Building IT 2000 - A hypertext database of predictions on the use of information technology in building

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Abstract

Hypertext is a medium particularly suitable for providing easy access to diverse information and maintaining it. It was used for a database of papers on the future of many aspects of information technology and their likely use by the year 2000. The recommendations include the development of project databases to integrate the use of computers by all parties to a building project, and the establishment of a building IT forum in the UK. CICA acted as research co-ordinator for the project and already carries out many of the functions of the building IT forum which will also need to include other organisations in the UK and in other countries.

The data in Building IT 2000 will be maintained on hypertext and will take advantage of future developments in hypermedia. These new techniques, with the ability to provide selective access to, and payment for, digital data could help solve the problems of managing building project data. Building IT 2000 will be demonstrated at this conference to show its flexibility. It is available as a printed report or on disk for Macintosh or PC Windows 3 computers.

1. HYPERTEXT - THE MEDIUM

Everyone is used to obtaining information in serial form, either text or video. It is normally structured so that the user is assumed to proceed from the beginning to the end. Reference books are used rather differently and interactive video allows direct access to particular items.

Hypertext is not a new concept and is just a simple database with a very good graphical user interface and a scripting language. It provides a dynamic book and, in the form of hypermedia, can integrate text, graphics, sound and video. Information can thus be reached directly, normally by clicking on buttons or, selectively, by defined paths or search facilities. The user need only see the information which is of particular interest, although hypertext will draw his attention to related information. He can start with the conclusions of a report if he wishes and work backwards to the source of these. Pictures and dynamic graphs or calculations can be integrated and, where interactive video or audio discs are attached to the computer, then a complete multimedia presentation can be assembled.

At the meeting of CIB W78 + W74 in Lund in 1988, hypertext systems were demonstrated by Dana Vanier of the National Research Council, Canada and Per Christiansson of Lund University of Technology. These covered applications to building details and town planning and were the author's first experience of this new medium. When he was invited to act as Research Co-ordinator for a project looking at the interaction between future developments in building design and production, information systems and communications, hypertext seemed to be the appropriate medium for presentation. Some 30 papers written by different experts had to be integrated and cross referenced. Hypertext is very good at handling copious and diverse information of which a user only wishes to see a part. It proved very suitable for the Building IT 2000 project.

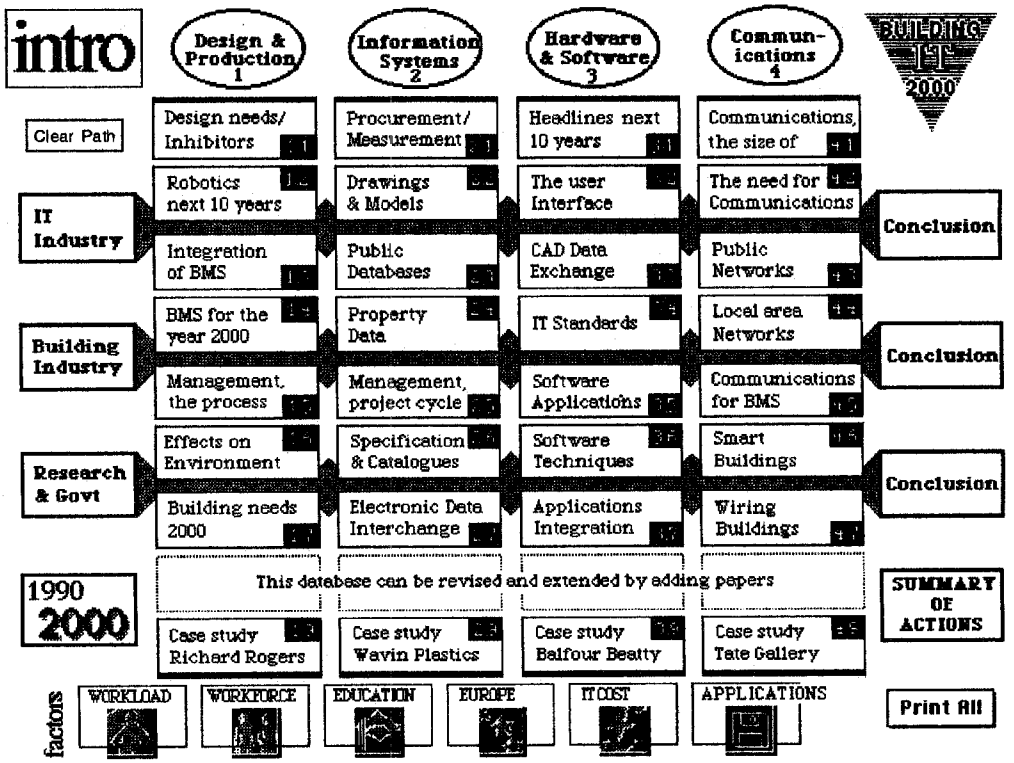

Figure 1. The overview of the hypertext database showing boxes which act as buttons to access the papers directly or to reach conclusions or background data.

2. BUILDING IT 2000

A proposal was made in 1987 for a study of the future of information technology in building, The project was based at the Building Centre in London and the University of Bath was involved. Eventually the project got underway with sponsorship from Apple Computer, the Building Centre Trust, Department of the Environment, IBM (UK) Limited, the Interbuild Fund and the National Council of Building Materials Producers. The Steering Committee appointed members of four working groups, most of whom wrote short papers on specific topics.

CICA acted as research co-ordinator and transferred data from a variety of word processors into Hypercard 2 on Apple Macintosh. Workstation Development Partnership acted a consultants and developed a database with quick access to about 500 cards of information. This was largely achieved by a graphical index of buttons through which each paper could be reached and a similar index at the beginning of each paper. Background data was collected in the form of graphs accessed via icons where relevant to particular papers,and papers were cross referenced. Specific routes were identified for three types of audience: the IT industry - those providing solutions, the Building industry - those needing to use these, and Research, Education & Government - those who would support future developments. Each of these paths ends in conclusions from which the source cards can be reached, so that the report can be read from back to front. A pictorial index, glossaries and a summary of actions complete the facilities offered by Building IT 2000.

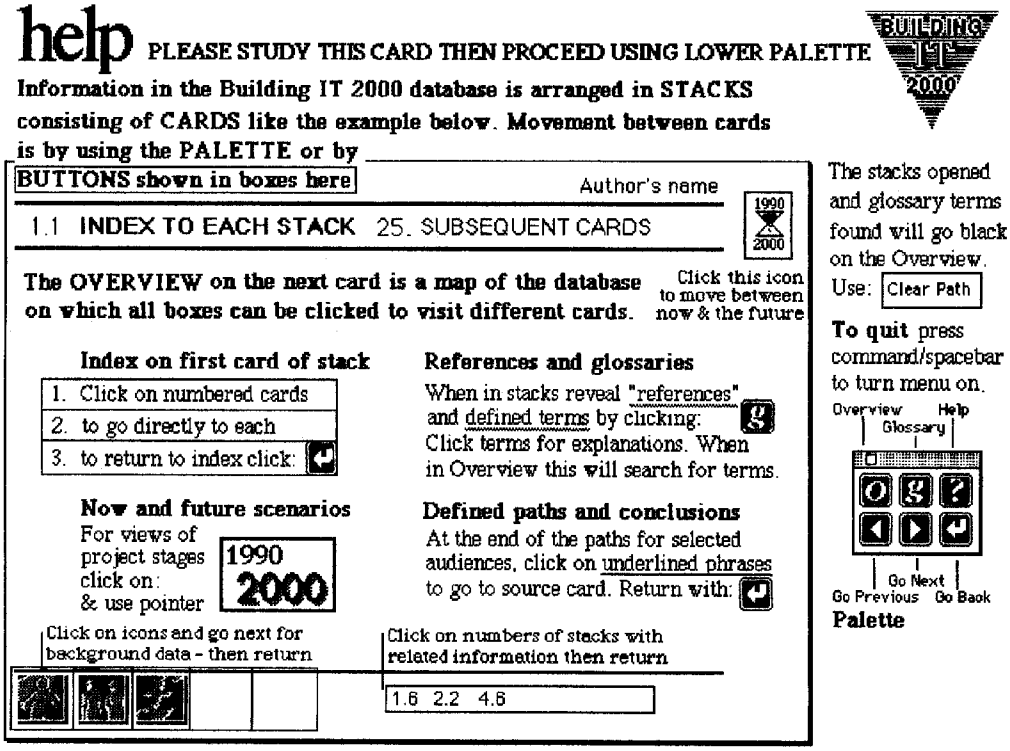

Figure 2. The Help card from Building IT 2000 showing facilities for moving around the data and finding topics of specific interest.

Many of the conclusions were not original but still need to be repeated: the need for observation of standards, the opportunity for integration, lack of training, etc. Other conclusions were on the likely effects of robotics on building design and construction, electronic trading with use of CAD as a basis for tendering, and the need to monitor environmental effects of buildings. Construction is now as much a processor of information as it is of materials and components. A building IT forum was proposed for taking the recommendations further and maintaining the hypertext database. Multimedia was seen as a potential solution to the problems of integrating building project data, and developing communications, such as EDI, would provide better access to all those involved.

The medium is the message and the use of hypertext aroused as much interest as did the contents of the report. It was launched in May 1991 and, as well as the Apple Hypercard 2 version there is also a Toolbook version running on PC Windows 3 computers. The illustrations give some idea of the content and the Help card an indication of the facilities for moving around the database. The hypertext needs to be used to appreciate the flexibility of this new form of dynamic report.

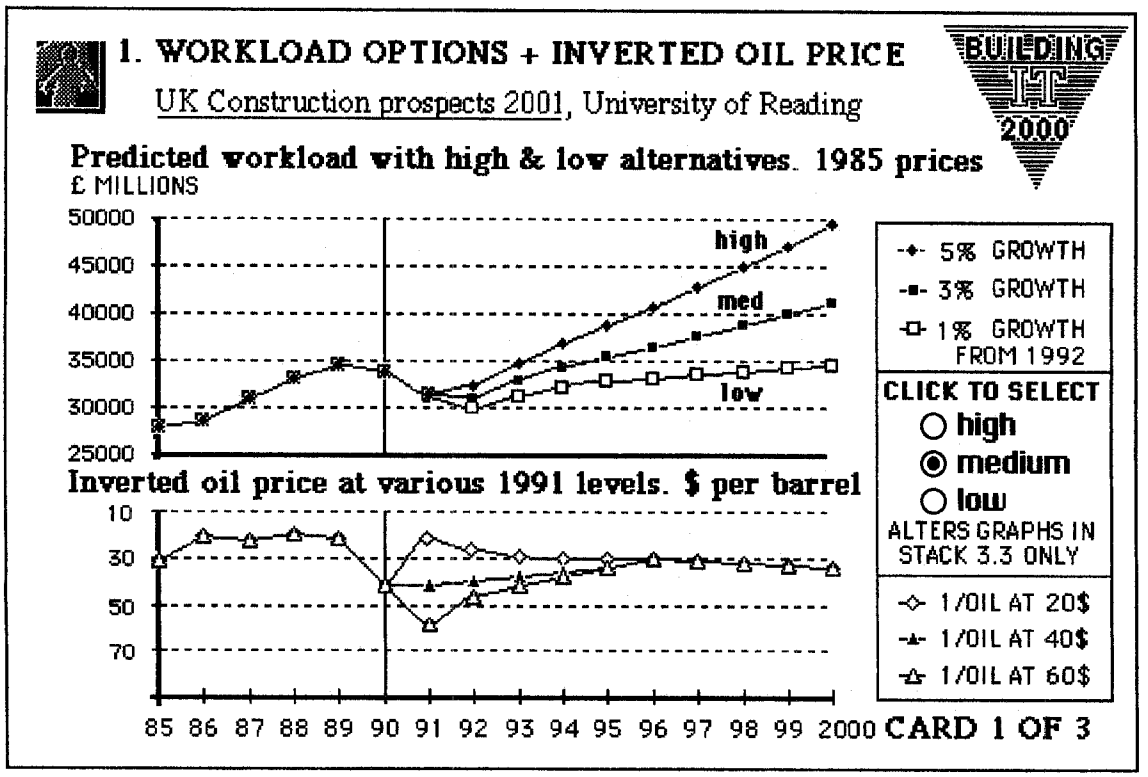

Figure 3. Background data on projected workload for the industry with three options which can be selected and affect predictions within the database.

3. NEW SOLUTIONS TO BUILDING INFORMATION PROBLEMS

Much of the Building IT 2000 report is about factors which inhibit the use of IT. These are mainly human and commercial limitations but they have to be removed before information can flow through a project from briefing to building management. Until the present, information technology has only been effectively used within individual businesses: architects, engineers or contractors. If we can solve, or provide a mechanism for handling, the problems of payment for information and liability, the developing technology will come into its own.

Hypertext and developments such as Xanadu, expected to emerge from the Autodesk think tank shortly, address the complexities of how we handle information while offering a simple user interface which should deter no member of the building team. If true values can be associated with the supply, and demand for, project information there will be incentives for those generating and using that information.

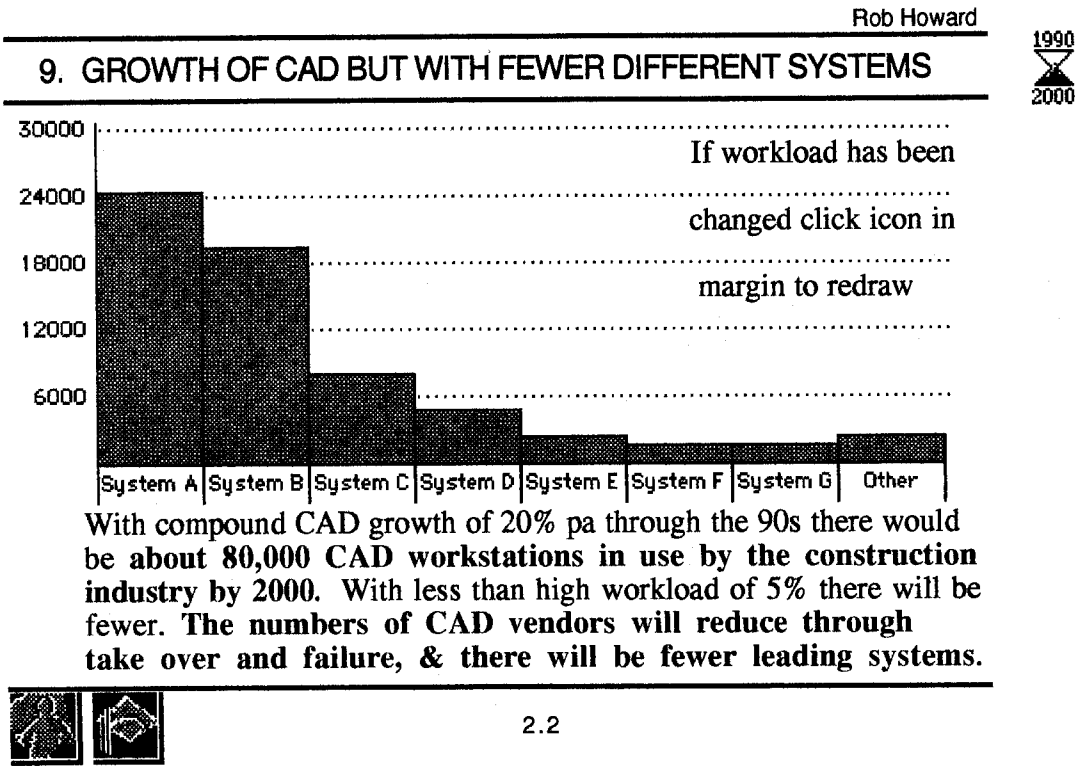

Figure 4. Predictions of CAD growth in the UK by the year 2000 based upon medium workload growth of an average of 3% per year.

Building IT 2000 has,within it the capability of modifying predicitions according to the selected level of a number of factors. For example, if the user selects a high, medium or low level of future growth for the workload of the construction industry, he can re-draw graphs of CAD usage to correspond with his choice. If there were adequate data on the effects of training or the European single market, these could also be allowed for. With Windows 3 and Apple System 7 offering multi-tasking, more complex applications can be run from within hypertext and accounts kept of information input and usage.

A Project Information Bank (PIB) would work with forms of contract such as that proposed by the British Property Federation, where consultants and contractors are paid by specific tasks carried out rather than by percentages or undefined profits. The client would pay for the capital cost of the building and a sum for information needed to design, construction and manage it. He might even provide the IT facilities for handling the information. Consultants would be paid for information in the form of drawings, specifications and quantities put into the PIB in a specified format. Other consultants, the contractor or the building manager who needed the information might pay to retrieve it, although this would be covered by their profit. Such a system would have the merit that only information for which someone would pay would ever get into the PIB and the client would have full records at the end of the project.

At present, building designers tend to build a wall of paper to protect themselves from others or from litigation. Much of this is unnecessary and complicates the building process. In the UK there is a complex form of quantities based on the Standard Method of Measurement. Only if the contractor requested this and was prepared to pay for it would the Quantity Surveyor be paid to prepare it? Likewise architects often do more drawings than necessary. Perspective views would only be prepared if the client required them or they were necessary for statutory approvals or communication with the project team. Engineer's calculations and assumptions could be built into a continuous project record.

Technology and the awareness of all those in the building industry needs to advance before a Project Information Bank is feasible but the heart of such a resource is a database which can control access to classes of data, associate values with them, integrate different forms of data and communicate with remote locations such as the site. Hypertext is starting to offer the simple user interface. Object oriented databases may be able to reflect values and ownership. All it needs is for standards to develop and all those in construction to observe them. The Project Information Bank is a concept for the next century but it is worth developing the goal, and its benefits, so that we can try to organise ourselves as the technology emerges.

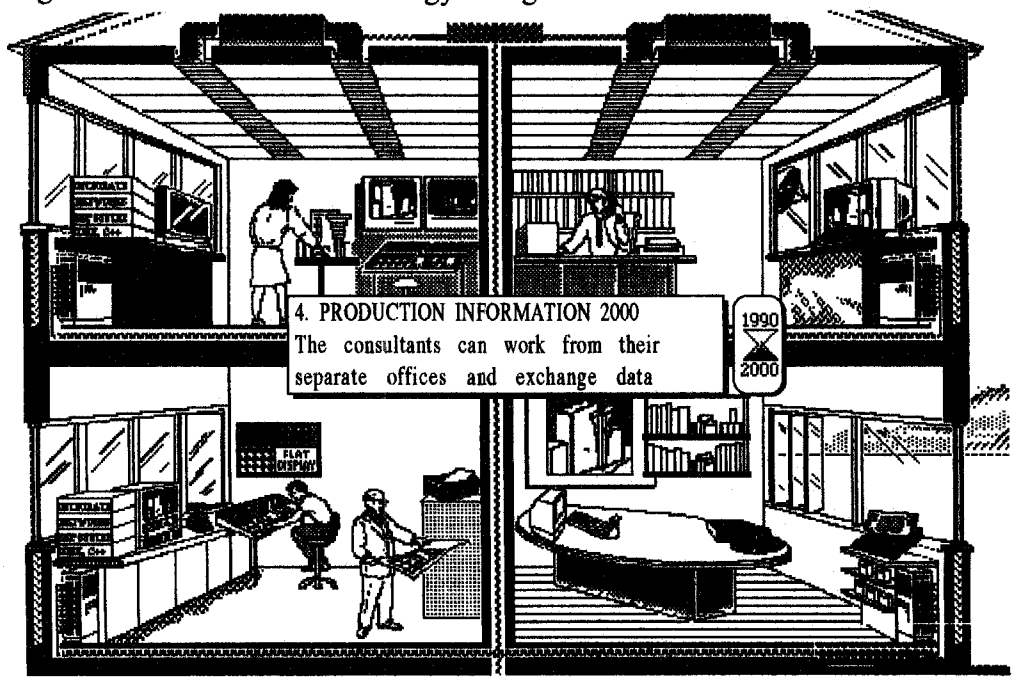

Figure 5. Pictorial output from Building IT 2000 showing future changes in project team communication.