Business Terms as a Critical Success Factor for Data Warehousing

Peter Lehmann
Lawson Mardon Singen
Alusingen-Platz 1
D-78221 Singen
peter.lehmann@lawsonmardon.com

Johann Jaszewski
Otto-von-Guericke-Universität Magdeburg
Fakultät für Wirtschaftsinformatik
Universitätsplatz 2
D-39106 Magdeburg
Jaszewsk@prinz-atm.cs.Uni-Magdeburg.DE

Abstract

This paper describes aspects of the data warehouse project at Lawson Mardon Singen, a German supplier of flexible packaging materials. We focus our work on the methodology of re-constructed business terms as our modeling approach. The goal is to provide high quality data based on clear defined business terms for end user's decision support in their business process.

1 Introduction

The Lawson Mardon Packaging Group is one of the leading manufacturer of flexible packaging materials. At the German location in Singen, blank and improved aluminum-foils are produced for the packaging industry in the market segments food, pharma and cosmetics. With almost 1200 employees, a revenue of over 600 million DM was obtained in 1998. Within the company, a large project was initiated to substitute the existing host applications by SAP's standard software package R/3. Subsystems are stock management, purchasing, production planing, company controlling, financial accounting, plant management, quality-management and sales and distribution. Several HP Unix systems are used as database servers based on Oracle DMBS . At the final stage about 600 clients have to be supported.

2 The Data Warehouse Project

In the past, it was a big problem to actually use the hidden information value stored in the operational systems for controlling and decision processes. Accompanying the rollout of the new online transaction systems, a new application-overlapping data-management is implemented. Data management in the sense of seeing data as a resource of the whole company for controlling and decision processes, and not just as the property of certain applications, persons or departments. The data will be submitted to an administrative unit, that has to convert available data into available information, e.g. subject-orientated, high quality information has to be available just in time. While data supports operative purposes very efficiently, it does not automatically lead to information which can change knowledge and increse process efficiency. Futhermore operational data is not presented in a way end user can easily understand and use.

As a conceptual approach towards a modern information processing system a data warehouse was constructed for efficient and effective usage of the existing data required for decision support. The data warehouse implementation based on the new SAP Business Information Warehouse [SAP99].

3 From Data to Information

A data warehouse is no product but a concept to support an integrated and systematic data architecture to deliver high quality, decision relevant (data) structures. End user themselve must be able to satisfy their needs for subject-oriented (effective) and just-in-time (efficient) information in using appropriated (front-end) tools. One critical aspect of our experience is:

> **only if data is linked to clear defined business terms it obtains a meaning (semantic) for the end user – the data turn to information**.

Instead of dealing with databases, tables and columns data is represented as application and subject related information objects in terms of end user's business

Proceedings of the International Workshop on Design and Management of Data Warehouses (DMDW'99)
Heidelberg, Germany, 14. - 15. 6. 1999
(S. Gatziu, M. Jeusfeld, M. Staudt, Y. Vassiliou, eds.)
http://sunsite.informatik.rwth-aachen.de/Publications/CEUR-WS/Vol-19/

language. These objects are elements of the (natural) business language and relate to database tables and columns. Business terms can be clustered subject oriented. If these clusters are named "material management" or "purchasing" end user can easily relate these structures to their daily business process. The complexity of data warehouse data structures are hidden behind a semantic layer of clear defined business term. This approach requires a unique (clear) understanding of an used term such as "order entry".

As an example image the key figure "order entry" as an important key performance indicator of a company. If you ask five persons in different departments for a definition of "order entry" you might get five different answers depending on the departments. A salesman has a different view on "order entries" (customer's view: what has to be shipped) as a person who is involved in production and planing (manufacturing's view: what has to be produced).

Thus, the data warehouse approach at Lawson Mardon Singen is based on a methodology to consolidate business terms to integrate them into the meta data of the warehouse system.

4 Methodology

4.1 Our Approach

While customizing the new ERP-System for the business process "material management" in 1998 we setup a data warehouse as a prototype using the new SAP Business Information Warehouse. The prototype was constructed to gain experiences with methods and tools to obtain a proof of concept in a small, but representative environment ("start small – think big"). The database consists of information object (-types) from the material management process such as MATERIAL, SUPPLIER, STOCK or ORDER. The data was extracted from the SAP operative system and enriched with legacy host data. We spend 6 months on extending the data warehouse stepwise to critically proof the concept.

4.2 Reconstruction Of Business Terms

In using the prototype our end users were conflicted with different business term definitions, such as "order entry" already mentioned above. The key figures were "interpreted" in as many different ways as definitions (interpretations) had been around. Based on the work from E. Ortner [Ort97] we established a methodology to obtain company wide clear defined business terms in using a critical language approach (figure 1).

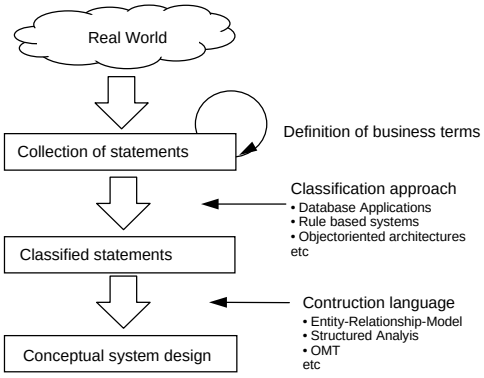


Figure 1: data model construction with business terms

4.2.1 Collection Of Natural Language Statements

The basis is a collection of statements about business information objects stated in natural language. The terms used are critical researched:

- What does the term mean?
- Which objects are included within the term?
- Which characteristics does the term possess?
- Is the term suitable in general?
- Etc.

4.2.2 Finding Defects In Terms

Business term definition contains a lot of lingual defects such as weaknesses or contradictions. To define the meaning (semantics) of a term the two concepts "intention" and "extension" has to be introduced. Intention means the set of objects which are covered by the term while extension denotes the set of characteristics (criteria) which are necessary to identify that an object belongs to a term set or not. The following term defects can be identified:

- Synonyms, e.g. terms which have the same meaning (intention and extension). Example: internal orders or workshop orders. Those terms are not forbidden in general if they are known and controlled.
- Homonyms, e.g. terms which are written equal but have a different meaning (intention and extension). Example: order entry (customer view) and order entry (manufacturing view). Homonyms must be cleared and distinguished, such as customer order entry and production order entry.
- Equipollents: e.g. same objects (extension) are seen under a different view (Intention) and denoted different. Example: stock quantity and stock value. Equipollent has to become uncovered.
- Weakness, e.g. as no clear demarcation (Intention) is obtained the set of objects which are covered by the term (extension) are weak. Example: do orders with

status “not shipped” belong to the key figure “open order quantity” or not? Weak terms must be cleared.
- Wrong terms, e.g. terms those meaning (Intention and extension) has changed over time. Wrong terms must be replaced.

4.2.3 Classification Of Statements

The collection of single statements can be classified for database applications into:

- Statements about information objects and their attributes
- Statements about relationships between information objects
- Statements about events
- Statements about integrity constraints.

The statements can be used for the creation of object types (entities) and its relationships within a conceptual data model. Connection words are used for constructing the data model.

4.2.3 Constructing The Conceptual Data Model

Based on natural language statements the classified statements can be used to construct a (graphical) entity relationship model.

Relationship Type	Natural language statement
Inclusion	**A A is a B or a C.** **Either A or B are C.**
Aggregation	**A A is part of many B.** **A C is part of D.**
Connection	**A A is part of B.** **A B consists of many A.** **The consistency of A in a B is called a C.**

Figure 2: The construction of a data model using natural language classification

The natural language documentation of the relationships between business terms is the basis for verification and discussion between IT and company departments. The (formal) language of a data model is the language of the data engineer but the dialog with the end user is based on natural language.

4.2.5 Further Modeling Steps

We focused on the modeling of data analysis applications as our main interest. In an university research project the modeling approach was adopted to multidimensional analysis purposes. The method was expanded by the concepts “key figures” and “dimension”. Figure 3 shows the conceptual approach schema [Yak98]:

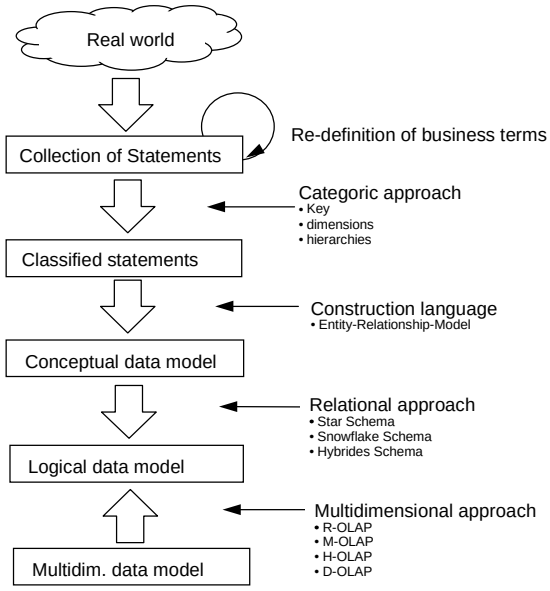


Figure 3: Method for modeling OLAP-Applications using natural language

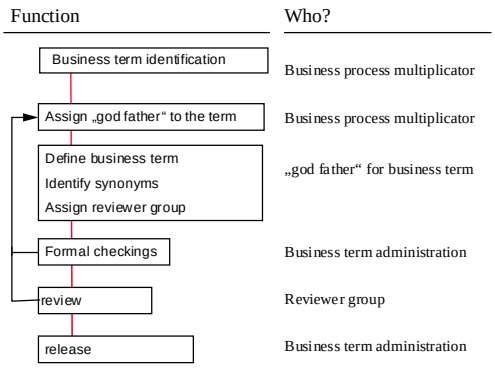
The results of the single modeling steps are documented in the meta data repository of the data warehouse. It is used as the basis for generating the logical structures (multidimensional or relational). The meta data of the repository has been extended with a lexicon component to serve as a dictionary for business term management and documentation of the relationship between them.

4.3 Organisational Aspects Of Term Definition

The process to business term definition is organize as shown in figure 4:

Figure 4: Organization of Business Term Definition

A business process is represented by one or more employees with sophisticated knowledge about the business process. These persons are call “process multiplicators”. Their responsibility is to act as a



communicator between business process requirements and the project team. They organize and pre-filter the information requests and coordinate its realization. They initialize the definition of new business term definitions and they are responsible for the organization of the definition process. A business term is defined by a “god father” who is responsible for the meaning (semantics) of a term which belongs to his/her business process. He also determines the group of persons responsible for reviewing the definition.

The review group is determined for each business term. Its task is to critical review the definition and to release the term to be valid company wide.

The business term administration is responsible for formal reviews to the completeness of cross references. It forwards the business terms to the review group, evaluates methods and procedures and administrates the tools used for business term definition.

5 Implementation

5.1 Business Terms and Meta Data

An appropriated end user access to the data warehouse is a critical success factor for acceptance and for efficient and effective information supply. Without any structuring the end user will not find the information needed – a circumstance which may convert an elegant data warehouse solution into a data cemetery. It was the goal of our system architecture to obtain a complete, consistent and always actual documentation about the objects of the data warehouse. Therefore a web application was designed with Oracle tools. The application serve as an interface between the meta data repository and the front-end tools for SAP Business Information Warehouse. The end user reaches the business term dictionary with an “information navigator”, a kind of help system. The information navigator accesses the business term dictionary and displays the information objects in end users terminology. An example is (figure 5):

- Which information objects are available for my problem?
- How are they defined?
- To who can I talk to?
- How is the access to the information object organized?
- Which reports are using the term?

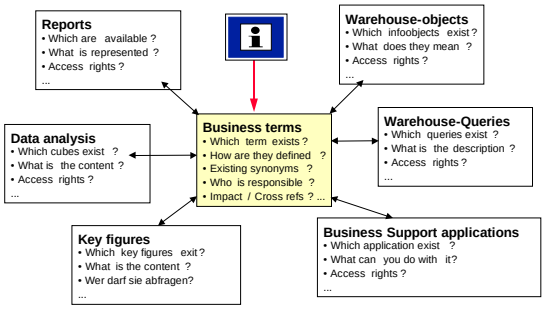


Figure 5: The structure of the information navigator

5.2 System Architecture

As Lawson Mardon Singen is operating on the global market it is necessary to obtain world wide access to the data warehouse. Therefore intranet technology plays an important role for our warehouse project. The tool used for designing an appropriated user interface is Dynasight from Arcplan [ARC99]. Dynasight is certified to access SAP Business Information Warehouse and other common data warehouse platforms.

To access SAP Business Information Warehouse a central Dynasight-Server connects to the system and asks for processing an end user request. The OLAP-Server processes the query in dialog with the data warehouse kernel. The data returned contains a link to the business term dictionary. The Dynasight-Server automatical creates a dynamic document with a hyperlink to the business term dictionary (figure 8). Any browser can present the (Java) documents.

The end user can directly reach the business term dictionary on clicking on the link which is contained in the document title (figure 7).

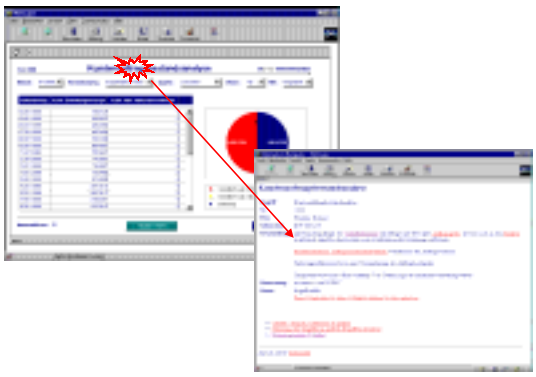


Figure 7: Linking business term dictorary

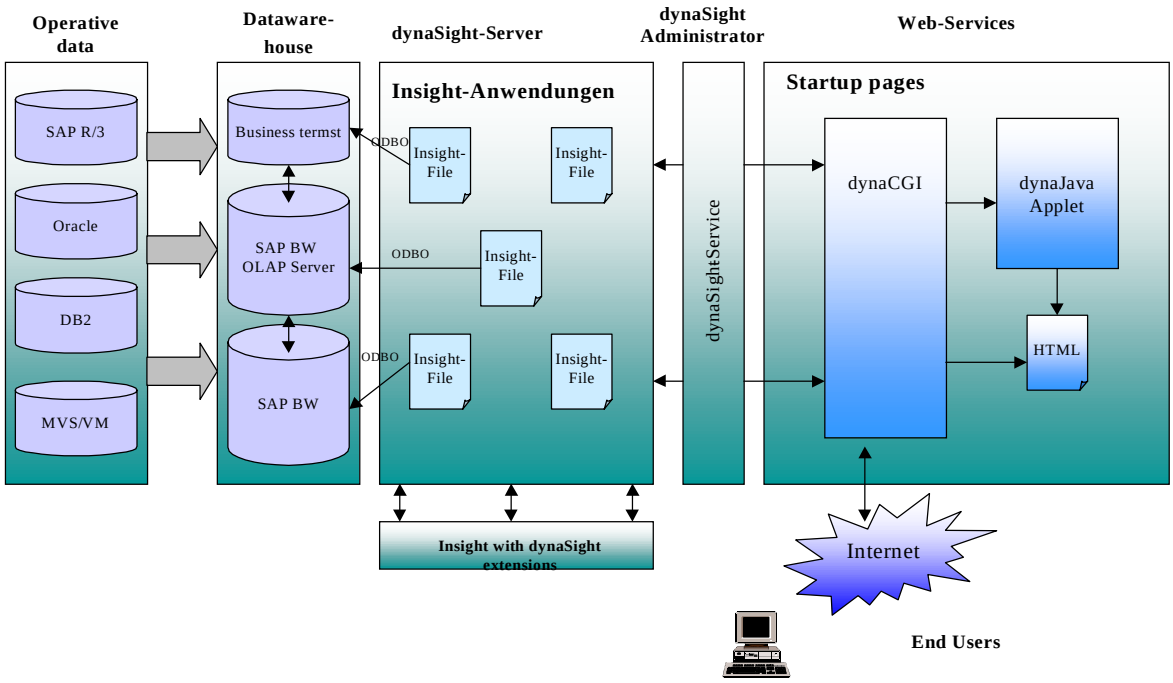


Figure 6: System architecture for meta data access

Experiences

Our main focus was to integrate clear defined business terms into the meta data of the warehouse to obtain a high quality information supply. After 4 months we have defined 500 business terms. We expect 2000 terms until the end of 1999. The main experiences are:

- Time is needed to implement (establish) the method in the organisation.
- The method works in prinziple – some further research work has to be done to support business term life cycle.
- High acceptance and understanding from the end user for the need to critical business term definition
- Start from the beginning of the project. Reverse documentation is very time consuming and difficult to obtain
- A sponor is needed as an advocate for the required time expense
- Tools support ER Modelling with classified business term are available such as Oracle Designer/2000 [ORA99]
- A tool is needed to administrate and integrate the the business term definitions into the meta data repository of the data warehouse.

In the need future we will link SAP's Knowlegde Mangement Modul with SAP Business Information Warehouse. Interface mechanisms are currently under study.

References

[ARC99] Arcplan's DynaSight. http://www.arcplan.de, 13-apr-99

[ORA99] Oracle Corp., http://www.oracle.com, 11-apr-99.

[Ort97] E. Ortner. Methodenneutraler Fachentwurf, Teubner-Reihe Wirtschaftsinformatik, Stuttgart, Leipzig, 1997.

[SAP99] SAP Business Information Warehouse, http://www.sap-ag.de/bw, 11-apr-99.

[Yak98] H. Yakup. Semantische Modellierung komplexer OLAP-Anwendungen mit der Objekttyenmethode (OTM) - Grundlagen und Fallstudie. Diplomarbeit. Universität Konstanz, Fachgruppe Informationswissenschaft, Juni 1998.