technology. There is a tendency to lose focus on why or whether certain technologies are useful to achieving the desired end result. In the context of the construction industry, this end result will be different for each participant. From a general perspective however it worth considering the various visions that have been proposed in recent years. One such vision is that espoused in the report on Strategies for the European Construction Sector [WS Atkins/ EU Commission, 1994]. This referred to a number of objectives for the industry including 'applying the best technology to improve Europe's landscape and living environment'. Brandon [1999] gives a more recent and more specific statement regarding why the exploitation of IT is central to improved industry: 'If substantial savings in cost can be achieved, if quality and performance can be markedly improved, and if time for construction can be shortened, then the world will be a better place.' In relation to the Irish construction industry, the Construction and Infrastructure Panel of the Technology Foresight Initiative [1999] gave the warning that 'failure to invest in the technological development of this industry will adversely affect its ability to maintain its contribution to the economy, to compete in the developing European and global construction environment and to provide and sustain the physical infrastructure we need between now and 2015.'

This paper considers how the Irish construction industry can move towards a greater exploitation of IT over the next five years. A brief review of the key influences is followed by specific consideration of the vitally important role of the current leading firms in the industry. The points listed below are fundamental to this consideration:

- IT can be a good thing (benefits > costs);

- adoption of IT involves change;

- exploitation of IT involves strategy and significant change;

- IT is not being exploited by the Irish construction industry;

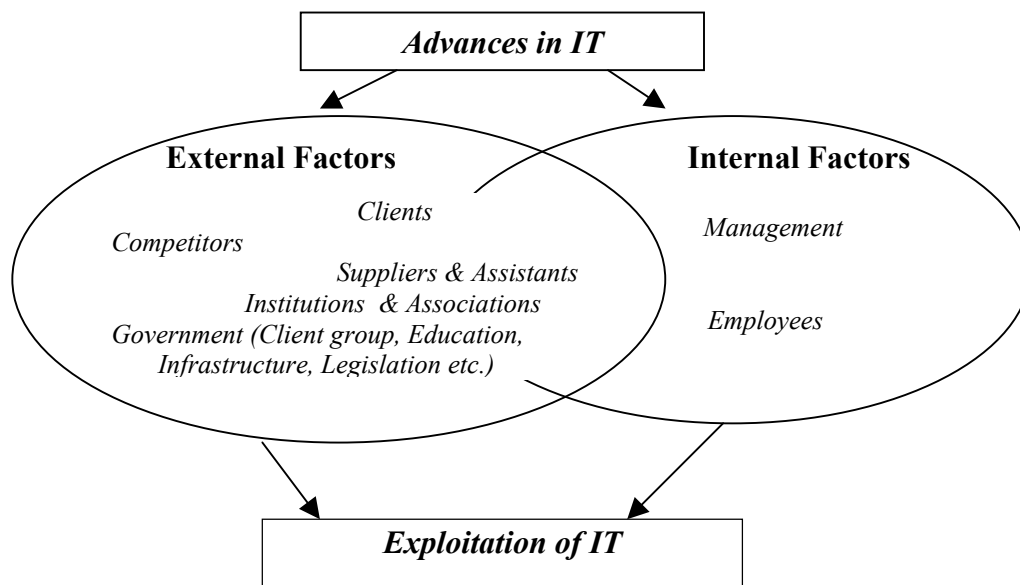- exploitation of IT is key to an improved industry.

FACTORS INFLUENCING THE EXPLOITATION OF IT

If one accepts the proposal that the exploitation of IT is key to improving the Irish construction industry, then the question of how this can be achieved has to be addressed. The Department of the Environment [DoE, 1999] has adopted the following definition of the construction industry: 'the construction industry incorporates site preparation, building, civil engineering, building installation work, building completion work, and the renting of construction or demolition equipment with operators'. Obviously there are a large number and a wide variety (size and nature) of participants in this industry. Estimates vary as to the number of firms but it could be in the order of 10,000. The number of people currently employed in the industry was estimated at 208,500 [DoE, 1999], with approximately 60,000 of these involved in 'off-site' activities (e.g. design). To persuade all of the current participants of the need to exploit IT for themselves, their clients and the industry as a whole, is a huge task. It is also likely to be an impossible task as a number of these participants will probably be unable or unwilling to make the associated changes. The issue therefore is how to get those participants who are willing to change, to make those changes as quickly as possible.

Of the external factors encouraging the participating firms in the Irish construction industry to exploit IT (see figure below), it is proposed that the most important are clients and competitors. The construction industry in Ireland is currently buoyant with a cumulative increase of 80% in the value of output over the five year period since 1994 [DoE, 1999]. Although the predictions are for continued growth, competition from non-Irish firms for construction-related work in Ireland is likely to increase. In an IT world, where geographic location is not necessarily a limitation to working, it is

inevitable that competition from overseas will increase. Clients will increasingly have a greater choice of firms. Those firms that can offer a better and more cost-effective service though exploiting IT, be they Irish or non-Irish, will obviously be in a stronger position to survive and prosper.

Factors influencing firms in the Irish construction industry to exploit IT

Advances in IT

External Factors

Clients

Competitors

Suppliers & Assistants
Institutions & Associations
Government (Client group, Education,
Infrastructure, Legislation etc.)

Internal Factors

Management

Employees

Exploitation of IT

Although the word 'client' generally refers to one individual or firm on a construction project, due to the many levels of work on construction projects there are in fact many clients. This broader definition of clients includes what are referred to as 'the leading firms' and the importance of these firms in relation to the exploitation of IT is considered in the next section.
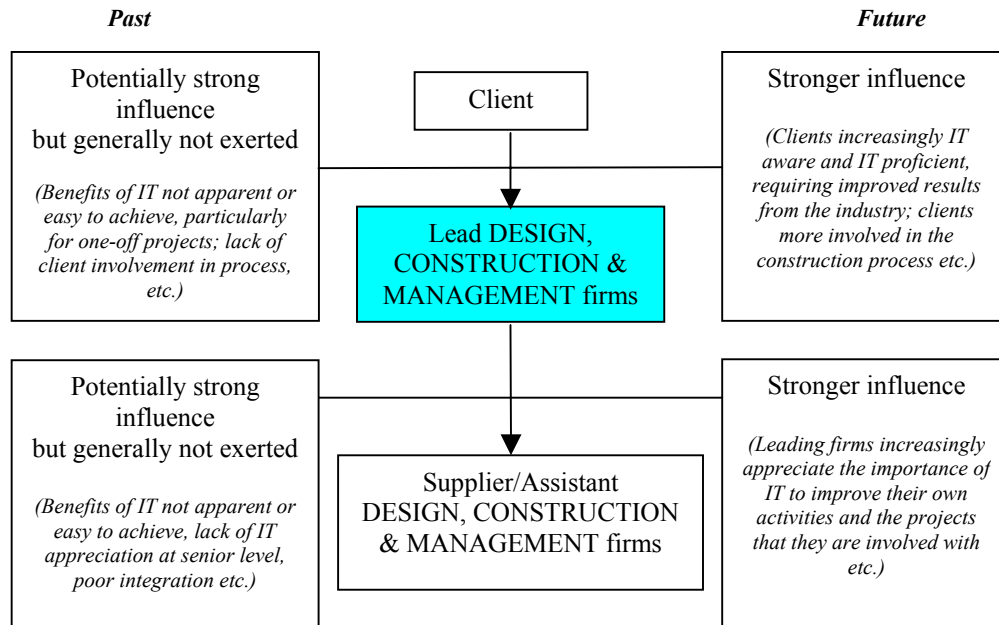
THE IMPORTANCE OF THE LEADING FIRMS

This paper proposes that that the quickest and most obvious way to achieving greater exploitation of IT in the Irish construction industry is for the current leading firms to take the lead. Although the total number of firms involved in the industry is relatively large, the existing and potential influence of the relatively small number of leading firms is large (e.g. 'approximately one third of total civil engineering and main contracting output is produced by the 34 leading contractors' – [DoE, 1999]). It is suggested that this influence could and should be brought to bear in order that rapid progress towards the exploitation of IT in the Irish construction industry is achieved.

The leading firms in the Irish construction industry generally dictate the approach to designing, constructing and managing the majority of the major construction projects in this country. As such, individual leading firms are in a very strong position to influence the activities of the many supplier/assistant firms with whom they do business. If the leading firms can visualise how IT can be exploited to the benefit of themselves and develop an appropriate strategy to realise that vision, then they can insist or certainly encourage others to follow that vision. Although it is recognised that to develop appropriate strategies is a potentially enormous and difficult task, it is necessary if the industry is to make significant progress in the short-term.

The 'top-down' influence of clients and the leading firms is indicated in the figure below. Although the potential for a 'bottom-up' influence to exist is accepted, it is suggested that this is not as important as the 'top-down' approach if the industry is to progress quickly in relation to the exploitation of IT.

'TOP-DOWN' influence of the leading firms in relation to IT

It is also recognised that the rate at which these leading design, construction and management firms influence their supplier/assistant design, construction and management firms will depend on a range of factors which include:

- the rate of increase in IT skills and requirements by clients;

- the rate of increase in IT appreciation/knowledge by their senior personnel;

- the rate of increase in IT skills and requirements of their employees;

- the rate of improvement in the benefit/cost ratio for IT advances;

- the extent of competition;

- the willingness and ability of the firm to change;

- the extent of strategic approach to IT.

A number of these factors were referred to in the IT survey which is considered in the next section of this paper.

IT SURVEY (April/May 1998)

In April/May 1998 the author carried out a wide ranging study of IT use in the Irish construction sector by the leading architectural, consulting engineering, quantity surveying and contracting firms (top 50 in each sub-sector). This survey had the following objectives:

- to discover the extent of their current IT use;

- to determine the level of their strategic approach to IT;

- to estimate their potential IT use and that of the construction sector in general.

The survey was confined to four of the traditional sub-sectors of the Irish construction sector as members of each of these sub-sectors were regarded as identifiable. That is to say that each had a representative institution (RIAI, ACEI, SCS, CIF) which were and are widely recognised. The architectural and consulting engineering firms were ranked (from totals of 250 and 103 firms respectively) according to the number of their employees. The quantity surveying firms were ranked, (from a total of 106), on the basis of the number of chartered surveyors they employed. Contracting firms were ranked (from a total of approximately 3500) on the basis of their turnover.

Although it would have been beneficial to have included other sub-sectors such as suppliers and clients in the survey, the lack of an appropriate representative body and associated difficulty with identifying the leaders meant that they were omitted. Prior to posting the questionnaire, a phone-call was made to each firm in order to identify the most senior person in the company with responsibility for IT. In some firms this person was known as the IT Manager but in the majority of cases this person had

other responsibilities apart from IT. The response rate for each of the targeted sub-sectors is shown in the figure below.

IT Survey – Response Rates

Construction sub-sector	Code	No. of replies	Response rate
Architecture	ARCH	37	74%
Consulting Engineering	ENG	33	66%
Quantity Surveying	QS	38	76%
Contracting	CON	33	66%
TOTAL		*141*	*70.5%*

A separate paper on the survey was published in the International Journal of Construction Information Technology [Thomas, 1999]. Some of the results however that the author considers as encouraging and disappointing in relation to the exploitation of IT are reflected upon in the next two sections.

ENCOURAGING RESULTS FROM SURVEY

The results showed that (in general) the firms are using IT extensively and their use of IT is likely to continue and increase in the future. Similar surveys had been completed in Scandinavia around the time of this survey and the IT use by the Irish firms appeared to be generally in line with the equivalent sub-sectors in Sweden and Denmark. It should be noted however that the Swedish and Danish results refer to the sub-sectors in general, not just the leading firms in these sub-sectors. Another encouraging aspect of the results to the Irish survey was that all four sub-sectors were using Internet facilities.

In relation to the influence of clients on participants in the Irish construction industry there was strong agreement (87% Average) that clients will insist on specific IT facilities within the next five years (i.e. by 2003). There was also general agreement (68% Average) that IT will have a major influence on the Irish construction industry from 1998 to 2003. These later two sets of results would indicate that the leading architectural, consulting engineering, quantity surveying and contracting firms in this country are aware of both the importance and potential of IT.

One of the most important aspects of IT is its potential to improve integration within the industry. Many of the more recent reports and reviews around the world, including the strategic review of the Irish construction industry [DoE, 1997], stress the importance of teamwork. It was therefore encouraging to note that the vast majority (90% Average) of respondents agreed that IT will improve the integration of the work of participants in the construction sector between 1998 and 2003.

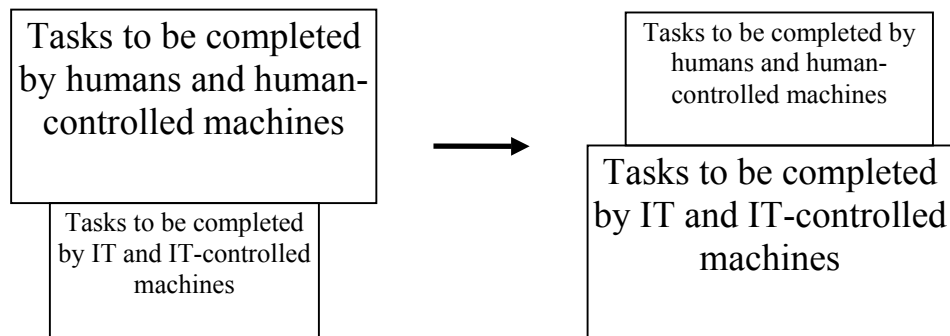**DISSAPPOINTING RESULTS FROM SURVEY**

Although there were many encouraging results from the survey, there were also a number that were regarded as disappointing. On the basis of the premise that exploitation of IT requires a strategic approach, it was a cause for concern that an average of only 41% had an IT strategy. Also over half of those who did not have an IT strategy had no short-term plans to develop and adopt such a strategy.

An interesting result, which in some ways contradicts the results regarding the impact of IT on the industry in the period 1998 to 2003 (see previous section), is that in relation to the use of IT by clients. There was strong agreement amongst all four sub-sectors that clients will <u>not</u> use IT to obtain more cost-effective services outside Ireland by 2003. Although it is true that many clients for construction work in this country will want to work with Irish firms in the future for a variety of reasons (e.g. personal relationships), it appears to a bit naïve to discount the potential of IT enabling clients to consider non-Irish options. IT has the potential to increase competition, particularly in the area of design. As the technology improves, costs decrease and standards converge, it is likely that at least some clients will consider firms based in the UK, mainland Europe, the US and beyond.

Another disappointing result is that relating to human input/participation and IT in the future. There was strong agreement that IT will <u>not</u> lead to a decrease in human input/participation in each of the sub-sectors by 2003. This attitude would appear to contradict the opinions of many experts, both those who have considered the impact of IT on the general business world and those who have focussed on the construction

industry (see figure below). As the technology develops it seems inevitable that an increasing number of construction related activities could benefit from IT. If this is true then the only way that the existing level of human input/participation would not decrease is for more and different activities to be carried out by humans.
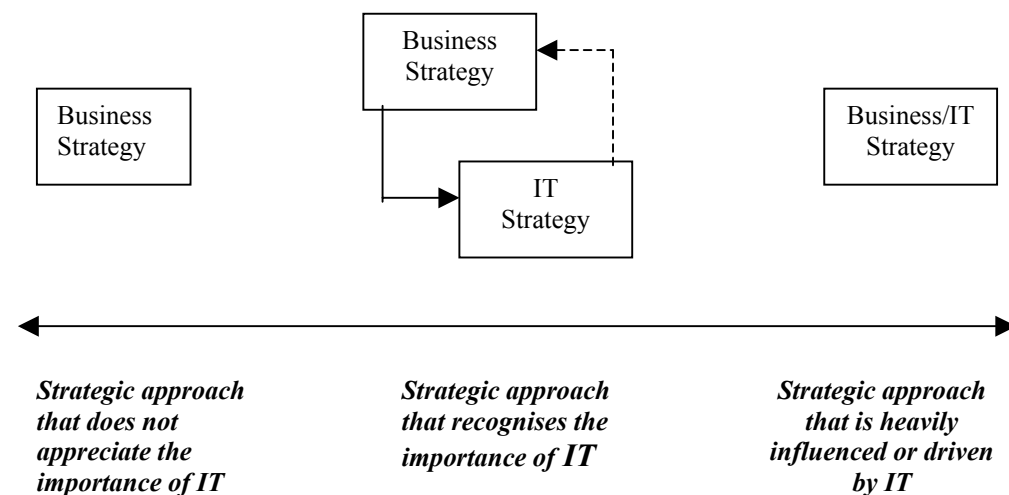
Trend in ratio of human and IT input for construction related activities

CONCLUSION

The potential impact of IT on the Irish construction industry is enormous. If IT is going to reduce or eliminate much of the human input into the industry, (particularly the straightforward, repetitive activities), all participants need to radically rethink their activities for the future. The likelihood of significantly increased competition due to IT also needs to be taken into account. These issues are important and all those who have an interest in construction related activities that are part of the Irish construction industry should be reflecting upon them. Certainly this process is well advanced in other countries around the world and consideration of their findings to date should be part of this reflection process.
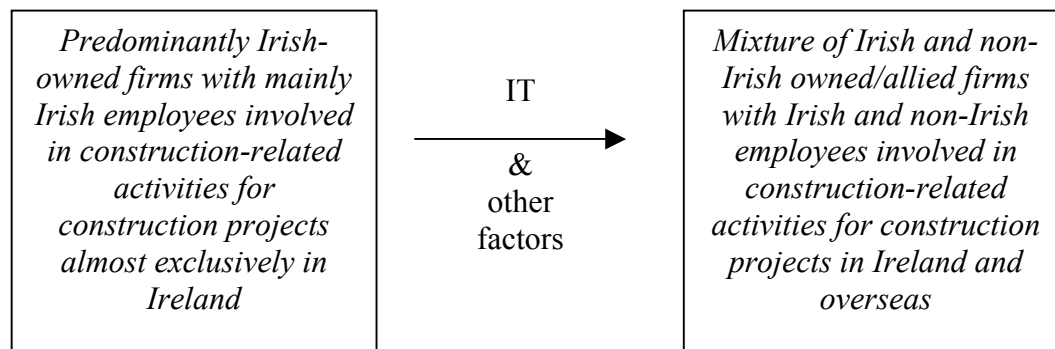
Strategic approach of organisations and the perceived importance of IT

It is hard to predict what the Irish construction industry will be like in the long-term. For example, it is debatable whether the term the 'Irish construction industry' will still even be referred to in the distant future given the increasing role of European and

International influences (see figure below). Also, the well-established professions of Architect, Engineer, Surveyor etc. are likely to increasingly question (and be questioned on) their role in an IT world [e.g. Turner, 1998].

Ireland and the construction industry

Predominantly Irish-owned firms with mainly Irish employees involved in construction-related activities for construction projects almost exclusively in Ireland	IT & other factors →	*Mixture of Irish and non-Irish owned/allied firms with Irish and non-Irish employees involved in construction-related activities for construction projects in Ireland and overseas*

Whatever about the long-term future for the Irish construction industry, planning for the next five years is an easier (but not simple) task. It is suggested that there are benefits for individual firms, their clients and the industry as a whole if they exploit IT. Ideally all of the participating firms in the Irish construction industry would recognise this fact and proceed to rapidly develop and implement appropriate and complimentary IT strategies. In the real world not all have recognised this need to exploit IT and a number will never do so. This paper proposes that to rapidly progress the extent of IT exploitation in the industry the current leading firms must take the lead. If they do so in the short-term, then they are likely to bring a relatively large number of other firms (partners, assistants, suppliers, sub-contractors etc.) with them. If they do not, then they run the risk of not being the leading firms in the future and the industry in general will take longer to reap the benefits of IT.

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The formation of strategic alliances between purchasing of Irsih firms by non-Irsih firms and the dustry is likely It is doubtful that the majority of the participating firms will recognise the need for exploiting IT and undertake this movement without external encouragement and direction, at least not in the near future. These external influences include the government, education, Institutions and associations. It is suggested however that more important influences particularly in the short-term however are clients and competitors.
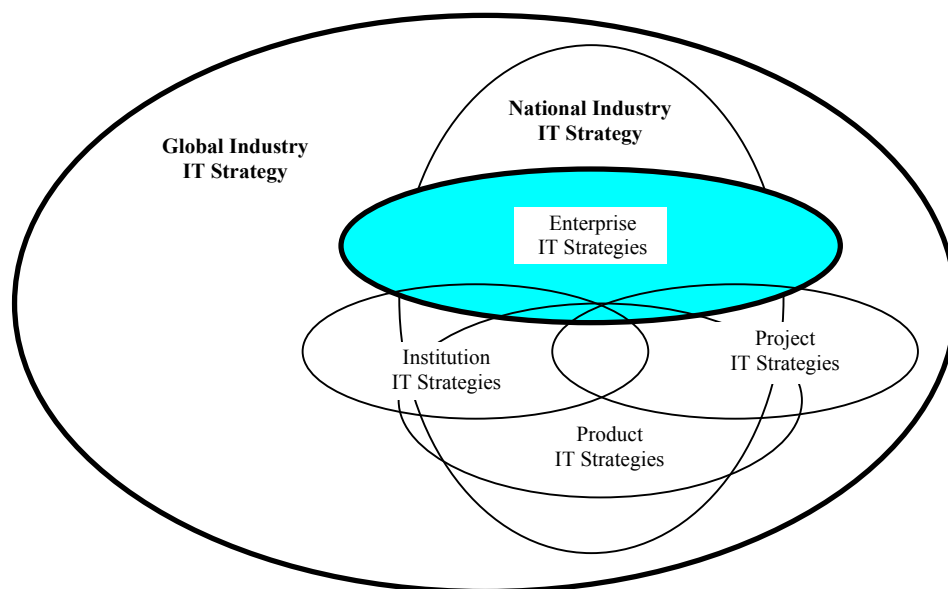
1.   Or to put it another way will Should individual particpants in the industry or representative groups take on this role ?
2.

Betts [1991] proposed that five levels of strategies are required (see figure below). There is some evidence that a number of the participants [Thomas, 1999] are attempting to exploit IT but they would generally be the exception rather than the rule.

How the majority of the particpants can be motivated to exploit IT

Client, Architectural, Consulting Engineering, Quantity Surveying, Construction
(Note: The boundaries between these 'traditional' groupings are increasingly difficult to identify)

Strategies for IT use in the AEC industry [Based on Betts' 5 level approach (1992)]

Betts [1992] referred to the development of strategies at five different levels in the construction industry in order to exploit IT. These levels were National, Institution, Enterprise, Project and Product.

The leading firms involved in the Irish construction industry should develop and regularly review strategies for IT. These strategies should ideally be developed by IT knowledgeable people at a senior level in the firm and have the support of senior management. The strategies should be closely aligned with the firm's business strategy and consider an IT world where previous processes, activities, division of responsibilities and levels of competition are likely to change significantly in the future. Having established appropriate strategies, they should then use their considerable influence in the industry to persuade all other firms that they deal with (partners, assistants, suppliers, sub-contractors etc.) to exploit IT in a complementary fashion.

This page has been established to inform participants in the Irish AEC Industry of the potential of IT and to encourage them to exploit that potential for their own benefit, the benefit of their clients and the Irish AEC industry in general.

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