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# **The SIZ Banking Data Model**

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## **Abstract**

The German Savings Banks Organization established a large enterprise-wide data model as a standard for heterogeneous IT organizations in the mid-90's and has been using it since. The basic elements, the architecture of the data model and practical experiences are described which show significant benefits for the organization on several levels.

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# 1 Introduction

In order to understand the purpose and objectives of the SIZ Banking Data Model, one must first understand the structure of the German Savings Banks Organization (GSBO) and the role of SIZ within this organization. This will be explained in this chapter before we describe the SIZ Banking Data Model and its development in section 2. Its concepts for use are outlined in section 3. Practical experiences with the data model are detailed in section 4, before we finish with a conclusion.

## 1.1 SIZ and the Savings Banks Organization

The GSBO consists of more than 500 savings banks, 12 state banks and a number of associated partner companies. Each of the savings banks is a legally independent company that is owned by the regional authorities (with a few exceptions). The savings banks have formed associations on a regional level and on the national level. The national association is the DSGV (Deutscher Sparkassen- und Giroverband). The state banks were founded on the regional level, originally with the objective to manage the financial transactions between the savings banks and other banks, but today they operate as wholesale banks. The savings banks are complete retail banks (in contrast to savings banks in the US).

In the world-wide rankings for the finance industry, the GSBO is usually not listed, since it is not one corporation, but an association of banks. However, if the accumulated total balance sheet of all organizations that are part of the GSBO is compared to the industry rankings, the GSBO ranks as one of the biggest banking organizations in the world. In Germany, it has managed to establish a very solid corporate image despite its decentralized structure.

This decentralized structure is reflected on the IT side of the organization. Around 1970, IT centres were formed on the regional level with the objective to provide IT support for the savings banks in their respective regions. The state banks have their own IT departments. Around 1990 in total, there were more than 50 computing centres in the GSBO about half of which developed applications on their own. This situation led to the foundation of SIZ, the computer science centre of the GSBO, in Bonn in 1991. SIZ is an independent company that is owned by the biggest state banks, by regional associations (in some cases their IT centres) and other member companies of GSBO. Its mission was originally to make progress in IT available and usable for the GSBO in order to improve productivity and quality. To this end, it was supposed to work towards more conformity and synergy in the IT area, in particular towards the exchange of applications between the IT centres.

SIZ focused on setting standards for the GSBO in terms of architecture, methodology and products, providing consulting services and co-ordinating joint application development of IT centres (but not developing applications on its own). This was done in close cooperation with the IT centres and the DSGV. According to its mission, SIZ was basically covering all of IT, with special emphasis on new technologies (systems, telecommunication, office), security, application coordination and application provision. Application provision included methodologies and tools for application development, integration and modelling.

The approach of SIZ turned out to be successful. SIZ had initiated an application development project called S-Buchen that was based on the SIZ Banking Data Model. In the course of several years this project led to a merger of the participating IT centres. The resulting IT centre is called Sparkassen Informatik and delivers its services to more than half of the Savings banks. Their application development continues to be based on the SIZ Banking Data Model. Ironically, this merger in combination with other changes in GSBO also resulted in a severe crisis of SIZ as a company around the year 2000, since its original

vocation had meanwhile been put in question by the significantly reduced number of IT-centres. So SIZ had to downsize drastically. Today it operates as an IT consulting company within GSBO. SIZ continues to maintain the SIZ Banking Data Model.

## **2 The SIZ Banking Data Model**

A major cornerstone in the former SIZ strategy for setting standards in the area of application provision was the SIZ Banking Data Model. The ideas behind this model, its architecture and the innovative and unusual story of its development are covered in this chapter.

### **2.1 Purpose**

A major opportunity for SIZ to provide more synergy was identified early on in the exchange of applications between IT centres. However, there were a number of obstacles to this in terms of non-compatible system architectures, application architectures, data base designs and even different terminologies. It quickly became evident that an organic, evolutionary approach to these problems was more realistic than to attempt a radical change. Therefore, SIZ chose to focus on standards for new developments that would make the resulting applications more easily exchangeable, without forcing the IT centres into major investments in adapting their legacy applications. In the area of data, this required a focus on a common terminology and logical data model, but not on a common physical data model since the applications would have to run based on the existing non-compatible data bases. This led to the idea of a reference model that would provide a common terminology plus gains in productivity and quality without enforcing a particular implementation. Acceptance in the IT centres could be achieved by a service-oriented approach that centered on productivity and quality gains for each application development project based on the data model (e.g. [Scheer92]).

The objectives of the project were to create a reference model useful for:

- application development projects with focus on
  - reusability
  - minimization of data redundancy
  - flexible and reliable data structures
- existing database analysis and tracing projects with focus on
  - stable definitions of data from an enterprise perspective
  - understanding existing data bases
  - migration to a maintained and stable model
- quality check of existing data models (e.g. of standard software)

Later on, the data model proved to be very useful in some other constellations, e.g. in the context of object models and when creating a new nomenclature for archive systems.

### **2.2 Development Approach**

The SIZ Banking Data Model in its first version was created and modified over a time of nearly four years. In order to understand the development it is helpful to understand the underlying model architecture which is described later in more detail.

The basic structure of the model is based upon IBM's Financial Services Data Model (FSDM) philosophy and distinguishes three levels called A, B and C (the architectural foundations are described in [Zachman87] and [Sowa92]). The A level introduces the major data concepts, the so called kernel entities, with their definitions. These kernel entities -in total nine - serve as the major sorting and classification categories for all other banking terms or for all other data concepts.

The B-level contains all data concepts sorted in hierarchies with the A-level kernel entities on top level. Every data item may be integrated in as much detail as necessary to hierarchies structured in super-subtype layers.

The C-level contains all data concepts of the B-level in the same fine granularity. But the representation of the C-level is an entity relationship model.

### 2.2.1 Customization of FSDM's B-Level

In 1991 IBM offered a general, internationally valid banking data model, intended as a reference model which was to be customized to the national and company-wide rules and specialities. The IBM-Financial Services Data Model (FSDM) was a preliminary, early engineering version and needed thorough and comprehensive quality improvement. The FSDM proposal was made, however, at a time when the SIZ organization was prepared and willing to build such a model from scratch internally.

Both approaches offered different benefits and risks on the road to success. On initial consideration, the idea of buying a comprehensive banking model from IBM seemed to be very attractive, however, the FSDM-option entailed faith in an, as yet, incomplete system. The alternative of building an enterprise model internally would have had the benefit of a tailor-made model for GSBO, but lacked a unifying, central basic structure reflecting the different (and often conflicting) needs of the GSBO members. The use of a model developed internally by one IT-centre would have put too much emphasis on the implemented systems view of that centre and might have had too little regard for future structures and more open, more flexible requirements. Finally, after much internal discussion and consideration, it was decided to purchase and modify IBM's FSDM.

In the first customization project from 1992 to 1993 a large effort was put into the understanding and enrichment of the IBM-FSDM model. The magnitude and complexity of adapting all information items in such a comprehensive model led to an end result where the B-level could only be described as half customized. The structure for the C-level had not been provided by IBM yet. But creating a new structure on the C-level and filling this structure with elements proved to be such a time-consuming exercise that it could only be done on a sample basis, leaving the C-level practically empty for further projects. The customizing top-down process was correctly organized as a joint effort of all IT-centres, however, the absence of specific project requirements and the sheer magnitude of the task at hand only led to theoretical and generic results. The results of the evaluation of this first customized organization-wide data model were disappointing if not discouraging.

The results were too generic. The model required far more detail and a level on which the projects could find their project view with the semantically connected information also connected in structures and the model presentation. The B-level was set as a normative level for naming and data definition alone including a structure that would support a data management view but not a project view. As there was no clear guideline of how to transform the B-level information via C-level to the needed details of data base design, the members of application development projects could not be expected to see the immediate benefits of the B-level model and the not clearly characterized C-level.

The goal, the usage and description of each level of the IBM model architecture and its C-level was questioned. At this point SIZ was forced to make a decision which would influence the development of GSBO's electronic data systems for decades to come: whether to drop the idea of one common data model across all IT centres or to stick with the further development of the model. While the former option would have meant the abandoning of SIZ's main project and writing off the substantial development costs, the latter option would require a difficult discussion about the architecture of the data model in order to devise an organization-wide data model which would be truly useful.

It was clear that the key success factors for the introduction of an enterprise-wide data model lay in sound decision-making with regard to the architecture and methodological structure combined with a suitable data management organization (e.g. [Durell85], [Gillenson85]). Workshops involving the IT-centres and SIZ were held in order to align both technical and conceptional expectations and possibilities. The creativity, flexibility and vision of the colleagues from different backgrounds with differing practical needs led to a plan which, while ambitious, was felt by all participants to be practical and in the best interests of their individual IT-units.

In this plan, the idea of levels called A, B, C was maintained from the IBM FSDM model. The details, however, had to be fine-tuned and adapted to the requirements of GSBO. It was absolutely necessary that the new plan combined the tools, method, presentation and of course the data items within the data structures itself in a way acceptable for all IT-units. Today, the original IBM-FSDM model and the SIZ data model have grown so far apart that they are - at C-level - hardly comparable any more.

## 2.2.2 Creation of a Savings Banks-specific C-Level

The creation of a stable C-level was accompanied by a long debate regarding the purpose and role of the C-level. Basically, the purpose of a reference model in general was questioned. As the different views developed of how the model ought to be used, the modelling techniques also evolved to suit the objectives. Finally, the major success factor for the improvement of the C-level based on bottom-up projects was to reach an agreement on the use of a reference model.

The C-level is a large entity-relationship model (ER-model; [Chen76]). The creation of the C-level went through three steps. In every step the method, the extension and intention of the ER-model was further developed. As a result the model, called version 1.0, contained 3 organization-wide integrated levels (A, B, C) where every level was regarded as stable enough for being used in projects running in parallel. Since then the model is in use without further methodological or structural changes.

The three development phases of the C-level:

### 1) *A sample from a first customization project (1993)*

In 1993, the first part of the C-level was created in the partition of securities-arrangement. The results seemed to be reasonable, but not yet detailed enough.

### 2) *Pre-release based on securities-arrangement and a loan system (1994)*

Thereafter, the data interface of a standard loan advisory system was mapped against the B-level. The missing data elements were added to the B-level or changed if necessary. The C-level was created very closely along the classification structures of the

B-level following the philosophy of IBM's C-level. As a result, the structures of the loan system had to be split into the dominant classification structures which led to difficulties in locating typical loan information in a particular loan context, especially among the financial (non-IT) staff. Therefore, it was argued that we needed domain views according to major banking concepts such as loan, customer, address etc. A pure reference model seemed to be cryptic for anybody with a practical banking background. The application / banking driven views should be supplementary to the same C-level - not an extra level requiring another encyclopaedia (see fig. 1: the preliminary version from 1994).

### 3) *a representative C-level after the complete integration of two controlling application models (SIZ philosophy)*

The data model required more banking details. Two existing controlling models (large ER models) had major advantages compared to data models of other banking applications: they had been developed and used in a large co-operation between two IT centres and already reflected the required generality and similarity to database design (e.g. [Tsichritzis82], [Date86]).

Once again, the information requirements of the controlling applications were mapped against the B-level and added or modified if necessary. On the C-level the modelling techniques were analyzed in detail in order to achieve the maximum semantic expression without losing the generic character of a global banking model. For this reason, one of the first results in this integration project was a handbook of the SIZ modelling methodology [MHBSIZ97]. This project was the first one in which an extra level was introduced for project models. The existing controlling models were traced against the C-level. And according to the data management requirements, the data administration team built traces from B- to C-level and from model version to model version.

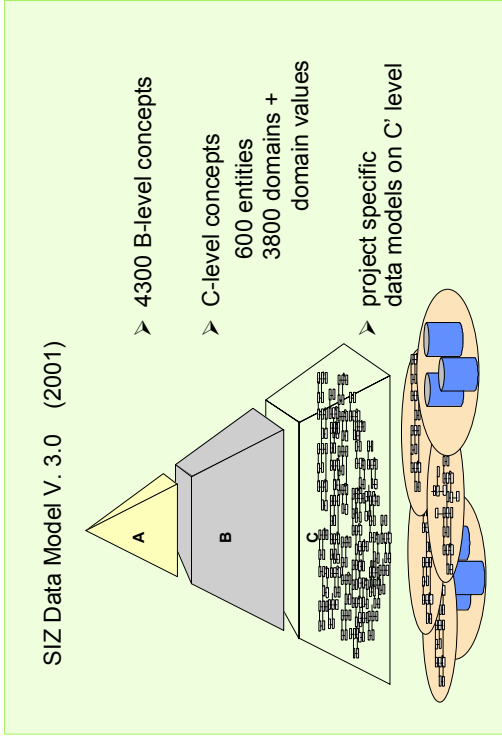
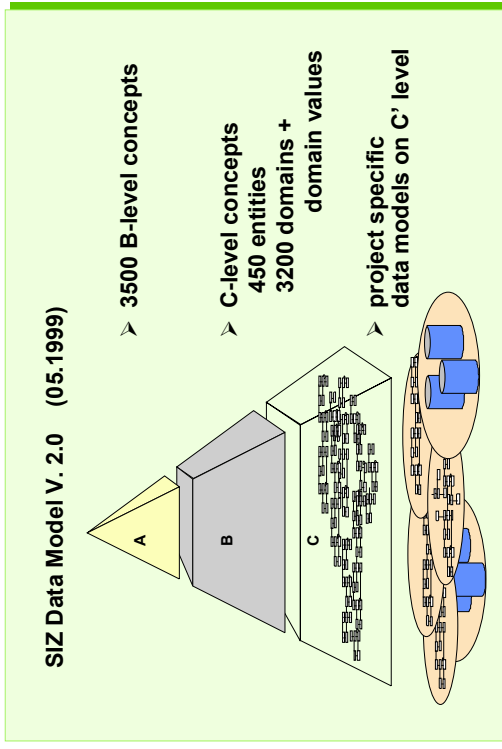
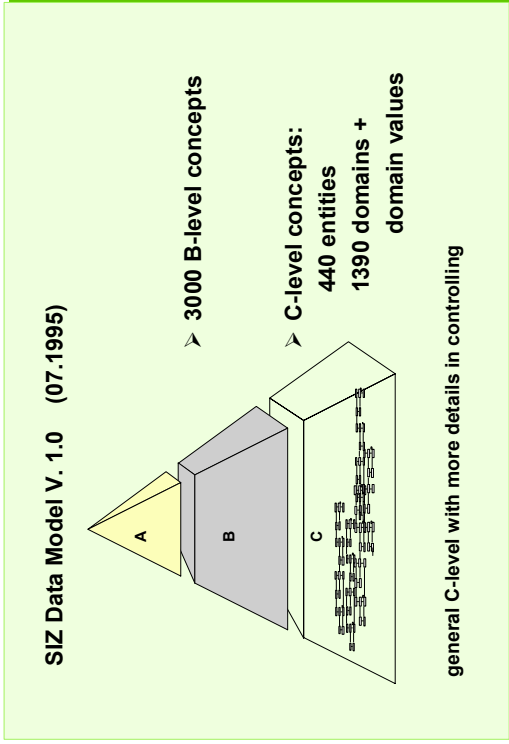
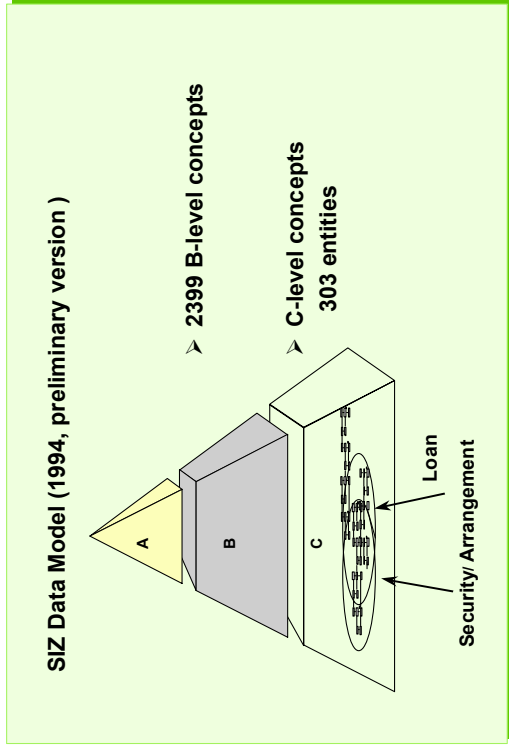
Nevertheless, the C-level was not supposed to be simply a reference model, rather - if required - a base for direct application development. Since then – since model version 1.0 - a busy central data administration was doing a good job in various projects. Starting on a solid base with SIZ data model v.1.0 version 4.0 is expected by the end of 2004. The most important project has been the S-Buchen project.

#### 2.2.3 Project driven enhancements through central administration

Since completion of version 1.0, the banking model has been enriched bottom-up with the benefit feedback of various projects. The idea of defining domain clusters on the C-level along major banking concepts was discarded. It was not possible to maintain and manage consistent banking domain models which would be compatible with the various, heterogeneous, yet subjectively justified projects views.

Rather, most of the recurring discussions in different projects were questions of semantic principles. For example, in controlling projects a decision about how to model management accounting is required. Following V. 1.0 the SIZ data administration team supported two more controlling projects. In order to introduce a unifying view to these overlapping projects they needed a strong argumentation and position to carry through the initial modelling decisions.

So the central data administration team started to define so called „Leitbilder“ on all levels which are broad outlines or semantic principles which allowed them to summarize the main decisions on modelling critical concepts such as account or customer. These broad outlines, however, still allow enough variants for specific database designs.



**Figure 1: Versions of the SIZ Data Model**

“Leitbilder“ continue to be in use, but since version 2.0 no new ideas or principals have been added anymore.

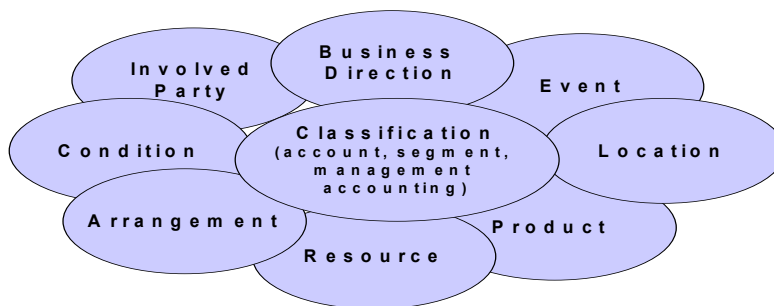
The idea of one “Leitbild”: the general decision about how to model „Customer“, will be explained as an example later on.

## 2.3 Architecture

### 2.3.1 A-level Modelling Concepts, Kernel Entities

On the A-level there are 9 top classification concepts. They serve as a sorting help for all other banking terms or data elements and are equivalent to IBM’s main data concepts [Everden96]. The definitions went through a fine tuning process which occasionally led to re-definition.

The kernel entities are:



**Figure 2: A-level**

Example: Definition of the kernel entity „Involved Party“:

Entity Type: INVOLVED PARTY
:LONG NAME: Involved Party
:DEFINITION: An Involved Party is a natural person, an organization, an organizational unit or a group of people about which a financial institute wants to collect information in order to co-operate in an optimal way. ....
:ALIAS: - Business Partner
:EXAMPLES: - the natural person „Hans-Bernd K.“ - the organization „Daimler Benz AG“ - the organization „Norddeutsche Landesbank“ - the organizational unit „Revision Department Savings“ - the group of people „Mr and Mrs Krahl“
:COUNTER EXAMPLES: - the dog „Hugo zu Wittgenstein“ with the right of inheritance...

**Table 1: Entity Involved Party**

### 2.3.2 Classification Hierarchies: the B-Level

The B-level is used to identify and to select the required scope of information for a special project. The B-level could be compared to a normative language: all banking terms are named, defined and classified by the 9 A-level kernel entities.

The B-level contains a set of concept hierarchies. Every banking business data item may be integrated in as much detail as necessary in the concept hierarchies structured in super-subtype layers. Method and structure of the B-level follow to a large extent the IBM philosophy.

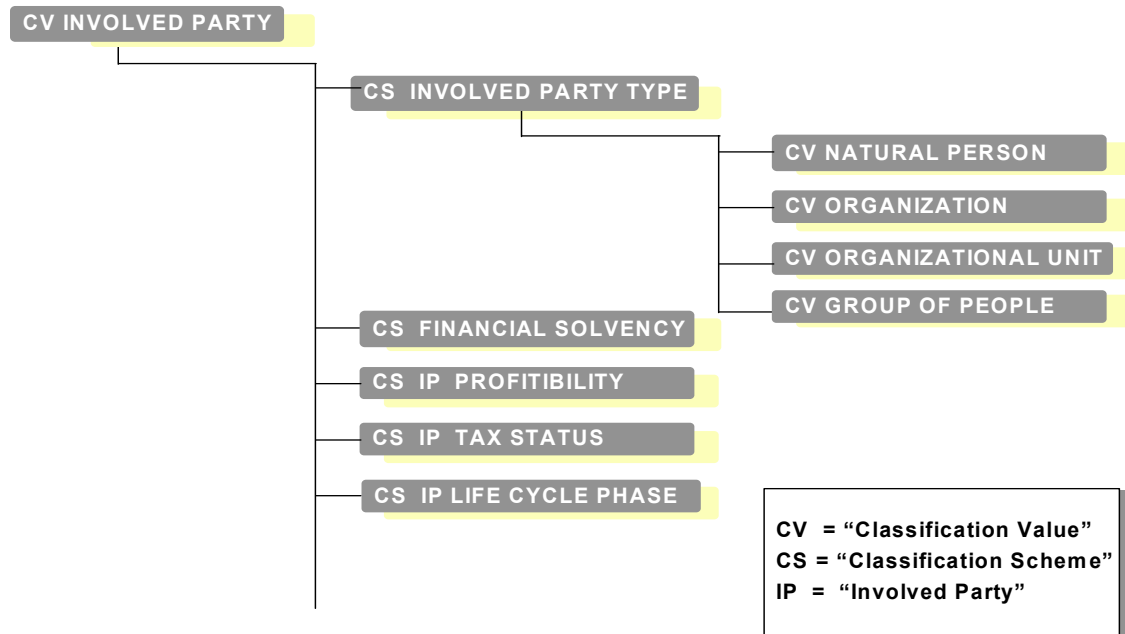
For each kernel entity there are 3 kinds of concept hierarchies: the classification hierarchy, the relationship hierarchy and the description hierarchy. In choosing the most suitable hierarchy for a particular data concept, the following distinctions are helpful:

- A classification hierarchy is the appropriate hierarchy type if the data concept is a subtype of one of the kernel entities. For example the data concept: a bankrupt or solvent company; these are kinds of Involved Party classified by their financial solvency.
- A relationship hierarchy is best suited if a data concept exists only in a relationship between concepts of classification hierarchies. All sorts of roles are concepts that exist when one data concept stands in a certain relationship to another. Cologne is the „home city “ of Daniela Krahl. Here „home city“ is a concept that exists in the relationship between a concept of the Location classification hierarchy and a concept of the Involved Party classification hierarchy.
- A description hierarchy is appropriate if a data concept gives a further detail to the relevant kernel entity. For example the differentiation between legal names and birth names can be found in the description hierarchy of Involved Party.

It is not always obvious which of the 9 kernel entities or which of the hierarchy types are best suited for a special data item. Often, modelling proved to be a constructive task requiring the analysis of almost equivalent modelling alternatives before choosing a suitable solution. Only some of the modelling decisions can be settled by methods or analytical considerations, for example, when deciding upon the hierarchy type.

But how is a concept hierarchy constructed? The top concept is always one of the kernel entities. When building super/subtype-layers it is helpful to use the subtyping criteria; for example `Involved Parties` can be classified by their different financial solvency type, their life cycle phase or by their tax status. By means of these criteria, called „schemes“, the subtypes or „values“ are sorted.

A detail of the classification hierarchy Involved Party is shown in fig. 3:



**Figure 3: Classification hierarchy Involved Party**

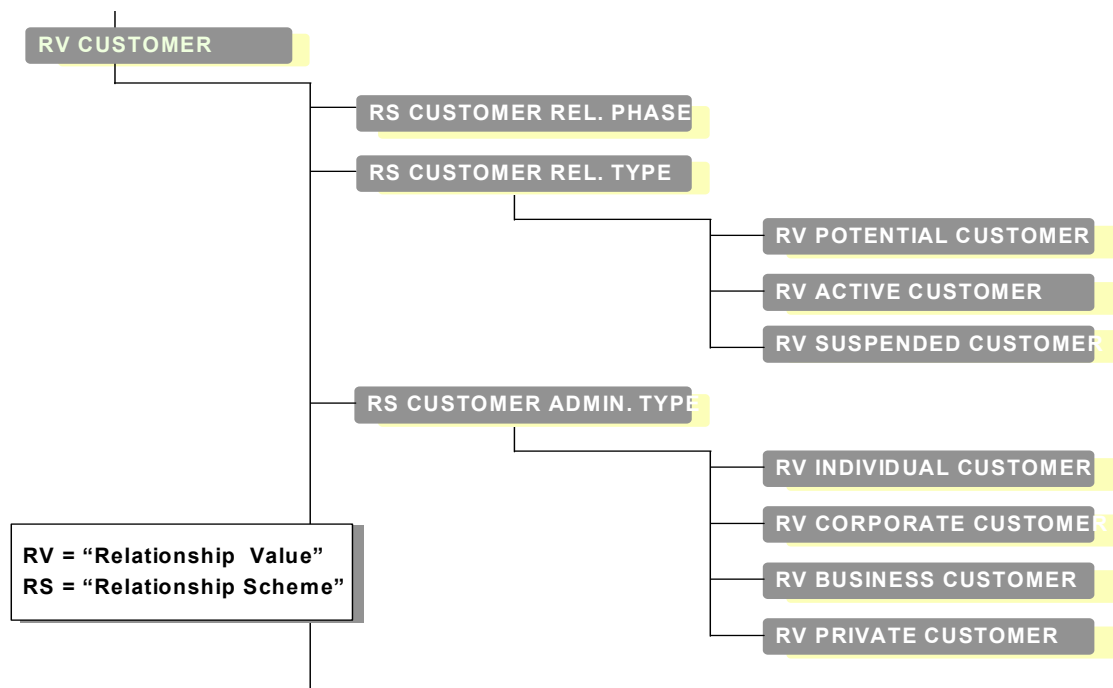
A second example for the B-level in table 2 presents the definition of Customer.

<b>Customer</b>
:LONG NAME: Customer
:DEFINITION: A customer is defined through the relationship between two Involved Parties in which the one Involved Party has an actual or potential business connection with the other Involved Party. ....
:ALIAS: - Partner
:EXAMPLES: - Mr Hintze is private customer of the Savings Bank Bonn - Mr Schmidt from Bakery Schmidt is a business customer of Hessische Landesbank

**Table 2: Definition of Customer**

Please note that in table 2 Customer is defined as a role or as a relationship between two Involved Parties. One of the Involved Parties has an actual or potential business connection to another Involved Party (a bank). This idea forms one „Leitbild“. There are some other ways of modelling Customer. Methods or analytical considerations are not relevant at this stage. This definition of Customer leads to a rather flexible and open model.

The detail showing Customer is taken from the relationship hierarchy of Involved Party.



**Figure 4: 'Customer' as part of the relationship hierarchy Involved Party**

### 2.3.3 Enterprise-/Organizationwide ER Model: the C-Level

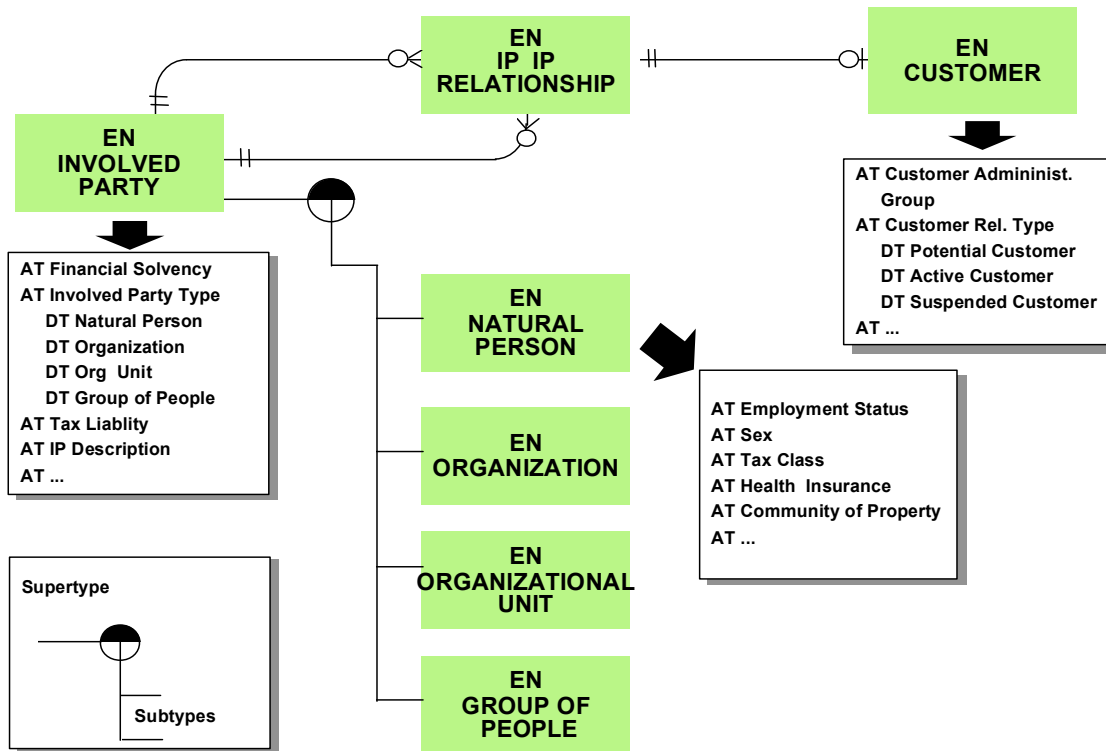
The C-level consists of all business data items that can be found on the B-level and that were necessary in one or more projects. The creation of the C-level is strictly project driven. If no project ever needed to differentiate between a „legal name“ and a „birth name“ than these data concepts would not be transformed from the B-level to the C-level.

The C-level is structured as a large Entity-Relationship model where only business terms are modelled. It is a conceptual layer without any implementation considerations. Especially noteworthy is the fact that the number of entities is not reduced or limited - this may be done in a specific project for a good database design later on.

Because we assume that most readers are familiar with Entity-Relationship Models we do not explain the main principles: entities, attributes, relationships, attribute domains and domain values. However, we would like to point out some important decisions that were established to meet the requirements in the GSBO. Specifically, the question of how to model relationships and attributes can be seen between two extreme positions. The one position has the interest of expressing as much banking specific content as possible on the ER diagrams in order to be easy to use for projects. The other position has the interest of expressing as much generality and as little specific details as possible in order to support the central data model administration requirements.

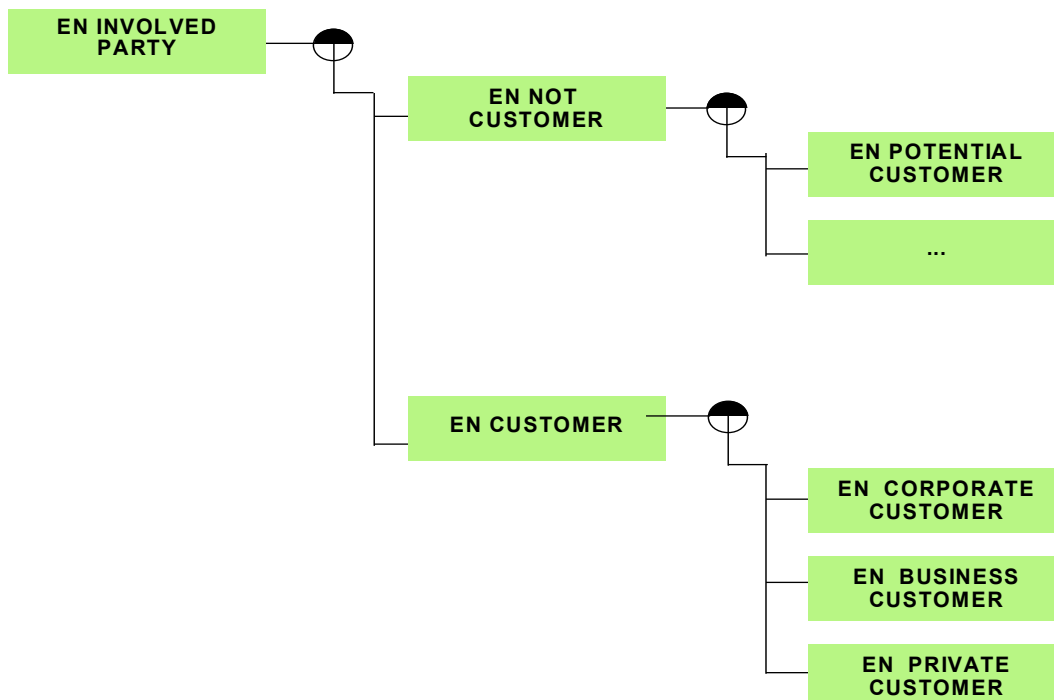
The central data administration team started with the principle: as specific as possible and as generic as necessary. Over time rules were settled for modelling techniques on the C-level.

In fig. 5 the representation of Customer and Involved Party on the C-level is shown:



**Figure 5: Customer and Involved Party on C-level**

Why is the „Leitbild“ Customer an orientation for further projects? With the given definition (Being a customer is a role of an Involved Party having an actual or a potential business connection with a financial institute) the modelling variations are limited. The following example of the C-level in fig. 6 is incompatible with this principle:



### Figure 6: Example for an inadequate modelling decision

Note, that in fig. 6 a lot of redundant information is being modelled due to an inadequate modelling decision. In this counter example you would find almost all attributes redundant between Customer and Non-Customer and consequently between all of their sub-types (e.g. Corporate Customer and Potential-Customer).

## 3 The SIZ Data Model Concepts for Use

### 3.1 SIZ Data Model Conformity

The need to define criteria whether a project model conforms with the SIZ data model or not, has its origins in the old mission of SIZ: setting internal standards and forcing more synergy and conformity. After some noteworthy mergers in the GSBO only a few, but large IT-centres survived. Accordingly, a decisive friction in the organisational structure of the model management occurred after the introduction of model version 2.0. After then, it was no more possible to enforce any central standards from SIZ level. Fortunately, the data model had been so well established that there was also no requirement for any enforcement any more.

The definition of conformity was a sensitive point. If the definition of model conformity had been too restrictive, some IT-centres of the GSBO would not have been able to develop new applications which conformed to the definition without unacceptable overhead for connecting their already existing databases. If the definition of model conformity had been too loose, then there would not have been any benefit from a unified conceptual schema. So it was important to find a balanced way between restrictions and freedom to match the actual needs.

A project data model conforms with the SIZ data model if

- The following basic requirements are met:
  - Use of terms and definitions given by the SIZ data model
  - Use of the defined modelling techniques and co-operation with the organization-wide data management team
  - Conformity with the main principles („Leitbilder“)
  - Project model output is in a special format (export file for Cool: Enterprise<sup>1</sup> or export format of ROCHADE<sup>2</sup>)
- There is a trace or mapping between the project data model and the C-level of the SIZ-data model.

A trace documents the dependencies between different model versions or between layers in the SIZ data model. In the latter case, normally the relationship between two adjoining levels is described. But there are exceptions, where the trace is written between the projects models and the B-level. Objects are identified by their unique identifiers which are artificial keys. A typical trace would be the mapping of a project database schema to the C-level of the SIZ data model.

Tracing is an important but time-consuming activity aimed at maintaining a consistent data model of proven quality. Fortunately, the use of the repository ROCHADE has proved to

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<sup>1</sup> Cool: Enterprise (CA) is a tool suite for model-driven development of host-based and client/server applications. It is a complete client/server development environment, generating source code, map definitions, graphical user interface resources, database definitions and network protocol definitions.

<sup>2</sup> Rochade (Allen Systems Group) is an enterprise-scale repository environment implemented in a client/server architecture. It is available on all popular platforms. The Rochade repository is designed to handle an organization's total information management need. It is easy to use, scaleable flexible, extensible, reliable and promotes reuse of the models and components defined by the meta data.

be a solid decision for the management of the SIZ data model. ROCHADE offers inherent mappings between the levels of the data model and other tracing facilities.

### **3.2 Application Development Projects**

The usefulness of the unified data model and the expected benefits vary depending on the banking context that has to be worked through and the need for freedom to create new structures.

Three project types were identified from this respect: new development projects, reverse engineering projects and referencing projects.

#### **3.2.1 New development projects**

If a project starts from scratch developing a new application, it is most helpful to have an initial, comprehensive data model. In our experience an initial project model can be extracted from B- and C-levels in very short time. The better the specific information requirements are known at the outset, the easier it is to identify the required elements on the B-level. If the scope of the B-level is marked accordingly it is very easy to extract the counterpart on the C-level. Here the tool M1<sup>3</sup> offers excellent tracing functionality.

This initial project model will be enriched during the modelling phase and might be modified again after understanding the full functionality of the supported application and creating the database design.

#### **3.2.2 Reverse Engineering of Databases**

Reverse engineering projects aim to create a logical view of an underlying database of an already existing application. Eventually, the database may be redesigned. As a result, the data requirement of the application is transparent and comparable to other SIZ conforming applications.

In reverse engineering projects the SIZ data model is important to introduce common terms (unified in the GSBO) and to understand the banking context of the existing database. If serious contradictions to one or more „Leitbilder“ are discovered, the drawbacks and benefits of a physical redesign can be considered.

#### **3.2.3 Referencing projects**

When deploying 'off-the-shelf' software products it is important to understand the data interface offered by these. Usually, only a non-modifiable data model or data interface is given, from which one may prove how the given underlying model is covering the reference model (SIZ data model).

This analysis may support the decision to purchase and deploy 'off-the-shelf' products. Also, such analysis helps to connect the new software to the existing databases if the underlying database is documented with traces to the SIZ data model.

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<sup>3</sup> Modelware M1 is a software tool specifically designed by modelWare to support the Information Framework, IFW (IBM). Functions within m1 include: Navigation of all IFW content models, full support for customizing and extending the models, ability to define countless project views that allow users to select model items relevant to a particular project, model management including model comparison, model merge, audit and security functions.

## **4 Feedback from Projects**

The experience of each developing project was documented and collected in the central data model administration group. The main focus was put upon six criteria:

1. Expenditure on data modelling
2. Reuse of data structures
3. Method and project proceedings
4. Use of the „Leitbilder“
5. Tool support
6. Generating database structures

### **4.1 Expenditure on data modelling**

The evaluation showed modelling with the help of the SIZ data model to be more cost-effective than with previous modelling methods. This assessment was especially apparent and positive when compared to estimates made before the SIZ data model was considered. Not only the modelling itself became more efficient, also the planning of time and of manpower resources became more reliable due to the superior overview of the requirements achieved by mapping the first ideas against the B-level.

### **4.2 Reuse of data structures**

But how suitable were the already predefined data structures and the quality of the model description from the projects' view? The feedback from individual projects showed clearly that they were suitable. Only the first two projects had the disadvantage of finding very little business content in the required scope.

Actually, projects with an information requirement comparable to projects already finished, found the reuse of data structures to be very helpful. Even if this assessment does not sound astonishing, it is certainly surprising. Earlier on, the IT centres in the GSBO were convinced that their information requirements and their data structures could not be shared with other IT centres. And since all IT centres are independent and there is no top management giving directions to everybody, only the discernment and insight to the benefits for each of them could convince the whole organization.

### **4.3 Method and project proceedings**

The evaluation of the modelling method and project work led to a positive assessment of the entire model. The adequate support of the central data administration group was a key success factor. The data management concept was improved and today offers a good description of the project proceedings and the co-operation with the central data administration group.

### **4.4 Use of the „Leitbilder“**

The semantic principles, „Leitbilder“, were proved to be necessary as a basis for compatibility. The ease of application of the „Leitbilder“ was dependant on the predominant, already implemented database structures - in some cases the application was uncomplicated where as other projects required longer discussions. However, the overall evaluation was again positive.

#### **4.5 Tool support**

Different modelling tools are used. The central data administration team uses the tool M1 (IBM) in connection with Cool:Enterprise (Sterling Software). These tools can exchange encyclopaedias via a common export file format. M1 is superior for the B-level and the administration of the traces between B- and C-level. Cool:Enterprise is superior for entity relationship modelling and multi user support. In some projects other object oriented modelling tools are in use, but ROCHADE offers an export/import interface for these cases.

#### **4.6 Contribution of the model to achieve the SIZ goals**

As outlined above, the SIZ Banking Data Model played an important role for SIZ in achieving its original mission. It continues to be used and maintained under SIZ's new mission as a consulting company within GSBO which proves its value.

### **5 Achievements and Conclusions**

The significant investment that went into the SIZ data model has resulted in significant benefits:

#### **5.1 Creation of a common nomenclature**

All financial institutes in the GSBO use nomenclatures for organizing filing cabinets, archives or record offices. Some of them have introduced electronic archive systems. But everywhere, the manual processes for organizing repositories are still regarded as necessary. For all of these processes -manual or electronic- a structure of the records and a list of keywords is necessary. These lists of keywords form a nomenclature which must be used when an information item is classified in order to archive, and later when the archived information item is being searched for. Unfortunately, there was no such single common nomenclature in the GSBO, but several existing, quite redundant and large nomenclatures. Moreover, none of them included definitions of the keywords. In that situation, the data model's B-level turned out as an ideal basis for mapping the existing nomenclatures. Today GSBO has a common nomenclature that is maintained by SIZ.

#### **5.2 Application Development Project S-Buchen**

When SIZ initiated a huge application development project called S-Buchen in 1996, it was clear from the very beginning that it would be based on the SIZ Banking Data Model. The participating IT centres did not need to fight about who would dominate the data side, since the SIZ data model was already established as an agreed-upon standard. In the course of the project the data model continued to play an important role. The view of the participating IT centres changed significantly over time. The data model was no longer the unloved standard that had been forced upon them, but an important factor contributing to the success of the project. The cooperation in the development project created an atmosphere of political and human trust between the executives of four IT centres that later on merged into one. Today that IT centre continues to use the SIZ data model because it values its benefits highly.

#### **5.3 Other Users**

SIZ initiated a second huge application development project called S-Clearing. Again the SIZ Banking Data Model was set as a starting point for that project. In S-Clearing even more IT organizations of GSBO tried to cooperate. Unfortunately, after three years the project

was cancelled because of management and political problems. Nevertheless the SIZ Banking Data Model gained valuable input from that project.

Several other IT organizations within GSBO have made use of the SIZ Banking Data Model for their individual development efforts, because by now there is so much banking knowledge formalized in the data model that a development project gets a head start by using it. Due to the change of mission of SIZ, there is no obligation for the IT organizations anymore to use it. So the fact that it is used proves that there is considerable value in the approach not only in terms of standardization, but also in terms of improved quality and reduced effort for individual development projects. The role of the data model in Database Marketing projects was described in [Kittlaus01]. Within SIZ there were wide-ranging plans outlined in [Schien00] that dealt with the combination and integration of the Data Model with other models like the SIZ Banking Process Model. Due to the new mission of SIZ, these plans could not be turned into reality.

Consequentially, when the opportunity came up to license the SIZ Banking Data Model to a bank outside of GSBO for a significant amount of money, the executives of the IT organizations of GSBO decided not to do that. They recognized the competitive advantage that the SIZ Banking Data Model gives to GSBO.

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