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A REFLECTION ON THE DEVELOPMENT, ACTIVITIES AND DELIVERABLES OF THE CONSTRUCTION IT ALLIANCE (CITA) IN IRELAND.

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ABSTRACT:

This paper reflects on the development, activities and deliverables of the Construction IT Alliance in the Republic of Ireland. This alliance was formed in 2001 with the vision of harnessing the potential of information and communication technologies in the Irish construction sector. CITA is a prime example of academia-industry-government collaboration in Ireland. A key driver in the development of CITA is the need to increase the extent of IT knowledge within the Irish construction sector. Membership of CITA includes leading architectural, engineering, surveying, management, construction, supplier, IT and academic organisations. The leading academic institutions in CITA are the Dublin Institute of Technology (DIT) and the Waterford Institute of Technology (WIT). CITA has also received the backing of the Department of the Environment and Local Government (DoE&LG) and the influential Forum for the Construction Industry (FCI). The structure and work of other similar bodies, particularly Construct IT in the UK, were taken into account in the development of CITA. CITA activities include the development and maintenance of a website; the hosting of bi-annual members meetings with expert guest speakers; and the formation and encouragement of Special Interest Groups (SIGs) to address particular issues.

Key words - alliance; education; Irish construction sector; IT

INTRODUCTION

Construction sectors in many different countries around the world are increasingly recognising the importance of Information Technology (IT). IT is helping to increase the efficiency of specific activities within the construction process. IT also has the potential to vastly improve the integration of the construction process through increased electronic sharing and communication of information.

Much research has been carried out regarding the use of IT in construction particularly in the USA, UK and Scandinavia. There are currently a significant number of relevant research programs being undertaken at national and international levels. A number of countries have established centres to identify and promote best practice use of IT in construction. Although much of the international research and work of these national centres is of use to Irish firms, the lack of specific research and an equivalent organisation prior to 2001 was regarded as a contributory factor in the slow progress towards harnessing the potential of IT in the Irish construction sector.

This paper reflects on the development and activities and deliverables of the Construction IT Alliance (CITA) in the Republic of Ireland. Before this reflection, summaries of the Irish construction sector (including its participants, the representative bodies and key statistics) and construction education in Ireland are given.

THE IRISH CONSTRUCTION SECTOR

There are many participants in the Irish Construction Sector and the Department of the Environment and Local Government (DoE&LG, 1997) classified them as follows:

- *public and private clients;*
- *contractors (main contractors, specialist sub-contractors, house builders etc.);*
- *consultants/designers (architects, engineers, quantity surveyors, project managers etc.);*
- *material and product producers and suppliers;*
- *construction workers.*

The majority of these groups have representative associations, committees, federations, institutions etc. looking after their own interests and ensuring internal communications. The arenas for formal communication between the various representative bodies within the Irish construction sector include the *Construction Industry Council (CIC)* and the *Construction Industry Liaison Committee (CILC)*. The CIC was established in 1991 and comprises the *Institution of Engineers of Ireland (IEI)*, the *Association of Consulting Engineers of Ireland (ACEI)*, the *Royal Institute of the Architects of Ireland (RIAI)*, the *Society of Chartered Surveyors (SCS)* and the *Building Materials Federation (BMF)*. This council was set up with the objective of dealing with issues of common interest to the construction industry and concerned itself with such matters as Building Regulations and Building Control, Health & Safety

Regulations, Developer Competitions and relevant European Directives. The CILC on the other hand was established in 1950 and is made up of three of the participants in the CIC; the RIAI, the SCS and the Construction Industry Federation (CIF). Its main function, which is more specific than that of the CIC, is to make recommendations for any amendment to standard forms of building contract.

A third arena known as the Forum for the Construction Industry (FCI) was established in 1997 under the aegis of the DoE&LG, principally to oversee the implementation of the recommendations of the *Strategic Review of the Construction Industry* (DoE&LG, 1997). The FCI includes representation from: the CIC and the CILC; the Irish Congress of Trade Unions (ICTU); private and public sector clients. By having such a diverse membership the FCI can be regarded as being representative of the majority of stakeholders in the Irish construction sector.

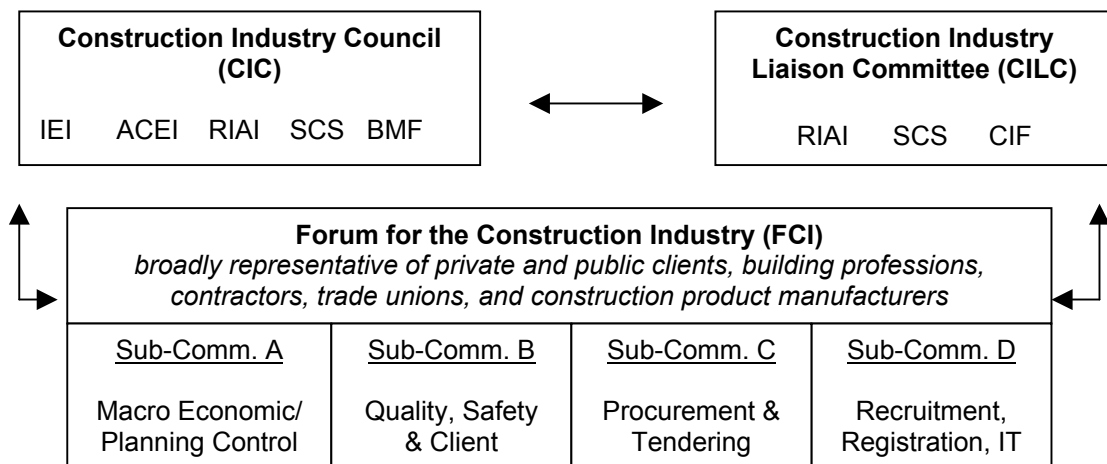


Fig. 1: Arenas for formal communication between representative bodies in the Irish construction sector

For a number of reasons (including geographical, historical and language) construction processes in Ireland are very similar to those in the UK. Many Irish firms either operate independently in the UK or have formed strategic alliances with UK firms. Strong links also exist between the relevant professional institutions. As well as the UK influence however, over the past 30 years a number of multi-national companies have established major pharmaceutical and computing manufacturing facilities in Ireland and in doing so have introduced alternative construction project concepts and processes. A number of major project management firms from the US have worked with these clients in that period and their influence in that aspect of the Irish construction sector has been strong. The influx of designers and contractors has not been as apparent over that period although there are signs that this is set to increase in the near future. The likelihood of an increasing number of public projects being procured in the future using a Public Private Partnership (PPP) approach is a contributory factor in that trend.

The Irish construction sector, in line with the general picture across Europe is predominated by small firms. Although it is difficult to calculate the precise number of individuals and firms that are currently involved in the Irish

construction sector, the following figures were estimated for 2001 (DoE&LG, 2002):

- *The value of the output was €20.1 billion;*
- *It employed 268,000 (191,000 persons directly and 77,000 indirectly), which was approximately 15% of the workforce;*
- *Construction output represented 21% of GDP.*

These figures represent a remarkable rise on those for 1995 as in that period the number of people employed has more than doubled. However after a sustained period of expansion predictions for 2002 and 2003 are mixed. For example the DoE&LG (2002) believe that that construction output in Ireland will decline by 0.2% over the period 2002-2004, while Craig (2002) believes that it will decline by 4% and 2% in 2002 and 2003 respectively.

CONSTRUCTION EDUCATION IN IRELAND

Traditionally professionals in the Irish construction sector were educated at one of the country's universities, namely: University College Dublin (UCD); Trinity College Dublin (TCD); University College Cork (UCC); and University College Galway (UCG). Over the past 30 years however the development of Ireland's eleven Institutes of Technology has led to a significant increase in the number and range of construction sector related undergraduate courses. Although the universities have generally continued to focus on BEng and BArch courses in civil/structural engineering and architecture respectively, the Institutes of Technology offer certificate, diploma and degree courses in a range of topics including: civil/structural and building services engineering; architecture and architectural technology; construction and facilities management; quantity surveying and property economics.

The fact that the Institutes of Technology offer such a diverse range of courses at different levels means that there are a number of opportunities as well as some difficulties. Ratcliffe (2000) pointed out that the range of courses in the Faculty of the Built Environment at the Dublin Institute of Technology (DIT) was both a strength and a weakness. This description could equally apply to the other Institutes of Technology where there are relatively large numbers of students on construction related courses, i.e. Waterford (WIT), Limerick (LIT), Cork (CIT) and Galway (GMIT). The strength of having a broad range of construction related courses in one Institute relates to the possibility of greater integration and understanding of the various participants in the construction process. It also offers the potential for the development of cross-disciplinary innovative approaches to design, construction and management issues. The weakness of having such a range of range of courses relates primarily to the spreading of resources and the associated problems in developing specialist expertise in particular disciplines.

In terms of developing IT knowledge within the Irish construction sector, it is recognised that all of the universities and Institute of Technology have a vital role to play at a number of levels.

CONSTRUCTION IT ALLIANCE (CITA)

In the period 1995 to 1998 a number of Irish people who had been involved with the activities of the Construct IT in the UK met to discuss the possibility of setting up a similar organisation in Ireland. These included Mr. Noel McDonagh as well as personnel from DIT and WIT. Although these meetings did not lead to the formation of an organisation, it did sow the seeds for the conference *Harnessing the potential of IT for the construction industry* held in DIT in November 1999. Following this successful conference, it was proposed that an alliance of interested people from academia and industry be formed to address the key issues associated with this problem. After a number of meetings of interested parties, the Construction IT Alliance (CITA) was eventually established in 2001.

The specific objectives of CITA are:

- *To inform the Irish construction sector of relevant IT developments.*
- *To establish and disseminate best practice in the use of IT in the Irish construction sector.*
- *To encourage IT related research and training collaboration between the Irish academic sector and the leading firms in the Irish construction sector.*
- *To establish and maintain links with relevant national and international organisations.*
- *To encourage the strategic use of IT by the leading firms in the Irish construction sector.*

The development of CITA has taken place mainly through a unique partnership arrangement between DIT and WIT. The authors of this paper are the Directors of CITA and are also members of the CITA Board of Management. CITA welcomes membership from all stakeholders in the Irish construction sector who share the CITA objectives and want to help in their achievement. Part of the strategy in the formation and initial development of CITA however has been to actively target the leading participants in the Irish construction sector. These leading participants play a very influential role and it is recognised that they are key to the improved use of IT in the sector in the short to medium term (Thomas, 1999).

There are currently sixty organisations that have joined CITA and these include construction firms, designers, consultants, product suppliers, specialist contractors, IT suppliers, professional institutions, legal, education and government bodies. The founding members of CITA were DIT, WIT, Sisk, Ascon/Rohcon (part of the HBG group), Arup, Homan O'Brien, PKS, CRH, Jones Engineering Group, the CIF and the RIAI. The FCI has also become a member and it has endorsed the objectives and activities of CITA. The need for maintaining a multi-disciplinary membership to CITA is vital as it is recognised that many of the factors hindering effective IT use in the industry relate to poor integration. A strong and diverse membership should also mean that CITA will be able to help shape the successful development and implementation of future innovations in the industry.

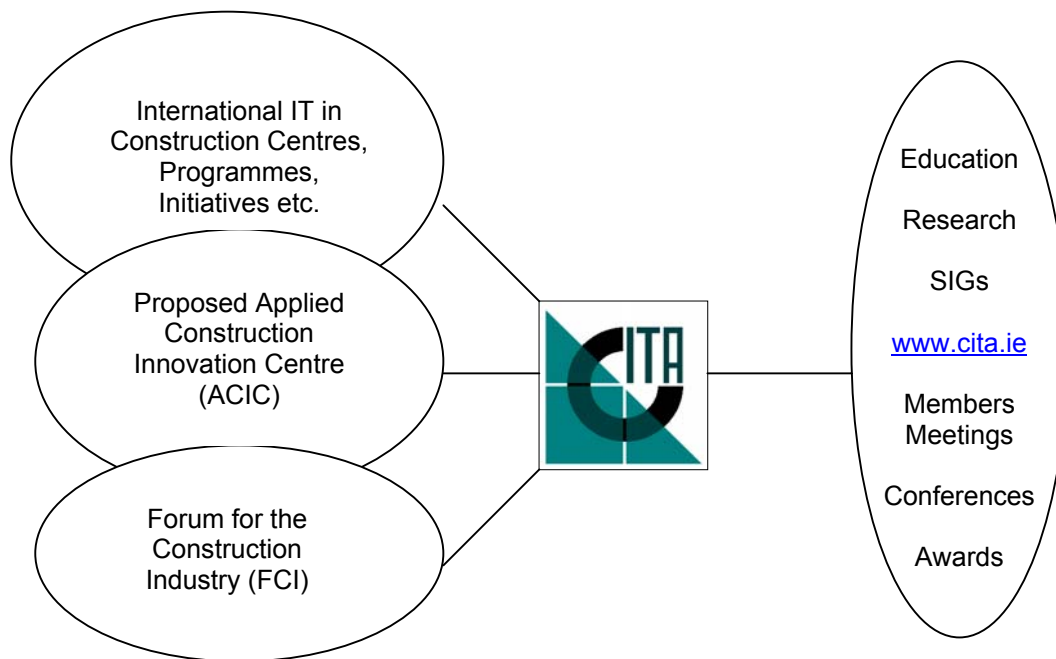


Fig. 2: CITA Links and Activities

There are a number of issues relating to the current management of CITA and its future direction. Many of these issues are referred to in the following sections of this paper and are also included in the *2002 Members Needs Survey*, which is ongoing at the time of preparing this paper. One obvious difficulty however is the lack of sufficient resources to drive the development of CITA and the achievement of its deliverables. Annual subscription for members is currently set at flat rate of €650 but this is not enough to provide the necessary funding. Whether the membership can be expanded to the required level or subscriptions raised to a higher level has yet to be established, but the proposed development of an Applied Construction Innovation Centre (ACIC) may provide part of the solution.

The ACIC was proposed two years ago by *Task Force A1* of the FCI (2000) in response to the final report of the *Technology Foresight - Construction and Infrastructure Panel* (1999). The centre was to have a staff of six people and an initial investment of €1.27 million. Much of the proposed activities of the ACIC overlap with those that CITA is currently undertaking. Unfortunately the government and the representative bodies have yet to agree on the ratio of public/private funding for the ACIC. However a study of the business case for such a centre, including a review of its proposed activities, has recently commenced and a report is due to be presented to the FCI in February 2003.

REVIEW OF CITA ACTIVITIES AND DELIVERABLES

CITA Members Meetings

The holding of bi-annual members Meetings have been crucial in the development of CITA. These meetings are significant milestones as they have provided opportunities for the members to listen to leading experts on relevant up-to-date issues. More importantly perhaps, they provide an opportunity for the members to discuss these issues in an open and relatively informal manner. The typical format for these meetings is for the members and invited guests to meet at 8.00am for breakfast. The members and guests are usually seated in groups of eight at circular tables and each of these tables will have representatives from the different disciplines involved in CITA. At 8.25am the meeting is formally opened and two or three speakers give their presentations. At approximately 9.45am a workshop is started where each of the tables are asked to discuss a number of questions relating to the presentations. Feedback from these discussions is then communicated by a representative from each table (typically a member of the CITA Board of Management) and the presenters are given an opportunity to give their views. The meeting is closed at 11.00am to allow the majority of the members time to get to their workplace for a portion of the working day. The main learning outcome from each of these meetings is the dissemination of information on relevant topics to the CITA members. The content and the discussions within the meetings have also been incorporated into the work of the SIGs. Summary details of the meetings held to date are included in Figure 2.

Date & Meeting Theme	Guest Speakers	Workshop Topics
May 2001 <i>Harnessing the potential of IT in the Irish construction sector</i>	Dr. John Connaughton, <i>DLE & ITCBP</i> Dr. Tim Broyd, <i>WS Atkins & Construct IT</i>	Consideration of relevant issues including the IT needs of the sector and barriers to IT implementation. Open discussion on the potential development of CITA.
November 2001 <i>Effective use of IT in the construction sector – the challenges and the benefits</i>	Mr. Brian Zelly, <i>O'Rourke Laing & IAI</i>	Identification and consideration of the integration and interoperability issues to be addressed by CITA SIGs. These included CAD Layering conventions and the procurement of building materials.
May 2002 <i>Effective collaboration in construction and launch of the CITA website</i> www.cita.ie	Mr. Tim Cole, <i>Causeway Technologies</i> Mr. Ed Crotty, <i>Buildonline</i> Minister Tom Kitt	Review of the work of the various SIGs during the 6 months since the previous meeting. Consideration of the structure and content of the new CITA website.
November 2002 <i>Desirable Objects – How the Irish construction sector can harness the potential of Object Technology</i>	Mr. Nick Nisbett, <i>Jeffrey Wix Consulting and AEC3 Ltd.</i> Dr. Jason Underwood <i>Construct IT</i> Mr. Bill Reddington, <i>DIT</i>	Consideration of the current and future use of Object Technology in the Irish construction sector. Review of the results to the Members Needs Survey and the election of a new Board of Management.

Fig. 3: Summary of CITA Members Meetings, 2001 & 2002

CITA Special Interest Groups (SIGs)

CITA depends a great deal on the network of Special Interest Groups (SIGs) formed by members. Members are encouraged to get involved in developing new interest groups or by joining established groups. It is intended that the findings of these groups will be published and will encourage further research. The SIGs that are currently in operation are as follows:

- SIG 1 - Materials Procurement
- SIG 2 - Layering convention for CAD drawings
- SIG 3 - Website development
- SIG 4 - Collaboration Tools
- SIG 5 - eTendering
- SIG 6 - Object Modelling
- SIG 7 - Education and Research

The progress of each of these SIGs has been varied. For example SIG2 has been very successful in that it has achieved its original objective. Within a year of its formation the group, which included representatives from a number of the leading architectural and engineering practices in Ireland, had reached agreement on a proposed layering standard. The proposed standard sets out principals and guidelines on how a layering system should be set up. It covers 90% of common CAD uses. It also allows flexibility to work within the principals laid down and for individual practices to suit any particular usual requirement. It uses four commands to create new standard layers and to change objects onto these layers. The structure of the layer name is standardised and consists of four abbreviations. For example an Architect's layer could be as follows: AR-BLDG-DIME-7. The first abbreviation (AR) is indicated that the layer belongs to the Architect and AR is the abbreviation advised in the British Standards of Layer Control. The second abbreviation (BLDG) consists of four letters and abbreviates the main object. The third abbreviation (DIME) is associated with the main object and the fourth (7) is always the pen thickness associated with that layer.

This standard is to be adopted by the RIAI and the ACEI for use on future projects in the Irish construction sector. Although specialist contractors and suppliers were not directly involved in the preparation of this standard, it is expected that these firms will also use it on future projects. All of the relevant third level institutions in Ireland are being encouraged to incorporate the standard in their construction sector courses, particularly those that have a significant CAD content. This standard is available to all CITA members (through the CITA website) and also through the ACEI and RIAI. It can be used by practices who we know currently do not have a standard and by practices to consolidate and formalise their own standards. The SIG members have agreed to monitor feedback on the standard for 12 months and any suggested improvements will be incorporated in a modified version of the standard after that period.

Apart from SIG2, the other SIGs have yet to achieve their original objectives. For example the original objective of SIG1 was 'to find a more effective and cost efficient system for the administration of purchasing and payment of building materials, using currently available technology'. It was expected that 'the proposed system should be practical and user-friendly' and 'it must be

designed in a manner that will allow it to be tested while being used alongside the current system'. The progress of this SIG has not been as fast as was anticipated. Reasons for this lack of progress include the significant up-front costs of developing an appropriate system and the difficulties of identifying a system that suits all the participating firms. SIG 3 has been successful in that the CITA website was created. The need for the on-going maintenance and development of the website is recognised and to date that has been difficult to achieve (see separate section on www.cita.ie below).

The personnel involved in SIG 4 have changed recently and the new group have established revised objectives, which they are currently addressing.

These objectives include the generation of guidelines for CITA Members on:

- *the various collaboration tools currently available;*
- *the legal status of electronically shared information;*
- *the costs/benefits of using collaboration tools;*
- *case studies of the use of collaboration tools in the Irish construction industry.*

SIG 5 is making some progress in achieving its objective of establishing guidelines for eTendering within the Irish construction Industry. Although there have been a number of technical difficulties identified, many of which relate to the level of interoperability of different software packages, the group hope to produce their report at the next members Meeting in May 2003. SIG 6 is in the process of being re-constituted, as the original group was not making any significant progress in developing guidelines for the development and use of object-technologies in the Irish construction industry. Although there is general agreement among the CITA members of the potential of object-technology, it would appear that the subject is not a priority at present. However it is hoped that the presentations at the most recent Members Meeting in November will engender enthusiasm about object technology and a newly invigorated SIG 6 can make some progress over the coming months.

The lack of progress on SIG7 is a major concern. This group was established to encourage collaboration between the Institutes of Technology and Universities. The short-term objectives of this SIG were:

- *To identify all existing and current research carried out in Irish Universities and Institutes of Technology that is relevant to the use of IT in the construction sector*
- *To identify the extent of IT training on current undergraduate and postgraduate courses related to the construction sector in Irish Universities and Institutes of Technology*
- *To identify specific training courses for IT use in the construction sector that are currently available in Irish Universities and Institutes of Technology*

The medium-term objectives are of this SIG were:

- *To develop a network of Irish academics that can work collaboratively on a range of research and training projects related to improving the use of IT in the construction sector*
- *To actively promote the importance of interoperability on undergraduate courses in Irish universities and Institutes of Technology*
- *To identify best practice examples of IT use for construction sector related education around the world*

Progress in achieving these objectives has been disappointing. Although membership of CITA for the Institutes of Technology and Universities is free, potential participants from colleges other than DIT and WIT have been reluctant to get involved. It is intended that this SIG will encourage the adoption of the CITA CAD Layering System on relevant undergraduate courses and this may lead to greater involvement and interest in CITA. The expected development of distance learning education courses and modules for the construction sector by the Irish Institutes of Technology and Universities currently, either independently or in an alliance, may also encourage more active participation in CITA.

In general there have been a number of difficulties with the majority of the SIGs, but probably the most crucial factor hindering progress has been that all the participants are acting in a voluntary capacity. That is to say the resources that the participants can allocate to the SIGs is quite limited with the day-to-day requirements of their core activities taking precedence. It is difficult to see how progress on the existing SIGs and the formation of new SIGs will be improved without the dedication of the necessary resources either directly through the participating firms or external funding.

CITA Website (www.cita.ie)

The CITA website www.cita.ie was launched at the Members Meeting in May 2002. The development of such a website was highlighted in the first CITA Members Meeting as being a priority. The design and maintenance of the website has been one of the few CITA activities that have been outsourced. The firm chosen to carry out this work was a relatively new company called *purewebstyle* and they worked closely with the CITA Directors in the development of the website in the six months prior to its launch. A key principle in the design of the website was 'simplicity of use'. The website has been structured in such a way as to provide quick access to general information about CITA, the Membership and the SIGs. Access to CITA publications and other relevant documentation is also available to members. Links to other national centres for the use of IT in the construction sector (e.g. Construct IT in the UK) and other relevant organisations are also provided. Sections for *Education* and *Research* have also been created although it is recognised that the current content is limited. As well as notices for the member meetings and other relevant events (exhibitions, conferences etc.), access to *Member Surveys*, the bi-monthly *Electronic Newsletter* and *Members Meetings Presentation Files* is provided through the website.

The website is currently reviewed and updated on a monthly basis. All members are encouraged to access the website for updates. Although the extent of content provided by the CITA members to date for the website has been relatively minor, it is expected that this will increase significantly in the coming year. The current level of traffic through the website is relatively low in volume. Preliminary results from the *2002 Members Needs Survey* do not place the website as of particular importance to the members at present. It is expected however that the website will become more useful to the members as

the content increases, particularly in relation to education and research activities that are specific to the use of IT in the Irish construction sector.

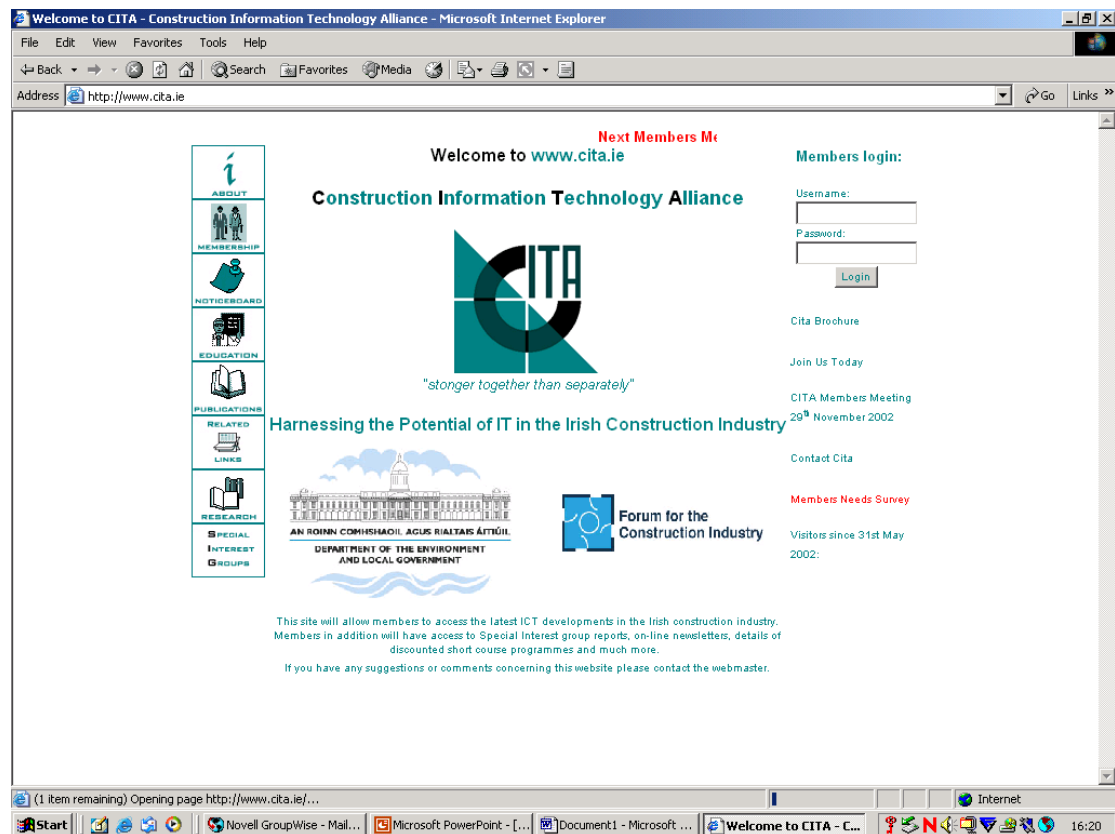


Fig. 3: CITA Website www.cita.ie

CONCLUSIONS

Since its establishment in May 2001, the Construction IT Alliance (CITA) has made some progress towards achieving its objectives. It has certainly been a positive influence in helping a number of the stakeholders in the Irish construction industry learn about relevant information and communication technologies. To date, sixty-two organisations have joined CITA and four successful Members Meetings have been held. These meetings have included some excellent presentations by national and international experts and allowed for cross-disciplinary discussion of the associated issues. The CITA website was launched in May 2002 and although the content is limited, it is expected that this will develop significantly during the next year. However in spite of its current limitations, this has become a useful focal-point for stakeholders in the Irish construction industry who want to learn about IT. Seven Special Interest Groups (SIGs) have been established to address relevant issues and the progress of these groups has varied considerably. Although the SIG2 on *CAD Layering Standards* for use in the Irish construction sector has successfully completed its work, the other six groups are at various stages of completion. The progress of SIG7 on *Education and Research* has been disappointing but there are a number of encouraging factors that are likely to increase the interest and participation of the Irish Institutes of Technology and Universities in CITA.

A key element in the development of CITA has been the diverse nature of the member organisations. The need for balance and cross-disciplinary approaches to the use of IT is recognised as being essential to the success of CITA. The main difficulty that CITA has encountered in its existence to date has been the over reliance on participants acting in a voluntary capacity. The lack of resources has hindered the rate of progress of the SIGs as well as the general administration of the alliance. The creation of the proposed Applied Construction Innovation Centre (ACIC) would potentially solve the majority of the resource difficulties, but there is some doubt as to whether this centre will be established. At the time of writing this paper, the *2002 CITA Members Needs Survey* is being completed. The results of this survey will provide feedback and guidance for the future development of CITA. The current challenge for the Directors and Board of Management is to maintain momentum and to continue encouraging participants in the Irish construction sector to harness the potential of IT.

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