The Design And Implementation Of A Database System To Help Determine The Information Needs Of A Knowledge Based Organization

Schubert Foo  
Division of Information Studies, School of Applied Science, Nanyang Technological University, Singapore  
Email: assfoo@ntu.edu.sg  Telephone: (65) 790-4621  Fax: (65) 792-6559

Mark Hepworth  
Department of Information Science, Loughborough University, United Kingdom  
Email: M.Hepworth@lboro.ac.uk

Abstract

One of the most difficult aspects of deriving an information management plan for a large knowledge based enterprise is to determine what information people require to do their various tasks as well as help them expand and update their existing knowledge. Defining the information needs of the organisation as a whole is a necessary part of a systematic process of becoming such an enterprise. This paper provides an overview of a methodology used to elicit the information needs of an organisation. The focus however is on the design and implementation of two databases that were used to support this process. These databases proved to be extremely useful for organising the qualitative and quantitative data derived from the information needs analysis research and also for analysing and presenting the findings. The organization, namely, the Singapore Productivity and Standards Board, whose role is to enhance the productivity of business and industry in Singapore, employs approximately 1000 people. The use of database technology combined with networked access to staff facilitated the capture and analysis of the information needs of a large number of people in a short period of time. A description is given of the database design; database implementation; the queries supported by the database as well as the exporting of data to other applications to help visualize information needs.

Keywords: Information needs, Database design and development, Information architecture.

1. Introduction

The Singapore Productivity and Standards Board (PSB) was formed in 1996 through the merger of the National Productivity Board and the Singapore Institute of Standards and Industrial Research. The merger was designed to enable an integrated approach to the management of Total Factory Productivity to sustain Singapore’s future growth (PSB, 1997). In order to sustain this growth, Singapore has seen a gradual change in emphasis from a low-cost manufacturing economy towards a higher
value-added knowledge based economy (or information society) that emphasizes the importance of human and intellectual capital for the future.

Taking the lead the PSB has recently embarked upon an information architecture project. The term information architecture is used here to mean a description of the information that people need and use across the organisation, where it comes, how they use it and what happens to it. The availability and perceived value of information categories are also addressed. The resulting information architecture is therefore a 'map' of the organisation's information environment on the basis of which information policy including data acquisition, data storage and IT solutions can be planned. The initiative to undertake this exercise stems from the realisation that systematic access, management, use and exploitation of data, information and knowledge can have significant bearing on an organization’s competitiveness (Davenport & Marchand, 1999; Davenport, 1998). Knowledge-based enterprises are beginning to emerge. Organisations such as Monsanto and Glaxo Welcome are quoted as being or are becoming such organisations, (Syrme & Amidon, 1997).

In order to develop a systematic approach to becoming such an organization, it is necessary to understand what information people need, use and would like, to help them do their work and to ensure their knowledge is 'refreshed' and kept up to date. As a result a project was instigated to determine these needs. The main objective was to identify the core information needs of the PSB workforce and to determine the overall information architecture of the organisation. This would then provide the context within which future information management policy and IT strategy could be defined.

In this paper, the authors, who acted as consultants to the project, trace the design and development of an integrated set of information needs databases that were used to assist in the derivation of the information architecture. The focus of the article is on the design and usefulness of the databases that facilitated the management of project data. A separate article is planned to discuss in detail the combination of qualitative and quantitative methods used to derive the data. However an outline of the approach taken is given below.

Determining and documenting the flow of information in an organisation is not unique however it tends to be done in relation to specific tasks or groups of people rather than the entire organisation. Methodologies used by software engineers are diverse and little standardisation of methods has taken place, (Wixon & Ramey 1996). Even the most established methods such as the Structured Systems Analysis and Design Method (SSADM) is widely criticised (Middleton 1999). Great emphasis tends to be placed on the specification and notation of user requirements rather than the initial understanding of needs. Debate still ensues about how to gather user requirements in particular whether to take a more ethnographic approach (Heath & Luff 1991). The objective of this project was to map the underlying information architecture of the organisation that activities depended upon. This is similar to the work done to develop decision support systems but extending the idea to the entire organisation or at least to those parts that depend on access to internal and external information. With regard to the PSB categories of information that made up this information architecture included for example company, industry, macro-economic, demographic, standards, regulations, internal corporate reports and people. Due to the
scale of the operation and the time constraints (three months) specific techniques had to be developed. These techniques included the use of both qualitative and quantitative techniques to understand the needs of the people in the organisation. These techniques were based on a theoretical framework derived form user studies, human computer interface design and software engineering. Similarly to Orna (1999) emphasis was placed on understanding what information helped achieve organisational goals. Emphasis however was placed on task analysis as a means for eliciting information needs. Selective sampling and the use of specific techniques such as flowcharting during focus groups helped to get input from a diverse range of staff and to incrementally build a picture of the needs of respondents. This was facilitated to a great extent by the use of information technology including database technology, networked access to respondents and the use of applications to help visualise the findings. Networked access in particular enabled the testing results of the qualitative research on the majority of people in the organisation. It also enabled the gathering of quantitative data on people's assessment of the availability and value of categories. Increasingly software is being used to help visualise the relationships between data. Horton (1994) was one of the first researchers to consciously use database techniques to understand information use in the organisation. However Horton was primarily concerned with mapping the information that exists in the organisation i.e. an information audit rather than identifying the fundamental information needs of people in an organisation.

2. Methodology

A host of approaches have been used to understand the information dynamics of an organisation and to aid the derivation of an information architecture including user needs studies (Wilson, 1994) and information audits (Buchanan & Gibb, 1998) which in turn use a diverse range of techniques such as paper based surveys, interviews with key staff, observations and talking to experts. From the perspective of the information manager such an exercise provides the opportunity to be proactive, develop interactions with users of information throughout the whole organization, improve the utilization of the information resources, and influence decisions on the strategic use of information and support knowledge creation. The results can be used to evaluate existing information services and systems, to gauge the match between information requirements and provision, to identify common information needs, classes of important information, and information gaps. All these provide views of the organization’s information infrastructure.

PSB is a large organization that employs approximately 1000 staff the majority of whom are professional graduate staff. It encompasses 13 Divisions and comprises in excess of 50 departments, centres and strategic business units. More than 20 separate information systems exist to support various functions for the organization. Due to the large number of staff and the three-month time constraint placed on the project data collection had to be particularly effective. The developed approach had to satisfy a number of considerations. These included the need to

- focus on those information needs that contributed to the goals and objectives of the organization;
- capture the information needs of the diverse functions within the organization;
- provide sufficient detail on which to base a future information and IT strategy;
- implement a strategy that could be applied by a group of 10 project team members, only one of whom had any background in information management;
- enable transfer of knowledge from the consultants to the project team members so that they could maintain and continually develop the information architecture;
- gain participation and support of staff in the organisation as a whole, (staff were already jaded by previous organization-wide surveys);
- complete the project in a short time frame i.e. three months.

To achieve these objectives a combination of qualitative and quantitative methods were applied. Figure 1 provides an overview of the methodology including the steps outlining the design, development and use of the databases. The qualitative approach including the use of interviews, focus groups and observation provided ‘depth’ and ‘authenticity’ and enabled the derivation of key categories of information needed by staff. Subsequently, a quantitative survey technique, which was made accessible to staff via e-mail and the network, was then used to survey the entire organisation to help quantify the demand and value placed on the key categories of information by staff throughout the organisation. Staff were also given the opportunity to add categories.

A comprehensive database application in MS Access 97 (comprising the Task Analysis and Information Needs (TA-IN) Database and the Information Audit (IA) Database) were developed to serve as a repository of data generated from the qualitative and quantitative research and for subsequent data analysis and evaluation.

As can be seen from Figure 1, Stage 1, ‘Project orientation’, relates to project start-up which involved the identification of relevant orientation and background information, familiarisation with the corporate plan, tour of key areas in the organisation, briefing sessions and the establishment of communication channels and protocols to facilitate project work. Various IT tools, databases and applications used in the organisation, as well as the IT proficiency of staff and the project team members were noted. This helped to determine the platform for the database application and the subsequent electronic survey.

Stage 2, ‘Task analysis and information needs analysis of staff”, signals the commencement of the data collection process design and actual data collection. Key areas that directly contribute to the organization’s mission and thrusts were identified throughout all the Divisions. Staff who played key roles in these areas were identified to participate in the exercise. A task analysis and information needs form was designed (by the consultants) for completion by these key staff. The completion of these forms was facilitated by project team members. These forms were used as the basis for the design and implementation of the TA-IN database. A related set of database input forms were designed for the project team members to input data into the database. Finally, a number of queries were formulated to yield answers to a host of typical information-related questions. Following a thorough pilot test on the database, a final TA-IN database was generated to accept real user responses.
Stage 1  
Project Orientation
- Identify IT tools/databases/applications

Stage 2  
Task Analysis and Information Needs Analysis of Staff
- Design and implement TA-IN database schema based on TA-IN forms;
- Design and implement forms (used by project team members) to define TA-IN information;
- Formulate and test queries;
- Carry out pilot test: populate database with dummy data through input forms and verify data correctness (in data input, data integrity, data query results);
- Generate TA-IN database for actual data input;
- Input task analysis and information needs;

Stage 3  
Task Analysis and Information Needs Analysis of Directors

Stage 4  
Focus Groups with Divisional Staff
- Input additional task analysis and information needs;
- Fine-tune database input form/database design as necessary;

Stage 5  
Observations and Clarification Exercise
- Execute queries to generate preliminary findings;
- Sort and group information to assist in identifying information categories;
- Input information coding and categories into TA-IN database

Stage 6  
Coding of Information
- Design and implement IA database schema based on survey requirements;
- Design and implement electronic survey forms (MS Excel and MS Access);
- Formulate and test queries;
- Carry out pilot test: appending database with dummy user returns and verify data correctness (in data appending, data integrity, data query results);
- Generate IA database for actual data appending;
- Obtain user returns and append to IA database;

Stage 7  
Information Audit
- Execute queries to generate findings;
- Modify existing queries/generate new queries to support new analysis requirements;
- Export database data to external applications (e.g. spreadsheet) for further analysis and data presentation;

Stage 8  
Data Analysis: Task Analysis and Information Needs Database

Stage 9  
Data Analysis: Information Audit Database

End

Figure 1. Methodology for Information Architecture Project
Data collection using an array of techniques including semi-structured interviews with directors, task analysis and focus groups with divisional staff, observation and clarification sessions sought to progressively build up a rich picture of the information needs of the organization. Data collected at these stages (3 through 5) was incrementally added to the database by project team members using the database input form. Feedback was solicited at these various stages to fine-tune the input form and database design. This helped to improve the ease of data entry, promote the use of standard vocabulary to describe similar information needs and sources, and enhance the data integrity in the database (see Section 3.2). In order to distinguish the data collected at these various stages, the input information was tagged with different unique identifiers.

Stage 6, ‘coding of information’, identified and defined information codes and information categories to best describe the data collected. Information in the database was filtered, sorted and grouped in an inductive fashion to aid the derivation of information categories and sub-categories. Synthesis did take place however where possible the terms that the respondent’s used to describe categories of information were retained. The completed definition of information codes and categories were subsequently used to ‘index’ the TA-IN database. The initial predefined queries were executed to generate a set of preliminary findings.

Stage 7, ‘information audit’, saw the application of an organisation-wide electronic information needs survey. This survey used the key information categories that were derived from the qualitative data in stage 6. The objective was to determine and quantify from the organisation as a whole the expressed need for these information categories, their current availability, their frequency of use, their perceived value and whether additional categories of information were required. Two sets of electronic survey forms in MS Access 97 and MS Excel 97 format were designed to carry out the survey. The use of different survey forms allowed staff participating in the survey to enter data in a way that was easy and familiar to them, rather than one that was easy for the project team but hard for the staff. At the same time, it was necessary to cater to different computing facilities that were available to staff. The use of an electronic survey tool therefore facilitated access by respondents and also allowed the survey information to be captured in electronic form and appended to the database directly for data analysis. As before, a number of queries were formulated to yield eventual answers to a host of typical information-related questions. A thorough pilot test was carried out to verify the electronic survey process. This included the simulated routing of survey instructions, completion of survey forms in both formats, survey returns, appending of survey results to the database, and executing the queries on the mock data. A final IA database was generated to accept survey responses.

With all the data collected and stored in the two databases, Stages 8 and 9 were primarily concerned with data analysis. The formulated queries were executed to yield findings in various forms and formats. Existing queries were modified while new queries were added as the iterative process of data analysis proceeded. Subsets of data from the database were also exported to other applications, such as spreadsheets, for further analysis and data presentation. Some of these sample outputs are shown in Section 4 of the paper.
3. Database System Design and Implementation

3.1 Database Design

Two databases, namely, TA-IN database and the IA database, were designed to handle the data storage and analysis of the data derived from the qualitative and quantitative approaches used in this project. The TA-IN database was used to capture the various tasks, sub tasks and the type of information required to achieve these tasks. It was also used to fully record additional information that was elicited or volunteered by staff during the data collection process. In contrast, the IA database was structured to capture the respondent’s feedback on the categories of information in terms of their perceived value, need/use and availability.

![Entity relationship diagram for Task Analysis and Information Needs (TA-IN) Model](image)

**Figure 2.** Entity relationship diagram for Task Analysis and Information Needs (TA-IN) Model

Figure 2 shows the overall database model used for the TA-IN database using an entity relationship diagram (or data object diagram). The entity types are represented by boxes, their attributes by ovals, and the relationships between entities by diamonds. Connections between entities are shown using standard symbols to indicate cardinality and modality (Tillman, 1993). As shown in the data model, every staff (Staff_Data) is a member within the hierarchical structure of Department,
Division or Group in the organization (Organisation_Data). Staff accomplish a series of tasks (Task_Data) in their work. This work can be associated with daily role-related routines, programmes or projects. Information is needed or generated in the process of accomplishing the tasks. Main tasks can be broken down into sub tasks. Such a child-parent relationship is uniquely identified by an extensible Task ID identifier in the data model. For instance, MSD100, MSD100.1, MSD100.2, MSD100.3 denotes a main task (labeled as 100) that comprises three sub tasks (labeled as 100.1, 100.2 and 100.3) in the MSD department. Such a convention can obviously be extended further to include sub-sub tasks if necessary. The information needs and information generated are represented by the Info_Data entity. Through its attributes, information can be defined exhaustively accordingly to the needs of the information architecture project. In our example, information can be flowing in or out (denoting information needed/used, or information generated), internal or external (within or outside the organisation), for/from whom the information is generated/obtained, information subject matter, category, frequency, mode of delivery, media, and so on.

Table 1. Description of Data Attributes of Information Data Entity

<table>
<thead>
<tr>
<th>Data Attribute</th>
<th>Description</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>InfoType</td>
<td>Type of information generated or needed: Int/Ext</td>
<td>Int = Internal information</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ext = External information</td>
</tr>
<tr>
<td>InfoFlow</td>
<td>Flow of information: In/Out</td>
<td>In = information needed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Out = information generated</td>
</tr>
<tr>
<td>InfoNeedGen</td>
<td>Describe the information needed to do the task, or information generated as a result of doing the task</td>
<td></td>
</tr>
<tr>
<td>InfoStatus</td>
<td>Status of information: AV/NA/PA</td>
<td>AV = Available information</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NA = Information not available</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PA = Partially available information</td>
</tr>
<tr>
<td>Media</td>
<td>Media in which information is obtained or generated.</td>
<td>Example: Database record, CD-ROM, Web page, etc.</td>
</tr>
<tr>
<td>Subject</td>
<td>Information subject</td>
<td></td>
</tr>
<tr>
<td>InfoCode</td>
<td>Information code</td>
<td>Used to identify information category (input only after Coding of Information phase – see Figure 1)</td>
</tr>
<tr>
<td>Form</td>
<td>Form of information</td>
<td>Example: Text, numeric, multimedia.</td>
</tr>
<tr>
<td>Coverage</td>
<td>Coverage of information needed/generated</td>
<td>Example: Specific, (information providing) breadth, depth</td>
</tr>
<tr>
<td>Frequency</td>
<td>Frequency of information needed/generated</td>
<td>Example: Daily, weekly, monthly, quarterly, frequent, infrequent, etc.</td>
</tr>
<tr>
<td>Quantity</td>
<td>Quantity of information</td>
<td>Example: small, medium, large</td>
</tr>
<tr>
<td>Whom</td>
<td>From whom is this information obtained/To whom is this information generated</td>
<td>“From whom” implies InfoFlow=In, “To whom” implies InfoFlow=Out.</td>
</tr>
<tr>
<td>ModeOfDelivery</td>
<td>Mode of delivery of the information.</td>
<td>Example: Basic directory, CD-ROM, Email; External database, etc.</td>
</tr>
<tr>
<td>OrgNameProduct</td>
<td>Name of organisation/information publisher</td>
<td>Example: Business Times, Reuters, etc.</td>
</tr>
</tbody>
</table>
Table 1 shows a brief description of the data attributes in the model. It should be noted that there is also a direct connection between the Staff_Data and Info_Data entity. This is to capture information needs in instances where the information is not directly related to particular tasks. For example, there may a common need among Divisional Directors for information on benchmarking and best practices on equivalent organizations abroad as part of their conceptual or current awareness requirements.

Figure 3. Entity relationship diagram for Information Needs Survey (IA) Model

Figure 3 shows the overall database model used for the IA database. Similarities exist between the two databases. As before, every staff is a member of the organisation so that the Staff_Data and Organisation_Data entities are identical. Every staff has his or her own set of information needs that is defined in the Info_Topic entity. This entity is related to TA-IN Info_Data entity in the form of the information code and categories. Thus, this common link allows data from both qualitative and quantitative analysis to be complemented and contrasted in the data analysis stages. In addition, the Info_Topic entity allows users to identify information categories used, its frequency, its status (whether the information is available or not) as well as the value of the information identified. Users were allowed to add in new information categories by defining a new information code. Table 2 shows a brief description of these new data attributes in the model.

3.2 Database System Implementation

Both TA-IN and IA database were developed using the MS Access 97 (Microsoft, 1999a) platform according to the data models outlined in the previous section. This was in line with the preferred type of database system in the organization. In addition, all the project team members had this application installed on their computers thereby enabling a convenient and de-centralized means to enter the
information needs data captured during the qualitative data collection phase of the project.

### Table 2. Description of Data Attributes of Information Topic Entity

<table>
<thead>
<tr>
<th>Data Attribute</th>
<th>Description</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>InfoCode</td>
<td>Information code to uniquely identify different information category</td>
<td>Identical to InfoCode attribute of Info_Data entity of Task analysis and information needs (TA-IN) data model.</td>
</tr>
<tr>
<td>InfoDesc</td>
<td>Information categories description.</td>
<td>Defines all information categories used for the electronic information needs survey.</td>
</tr>
<tr>
<td>InfoUse</td>
<td>Is information used/needed? - (Yes/No)</td>
<td>Tick box if answer is yes</td>
</tr>
<tr>
<td>InfoStatus</td>
<td>Is information available? - Yes/No/Partially</td>
<td>Only required to be defined if InfoUse = Yes</td>
</tr>
<tr>
<td>InfoFrequency</td>
<td>Frequency of information needs? - Weekly, monthly, quarterly, annually, infrequent</td>
<td>Only required to be defined if InfoUse = Yes</td>
</tr>
</tbody>
</table>

Data entry to the TA-IN database was accomplished through a series of forms for the convenience of the project team members and to minimize erroneous entries. The select-and-click paradigm using pull-down menus was used whenever possible. A set of example data entries showing different typical information needs/sources was prepared beforehand and distributed as part of the ‘training session’ to promote standardization in describing the same information entities.

Likewise, the electronic information needs survey was accomplished through two sets of forms in MS Access 97 (Microsoft, 1999a) and MS Excel 97 (Microsoft, 1999b) format to cater for different staff preferences and computing facilities of PSB staff. As the organization-wide survey encompasses all professional staff with differing levels of digital competency, due attention was placed on the design of these survey forms to minimize ambiguity, and to make it as easy to complete and return as possible. In addition, the overall process of the electronic survey followed a well-defined procedure of survey preparation, distribution, data collection and processing. Interested readers can refer to a separate paper detailing the implementation of the electronic survey process (Foo & Hepworth, 1999). The paper also contains a section of practical, tested guidelines (derived from the experience in this project) that serve as a useful guide for similar work. As an example of these forms, Figures 4 and 5 shows a partially completed information needs questionnaire in MS Access and Excel respectively.
It should become apparent that in these survey forms, all unnecessary features of the electronic form (e.g. database or spreadsheet menus, macros, short-cuts, etc.) are disabled to ensure that staff are only presented with the bare minimum (but sufficient) functionality to complete the survey. This is to minimize the temptation for users to explore and create problems for themselves and the project team. Furthermore, in this
case where multiple forms were required, an attempt was made to create a similar ‘look-and-feel’ survey to achieve consistency. Clear instructions for survey completion, appropriate use of language and tone, minimizing user input through the use of list boxes for user selection, providing help features and following a logical organization of questions were carefully observed and implemented in the survey questionnaire.

3.3 Queries Supported by the Database

The notion of ‘every field in the database is queryable’ is important so that maximum use can be made of the databases for data repository and analysis. Once the data model is properly linked and implemented through the appropriate fields and tables in the database, the querying supported by databases becomes the value-added facility to allow the captured information to be filtered, sorted, extracted, manipulated and presented according to user needs. In the TA-IN and IA databases, a total of approximately 30 basic queries were formulated. This number is in fact higher since the analyst can apply slight modifications to the existing queries or input the desired properties to change the focus of desired information. For example, a basic query can be formulated to reveal the type of information sources used. This can then be filtered to yield the information sources used by an individual staff, by role, by department, by division or by group. An append query was also written to append the electronic survey returns directly into the IA database. In this case, only the needed information categories that are indicated by staff are appended. The queries were formulated using the Access Query-By-Example (QBE) facility or direct SQL (Structured Query Language) statements.

The query results coupled with data analysis helped to address many questions. These included:

- What are the information needs of individuals, departments or divisions?
- What are the percentage returns of the electronic survey from each department?
- What is perceived to be the most valuable information by staff in their respective part of the organization?
- What information is used most frequently by X% of the staff?
- Where are the common or overlapping areas of information need?
- What information generated internally within the organization is needed by staff or consumed externally by clients?
- What information sources and services are used most often?
- Which information is lacking or only partially available?
- What is the staff participation rate in the information architecture project? Which departments have been left out in the qualitative and quantitative analysis?
4. **Information Profile Derived from Information Needs Analysis**

In addition to using tabulated outputs or listings from the queries, many other forms of result presentations are possible to fully illustrate the information profile derived from such an information needs analysis. This section provides a number of examples to show some of these possibilities. Mock up data and scaled-down versions of the data are used in these figures.

![Information Landscape (Company information - whole organization)](image)

Figure 6. Information landscape showing demand for categories of company information across the whole organisation.

Figure 6 shows the information landscape that defines the demand for categories of company information across the whole organisation. This can be extended easily to incorporate all the information categories. Peaks and troughs are easily identifiable from this plot. Figure 7 uses column bars to show the demand for company information by division. This provides a means to compare the contrasting need for information by different divisions. Figure 8 uses a doughnut plot to show the top five information needs of the organization. Figure 9 uses a pie chart to show a similar set of information in the form of the top 5 information sources.
Figure 7. Column bars showing the demand for company information by division

Figure 8. Doughnut plot showing top five information needs
Top 5 Information Sources

- Kompass 12%
- Business Times 18%
- RCB 25%
- Dialog 23%
- Company annual reports 22%

Figure 9. Pie chart showing organization’s top five information sources

<table>
<thead>
<tr>
<th>Information Category</th>
<th>PCDD</th>
<th>PIRD</th>
<th>MCSD</th>
<th>WD</th>
<th>LED</th>
</tr>
</thead>
<tbody>
<tr>
<td>C01. Company (company name - list)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>C02. Company (profile)</td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C03. Company (listing of persons by job function)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C04. Company (organisational structure)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C05. Company (call/contact report)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C06. Company (individual's participation in PSB act)</td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>C07. Company (participation - event)</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C08. Company (participation - consultancy)</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C09. Company (participation - training)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>C10. Company (participation - incentive scheme)</td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>C11. Company (participation - library scheme)</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C12. Company (participation - certification)</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C13. Company (participation - technical services)</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C14. Company (participation - awards)</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C15. Company (participation - standard)</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C16. Company (participation - industry programme)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C17. Company (benefit of participation in PSB act)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C18. Company (data on transaction with PSB)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>C19. Company (PSB prospect)</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C20. Company (committee member)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 10. Table plot showing common information needs or gaps relating to company information categories by division
The table plot (2D matrix) of Figure 10 is used to show the common information needs or gaps relating to the company information category by division. Figure 11 uses a data flow diagram to show the internal information flow between a division and all other divisions in the organization. Information flowing in to the division from other divisions is shown on the left while information flowing out to other divisions is shown on the right. Furthermore, internal information generated and consumed by the same division is shown by a loop in the figure. A similar figure can be used to map the information flow of the organization with the external environment.

Figure 12 shows an external application developed in MS Visual Basic (Microsoft, 1999c) to link and present an alternative display of information need results from the IA database. This application is queryable since it allows the user to select the divisions of interest and apply a set of filters to the survey information. In the figure, the highly-valued (Info Value = 5 to 7, where 7 is the highest indicated by users) daily (Info Frequency = Daily) used (Info Status = Available) company information of three selected divisions (TDD, PDAD and IND) are identified by the highlighted bars.
5. Conclusion

This paper has traced the design and development of two databases that served as an accompanying tool to carry out an information architecture project for a large organisation of approximately 1000 people. The TA-IN and IA databases were used as a repository for data collected during the qualitative and quantitative phases of the project. Input forms provided a convenient means to input the qualitative data, while an append query function provided an efficient way to append the relevant data from the electronic survey directly into the IA database. These databases subsequently served as complementary tools during data analysis by allowing various queries on the information to be performed. It also allowed the easy export of data to other applications so that other more detailed analysis could be carried out. These databases are now available for subsequent analysis and also to facilitate the capturing and analysis of additional information needs in future. Without these two databases it would have been very difficult to manage the large amount of data gathered through the use of both qualitative and quantitative methods.

The careful design and implementation of the methodology, data collection and analysis has led to the completion of the information architecture project in three months, which for a project of this scale, is extremely short. Internal PSB documents and business process re-engineering consultants had estimated between six months and one year for the project. The project laid the groundwork and generated findings
for the derivation of PSB’s strategic information plan. This plan will, it is expected, enable the realization of the corporate vision to become a knowledge-based enterprise where the systematic management of data, information and knowledge is seen as a key strategy for success.

References


