The Use of Business Metadata to Support Decision-Making Processes

Muzaffar Hamzah and Anthony Sobey

***Abstract*—Decision Support Systems (DSS) rely on a data warehouse to assist the users, especially the managers, to make intelligent decisions for the organisation. To support correct and quality decision-making, the data warehouse should integrate the information associated with the managers by the roles and business processes of the managers. This paper integrates two areas—the DSS, especially the data warehouse, and management theories—to benefit the DSS users, especially top-level managers.**

***Index Terms*—Business Process, Decision-Making Process, Decision Support Systems, Roles.**

I. Introduction

Managers, especially the top-level managers, have limited time to obtain and comprehend information available to them for making a decision. As the decisions to be made are crucial to the organisation, they need assistance in finding the right information. There exist information systems called DSS [1] to assist the managers, especially at executive level, to make a decision. However, little research integrates the decision-making process (part of the business process) into the data warehouse structure [2], [3]. Hence, to enhance the capability and usage of DSS, the data warehouse should integrate the job roles and decision-making processes into finding the information that is available for specific managers within the enterprise-wide data warehouse. Roles of managers will specify the relevant tasks while business process will indicate the flow of information at specific decision point.

II. Data Warehouse

Data warehouse technology is define as a "collection of integrated, non-volatile, subject-oriented databases that support the decision support systems (DSS) function" [4]. For better and more timely provision of data, the data warehouse should be designed to support its user's needs especially in the case of decision-making processes. Data warehouses support multidimensional structure that allows views of information in different perspective, supporting the decision-making of managers, however often managers can't find or are not aware of data that resides within the data warehouse that could support a particular decision-making process. The use of tagging can assist the manager in finding relevant data. This tagging can be done through the enhancement of the data warehouse metadata – an important component for efficiency of the data warehouse. Metadata can be classified as technical and business metadata [5]. Technical metadata provides technical properties such as table and fields structures that are useful to support decision quality or transfer of data between a data warehouse and information systems. On the other hand, business metadata that describes the content more in the language of the business, can helps govern access within the business environment. So, in this study it is more useful to focus on business metadata rather than the technical metadata that is most commonly used in today's data warehouse [6].

Manuscript received August 18, 2012; revised September 30, 2012.

Muzaffar Hamzah and Anthony Sobey are with Strategic Information Management Laboratory (SIM Lab), School of Computer and Information Science, University of South Australia, South Australia, Australia (email: muzaffar.hamzah@mymail.unisa.edu.au, anthony.sobey@unisa.edu.au).

III. Business Metadata

Business metadata provides business context to the data in the data warehouse so the business meaning will be clearer when using the data in various business processes, including decision-making. The effort to align the business metadata with the goal of the organization [7] looks promising to ensure businesses obtain benefits from using metadata in their data warehouse. However, there is still need for research into the links between the roles of those involved in a decision-making process and the use of business metadata in the organisations data warehouse. For example, when the data warehouse generates reports for the managers within certain business processes, it should explicitly provide the manager with a view of the data that is relevant to the manager's role. This is one situation where business metadata could be used to enhance the typical access and navigation functions available in a current data warehouse.

IV. Business Process and Roles

Organisations evolve to better achieve their business goal. To achieve these goals, the organisation set up processes and activities. Activities performed in an organizational environment can be divided into two types—the production and the office processes [8]. The production processes are more towards input-process-output activities that are performed, whereas the office processes are more on office workflows and are closer to the management decision-making processes. The management team responsible for a decision-making process are more goals based and will do necessary activities to attain a goal. Such a business activity often involves documents as primary medium of business communication. The information being used in the document should suit the business context.

DOI: 10.7763/IJIMT.2012.V3.297

As almost all kinds of business activities have some associated documents therefore the document workflows is also important to ensure the right person will do the right task at the right time. Essentially, the document workflow will start from the human as the primary performer and the system that coordinate the workflow as the secondary performer [9]. When one of the managers in a specified business process finishes filling in a form in the system, then the document will flow to the appropriate managers associated to the next task until the document is published at the end of the process. To keep the document traceable due to changes made by different managers within the workflow, versioning will be integrated into the systems. The workflow also incorporates storage for document retrieval around the management team. To ensure the right information is incorporated into the document, it is important to be able to access information associated with the manager's role within the workflow. In realising this requirement, business metadata is one technique available to assists discovery of the data required by a manager when acting in a particular role.

V. Managerial Decision-Making Process

Any type of organisation or activity that needs to be managed requires managerial decision-making. Managerial decision-making mainly involves discussion and consideration of alternatives that aim to achieve the objective that has been set. Generally, the decision-making processes involve the preparation of information, particularly the alternatives, prior to the meeting, and choosing courses of action during the meeting. In achieving the objectives, there exist steps or processes to ensure the success of the decision-making process and also the quality of the decision outcome. The decision–making processes comprises of establishing objectives, generating alternatives, explore alternatives and evaluating alternatives [10], [11] as shown in Fig. 1 below.

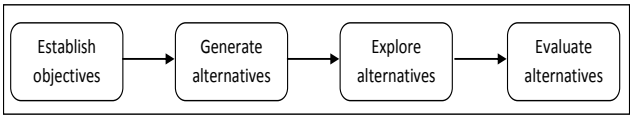

Fig. 1. Flow of the decision-making process (based on: [10, 11])

The objectives normally are set up to ensure those participating in the meeting are aware of the meeting scope. Awareness of the scope will direct the effort for finding the information during the preparation for the meeting. While finding the information, some low-level tasks such as categorise, cluster and compare are performed by the managers as they attempt to understand the information [12]. Through the understanding activity, information, particularly the alternatives that will be considered at the meeting, is developed and will be evaluated for implementation.

For the decision to meet the managerial objectives, the member of the decision-making processes, particularly the managers, must determine what information to use, how and where to find it and what to do with it [13]. Thus, the dependency on information not only exists in the business process but also in the decision-making processes, so the retrieval of the data associated with certain manager's role from the data warehouse is crucial for a good decision.

VI. Discussion

This paper attempts to identify several factors that underpin the formation of a new usage of business metadata, particularly in decision-making processes. DSS intends to integrate and analyse the organisational data to give the big picture view of the systems to support decision-making.

A DSS incorporates a data warehouse to integrate the storage and retrieval of enterprise-wide data. In addition in supplying data within the organisation, data warehouse makes use of metadata to facilitate understanding, use and management of data. Although the requirement to effectively use metadata—both technical and business metadata—is being addressed within data warehouse, nevertheless the use of technical metadata is more pervasive and better understood.

Organisations aim to achieve their business goals, and do this by setting up appropriate processes and activities. Many activities involve a decision by a manager. To obtain a quality decision, the use of information is important and the information is derived from many resources whether internally and externally. The composition of all the internal resources is constructed using data warehouse technology. In certain business processes, including decision-making, information is required by the managers from the data warehouse. The information associated to the manager's role should flow into the processes. The workflow commences when various authors (i.e. managers) incorporating information into a document, viewing and updating by various authorised editors (i.e. managers) and coming into a published document at the end of the process. Within the workflow there are decision points for specific managers to make decision and this requires them to find and explore information that available in the data warehouse. Business metadata that is linked to business processes and roles, formulated in business terms understood by business users, can be used to provide managers with better access to the relevant information for both the workflow and the decision-making processes. The use of metadata can be a promising approach to the provision of relevant data needed in different processes and documents.

VII. Conclusion

This paper provides insight into the establishment of business metadata as one of the techniques that will enhance the finding of relevant data to manager's role in a business processes that require a decision. This concept will be put forward into an empirical study to evaluate the benefits of business metadata in supporting decision-making and to enhance the value of the organisation's data warehouse.

References

[1] D. J. Power, *Decision Support Basics*, US: Business Expert Press, 2009, pp. 103.

[2] D. Arnott and G. "Pervan, Eight key issues for the decision support systems discipline," *Decision Support Systems* vol. 44, no. 3, pp. 657-672, 2008.
[3] S. March and A. Hevner, "Integrated decision support systems: A data warehousing perspective," *Decision Support Systems*, vol. 43, no. 3, pp. 1031-1043, 2008.
[4] W. Inmon, *Building the data warehouse*, 2009, India: Wiley-India.
[5] W. Inmon, B. O'Neil, and L. Fryman, *Business metadata: Capturing enterprise knowledge. Morgan Kaufmann*, 2008.
[6] W. H. Inmon and G. Neushloss, *Dw 2.0: The architecture for the next generation of data warehousing*, Amsterdam: Morgan Kaufmann/Elsevier, 2008.
[7] V. Stefanov and B. List, "Business metadata for the datawarehouse-weaving enterprise goals and multidimensional models," presented at the 10th IEEE International Enterprise Distributed Object Computing Conference Workshops (EDOCW'06), Hong Kong, October 16-20, 2006.
[8] M. Weske, "Business process management: Concepts, languages, architectures," *Springer-Verlag Berlin Heidelberg*, vol. 1, pp. 17-21, 2007.
[9] W. Orlowska, "Applying a generic conceptual workflow modeling technique to document workflows", in *Proc. 2nd Australian Document Computing Symposium, Mebourne*, 1997.
[10] S. Simon, "The new science of management decision," in *Proc. the 33rd Conference of the Operational Research Society of New Zealand*, 1960.
[11] B. Bass, *Organizational decision making*, Homewood, Illinois: RD Irwin, 1983.
[12] S. Wehrend and C. Lewis, "A problem-oriented classification of visualization techniques," in *Proc. the conference on Visualization, California, USA*, 1990.
[13] D. Kaye, "The importance of information," *Management Decision*, vol. 33, no. 5, pp. 5-12, 1995.

Muzaffar Hamzah is currently a Ph.D student at the School of Computer and Information Science, University of South Australia. His research is on Information Visualisation to Support Decision-Making. His study is under the scholarship of Ministry of Higher Education, Malaysia.

Anthony Sobey is an Associate Head of the School of Computer and Information Science, University of South Australia. He received his Ph.D in Mathematics from Imperial College, London. His research interests are on computer graphics, software engineering and information visualisation