78412

MIMAR SINAN UNIVERSITY★INSTITUTE OF SCIENCE & TECHNOLOGY

A VIRTUAL BUILDING CENTER MODEL TO SUPPORT PROCUREMENT OF BUILDING MATERIALS AND SERVICES IN TURKISH CONSTRUCTION INDUSTRY

MSc THESIS

METE SEV, Architect (MSU)

STRUCTURAL ENGINEERING PROGRAM
"CONSTRUCTION PROJECT MANAGEMENT" SUB-PROGRAM

SUPERVISED BY : **Prof.Dr. SİNA BERKÖZ**

JUNE 1998

T.C. YÜKSEKÖĞRETİM KURULU
DOKÜMANTASYON MERKEZİ

Acknowledgment

I would like to thank to my supervisor Prof.Dr.Sina Berköz for both academic and personal support during my research.

I am also indebted to Dr.Kırhan Dadaşbilge and Associate Professor Alaattin Kanoğlu for their invaluable advices. I also wish to thank to my Project Manager Mr.Haldun Aktaş (Civ.Eng) for his support.

I dedicate this thesis to my wife, Ayşin Sev, for her forbearance.

Mete SEV

28.06.1998

LIST OF FIGURES v

LIST OF TABLES vi

ABSTRACT vii

ÖZET viii

1. INTRODUCTION 1

1.1. Background of the Problem 1

1.2. Statement of the Problem 2

1.3. Previous Work Related to the Problem 2

1.3.1. At Abroad 2

1.3.2. In Turkey 2

1.4. Objectives of the Thesis 2

1.5. Scope and Limitations 3

2. VIRTUAL (ON-LINE) BUILDING CENTERS 4

2.1. Building Centers 4

2.2. Evolution of Building Centers 5

2.3. Building Centers in the Internet 9

2.3.1. Internet 9

2.3.1.1. Making Business in the Internet 12

2.3.1.1.1. Information Distribution in the Internet 18

2.3.1.1.2. Advertising, Marketing, and Shopping in the Internet 19

2.3.1.2. Statistics and Demographics 21

2.3.2. Opportunities For Information Dissemination in the Building Industry 24

2.3.2.1. Introductory Building Centers 24

2.3.2.2. On-line Information and Service Providing Building Centers 30

3. RESEARCH METHODOLOGY 49

3.1. Making a Survey About Building Centers 49

3.1.1. Contacting Building Centers in Different Countries 49

3.1.2. Research Into History of Building Centers 49

3.1.3. Identification Of The Services That Building Centers Provide 49

3.2. A Brief Analysis of the Internet 49

3.2.1. History of the Internet 50

3.2.2. Identification of the Services Internet Provides 50

3.3. Research About "Making Business in the Internet" 50

3.4. Analyzing Samples of On-line Building Centers 50
3.4.1. Choosing Samples *50*
3.4.2. Making a List of Services and Analyzing the Data *50*
3.5. Constructing a Virtual Building Center Model 51
3.5.1. Development of the Model *51*
3.5.2. Testing the Model *51*
4. RESULTS AND FINDINGS 52
4.1. Overview 53
4.2. Product Index 53
4.3. Contractors Directory 54
4.4. Manufacturers and Distributors Directory 54
4.5. News 54
4.6. Construction Related Links 55
5. A PROPOSAL FOR A VIRTUAL BUILDING CENTER 60
5.1. The Effects of the Internet 60
5.2. The User Profile 61
5.3. Services 61
5.4. Web Site Model : Virtual Building Center 62
5.4.1. Welcome Screen *63*
5.4.2. Site Map *63*
5.4.3. Services *65*
5.4.4. Construction Related Links *65*
5.4.5. Directories *66*
5.4.6. Search *66*
5.4.7. Product Indexing *68*
5.4.7.1. 16 Division CSI/Master Format 68
5.4.7.2. Ministry of Public Works Unit Cost Analysis 70
6. CONCLUSION 77
APPENDIX A 78
APPENDIX B 79
GLOSSARY 83
REFERENCES 85
BIOGRAPHY 87

LIST OF FIGURES

Figure 2-1 P.J.Westwood & Sons' winning design in the competition for a new shop front and entrance in aluminium for 158 New Bond Street (London, UK), promoted by the Building Centre and the Northern Aluminium Company in 1939 [4]. 9
Figure 2-2 A typical e-mail client program 11
Figure 2-3 GUI supporting software is used to browse the WWW [11] 12
Figure 2-4 An information providing web site in the construction industry [12]. 19
Figure 2-5 Caterpillar's web site [13] 20
Figure 2-6 Soyak Group of Companies: An advertisement and marketing example in the Turkish Industry [14]. 21
Figure 2-7 Internet Population Projected Growth [10] 22
Figure 2-8 World Wide Web Population Projected Growth [10] 22
Figure 2-9 Gradual growth of WWW users [10] 23
Figure 2-10 Internet uses analysis [15] 23
Figure 2-11 Icelandic Building Center Homepage : The very basic form of a web site [16] 25
Figure 2-12 Norwegian Building Center [17] 26
Figure 2-13 The Building Centre, UK [18] 28
Figure 2-14 Finnish Building Information Center [19] 29
Figure 2-15 German Building Center: Fraunhofer Informationszentrum Raum und Bau [20] 29
Figure 2-16 Architecture/Engineering/Construction (AEC) Info Web Site [11] 30
Figure 2-17 Services supported by AEC Info. 31
Figure 2-18 The classification of building products in the AEC Info web site. 32
Figure 2-19 An example of a sub-category listing in AEC Info 33
Figure 2-20 Government and authorities links page in the AEC Info site 34
Figure 2-21 Sweet's Group home page [21] 35
Figure 2-22 Sweet's map of services 35
Figure 2-23 Sweet's subcategory listing of building products 36
Figure 2-24 English start page of Finnish Building Center [22] 38
Figure 2-25 Product classification of Finnish Building Center 38
Figure 2-26 Sub-category listing of Electrical Services Products in the Finnish Building Center 39
Figure 2-27 Construction Materials home page [12] 40
Figure 2-28 Product classification (CSI/Master Format) of Construction Materials web site 41
Figure 2-29 Construction Net Dashboard provides construction related service 43
Figure 2-30 Trades classification used in finding a local distributor in the ConstructionNet web site 44
Figure 2-31 Construction SuperNetwork menu [24] 44
Figure 2-32 Index page of Construction SuperNetwork 45
Figure 2-33 The site map of Construction SuperNetwork 46
Figure 2-34 The member services of SuperNetwork 48
Figure 3-1 Members of UICB are listed in UICB web site [1] 51

Figure 5-1 The menu bar of VBC 62
Figure 5-2 The structure of VBC 62
Figure 5-3 Welcome screen of VBC 63
Figure 5-4 Site Map of VBC 64
Figure 5-5 Services of VBC 64
Figure 5-6 Construction Related Links of VBC 65
Figure 5-7 Directory listings of VBC 66
Figure 5-8 Search service of 67
Figure 5-9 Product Catalog of VBC 67
Figure 5-10 Master Format Divisions 68
Figure 5-11 Sub-category index of Division 9-Finishes 69
Figure 5-12 Product information of 9640-Wood Flooring 70
Figure 5-13 Entrance of MPW indexing 71
Figure 5-14 The Registration Form of VBC 71
Figure 5-15 Categories of MPW Unit Prices 72
Figure 5-16 Sample sub-division listing of 14-Hand Excavation 72
Figure 5-17 Adding items for the Calculation Area 73
Figure 5-18 Calculation Area 74
Figure 5-19 Entering a new price for an item 74
Figure 5-20 Step 2 of Calculation Area 75
Figure 5-21 Final step for the cost analysis 76

LIST OF TABLES

Table 4-1 Comparison of Building Centers 59

ABSTRACT

In this thesis, the problem is stated as:

"How is it possible to enhance the services that Building Centers provide in the Internet in order to support advertising, marketing and procurement of building materials and services in Turkey?"

The study is presented in five main sections:

In the first section the background of the problem, statement of the problem, previous work related with the problem, objectives of the thesis, and scope and limitations of the thesis is presented.

In the second section literature survey about the Internet and Building Centers is made. After defining the concepts that will be used in further sections, Building Centers are introduced with a historical background. After making an introduction to the Internet, the services that on-line Building Centers provide are researched.

In the third section research methodology is stated. The steps taken during the research are outlined and explained.

In the fourth section the results and findings of the literature survey, which is made in the second section, is presented. For this research, sample web sites are visited, and their services are noted down. Finally, a table of services is made for comparison.

In the fifth section the analysis of the above results is made. In the presence of these analysis, the user profiles, and the services that must be provided by an on-line Building Center is stated, and a web site is presented as a model.

In the sixth section, it is stated that the web site model presented in this thesis is open to further development by including modules as the Internet technology advances.

ÖZET

Bu tezde aşağıdaki problem ele alınmıştır:

"Türkiye'de yapı ürünlerinin ve servislerin reklamını, pazarlanmasını ve teminini desteklemek amacıyla, yapı merkezlerinin Internet ortamında verdikleri hizmetleri geliştirmek nasıl mümkün olabilir?"

Çalışma beş ana bölümden oluşmaktadır:

Birinci bölümde, problemin arka planı açıklandıktan sonra tanımı yapılmış ve bu problemle ilgili daha önce yapılan çalışmalar, tezin amacı, kapsam ve sınırlamaları incelenmiştir.

İkinci bölümde, Internet ve yapı merkezleri konularında literatür araştırmaları yapılmıştır. Konuyla ilgili kavram ve tanımlamalar yapıldıktan sonra, yapı merkezleri ve tarihsel gelişimleri anlatılmıştır. Internet hakkında bilgi verilmiş, yapı merkezlerinin Internet ortamında verdikleri hizmetler araştırılmıştır.

Üçüncü bölümde, araştırma sırasında izlenen metodlar aşamalı olarak açıklanmıştır.

Dördüncü bölümde, ikinci bölümde yapılan araştırmalardan elde edilen bulgular ortaya konmuştur. Örnek olarak seçilen siteler ziyaret edilmiş ve sağladıkları servisler, karşılaştırmaya zemin oluşturması açısından bir tablo haline dönüştürülmüştür.

Beşinci bölümde, bir önceki bölümdeki bulguların analizi sunulmaktadır. Bu analizler doğrultusunda kullanıcı profilleri tanımlanmış, yapı merkezlerinin vermeleri gereken servisler sıralanmış ve örnek bir Internet sitesi hazırlanarak bir model olarak sunulmuştur.

Altıncı bölümde ise, gelecekte teknolojinin geliştirilmesiyle Internet'te verilen hizmetlerin buna paralel olarak artacağı, sunulan modelin de bu gelişmelere uygun olarak modüllerle desteklenebileceği vurgulanmaktadır.

1. INTRODUCTION

1.1.Background of the Problem

Today's digital technology, which led to new opportunities to our daily life, has a great role in the improvement of information exchange and dissemination. By using enhanced media technology, information can be exchanged much more easily and effectively compared to earlier methods. Computers and the Internet have a vital role in this dissemination as well as media like radio, TV, and newspapers that we use today.

Information dissemination can be applied to many business areas, including construction industry as well as our daily requirements. Information is provided by many individuals, companies, and organizations in the construction sector, but mostly by the Building Centers.

The idea of Building Centers had come into being in 1925 as a result of an architect's using a samples room at the Architectural Association (UK) to show samples of three kinds of bricks to a woman client whose house he was designing. When the choice had been made, the bricks remained there, and the samples room developed around them [4]. After the II. World War, Building Centers took part in the reconstruction of Europe. Today, the basic function of Building Centers is to provide building information service for the building trade and professions as well as everyday enquirer [1]. This is achieved on different levels, and methods change with the new information systems.

Internet, which is formed by the network of computers, uses all possible digital technology and assists Building Centers in their missions of information exchange and dissemination. The Building Centers in the USA, and the members of Union of International Building Centers (UICB-Union Internationale des Centres du Batiment) in Europe, are currently using the Internet to provide information and services.

In this thesis, the services of Building Centers provided in the Internet are analyzed, and compared with the improving opportunities in Turkey, and a new web site design is suggested in order to make these services more efficient and up to date.

1.2.Statement of the Problem

How is it possible to enhance the services that Building Centers provide in the Internet in order to support procurement of building materials and services in Turkey?

1.3.Previous Work Related to the Problem

1.3.1. At Abroad

The previous work related to the problem has been researched, and no scientific research has been found about problem stated above.

1.3.2. In Turkey

The National Library and the libraries of the universities have been visited, and no other work has been found in Turkey.

1.4.Objectives of the Thesis

The objectives of this thesis are:

- To make a research about Building Centers, and make a profile of the services they provide.
- To take a closer look in the Internet which uses today's enhanced digital technology, and determine the methods of information exchange and dissemination, and other kinds of services that are widely being used.
- To elaborate the topic of *business opportunities and marketing* in the Internet.
- To build a link between the concepts of service providing of Building Centers and the Internet.
- To construct a web site model of an imaginary Building Center to present the enhancements of services that a Building Center can provide.

1.5.Scope and Limitations

Though it is possible to state that there are no limitations, and the scope of the research is world-wide, the priority is given to the European and the American Building Centers, which use more enhanced technology compared the other countries. Also the virtual building center model was not uploaded to a server, so the database and the search functions are limited with the local hard drive

2. VIRTUAL (ON-LINE) BUILDING CENTERS

2.1.Building Centers

The basic function of Building Centers is to provide building information service for the building trade and professions as well as the everyday enquirer [1]. Besides, Building Centers carry out various researches projects in the building construction field, evaluate newly developed technologies and provide this information to the public [2]. There are also Building Centers, which gathers and procures technical, economic and planning-related information from science and practice of the special fields of structural engineering, architecture, building industry, urban planning and regional planning [3].

Building Centers can have many fields of service. A typical field of services that a Building Center may have is as follows:

- Exhibitions (permanent and/or temporary),
- Information Center,
  - Data bank,
  - Library,
  - Lectures, seminars, and courses,
- Fairs,
- Bookstore,
- Publications.

Today, Building Centers represent a business opportunity in the construction industry. Many privileges can be obtained by being a member of a Building Center with an amount of membership fee, so we can conclude that Building Centers are the participants of today's business world as well as their public service.

2.2.Evolution of Building Centers

The world's first Building Center was established in London UK in 1932, which introduced the term "center" to the world identifying a focal point of an activity[4].

J.K. Winser, the first Technical Manager of the Center, had come to the Architectural Association via Bedales School. While at the Architectural Association (AA), he operated the Samples Room which existed 'under the stairs' at 36 Bedford-square housing a modest display of bricks, tiles and so on which were used in the lectures on materials. Various claims to the formation of the Samples Room have been lodged, but worth recording is a remark once made by G. Grey Wornum to Frank Yerbury in the presence of Percy Dunn- 'and to think this all started with three bricks'. The Samples Room had come into being in 1925 as the result of Wornum's request to Yerbury to use a room at the AA to show samples of three kinds of bricks to a woman client whose house he was designing. When the choice had been made, the bricks remained there and the Samples Room developed around them. Winser took charge of this room in 1927.

In 1928 Winser, being in the need of paid employment, put up to Frank Yerbury, at that time Secretary of the AA, a scheme for extending the Samples Room –an idea which he had hatched with the late David Booth ARIBA. Yerbury accepted the scheme and the Samples Room was transferred to larger premises on the east side of Bedford Square. Winser was put in charge, assisted by a young man C.H. Knight (afterwards Director of the Lead Development Association).

By 1930 several things had begun to happen. The collection of samples was growing, largely due to the interest taken by AA and also RIBA members, as also were the calls for technical information supplied by Winser. There were demands for more space and more staff. The Samples Room had become a success. It was at this point of time that the idea of a display of materials on permanent and commercial lines was born, and with its plans for an extended and improved Information Service.

It is not exactly known in whose mind the idea of a permanent Building Centre first arose, though Winser thinks it was probably Yerbury's. Yerbury had paid a visit

about that time to Berlin where a building materials display (Bauwelt Musterschau) had been opened on a commercial basis. Winser's recollection is that Yerbury's awareness, as Secretary, of the financial embarrassment caused to the AA Council by the growing needs of their Samples Room, plus the evidence from Berlin that such a venture could be run commercially, may have struck the spark. But this account does not explain how Sidney Glyn and V.E. Vincent came on the scene, or why they should have provided the initial finance and much of the impetus.

V.E. Vincent has lately given a different version. When in New York in 1929 he went to see what is still called "The Architects' Sample Bureau". Operated by one of the technical journals, it was a room in which were assembled samples of the materials and equipment an architect would use in a particular building and to which he could bring the client. That done, the samples were removed and the process repeated for another project.

Vincent, during his visit, noticed that one piece of equipment, a radiator, had been left by accident and this, he says, gave him the idea of permanent display in London. On his return, after discussing the proposal with several friends, he gave a lunch at the old Carlton Hotel in the Haymarket to which were invited a number of leading architects, including Grey Wornum, L.H. Bucknell, Louis de Soissons, A.B. Knapp-Fisher and Robert Atkinson. To these Vincent explained his idea for setting up an Architect's Samples Bureau. Present at the lunch, at Wornum's suggestion, was Frank Yerbury, whom Vincent had not previously met.

An enthusiastic reception was accorded the plan, and promises of support were given. It was following this, Vincent says, that Yerbury told him of the AA Samples Room. It is difficult to fix the precise date of the Carlton Hotel luncheon, but it was at some point in time between Vincent's return from USA late in 1929 and the spring of 1930. Much discussion and planning took place before, at the end of 1931, the first meeting was held of those who became the Board of Directors.

What is common to both the accounts that the new foundation did take over the AA Samples Room, and that with it, on Vincent's suggestion, went Yerbury and Winser. The explanation of what appear at first sight to be conflicting accounts may be recalling that the idea of a permanent display of building materials was not new (it

was in being already in Berlin on a paying basis, and both USA and Sweden were operating samples bureaux for architects) and the plan for a London Centre may well have sprung simultaneously in more that one mind. It is even possible that the AA, had it had the money, might have initiated a similar scheme. What is not in question is that the first impetus and the priming funds came from Vincent and his brother Sidney Glyn.

Following the Carlton Hotel lunch, but previous to the initial Board meeting, there was at least one other exploratory gathering, for this is referred to in the Minutes of the first recorded meeting of was to become the Board of Directors. At this Board meeting held on 2 December 1931, there were present Robert Atkinson, L.H. Bucknell, Louis de Soissons, V.E. Vincent, Sidney Glyn, A.B. Knapp-Fisher, Maurice E. Webb, G. Grey Wornum and F.R. Yerbury. Sidney Glyn, from the chair, asked Maurice E. Webb to report on the 'attitude of the RIBA to the proposed "Architectural Bureau" ' to which Webb replied that the Council had consented to support the new Bureau 'subject to the constitution being drafted so that no single exhibitor could gain control'. (The Council met this request by lying down that no exhibitor should occupy more than £300 worth of space.)

The meeting was also heard from Knapp-Fisher (then the AA President) that the AA had made 'tentative arrangements to form a separate company to run a bigger and better Bureau' but in view of the new development they would be quite willing to merge on terms. These were later stated by Yerbury as being the refund of the £5.000 that the AA had laid out on their bureau. (This sum was later reduced to £1.500, to be taken in debentures, plus the cost of keeping the AA Samples Room in being until the new Bureau opened.) Knapp-Fisher's statement seems to give substance to the view already expressed, that Vincent and Yerbury independently hit on the idea of a Building Centre run on commercial lines.

The meeting proceeded to elect as Directors Robert Atkinson, L.H. Bucknell, Louis de Soissons, Sidney Glyn, V.E. Vincent, Maurice E. Webb, G. Grey Wornum and F.R. Yerbury – all except Glyn, Vincent and Yerbury being members of the RIBA. Total remuneration for Directors was to be £500 annually, divided equally, but the company was to take power to pay the Directors special fees for special services An

article contributed by Yerbury to 'Building' (then 'The Builder') set out the thinking behind the preponderately architectural control. 'The organisation should be controlled by architects, as it is, who personally can gain nothing from their association with it. Obviously, an enterprise of this kind, in order that it should be reliable and effective, should be in the hands of disinterested parties from whom there is no inducement either way to favour one material more than another, except on grounds of superiority'.

An intensive search for premises resulted in leasing three floors of a building at No.158 New Bond Street, and there the Building Centre opened officially on 7 September 1932, though it had in fact been partially in operation since the previous July.

Manufacturers had given support to the Centre from the time that representatives of leading firms had been invited to a meeting held at RIBA in Conduit Street, in December 1931, with Raymond Unwin in the chair. This meeting was called to explain what 'The Architectural Bureau' was all about; out of that meeting 'Building Centre' emerged, the first use that can be traced of a term 'Centre' that is now widely used in many countries to identify a focal point of an activity. (On 3 February 1932, by formal resolution, the Board agreed that the exhibition should be called 'the Centre' and the company 'The Building Centre Limited'.)

The 120 manufacturers present at the meeting in December heard Maurice Webb (who had been elected chairman of the Board) outline the purpose of the Centre as 'arising out of the great need – one of the most pressing of the building industry- for a ready and accessible means whereby the architect and others interested in building may keep themselves abreast of modern developments in building materials and, conversely, the manufacturers may feel certain that their products and their developments are constantly receiving the consideration of the architectural professions, the building industry and the public'. Manufacturers rallied to this call, and by the time the Centre opened in the following September, space to the value of over £21.000 had been booked. Much help and useful advice was given by the gas Council and the Electrical Development Association and by individual

manufacturers, including Cyril Carter of Carter & Co. Ltd., the tile manufacturers, and Donald Hope of Hope's Metal Windows.

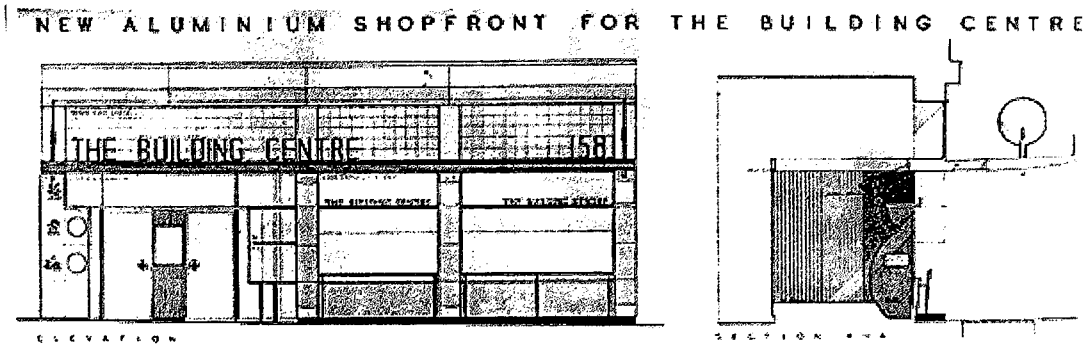


Figure 2-1 *P.J. Westwood & Sons' winning design in the competition for a new shop front and entrance in aluminium for 158 New Bond Street (London, UK), promoted by the Building Centre and the Northern Aluminium Company in 1939* [4].

The foundation of the first Building Center inspired other countries to establish their own Building Centers. In 1958, UICB (UICB-Union Internationale des Centres du Batiment), which has now 31 members all over the world, was founded to provide a connecting link between national and regional Building Centers.

2.3.Building Centers in the Internet

To elaborate the services that the Building Centers can provide in the Internet, it is vital to understand the Internet and its capabilities.

2.3.1. Internet

Computing technology today allows people to create stunning graphics, and provide impressive digitized sound systems. Yet, the most amazing technologies are really those available to the common household and businesses. Networking technology is racing towards the future in instant global communication. There are now proposals for global coverage of data and telephony communication via satellites from various organizations but we first have to understand the current capabilities of global networks and computing technology.

For businesses, large and small alike, computing and networking technology is quickly becoming an absolute necessity. Why is global networking so important?

Some businesses have discovered that their area of service naturally extends to a global scale and wish to contact whole new base clients. Others have found peer organizations and people involved in similar work to share and communicate new ideas for various aspects of their business. Still others have found a whole new way of advertising their company's services or products. Global networks such as the Internet have also become a cost-effective and quicker way to transfer important documents to remote offices than courier services or even fax [5].

The term "Internet" is used to identify any collection of networks into a larger *Wide Area Network* (WAN). The Internet itself is a conglomeration of thousands of computer networks utilizing a common set of technical protocols to create a worldwide communications medium. The Internet has an estimated population of 20 million users and has a presence in over 70 countries. The Internet as it now stands is still one thirds a research and educational network because of the many universities and institutes connected to it. Commercial communications have taken over the majority of Internet traffic.

There are many tools to get an access to Internet, which serves different functions according to our purposes.

Electronic mail (e-mail) is a messaging system, which allows the user to send communiqués, and reports to users on the Internet. Every computer on the Internet can be addressed uniquely and many of these 1.7 million or so computers support multiple users. Each of these users may also be uniquely addressable through their email addresses, which may or may not correspond to the names of their Internet accounts and machines depending upon the local set up.

Electronic News on the Internet is mainly distributed through the Usenet news system. Usenet newsgroups can be thought of as bulletin board systems where users posting to a certain group can inform all other readers of those newsgroups. Each newsgroup concentrates on its own specific topic, which also is the general name of the newsgroup. [5]

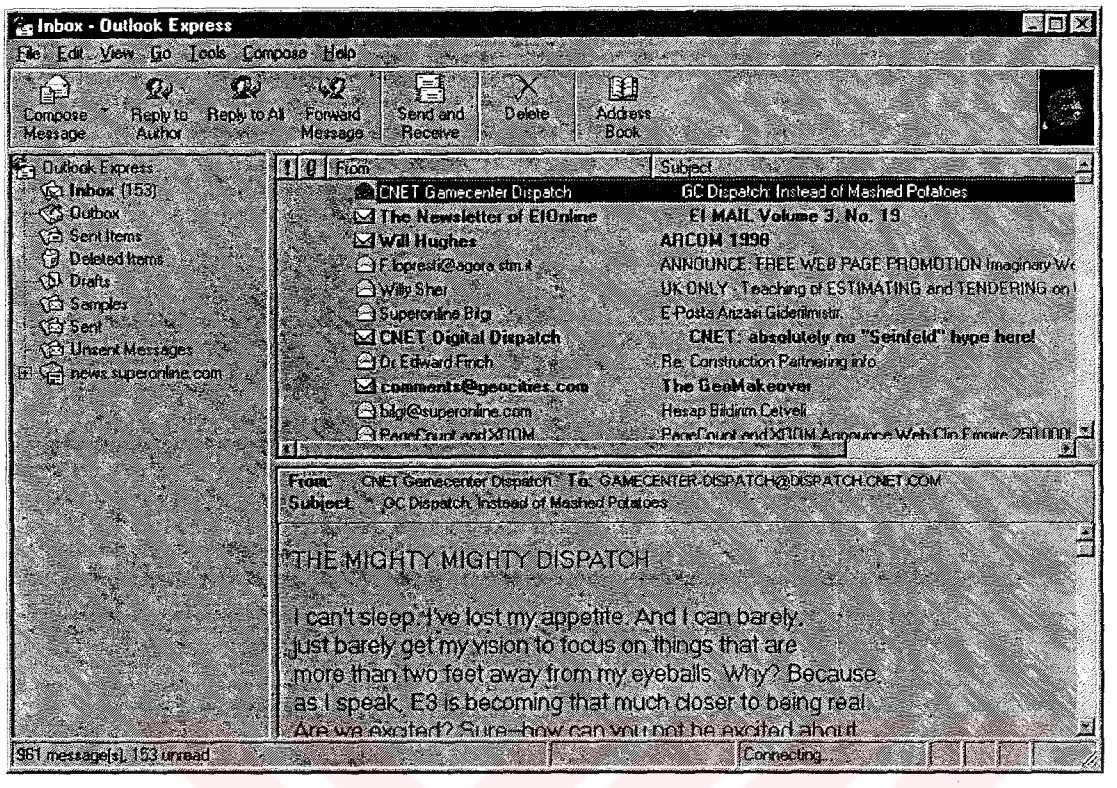


Figure 2-2 *A typical e-mail client program*

File Transfer Protocol (FTP) is a service, which enables file transfers between computers. With FTP, it is possible to move, or retrieve files from one computer the other. Typically, password protection is available to prevent unauthorized use of the server. Anonymous FTP access is available on many servers around the world, normally with few restrictions. A prime use of anonymous FTP is to access shareware, graphical images, and updates to software applications [7].

The World Wide Web is a hypertext based information service. It provides access to multimedia and complex documents and databases. The Web, as its is colloquially known, is one of the most effective methods to provide information because of its visual impact and advanced features. The Web can be used as a complete presentation media for a companies corporate information or information on all its products and services. Smaller companies also provide their own information on a global scale through the Web [5].

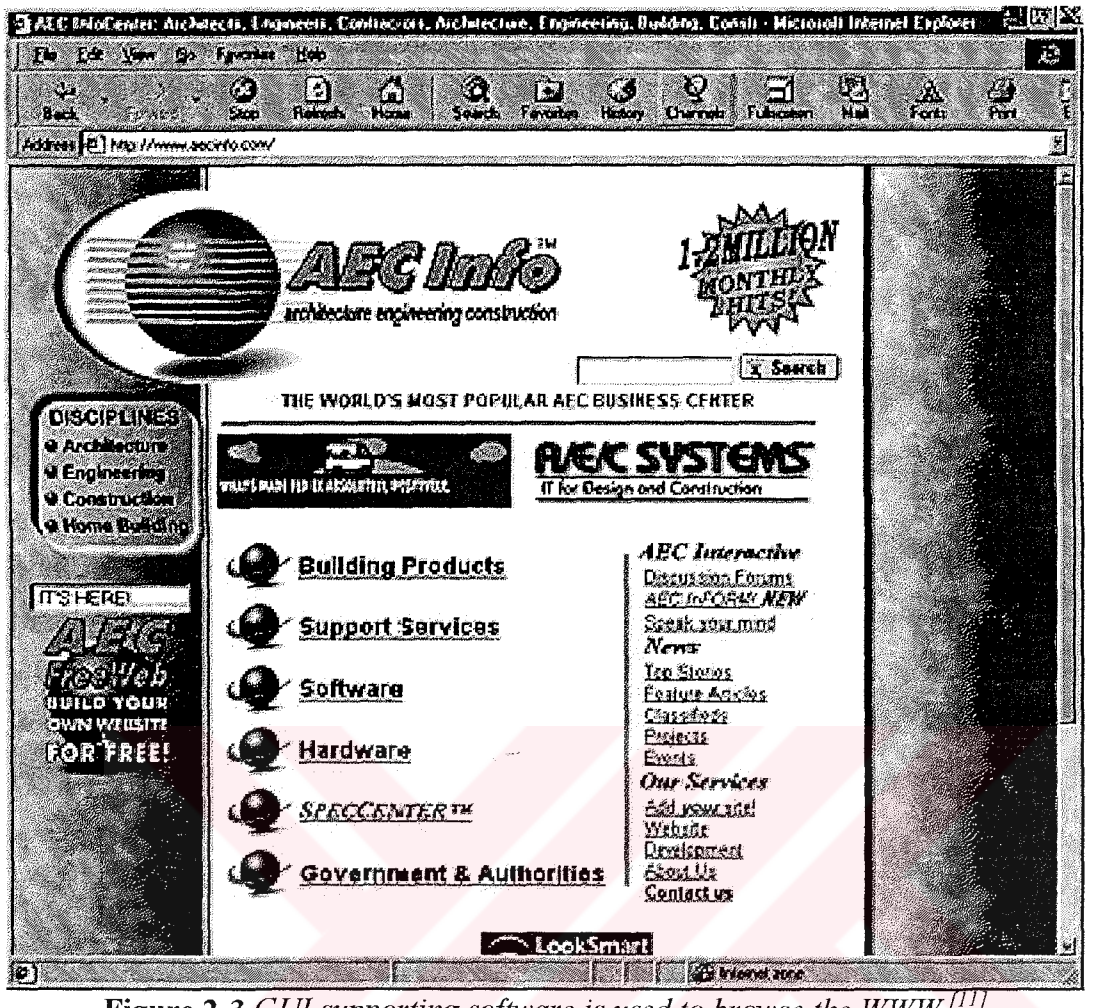


Figure 2-3 *GUI supporting software is used to browse the WWW* [11]

2.3.1.1.Making Business in the Internet

For hundreds of years, newspapers have been a rich source of information. Primarily textual in nature, they offered dense information in an easy-to-use form. When radio came along, the communication became less information-rich, more entertainment driven; and television brought yet another lowering of the level content.

With the Net and the Web, the opportunity exists to return to an information-rich enviroment, but now enhanced by the multimedia features of the Web [6].

Businesses are the fastest growing segment of the Internet for many reasons: You can gather information, communicate, and actually transact business on the Internet. Some businesses are creating a corporate presence on the Internet, sometimes using a

virtual storefront. Corporations are using e-mail for communication; Web sites for marketing, PR, and selling; and FTP for file and data transfers.

There are both visible and invisible business users of the Internet. Many businesses use the Internet for transacting business, but their work is largely not seen by the average Internet user. The largest invisible users of the Internet tend to be financial and medical institutions and insurance corporations, industries with very high data traffic rates on the network. Most of these large companies have established "fire-walls" to separate their own local data traffic from the rest of the Internet.

The most visible businesses on the Internet have a multifaceted corporate presence. They are visible in product announcements, on lists, on Usenet newsgroups, FTP, and more importantly, on the World Wide Web. Many have established virtual storefronts.

Businesses use the Internet for almost as many reasons as there are businesses. The Internet is used by businesses for:

- Communication (internal and external)
- Corporate logistics
- Leveling the playing field
- Globalization
- Gaining and maintaining competitive advantage
- Cost containment
- Collaboration and development
- Information retrieval and utilization
- Marketing, PR, and sales
- Transmission of data
- Creating a corporate presence

These reasons are explained as follows:

Communication (internal and external) : Maintaining good corporate communication is critical to businesses, and e-mail is a low-cost method for maintaining local, regional, national, and international communication. Messages can be exchanged in minutes, as opposed to days or even months using regular mail. E-mail is a shared information utility and is one of the most important productivity packages going. Often, the first and most frequent business use of Internet connectivity involves internal and external communications.

Businesses use the Internet to keep departments, work groups, and individuals in close contact. Many companies are using internal Web sites (intranets) to maintain good communication with branches and distant offices. Web documents provide a way to add and link related information from divisions such as marketing, accounting, sales, and planning--for example, to create an integrated set of documents.

E-mail is the primary way that people on the Internet communicate with each other. Many people use the Internet daily because they prefer communicating by e-mail, rather than over the phone or by postal mail. Businesses can make use of this increasing public enthusiasm for e-mail by interacting with customers via e-mail. Because some people prefer using e-mail, you are more likely to receive a quick but thoughtful reply if you send your message by e-mail. Customers are increasingly finding that they can obtain up-to-date information readily through e-mail, company-sponsored discussion lists, auto-responders, and the other tools used by businesses: the Web, Gophers, and FTP sites.

Corporate Logistics : When communicating via e-mail, and electronic conferences, not all participants have to be in the same place at the same time to conduct business. Actual "real-time" communication is also possible among individuals worldwide. The increasing use of video conferencing techniques, or telephone-like software is making virtual meetings easier. Distance and time barriers are lessened by using the Internet for communication.

Logistical concerns that can dominate production planning can be eased by better contact through the Internet.

Globalization and Leveling the Playing Field : Using the Internet, many organizations are able to bring a global edge to a provincial business. This opportunity for rapid communication can increase a business's visibility from local to global overnight. Because access to the Internet has gotten cheaper, even smaller industries can compete in the larger marketplace by creating an image on the network that allows them to compete with large businesses.

Businesses that use the Web and, to a lesser degree, the other parts of the Internet, will need to think about the use of the global Internet, and their ability to do product fulfillment on a global scale.

Gaining and Maintaining Competitive Advantage : Increasingly, businesses are taking a look at their own organizations, structures, and processes in an effort to become more competitive. The Internet is a wonderful tool for engaging in these activities. Many companies are using e-mail and group conferencing to engage in business process reengineering projects. Maintaining good communication and the exchange of data and documents is critical in undertaking the reengineering of business processes.

Companies can gain a competitive advantage by having access to state-of-the art information on products, materials, and new ideas, and an increased ability to evaluate the existing state in a given industry. Many corporations use the Internet to engage in new technologies, and the market response to those technologies, by gathering information as well as data on financial performance and the stock market.

In addition, many businesses are using their Web sites to make available corporate information such as is typically found in annual reports, including information regarding financial performance and more.

Cost Containment : Many business are using the Internet to contain long-distance telephone and mailing costs. Businesses can save thousands of dollars using e-mail, instead of some long-distance phone calls and postal deliveries. And these e-mail

messages can increasingly contain data files (such as spreadsheets or CAD files), pictures, graphics, sound and movie files, and software. In addition, the e-mail, data exchange, and conferencing abilities of the Internet are reducing the need for travel. This saves time, effort, and money.

Collaboration and Development: It is increasingly common for companies to form partnerships and collaborative development efforts. The Internet also allows several small businesses to band together much more easily for product development.

Formerly, companies tended to maintain separate projects, or to create a new division or production unit to handle a specific problem. Now, many companies are temporarily pooling resources to put out a new product or service, and are using the Internet to do this through e-mail, group conferencing, and exchange of spreadsheets, documents, drawings, pictures, and sound files. Web sites often are used in support of such projects. Such collaborations allow those in marketing, research, engineering, and accounting to keep track of and provide input on a project through every step of its development.

Information Retrieval and Utilization: Rich in resources, the Internet provides software, communications connections worldwide, and files of text, data, graphs, and images. The Internet provides access to databases, books, manuals, training information, experts in various fields, even sound and video clips.

Marketing and Sales : As businesses use the Internet more, and Internet users become more accustomed to marketing activities, Internet marketing is becoming much more popular. Marketing on the Internet involves both research and active outflow of information-marketing through information.

Marketing and sales on the Internet, both business-to-business and direct to the consumer, have been revolutionized by the World Wide Web. Business on the Web allows for:

- Full-color catalogs that are easily and frequently updated
- Online graphics, sound, and textual information

- On-screen ordering, customer feedback, and surveys
- Online technical support
- Worldwide distribution of announcements and PR information

One of the prime business uses of the Internet is in the area of customer support. Customers can reach a company on their own schedules-day or night. The customer support information only has to be transferred to an archive once, and yet it may be accessed by thousands of customers and potential customers-a very labor-efficient and cost-effective way of distributing information.

The Internet is also a fast and efficient way of networking with vendors and suppliers. With its global reach, the Internet can assist businesses in locating new suppliers and keeping in better touch with them.

In an increasing number of cases, companies are doing actual product sales transactions on the Internet, particularly through the Web. In addition, if the product is amenable to electronic delivery, as with software and information, it is actually delivered via the Internet.

Transmission of Data : Many companies have been using the Internet for the transmission of data. The major financial and medical institutions in the world use the Internet extensively for exchanging information and files. Publishers are using the Internet to receive manuscripts, and to transmit files for printing over the Internet. Books are written and edited collaboratively using the Internet.

Research and scientific organizations and educational institutions, the original inhabitants of the Internet, are using the Internet to transmit large quantities of data as well, but corporate users now transfer the largest portion of data over the Net.

Corporate Presence on the Internet : By creating a corporate presence on the Internet, businesses can participate in all the benefits of online marketing, publicity, and sales. They can use such tools as the Web, Gopher, FTP, Telnet, e-mail, and Usenet to build and support a virtual storefront, create catalogs that can be browsed online, announce products, take orders, and get customer feedback.

2.3.1.1.1. Information Distribution in the Internet

The Internet is a worldwide electronic media source for retrieving and sending information between bases. The World Wide Web enables electronic data devices to take advantage of the vast information store, which makes up the Internet. In the quest for competitive advantage, it is essential to advertise and market in the most effective forms of media. With the advent of electronic media came the ability to provide quick, cost effective collections of information.

The Internet was created with the goal to provide a global, uncontrolled, flexible source of information. The "net" allows people, businesses, and companies to store unlimited sources of information for public or controlled access. A great portion of this information requires management, most of which is provided by database systems. Databases in the past were only able to be used across a company with the use of Local Area and Wide Area Networks (LAN's, WAN's). However now, the Internet, a global network, allows companies to provide access to databases from anywhere in the world.

As the structure of the Internet is based electronically, it is not static, thus providing flexibility. Advertising pages and informational data bases can be edited, added or deleted in minimal time on request. Other forms of media such as television or print media cannot match this flexibility. With this in mind Internet users are taking advantage of a new form of media that can be completely tailored to their specific needs with minimal cost, time and resources. The Internet is based on a need-to-know basis, giving the browser complete control over the information that he/she requires. This allows users to bypass information that they are not concerned with, thus pin pointing their information quickly [8].

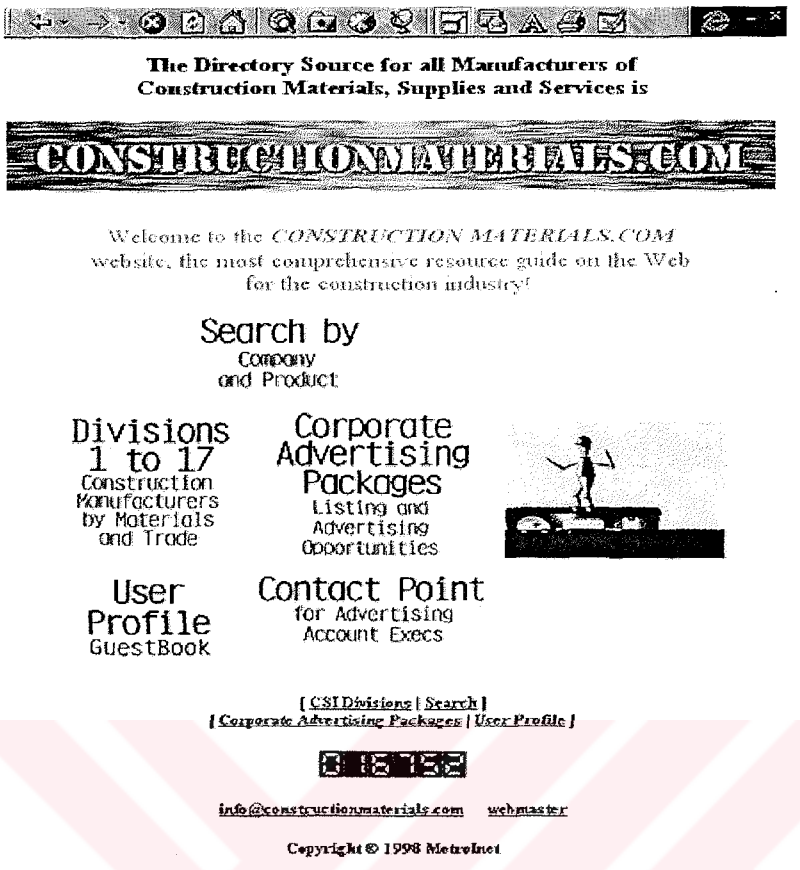


Figure 2-4 *An information providing web site in the construction industry* [12].

2.3.1.1.2. Advertising, Marketing, and Shopping in the Internet

The Internet provides a dynamic platform to provide marketing and advertising campaigns. With a communication medium that provides access to every location on earth, the audience scope becomes incredibly vast. Moving closer to home, companies using the Internet are taking advantage of spreading their advertising message to over 1.5 million subscribers across the nation. The rapid increase in PC/Internet penetration statistics highlight the snowballing effect that electronic media has on the general public, particularly in household usage. By using the Internet to advertise, you have the potential to reach this large audience comprising of both potential clients / customers and competitors [8].

The Internet is being used extensively for marketing and selling. This is becoming the most popular business use of the Web- for advertising, visibility, brand name recognition, public relations, press releases, corporate sponsorships, and direct sales.

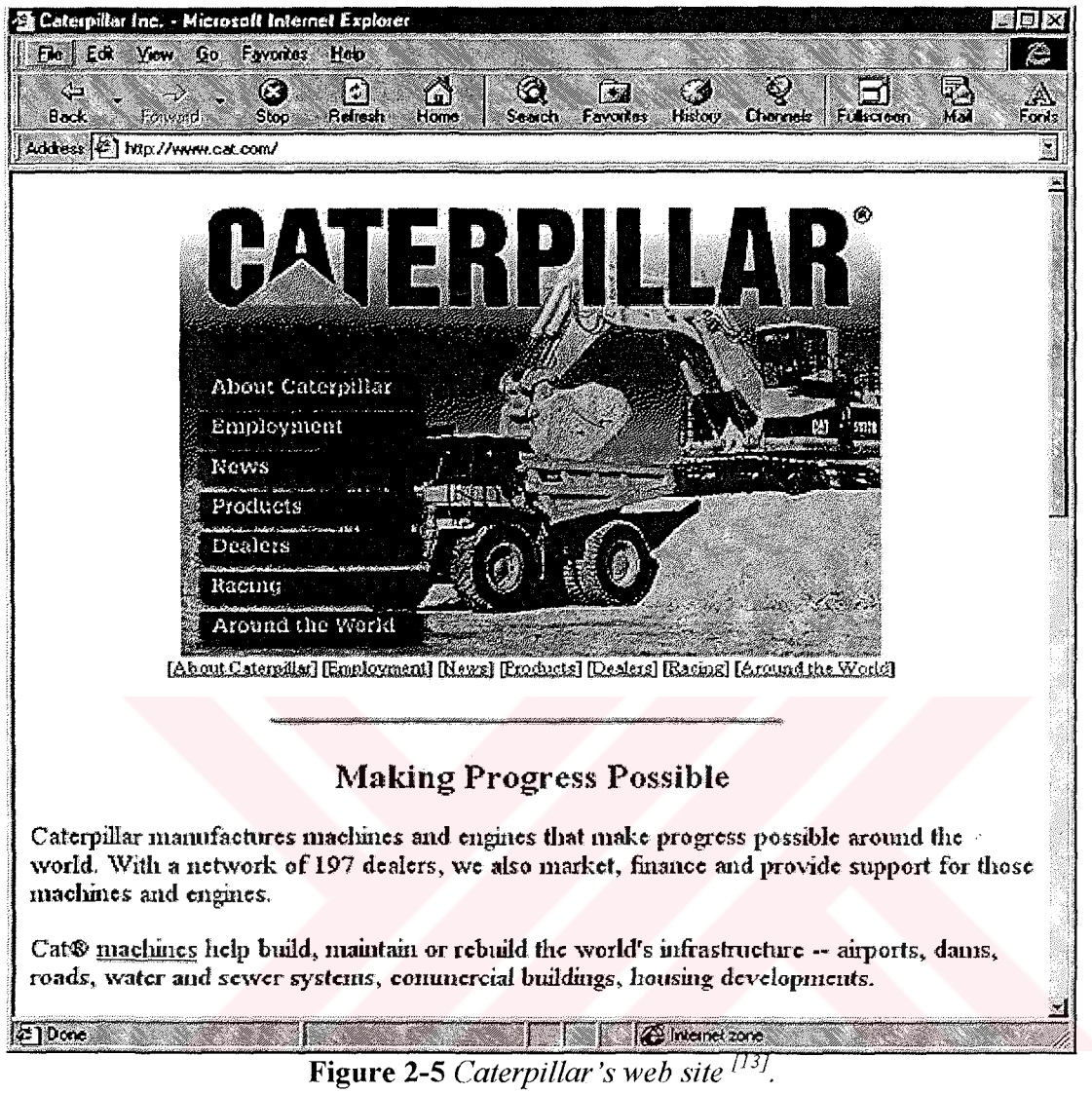


Figure 2-5 *Caterpillar's web site* [13].

There are several other significant reasons why the Internet is continuing to thrive. The first one is that it is estimated that between 6 and 14 million people around the world, regularly "surf the net". Approximately 50% of individual WWW users have personal incomes of $50,000 or more. Approximately 65% have incomes greater than $35,000 [9]. These figures clearly demonstrate the enormous potential that the Internet has developed since its ascent a couple of years ago. Another astounding figure is that in the last year, sales over the Internet have topped $118 million. Although this may not seem like a huge sum, spread over 14 million users, one fact remains clear, and that is, that the Internet's use is not slowing. If anything, it is apparent that the Internet is the medium for communications into the future, and its current status is only the tip of the iceberg. [8]

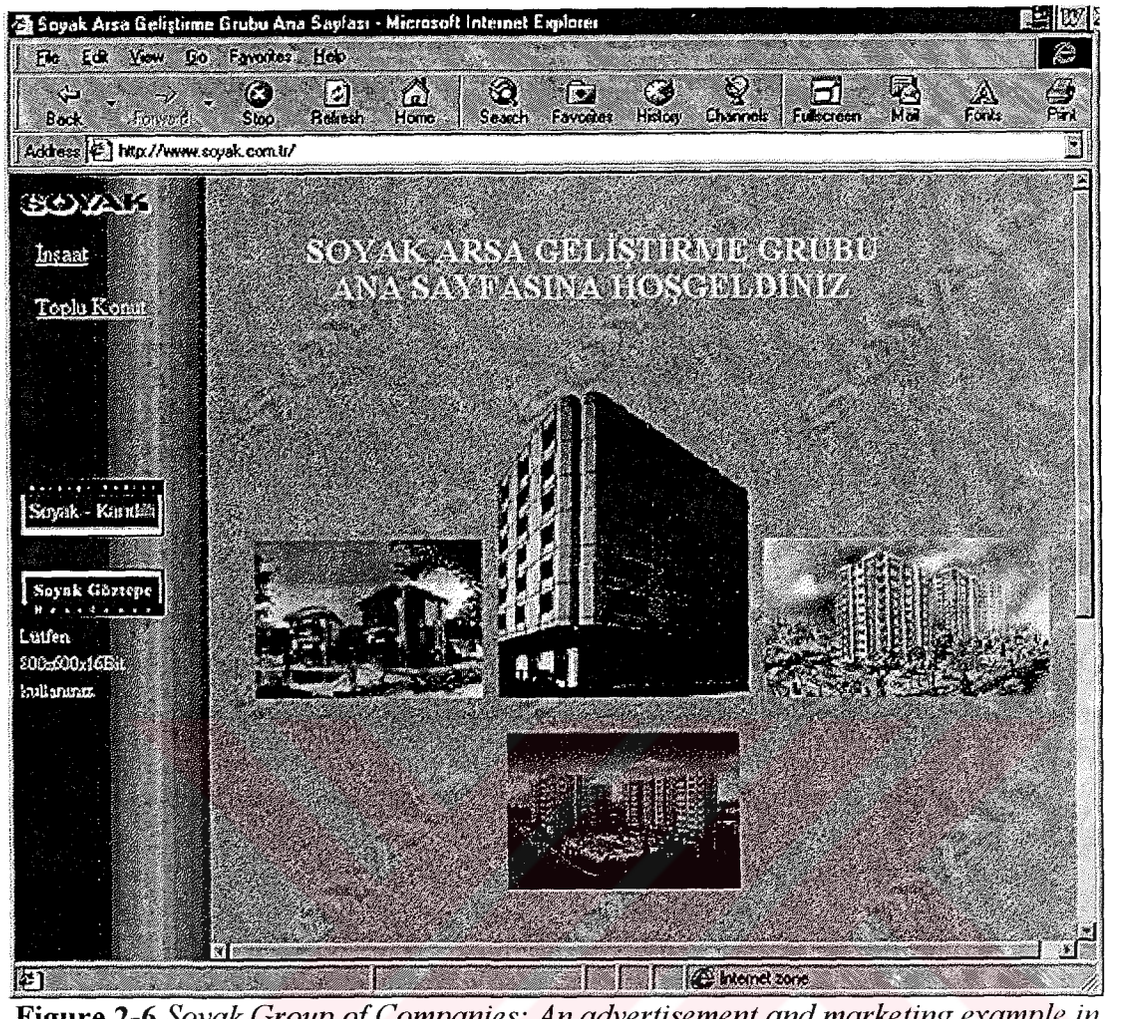
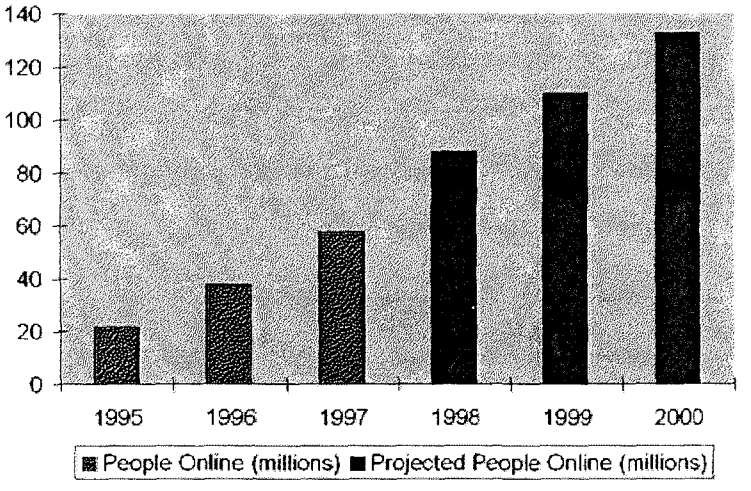


Figure 2-6 *Soyak Group of Companies: An advertisement and marketing example in the Turkish Industry* [14].

2.3.1.2.Statistics and Demographics

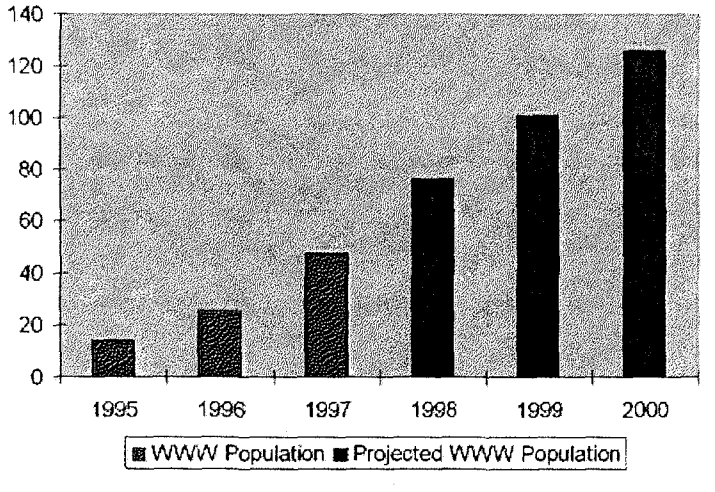
Because the Internet is made up of over 60,000 networks that can each transfer data via many routes, it is nearly impossible to pin down any exact numbers concerning its size [6]. However, there are *statistics information centers* that survey the Internet growth. Figure 2-7 shows the Internet Population Projected Growth, which has been updated with latest data from the Fall 1997 CommerceNet/Nielsen Internet Demographic Survey. The projected growth has been adjusted to reflect this new data [10]. These projections are based on the assumption that the Internet will continue to grow at a rate of approximately 10% per year through the year 2000.



Internet Population Projected Growth	
Date	Population (In millions)
1995	22
1996	37.84
1997	58
1998	87.75
1999	110.25
2000	132.75

Figure 2-7 *Internet Population Projected Growth* [10]

The following chart (Figure 2-8) shows the projected growth of the World Wide Web[10]. Location of the majority of users (80%) are located in the US, with 10% from Europe, 5.5% from Canada & Mexico, and 1% Asia. Approximately 43% of WWW users are female, and the average age is 35. 88% have more education than a high school diploma, 66% of WWW users have a college degreee, 20% have Master degree, and 7% have a PhD. Approximately 50% of individual WWW users have personal incomes of $50,000 or more, and 65% have incomes greater than $35,000[9].



World Wide Web Population Projected Growth	
Date	Population (In millions)
1995	14.3
1996	25.96
1997	48
1998	76.5
1999	101.25
2000	126

Figure 2-8 *World Wide Web Population Projected Growth* [10]

The following chart (Figure 2-9) combines the two tables found up above, showing the gradual growth of WWW users, almost eliminating the gap between the population that solely uses the Internet and the population that also uses the World Wide Web[10].

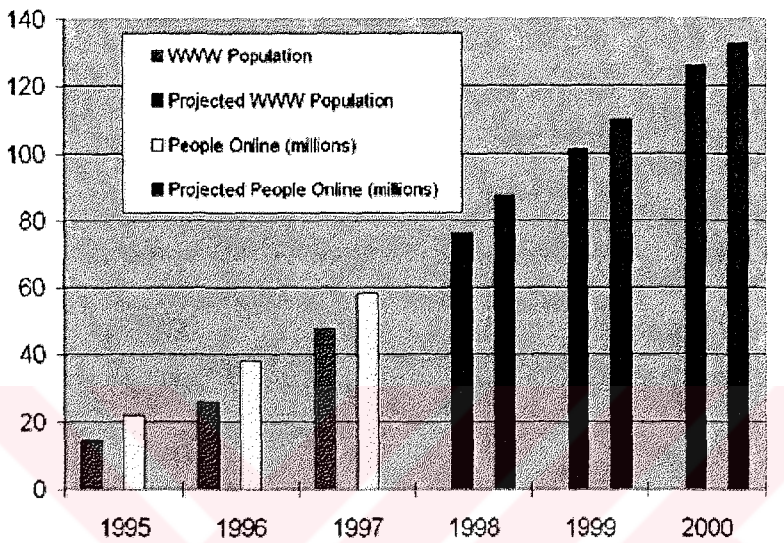


Figure 2-9 *Gradual growth of WWW users* [10]

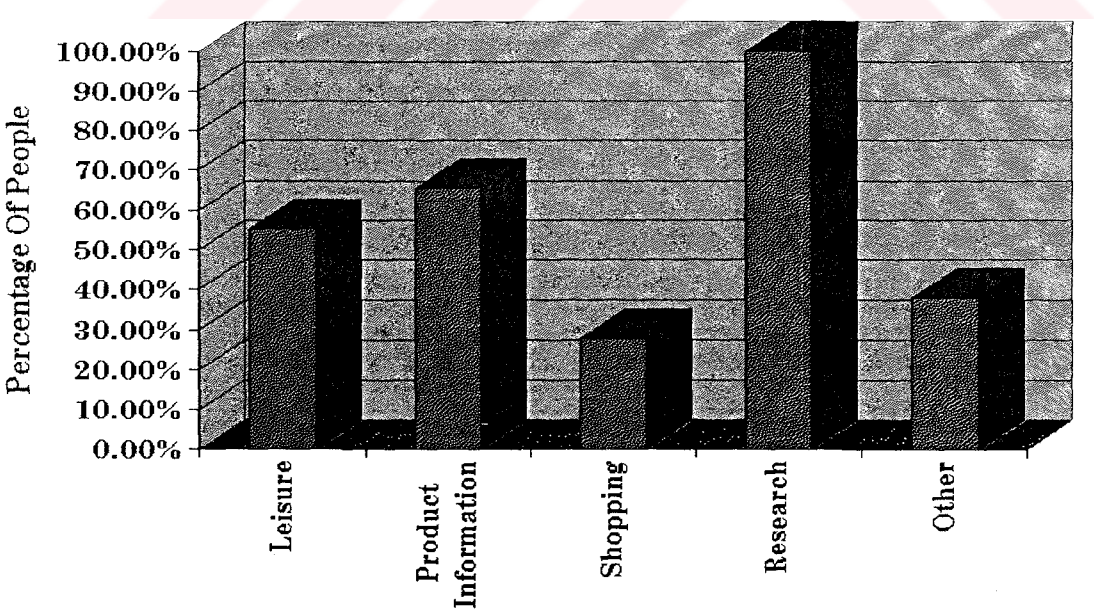


Figure 2-10 *Internet uses analysis* [15]

2.3.2. *Opportunities For Information Dissemination in the Building Industry*

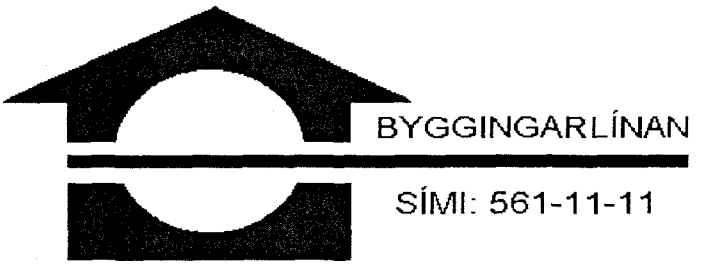
The Internet provides new opportunities for the distribution of construction information. The Internet can provide the necessary backbone for the distribution of construction technical information to researchers, architects, engineers and builders. Included in the benefits of this type of application are ease of access, instantaneous updates, and rapid information exchange. Other opportunities include the availability of multiple editions of documents, friendly standardized user interfaces, and transparent information access. The Internet also provides opportunities to link into other computer programs on distributed servers and to efficiently browse and search large text documents [7].

Today, information dissemination of the building industry is mostly provided by the Building Centers as well as individuals, organizations, and companies. These services vary according to the detail level of the information. In general, there are two types of services that Building Centers provide in the Internet:

2.3.2.1.Introductory Building Centers

The purpose of these services is to introduce the Building Centers to the visitors of the web site. Generally, telephone numbers and addresses are stated to make a contact with the Building Center, as well as e-mail addresses.

In Icelandic Building Center homepage [16] (Figure 2-11), the UICB trademark welcomes us with the telephone number of the Building Center. Then comes an introduction, which is followed by the headings of the services that the Building Center provides. These services are explained with no more than a sentence, and it is understood that these services are only available by phone. At end of the page, a brief explanation of organizations that Icelandic Building Center make are stated, and an email address is included, which is only used to send comments and suggestions. This is an example of a very basic form of a web site, and is generally made up of one page.



Welcome to the home page of The Icelandic Building Centre Inc. (Byggingarşjónustan h.f.)

Íslensk heimasíğa

The Icelandic Building Centre (IBC) is an independent company serving the construction industry in Iceland. The Icelandic Building Centre is a member of the International Union of Building Centres (UICB).

UICB Building Centres in Scandinavia now have a common home page with links to their databases in Scandinavia and information servers for the construction industry around the world.

The Icelandic Building Centre offers the following services:

BUILDING MATERIALS

Information on domestic and foreign building materials by telephone 561-11-11.

PROFESSIONAL SERVICES AND CONTRACTORS

Information about professionals in the building industry: contractors, construction companies and advisors by telephone 561-11-11.

INFORMATION

The following reports can be obtained from the Icelandic Building Centre:
Reports in Icelandic
Reports in Danish
Reports in Swedish

SPECIAL OFFERS

The Icelandic Building Centre gives information on advantageous offers on various building materials.

The Icelandic Building Centre organizes courses, exhibitions, study tours, trade fairs and conferences on various issues relating to the construction industry. Every year there is a special Construction Congress (Mannvirkjaşing) organized by the IBC.

Please send suggestions and comments to skipark@centrum.is or call +354-561-11-11.

Figure 2-11 *Icelandic Building Center Homepage : The very basic form of a web site*[16]

Om Norsk Byggtjeneste

NORSK BYGGTJENESTE

About the Norwegian Building Centre

Norwegian Building Centre was founded in 1956, providing important information for professionals within the building industry.

Management
Managing Director Jan-Erik Erichsen
Sales Manager Orjan Albaug
Technical Manager, Production Steinar Bunes
Financial Manager Tove Grimsbo

Owners
Bygningsartikel-Grossistenes Forening
Union of Wholesalers of Building Products (50%)
Norske Byggevareprodusenters Forening
Union of Producers of Building Products (50%)

Board
President Narve Ludvigsen, Icopal AS (chairman)
Managing Director. Lars Anders Lund, L. A. Lund AS (vice chairman)
Chairman of the board Einar Gill Stange, Einar Stange AS
Managing Director Bjarne Th. Schmidt, Norsk Leca AS
Vice President Odd Erik Bjarne, Løvenskiold-Vækerø AS
Managing Director Arne Skjelle, Norske Byggevareprodusenters Forening

International connections
Norwegian Building Centre is member UICB; Union Internationale des Centres du Batiment (International Union of Building Centres) - a worldwide organization with approximately 40 member countries. These countries exercise an extensive exchange of information and experience, especially between the Nordic countries.

Our business idea in words

> Norwegian Building Centre is committed to spread knowledge and professional information to consumers and professionals within the building & construction industry in the right media and format according to the market at all times."

Our business idea in action
Norwegian Building Product Database; edp product containing more than 80.000 products - with descriptions and prices.

Norwegian Building Directory; 9 different booklets divided according to European standard product groups. The products are richly described with 4-colour illustrations.

Planning series; tool for professional area planning, containing laws, public documents and other comments of current interest in the area of society planning in a wide aspect.

Building Regulations series; updates of building & technical laws and regulations for professionals.

BASIS; ecological database for those who wish to plan ecologically responsibly.

For further information, please use

Visits: Haakon VIIs gate 5, Oslo **Phone:** +47 23 11 44 00
Mail: Postboks 1575 Vika, 0118 Oslo **Faxi** +47 22 83 42 33
Company e-mail: nbb@byggtjeneste.no
Norwegian Building Centre on the Internet:: http://www.byggtjeneste.no

1997 Norsk Byggtjeneste - updated 11. December 1997

Figure 2-12 *Norwegian Building Center* [17]

Figure 2-12 is the web site of Norwegian Building Center [17]. Although this page is an English summary of the Norwegian web site, the original concept is the same as the original pages: Following links bring the user a phone line, or an e-mail address in order to contact to the responsible person of that service. This page slightly differs from the Icelandic web page, by adding the names and e-mail addresses of managers. Again, the services are summarized, and for further information, the user must contact the Building Center by phone, fax or e-mail.

The Building Centre (UK), which is formed from a *samples room* as stated in section 2.2.2, has a web site as shown in Figure 2-13 [18]. This page is again a good example of an introductory web site, though it is written at the start of the page that it will be fully updated soon, that unfortunately does not give any evidence whether it will serve in the way it does now. As the others do (Figure 2-11, Figure 2-12), this page starts with the information about the Building Centre, and its location in the UK. Telephone and fax numbers and an email address are given for the contact with the Building Centre. The page continues with *The Information/Enquiry Services* presentation, which is a service of information providing about manufacturers and materials by phone, fax or snail-mail upon request, and is charged with different rates. At the end of the page, information about *Technical Research Service* is given. This is a service for tracing suppliers, products, standards and regulations, and is again charged. The given e-mail address in the page is used for all of the services.

Finnish Building Information Institute home page (Figure 2-14) starts with the address, phone numbers and e-mail address. Then comes a brief explanation of what the Institute is responsible for, and in the right section there are four headings, which lead to related pages. At the bottom of the page, there is a link to the other building industry-related pages.

Figure 2-15 is the web site of German Information Center for Regional Planning and Building Construction [20]. In this example, the visitor is introduced to the site with a brief introduction, and the four buttons lead the visitor to the general information about the center.

THE BUILDING CENTRE

The Industry's Information Centre *

*Please note that this is only a temporary service a full update of The Building Centre Website should be on-line by spring '98. Please bookmark this page and return in the near future.

What is The Building Centre ?

The Building Centre functions as the main source of information for the UK building & construction industry. The Building Centre is also the largest permanent exhibition of building and related products in the world and welcomes more over 100,000 visitors each year, professional and public alike.

Where is The Building Centre ?

The Building Centre is located at 26 Store Street, London, WC1E 7BT and is open from 9.30 am to 5.15 pm, Monday to Friday and from 10am to 1pm on Saturdays (except those preceding bank holidays when the Centre is closed). The Centre is located close to Tottenham Court Road, and is equidistant between Tottenham Court Road and Goodge Street underground stations. Admission is free.

For details of the full range of available services telephone our main number on 0171 637 1022 or fax on 0171 580 9641. For details on how to make enquiries to our Information Services Department please chose the '**Information Enquiry Services**' option below. **For General Enquiries please e-mail manu@buildingcentre.co.uk**

THE BUILDING CENTRE

The Information/ Enquiry Services

Welcome to **The Building Centre's** Information Services. **The Building Centre** is now recognised as the as most authoritative source of information on building and construction. We have developed and perfected the most comprehensive and up-to-date information resource covering all aspects of the industry, enabling us to provide a unique and invaluable range of services to professionals, manufacturers, suppliers, trade associations, home improvers and self builders.

General Product Enquiries (research service and help line)

Enquiry Research

If you have a problem finding the product information you require, our product research service can help. Drawing from the Centre's own unique and extensive resources, the Information Department can source individual products, trade names, company names, or provide comprehensive lists of manufacturers (detailing addresses, phone and fax numbers) producing specific product types. Manufacturers literature will be sent where possible.

To register your enquiry, and for a written quotation please e-mail manu@buildingcentre.co.uk

Alternatively you can telephone the Building Centre's *Guidline* on **0897 16 11 36*** The *Guidline* has been created for home improvers, self builders and students and enables them to speak directly to our experienced information officers.

Tariff for information

- Searching up to five company names, trade names or products **£15 + VAT (£17.62)**
- Supplying listings of manufacturers according to product types **£35 + VAT (£41.12) for up to 10 lists.**

Market Research and Enquiries (research service and help line)

Market Research Service

Looking for help with your market research ? Need technical guidance ? We have the very latest sources of building and construction market information. Further more our information library covers all aspects related to the industry including statistical data, market analysis, company profiles, forecasts, regulations, standards and codes of practice.

Additionally, if you need to commission a fully detailed report covering specific aspects of the industry, we can investigate market trends, prepare financial forecast, supply statistical data, evaluate market opportunities and much more.

To register your enquiry, and for a written quotation please e-mail manu@buildingcentre.co.uk or alternatively, contact our Market and Technical Information Help-line on 0897 16 11 37*

Technical Information Enquiries (research service and help line)

Technical Research Service

If you have a problem tracing specific suppliers, manufacturers, products, agents; have an individual problem requiring one-off research or need guidance on appropriate Standards and regulations, try our technical research service. For a fee of only **£45 + VAT** we will provide the services of one of our expert in house researchers for half an hour. Over 95% of all our enquiries are answered within this time and we endeavour to respond within 48 hours. If your enquiry requires additional research we will contact you with a quotation.

To register your enquiry please e-mail your enquiry to manu@buildingcentre.co.uk or contact our Market and Technical Information Help-line on 0897 16 11 37*

* Calls are charged at the rate of £1.50 per minute. Service available in the United Kingdom only.

Figure 2-13 *The Building Centre, UK* [18]

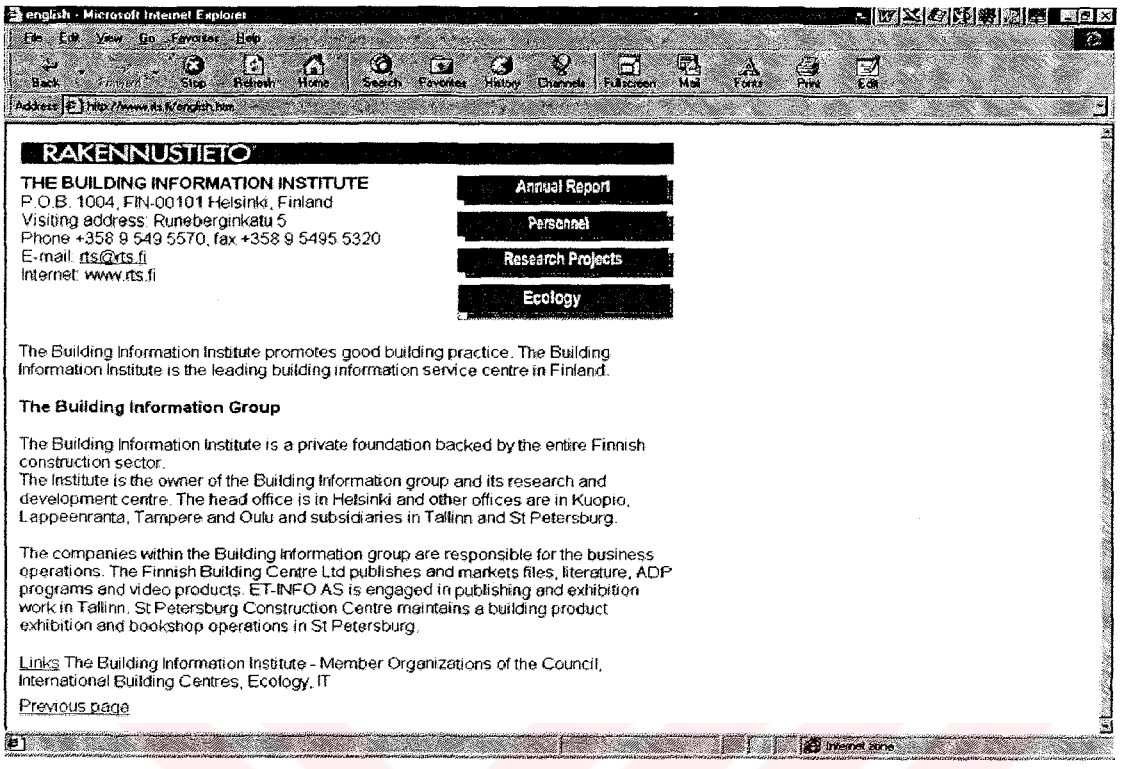


Figure 2-14 *Finnish Building Information Center* [19]

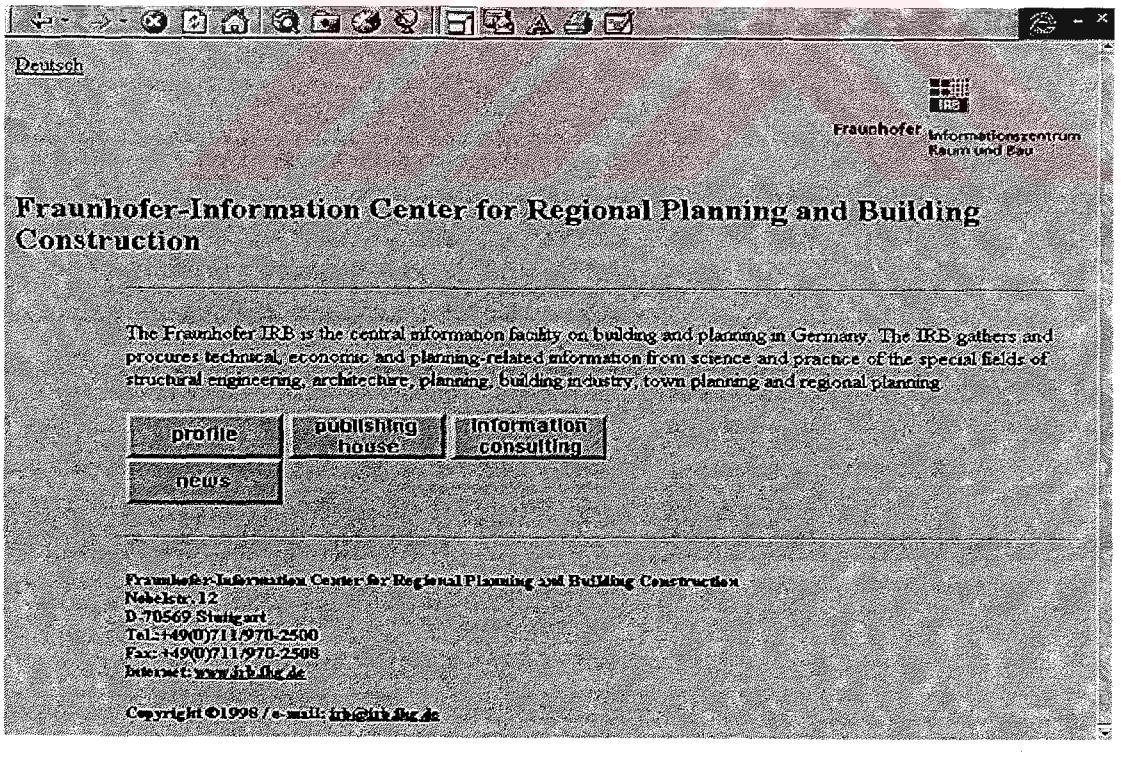


Figure 2-15 *German Building Center: Fraunhofer Informationszentrum Raum und Bau* [20]

2.3.2.2.On-line Information and Service Providing Building Centers

With the enhancements that WWW brought to the Internet as stated in section 2.3.1, there came the possibility of making complex and user-friendlier interfaces. Introductory web sites do not take the advantages of WWW as they only intend to give a simple text-based service to the visitor. On the contrary, with useful WWW enhancements like following links, forms, tables, and frames, it is possible to construct web sites that offer different kinds of services.

Figure 2-16 is screen-shot of Architecture/Engineering/Construction (AEC) Info web site [11]. AEC Info is a Business Center dedicated to the Architectural, Engineering, Construction and Home Building industry, and the information provided in this site is all free of charge. In this web site, the links lead the visitor to many services, including building products, support services, computer software and hardware related to the disciplines that AEC Info center supports. There is also a SPECCENTER ™ that provides architects, engineers, specifiers and others with free specifications courtesy of contributing manufacturers.

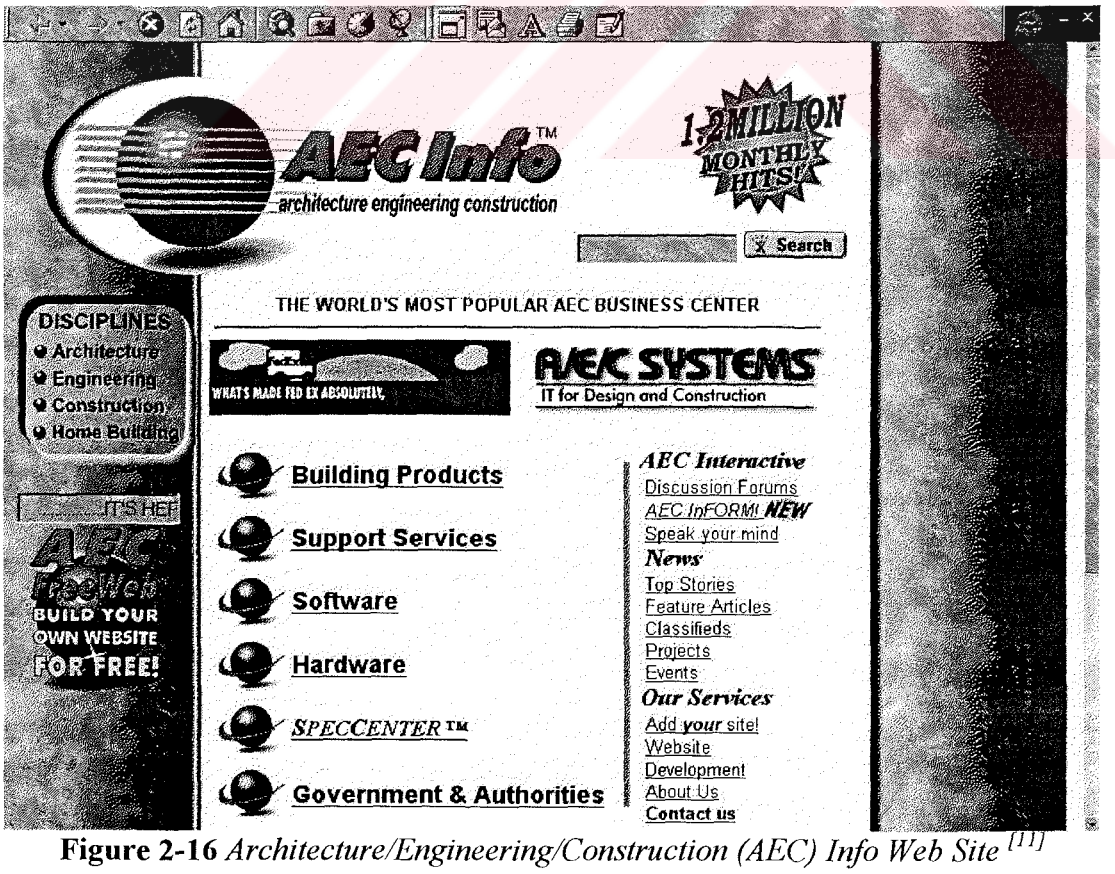


Figure 2-16 *Architecture/Engineering/Construction (AEC) Info Web Site* [11]

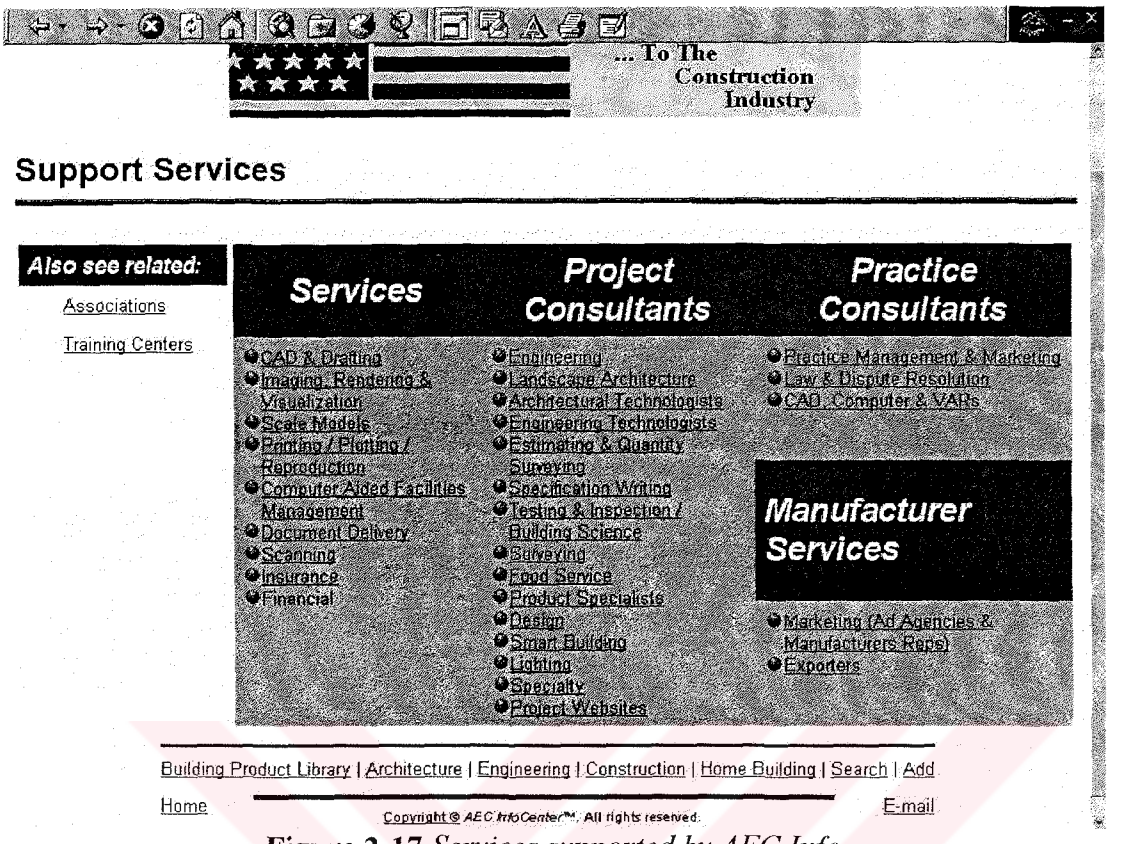


Figure 2-17 *Services supported by AEC Info.*

Figure 2-17 shows the supported services of AEC Info. In the Services tab, there are links of computer services like scanning, plotting, rendering, etc. In the other tabs, there are links to the consulting, and manufacturing services, which consist of the lists of the companies that provide related services, and enable the user to connect directly to the companies' web sites.

In Figure 2-18, there are the classifications of the building products. Each of these products has a link to subdivisions of related subject. For example:

- *CSI/CSC Master Format Division* - Doors and Windows – Wood and Plastic Doors – Vendors

- *Residential* – Concrete (Flooring) – Precast Concrete – Vendors.

Following the appropriate link brings the user to the list of product suppliers' page, in which the user can find ways of contact with the related vendor.

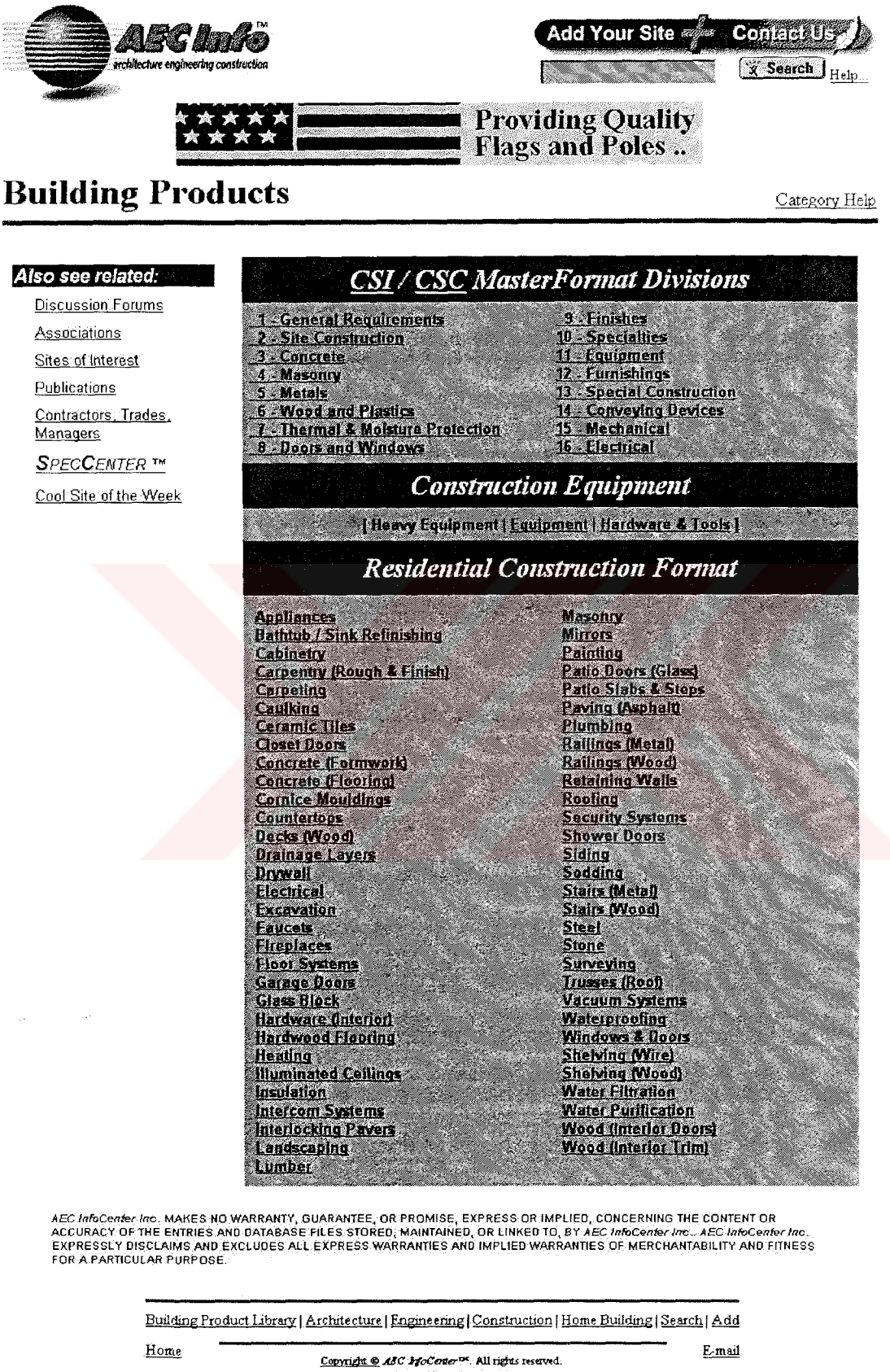


Figure 2-18 *The classification of building products in the AEC Info web site.*

As seen in Figure 2-18, the user can easily find a material by choosing the appropriate division with just a few clicks. For example, by clicking the No.8 (Doors and Windows) link in the CSI/CSC Master Format Divisions, the user can reach a sub-division page as seen in Figure 2-19. It is possible to retrieve a list of vendors by clicking the interested link. The service provided to the user for the building products ends here, and there is not any chance to obtain further information including specifications, prices, photographs, and etc.

Figure 2-20 shows how the *Government and Authorities* links are listed, both inside and outside the USA, which enables the user to connect directly to the related address.

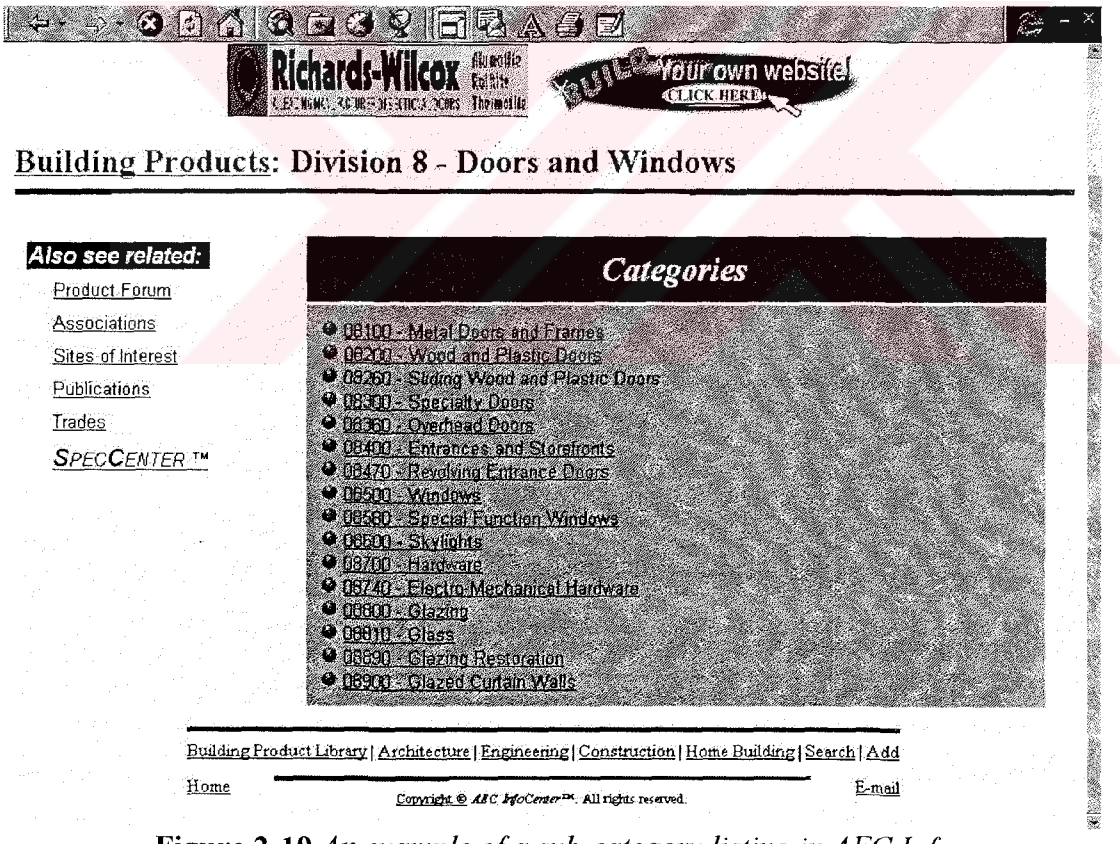


Figure 2-19 *An example of a sub-category listing in AEC Info*

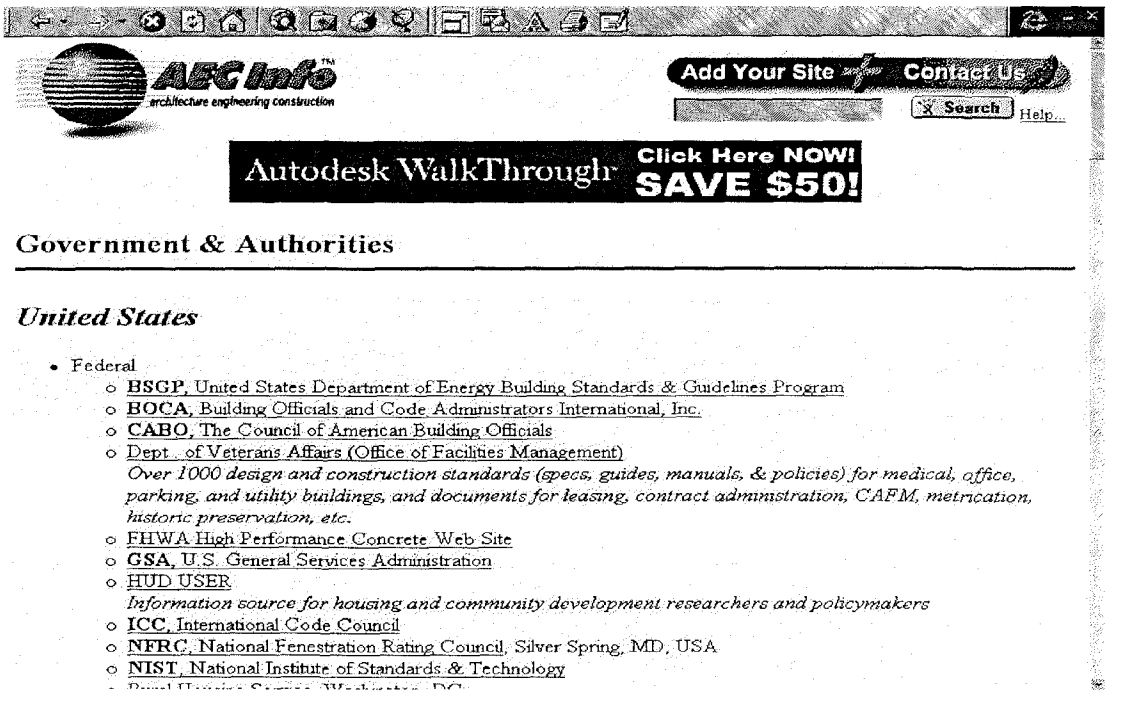


Figure 2-20 *Government and authorities links page in the AEC Info site*

Figure 2-21 shows the Sweet's Group Home Page, which contains the system of a variety of special purpose tools, each designed to reach the AEC professional with the specific type of product information needed in the various stages of the design process [21]. Although Sweet's is not a Building Center, it is the construction industry's primary product information source in the USA. Sweet's home page welcomes the user with the Building Product Information system. This is system is based on the CSI Master Format, and is used with the conjunction of a search engine, which is used to retrieve the desired information of a product without the need of browsing the catalog. In the menu bar, there are several buttons, which lead the user to other services including Sweet's Products and Sales Representatives listings, map of the site, e-mail address to contact, and etc. Figure 2-22 is the page showing the map of the site, in which the "Search for Bldg. Products" represents the start (index) page. The unfavorable part of this page is that, the user can reach these services only from the menu bar in the index page, for it is not possible to click on the headings of the services and link directly to the desired service.

Figure 2-21 *Sweet's Group home page* [21]

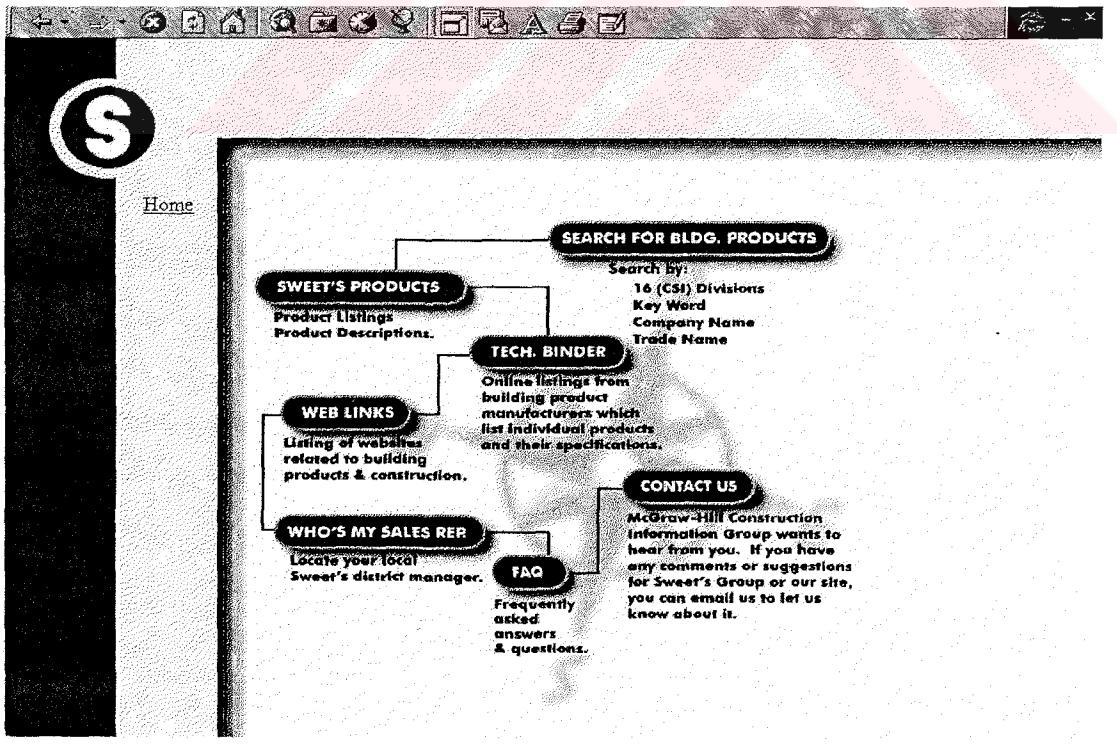
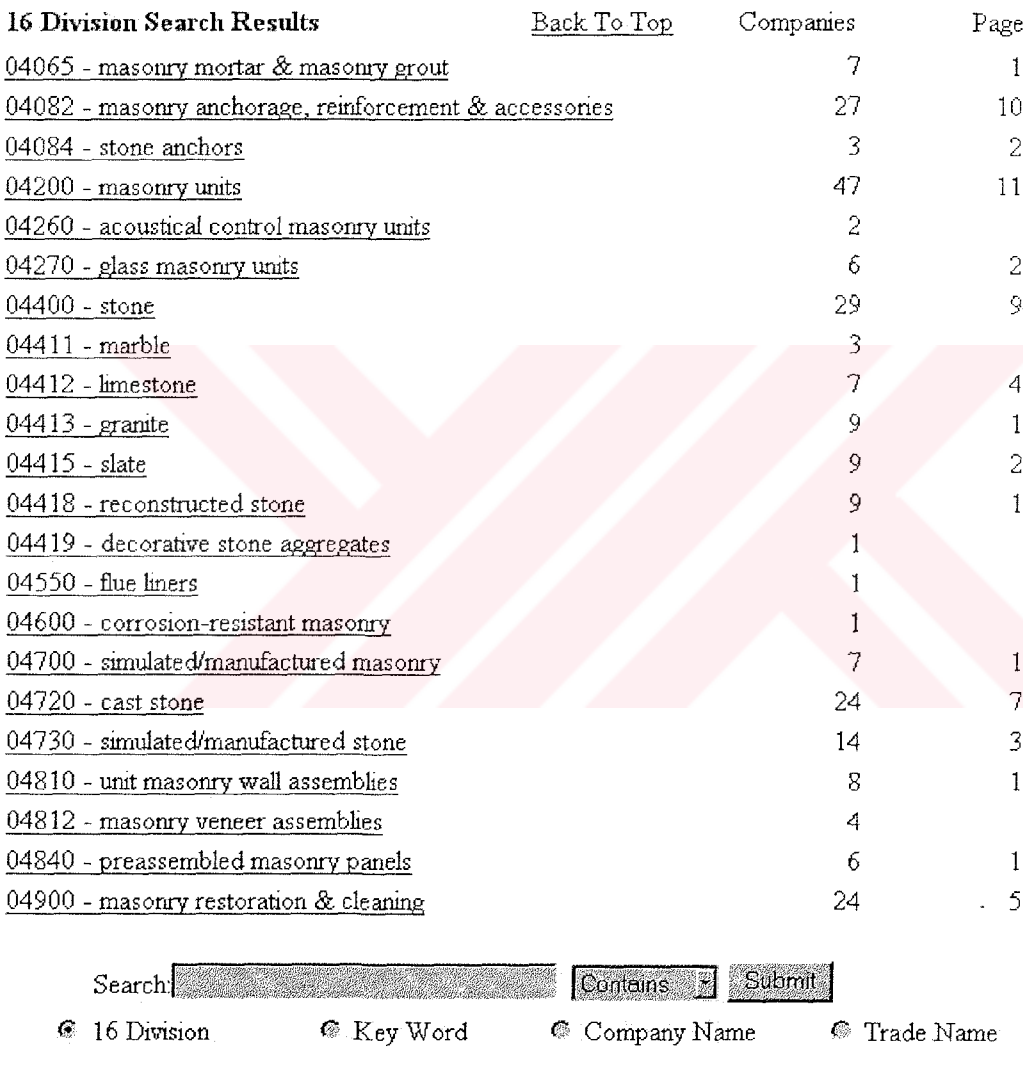


Figure 2-22 *Sweet's map of services*

As stated above, Sweet's Product Catalog is based on the CSI Master Format, and can be browsed by clicking on the desired category. In Figure 2-23, an example is given by choosing the Division 4 – MASONRY. The sub-divisions are listed and the vendors of each category can be retrieved by clicking on the desired link. It is also important to note that the number of companies and pages of the selected category is also given.



16 Division Search Results	Back To Top	Companies	Pages
04065 - masonry mortar & masonry grout		7	18
04082 - masonry anchorage, reinforcement & accessories		27	102
04084 - stone anchors		3	23
04200 - masonry units		47	118
04260 - acoustical control masonry units		2	5
04270 - glass masonry units		6	23
04400 - stone		29	94
04411 - marble		3	4
04412 - limestone		7	46
04413 - granite		9	16
04415 - slate		9	22
04418 - reconstructed stone		9	16
04419 - decorative stone aggregates		1	1
04550 - flue liners		1	1
04600 - corrosion-resistant masonry		1	1
04700 - simulated/manufactured masonry		7	16
04720 - cast stone		24	71
04730 - simulated/manufactured stone		14	30
04810 - unit masonry wall assemblies		8	16
04812 - masonry veneer assemblies		4	9
04840 - preassembled masonry panels		6	12
04900 - masonry restoration & cleaning		24	50

Figure 2-23 *Sweet's subcategory listing of building products*

At the bottom of the page, the user is also given an opportunity to use a search engine, and without going back to the category listing, it is possible to retrieve the desired category.

Like Sweet's Group, Finnish Building Center offers an on-line product catalog (Figure 2-25). This page can be loaded by clicking the "Product Classification-2" tab in the start page (Figure 2-24). By choosing the desired sub-category, the user can obtain the list of vendors, to whom he/she can contact with the given address or telephone numbers. Figure 2-26 is the list of "8-Electrical Services Products" division. Like the other Building Centers or Information Services reviewed in this section (2.3.2.2), both Sweet's and Finnish Building Center do not offer any other kind of on-line services relating the building products other than product suppliers' list.

In Construction Materials home page (Figure 2-27), the user has the opportunity to find information about the products and companies by searching through a search engine, or by browsing CSI Divisions. These Divisions are based on the CSI's Master Format with an included 17th Division called "Classifieds and Professional Services", which is listed in Figure 2-28. In this site, there are other services like "Corporate Advertising Packages" where the companies can make their advertisements. Construction Materials offers different advertising packages, which include e-mail address listing, company listing, introductory and/or interactive web site design with credit card transaction support. There is no other kind of service in this site for the user to find any specific information about a building product.

Construction Net Dashboard is another "on-line service providing" web site (Figure 2-29) is made up of three main services:

- *Construction Net:* In this service area, the user has the opportunity to find a local contractor, distributor, or a manufacturer inside the USA.

  (a) Contractors are classified as:

  - Commercial and Residential Subcontractors
  - General Contractors and Home Builders
  - Lawyers, Insurance and Support Professionals
  - Architects and Engineers

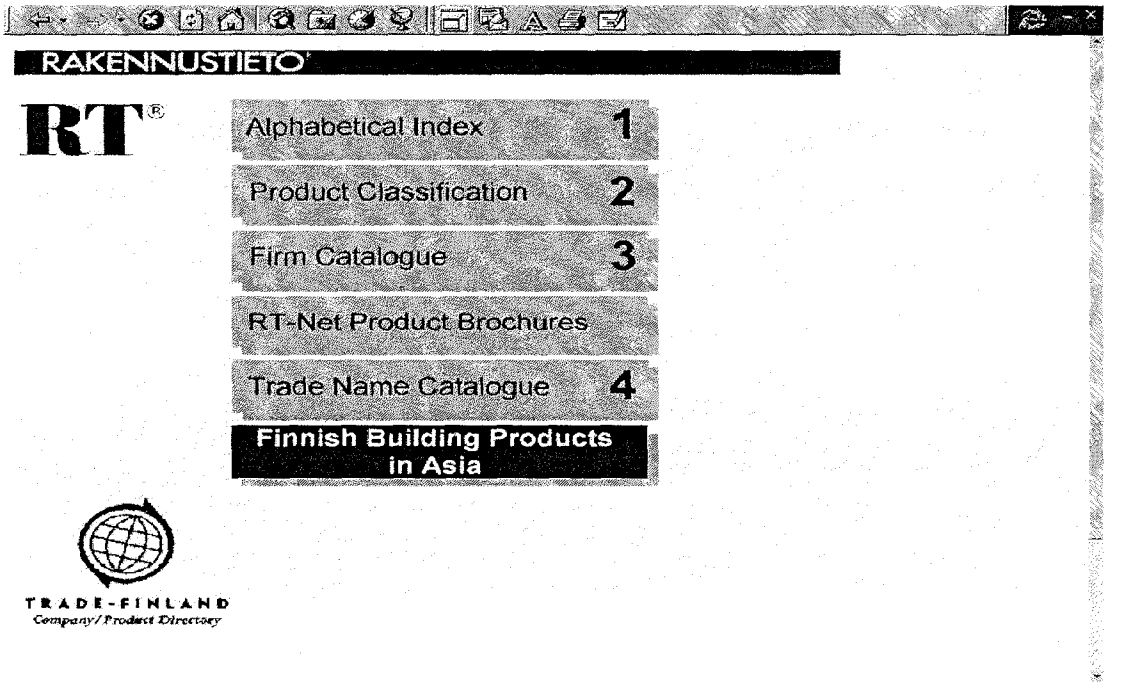


Figure 2-24 *English start page of Finnish Building Center* [22]

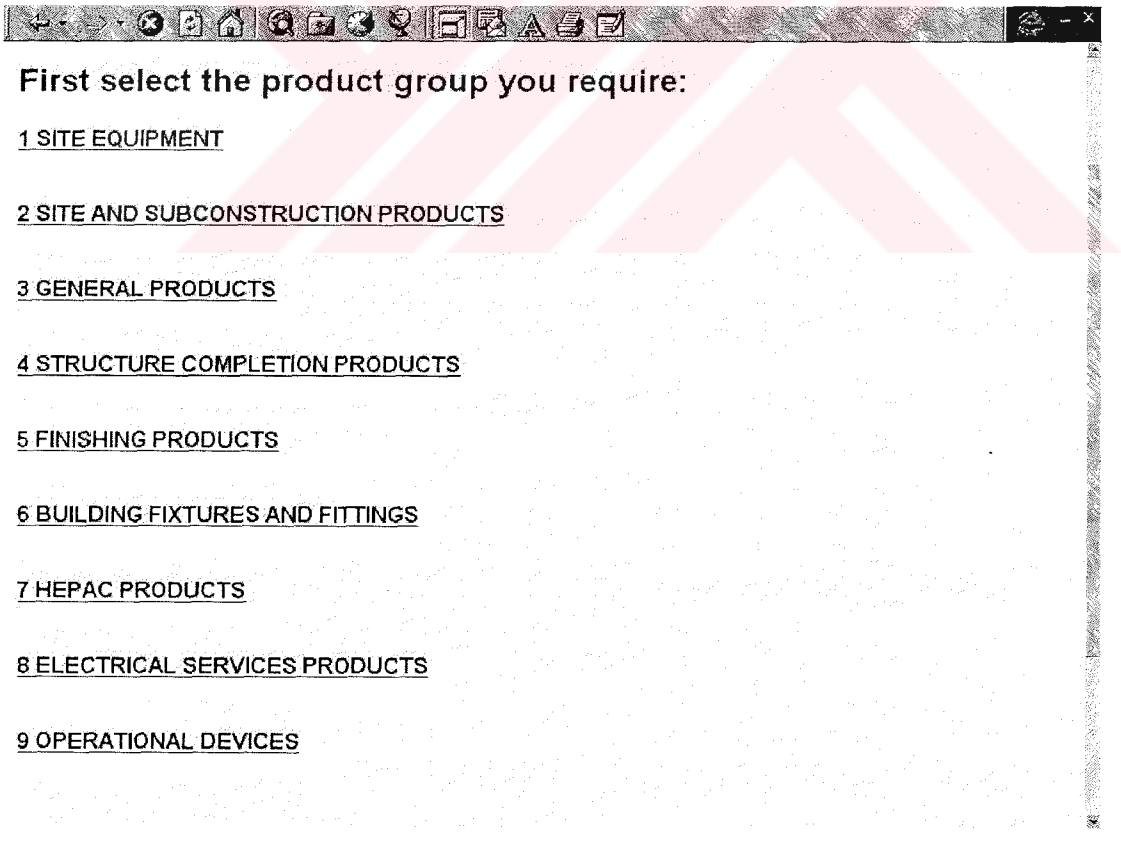


Figure 2-25 *Product classification of Finnish Building Center*

RAKENNUSTIETO

RT®

Choose a product name:

8	ELECTRICAL SERVICES PRODUCTS
83	**Conduits and trunking**
831	Cable supports
832	Conduits and trunking
8321	Conduits and trunking
8326	Distribution channels
84	**Cables and wiring**
843	
8431	Cables
85	**Lighting**
851	Interior lighting
8511	General lighting
8512	Domestic lighting
85122	Bathroom and sauna lighting
8514	Office and industrial lighting
8516	Swiming pool lighting
852	External lighting
854	Special lighting
8541	Illuminated signs
8542	Advertising lighting
8545	Slip-road lighting
856	Lighting components
86	**Electrical equipment**
861	Electrical equipment
8611	Electric heaters
8615	Accumulators
88	**Control and information appliances**
885	Security and control systems
888	Road network systems
89	**Measurement and control equipment**
891	Control system components
8911	Sensing elements, bulbs
8913	Controls and regulators
8914	Thermostats

Figure 2-26 *Sub-category listing of Electrical Services Products in the Finnish Building Center*

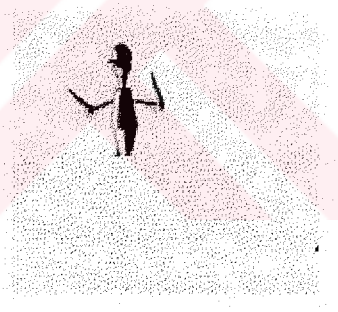
The Directory Source for all Manufacturers of Construction Materials, Supplies and Services is

Welcome to the *CONSTRUCTION MATERIALS.COM* website, the most comprehensive resource guide on the Web for the construction industry!

Search by
Company
and Product

Divisions
1 to 17
Construction
Manufacturers
by Materials
and Trade

Corporate
Advertising
Packages
Listing and
Advertising
Opportunities



User
Profile
GuestBook

Contact Point
for Advertising
Account Execs

[CSI Divisions | Search]
[Corporate Advertising Packages | User Profile]

info@constructionmaterials.com webmaster

Figure 2-27 *Construction Materials home page* [12]

Figure 2-28 *Product classification (CSI/Master Format) of Construction Materials web site*

(b) Distributors are listed according to the trade classification system that ConstructionNet uses. This system contains 25 items like Ceramic Tile Materials And Tools, Earthmoving Equipment – Heavy, Architectural Doors And Hardware, and etc. Complete classification is listed in Figure 2-30.

(c) Manufacturers are classified as:

- Product Manufacturers: This is the directory of the product manufacturers in the USA, and is classified according to the CSI Master Format. The user can access the list of manufacturers by clicking the desired sub-category in the 16 Division list.

- Tools and Equipment Manufacturers: This is the local directory of the tools and equipment manufacturers in the USA.

- Technology Product Manufacturers: This section contains the computer hardware and software product manufacturers including the makers of software and hardware.

To retrieve the list of manufacturers, the first step is to determine the state by pointing the desired location in the US map. Each local company has a metro area that they serve, so the next step is to choose the suitable region again from the map of that state.

- *Construction Related Sites*: The user can find many links related to construction industry as seen in Figure 2-29. It is possible to access these lists by clicking on the desired links.

- *Top Business Sites*: This section again contains links to various business related web sites like management, publications, investment links as well as weather, travel, and updated news.

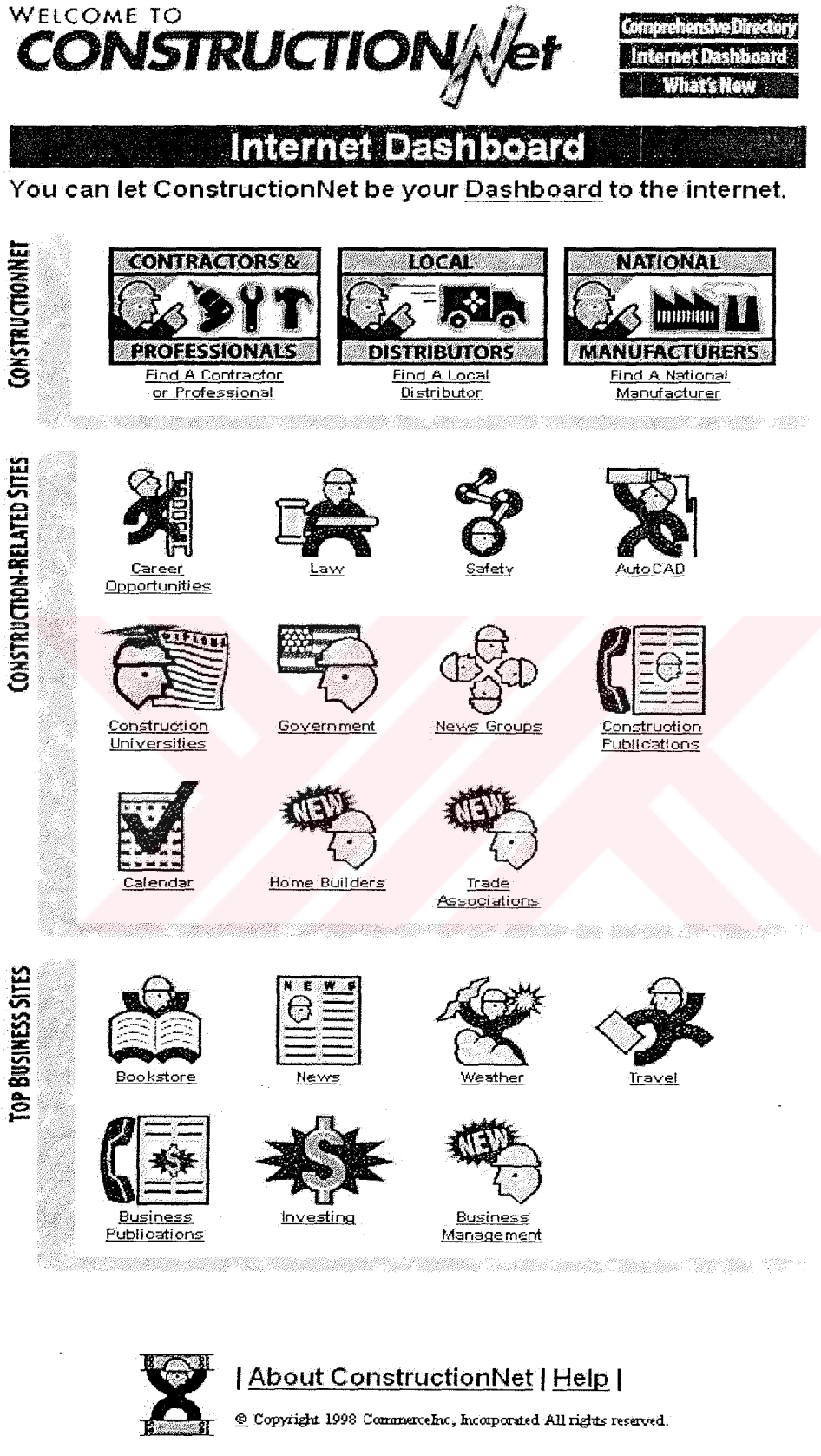


Figure 2-29 *Construction Net Dashboard provides construction related service*

Trade Classification of ConstructionNet :

Jlg Product Distributors
Ditch Witch Product Distributor
Steelcraft Distributor
Aerial/Personnel Lifts Sales And Rentals
Air Compressors And Air Tools
Forklift Sales And Rentals
Rental Service Stores & Yards
Tools-Electric/Pneumatic/Powder
Welding Equipment & Supplies
Concrete Placing And Finishing Equipment
Crushed Stone Quarries
Ready Mix Concrete Plants
Earthmoving Equipment - Heavy
Excavating Equipment Sales And Rentals
Concrete Block Masonry Units Products And Supplies
Precast Architectural Concrete
Architectural Doors And Hardware
Drywall Materials And Tools
Ceramic Tile Materials And Tools
Lumber Yards
Paint And Painting Supplies
Fire Extinguishers And Alarms
HVAC Equipment, Tools, And Supplies
Plumbing Fixtures & Supplies
Electrical Trades

Figure 2-30 *Trades classification used in finding a local distributor in the ConstructionNet web site*

Construction *Super*Network [24] is one of the biggest on-line information providing service in the USA. Below (Figure 2-31) is the menu of the site, which is placed on the top of every page for the ease of access to the services provided by the company.

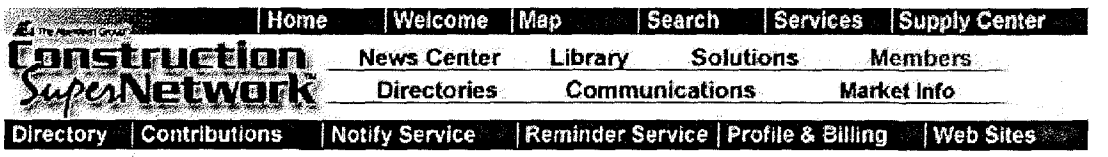


Figure 2-31 *Construction SuperNetwork menu* [24]

Figure 2-32 *Index page of Construction SuperNetwork*

The index page welcomes the user with the updated industry, and product news as well as features (Figure 2-32). The user has an opportunity to get help to navigate easily in the site by a service named "Welcome Center". In this site, there are many services related to construction industry. The main titles of the services are as follows:

- Advertising
- Contact Information
- Creative Services
- Electronic Commerce
- Marketing
- Subscriptions
- Web Design & Hosting
- Web Site Search Services

Figure 2-33 shows the whole site map of the Construction *Super* Network web site.

Construction SuperNetwork Site Map

- **Welcome Center**
- **Map and Site Index**
- **Search (Resource Locator)**
- **Services**
  - *Advertising*
  - *Contact Information*
  - *Creative Services*
  - *Electronic Commerce*
  - *Marketing*
  - *Subscriptions*
  - *Web Design & Hosting*
  - *Web Site Search Services*
- **Supply Center**
  - *Aberdeen Bookstore*
  - *American Concrete Institute Bookstore*
- **News Center**
  - *Events Calendar Search*
  - *Events Calendar Entry Form*
  - *Classified Ads Search*
  - *Classified Ads Entry Form*
  - *Industry News Search*
  - *Industry News Entry Form*
  - *Product News Search*
  - *Product News Entry Form*
  - *Expomart Showroom*
  - *Weather Center*
- **Directories**
  - *The A-List Registry of Concrete and Masonry Professionals*
    - Architects and Engineers
    - Associations
    - Concrete Producers
    - Consultants
    - Contractors
    - Distributors
    - Educational Programs
    - Testing Laboratories
  - *Create or Update Your Registry Listing*
  - *Buyer's Guide*
  - *Create or Update Your Buyers' Guide Listing*
  - *Construction Marketing Network Media Guide*
- **Library**
  - *Article Archives*
  - *ACI Glossary of Concrete Terminology*
  - *Leisure Center*
    - Arts & Entertainment
    - Games & Recreation
    - Online Shopping
    - Health & Science
    - Travel
    - Sports
    - Education
    - Humor
  - *Online Magazines*
    - Concrete Construction
    - Concrete Repair Digest
    - The Concrete Producer
    - Masonry Construction
    - Construction Marketing Today
- **Communications**
  - *Forums*
    - Concrete Forum
    - Masonry Forum
    - General Business Forum
    - Construction Marketing Forum
  - *Roundtables*
  - *Conference Center*
    - Lobby
    - Concrete Chat Room
    - Masonry Chat Room
    - CSN Auditorium
- **Solutions**
  - *Construction SuperNetwork Features*
    - Business & Marketing
    - Project Design
    - Jobsite
    - Issues & Trends
    - Technology
  - *Construction Marketing Features*
    - Advertising
    - Trade Show Exhibiting
    - Public Relations
    - Direct Mail
    - New Media
    - Sales Strategies
  - *Problem Clinic*
  - *Tools to Increase Your Productivity*
    - Industry Salary Survey
    - Graphics Gallery
    - Business Forms
    - Software & Computers
    - Online Calculators
    - Construction Industry Web Sites
    - General Business Web Sites
    - Current News Web Sites
    - Reference Information Web Sites
    - Web Searching
  - *Business Management Center*
- **Member Center**
  - *Member Profile and Billing*
  - *Member Contributions*
  - *Notify Service Preferences*
  - *Reminder Service Preferences*
  - *Member Directory*
- **Market Information**
  - *Government Information Center*
    - Business Resources
    - Health & Safety Resources
    - Housing & Building Resources
    - Legislative Resources
    - State & Regional Agencies
    - Statistics & Data Resources
    - Transportation Resources
    - Additional Government Sites
  - *Economic Statistics*
  - *Aberdeen's Outlook*
  - *Industry Salary Search*
  - *Marketing Salaries*
  - *Marketing Communications Budgets*
  - *Buying Practices*

Figure 2-33 *The site map of Construction SuperNetwork*

The search for a product or a service is done by entering the Buyer Guide in the *Directories* category. Though there is not a specific classifications system, with the buying wizard –a program that provides help topics and tips to help in accomplishing the tasks- the user is able find any requested data about the construction industry. The criteria for the search are entered step-by-step with the help of the wizard, and suppliers' list is retrieved as a result. For example:

- First of all, a *General Category* is chosen: Services, Consultants, and Contractors.
- After that, 2^{nd} *Level Category* is entered: Construction Industry Services.
- The last step is to enter the *End-Product Category*: Project Management Service.

The region, country, or the state may be entered to narrow the search, where the company or product is known to be available.

Figure 2-34 is the Member Center page, where different member services are provided. Though many services in the site are free in return of a registration procedure where personal information is given to the company, there are many benefits in being a subscriber. For a monthly fee, the subscriber can have access to the areas like Library Archive, Industry Directory, Problem Clinic, Tool Library or Government Center, as well as public and registered areas.

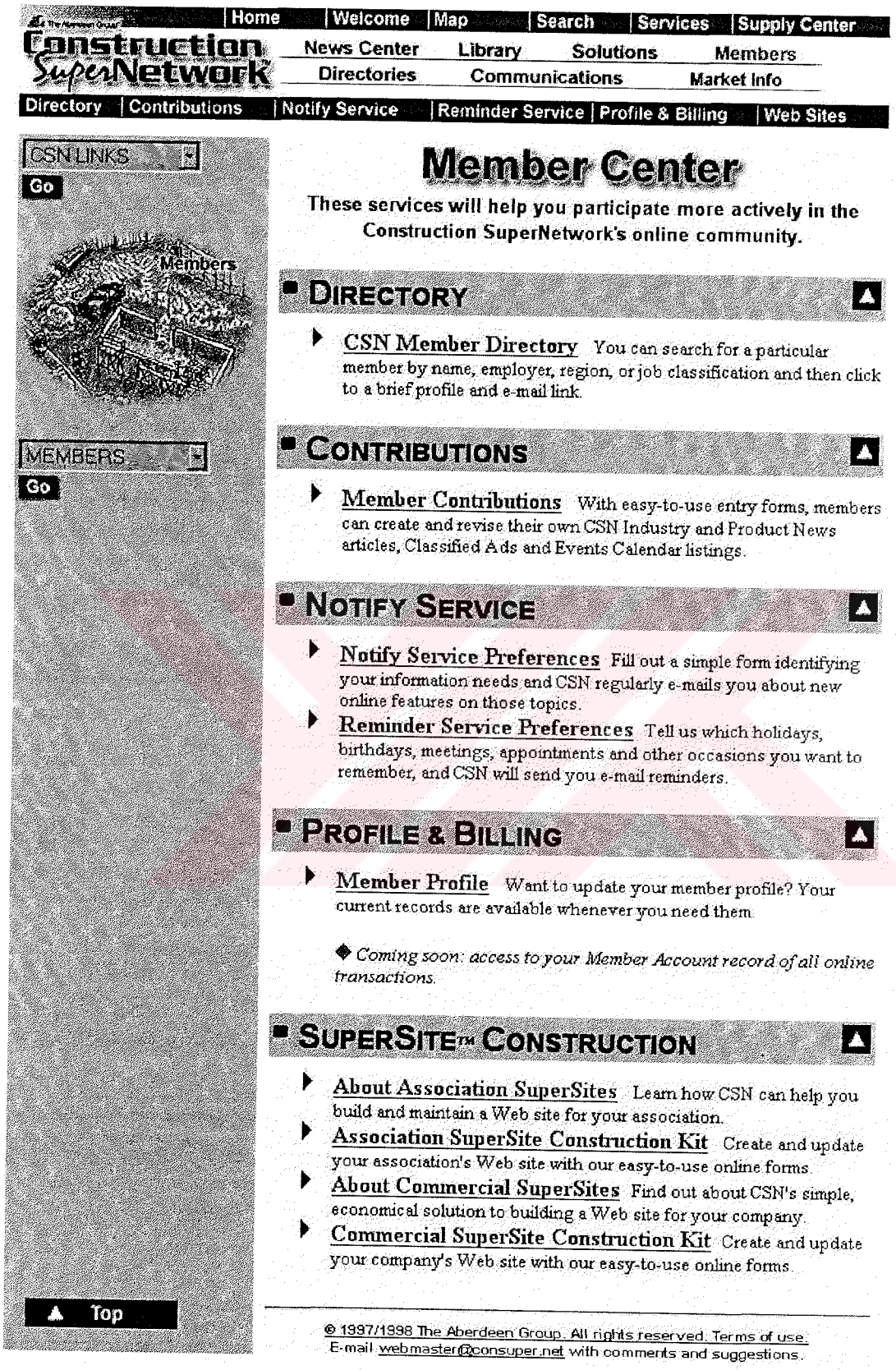


Figure 2-34 *The member services of SuperNetwork*

3. RESEARCH METHODOLOGY

3.1.Making a Survey About Building Centers

In order to build a virtual Building Center model, it is essential to make a research about Building Centers. The steps that are taken in this research are as follows:

3.1.1. Contacting Building Centers in Different Countries

The information-collecting phase started with the Turkish Industry Building Center (Yapi Endustri Merkezi, YEM). The services that the Turkish Industry Building Center provides are determined by the help of the brochures. The list of the new classification system, which is planned to be used in the future as a replacement of the current CI/SfB system, is also acquired.

The next step is to make a connection to the web site of UICB, where the list, addresses, telephones, and e-mails of the member(s) Building Centers are listed. A questionnaire was sent to each of the Building Center with an e-mail, of which some of the answers were received by snail-mail. Another way of obtaining information was to visit the web sites of on-line Building Centers.

3.1.2. Research Into History of Building Centers

In order to find information about "Evolution of Building Centers", a help-requesting e-mail is sent to CNBR list. Another step taken in this research was to visit both traditional and virtual libraries.

3.1.3. Identification Of The Services That Building Centers Provide

One of the purposes of the questionnaire was to determine what kinds of services were provided by the Building Centers. Further information was acquired from the brochures and the web sites of the Building Centers.

3.2.A Brief Analysis of the Internet

To design a web site of an imaginary Building Center concerning various services, an essential research about the Internet was made. Here are the steps of this research:

3.2.1. History of the Internet

In this phase, the evolution of the Internet was researched in the libraries containing book about computers and the Internet. Various bookshops were also visited with the same purpose. Then, using the Internet's one of the biggest search engine YAHOO[25], the links related with this topic were retrieved.

3.2.2. Identification of the Services Internet Provides

The next step was to determine what types of services could be used while building a web site in the Internet. The benefits of each service are researched both in the books and in the Internet.

3.3.Research About "Making Business in the Internet"

The benefits that the corporations, industries, and associations gain from making business in the Internet were stated in Section 2.3.1.1. On-line Building Centers also present a way of making business by providing some of the advanced services to members, who pay an amount of fee. Because of this reason, the opportunities of making business in the Internet have been researched in the libraries, and in the "Business and Economics" section of the YAHOO Search Engine.

3.4.Analyzing Samples of On-line Building Centers

3.4.1. Choosing Samples

As the theme of the thesis was about Building Centers, the first step in this phase was to retrieve the list and the Internet addresses of the Building Centers from the UICB (Union of International Building Centers) web site (Figure 3-1). However, the web sites of the members of the UICB were providing only introductory service (Section 2.3.2.1), so by following the links of YAHOO and construction links, the lists of "on-line service providing" Building Centers and other services were retrieved.

3.4.2. Making a List of Services and Analyzing the Data

The list of services that the on-line Building Centers provide was made by gathering data from each Building Center's web site. The next step was to make a table in order to have the opportunity to analyze and compare these services with each other, which also helped in determining the general trends.

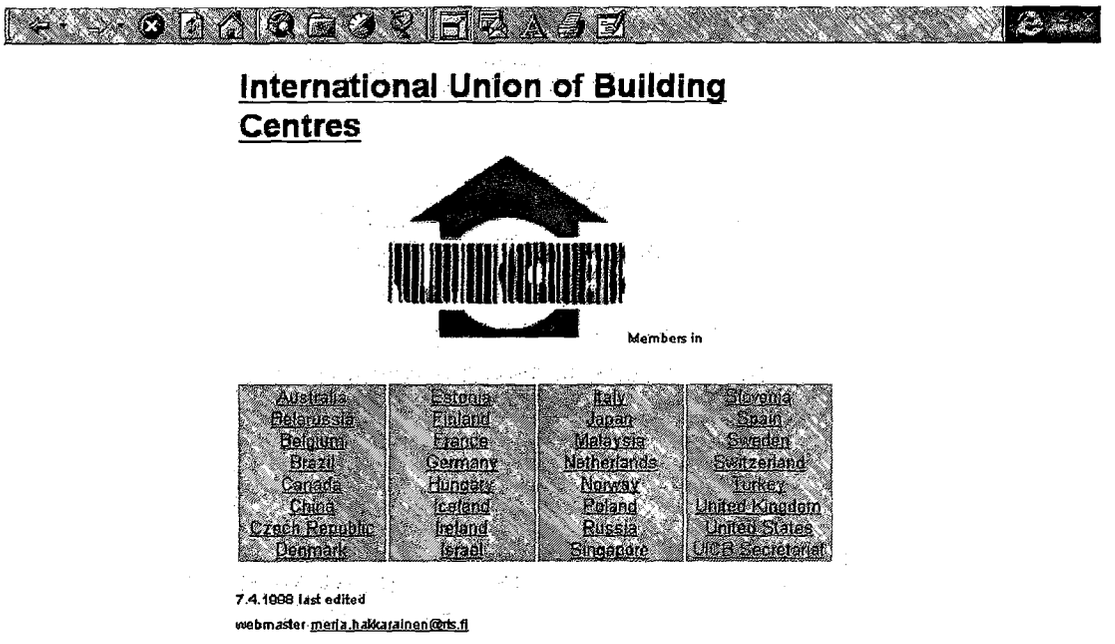


Figure 3-1 *Members of UICB are listed in UICB web site* [1]

3.5.Constructing a Virtual Building Center Model

3.5.1. Development of the Model

After determining the user profile and making a list of services that were planned to be provided, the construction of the web site started with the framework of the backbone. A virtual map of site was made, and then the graphics are prepared. Writing the HTML code with an HTML Editor, and inserting the appropriate JAVA applets, the site was ready for the final test.

3.5.2. Testing the Model

The test of the web site was taken by following the links found in the site. Because the web site was not uploaded to a real web server, the database and the search functions were limited with the local hard drive.

4. RESULTS AND FINDINGS

In this thesis, the services that Building Centers provide via Internet are researched. While making this research, samples are selected within hundreds of web sites, which could be accessed through search engines and construction related links. There are -for sure- other sites, which are not listed in any of search engine, or in any other construction links.

In order to analyze and compare the Building Centers with each other, 7 topics are determined (Table 4-1):

- Introduction
- Product Index
- Contractors Directory
- Manufacturers Directory
- Distributors Directory
- News
- Construction Related Links

Because the members of UICB, which is made up of traditional Building Centers, have permanent show rooms, the services provided in the Internet by these organizations have not evolved as much as the services that are specially founded virtually for the purpose of information providing. These Building Centers only introduce their organizations to the visitors of their web sites, and generally invite them to their show room by giving addresses, or offer help by telephone. This is the main reason why *physical* (non-virtual) Building Centers offer less service than those of only-Internet companies do.

4.1.Overview

As the users enter the web sites of Building Centers, they are welcome with an introduction, where they are informed about the history, services and other news related to that Building Center. In this topic, this introduction, which can be customized for each of those Building Centers, is researched. As a result, most of the web sites (13 of 15 as seen in Table 4-1) make an introduction to the user. The level of this introduction changes according to the services provided, just because it takes longer to explain what kinds of services can be obtained by going to the related addresses, instead of clicking and linking to the appropriate service.

4.2.Product Index

Product index is the service where building materials and products are listed upon request of the visitor of the web site. Product index service requires a database of these products and their vendors as well as pictures and prices which may also be added.

This product index service is provided only by Finnish Building Center among the UICB members, and the other non-UICB Members except ConstructionNet also offers this service to the visitors.

- Classification System : Among the services, four of them offer 16 Division Master Format, and five of them prefer to use customized product classifications, which differ from 9 to 42 topics. Construction Info Net[31] uses alphabetical classification system, where Finnish Building Center[22] has 9 class system as well as alphabetical index.

- Search Engine: Search engine is used to reach directly to the required information without the need of browsing the complex classification systems. This is achieved by entering a key word in the search tab (e.g. door, or ceramic). Only five of the samples offer search service, where the others provide products information only by their classification system.

- Prices of Products: None of the sample Building Centers provide any information about the prices of the products, so the only chance is to make contact with the supplier.

- Pictures of Products: Only ImproveNet [28] provides the picture of the selected product among the on-line information providing services. This helps the user to perceive the selection visually, and make him/her sure that the selection of the material is made properly.

- Cyber Shopping: Non of the services offer opportunity for on-line shopping. Only Construction *Super*Network [24] has an on-line bookstore, where people can buy books of interest by using a credit card.

4.3.Contractors Directory

Contractors directory is the service used to find contractors or sub-contractors for the related work. The sub-categories of this service are the *regional index* and *direct connection to contractor's web site*. The regional index can be used to retrieve the list of contractors specified to a region in order to narrow the search. Direct connection to contractor's web site (if available) is useful to get more information about the contractor. The result of this research shows that six Building Centers support the directory service where just two of them provide full service about contractors.

4.4.Manufacturers and Distributors Directory

Manufacturers and distributors directory can be found in the web sites of Building Centers, which provide product indexes. These services are also made up of three parts: The general index, regional index and the connection to the related web site. Generally, 11 services include this services in their web sites while the two Building Centers mentioned above (4.3) again provides the complete service: Construction *Super*Network[24], and ConstructionNet[23].

4.5.News

Only one of the UICB member (Franhaufer Information Center [3]) inform the visitors about the construction industry, where six of non-UICB members have news

service. Only AEC Info Center[11] and Construction *Super*Network[24] have classified news service for Architectural, Engineering and Construction topics.

4.6.Construction Related Links

In this section, the relationship between the Building Centers and the other construction related sites are tested. Among the UICB members, the only web site that contains construction links was the Finnish Building Information Institute[19] though governmental links were missing. Nearly all the other samples except Home Ideas[30] and Construction Materials[12] provide news service related to construction industry.

	Members of UICB			
	Building & Ind. Center[26]	**The Building Centre [18]**	**Finnish Building Inf. Institute [19]**	**Finnish Building Center [22]**
Introduction	√	√	√	√
Products Index	-	-	-	√
Classification System	-	-	-	9 class.sys.+alphabetical
Search Engine	-	-	-	-
Prices of Products	-	-	-	-
Pictures of Products	-	-	-	-
Cyber Shopping	-	-	-	-
Contractors Directory	-	-	-	-
Regional Index	-	-	-	-
Direct Connection to Contractor's Web Site (if available)	-	-	-	-
Manufacturers Directory	-	-	-	√
Regional Index	-	-	-	-
Direct Connection to Contractor's Web Site (if available)	-	-	-	-
Distributors Directory	-	-	-	√
Regional Index	-	-	-	-
Direct Connection to Contractor's Web Site (if available)	-	-	-	-
News	-	-	-	-
Industrial News	-	-	-	-
Architectural	-	-	-	-
Engineering	-	-	-	-
Construction	-	-	-	-
What's New	-	-	-	-
Construction Related Links	-	-	√	-
Governmental Links	-	-	-	-
Corporate Links	-	-	√	-
Institutes Links	-	-	√	-

	UICB Member	Non-UICB Members		
	Fraunhofer Info.Center [3]	**InsaatNet** [27]	**AEC Info Center** [11]	**Const.Super Net.** [24]
Introduction	√	√	√	√
Products Index	-	√	√	√
Classification System	-	**Master Format**	**Master Format**	**2-step material choosing**
Search Engine	-	-	-	√
Prices of Products	-	-	-	-
Pictures of Products	-	-	-	-
Cyber Shopping	-	-	-	**On-line book store**
Contractors Directory	-	√	-	√
Regional Index	-	-	-	√
Direct Connection to Contractor's Web Site (if available)	-	-	-	√
Manufacturers Directory	-	√	√	√
Regional Index	-	-	-	√
Direct Connection to Contractor's Web Site (if available)	-	-	√	√
Distributors Directory	-	√	-	√
Regional Index	-	-	-	√
Direct Connection to Contractor's Web Site (if available)	-	-	-	√
News	√	√	√	√
Industrial News	√	√	√	√
Architectural	-	-	√	√
Engineering	-	-	√	√
Construction	-	-	√	√
What's New	√	-	√	√
Construction Related Links	-	√	√	√
Governmental Links	-	√	√	√
Corporate Links	-	√	√	√
Institutes Links	-	√	-	√

	Non-UICB Members			
	ConstructionNet [23]	**Sweet's** [21]	**ImproveNET** [28]	**BuilData** [29]
Introduction	√	√	√	√
Products Index	-	√	√	√
Classification System	-	16 Div. Master Format	Customised 19 class.system	Customised 53 class.system
Search Engine	-	√	-	√
Prices of Products	-	-	-	-
Pictures of Products	-	-	√	-
Cyber Shopping	-	-	-	-
Contractors Directory	√	-	√	-
Regional Index	√	-	-	-
Direct Connection to Contractor's Web Site (if available)	√	-	-	-
Manufacturers Directory	√	-	-	√
Regional Index	√	-	-	-
Direct Connection to Contractor's Web Site (if available)	√	-	-	√
Distributors Directory	√	√	√	√
Regional Index	√	-	-	-
Direct Connection to Contractor's Web Site (if available)	√	-	-	√
News	√	-	√	-
Industrial News	√	-	-	-
Architectural	-	-	√	-
Engineering	-	-	-	-
Construction	-	-	-	-
What's New	√	-	-	-
Construction Related Links	√	√	√	√
Governmental Links	√	√	√	-
Corporate Links	√	-	-	√
Institutes Links	-	√	√	√

	Non-UICB Members			
	Home Ideas [30]	**Construction InfoNet** [31]	**Aedile** [32]	**Construction Materials** [12]
Introduction	-	-	√	√
Products Index	√	√	√	√
Classification System	42 class.+Produt Selector	Alphabetical index	Customised system	16 Div. Master Format
Search Engine	-	√	-	√
Prices of Products	-	-	-	-
Pictures of Products	-	-	-	-
Cyber Shopping	-	-	-	-
Contractors Directory	√	-	√	-
Regional Index	√	-	-	-
Direct Connection to Contractor's Web Site (if available)	-	-	√	-
Manufacturers Directory	√	√	√	√
Regional Index	√	-	-	-
Direct Connection to Contractor's Web Site (if available)	-	√	√	-
Distributors Directory	√	√	√	-
Regional Index	√	-	-	-
Direct Connection to Contractor's Web Site (if available)	-	√	√	-
News	-	-	√	-
Industrial News	-	-	√	-
Architectural	-	-	-	-
Engineering	-	-	-	-
Construction	-	-	-	-
What's New	-	-	√	-
Construction Related Links	-	√	√	-
Governmental Links	-	-	-	-
Corporate Links	-	√	√	-
Institutes Links	-	√	√	-

Table 4-1 *Comparison of Building Centers*

5. A PROPOSAL FOR A VIRTUAL BUILDING CENTER

5.1.The Effects of the Internet

The effects of the Internet are growing larger in the construction sector as well as in the other industries. This is a result of the improvement of the digital technology, and it is much easier and cheaper to use an Internet computer at home or in offices. Besides, as the bandwidths get wider to increase the flow of data, and the standards of the languages that are used in writing the codes become richer, the quality and number of services that are provided by the Internet are also getting better.

Nowadays, it is essential to keep up with the growing demand of the Internet users in the competitive building products sector. As an effect of this, the scope of the services is getting broad, and the modern interactive web sites are replacing the old one-page-introductory services. In this new concept, the users are given the opportunity of getting the most of information dissemination by various services like industrial news, search engines, linking to related sites, product catalog browsing, and etc.

Today, Internet is an important factor for both Turkish and international construction industries. The Internet provides a globalization of information in the world, so these services must be taken into consideration in the essence of this globalization, and the uniting of the markets.

As a result of this thesis, a web site of an imaginary Building Center (***Virtual* Building Center-*V*BC**) is suggested as a model in order to pioneer the improvements and enhancements in the scope of services provided by Building Centers. Before presenting the web site, there are two topics that took part in the concept of the design:

- User profile, and
- The list of the services.

5.2.The User Profile

The user profile here represents the level of interest of the user to the construction industry. Mainly, there are two types of profiles that are determined for the related services:

- *Everyday Enquirer:* In this user profile, the user is not directly interested in construction industry or construction related services. The main reason of the visit to the web site is the demand of information about a building product, or general interest of the industry. The user does not have to be a construction professional.

- *Professional User:* This user profile consists of professional users involved in construction industry. Professional user requires more complicated and specific information than everyday enquirer. The services designed for this type of users require complex entries and updating of databases, and the service providers may feel the necessity of charged memberships.

5.3.Services

After naming the profiles of the visitors, the list of the services has been made according to the general trends determined in Table 4-1. As mentioned above, the services, except those requiring certain performance, may be provided free of charge, because the providers usually finance the expenses by hiring advertisement banners or finding sponsors for the web site. The services provided in the ***Virtual* Building Center** are as follows:

- Product catalogs (partially requires membership)
- Search engine
- Directories
- Construction links
- Construction industry news

5.4.Web Site Model : Virtual Building Center

After determining the user profiles and services, web site model (*V*BC) is constructed. The site consists of three main parts (frames):

- *Main menu (top):* The menu bar (Figure 5-1), which contains the topics of the services, is permanently at the top of the page, so that the user is able to jump topic to topic easily without the need of going backwards.

Figure 5-1 *The menu bar of* **V**BC

- *Secondary menu (left):* Like the main menu, this part of the page is also permanent to provide easy access to other links by using Quick Links tab. The user also has a chance to search site-specific information at any time.

- *Body of the page (below):* This is the place where the top and left menus are directed.

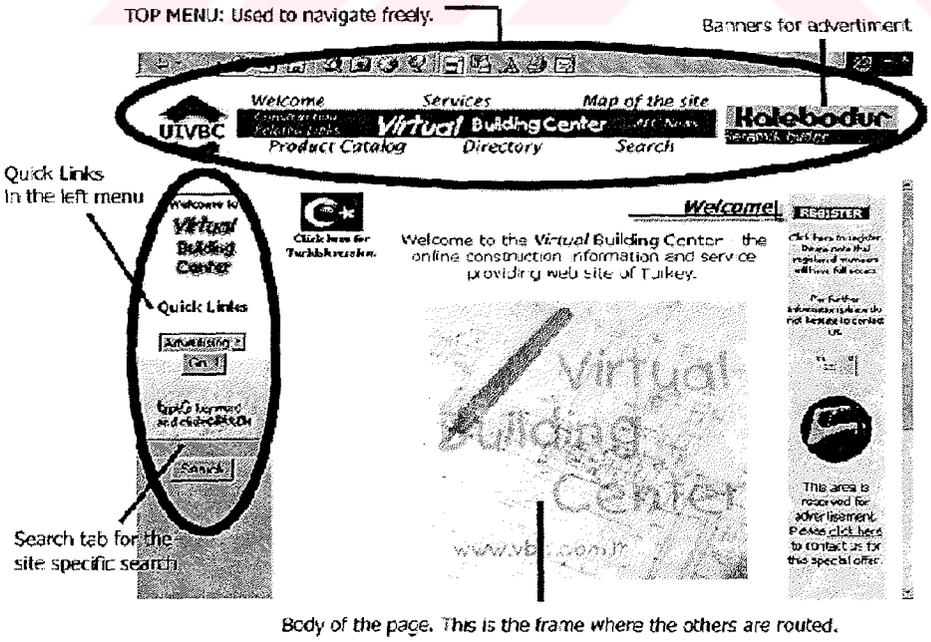


Figure 5-2 *The structure of* **V**BC

5.4.1. Welcome Screen

This is the index page of the web site (Figure 5-3) that welcomes the user, which contains an introduction to *V*BC. The user has an opportunity to use the Turkish version of the site by clicking the Turkish flag. The right section of the page is reserved for advertisements and announcements, where a registration button also placed for the membership.

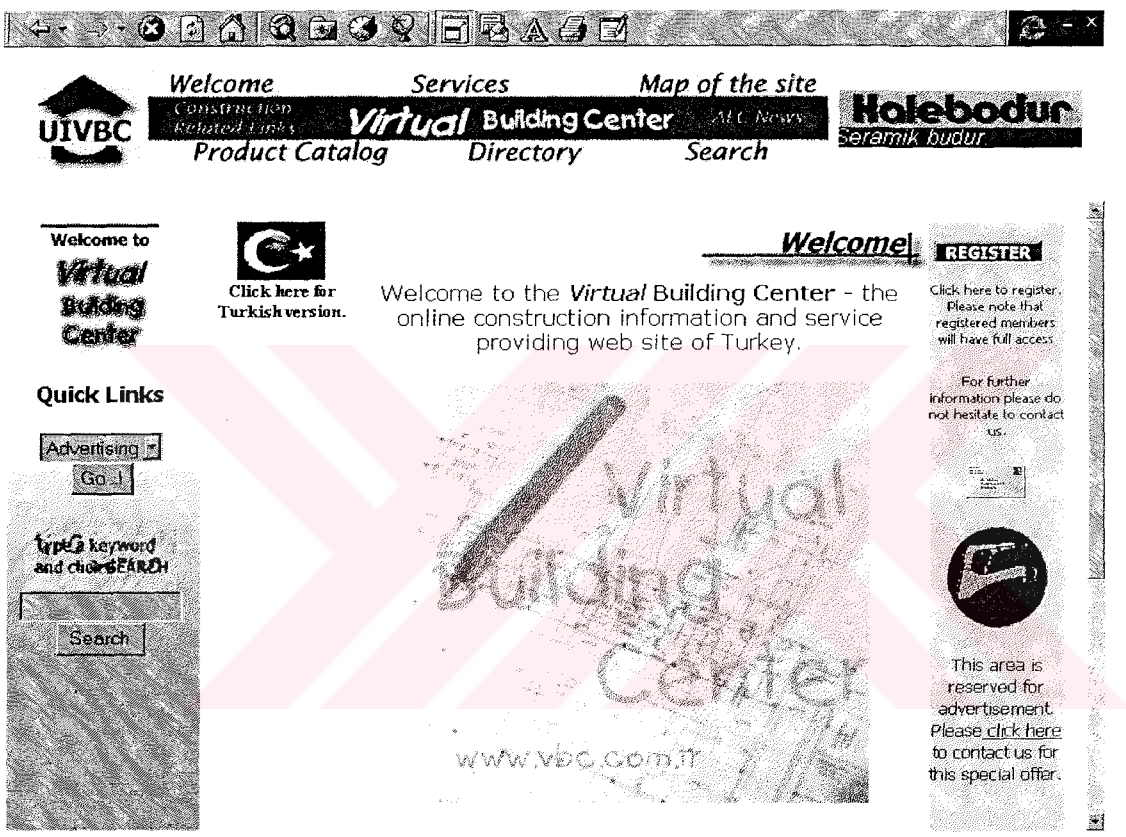


Figure 5-3 *Welcome screen of* ***V*BC**

5.4.2. Site Map

In the site map (Figure 5-4), the main and sub topics of the services provided are listed in a graphical format, where the users may reach the desired service page by just clicking on the topics. The reason of listing the sub-categories of these topics is to provide easiness to decide where to browse in the site.

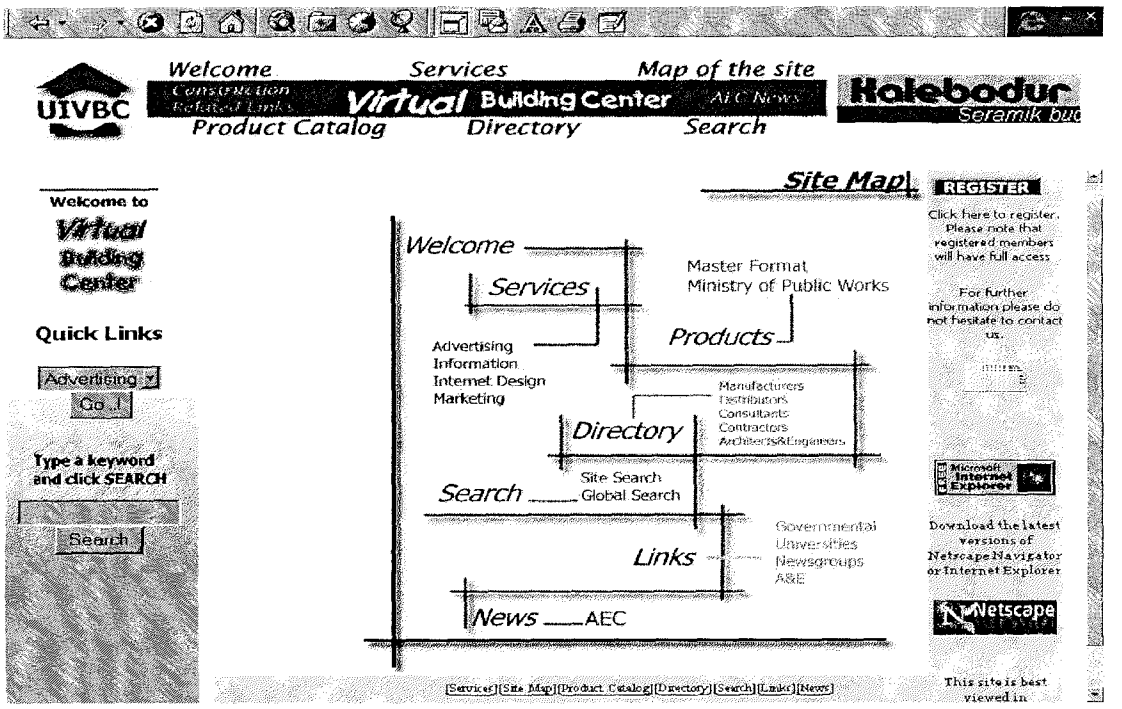


Figure 5-4 *Site Map of VBC*

Figure 5-5 *Services of VBC*

5.4.3. Services

In Figure 5-5, there is a screen shot of the Services page of ***V*BC**. These services are charged according to the detail level, and are provided on demand of the user. It is important to note that the content of this page is not similar with the standard top menu services in Figure 5-1 because these are professional services for individuals or companies of construction industry.

5.4.4. Construction Related Links

The links page (Figure 5-6) lists the links related to construction industry. These links are made up of Governments, universities, institutions and associations as well as newsgroups. It is possible to get the full listing of the desired topic by clicking the sub-categories.

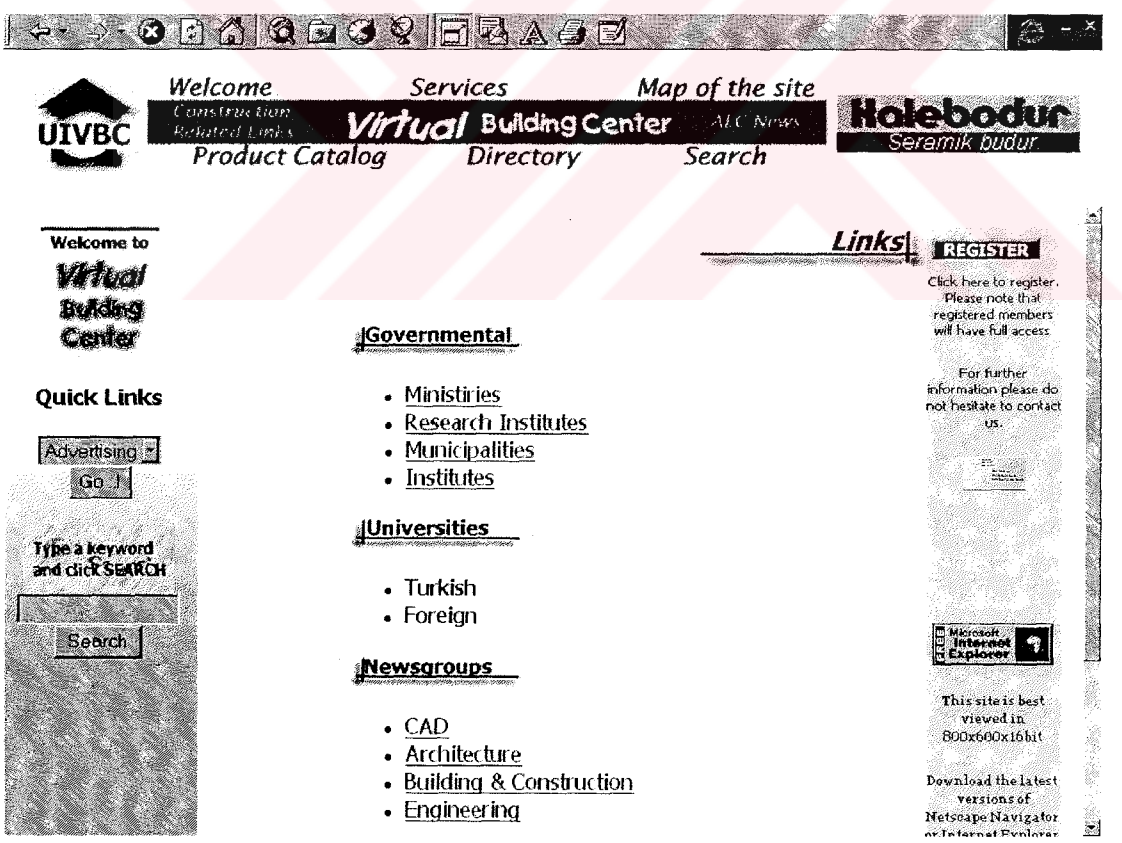


Figure 5-6 *Construction Related Links of* ***V*BC**

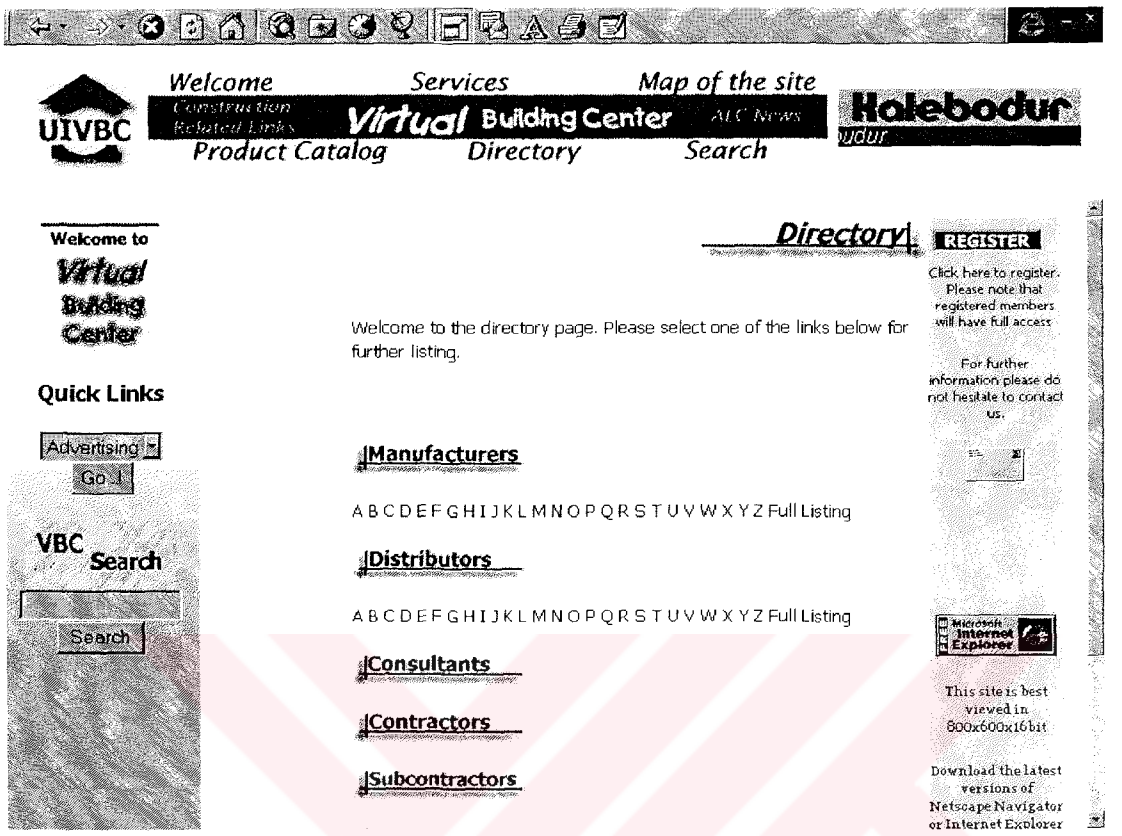


Figure 5-7 *Directory listings of VBC*

5.4.5. Directories

As shown in Figure 5-7, various construction directories are listed. It is possible to retrieve the full listing by clicking the headers, or the letters may be used for limited lists where possible.

5.4.6. Search

The left menu frame contains Virtual Building Center Search field, which is used to make a site-specific search. However, it is possible to search general information by using popular search engines. As shown in Figure 5-8, queries can be directly sent to Yahoo or AltaVista without the need of linking to their site.

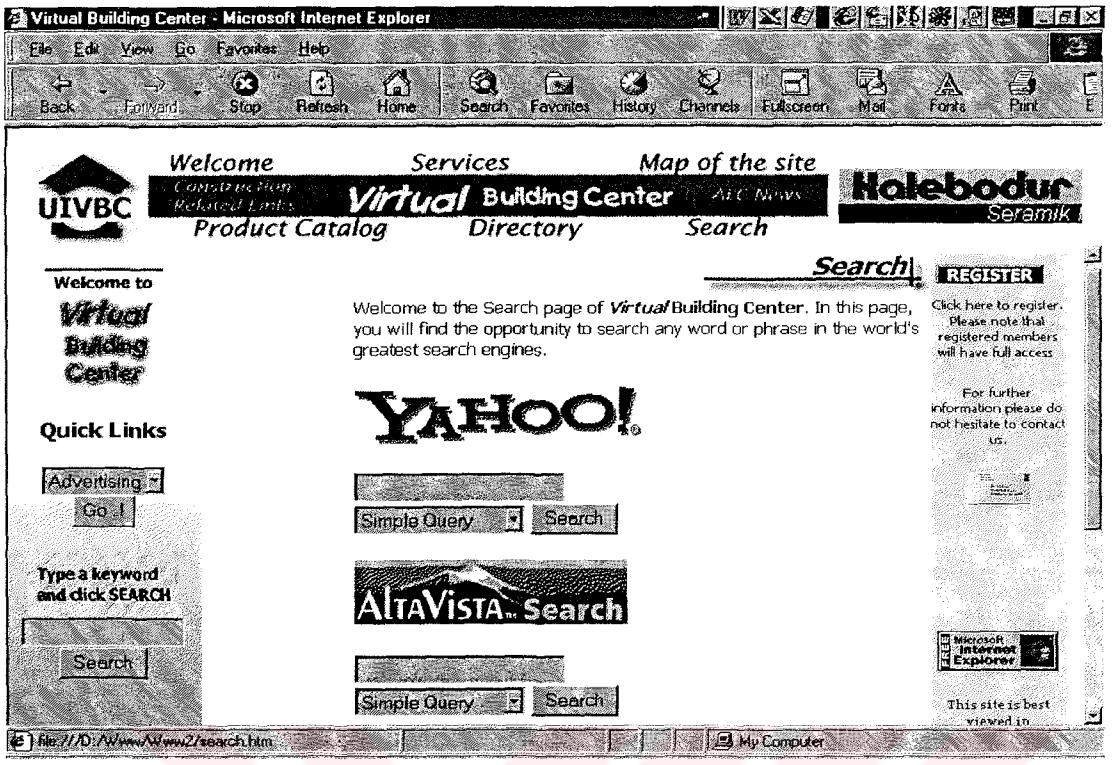


Figure 5-8 *Search service of*

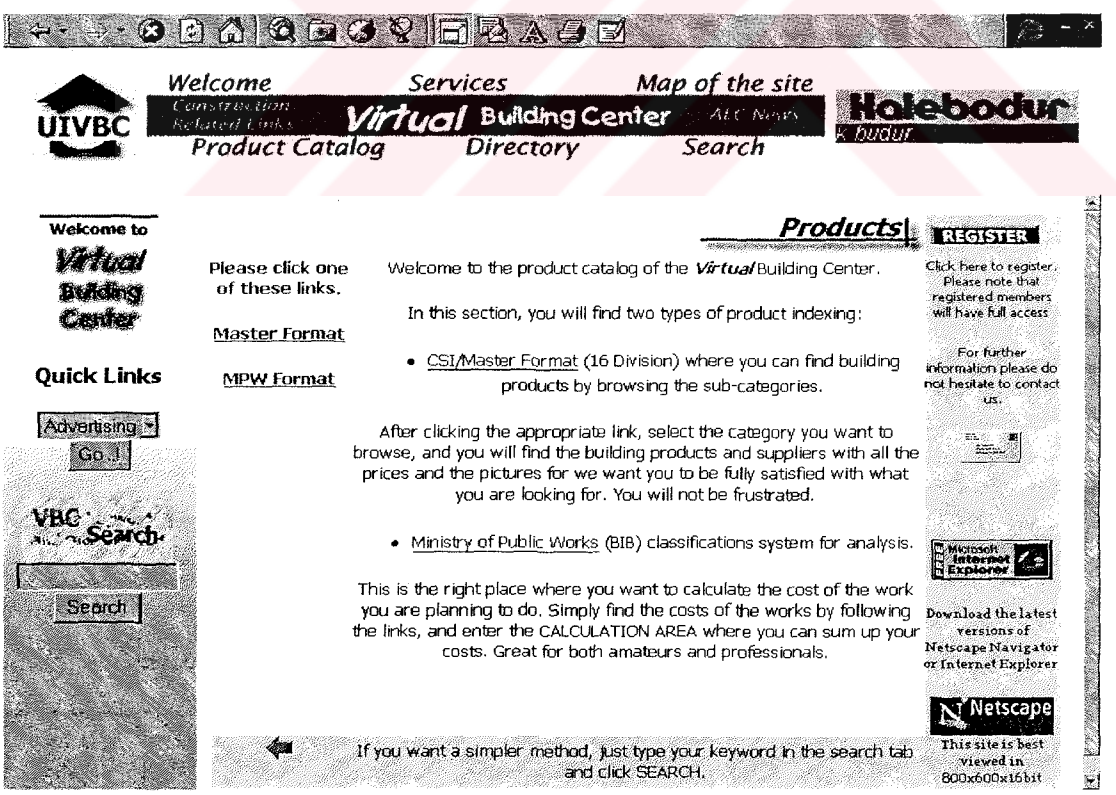


Figure 5-9 *Product Catalog of VBC*

5.4.7. Product Indexing

In, there are two types of Product Indexing (Figure 5-9). The first one is the "16 Division CSI/Master Format", which is simple enough for a non-professional (everyday enquirer) to browse in the categories and find the desired building product as well as professionals. The second service (Ministry of Public Works classification system) is aimed for only members of the ***VBC,*** and is charged. While it is possible to browse, find and get information about a building product in the first service, the user can make a cost analysis of a work using the "Ministry of Public Works-Unit Price Analysis" in the second service.

5.4.7.1.16 Division CSI/Master Format

As mentioned above, CSI/Master Format is used here to provide easiness for a non-professional. In the main index page, the user can choose one of the categories of interest by clicking the appropriate topic (Figure 5-10).

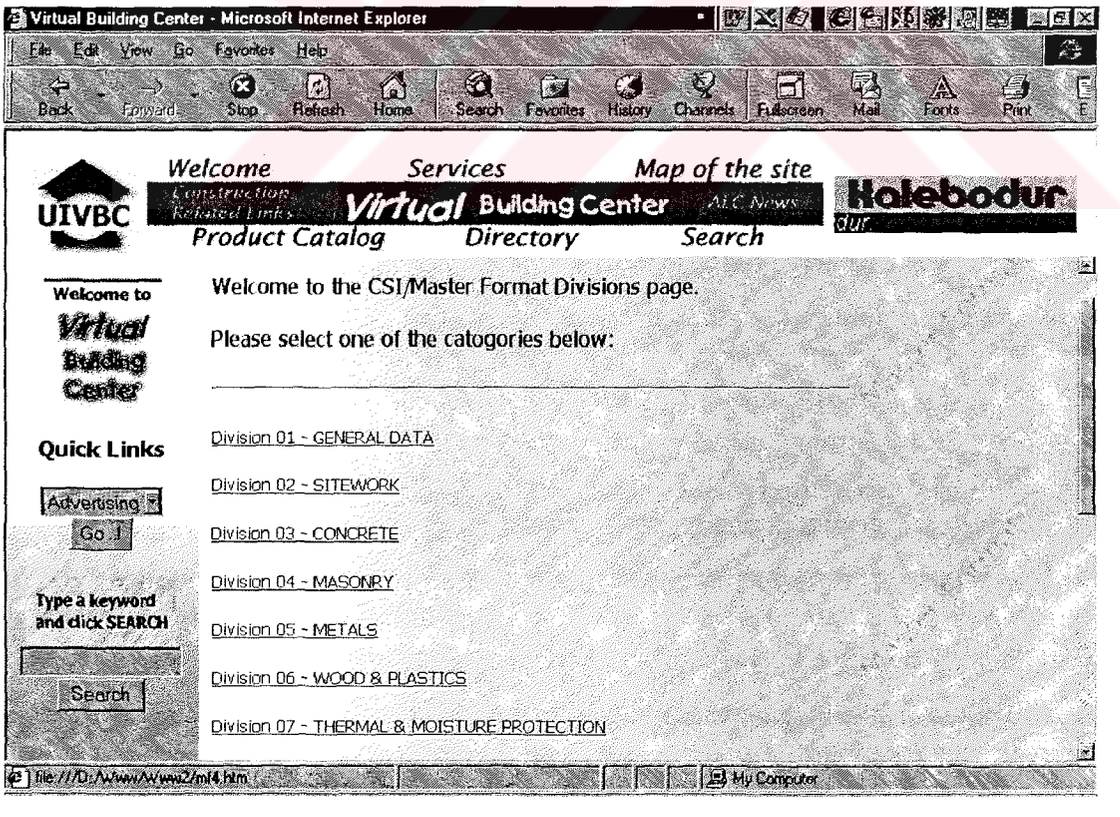


Figure 5-10 *Master Format Divisions*

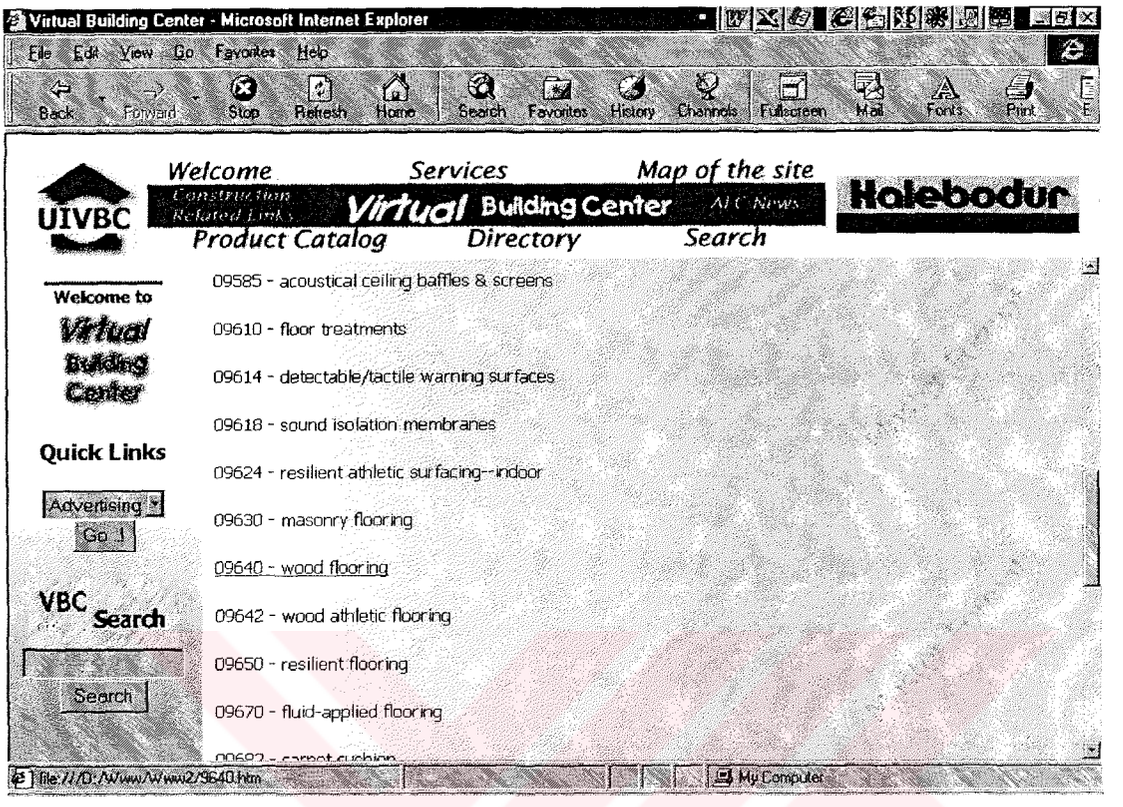


Figure 5-11 *Sub-category index of Division 9-Finishes*

Clicking one of the divisions brings the sub-categories of the required subject. Figure 5-11 shows the listing of the "9-Finishes" category. The lists of vendors and the information about the products can be retrieved again by clicking the sub-category. For example, Figure 5-12 shows the list of vendors of "Division 9- Finishes". In this page, the user is able to perceive the products visually with the help of the pictures, which helps the user to be sure about the products.

The CSI/master Format Divisions service is planned to be free of charge, because the sponsors and the advertisement banners in the site may simply finance the costs of this product indexing service.

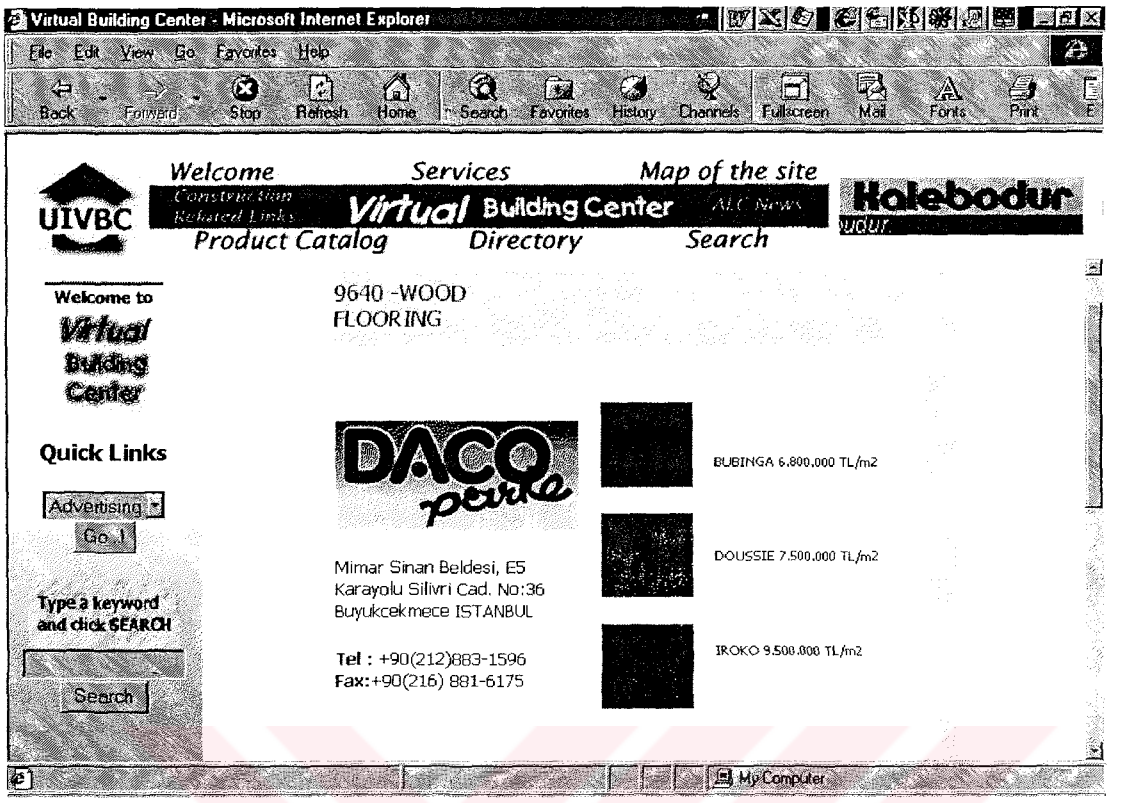


Figure 5-12 *Product information of 9640-Wood Flooring*

5.4.7.2.Ministry of Public Works Unit Cost Analysis

Although this part of the service is not directly related with the product indexing, it is integrated with the product selection and prices of Master Format classifications.

Figure 5-13 is the start page of MPW Analysis page. In this page, the information about how the analysis will be made is given. As this analysis system requires a large database with a monthly update of the prices, a membership fee is required for the costs of this work. This is achieved with the membership ID and password protection, which only the members are permitted. If not registered, it is possible to click on the Register (Figure 5-13), and become a member by filling out the Registration Form (Figure 5-14). The fee of the service is not included in the form as it is subject to change according to the service provider.

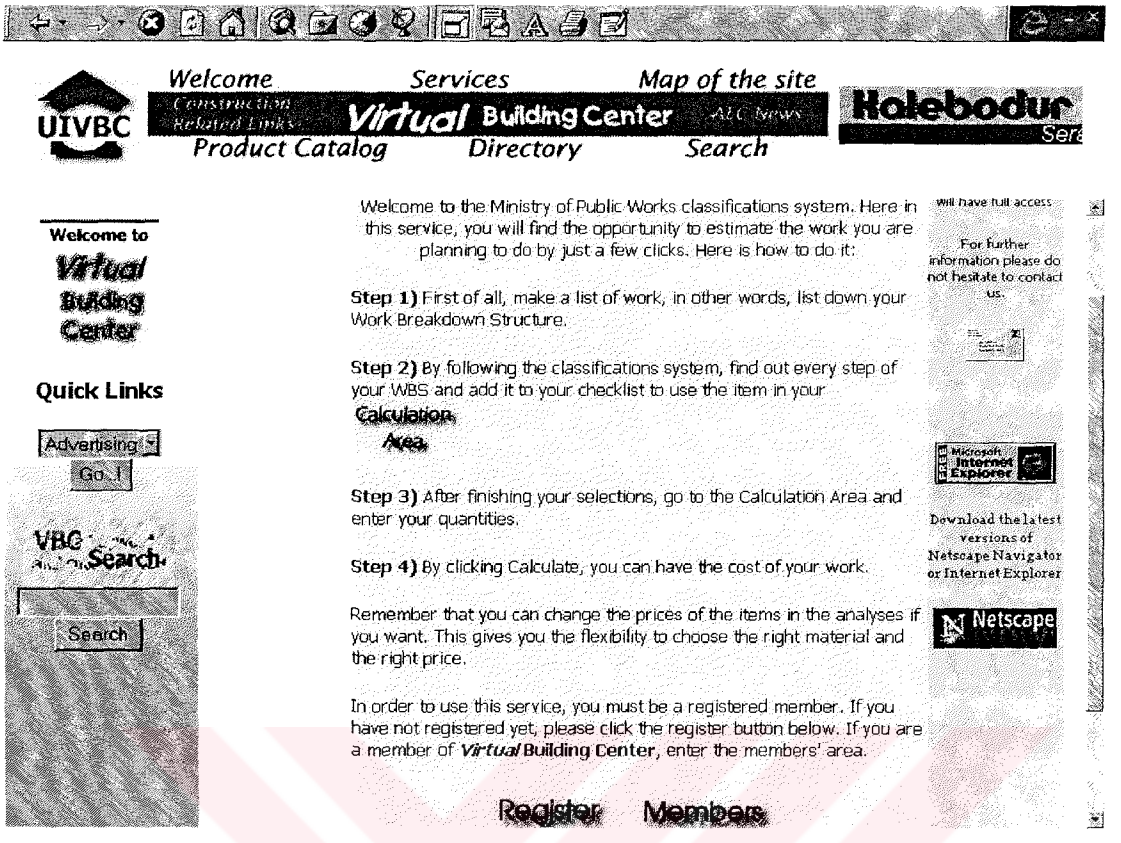


Figure 5-13 *Entrance of MPW indexing*

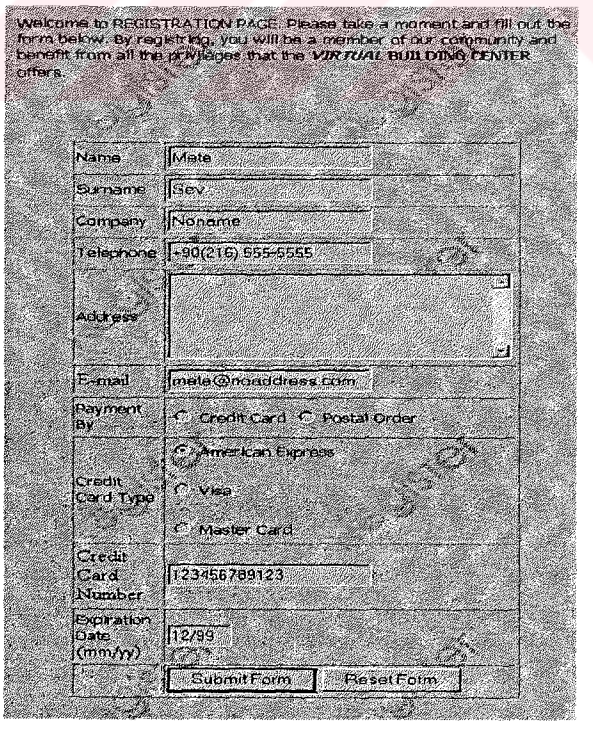


Figure 5-14 *The Registration Form of* **VBC**

The MPW Unit Price Categories are listed after a validation of member ID and password as shown in Figure 5-15.

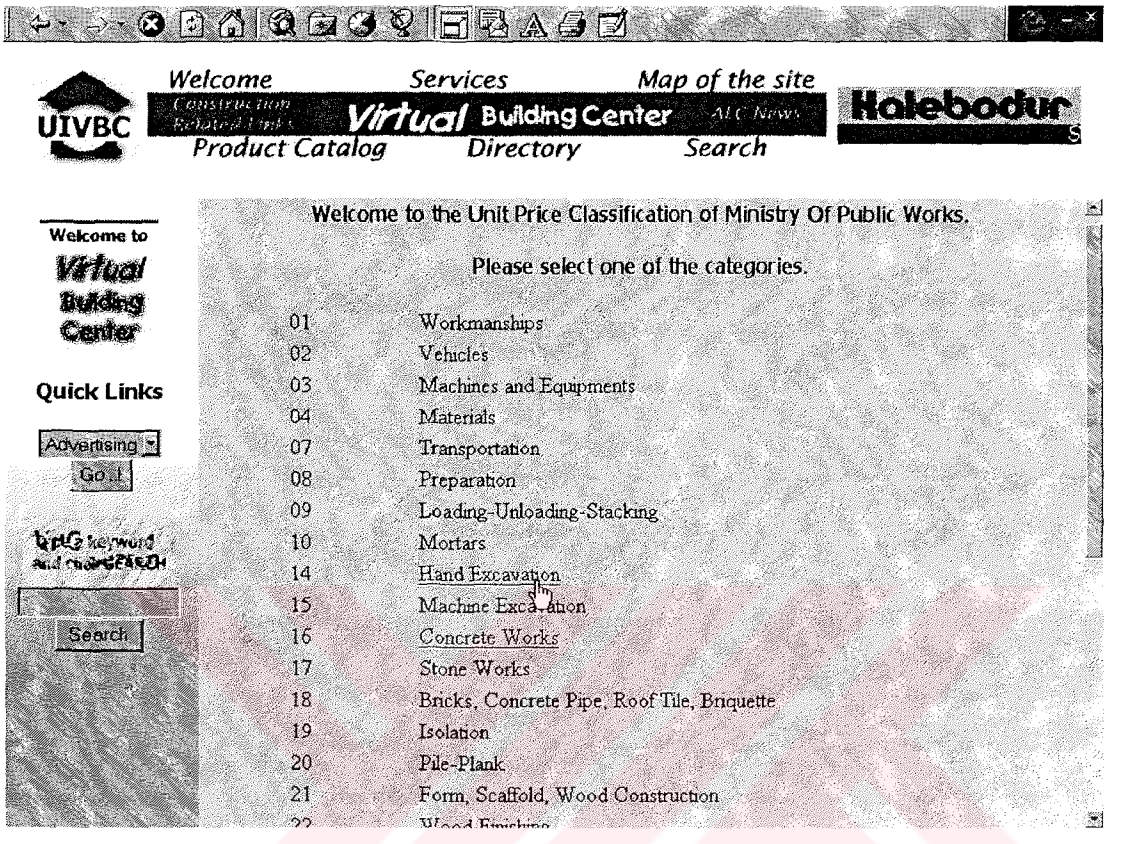


Figure 5-15 *Categories of MPW Unit Prices*

By clicking the required category, it is possible to get the listing of sub-divisions. For instance, Figure 5-16 shows the list of sub-division of the main division 14-Hand Excavation (Figure 5-15).

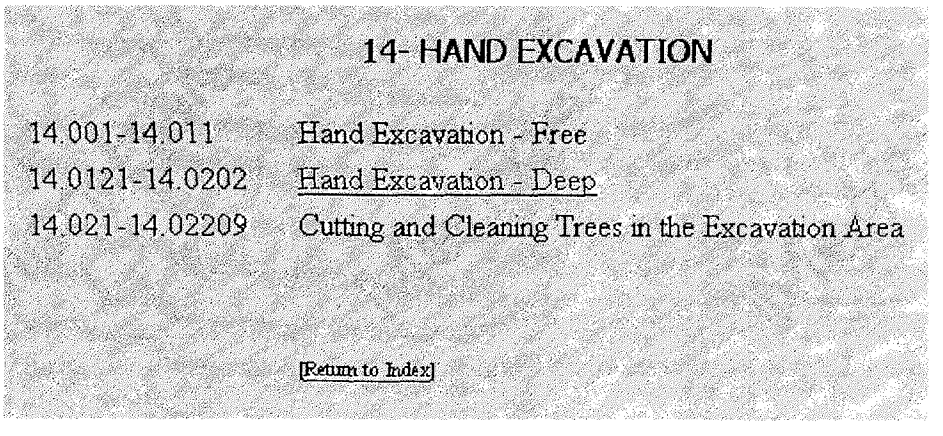


Figure 5-16 *Sample sub-divisions listing of 14-Hand Excavation*

After clicking the sub-category of the work, the last part of the selected category can be loaded. In this page the items, which take part in the Work Breakdown Structure of the work planned, can be added for the estimation of the work. The *checked* items will appear in the **Calculation Area** for the input of further information. Figure 5-17 shows the way to add items.

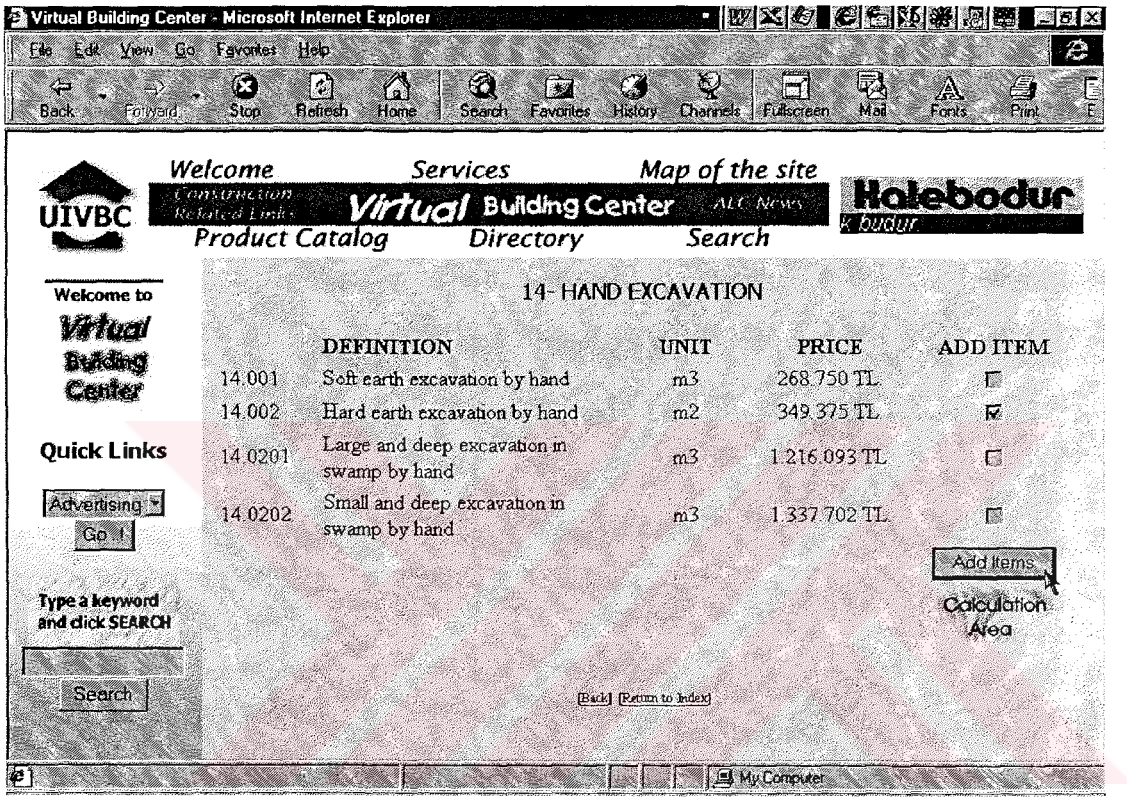


Figure 5-17 *Adding items for the Calculation Area*

The **Calculation Area** button is used to jump to the calculation area after selecting all the items. In this page, the user is informed about the selections made so far, and asked either to go to the next step or return to the index page for additions to the current list (Figure 5-18). Another possibility is to have the analysis of an item *where possible* for the price changes. For example, in Figure 5-18, by clicking the selected item "26.203 Floor casing with 4 cm. colored marble", it is possible to get the analysis as in Figure 5-19, and the price of the desired component may be changed easily by entering the new price.

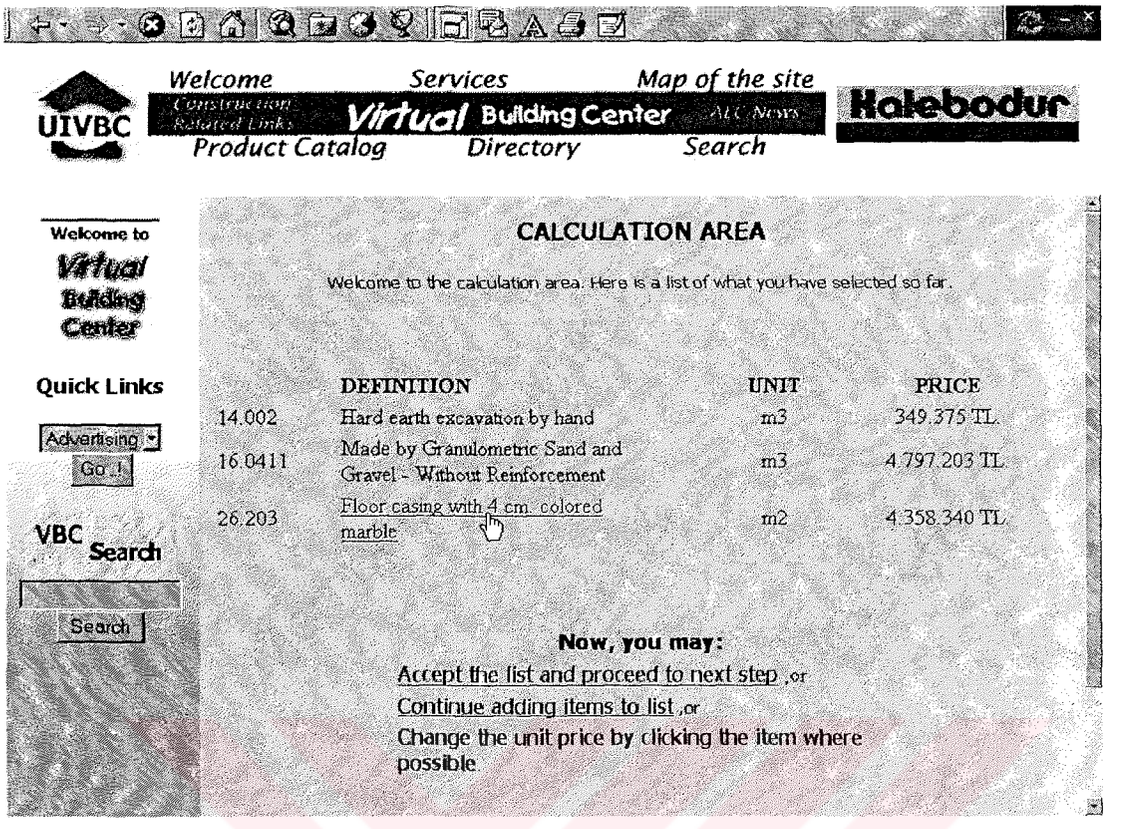


Figure 5-18 *Calculation Area*

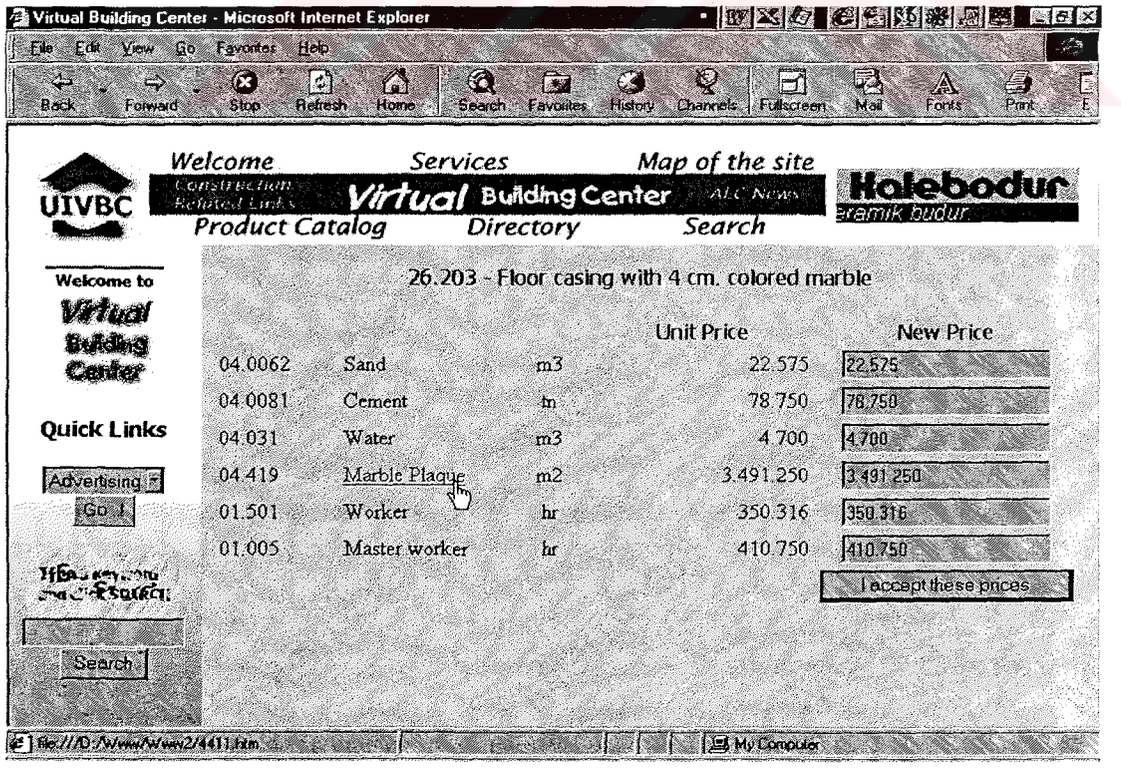


Figure 5-19 *Entering a new price for an item*

If the new price of the component is not known, or a selection of a building product is not made, it is possible to jump to Master Format by clicking the link and choose a proper price for the new material.

After accepting the list and the unit prices, the next step is to enter the quantities of the works (Figure 5-20).

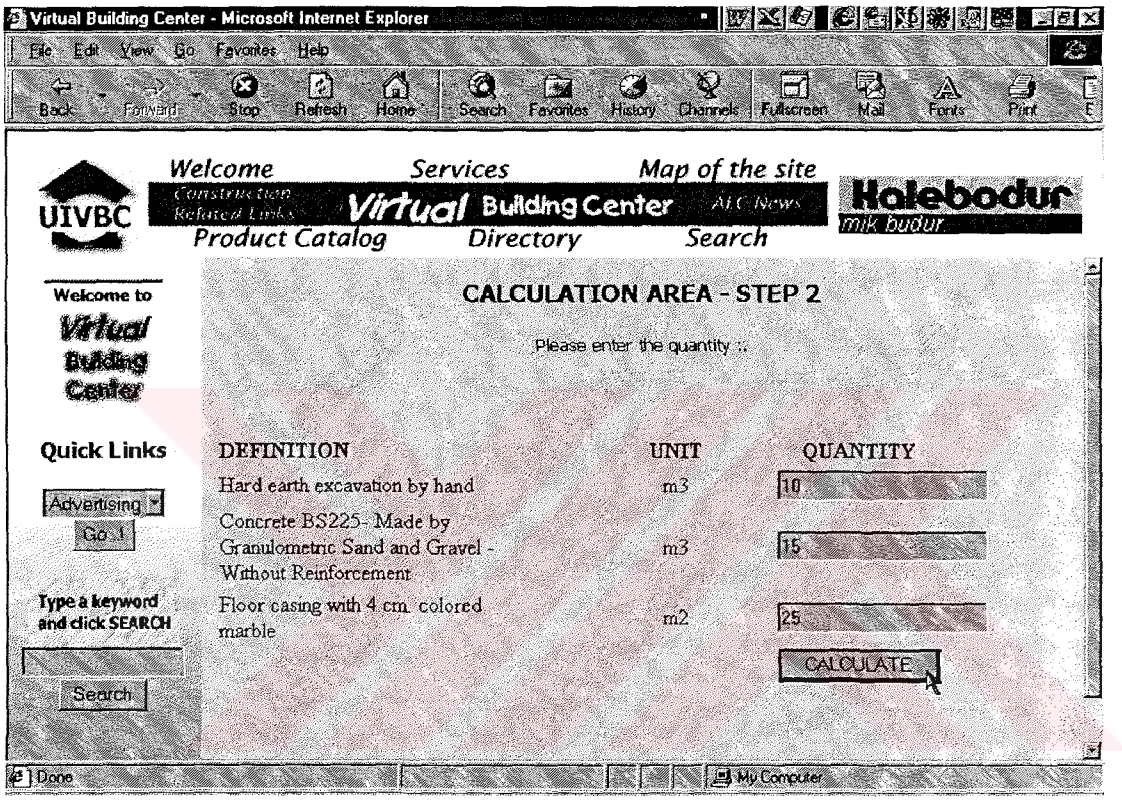


Figure 5-20 *Step 2 of Calculation Area*

After entering the data correctly, the last step of the analysis is achieved by clicking the CALCULATE button. The final cost is calculated by multiplying the unit prices with the quantities (Figure 5-21).

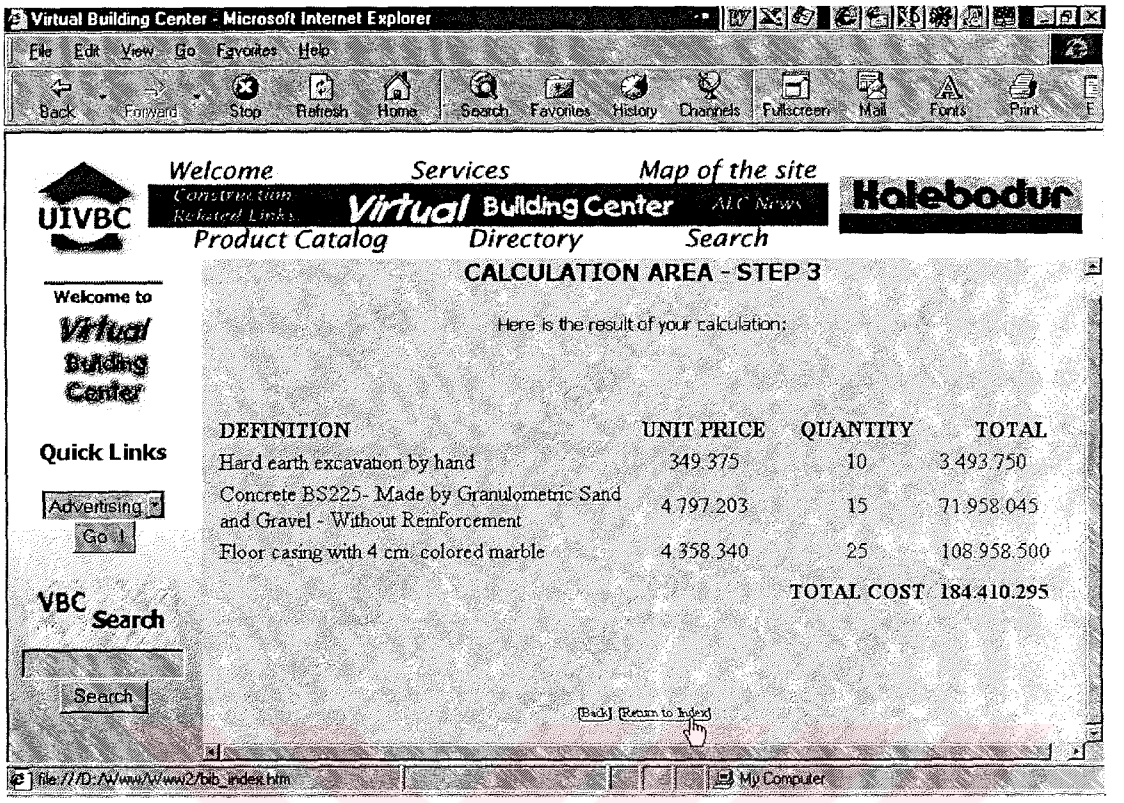


Figure 5-21 *Final step for the cost analysis*

This web site model is constructed to demonstrate the possibilities of services that may be provided in the Internet in order to support advertising, marketing and procurement of building products and services as well as integration of the Turkish and international building industries.

In this web site, on-line shopping is not supported, because the standards for secure credit card transactions are not determined. In the future, it is possible to add a shopping module, which will directly inform the vendor about the requests of the users by e-mail.

6. CONCLUSION

Building Centers play an essential role in the construction industry by providing information about building products and services. Today, the Internet supports these services by providing an unprecedented tool for reaching at the desired information. The development of the advanced technologies -like higher bandwidths, more graphical usage, and increase in the browser capabilities- enriches the contents of the information. Besides, electronic commerce (e-commerce) is also taking place in our daily life with the development in secure money transactions and digital cash technologies.

The web site model presented in this thesis is also open to further development by including on-line shopping and money transaction modules. It is also possible to adapt the model to interact with databases for regular updates of products, prices and etc. as large business and organization databases start appearing on-line in greater numbers, due to the recent availability of software that links databases to the Web. In the future, there is no doubt that these services and resources will be more enhanced as the Internet is constantly and rapidly changing.

APPENDIX A

The following questionnaire was sent to the UICB Members.

1- When was your center established, and how it operates?

2- On which basis (or how) do you classify the building products and services you exhibit? (E.g. CI/Sfb, Master Format etc)

3- Do you provide, at present, on-line access to the information you provide about building products and services? (E.g. web pages for introduction, promotion and marketing for building products and services, cyber marketing, etc.)

4- Can you give any information relating to marketing, promotion and providing information about products in your country?

APPENDIX B

The members of UICB are as follows:

1. **Australia**

- Home Ideas Centres Pty Ltd.
- Architecture Media Australia Pty Ltd.
- Sydney Building Information Centre Pty Limited

2. **Belarussia**

- Research, Design and Technological Institute of Building Industry (NIPTIS)

3. **Belgium**

- WTCB-CSTC Centre Scientifique et Technique de la Construction

4. **Brazil**

- The Building Centre of Brazil Centro da Construçâo

5. **Canada**

- Designers Walk Inc.
- McGraw Hill Information Service Ltd

6. **China**

- C.B.T.D.C. China Building Technology Development Centre

7. **Czech Republic**

- ABF Architecture and Building Foundation
- BVV as Brnênskê veletrhy a výstavy

8. **Denmark**

- Byggecentrum Centre for Building Information

9. **Estonia**

- Estonian Building Foundation Ehituskeskus ET-INFO Ltd.

10. **Finland**

- The Building Information Institute Rakennustietosäätiö

11. France

- CEBTP Centre Expérmental de Recherches et d'Etudes du BTP
- Centre Infobatir
- BATIMAT

12. Germany

- Bauzentrum München
- Heinze GmbH
- IRB Informationszentrum RAUM und BAU der Fraunhofer-Gesellschaft

13. Hungary

- E.T.K. Epitésügyi Tájékoztatási Központ Information Centre of Building

14. Iceland

- Byggingapjonustan

15. Ireland

- The Building Information Centre Dublin Institute of Technology

16. Israel

- B.C.I. Building Centre of Israel

17. Italy

- QUASCO

18. Japan

- B.C.J.The Building Center of Japan
- The Japan Building Center

19. Malaysia

- BICMA Building Information Center of Malaysia

20. Netherlands

- PRC Bouwcentrum

- NBD Dederlandse Bouw Dokumentatie

21. Norway

- Norsk Byggtjeneste A.S Norwegian Building Centre

22. Poland

- COIB-Centralny Osrodek Informacji

23. Russia

- VNIIESM
- VNIINTPI International Construction Institute
- St. Petersburg Construction Centre

24. Singapore

- CDIB Constr. Industry Development Board

25. Slovenia

- Gradberi Centre Slovenije

26. Spain

- CIC Centro Informativo de la Construccion
- ITEC Institut de Technologia de la Construcció de Catalunya
- Collegi D'Aparelladorsi A.T. De Barcelona - Centre de Documentarció Josep Renart

27. Sweden

- AB Svensk Byggtjänst
- Byggcentrum Göteborg AB
- Skansk Byggtjänst i Malmö

28. Switzerland

- Schweizer Baudokumentation
- DOCU

29. Turkey

- Y.E.M.Yapi-Endüstri Merkezi -The Building & Industry Centre

30. United Kingdom

- Building Centers The Building Centre Group
- Barbour Index Ltd.
- BRE Building Research Establishment
- Archinet Ltd.
- National Council of Building Material Producers

31. United States

- National Association of Home Builders
- Building Center International Corporation (BCIC)

GLOSSARY

- *Authentication* is any of several methods used to provide proof that a particular document received electronically is actually from the individual it claims to be from, and is unchanged.

- *Browser* is any of a number of programs used for retrieving and viewing HTML documents. Netscape Communicator and Internet Explorer are GUI Browsers.

- *Client/Server* is a way of distributing information on a network that involves using a small number of server programs to provide data to cilent programs installed on many computers throughout the network. The server program maintains databases and provides information to the client programs, through the network, when requested.

- *Communications software* usually refers to programs that are run on personal computers to allow computers to communicate via a modem, and phone lines.

- *Database* is a collection of data, especially accessible by computer.

- *Download* is to receive on your local computer a copy of a file that currently exists on some remote computer.

- *Host* is the Internet access provider's computer. Generally used by dialing up with a modem to connect.

- *Hypertext* is the text written with special encoding that provides links to other locations within a document, or to other documents. Documents are displayed with some of the words highlighted. These highlighted words represent links to other documents that allow you, with just a few keystrokes of clicks of a mouse, to view these other documents, which ay also have links to still other documents.

- *Hyper Text Markup Language (HTML)* is a standardized (but evolving) set of commands and syntax rules used for encoding text files with formatting and document linking information. These documents are encoded for use on the World Wide Web and are viewed with a Web browser.

- *Hyper Text Transfer Protocol (HTTP)* is a a standardized set of rules for transferring and processing HTML and other documents on networks.

- *Internet Service Provider (ISP)* is a business or institution connected to the Internet that provides Internet access to others (usually via phone lines).

- *Offline* is anything that happens when your computer is not connected to any other computer. For instance, a program may download many messages and files quickly and then allow you to read them offline in order to save on connect charges and long-distance phone charges.

- *Online* is any activity carried out while your computer is connected to onother computer or network.

- *Protocol* is a formal, standardized set of operating rules for governing the format, timing, error control, etc. of data transmissions and other activities on a network.

- *Secure transactions* are the financial or other business transactions carried out using privacy and authentication procedures adequate to the nature and risks of transactions. In general, on the Internet, this means using Secure HTTP, encryption, or other procedures to protect privacy and the use of credit card numbers and other personal information.

- *Uniform Resource Locator (URL)* is an addressing system that can uniquely name most files found on the Internet. It includes a protocol name, plus a site name and subdirectory path, and a file name.

- *World Wide Web (WWW)* is initially created in Switzerland, and is a client/server system designed to use hypertext and hypermedia documents via the Internet. It uses HTTP to exchange documents and images. The documents are formatted in HTML.

REFERENCES

[1] http://www.uicb.org

[2] http://www.globe.or.jp/bcj/src/sougos-e.html

[3] http://www.irb.fhg.de/irbsite/verlag-en/home-en.html

[4] LESLIE, Ian M., "The Building Success Story 1932-1971", BUILDING CENTRE INTELLIGENCE REPORT No: 5

[5] http://www.rtd.com/people/rawn/business.html

[6] ELLSWORTH, Jill H. ,ELLSWORTH, Matthew V., "Internet Business Book", John Wiley & Sons Inc., Canada 1996

[7] http://www.nrc.ca/irc/vtcitdoc.html

[8] http://w3c2.com.au/steve/is3.html

[9] http://www.ndmsweb.com/statistics.html

[10] http://www.commerce.net/research/stats/wwwpop.html

[11] http://www.aecinfo.com/

[12] http://www.constructionmaterials.com

[13] http://www.cat.com

[14] http://www.soyak.com.tr

[15] http://members.aol.com/commxtra/survey96.html

[16] http://www.itn.is/bygglina/english.html

[17] http://byggtjeneste.no/about.html

[18] http://buildingcentre.co.uk

[19] http://www.rts.fi/english.html

[20] http://www.irb.fhg.de/irbsite/verlag-en/home-en.htm

[21] http://www.sweets.com

[22] http://www.rakennustieto.fi/rtnet_en/rtnet2.htm

[23] http://www.constructionnet.net/dashboard/

[24] http://www.supernetwork.net

[25] http://www.yahoo.com

[26] http://www.yem.net

[27] http://www.insaat.net

[28] http://www.improvenet.com

[29] http://www.buildata.com

[30] http://www.homeideas.com.au

[31] http://www.dbm.com.au

[32] http://www.aedile.it

BIOGRAPHY

Mete SEV was born in 1970 in İstanbul. He attended to İlhami Ahmet Örnekal Primary School in İstanbul. Graduated from Kadıköy Anatolian Highschool in 1988, he started his architecture education in Mimar Sinan University. In 1996 he is enrolled in master program about "Construction Project Management" in the same university. He worked as Research Assistant in the Construction Engineering Department. At present, he is working in Soyak Göztepe Residence Site as a site architect in Soyak Toplu Konut A.Ş. His marital status is married.

T.C. YÜ... KURULU...
DOKÜMA... MERKEZİ