TRANSPORT KNOWLEDGE DATABASES – EXAMPLES AND USES

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ABSTRACT

Understanding the state of the art and being aware of ongoing relevant activity are essential elements for the sound basis of research endeavour. Knowledge databases provide a useful and convenient way to identify and access relevant literature and research projects. Literature searches of such databases at the beginnings of research are important to avoid possible overlap and reinventing the wheel. They can also be a mechanism for sharing and disseminating the results of research once completed

The presentation will look at two such databases in the field of transport. The first is the International Transport Research Documentation which has at its heart the ITRD database - a co-operative world-wide database of published information and ongoing research in the transport field. For many years the OECD Road Transport Research Program and now its successor, the OECD/ECMT Joint Transport Research Centre, has overseen the ITRD in its mission to facilitate the dissemination of information in the transport field. Since 2003 TRL has administered ITRD on behalf of OECD. In the presentation the subject content and how the ITRD system works will be described, together with examples of searches which demonstrate the quality and relevance of information retrieved compared to more general web searches.

The second rather different example is a database on 'Soft Research Infrastructures' that has been developed by the European Conference of Transport Research Institutes (ECTRI) for use by its members. The database is designed to facilitate the sharing of information between its members that is useful for the pursuit of members' research activities. It contains details of research activity, information on research facilities and on datasets that could be available to ECTRI members. The presentation will discuss how the information is collected, presented and used.

Keywords: databases, knowledge

INTRODUCTION

Understanding the state of the art and being aware of ongoing relevant activity are essential elements for the sound basis of research endeavour. Knowledge databases provide a useful and convenient way to identify and access relevant literature and research projects. Literature searches of such databases at the beginnings of research are important provide a sound platform for further research and to avoid possible overlap and reinventing the wheel. They can also be a mechanism for sharing and disseminating the results of research once completed

The paper looks at two such databases in the field of transport. The first is the International Transport Research Documentation (ITRD) which has at its heart a co-operative world-wide database of published information and ongoing research in the transport field. The second rather different example is a database on 'Soft Research Infrastructures' that has been developed by the European Conference of Transport Research Institutes (ECTRI) for use by its members.

THE INTERNATIONAL TRANSPORT RESEARCH DOCUMENTATION DATABASE (ITRD)

Background

The ITRD (Howard, 1998) is a co-operative world-wide database of published information on transport and transport Research and is a permanent activity of the OECD / International Transport Forum / Joint Transport Research Centre. The OECD brings together the governments of countries committed to democracy and the market economy from around the world to:

- Support sustainable economic growth
- Boost employment
- Raise living standards
- Maintain financial stability
- Assist other countries' economic development
- Contribute to growth in world trade

OECD provides a setting where governments compare policy experiences, seek answers to common problems, identify good practice and coordinate domestic and international policies. Part of OECD's mission is to facilitate the dissemination of information in the transport field.

The database has been in existence since 1972. Initially it was known as the International Road Research Documentation (IRRD) concentrating primarily on road research, but since the mid 1990s the scope has broadened to take in most forms of land transport as well as intermodal, air and sea.

The primary aim of ITRD is to provide information of relevance to all potential users worldwide. This is done by collecting, co-ordinating, and disseminating information of interest to engineers, managers, researchers, educators and others working in the transport research sector. The references contained in the ITRD database, which include an informative abstract, originate from research reports, books, journal articles, reviews, theses, standards and conference proceedings. More than 400,000 references are now available electronically through a number of complementary and accessible channels. The database is continuously updated with abstracts of new publications (95%) and on-going research (5%); 1000 abstracts are added every month.

Building the database

ITRD is open to all countries, institutions and professional users. Currently 30 members from respected research organisations in 23 countries world-wide provide abstracts each month. Each member, usually a national institution or centre of excellence in transport research, is responsible for scanning and abstracting material published by itself and its own country. Information specialists from ITRD members' organisations use their personal judgement to select and ensure continuous screening of new publications and research. Coverage of information originating in countries that do not participate in the ITRD is divided among the Member institutes. Each member chooses which of the four working languages it wishes to input in and forwards these abstracts to the appropriate language co-ordinating centre. These are:

- English – the Transport Research Laboratory (TRL), UK
- German - Bundesanstalt für Strassenwesen (BASt), Germany
- French - Institute National de Recherche sur les Transports et leur Securite (INRETS), France
- Spanish - Centro de Estudios y Experimentación de Obras Públicas (CEDEX), Spain.

The co-ordinating centres verify the abstracts and keywords before adding the record to the database. Each of the records in the database is indexed with keyword terms taken from the ITRD thesaurus. As well as the keywords each record is also indexed with one or more subject categories. One of the unique aspects of ITRD is the fact that there are the four official languages represented in the database and the various language versions of these terms are linked by a single four digit code. Thus although each record is available in only one of these languages the quadrilingual thesaurus allows all the records to be searched by using the term code which is the same whatever the language of abstract.

As well as the keywords each record is also indexed with one or more subject categories. These again work on the same principal with each category having a two digit code which can be used to search across all languages. An example is shown in Figure 1 and The record entry process is shown schematically in Figure 2.

ENGLISH ALPHABETICAL THESAURUS   2005

AADT	0674	TMJA	JDTV	IMD
(only since 2004)			
AASHO ROAD TEST	6278	ESSAI AASHO	AASHO ROAD TEST	ENSAYO AASHO
ABANDONED VEHICLE	1514	EPAVE (VEH)	HERRENLOSES FAHRZEUG	VEHICULO ABANDONADO
(only since 1979)			
(PREVIOUSLY 10 36)			
(USE FOR VEHICLE LEFT ON ROAD			
OR ROADSIDE CAUSING HAZARD OR			
ENVIRONMENTAL POLLUTION)			
ABDOMEN	2035	ABDOMEN	UNTERLEIB	ABDOMEN
ABILITY (ROAD USER) = SKILL			
(ROAD USER)	2205		
ABRASION = WEAR	3868		
ABSORPTION	6758	ABSORPTION	ABSORPTION	ABSORCION
ABUTMENT	3424	CULEE	WIDERLAGER	ESTRIBO (PUENTE)
ACC = ADAPTIVE CRUISE CONTROL	8731		
ACCELERATED = QUICK	9064		
ACCELERATING POLISHING TEST =			
POLISHING	3822		
+ TEST	6255		
ACCELERATION	5405	ACCELERATION	BESCHLEUNIGUNG	ACELERACION
(SEE ALSO QUICK 90 64)			
ACCELERATOR (CONCRETE)	4726	ACCELERATEUR DE PRISE	ERSTARRUNGSBESCHLEUNIGER	ACELERADOR DE FRAGUADO
ACCELERATOR (VEH)	1363	ACCELERATEUR (VEH)	GASPEDAL	ACELERADOR (VEHICULO)
ACCEPTABILITY = ATTITUDE			
(PSYCHOL)	2267		
ACCEPTANCE (QUALITY) =			
COMPLIANCE (SPECIF)	0148		
ACCESS ROAD	0435	ROUTE D'ACCES	ZUFAHRTSSTRASSE	VIA DE ACCESO
ACCESSIBILITY	0634	ACCESSIBILITE	ZUGAENGLICHKEIT	ACCESIBILIDAD
ACCESSORIES (VEH) = COMPONENTS			
OF THE CAR	1354		
ACCIDENT	1643	ACCIDENT	UNFALL	ACCIDENTE
ACCIDENT BLACK SPOT	1663	POINT NOIR (ACCID)	UNFALLSCHWERPUNKT	PUNTO NEGRO (ACCIDENTE)
ACCIDENT EXPOSURE =			
ACCIDENT	1643		

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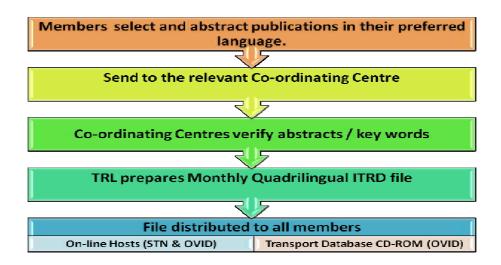Figure 1 - Using the numeric code to link terms in the Quadrilingual Thesauras

Figure 2 - Data entry process for ITRD

The majority of input is in English (75%), followed by German (15%), French (6%) and Spanish (4%).

The database is continuously updated with abstracts of new publications (95%) and on-going research (5%).

Information is collected from journals (over 500 are covered), on research in progress and on standards and specification. Records are selected for inclusion from peer reviewed and / or trustworthy sources of information, or from non-peer reviewed items where the author shows significant understanding of the subject matter. As well as journals, sources of information include books, dissertations, technical reports, conference proceedings, company publications and patents.

The broad subject areas covered by ITRD are shown in Table 1:

Table 1 - Main subject areas for ITRD

Accident studies	Construction of pavements, bridges and structures	Design of roads and related structures
Drainage of soils	Earthworks	Environment
Highway financing and administration	Intermodal transport	Intelligent transport systems
Materials and maintenance	Road safety, accidents	Soils and rock mechanics
Sustainable construction	Traffic and transport policy	Vehicles

In addition, abstracts from other disciplines are included when they are applied to transport issues. Typically these could be in the areas of mathematics, software, climate change, psychology, biology, economics and law.

Records are included where they relate to newly developed concepts, materials, etc, new applications or uses of well-known facts, new research on software applications and their use, new equipment and ways to use it and new ways of using existing equipment. Normally excluded are general news items, articles of purely local interest, articles for the general public and articles published for a second time or summaries of conferences or reports.

Advantages of ITRD

The use of ITRD avoids problems that are often encountered when using more general searches on the Web. These latter web searches often provide a very large number of references which are not relevant to the main interest, are unfocussed and whose quality cannot easily be established. A typical example is the term TDM which in the transport field stands for Transportation, or Travel, Demand Management. But a Google search for TDM finds 5.9 million hits - most of the first hits deal with Time Division Multiplexing, Therapeutic Drug Monitoring or Timber Door Manufacturers. Even for found references for Transport Demand Management the references are not necessarily accessible or in a convenient format for down-loading. However, in ITRD TDM finds 299 accessible hits all of which are transport related and all come from quality peer-reviewed publications.

Though unlike the readily available Internet search engines the various online versions of the database are not free of charge (except for members), by providing fast and accurate access to relevant high quality and peer-reviewed information, the cost of using the database can be more than offset by a saving in researcher's time.

Using the database

The database can be searched via the Internet through two main channels:

- ITRD online, produced by STN (The Scientific & Technical Information Network) (http://www.fiz-karlsruhe.de/)
- TRANSPORT, produced by Wolters-Kluwer/ Ovid (SilverPlatter), available on-line or on CD ROM. TRANSPORT is a compilation of the ITRD and the US/TRIS databases (www.ovid.com)

Access is through membership subscription or 'pay as you go'.

STN provides a choice of interfaces -one of which is the STNEasy interface. An example of search page in STNEasy is shown in Figure 3, where the search is for articles on safety evaluation in developing countries. This resulted in the titles of 102 records being displayed in the results screen shown in Figure 4. Individual records can be selected and displayed (Figure 5) by ticking the box next to each title. Records that have been displayed can be downloaded in various convenient formats such as PDF, html or RTF for subsequent manipulation and inclusion in papers or documents.
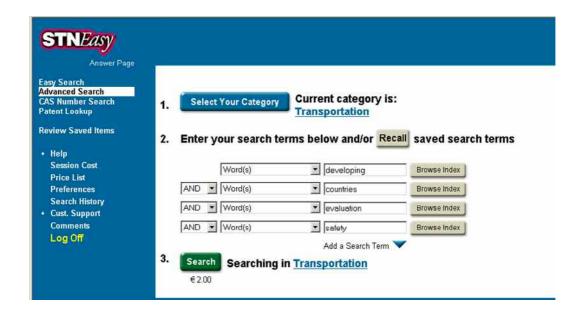

Figure 3 - Search entry page for STN*Easy*

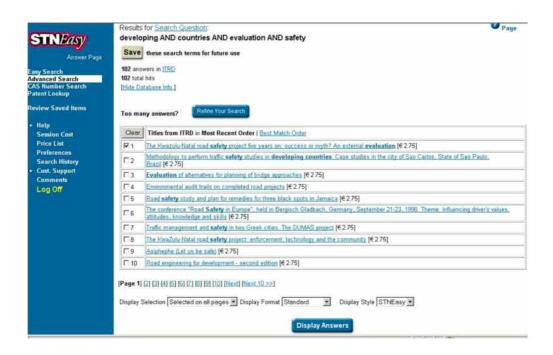*12th WCTR, July 11-15, 2010 – Lisbon, Portugal*
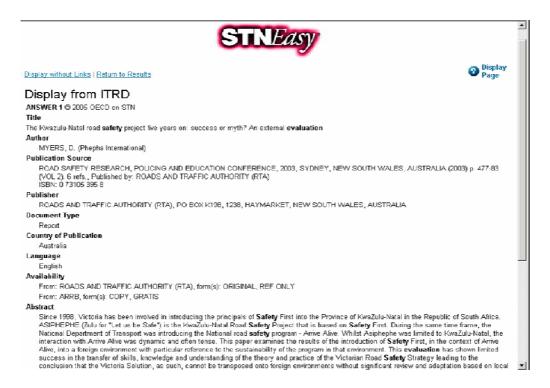
Figure 4 - Found relevant records in the database

Figure 5 - A selected abstract

THE ECTRI SOFT RESEARCH INFRASTRUCTURES DATABASE

Background

The second rather different example is a database on 'Soft Research Infrastructures' that has been developed by the European Conference of Transport Research Institutes (ECTRI) for use by its members. It contains details of research activity, information on research facilities and on datasets that are available to ECTRI members. The database is designed to facilitate the sharing of information between its members that is useful for the pursuit of members' research activities and to facilitate contacts between researchers and experts within appropriate subject areas.

The ECTRI database is an example of a meta-database, since many of its elements are databases themselves, such as ITRD. It does not contain the data, but references to them, their owners, provenance, etc, and, where appropriate, web links to them.

In order to inform the requirements and content of a research infrastructures database ECTRI initiated a survey amongst its members to discover what kind of transport-related data sets are available; to define main research areas of ECTRI member institutions to determine what libraries and transport data sets are already available, and how they are accessed; and to identify how these may be used by ECTRI research institutions.

As a result of the survey it was decided that the purpose and content of the database should be to provide information to the ECTRI transport research community through:
- basic information of all ECTRI institutes
- description of ECTRI research activity areas
- contact persons details related to major research activity areas
- links to available libraries within the ECTRI institutes
- descriptions of datasets

It is a first generation database, using free and open source software and tools. It has a simple database structure, easily expandable. Its development was, and is, a shared effort amongst ECTRI members. It depends on the willingness of ECTRI members to provide information, and keep it up to date. Input is accepted on the understanding that the it can be made available to other members; if a member prefers that a particular information should not be shared it will not be entered into the database.

Structure and use of the database

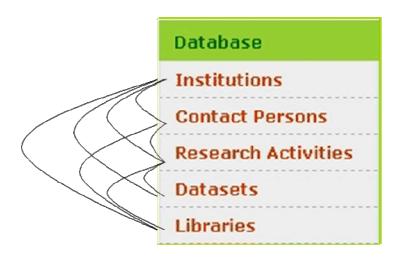The database is structured as shown in Figure 6.

Figure 6 - Database structure

All the information items are linked together and can be accessed from everywhere within the database.

The *Institutions* page identifies the member institutions, a link to the individual members' webpages and then a link within the database to a more general description of the institution, including the main contact person for the purposes of the database, research activity areas, libraries and datasets available for access by ECTRI members, and possibly some names of key researchers.

The *Contact Persons* page contains the names of those key researchers and their research domains, which are also accessed through the *Research Activities* page. The database page showing research activity areas is shown in Figure 7.

Figure 7 - Index of research activity areas

Selecting any of the entries will show institutions and their researchers who are active in that particular research area.

Finally the datasets and libraries pages provide details of the relevant data provide by institutions, linked to research areas, and then specific details about each dataset or library, what it contains, its scope, and how to access it, etc.

Access to the database is restricted to ECTRI members via a username and password for each registered user. The database has a general editor, and each member has an institutional editor who manages that institution's input to the database and maintains its content on behalf of the institution.

Benefits of the database

The resulting database provides a number of benefits to the ECTRI community. It demonstrates that there is a broad range of soft research infrastructures available within the ECTRI community and it helps maximise the efficient use of soft research infrastructures amongst its members. It is an instrument to support cooperation and develop common methods. It gives easy access to the information, which includes datasets and libraries; it provides scope and accessibility, a clear structure and contacts to relevant people. Particularly importantly it enables the sharing of expertise where appropriate and facilitates cooperation among facility owners and users/researchers, thus strengthening the research community.

CONCLUDING REMARKS

The common purpose of the two different databases described here is to collect and disseminate all information of interest to those involved in transport research. In ITRD this is achieved through a database which is the product of a cooperative system that facilitates the systematic worldwide exchange of published information on scientific and technical literature and current research programmes. In ECTRI it is achieved through a database of information that allows identification of the domains of interest of member institutions, contacts within those institutions and access to data of common interest to ECTRI members. Both types of transport knowledge databases are important tools available to the transport researcher in pursuing new insights and understanding to transport issues.

REFERENCES

Howard, C. (1998) International Road Research Documentation (IRRD) a cooperative
        worldwide database of information on road transport, TR News (195) 12-16.
ITRD Website: www.itrd.org
STN (The Scientific & Technical Network): www.stn-international.de