

Process-redesign of information delivery

We needed to reorganize the existing process of information delivery and isolated individual data processing. We had to establish one single, unified and integrated data warehouse.

Improved management decision systems

The host-based application of our contributing accounting system was to be replaced by a modern one fulfilling our new requirements. The sales information system should be released in the next step.

Customer focus

In terms of customer relationship management (CRM), we will establish applications to predict the propensity of customers to buy other Mannheimer products and the probability that they will cancel, enabling the formulation of effective cross-selling and retention strategies. We will also implement applications to identify individuals' revenue potential and lifetime value, enabling us to focus resources on the acquisition of more profitable customers.

In addition to the traditional insurance business, we set up click-stream analysis of web log files to deliver improved service to customers of mamax.com. Mamax is our internet-based life insurance company with main focus on permanent disability insurance, unit-linked policy assurance and pension insurance according to the law drafted by German federal employment minister Riestler.

Underwriting and actuarial controlling

We will define applications to reduce our underwriting expenditures by utilizing statistical predictions for claims and fraud probability.

Rating and Risk Management

We have to be able to identify risks due to the calculation of tariffs and concerning the adequacy of our reserves for outstanding claims. Therefore, we plan to build up applications to review our tariff structure in order to improve it. We also plan solutions like a Balanced Scorecard and an early warning system.

Additionally, we must be able to assess the local and temporal accumulation of our insured risks in order to be conscious of the value concentration in case of loss. September 11, 2001 shows that one loss event can easily lead to an enormous accumulation of claims. None of the insurance companies and not even one of the reinsurance companies ever expected to be faced simultaneously with claims of buildings insurance in New York, business interruption insurance for airports and third party claims of airlines. Further possible combined effects with policies in the health and life insurance have not been examined so far.

MODELLING OF DATA

We used different design methods (see figure 2) according to specific purposes (e.g. extraction, preparation and presentation of data).

We started working conceptually, defining the business contents. In this early stage we did not consider any technical restrictions (e.g. platform). We defined our logical data model for all our heterogeneous systems. To identify the necessary key- and value-fields we examined the existing and required reports and consulted our controllers and specialists as to their information needs.

We structured our complex data in a simple logical data model. To do so we selected and standardized the required fields. Furthermore, we had to examine the relevant objects and the existing relations while not considering the time aspect. These relations were reproduced in the entity-relationship-model (ERM). In figure 3 the entities are pictured as boxes and the relations

with their cardinality (1:1; 1:n; n:m) as arrows.

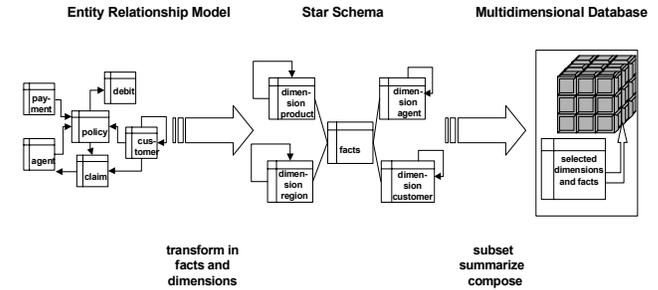


Figure 2: Design methods

The logical data model of figure 3 illustrates the most important entities and types of relations of our insurance business [2]. The main views relate to product, contract, customer and organizational structure.

We evaluated different software solutions and choose the SAS software. Therefore, as our next step we developed a decision-oriented database on the underlying facts of the ERM. We used the star-scheme to structure the decision-oriented data.

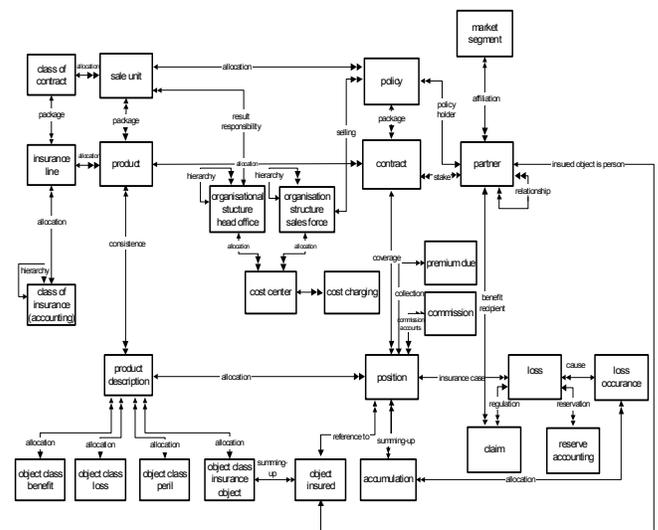


Figure 3: Entity Relationship Model

The Star Schema [3] divides the data items in facts (values) and dimensions (grouping and classification keys with the corresponding hierarchies). The facts and all keys on the lowest level of each dimension are combined in one table. Other tables consist of these keys and the additional data items of each dimension. Based on well-defined keys this kind of data modeling allows to combine facts and dimensions by joining these tables in a convenient and flexible way.

We subdivided the dimension- and fact tables in a multistage model. The technical term is 'snowflake schema' (see figure 4). This was necessary to fully meet our requirements with regard to our huge data volume and our technical performance expectations.

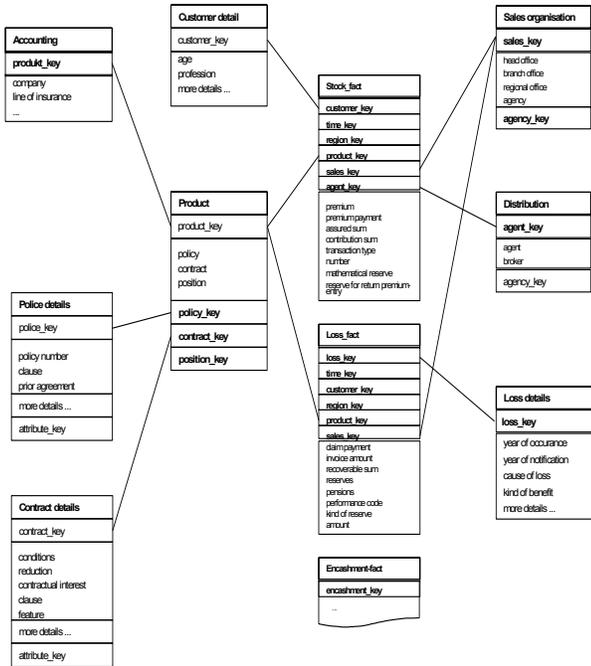


Figure 4: Simplified description of our Snowflake Schema

IMPLEMENTING THE DATA WAREHOUSE

In 1999 we drafted the framework for the *entire* warehouse after 2 years of conceptual work [4]. We regularly explained and discussed the solution with users and management. Since 2000 we have been supported by SAS Professional Services.

STRUCTURING THE DATA WAREHOUSE

Our data warehouse is clearly structured into 3 different levels (see figure 5):

- ◆ Operational Data Definition (ODD)
- ◆ Central Warehouse
- ◆ Data Marts

All data is stored as SAS data sets.

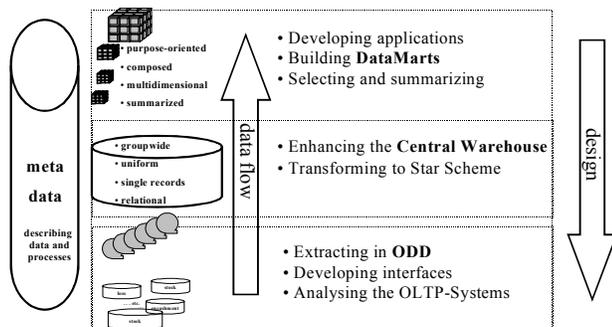


Figure 5: Levels of the Data Warehouse

In general, the files on the ODD-level are structured exactly like the files in the data sources. This was a quick and simple method

of implementation. It also ensures easy maintenance.

In the Central Warehouse, the required fields are adjusted and unified. This concerns formal rules (e.g. nomenclature, formats) as well as contents like unification of different business lines, and the handling of missing values or relations. To make sure that new information needs can be solved, there are still single records in the Central Warehouse, even in the data history from the last 10 years.

At the third level of the warehouse, Data Marts are generated, summarizing and combining the data as well as creating additional key figures. Data Marts are built as multidimensional databases (MDDB) for online analytical processing applications (OLAP) or as summary tables or views for analysis in our departments.

Data Marts represent a partition of the data and simplify the analysis while optimizing the performance. In some cases we used multidimensional databases and relational data-tables in combination to provide a performant reach-through on the single records.

Temporary tables required during the transformation processes are located in a separate transformation level. However, only the level of the Central Warehouse and the Data Marts are accessible for users. All data definitions (views, tables, fields, formats, labels, etc.), mappings and other transformation processes (user-exits) are separately stored as metadata with SAS/Warehouse Administrator (figure 6).

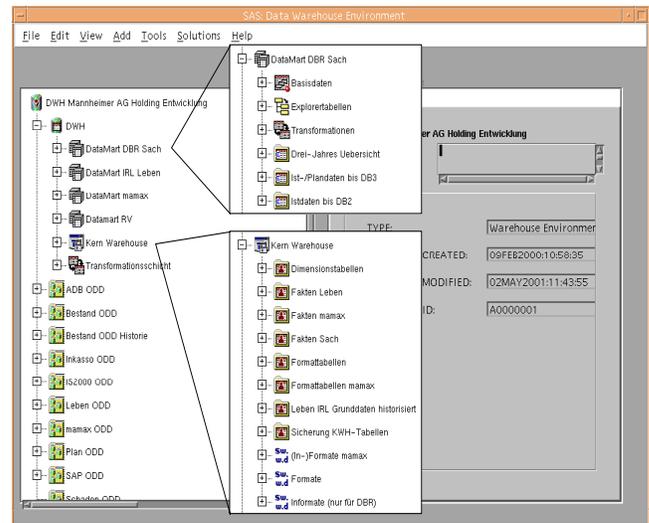


Figure 6: Partition of the data structure built with SAS/Warehouse Administrator

Mannheimer has over one million contracts, most of which undergo several changes during their lifetimes. Obviously, the combination with different dimensions leads to a huge amount of data. Table 1 shows the dimension of the Data Warehouse.

EXTERNAL LOADING PROCESS

The interfaces to the various OLTP-systems had to be programmed and the transformation rules had to be designed. As a first step we had to load the historical data of the last 10 years. Necessary data from the OLTP systems are copied into flat files. To bring our warehouse up-to-date, flat files from each data-source are loaded monthly. Depending on the volume of the data-sources, some flat files contain only the alterations of the last month. For the eCRM-application of mamax.com data is even delivered daily.

The flat files are transformed into SAS files on a UNIX server as

ODDs. Outgoing from the ODDs data is transformed on a single record basis into our Central Data Warehouse store.

Table1: Dimension of the Data Warehouse

ODD

Source	Tables	Columns	Records	GB
Contracts	134	11,949	Replace: 58,168,784 Append: 46,074,795	36.2 1.1
Collections	1	230	Append: 1,496,104	7.5
Claims	27	441	Replace: 11,498,027	3.0
Customers	4	129	Replace: 17,326,581	3.7
Others	12	134	Replace: 189,448 Append: 9,650	0.1
mamax.com	25	249	Append: 181,620	0.1

Central Warehouse

Type	Tables	Columns	Records	GB
Facts	72	2,830	226,600,000	86.1
Dimensions	45	195	13,197,900	1.3

Data Marts

Type	Tables	Columns	Records	GB
p/c	78	4,390	241,872,503	85.9
Life	37	2,096	70,181,656	30.4
mamax.com			mddb: 8; var.: 168	0.1

MANAGING COMPLEXITY WITH THE SAS/WAREHOUSE ADMINISTRATOR

Overall, we have to deal with low data quality in nearly all OLTP systems, i.e. data that is incomplete, inconsistent, and/or difficult to access. The biggest challenge was to consolidate the data. So it was vital to have a powerful data management solution with SAS/Warehouse Administrator.

The SAS/Warehouse Administrator is the control panel for administrating all definitions and processes for extraction, transformation and delivery of data. The SAS/Warehouse Administrator automatically generates the programming code, although individual customizing is also possible. Administration tasks can be dispatched by point-and-click without typing code. Thus, we have achieved great organizational advantages in development and maintenance of the warehouse. Figure 7 shows such an implementation process for our collection data where the data items are mapped and enriched.

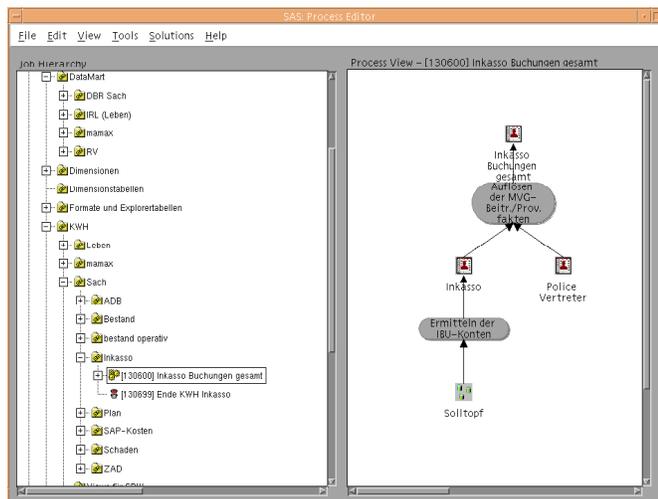


Figure 7: Exemplary process in SAS/Warehouse Administrator

After configuring our UNIX server (AIX 64 bit) and organizing the file system we set up the environment in the SAS/Warehouse Administrator by defining the structure of the different data-elements. The loading-process for nearly all of our data sources were implemented; the rules for the transformation into the central warehouse designed according to our unified data model.

We had to straighten out several inconsistencies with our data. We had to adjust historical contracts and to develop workarounds in case of missing or overlapping time periods.

The accounting information system as our first application started on time; but further on, we have been confronted with many problems with the complexity of the various different contract-administration systems of property and casualty insurance. The fields in the different systems sometimes have the same meaning but different names or have the same names with differing contents or formats. Therefore, we did not transform the contract systems all at once. In order to reduce complexity, we decided to start with a single contract-administration system. In 2002, we will set up a pilot-project for both contract analysis and tariff review by creating a special Data Mart 'rating' for the insurance line private property.

RESULTS SO FAR

We wanted to get the first application working as quickly as possible. We continued to broaden the warehouse-scope according to the defined framework. Thus, in general, we will avoid redesign and we can easily include additional data.

ACCESS TO DATA

Currently, the ODD-level is almost completed. The stock-portfolio data for life and property and casualty insurance, all accounting entries (e.g. premiums, benefits, commissions, expenses) and the data concerning our sales organization and customers are regularly infilled.

The data from life insurance is completely transformed from the ODD-level to the Central Warehouse. As mentioned above, so far there is a lack of the stock-portfolio data for the non-life insurance in the Central Warehouse.

In addition, 3 Data Marts were installed. One of them consists of all information for internal accounting and actuarial controlling for the life insurance. The second contains all data for the contributing accounting system, and the third is for eCRM of mamax.com.

In principle, analysis is possible on all 3 levels of the data warehouse. However, the data in the ODD-level is not adjusted and standardized. Therefore, detailed knowledge of the data-structure is necessary. Access to this level is only possible with SAS base[®] programming language.

Our Data Warehouse is geared to different user groups with varying information needs and levels of technical knowledge. We distinguish between 3 groups:

- ◆ 'Standard-users' use our web-based application
- ◆ 'Specialists' work directly on the Data Mart tables with Enterprise Guide[®] or Enterprise Reporter[®]
- ◆ 'Power-users' apply SAS base[®] (SQL, data steps, SAS procedures etc.) on all warehouse levels.

HISTORY AND UPDATE OF DATA

Single records are available in the Central Warehouse in the data history from the last 10 years. In the Data Mart for our contribution accounting we have a data history from the last 3 years on a single record basis and for all our key figures. In the Data Mart related to eCRM we will hold up a data history of 1 year, in the accounting Data Mart for life insurance of 3 years.

DATAWAREHOUSING AND STRATEGIC MANAGEMENT

Our SAS Data Warehouse also provides us a unique informational basis for Strategic Management.

In general, Strategic Management can be differentiated into 5 main areas [5]:

- ◆ Strategic Enterprise Management
- ◆ Strategic Capability Management
- ◆ Strategic Surprise Management
- ◆ Strategic Issue Management
- ◆ Strategic Evolution Management

with a different focus on

- ◆ the company's level (e.g. entire company vs. elements or functions)
- ◆ the emphasis on fundamental aspects (such as reduction of complexity vs. concentration on potentials)
- ◆ the way to deal with the future (contingency planning vs. creation of the relevant conditions)

At the Strategic Enterprise level the aim is to reduce the complexity of managing the company as a whole, using a Balanced Scorecard for strategy formulation and supporting strategic decision making through a contribution accounting information system and a sales information system. Strategic Capability Management is also applied company-wide, but concentrates on the major business potentials such as CRM, eCRM and internal process redesign.

Strategic Surprise and Issue Management focus on 'managing the future' in specific functional areas. Surprise Management addresses contingencies by providing early warning alerts on impending risks, and enables daily risk management e.g. through the Value at Risk (VaR) model. Issue Management creates the conditions for growth, for example through tariff review, loss prevention, reduction of loss ratio, and claims probability analysis.

Strategic Evolution Management is concerned with creating the conditions for the long-term health and vitality of the entire company through the identification of organizational learning needs.

Strategic Enterprise Management > Entire company > Reduction of complexity	> Strategy Formulation > Balanced Scorecard > Contribution accounting information system > Sales information system	sas®
Strategic Capability Management > Entire company > Concentration on potentials	> Cross selling > Acquisition of new, valuable customers > e-CRM > Customer lifetime value > Actuarial controlling for life insurance > Process redesign of information delivery	sas® sas® sas®
Strategic Surprise Management > Elements/Functions of the company > Contingency	> Early warning system > Value at Risk	
Strategic Issue Management > Elements/Functions of the company > Creating the relevant conditions	> Tariff review > Loss prevention > Reduction of loss ratio > Retention plans > Claims probability	sas®
Strategic Evolution Management > Entire Company > Generating variety > Creating the relevant conditions	> Organizational learning	

sas® : completed in 2001

Figure 10: Data Warehousing and Strategic Management

Our defined business cases match these five areas of Strategic Management (see figure 10). Subsequently our business solutions support our Strategic Management. The business cases we completed in 2001 have been marked. This shows that we have put theory into practice.

CONCLUSION

Although we knew we would not get tangible benefits for some time, we had to start with the 'basics', i.e. data modeling and meta data repository.

Competitive advantage and measurable ROI could only be achieved with our clear strategic management focus. Now we see significant benefits in a variety of business areas; but we still have a long way to go to accomplish our feat.

In today's business environment, strategic management and decision making without a Data Warehouse is like navigating without a compass.

REFERENCES

- [1] Psychodynamics (2001), *Marktstrategien 2005. Befragung von Führungskräften zu Marketing- und Vertriebsstrategien im Versicherungsmarkt*, Köln.
- [2] Hofbauer, Wolfgang (1999), *Integriertes Controlling in Versicherungsunternehmen*, in: Scheer, A.W. (ed.), *Electronic Business and Knowledge Management*, Heidelberg: Physica, pp. 315-333.
- [3] Kimball, Ralph (1996), *The Data Warehouse Toolkit. Practical Techniques for Building Dimensional Data Warehouses*, New York etc.: Wiley&Sons.
- [4] Welbrock, Peter R. (1998), *Strategic Data Warehousing Principles Using SAS® Software*, Cary, NC: SAS Institute Inc.
- [5] Ansoff, Igor H. (1979), *Strategic Management*, London-Basingstoke: MacMillan; Ansoff, Igor H. (1984), *Implanting Strategic Management*, Englewood Cliffs N.J.: Prentice Hall; Hofbauer, Wolfgang (1991), *Organisationskultur und Unternehmensstrategie*, München-Mering: Hampp.

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CONTACT INFORMATION

Dr. Wolfgang Hofbauer
 Head of Finance
 Mannheimer AG Holding
 Augustaanlage 66
 D-68165 Mannheim
 Germany

Work Phone: +49 621 4574223
 Fax: +49 621 4574289
 Email: wolfgang.hofbauer@mannheimer.de

Web: <http://www.mannheimer.de>
 Web: <http://www.mamax.com>

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