# Research Notes

## 1. Finland

For a small country, Finland has contributed disproportionately to the theory and practice of information science and management. That, at least, is my impression. The professional literature of the field is peppered with Finnish names, among them those of faculty members at the Department of Library and Information Science, University of Tampere. For a small unit, the Department embraces a rich mix of research topics and attracts R&D funding from a quite diverse range of sources. This year (1991), the Department marks its 20th anniversary and as part of the celebrations is organizing an international conference on 'Conceptions of library and information science: Historical, empirical and theoretical perspectives', which will explore the roots and *raison d'être* of the field. As a member of the conference organizing committee I have had the pleasure of working closely with Professors Vakkari and Järvelin over the last few months, and feel that this is a timely moment to highlight some of their efforts and achievements in the pages of *IJIM*.

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### The Department of Library and Information Science, University of Tampere, Finland

The department is the oldest and largest department of library and information science (LIS) in Finland. It was established within the Faculty of Social Sciences in 1971 as the first Scandinavian institution to offer graduate and postgraduate courses in LIS studies. At present there are ten permanent academic positions and four externally-funded research fellowships. External funds have also been used to hire a group of temporary assistants.

The department educates professionals for service, administration and planning purposes across the entire spectrum of library and information work. Emerging information management markets in both the public and private sectors demand professionals with sound knowledge and skills in LIS. About half of all librarians and information professionals who graduate annually in Finland are produced by the department.

The basic degree of the department is the Master of Social Sciences with LIS as the major subject. Depending on personal interests, studies within LIS can be directed to, for example, information retrieval or information management. The minor subjects are optional and they may support specialization within LIS studies. The course of study leads to basic competence for research work and qualifies students for postgraduate studies at both licentiate and doctoral level. Furthermore, the department offers study units (of 20 and 40 credits) for other degree programmes. These are also offered as postgraduate units to Bachelors of Economic Sciences, engineers, natural scientists and anyone interested in LIS.

Research work based on external funds is increasing. The department has (recent or current) research cooperation with, for example, TEKES (Finnish Centre for Development of Technology), VTT (Technical Research Centre of Finland), the Ministry of Education, the Finnish Town Confederacy, the Scandinavian Library Schools, with a Finnish printing house Tampereen Kirjapaino, and with the Department of Computer Science (University of Tampere). External funding comes from the Ministry of Education, the Academy of Finland, TEKES, VTT, the Finnish Town Confederacy and NORDINFO (a Nordic funding body for research in the LIS area).

Research in the Department of Library and Information Science has focused in the past mainly on the following areas: scientific communication and bibliometrics, the relationship between reading and library use, the analysis of LIS, information needs and seeking, the dissemination of information, information retrieval in source databases, and information politics. At present, a key objective is to establish a research laboratory for information retrieval, which will give us the facilities to develop further research work in this field. Current research has centred on the following areas:

- Intermediary systems for distributed fact databases
- Developing work research in public libraries
- Theoretical, historical and empirical analysis of LIS
- The evaluation and measurement of public library performance
- Text retrieval and indexing.

## Intermediary systems for distributed fact databases — Project FUN

The project aims to develop functional, relational and translation oriented techniques for database application development. It has its roots both in computer science (database management research) and library and information science (information retrieval research). Its main goal is to create concepts and methodologies for specifying and developing database and information retrieval (IR) applications in a general, precise and systematic way. A major application area is intermediary systems for distributed heterogeneous fact databases. The modern IR environment provides thousands of fact databases through many communication networks. Severe user problems are due to: inconsistency in the naming of data items, data inconsistency, heterogeneity of data structures and data models, and complexity of the query languages in the database management systems (DBMSs).

The project studies concepts, methods and representations to solve such problems and the implementation of the solutions, e.g., in the form of intermediary systems for fact retrieval. The task of such a system is to identify the databases from which the answers can be found, how the connections are established, how the queries are represented in database specific query languages, how the local results are made compatible, etc. The project considers object oriented DBMSs and query languages, data model integration and extension to recursive processing, semantic nets and frame representation, abstract data types, conceptual modelling of knowledge in various domains, and data dictionaries/directories as approaches for solving the problems.

Since 1985 the project has produced two dissertations, several journal articles, plus a number of seminar papers and internal reports. Kalervo Järvelin and Dr Timo Niemi (from the Department of Computer Science, University of Tampere) have worked on the project. In 1989, an operation-oriented query language approach for recursive queries was developed and its prototype was implemented on the basis of Prolog. Furthermore, a Prolog-based system for constructing queries automatically from high-level, object-based specifications was developed.

### Publications

JÄRVELIN, K. (1990). Boolean predicate reduction for file access. In: *Information modelling and knowledge bases* (H. Kangassalo, S. Ohsuga and H. Jaakkola, eds). Amsterdam: IOS Press, pp. 388–406.

JÄRVELIN, K. AND NIEMI, T. (1990). Simplifying fact retrieval through intermediary systems: problems and requirements. *International Forum on Information and Documentation, 15* (No. 2), pp. 8–15.

JÄRVELIN, K. (1989). An approach to query cost modelling in numeric databases. *Journal of the American Society for Information Science, 40* (No. 4), pp. 236–245.

JÄRVELIN, K. (1989). A blueprint of an intermediary system for numeric source databases. In: *Information*knowledge*evolution* (S. Koskiala and R. Launo, eds). Proceedings of the 44th FID Congress, Aug 28–Sept 1, 1988, Helsinki, Finland. FID Publication 675. Amsterdam: North-Holland, pp. 311–320.

JÄRVELIN, K. (1988). A methodology for user charge estimation in numeric online databanks. Part I: A review of numeric databanks and charging principles. *Journal of Information Science, 14*, pp. 3–16.

JÄRVELIN, K. (1988). A methodology of user charge estimation in numeric online databanks. Part II. *Journal of Information Science, 14*, pp. 77–92.

## Developing work research in public libraries — Project KIRKE

The intention of the KIRKE, or 'Developing library work', project is to study and develop the Espoo Public Library, which also functions as a county library in the administrative district surrounding Helsinki. The final aim of the project is to create in some respect a new model of library work and an experiment based on it. Because the project is a kind of action research involving the library's employees, the number of departments and units taking part has been restricted. The participating units are the entire management team of the whole library (excluding office staff), the department of technical services, the Main Library of Espoo (excluding county and mobile library staff) and one branch library.

The project applies models of developing work research and 'towards good service' activities (a programme aimed at developing library services from the user's point of view). In practice this means collecting many kinds of research data in Espoo library and examining them jointly with the library staff. A couple of times a year there are days for education or development, each of which has its own themes, based on earlier work. The main thrust of the process consists of team work, different tasks, or simply thinking.

KIRKE is financed by the Ministry of Education, the Finnish Town Confederacy and the town of Espoo. The project manager is Pertti Vakkari, and Hannu Kurki the researcher. There are also eight students preparing their master's theses as a part of the project. The project started in August 1989, and is scheduled to be completed in summer 1991.

## Empirical, historical and theoretical analysis of LIS

Several projects concerned with empirical analysis of LIS have been completed or are under way at the Department. These projects have studied, in particular: how LIS research is distributed over various topics; what kinds of approaches have been utilized in the research; and what research

methods have been applied. The data have been derived from: scholarly articles published in international LIS journals (spanning the years 1965, 1975, 1985); Finnish research articles and reports in the domain of LIS (data for the period 1970–1988); and Nordic research articles and reports in the domain of LIS (data for the period 1970–88). The last study is a cooperative Nordic research effort.

The studies aim at a systematic and analytical picture of LIS research on the national, Nordic and international levels. A systematic hierarchical classification of LIS topics which differentiates major LIS fields and their sub-fields is the key feature in the analyses. The relations of research topics to the viewpoints on information dissemination present in the studies, the social levels focused on in the studies, and research strategies, methods of data collection and methods of data analysis are also analysed. This provides novel results on the distributions and relationships of topics, approaches and methods in LIS research.

## Publications

JÄRVELIN, K AND VAKKARI, P. (1990). Content analysis of library and information science research articles. *Library and Information Science Research, 12* (No. 4).
KUMPULAINEN, S. Content analysis of the 1975 library and information science research articles. (forthcoming)

Another current project analyses the 'Roots of library science in historia literaria'. It examines the relation between *historia literaria* (the predecessor of history of science and scholarship) and the German *Bibliothekswissenschaft* in the 17th to 19th centuries, primarily in Germany. Librarianship (*res bibliothecaria*) was at that time to a great extent part of *historia literaria*. The hypothesis is that *Bibliothekswissenschaft* can be differentiated from it. The method to prove the hypothesis is to reconstruct the disciplinary structure of *historia literaria* and show that librarianship had a place in this structure and that it can be differentiated from the structure of *historia literaria*. The driving force behind the differentiation was the weakening of *historia literaria* in the beginning of the 19th century.

## Publication

VAKKARI, P. (1986). Roots of library science in historia literaria. *Wolfenbütteler Notizen zur Buchgeschichte, XI* (No. 2), pp. 72–81.

In addition, there is a project which is planned as an inquiry into the theoretical and practical interests, the objects, and the methodologies of research on scientific communication, especially research carried out in information science and the sociology of science. The aim is to find out on what kinds of theoretical thinking and practical intentions studies of scientific communication are based, and to describe the nature of the research area. It may also be possible to more generally compare information science and sociology of science, or at least to see what they have in common, and what differences in outlook and approach they bring to the field of scientific communication. I (Riitta Kärki) am working on this study.

## The evaluation and measurement of public library performance

The objective of this study is to examine the conceptual problems associated with the evaluation and measurement of public library performance. Terms like productivity, efficiency and effectiveness have a wide variety of meanings in a public library context, leading to difficulties in the selection and operationalization of measures. The study focuses on the questions of applicability of performance measures in public libraries. Issues of applicability involve both theoretical and practical dimensions. The theoretical questions deal primarily with the validity and reliability of measures. The evaluation and measurement of public library performance involve several practical (inherently political) problems linked with the weighing of evaluation criteria and utilization of evaluation results in planning and decision-making processes. The results of the study will be reported later this year. The study is being undertaken by Reijo Savolainen.

## Text retrieval and indexing

One project in this field deals with the effectiveness of search-aid thesauri in free-text searching of full-text databases (principal investigator: Jaana Kristensen). This project seeks to develop vocabularly aids for free-text searching. A pilot study evaluated the effectiveness of a search-aid thesaurus in terms of its effects on the recall and precision of search results. In a further study the relationships of a search-aid thesaurus will be elaborated, and the use of word frequency thresholds as an indicator of relevance as well as the efficiency of scalable synonymity and hierarchical expansion of search terms will be tested.

## Publication

KRISTENSEN, J. AND JÄRVELIN, K. (1990). The effectiveness of a searching thesaurus in free-text searching in a full-text database. *International Classification, 17* (No. 2), pp. 77–84.

## Other publications from the department

ESKOLA, P. AND SORMUNEN, E. (1990). Cost comparison of online searching in four hosts: DATA-STAR, DIALOG, ESA-IRS and STN. *Online Review, 14* (No. 5), pp. 303–316.

IIVONEN, M. (1990). The impact of the indexing environment of interindexer consistency. *Advances in Knowledge Organization, 1*, pp. 259–261.

IIVONEN, M. (1990). Interindexer consistency and the indexing environment. *International Forum on Information and Documentation, 15* (No. 2), pp. 16–21.

IIVONEN, M. (1988). On the library classification of fiction. *Scandinavian Public Library Quarterly, 1*, pp. 12–15.

KÄRKI, R. (1990). Formal scientific communication in Finnish communication research. An analysis of the literature used in journal articles. In: *The role of social science information in knowledge creation*, Proceedings of the Vth ECSSID general conference, Berlin, GDR, January 22–24 1989, vol. 2.

REPO, A.J. (1989). The value of information: approaches in economics, accounting and management science, *Journal of American Society for Information Science, 40* (No. 2), pp. 68–85.

REPO, A.J. (1987). Pilot study of the value of secondary information: discussions from the viewpoints of information providers and users. *Aslib Proceedings, 39* (No. 4), pp. 135–147.

REPO, A.J. (1987). Economics of information. In: *Annual Review of Information Science and Technology, 22*, pp. 3–35.

SAVOLAINEN, R. (1990). Fee or free?. The socio-economic dimensions of the charging dilemma. *Journal of Information Science, 16*, pp. 143–153.

SAVOLAINEN, R. (1990). Access to information and the issue on charging for library and information services: Changing ideological standpoints. In: *The Knowledge Industries: levers of economic and social development in the 1990s* (B. Cronin and N. Tudor-Silovic, eds), London: Aslib, pp. 293–305.

VAKKARI, P. (1989). The role of the public library in the Finnish book culture. *Scandinavian Public Library Quarterly*, 2, pp. 24–31.

VAKKARI, P. (1988). Library supply as an incentive to borrowing. A contextual analytic approach. *Svensk Biblioteksforskning*, 1 (No. 3–4), pp. 24–41.

VAKKARI, P. (1989). The role of research in library and information education. *International Journal of Information and Library Research*, 1 (No. 3), pp. 185–195.

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# 2. France

This section of the Research Notes looks at research on multimedia being conducted at a university in France. Multimedia research will have considerable implications for the way information is represented, manipulated, presented and used in future information systems. The breakthrough in this technology will not only affect the way information systems are used but also the way systems are designed to realize the potential of technology. Already the notion of information base design (as opposed to database design) is being discussed as a possible fundamental conceptual notion for designing information systems.

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## Multimedia research — potential implications for information systems

### Introduction

The Institut Universitaire de Technologie (IUT) is a research and teaching institute at the Université de Pau et des Pays de L'Adour (the university of Pau and regions surrounding the river L'Adour) and is located at Bayonne, France. The institute runs academic programmes in Business and Applied Computing and professional courses in International Commerce, Languages and Project Management. At a European level it collaborates with Brighton and Coventry Polytechnics (UK), the University of Basque Country, San Sebastian, and the University of Salamanca (Spain) and the Polytechnic of Guarda (Portugal). In addition, the institute maintains very strong research and collaborative links with a network of industrial companies which include France Telecom, SEI of France, Renault Guarda of Portugal, SPRI and APIKA of Spain. Research in information technology is currently concentrated in artificial intelligence, communication, computer aided tutoring, teaching/learning systems and multimedia. This paper will concentrate on the multimedia research project of the institute.

### Multimedia research

In the last few years there has been considerable research interest shown in the development of information storage on different information media and other technologies (e.g., CD, audio cassettes) and the possible integration of information for manipulation and presentation to users. These include sound/voice data, traditional numeric and text data, pictures and images, static and dynamic representation of picture data, and graphic data such as shapes and animation. The storage and representation of all these forms of information in digitized form on different media has raised new possibilities for the integration of information and its presentation to users for decision making and action. There is further research interest in

the development of more natural human interfaces. For instance, the Apple Mackintosh Macrecorder provides an opportunity for mixing music (sound) with notes. The opportunity of integrating different forms of information without considering different media is raising new systems design concepts such as object-oriented database and human dialogue design. At the data organization level, multimedia research offers a unique opportunity for the development of a fundamentally new conceptual approach: i.e., the idea of an information base incorporating picture, sound, text, etc. as opposed to current database notions which are based on data in text and numeric form.

## Research at the institute of Bayonne

Research at the institute is both theoretical and applied in nature. It is exploring the development and use of multimedia as a potential way of promoting the Basque culture, particularly traditional songs. Research on multimedia at the institute can be considered at three levels.

*Technology level.* At the technology level there is considerable interest in new forms of hardware architectures which may bring about new design concepts. However, at present, the institute research is focused on the development of new software and design concepts of data (the French term for this is 'generalized information bases' to reflect the mixed nature of picture, sound, text, graphics and numeric data), the dynamic time-related interactions of the data (for example, picture and voice harmonization) and the implementation strategies of these new concepts on existing technologies. Current database notions of entity, attributes, entity relationships expressed in the form of text/numeric data are being challenged. The representation of objects is also being considered as objects themselves, for example. Problems of hardware interfaces, i.e., CD/video/ text are also being explored as well as problems of user interfaces.

*Cultural level.* At a cultural level, the

Basque government and the regional agencies of Spain are involved in the project as any developments in the use of multimedia could help to promote Basque cultural activities. If synchronization problems can be handled then, through telecommunication media, access can be provided to a large number of users. It is envisaged that the developments and the use of multimedia will help to promote interactive learning of Basque songs. The technology could permit a mixture of sound, music notes presentation and animation. It is also expected that this form of application will help to create new forms of art and help to enhance the development of Basque cultural activities.

*Functional level.* The project is of interest to a number of users including teachers, musicians and researchers, etc. Research interest will extend to the study of how the technology could support teaching, the implication of the use of technology on current teaching methods, and whether the technology could create a realistic cultural atmosphere for learning and motivation. For the advanced users (i.e., those who already have an expert knowledge of the language and culture), this research is expected to offer facilities for enhancing their creative activities. Five categories of users have been identified for the purpose of functional and HCI (human–computer interaction) analysis. They are:

● Ordinary users. These are users who like to maintain their cultural links, i.e., public access.
● Teachers and promoters. These are users who already have an advanced knowledge of the Basque culture and are looking to use the media as a tool for enhancing their teaching/promotional activities.
● Creators of art, music and culture. These are users who would like to use multimedia both as a tool and for their information content for the development of cultural objects, music and art forms, etc.
● Researchers. These are groups who conduct research into the origins and the development of Basque language, culture, etc. They in-

clude linguists/literature agents who undertake text analysis and musicians who undertake spectral analysis of music etc.

● Designers/administrators. These are professionals who are responsible for the design, organization and performance of multimedia, i.e., information systems people.

## *Prototyping*

At present the project is going through a prototyping stage to establish the functional requirements, particularly in,

● establishing possible entry paths to the information base;
● exploring navigation techniques; and
● verification of media support for meeting user needs.

This stage is to establish information retrieval needs of the users only. Apple Macintosh Hypercard, Macrecorder and other softwares are being used for developing prototype user interfaces and functional features.

## *Collaborators*

The multimedia research project at the Bayonne Institute has collaborative support from a number of sectors. Among the industrial partners collaborating in the project are France Telecom, SEI and GSI from France and APIKA from Spain. The Basque Government of Spain has a considerable investment in the project and is already supporting a number of researchers. Among the universities participating in the project are the University of Basque Country (Spain), University of Toulouse (France) and Heirot-Watt University (Scotland).

The project has attracted annual funding of over FF1 272 000 from the Basque Government, Aquitaine re-

gional council and others. In addition, the institute has attracted fundings over FF580 000 for equipment. Some of the industrial funding includes research posts at the institute.

Research at the institute in Bayonne is carried out by a team of researchers led by Professor B. Causse. Mr Jose Luis Echeveste from the Basque University, San Sebastian, is also a member of the core group of researchers. A team led by Professor Chrisment from the University of Toulouse provides external university collaboration. Industrial research input and supervision is provided by Messrs Barusso of APIKA, Forestier of France Telecom, Pryzso of Informatique et Mer and Harlouchet of SEI.

## *Conclusion*

It is expected that research in multimedia will generate new conceptual definitions of information organization, manipulation and use as did databases to traditional data processing. Already concepts of natural language interfaces and object-oriented designs are providing new ways of designing information systems. It is envisaged that the new developments in generalized information base design will have a revolutionary impact in the way future information systems are organized and managed in organizations.

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