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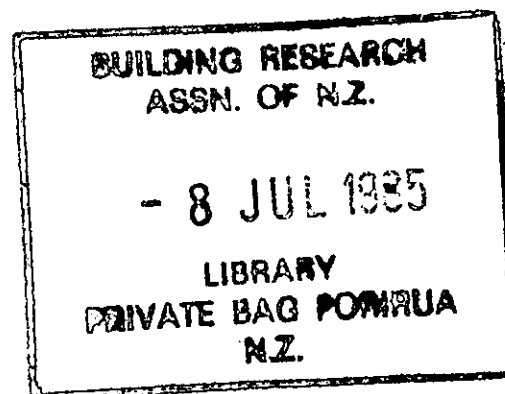
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THE DEVELOPMENT OF A BRANZ COMPUTERISED BUILDING TECHNOLOGY INFORMATION RESOURCE

R.S. Whitney & A.H. Dechapunya

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BUILDING TECHNOLOGY INFORMATION RESOURCE

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THE DEVELOPMENT OF A BRANZ COMPUTERISED BUILDING
TECHNOLOGY INFORMATION RESOURCE

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ABSTRACT

The use of computers to cope with the ever-increasing demand for rapidly-accessible information within the building industry is increasing steadily. BRANZ has, therefore, purchased a computing system to enable it to disseminate its information resource to the industry. Provision will be made for outside access via the Public Packet Switching Network (PPSN).

At present the Association is preparing, for on-line access, full bibliographic information on printed material kept in its library.

Ultimately, building industry users should be able to gain access to a broad range of information, software and knowledge bases, developed in response to industry needs and aimed at facilitating operational procedures, design etc. The cost of providing this service will need to be recovered from users.

INTRODUCTION

The Building Research Association of New Zealand (BRANZ) sees the identification and satisfaction of the technological information needs of the building industry as its major role.

Currently BRANZ information is made available in many ways including:

- BRANZ publications such as Information Bulletins, Technical Recommendations, Appraisal Certificates, Research Reports and Technical Papers.
- Papers presented at conferences and published in journals.
- Industry access to the BRANZ Library collection.
- News releases and articles for industry magazines.
- The Association's newsletter, BUILD.
- Through the BRANZ nationwide advisory service, based in the four main centres of Auckland, Wellington, Christchurch and Dunedin.
- Staff presentations to the industry, for example on Thermal Insulation and NZ 3604 Code of practice for light timber frame buildings not requiring specific design.
- Tape/slide presentations, for example on sealants and subfloor ventilation.
- Input to codes and standards.

Through the Association's contacts with the industry, it is apparent that in New Zealand, just as overseas (Wright, 1984), computers have an integral part to play in making the above and other information readily accessible to the industry. The authors see the volume and complexity of information increasing, and computers becoming widely used throughout the industry. As a result, information will have to be presented in a way in which it is easily and rapidly accessed and used via computers. Failure to utilise these developments would seriously jeopardise the ability of BRANZ to fulfil its role.

There is an immediate need to computerise the Association's Library, and the opportunity has been taken to purchase computer hardware and information retrieval software with sufficient power to enable the development of an information resource greater than just the library holdings.

This presentation describes the proposed BRANZ system, reviews the type of information to be computerised, and provides a basis for discussion of the future development of this information resource.

THE BRANZ INFORMATION COMPUTING SYSTEM

The BRANZ information computer will be based on a Digital VAX 11/750 running VMS version 4 operating system, with 4 Mb of memory. On-line storage will be a 454 Mb fixed Winchester disc drive, with tape drive for media transfer and maintenance.

CAIRS (Computer Assisted Information Retrieval System) text information management software has been purchased. This was originally developed by the Food Research Association (FRA) in Leatherhead, Britain, during the mid 1970's to provide an information service for its staff and 700 member companies for which there was no adequate alternative. FRA who now run CAIRS on a VAX 11/750, have since developed it on a commercial basis and marketed it world-wide to over 85 sites, 15 of which are in Australia. The CAIRS installation at BRANZ will be the first in New Zealand; it is available in a variety of versions and runs on a range of machines from Apricot and IBM PCs, to VAX 11/780 and PRIME 850.

The Association has purchased the VAX 11/750 and CAIRS to enable computerisation of its library catalogue, and to allow library users on-line retrieval of bibliographic information. It is planned to retrospectively enter acquisitions made since 1974, and to provide general access to the system for outside users via the Public Packet Switching Network (PPSN) in 1986.

To this end, a link with the PPSN at a speed of 9600 baud will be set up. It is anticipated that, after allowing capacity for communication with BRANZ regional offices and outward calls, sufficient capacity would be available on the PPSN link and the VAX for up to about 10 concurrent outside users. This will make up to 20,000 terminal hours/year available to the industry within normal working hours.

Outside users will require data terminal equipment such as a VDU, PC or teleprinter capable of connecting to the PPSN. Preferably the equipment will be able to emulate a VT 52 or VT 100 terminal to allow full screen facilities to be used, otherwise the system will operate in a teleprinter mode. Telecommunication charges for the PPSN are given in Appendix 1. Charging details for access to the BRANZ system have not yet been finalised.

The provision of this computerised database will make access to the library's resources easier and more efficient. There will be greater access to subjects via keywords and more information will be available about items - for instance, it will be possible to determine whether an item is on order or on loan.

Outside users will have access (either directly or through the Association's regional offices) to the library's catalogue, and will thus be able to determine immediately what is available. It will be possible for users to order material or communicate with the Association's staff by electronic mail via their own terminals.

The computerised database makes possible the presentation of a greater range of information in printed and other forms. The present library accessions list, Selected Building References, may be replaced by specific lists matching the interest profile of individual users. Printouts from the library and other databases could be produced for users who do not have convenient on-line access to the database.

Access to the BRANZ database should not be limited to regular users who can justify on-line access or subscriptions to printed products. Many public libraries, particularly those with Science and Technology Information Service (SATIS) centres, already refer enquiries to the BRANZ library. It would be logical for these libraries to use the BRANZ database on behalf of their enquirers, who may be smaller manufacturers, builders and architects, as well as do-it-yourselfers. Larger public libraries are establishing PPSN connections for access to overseas databases; they would be able to access the BRANZ information system on-line. Other public libraries may be able to have, for instance, a BRANZ library database on microfiche available for searching for material which might be requested through the inter-library loan system.

DEVELOPMENT STRATEGY

The Association's only commitment so far has been to computerise its library and make access available to the building industry via the PPSN. The paper will now consider how and if the information resource should be further developed over the next few years.

In order to consider the various types of information resources that could be made available, it is necessary to look first at how they would fit into an information-dissemination strategy. Patterson and Farrant (1984), in their study into the use of information in decision-making within the New Zealand building industry, made several pertinent points.

They noted that an important component of an information system is its completeness: greater benefits are available if an information resource is part of a co-ordinated and inter-related package of information systems. They identified two possible strategies for BRANZ: either to confine information dissemination mainly to BRANZ-generated information, or to provide a wide range of information generated by a variety of agencies and groups across the building industry. Obviously the latter course of action requires more time and resources, which leads to another point made by Patterson and Farrant: the additional time most decision-makers spend on obtaining information means that the true costs of decision-making are not recognised. It follows that there is potential for recovering the costs of providing a wider range of information. If the Association is to provide an extensive and co-ordinated service of this sort the additional resource required will need to be funded by its users.

Patterson and Farrant identified three phases in information searches:

"The first is an 'awareness' phase, when information about possible sources is being sought. This leads to the 'acquisition' phase when the information relevant to the problem is collected, perused and utilised. Finally, many searches end up in a 'confirmation' phase when earlier information is checked, expanded, or confirmed."

Patterson and Farrant found that BRANZ-generated information is more generally used in the 'confirmation' stage. This leads to the possibility of including other areas of 'confirmation' information such as codes, design manuals, model specifications and technical recommendations, in the information resource. Patterson and Farrant identified this phase as leading to wider searches and providing an evident role for BRANZ.

In addition, the increased availability of library and other information to outside users could well lead to an increased use of the Association's information resource for 'acquisition' searches which, typically, at the moment are restricted to manufacturers' information. 'Awareness' information is generally obtained from colleagues or superiors, so extension into this area would be indirect - by aiming marketing of the information at these 'gatekeepers' in organisations.

It is necessary that the use of the BRANZ information computer should be cost-effective, not only when compared with non-computer assisted information, but also when compared with other computer options. For example, consideration should be given to whether it is more appropriate that any particular software or information service should be provided on the VAX, or through alternative resources such as office PCs, video-text, or other New Zealand or overseas databases. Longer term we can also consider the possibility of integrating the resource with industry-based PCs and mini computers - by downloading files, or parts of the library data-base. The more potential that is seen for integrated computerised information systems, the more important it is to carefully consider compatibility of hardware and software.

The emergence of expert systems could have a strong impact on progress towards an integrated information resource (Jones 1984 and Pollitt 1984). Two stages of development can occur. The first could see an expert system as a front end to the BRANZ information computer, allowing subscribers to use using natural language instructions and guiding them to the information that they need. The second could see an expert system controlling the whole session of access to the BRANZ information resource, making its own decisions about which part of the resource should be accessed and even, if necessary, accessing non-BRANZ information via the PPSN.

POTENTIAL INFORMATION RESOURCES

Bibliographic Databases

The BRANZ library database will not give a completely comprehensive coverage of building literature. Since 1979 the BRANZ library has been making use of computerised databases overseas through database hosts such as DIALOG. A problem in providing effective searching for building and construction literature has been the absence of an easily-accessible database dealing with this subject area. Searches could be made in COMPENDEX, the engineering literature database, or NTIS, the database of US government reports, but, in general, searches in building technology have been hampered by the need to search a number of databases dealing with different aspects of a particular query. Recently some overseas databases dealing specifically with building technology have become available. The Pergamon Infoline database host in the UK is mounting two databases of particular interest:

PICA - a database of construction and architecture literature produced by the UK Property Services Agency, containing material since 1974, increasing at 5000 items per year.

ISBEDEX - dealing with mechanical and electrical services in buildings, produced by the Building Services Research and Information Association (BSRIA). It contains material from 1979 and is updated by 5000 records annually.

A number of other databases are being produced by research establishments in the building and construction field. These include the Scandinavian database BYGGDOK, and the German database RSWB produced by Informationsverbundzentrum RAUM und BAU (IRB) available through the EURONET/DIANE database host. IRB is also co-ordinating an international database of building technology information, ICONDA, which will be available in 1986. Closer to home, the Australian Department of Housing and Construction's Experimental Building Station is computerising its library, thus creating a database of Australian-oriented building information which could possibly be searched on-line by NZ users.

Within New Zealand, the New Zealand Bibliographic Network (NZBN) is being established and other bibliographic databases are also available. Hissink (1985) described the range of databases available in New Zealand, and how they could be interconnected.

It is intended to make increasing use of these databases to augment BRANZ's own resources and to explore the possibility of directly transferring searches to overseas databases when insufficient information has been found in a search of the local ones. In some cases we could automatically search updates to these databases for material matching a specific information profile; a service known as Selective Dissemination of Information (SDI). Machine-readable tapes of the BRANZ library database could be made available on overseas database hosts - for instance, CSIRONET in Australia - possibly on an exchange basis.

Non-bibliographic Databases

Within BRANZ there are already several databases and potential databases which could be computerised and made publicly available in part or in full (Figure 1).

The Directory of Building-Related Research in New Zealand has recently been published (BRANZ 1984). It identifies 22 sponsor organisations, 40 research organisations and 210 research projects. Each project has a set of keywords (average 4 to 5) and is listed under each keyword. The result is a weighty 300 page document which is expensive to produce, distribute and update. Computerisation will allow both easier access and more efficient updating of this directory.

The BRANZ slide collection, which numbers about 6000, is being catalogued at present. Many of these slides would be suitable for reproduction and could be made publicly available. Computerisation will allow on-line access to the catalogue. It is likely, however, that this service will only be of limited interest until technology advances to the stage where full images can be economically stored, accessed, transmitted and displayed.

The Association has a need for a database of information from over a thousand fire tests conducted at BRANZ. While much is confidential, it may be possible to arrange access to some of this as allowed by the test sponsors. Alternately BRANZ may mount, on behalf of SANZ, data from NZSMP9 Fire properties of building materials and elements of structure.

More uncertain at this stage are ways in which the general pool of experience available amongst BRANZ staff could be accessed. Perhaps the most coherent expression of this experience is the Advisory Services enquiries files. Computerisation of these has obvious potential for a more efficient Advisory Service with, in the longer term, a wider availability.

Some of BRANZ's publication series, in particular Building Information Bulletins and Appraisal Certificates could be held on-line in full text. It would be possible to search these using a keyword-type approach. Similarly, indexes to product information could also be computerised.

Outside BRANZ there are databases in New Zealand which are of potential interest to the Building Industry. The Department of Statistics database INFOS has already been made available to outside users. The Fire Service and Meteorological Office are potential information sources longer term. Leslie and Trethowen (1977) have produced meteorological files containing sequential hourly climatic records over five years for Auckland, Wellington, Christchurch and Invercargill. This data has been used extensively for thermal analyses of buildings, particularly for passive solar heating studies.

Interest need not be confined to information generated in New Zealand. The computerised database being established by the Architectural and Engineering Performance Information Centre (AEPIC) at the University of Maryland (Loss 1984), is designed to receive information on incidents involving the performance of projects. This is of potential interest both as a source of information and a model for a similar database in New Zealand.

Application Software Packages

It is becoming necessary to consider computer software as an important mechanism for the application of the Association's research for the industry. Already BRANZ has produced several publications amenable to conversion to software packages. An example of this is the Technical Recommendation: 'lintels and beams supporting light timber frame constructions' (BRANZ 1983). LINBEAM - a software version of this has been prepared (see note p.13). Packages such as this could produce output which could be used in support of a permit application. Other software packages which could be considered, provided there was a demand from the industry, would include a glass thickness selector (a software version of a forthcoming Bulletin), and a thermal design package based on a revised version of the ALF Design Manual (Bassett 1980). Software versions of design codes could also be produced.

With these packages careful consideration should be given to the economic and other advantages of maintaining them on the VAX, as opposed to marketing versions which could be run on PCs or micro-computers.

Commercial Packages

Given that the BRANZ computer becomes the focus of a total building industry information resource, consideration could be given to making available packages on such subjects as engineering design, building energy analysis, statistical analysis etc. The cost of such packages might not be justified for individual users, or for BRANZ internal use, but could be a worthwhile co-operative investment for the building industry as a whole.

Expert Systems

One particular area worth focussing on is the application of expert systems. They offer a great potential for information transfer to the building industry in a simple but useful form (Gero and Coyne, 1984; Lansdown, 1982; and Wright, 1984).

Until recently computers have been used to solve mainly numerical problems. In the real world, not all problems can be put into equations, a lot of problems are more easily solved by applying knowledge, much of which is derived from real-life experiences gained through working in those fields.

An 'expert system' has been defined (for example, Gevarter, 1982) as a software system which attempts to represent the knowledge of a human expert in a specific domain and to simulate the deductive and reasoning processes of the expert using the stored knowledge. An expert system generally consists of two parts:

1. The 'knowledge base' which represents the facts and rules about the problem domain.
2. The 'inference engine' which is a task which interrogates the knowledge base and makes logical deductions based on it and also on information gathered from a user.

BRANZ has now started a feasibility study of the application of expert systems for itself and for the building industry. Initially, two techniques will be considered:

- Diagnostic
- Text animation (or Classification)

Diagnostic methods could be used, for example, to diagnose problems in buildings. Sachdeva (1985) describes a diagnostic system for architectural moisture problems (DAMP) (see note, page 13). The DAMP expert system has been developed using LISP and PASCAL languages, the knowledge base has been created with the assistance of Association researchers and field staff. It is planned to implement this DAMP expert system on the BRANZ computer so that its feasibility for use by the building industry can be evaluated.

Text animation (Naylor, 1984) is a new technique of expert system application. Its aim is to present texts such as complex regulations, tax codes, building codes etc. in a way that they can be easily accessed and used. Building codes such as NZS 3604 for light timber frame buildings, and NZS 1900 Chapter 5 Fire-resisting construction and means of egress, are the subject of a substantial proportion of queries to the BRANZ Advisory Service. Presentation of building codes on the BRANZ computer using text animation techniques could be a valuable service. This task could be simplified if codewriters recognised this possibility by preparing decision algorithms during code preparation.

CONCLUSIONS

BRANZ is initiating the development of a computerised resource of building technology information. It is envisaged that this resource will be widely accessible to all sectors of the industry.

A VAX 11/750 computer and CAIRS information retrieval software have been purchased, and a high speed link to the PPSN is being arranged. Immediate plans are to computerise bibliographic records of the library holdings back to 1974. This will allow users direct access to the library catalogue, and will facilitate keyword searching for information. It will also allow the library to introduce a greater range of services such as individual current awareness profiles.

BRANZ should aim to develop its resource to become part of a co-ordinated and inter-related building information resource funded by users of the information. If the true costs of information searching are isolated and recognised by the industry, there is potential for recovering the cost of such an information resource.

A co-ordinated information resource should take into account ways in which industry uses information, and the availability of other resources, ranging from PCs in individual offices to large overseas databases.

A list of potential information resources is quite extensive:

- A wide range of bibliographic databases in New Zealand and overseas.
- Non-bibliographic databases, ranging from Directory of Building-Related Research in New Zealand, to numerical information such as meteorological data; the Department of Statistics database INFOS; and overseas databases, such as AEPIC.
- BRANZ-developed software packages.
- Commercial packages.
- Diagnostic and text animation-based expert systems.

This last area is one of the most exciting and powerful areas of potential development for the information resource.

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NOTE

The packages LINBEAM and DAMP will be demonstrated in Workshop 3 by Terry Neal and Pramod Sachdeva.

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BRANZ would also like to acknowledge the assistance of P. Sachdeva, M. Hamilton and Dr. G. Wright of the Computer Science Department, Victoria University of Wellington, who have developed the DAMP system.

APPENDIX: PUBLIC PACKET SWITCHING NETWORK CHARGES

An outside user will be able to use BRANZ VAX 11/750 computer by connecting data terminal equipment (VDU, teleprinter, PC depending on its level of usage etc..) to the PPSN. There are two basic methods for the connection, Datel which uses existing phones or a dedicated link to the PPSN.

For a Datel connection, the PPSN costs involved are:

Monthly rental of Modem at 300 baud	\$20.
Monthly rental of Modem at 1200 baud	\$25.
Hourly charge for active connection	\$ 2.40
Monthly charge for user identity	\$ 4.0
Data transfer charge per 64000 characters	\$ 1.0

For a dedicated connection to the PPSN, the costs involved are:

Monthly rental of Modem at 300 baud	\$160.
Monthly rental of Modem at 1200 baud	\$210.
Hourly charge for active connection	\$ 0.60
Data transfer charge per 64000 characters	\$ 1.0

Outside users can apply to the Post Office to connect their equipment by either mode depending on their requirements. The table below compares monthly PPSN costs of the two modes running at 300 baud:

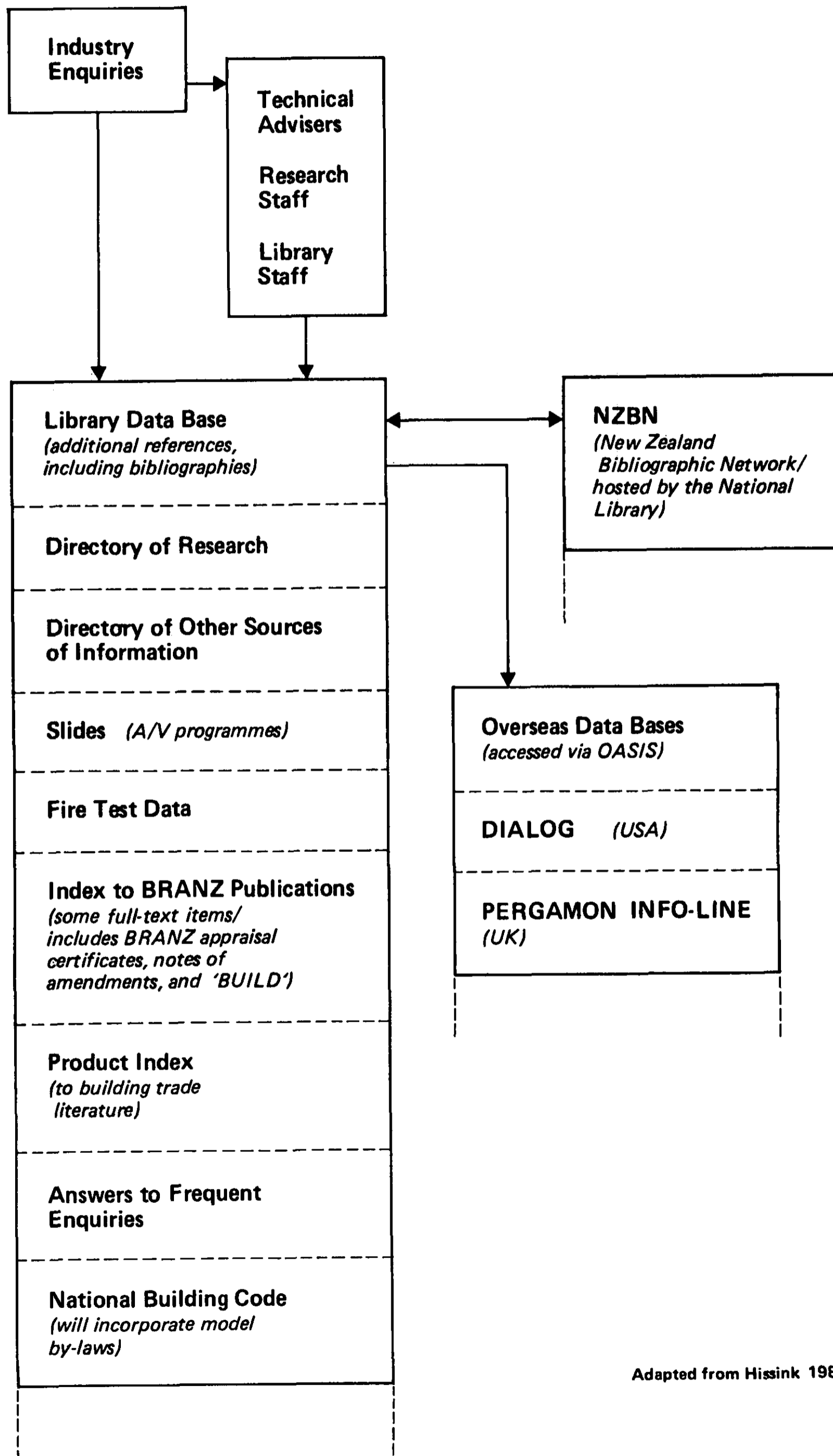
Hours of usages/day	Datel	Dedicated
1	\$ 74	\$173
2	\$125	\$185
3	\$175	\$198
4	\$225	\$210
8	\$427	\$261

Notes:

Excluding data transfer cost and assuming 21 days per month.

Deduct \$20 from Datel if using your own acoustic coupler.

Figure 1 The BRANZ Building Data Base



Adapted from Hissink 1985

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The Building Research Association of New Zealand is an industry-backed, independent research and testing organisation set up to acquire, apply and distribute knowledge about building which will benefit the industry and through it the community at large.

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