Reflecting Reporting Problems and Data Warehousing

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INTRODUCTION

Reporting is one of the basic processes in all organizations. Reports should offer relevant information for guiding the decision-making. Reporting provides information for planning and on the other hand it provides information for analyzing the correctness of the decisions made at the beginning of the processes. Reporting is based on the data the operational information systems contain. Reports can be produced directly from these operational databases, but an operational database is not organized in a way that naturally supports analysis. An alternative way is to organize the data in such a way that supports analysis easily. Typically this leads to the introduction of a data warehouse.

In summer 2002 a multiple case study research was launched in six Finnish organizations. The research studied the databases of these organizations and identified the trends in database exploitation. One of the main ideas was to study the diffusion of database innovations. In practice this meant that the present database architecture was described and the future plans and present problems were identified. The data was mainly collected with semi-structured interviews and altogether 54 interviews were arranged.

The research processed data of 44 different information systems. Most (40 %) of the analyzed information systems were online transaction processing systems like order-entry systems. Second biggest category (30 %) was information systems relating to decision support and reporting. Only one pilot data warehouse was among these, but on the other hand customized reporting systems was used for example in SOK, SSP and OPTI. Reporting was anyway commonly recognized as an area where interviewees were not satisfied and improvements were hoped.

Turku University of Applied Sciences is one of the largest of its kind in Finland with almost 9000 students and 33 Degree Programs. Our University is organized in six units of education that promote multidisciplinary learning. In autumn 2005 an enterprise resource planning system was introduced at Turku University of Applied Sciences. At the heart of this information system is a data warehouse collecting necessary information from the operational databases.

This paper concentrates on briefly describing the identified problems in reporting in the earlier research and how a data warehouse might help overcoming these problems (a more thorough description is provided at (Kontio 2005)). These ideas are benchmarked with usage experiences of the data warehouse based ERP at Turku University of Applied Sciences resulting to some generalizations and confirmation.

BACKGROUND

The term data warehouse was first introduced as a subject-oriented, integrated, non-volatile, and time variant collection of data in support of management's decisions (Inmon 1992). A simpler definition says that a data warehouse is a store of enterprise data that is designed to facilitate management decision-making (Kroenke 2004). A data warehouse differs from traditional databases in many points. The structure of a data warehouse is different than traditional databases and different functionalities are required (Elmasri and Navathe 2000). The aim is to integrate all corporate information into one repository where the information is easily accessed, queried, analyzed and used as basis for the reports (Begg and Connolly 2002). A data warehouse provides decision support to organizations with the help of analytical databases and On Line Analytical Processing (OLAP) tools (Gorla 2003). A data warehouse (see Figure 1.) receives data from the operational databases on regular basis and new data is added to the existing data. This process is called an ETL-process letters standing for extract, transform and load (Simitsis 2005). A data warehouse contains both detailed aggregated data and also summarized data to

Figure 1. Data Warehousing
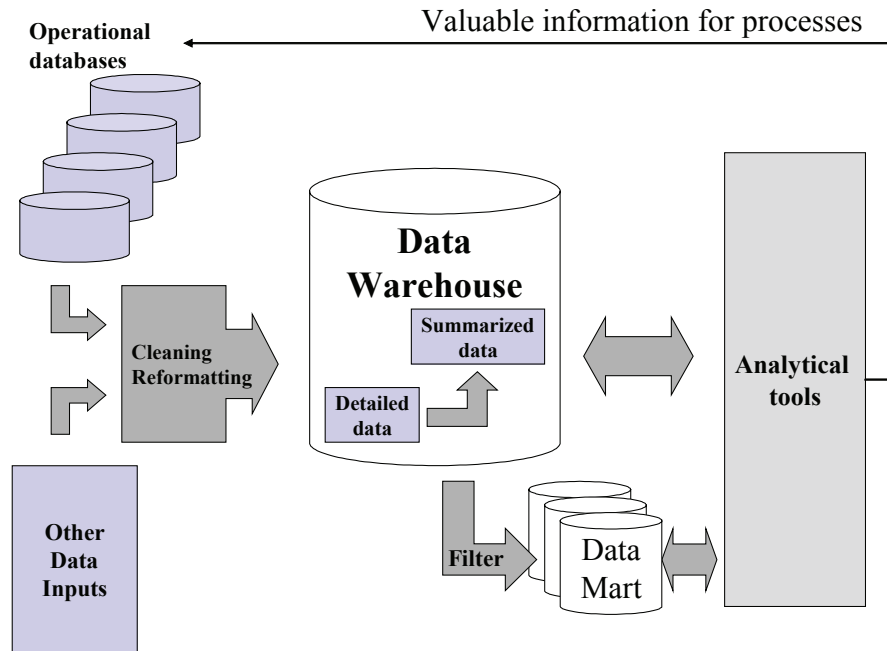
speed up the queries. A data warehouse is typically organized in smaller units called data marts that support the specific analysis needs of a department or a business unit (Bonifati, Cattaneo et al. 2001).

In the case organizations the idea of the data warehouse had been discussed but so far no data warehouses existed although in one case a data warehouse pilot was in use. The main reason for these discussions was that the reporting and the analyzing possibilities are not serving the organizations very well. The research

actually identified many problems in reporting. The reporting and analyzing problems played also a role in starting the ERP design at our University.

The case organizations of the 2002 study introduced several problems in reporting and analyzing (Table 1).

These cases proposed alternative solutions to overcome the presented problems in reporting and analyzing. In case A centralization of the data has been discussed to overcome the challenges. In case B the organization has discussed a data warehouse solution for three

Table 1. Identified problems in reporting and analyzing.

Organization	Problems in reporting and analyzing
A	The data is distributed in numerous information systems and building a comprehensive view of the data is difficult. Financial reporting gives conflicting results, because data is not harmonized and processed similarly.
B	The major information system is somehow used inconsistently leading to data that is not consistent. The reporting system has capacity limitations and users are incapable to define own reports. Analyzing customer data is also difficult, because the collection of relevant data is very hard.
C	The case organization gathers and analyzes a large amount of data, but no special data management tools were not in use. The analysis task is a very burdensome task.
D	Reporting was not identified as a major problem at the moment, but a DW might offer extra value in data analysis.
E	A DW pilot existed, but the distribution and the format of the reports should be solved. Due to some compatibility problems the usage of the system is not widely spread.
F	Reports are generated directly from operational databases that are not designed for reporting purposes.

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