REALIZATION OF EXPOSITION-LIKE EVENTS IN CYBER-SPACE

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Abstract: Realisation of exposition-like events, like conferences, exhibitions, etc., involves a multifaceted process regarding aspects such as: general planning, administration of the event's ground, exhibitors and visitors support, local event's time scheduling during de exposition or simple staff management. Depending on the complexity of the exposition, this usually requires considerable logistics efforts, which could be decisively facilitated through information technologies such as Internet/Intranet/Web-based systems. The aim of this paper is to propose a generic web-based solution to support exposition-like events. A prototype designed to support any type of exposition-like events - the Exvent System, is in detail described and discussed. It supports specific services and interfaces regarding different users such as: organisers, exhibitors and visitors. Users have a multimedia environment available, displaying a graphical model of the exposition-ground along with specific on-line facilities.

1. INTRODUCTION

In the last years different systems in the areas of (Geo) Graphic Information, Facility Management and Building Administration, have been implemented proposing graphic-interactive interfaces, integration of various kinds of software tools and databases in order to address problems focusing on providing information and co-ordinating people and processes (Tompkins 1996) (Flick 1996) (Jung 1997). However it has been shown these systems do not satisfactorily support temporal and/or sporadic events such as expositions or fairs, which may involve high levels of coordination efforts and resource management during short periods of time. On the other hand, traditional solutions do not actually explore the potentialities of the Internet/WWW technology for the actual administration or management of events.

We deal here with events of many different kinds, like conferences, exhibitions, workshops and many others - in the following called **exvents** (exhibition-like events), whose process planning, concerning their first outlining, organisation and execution comes normally along with special needs, involving a very specific logistic complexity. Yet one can identify a common set of tasks which desirably should be computationally supported, for instance:

– the overall planning of the exhibition ground.

– the allocation of space units (booths) and their assignment to exhibitors;

– the preparation and management of the catalogue of products and services offered by the exhibitors;

– the planning of the event's time schedule, in regard to the exhibitors' personnel at the exvent as well as concerning the schedule of each individual visitor;

– the process of accessing the exvent both as visitor or exhibitor, which can be guided, based on flexible and effective support tools in form of Intelligent Agents.

We can here clearly state that an effective support of exvents requires necessarily a graphical representation of the exposition ground and the booths. This has also to consider a GUI and a set of optimised interaction paradigms for an easy, intuitive and fast navigation through the exposition ground,

permitting not only its adequate visualisation, but also its administration. Reserving a booth has to be as simple as editing an object on the screen.

In this paper we propose a global solution for the implementation of exvents on the Web – the Exvent system.

The main objective behind the Exvent project was to analyse the essential requirements of an exvent and to design an appropriate Web-based supporting environment. It includes tools to reduce how much as possible the logistic complexity of the overall management of an exvent. It was designed and developed to be generic and flexible enough in order to support all kinds of exhibition-like events. It is aimed to fulfil the needs of all different type of target users, i.e., organisers, exhibitors and visitors, offering them specific services on top of a common platform. Otherwise, the Exvent system is thought not only for physical events, but also for those that take place only in Cyberspace ("Virtual Exhibition"), overcoming this way the limits imposed by a specific place. Furthermore, the Exvent system enables a perfect synchronisation between virtual and physical events. Being Internet-oriented reduces also the difficulties that arise by the physical distance of the various participants in the exvents preparation and management (Ferreira 1998).

In this paper we start by presenting the overall architecture of the Exvent system. Then the specific services for the different users are discussed in detail. In addition the visualisation strategy, in terms of navigation and interaction models, as well as some advanced facilities integrating Intelligent Agents and Mobile Computing are exposed. Finally we compare the results with other related representative work and draw out some conclusions and future work directions.

2. EXVENT ARCHITECTURE

Using the most recent Web technologies like Dynamic HTML, Java, Java3D, VRML and Active Server Pages, the Exvent system is an interactive and flexible Multimedia Information System. Its modular, object oriented and open-ended architecture allow a wide set of tools to be plugged in as needed, without affecting the system's integrity and consistency.

The system's central component is a Web Server that provides a graphical front end to support (different) DBMS, establishing an interface between visitors, exhibitors, organisers, and the different related services provided. It enables also communication channels between them via circulation of E-mail memos, allowing an increased user feedback. Middleware connectivity is achieved using technologies like JDBC, ODBC, Active Server Pages, Java and ActiveX. The project's backbone is a (distributed) RDBMS where all relevant information about one or more exvents is stored.

The functional architecture bases on object- and component-oriented approaches. An overview is given in Figure 1.
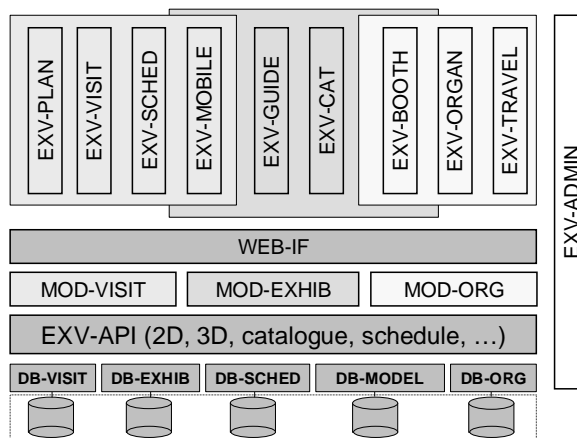

Fig. 1: Functional Architecture of the Exvent system

On the lowest level, DB-specific modules manage the access to the DBM systems, file systems and other repositories. Together they build the back-end of the system that may also be distributed. On a second level, an API (EXV-API) provides objects and object-like data structure and function calls that encapsulate the complexity of the lower levels. The API is used by the 3 modules MOD-VISIT, MOD-EXHIB, MOD-ORG which represent the different application modules explained below (see section 3). Each module disposes of a Web-based User Interface that also acts as interface between both client and server. Based on this Web interface and the

three main modules the different services are provided to the different users. Finally an administrative component allows a centralised maintenance of at least the main tasks like user account creation, DB maintenance, etc.

3. SERVICES FOR THE DIFFERENT USERS

In the Exvent system, functionality is provided following a user-centred manner according to the related acting role. If the user entering the system is an organiser, exhibitor or visitor, the system will provide a correspondent service package together with a specific front-end.

3.1 Organisers' View

The **organisers** of the exvent will be able to set up the event space and time scheduling through an easy, intuitive and dynamic interface that consists mainly of a set of Java applets as a graphical front-end. Applets permit to model the exhibition ground, halls and other buildings as well as the booths in a 2D mode. All the data created by this procedure are stored in a model repository (RDBMS) following a vectorised format. This facilitates subsequent scaling of the graphical models. A further extension addresses the
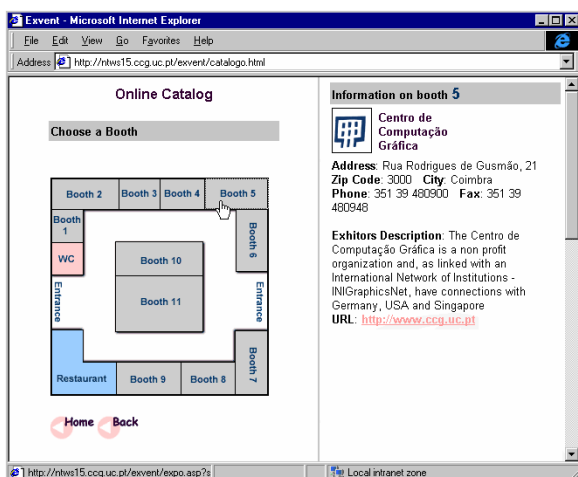

Fig. 2: Prototype of 2D-visualisation module

support of three-dimensional modelling using technologies like VRML and Java3D. Also cooperative facilities are foreseen, intended to efficiently support eventual shared negotiation

processes between exhibitors and organisers concerning special needs on booth-specific issues (Marcos 1997) (Marcos 1998).

3.2 Exhibitors' View

The Exvent system helps the **exhibitors** in all the services needed to accomplish most of the logistic tasks related to the choice, planning and management of their booths. This covers the inclusion and alteration of Multimedia information concerning products and services presented and/or available at the booth as well as about the company itself. Besides the system support scheduling facilities for exhibitor staff. This information will be also partially available to visitors, especially considering aspects such as the presence in the booth of a specific specialist or products demonstration, which can be useful for each visitor's individual schedule.

3.3 Visitor's View

The **visitor's** module allows the comfortable and efficient planning of a possible visit to the event, including lodging or hotel reservation and travelling facilities. In order to make people's life easier, this module also provides easy access to all relevant information regarding the visit through online-catalogues, search modules and Intelligent Agents. These late provide for sophisticated planning wizards that determine the shortest path through an exhibition, or handle the scheduling of interviews and business meetings. An example of the interaction modules (navigation and access to booth-related information in 2D mode), is given in Figure 2.

4. VISUALISATION MODULE

The visualisation system encompasses two major components: One based on 2D visualisation concepts and another one based on 3D. Both components use the same data retrieval engine. Technologies as VRML and Java3D are applied for the 3D-visualisation

module (Fig. 4). The 2D module itself relies on standard vectorised formats. The inherent advantages of this approach are:

– The visitor will be able to **choose between 2D and 3D visualisation** permitting visitors to easily switch between these two visualisation modes. As 3D models commonly include much more information as the corresponding 2D ones (thus requiring much more bandwidth) the visitor thereby has the choice to **react to different network loads** in terms of bandwidth need and computing power. This is especially important for Internet-based access.

– Organisers or exhibitors **may discard the 3D** visualisation module, since the manipulation of the exhibition ground in terms of design and shaping of the booths, is normally **easier using a 2D interface** (Fig. 3).
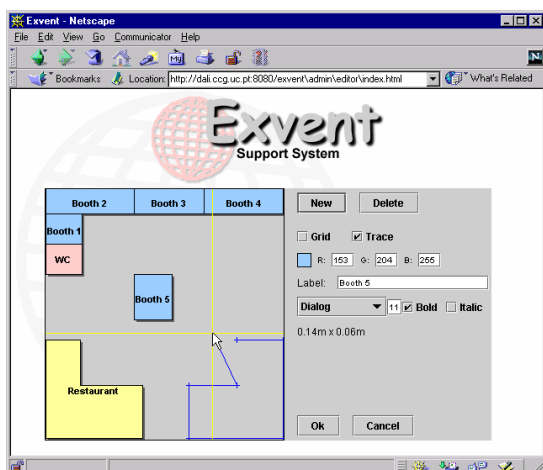

Fig.3: 2D design for boot creation

– Applying object-oriented software design concepts, the same basic modules can be used for design and pure visualisation models (visitor). This facilitates the development of the different visualisation modules significantly.

– The application of VRML and Java3D allows the direct integration and exploitation of existing features, reducing considerably the development efforts. Moreover the **platform independence** characteristic of both VRML and Java3D facilitates the portability of the system (Rushforth 1997) (Lea 1996).

On the other hand, since the Exvent system may also be used for purely virtual exvents, a subset of visualisation and interaction features will be only available for real (physical) exvents. This mode includes:

– **Snapshots and video sequences** - the exhibitor will have access to visual information that gives him an idea about the progress of work at the location (mounting of a booth, etc.).

– **Video** – records of talks, presentations etc. for those visitors that hadn't the opportunity to register for such an event.

– **Monitoring of "remote" areas** – visual information about the situation at other locations on the exposition ground, during the visit, from the visitor's point of view (see section 5.1)
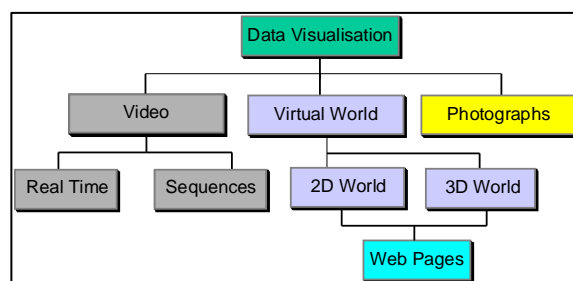

Fig.4: Visualisation Modules

The 3D navigation is adaptable to the preferences of the diverse types of visitors as also, to their type of equipment. The basic module is to be used in a Web browser on a standard desktop computer. The keyboard serves for the normal navigation through the space such as: move back and forth, turn, etc. The mouse complements the navigation (e.g.: moving to one determined point) and allows the visitor to interact with the virtual world such as open a web page whose link is placed in a board, or get information concerning one specific booth, etc. The 3D-navigation module encompasses also other navigation devices as space mouse, joystick, etc. In the case of the Mobile EXVENT Guide, the support of palmtop and handheld specific input devices are foreseen (see section 5.1).

5.   THE EXVENT GUIDE

As mentioned above, a typical Web server that accompanies a (physical) exposition does not normally provide an adequate degree of

interactivity with the exposition data. It is limited to furnishing access to an online catalogue where the visitor may browse looking for specific topics or special exhibitors. However, the tasks involved in the preparation of a visit regarding to a trade fair or exposition is often much more complex. We have identified the following non-trivial tasks:

– Planning of the visitor's own time schedule concerning the availability of a (special) representative at some company's booth at a given time.

– How to get from point A to point B, i.e. from a specific booth to another one, quickly and in a comfortable manner, and, in addition, passing by a series of booths C … N, on the same route?
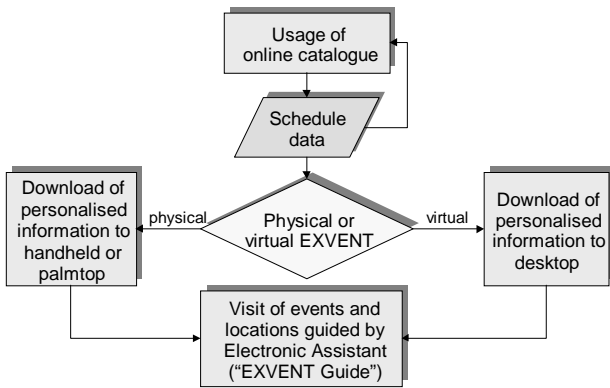
Fig. 5: Exvent Guide: Basic Communication Scheme

– How to get context specific information while walking through the (physical as well as virtual) exhibition ground, i.e. information about pre-selected areas of interest? I pass by a booth and I'm not aware that the exhibitor may have products and/or competency concerning an area that is of interest to me?

– What is going on at other locations of the exposition ground? Is booth X still crowded? Are there still seats available for the presentation that I wanted to attend on short-term?

However, typical Facility Management Systems (FCS) available on the market focus on the coping with tasks that are different from the ones described above (mainly resource management). This led to the integration of a specific Intelligent Agent ("EXVENT Guide") that helps out processing the enormous amount

of information that is made available at many exvents like trade fairs and exhibitions. Moreover the EXVENT Guide may work in very similar ways both for physical as well as virtual exvents:

– For virtual exvents the EXVENT Guide will be used as a desktop application and be integrated into the services available at the user's desktop (email, scheduling, etc.).

– In the case of a physical exvent, the Intelligent Agent has to be mobile and must be available to the visitor "at his fingertip". This requirement led to the design of a mobile application.
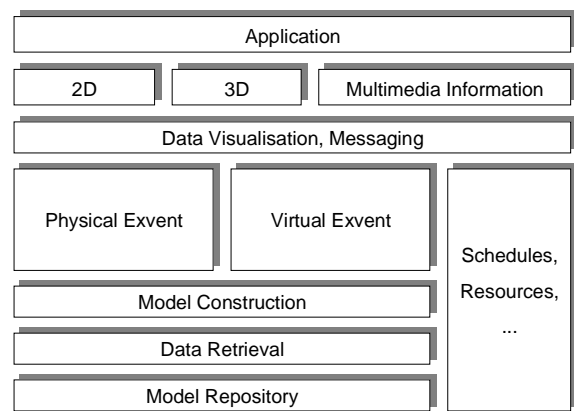
Fig. 6: Exvent Guide: Main components

An overall design of the EXVENT Guide is given in Figures 5 and 6. Based on the Model Repository, all relevant information is retrieved and passed to the visualisation process (2D or 3D). The data may then be differently interpreted in context with a physical or a virtual exvent (mapping of environment data, construction of avatars, etc.). However, after this step the data is available in a unified format enable its visualisation and further processing by the application. Contextual multimedia information that has been retrieved during this process may also be mapped into the application. Java and Java3D have been adopted mainly due to portability purposes.

5.1 The Mobile EXVENT Guide (MEG)

The MEG bases on a Windows CE palmtop or handheld. The device features an integrated

position detection system that allows the MEG to keep constantly track of its position on the exposition ground. Using a wireless LAN connection, the MEG has constant access to the Exvent support system and can on-demand retrieve information from any of the backends.

The MEG's main working modes are the following:

– Access and retrieval of exhibitor specific information on-demand, using the built-in search interface.

– Based on the position of the device, provide contextual information such as: "show me all booths in the surrounding that may have information/products/services about topic X, and how to get to them".

– Alarm mode: same as previous, but pre-programmed. As soon as the distance gets closer to a specific booth with a predefined threshold value the MEG visualises the booth(s) and optionally notifies the visitor by playing an acoustic sound or a spoken message.

– Overview of the exposition ground; Access to the different webcams installed on the exposition ground. The webcams may be chosen directly or by indicating a specific exhibitor/booth; in that case the system chooses the best webcam(s) for that purpose.

6.   RELATED WORK

Areas like Geographic Information System or Facility Management, or simple Building Management have produced important results, but addressing only partially the main problems posed by exvents. In following we present some of these representative solutions:

Virtual Design Exhibition

FhG-IAO, Stuttgart, Germany

http://virtual.design-exhibition.com/

The basic idea of the *Virtual Design Exhibition* consists of presenting products better and more attractively through the provision of VRML models that substitute static catalogue pages with product figures and descriptions. Instead of a 'flat' photo that can be examined by one and only one perspective the visitor of the *Virtual Design Exhibition* can look at exposed objects from many different positions and freely select the perspective and the distance to them. This allows a much better perception of products in general and hardly visible details in special. However no concrete online administration/management facilities are provided, since the focus lies on the static presentation itself of products.

EVENT Pro

Profit Systems Inc., Saskatoon, Canada

http://www.profitsys.sk.ca/Event/Event.htm

EVENT Pro is an Event Management Software designed for Convention Centres, Auditoriums, Concert Halls, Hotels, Colleges, Banquet Halls, and Caterers. The software allows Room/Hall booking, Menu Planning, Setup and Labour details. It is able to display rooms/halls on-screen and allows demonstrating and editing a variety of seating types and seating arrangements. One could extend this system to cover exvents, augmenting its domain to exhibitions and considering the existence of different kind of users. EVENT Pro is this way an environment oriented to simple reservation of rooms/halls.

GOOVI-3D

Interactive Access and Visualisation of 3D Geographical Information in the WWW.

FhG-IGD, Darmstadt, Germany

http://www-a5.igd.fhg.de/projects/goovi/index_e.html

GOOVI is a geographical information system developed at IGD, a member of the INI-GraphicsNet. With GOOVI-3D, a distributed architecture was developed which allows interactive access, visualisation and modification of 3D geographical information. This new architecture is not intended to create a new information system. The aim is rather to use available systems in order to allow data to be accessed flexibly, transparently, and maintenance-free by the World Wide Web community.

Alpha Omega Management CO.

Montclair, New Jersey, USA

http://www.alphaomega-mgmt.com/

The work done by this company concentrates on the implementation of real expositions / exhibitions. AOM offer solutions, strategic planning and engineering capability to perform many kinds of expositions. They also provide multimedia presentations, and construction of HTML pages in the web. No actual exvent management facility is provided.

Altogether, we argue that exvents involve intrinsic interdependencies between its processes, which are only adequately improved by an integrated solution. This has to take into account its multiple-faceted characteristics in terms of users profiles and information. The simplicity and modularity of the final solution is then achieved through WWW technology and platform-independent graphic development.

7. FUTURE WORK

Plan for future work, include a smooth integration to E-Commerce and Multimedia Kiosk systems, approaching the virtual space to the reality of business. Multimedia features like videoconference and voice, or Internet telephony facilities enable virtual conferences and workshops. Sponsors can be on line supported via Web, allowing them to verify in a quick and easy way, if their money is applied in a prosperous way. Intelligent notifying systems can inform visitors and exhibitors about relevant changes. An electronic guiding system can be achieved by supporting handholds and palmtops before and during the visit of the event, and by providing wireless communication means to those equipment on the exhibition ground. Those Mobile Computing concepts will offer extended communication features and services, and can be attached to portable display systems.

8. CONCLUSIONS

In this paper we have presented and discussed the Exvent system. It is much of a GIS and facility Management System – in a very special context: exhibitions trade fairs and similar events. Its output is generated on the fly offering a browsable 2D and 3D Web User Interface.

The Exvent environment provides a complete integrated *exvent* supporting system, facilitating assistance before, during and after an exvent. It offers from planning and decision making support to permanent Web presence, outranking all existent exhibition supports and Web sites. It is intended to be open and platform independent, so, when needed, adaptation and improvement becomes an easy job.

The importance of online presence evidences the need of a flexible web-based structure. The "everyone, anytime, anywhere" principle needs to be extended to all involved parties, i.e., organisers, exhibitors and visitors. Web presence helps the organisers and exhibitors to obtain feedback from active end-user (visitors) and enables Electronic Commerce integration, increasing the volume of reachable audience. Furthermore, Mobile Computer based services and new and emerging technologies like Wearable Computers help to supply information about the visitor's movements on the exhibition ground. The data obtained through those activities transforms Exvent into an exhibition Data Warehouse. Decision-Support Systems, Data Mining tools and Intelligent Agents can then later be used to examine all those data in more detail and help out in the realisation of analyses, production of reports and documentation, useful business information or answer questions like:

- What booth was most visited?

- Which exposing company had more sells or which product was most sold?

- Which brand-new technology was found the most interesting?

- Which were the preferred accommodation choice and restaurants of your visitors?

- Who accessed which information, or, who bought what?

In this way it helps to improve success/failure analysis and future planning.

Acknowledgements

REFERENCES

Chávez, E, Kirste, T., 1998. *InHouse – ein mobiles Gebäudeinformationssystem*,, in Proc. Of WIWITA'98, Wismar, Germany, May 4-5, 1998. http://www.egd.igd.fhg.de/fhg_igd/abteilungen/a3/PROJECTS/inhouse/inhouse_d.html

Libertin, A., Kirste, T., 1998. *InDoor Ortung mittels Loran-C: Studie zur Positionsbestimmung in Gebäuden mittels LORAN-C*, Technical Paper, IGD-Rostock, Germany: http://www.egd.igd.fhg.de/fhg_igd /abteilungen/a3/PROJECTS/Recherchen/loran_c.html

Carey, R., Bell, G., 1997. *The Annotated Vrml 2.0 Reference Manual,* Addison-Wesley Pub Co.

Ferreira, R., Cardoso B., Tsen., E., 1998. *Exvent Support System – Support and Realisation of Exposition-like Events in Cyber-Space*, in TOPICS, no.4/98, vol.10, pp18-19, ISSN 0936-2770.

Flick, S., 1996. *An Object-Oriented Framework for the Realisation of 3D Geographic Information System*s In: Rumor, M.; McMillan, R.; Ottens, H.F.L. (Eds.): Geographical Information. From Research to Application through Cooperation. Vol. 1. Proceedings of the 2nd Joint European Conference & Exhibition on Geographical Information, Barcelona, Spain.

Amsterdam; Oxford; Tokio: IOS Press, 1996, pp 167-176.

Jung, V., 1998. *Integrierte Benutzerunterstützung für die Visualisierung in Geo-Informationssystemen*, PhD Thesis, Darmstadt University of Technology, _Fraunhofer Verlag, ISBN 3-8167-5218-7.

Lea, R., Matsuda, K., Miyashita, K., 1996. *Java for 3d and Vrml Worlds,* New Riders Publishing.

Luz, R. M., Marcos, A., ·Hornung, Ch., Próspero, M., 1998. *A Model and Architecture to support Asynchronous Collaboration Modes in Intranets* in Proc. of 8º Encontro Português de Computação Gráfica, Coimbra, Fev. 98.

Marcos, A., 1997. *Modelling Cooperative Multimedia Support for Software Development and Stand-Alone Environments*. PhD Thesis, Darmstadt University of Technology, Germany, Shaker Verlag, ISBN 3-8265-4057-3.

Rushforth, K., Deering, M., Sowizral, H., 1997. *The Java 3d Api Specification (Java Series),* Addison-Wesley Pub Co.

Rudi, 1997. *Wireless LANs*, Technical Paper, IGD-Rostock, Germany: http://www.egd.igd.fhg.de/fhg_igd/abteilungen/a3/PROJECTS/Wlan/wireless_d.html

Tompkins, J., Bozer, Y., Frazelle, J., 1996. *Facilities Planning,* 2ⁿᵈ ed. John Wiley & Sons.

Kaiser, H., 1989. Facilities Manager's Reference Management Planning Building Audits Estimating, Robert s Means Co.

Wrennall, W., Lee, Q., 1993. *Handbook of Commercial and Industrial Facilities Management,* 7ᵗʰ ed. McGraw Hill Text.