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Long-Term Evolution of a Conceptual Schema at a Life Insurance Company

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EXECUTIVE SUMMARY

Enterprises need data resources that are stable and at the same time flexible to support current and new ways of doing business. However, there is a lack of understanding how flexibility of a Conceptual Schema design is demonstrated in its evolution over time. This case study outlines the evolution of a highly integrated Conceptual Schema in its business environment. A gradual decline in schema quality is observed: size and complexity of the schema increase, understandability and consistency decrease. Contrary to popular belief, it is found that changes aren't driven only by 'accepted' causes like new legislation or product innovation. Other change drivers are identified like error correction, changing perceptions of what the information need of the business is and elimination of derived data. The case shows that a real Conceptual Schema is the result of 'objective' design practices as well as the product of negotiation and compromise with the user community.

BACKGROUND

Justification

Many large application systems in government, banking, insurance and other industries are centered around a relational database. A central component is its Conceptual Schema, being the linking pin between information requirements and perceptions of 'reality' as seen by users, and the way how the corresponding data are actually stored in the database. As user requirements can and will evolve over time, it must be expected that changes to the Conceptual Schema (CS) become necessary. Nevertheless, it is often assumed that superior quality of the initial design is sufficient for it to remain stable over the entire information systems lifecycle. Thus, the ability to adapt to later changes in the user requirements is taken for granted, if not blatantly ignored in most design methods.

This case looks at the cumulative effects of a series of changes on the overall quality of a CS, by tracing the actual evolution of one CS in its natural business environment. Although we do describe the separate change step, we don't intend to study or criticize the individual change projects or the realization of strategic targets. Our aim is to develop an overall understanding of successive changes

in the CS, and its change drivers. And by taking the viewpoint of sustained system exploitation, we place the importance of initial design quality into its proper long-term perspective. To our knowledge, these kinds of cases aren't available in contemporary Computer Science literature. Benefits of the case study for teaching purposes are:

- it provides students with an example of a real schema, instead of academic examples which tend to be unrealistic and untried
- showing the evolution of a Conceptual Schema in a real business environment puts the importance of 'high-quality design practices' as taught in the university curriculum in its proper perspective.

The Company

The enterprise where this case study has been conducted is a European life insurance company, or to be more exact a pension fund. Pensions provide financial coverage for old-age, death and early-retirement of an employers workforce. From now on, we will refer to it as the 'Pension' company.

The Pension company manages pension benefits of over a million (former) employees and family members. The net current value of their pension benefits is in excess of US$1 billion, and the monthly paycheck to pensioners is over US$0.5 billion. However interesting these financial aspects, we will concern ourselves with the data management aspect as pensions require meticulous and complicated recordkeeping.

Business Functions

Figure 1 shows the (simplified) chain of primary business functions involved. It shows how employers submit data about their workforce (usually some copy of the payroll) and pay in their financial contributions. These two inflows are carefully checked against each other. The accepted data are then transferred to Benefit Administration for further processing. All claims are processed by the Claims-and-Payments departments. The case study concerns the business function of Benefit Administration only; we will not study the integration of this business function with its neighboring functions.

Figure 1 : Value Chain of Primary Business Functions