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Dealing with Complexity: A Method to Adapt and Implement a Maturity Model for Corporate Data Quality Management

Martin H. Ofner
University of St. Gallen, martin.ofner@unisg.ch

Kai M. Huener
University of St. Gallen, kai.huener@unisg.ch

Boris Otto
University of St. Gallen, boris.otto@tu-dortmund.de

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Martin H. Ofner
University of St. Gallen
Institute of Information Management
martin.ofner@unisg.ch

Kai M. Hüner
University of St. Gallen
Institute of Information Management
kai.huener@unisg.ch

Boris Otto
University of St. Gallen
Institute of Information Management
boris.otto@unisg.ch

ABSTRACT

Reference models usually serve as starting points for developing company specific models. Unfortunately, successful usage of reference models is often impeded by various aspects, such as a lack of acceptance among employees, incorrect model implementation, or high project costs - all of which more often than not are resulting from an imbalance between the model's complexity and the complexity of a company's specific structures. The paper at hand develops a methodical approach for taking a given reference model (the Maturity Model for Corporate Data Quality Management) and transforming it into a company specific model, with a particular focus on the specific complexity of a company's structures. Corporate Data Quality Management describes the quality oriented organization and control of a company's key data assets such as material, customer, and vendor data. Two case studies show how the method has been successfully implemented in real-world scenarios.

Keywords

Corporate Data Quality, Data Quality Management, Maturity Models, Method Engineering, Design Science Research, Action Research, Complexity Management

INTRODUCTION

Since the last decade, market and regulatory driven challenges regarding management of corporate data have been eminently arising (Lee, Pipino, Funk and Wang, 2006; Newman and Logan, 2006). Especially in large companies, high-quality corporate data is a key prerequisite for a number of strategic business objectives, like global supply chain management (Kagermann and Österle, 2006, p. 111; Tellkamp, Angerer, Fleisch and Corsten, 2004; Vermeer, 2000), customer relationship management (Reid and Catterall, 2005; Zahay and Griffin, 2003), decision-making and business intelligence (Price and Shanks, 2005; Shankaranarayan, Ziad and Wang, 2003), or compliance with regulatory and legal requirements (Friedman, 2006). Despite the great importance of corporate data, many companies do reactive data quality management only, or they do no such management at all. The authors already developed a maturity model for corporate data quality management (CDQ MM, Hüner, Ofner and Otto, 2009) to help companies establish and continuously improve preventive Corporate Data Quality Management (CDQM).

When applied in two companies for ascertaining their CDQM status quos, however, it turned out that the model proved to be too rigid and generic to allow for sound results. Due to different organizational structures and also different expectations on the part of employees, it became apparent that an interview guideline used to specify the criteria of the maturity model needs to be adapted to company specific requirements – and so does the model, which either simplifies too much in a company specific context and fails to represent individual company structures, or which is too complex and fails to achieve sufficient user acceptance. The main difficulty for the assessors was to find an appropriate balance between model complexity and desired granularity.

Therefore, the research question to be answered is: What methodical approach can be applied by any company to configure the CDQ MM for its specific requirements in order to be able to work with a model that offers an appropriate degree of complexity?

The paper at hand proposes a method for configuring a given maturity model for corporate data quality management (Hüner et al., 2009) under consideration of company specific requirements that determine the model's complexity. This method is built as a Design Science Research (DSR) artifact considering a Method Engineering (ME) approach. We will not present an all-out method (cf. Figure 4 for a definition) but focus on discussing two central components of the method suggested, namely the procedure model and the model of roles. The main part of the paper starts with providing some information on the background of data quality management and outlining DSR and ME as the fundamental concepts our work is based on. Concerning these approaches, the subsequent sections describe the process of designing the method and its components. The paper concludes with a summary and outlook on further research.

BACKGROUND

Maturity model development

The principle idea of a maturity model is to briefly describe the typical behavior (activities) exhibited by an organization at a number of levels of maturity (Fraser, Moultrie and Gregory, 2002, p. 244). For each activity, it provides a description as to how it might be performed at each defined maturity level (Fraser et al., 2002, p. 246). In general, maturity models are designed to assess the maturity of a selected domain (de Bruin, Freeze, Kulkarni and Rosemann, 2005). Besides assessment criteria, a maturity model provides guidelines how to reach the next, higher maturity level, as the descriptions of higher maturity levels can be seen as best-practice guidance (Fraser et al., 2002, p. 244). For a better understanding, we subdivide the concept of a maturity model into two generic sub-concepts (cf. Figure 1): A domain reference model (i.e. the domain or scope that is assessed) and an assessment model (i.e. how maturity levels are assigned to particular elements of the domain reference model).

Variables	Values		
Scope	**Enterprise**	Business Unit	Process
Maturity levels	One	Many (parallel)	**Many (hierarchical)**
Focus	**Specific**		General
Aim	Maximization		**Optimization**
Orientation	Process	**Outcome**	**Implementation**
Comprehensiveness	**Measure maturity**	**Determine appropriate maturity**	**Improve maturity**
Adaptability	Low	Medium	**High**
Reliability	Low	Medium	**High**
Benchmarking	Not possible	Not suitable	**Possible**
Complexity	Low	**Medium**	High
Recognition/Acceptance	Low	Medium	**High**

Table 1. Morphological field of maturity model characteristics based on (Hueffner, 2004, p. 49)

De Bruin describes a maturity model's development process by means of six phases (de Bruin et al., 2005, pp. 3-9). During the *Design* phase and the *Scope* phase, general characteristics of the maturity model are determined. Table 1 describes the configurations space for these characteristics in the form of a morphological field. A particular constructed configuration (cf. Ritchey (2006, p. 794) for details regarding morphological fields and their configuration) is determined by selecting a single value from each of the variables. These values determine the basic characteristics of the maturity model, and they have a direct impact on the model's applicability at a later stage. Selected values in Table 1 state the "to-be" configuration (black) for the CDQ MM. The variables *Maturity Levels*, *Focus* and *Complexity* are discussed in detail in the following subsections.

Corporate data quality management

Regardless of a clear theoretical differentiation between data and information (Boissot and Canals, 2004), practitioners use the term 'data' in a broader sense. Master data (e.g. customer or materials master data) are not just values (e.g. 0721) but comprise also the act of interpreting by means of certain schemas (e.g. a telephone area code) or in a certain context (e.g. area code plus a customer's phone number). As the method to be presented in this paper does not so much aim at a theoretical differentiation of certain terms but rather focuses on the practical use of data in business processes, we favor a broader semantic meaning of the term ‚data': We see data as being consumed in and generated by business processes.

Data quality is defined by the degree of benefit (or value) perceived by a user using certain data in a certain context ('fitness for use') (Redman, 1996, p. 19; Wang and Strong, 1996, p. 6). We are emphasizing the corporate scope of data quality (Corporate Data Quality, CDQ). The challenge of being able to ensure good data quality is particularly salient in decentralized organizations acting on a global level. Such companies possess a diversified portfolio of data storing and processing systems due to a history of mergers and acquisitions, deviant requirements of business units, and different regulations among countries. Data quality problems often occur when it comes to gathering information across business functions or organizational boundaries from several distributed systems (Batini and Scannapieco, 2006, p. 69). Therefore, our focus is on multi-business and multi-national organizations looking for a corporate approach to manage data quality. We refer to the whole set of activities intended to improve data quality (both reactive and preventive) as Corporate Data Quality Management (CDQM).

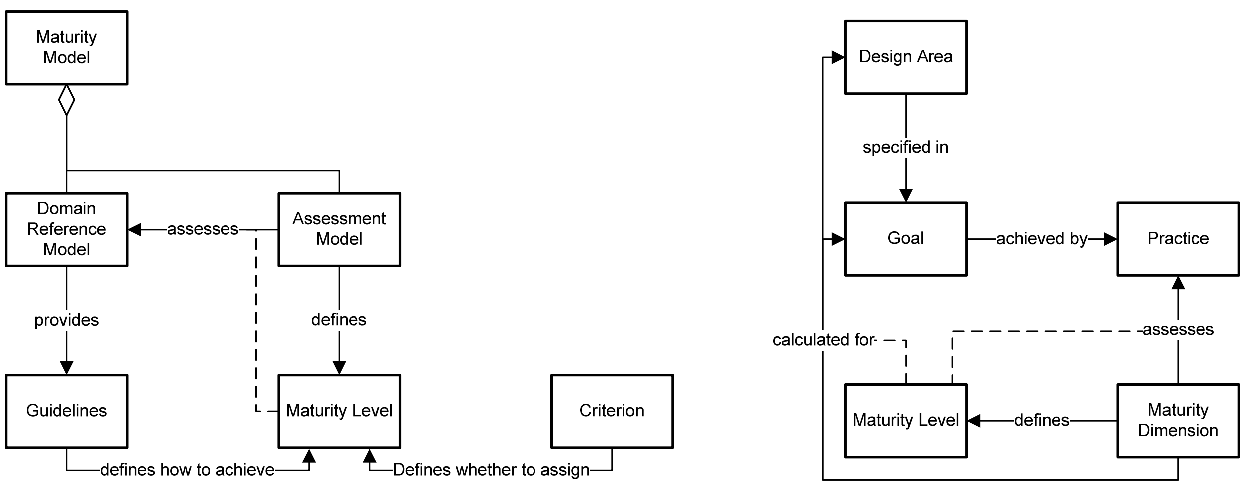

Figure 1. Meta models of the CDQ MM (left) and the assessment model (right)

The revised CDQ Framework presented in (Hüner et al., 2009) structures the domain of CDQM in three tiers: Design Areas, Goals, and Practices. A Design Area (e.g. *CDQ Strategy, CDQ Organization*) is a cluster of related best-practices in a certain area, which when implemented collectively meet a set of Goals (i.e. *Accountabilities for Data Quality defined*) considered important for achieving significant improvement in that area. A Practice (i.e. *Build a data governance model*) is the description of an activity that is considered important in achieving the associated Goal. This structure is also used in the CDQ MM as a domain reference model (Hüner et al., 2009). Figure 2 illustrates the Design Areas and Goals of the CDQ MM.

Complexity of maturity models

The complexity of a maturity model is reflected in the model's framework (including domain reference model and assessment model), its documentation, and in the related assessment procedure (Hueffner, 2004, p. 48). Both models have to find an appropriate trade-off between complexity and simplification (Rosemann and de Bruin, 2005, p. 4). A simpler model typically is easier to understand and to apply, and it leads to higher user acceptance. However, with low complexity usually not all aspects of a domain can be covered, and applying a model may not provide sufficient relevant information for the stakeholders. On the other hand, a complex model tends to depict reality more appropriately, although a model which is too complicated may limit interest or create confusion (de Bruin et al., 2005, p. 4). Furthermore, a complex and complicated model bears the risk of being incorrectly applied which might result in misleading outcomes (de Bruin et al., 2005, p. 5).

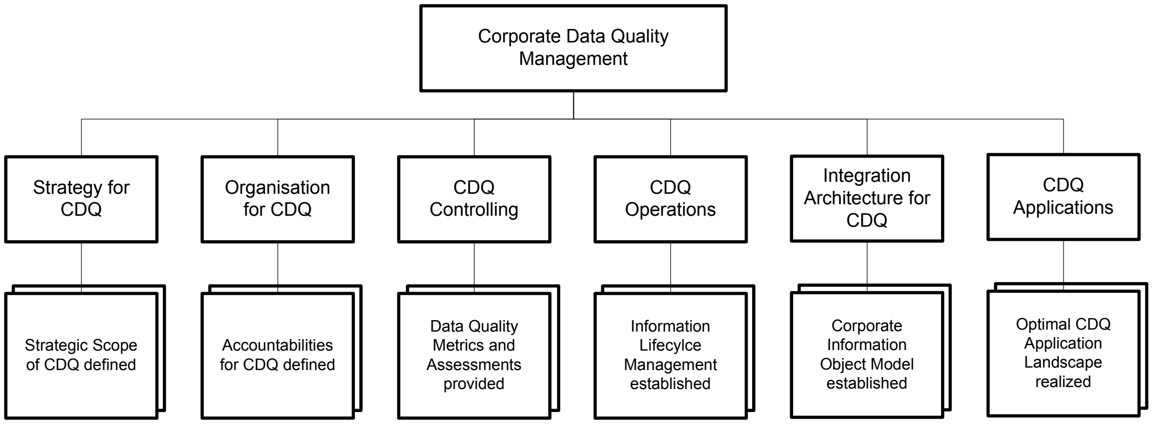

Figure 2. CDQ Framework: domain reference model of the CDQ MM

In the context of maturity models, simple assessment models provide only one maturity level while more complex models provide differentiated insights into various maturity levels and scales (Rosemann and de Bruin, 2005, p. 4). There are three different model structures that can be used to assess the maturity of a domain: one single maturity level, many parallel maturity levels, or hierarchical maturity levels. The third approach combines the first two. Hierarchical maturity levels are assigned independently, but then a metric is defined to consolidate these maturities to a lower level of detail or to one company wide maturity level (Hueffner, 2004, p.43).

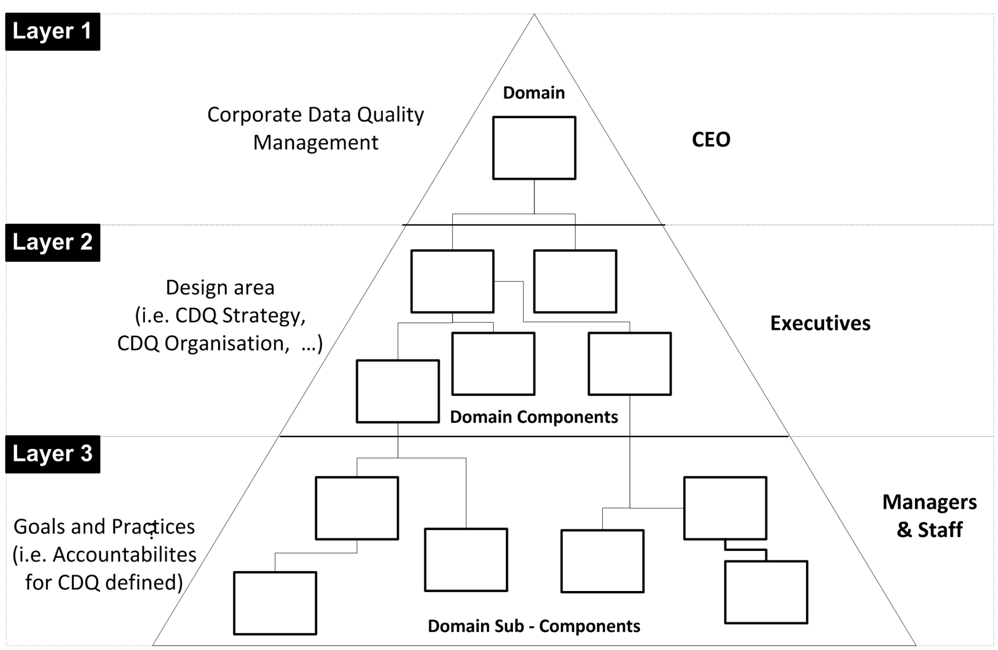

Figure 3. Domain reference model layers and CDQ MM examples based on de Bruin et al. (2005, p. 5)

According to de Bruin (de Bruin et al., 2005, p. 4), different layers can be identified for a domain reference model in a hierarchical approach, with the assessment model being applied on each layer. First, these assessment results enable an organization to gain deeper understanding of its strengths and weaknesses, and second, they address the needs of varying stakeholders within an organization. Figure 3 shows the layer concept with examples of the domain reference model of the CDQ MM for each layer (compare with previous subsection).

A domain component is a major, independent aspect of a given domain that is important for domain maturity, while domain sub-components (layer 3) are specific capability areas within the domain components that provide further detail and allow for targeted maturity level improvements.

The method focuses on company specific adaptation of both the domain reference model and the assessment model. Following typical questions need to be addressed by the method. Which Design Areas of the domain reference model should be selected for first, prototypical implementations of the maturity model? Or, what is an appropriate approach (in terms of suiting a specific company's needs) to measure the Goal *Accountabilities for CDQ defined*? Which maturity stages can be used? One approach could be to measure the percentage of corporate data classes already covered. The difficulty and challenge is to keep the appropriate balance of model complexity and granularity in order to avoid the aforementioned disadvantages.

Research Methodology

The paper at hand offers a description of the process of implementing the CDQ MM in a company specific context. Thus, the main topic is a method as a Design Science Research (DSR) artifact. We use DSR as a methodological framework for the general design process, and Method Engineering (ME) as a concrete guideline for designing the method. Our scientific context is constituted by a consortial research project, in the course of which we have been developing, evaluating, and adapting scientific findings together with various companies. In accordance with DSR principles, multiple iterations have been performed. The development process was conducted in bilateral projects with a subset of the partner consortium, and the preliminary results of the method's application have been validated in plenary workshops and one-on-one interviews with subject matter experts.

DSR is a framework for design oriented research, aiming at the design of solutions to practical problems (Hevner, March, Park and Ram, 2004, p. 76; March and Smith, 1995, pp. 256 ff.). Outcomes of DSR are artifacts, i.e. constructs, models, methods, or instantiations. In this context, a method is defined as a procedure applied to solve a problem (e.g. an algorithm or best Practices) (Hevner et al., 2004, p. 79; March and Smith, 1995p. 257). Regarding several requirements (Hevner et al., 2004, pp. 82-90), the design process of a DSR artifact comprises phases of constructing, evaluating, and adapting the artifact (Gregor, 2006, p.62; March and Smith, 1995, pp. 254).

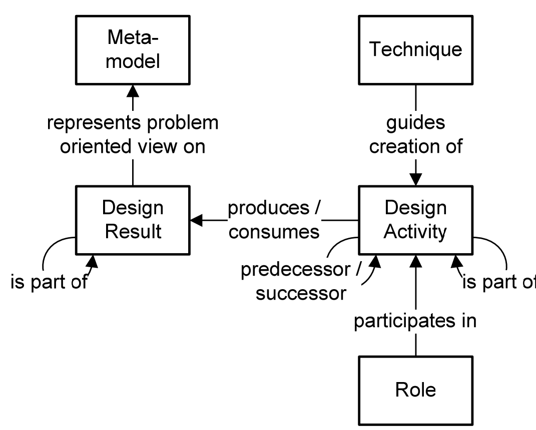

Figure 4. Method components in terms of Method Engineering

A method in the context of ME represents a form of integrated, systematic procedure for developing information systems (Heym and Österle, 1993, p. 345; Nuseibeh, Finkelstein, Anthony and Kramer, 1996, p. 267). ME deals with the design of methods (Brinkkemper, 1996, p. 267), and applies method principles (i.e. an engineering design approach of IS) to the design of methods (Gutzwiller, 1994, p. 11). Figure 4 shows the components of a method, according to Gutzwiller (Gutzwiller, 1994, pp. 11-14). A translation has been adopted by Bucher et al. (Bucher and Winter, 2008, p. 48). The method presented in this paper instantiates these concepts while taking into account the semantics stated in the list below. Other authors too describe these components of methods (Braun, Wortmann, Hafner and Winter, 2005, p. 1297).

- *Design activities*. Activities are method fragments aiming at producing one or more defined results. Activities can be structured hierarchically and can be part of a process sequence. The total of process sequences constitutes the procedure model as one central component of a method.
- *Roles*. Roles aggregate several activities, which are executed by individuals or boards assigned to a certain role. Roles are always involved in activities in one way or another (e.g. 'responsible' or 'consulted').
- *Design results*. Results are used, produced, or modified by activities. Like activities, results can be structured hierarchically. The total of results constitutes the documentation model.
- *Meta model*. The meta model describes entities (i.e. results) and their relations. In terms of a formal language, the meta model defines the syntax and the semantics of the results.
- *Techniques*. Techniques describe how single results or groups of logically associated results are produced (in contrast to the procedure model, which specifies when and in what order results are to be produced).

METHOD DESIGN PROCESS

Overview

Applying the DSR method and using the DSR phases sequentially over two full iterative cycles helped us to design, evaluate and adapt the method in terms of a DSR artifact. For instance, collaborative specification with the help of subject matter experts and evaluation of the method's application in the first DSR research cycle deepened our understanding of the challenges and problems of company specific adaptation of the CDQ MM. This section presents two projects in which we, together with the companies involved, implemented the CDQ MM. Each project represents a full iterative DSR cycle. What we did in each project will be illustrated by means of the activities as defined in the procedure model and the roles as defined in the model of roles.

CarSupply Inc.: Assessing CDQM maturity for several data classes

CarSupply Inc. (case anonymized due to company's communication policy) is a German machine manufacturer and automotive industry supplier with 270,000 employees worldwide, 290 manufacturing sites worldwide, and an annual turnover of 46 billion euros (in 2007). In 2006, CarSupply started a corporate master data management initiative aiming at the improvement of the quality and use of corporate master data (i.e. vendor, material, and customer master data that is used in more than one division). The company has institutionalized the initiative by issuing a corporate policy defining the overall scope (cp. Figure 6, activity I.1) and a data governance model defining necessary tasks and roles that carry out these tasks. The data governance model defines four lifecycle stages (i.e. business demands identified, concept created, projects conducted, and regular operations) for every corporate master data class.

		Model of roles
Confirmation	● Splitting up the adaptation of the CDQ MM into five activities has proven to be reasonable, as that made it possible to determine single aspects very specifically and to reduce complexity by achieving partial results. ● The prior identification of scope and maturity dimensions has proven to be reasonable, as there have been clear objectives for the adaptation phase.	● Choosing the Chief Data Steward role has proven to be adequate for adapting and conducting CDQ MM assessments.
New findings	● After the adaptation phase, there was uncertainty about the fulfillment of the objectives given by the scope description (cf. activity I.1). Therefore, we added activities I.3 and III.4 in order to explicitly document and verify requirements.	● The decision to use the CDQ MM was made by the Chief Data Steward, but it was not supported by a Sponsor. Including a Sponsor into phase I would be helpful for establishing CDQ MM assessments throughout the whole company.

Table 2. Findings from the assessment at Company A

The Chief Data Steward (cf. Table 5) decided to introduce the CDQ MM to assess and continuously report on the progress of the initiative. The evaluation of Design Areas of the CDQ MM resulted in a principle fit and an adaptation: The strategic level was decided not to be considered (cf. Figure 6, activity II.1). The lifecycle described by the data governance model was identified as an appropriate maturity dimension (cf. activity III.1) and the stages as appropriate levels (cf. activity III.2). Figure 5 shows the domain reference model configured for CarSupply as well as the adjusted assessment model.

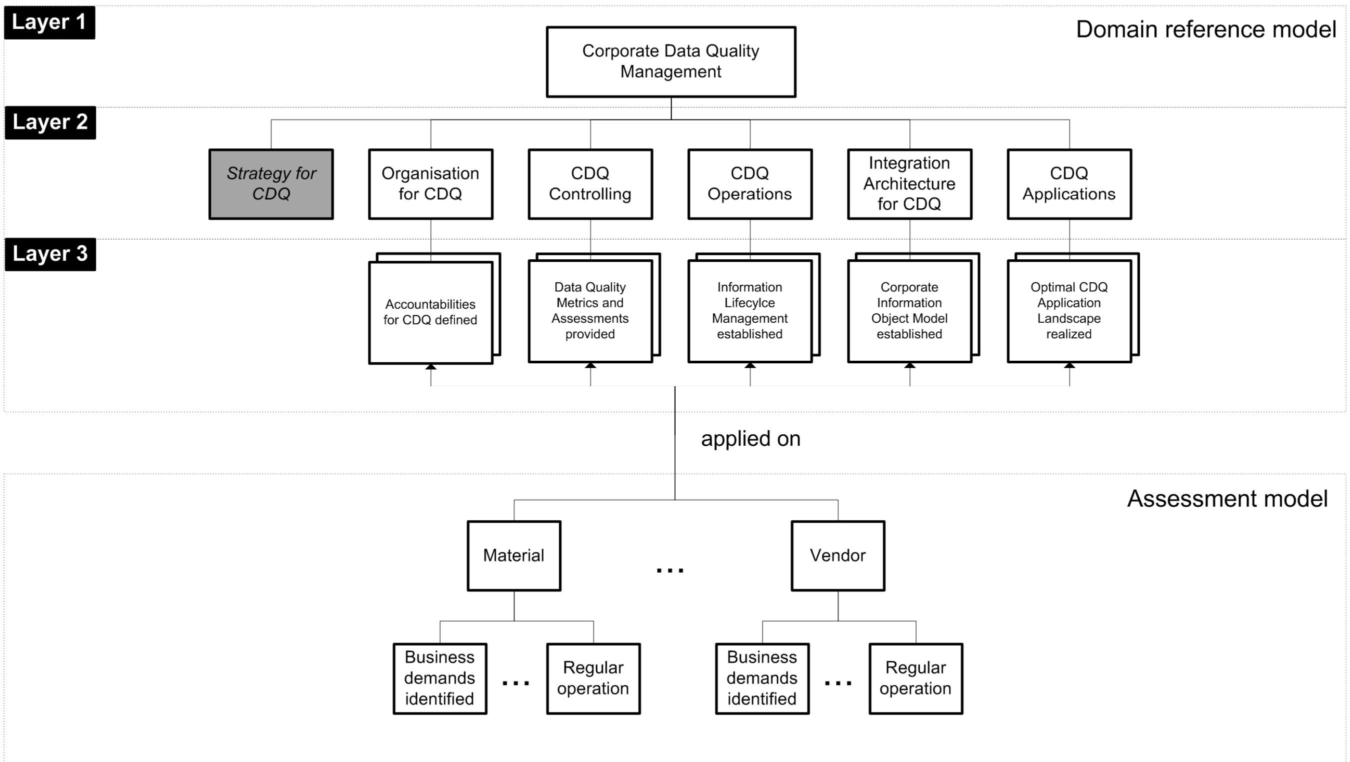

Figure 5. Maturity model configuration for CarSupply Inc.

ZF Friedrichshafen AG: Assessing CDQM maturity for several divisions

ZF Friedrichshafen AG is a worldwide supplier of driveline and chassis technology that provides components and systems to the automotive, marine, rail, and aviation industries, as well as for industrial applications. 60,000 employees work in 120 locations in 26 countries. The company had a turnover of 13 billion euros in 2007. Master data management (MDM) is part of a global process harmonization initiative and is established as a corporate function across several divisions. The initiative started in 2006 and is controlled and governed with the help of a management board, which is responsible for basic decisions and the project's progress.

The Chief Data Steward (cf. activity IV.B) decided to use the CDQ MM to assess the progress of implementing the corporate function and continuously report to the board. Due to the findings during the assessment at CarSupply, we added the *Sponsor* role to the model of roles. At ZF Friedrichshafen, the sponsor is a board member who recognized the benefits of the CDQ MM for the MDM initiative. Regarding Table 5, the Sponsor is involved in scoping and approval activities. The strategic level was decided not to be considered. For the first implementation, the scope was reduced to three divisions and their respective master data classes (cf. activity I.1). ZF Friedrichshafen is divided into ten divisions, with each division being responsible for at least one master data class (like vendor or material master data).

ZF Friedrichshafen uses a generic six-phase project management structure (i.e. analysis, conceptualization, implementation, etc.). The project management structure was identified as an appropriate maturity dimension (cf. activity III.1) and the stages as appropriate levels (cf. activity III.2).

	Procedure model	Model of roles
Confirmation	● Specifying and verifying a requirements catalog (cf. I.3 and IV.3) turned out to be very helpful in two ways. First, these activities ensured to comply with company specific requirements before starting a time- and cost-consuming self-assessment. And second, the documented requirements helped to communicate the benefits and expected results of self-assessment to the Sponsor.	● Including a Sponsor into phase I was helpful for establishing CDQ MM assessments throughout the whole company.
New findings	● The company also used the method to adapt layer 2 (Design Areas), which we actually had considered to be static. This may be useful and appropriate for internal self-assessments, but problematic in benchmarking processes (where comparability must be ensured). Each activity should contain constraints for adaptation in order to be able to take part in a benchmarking process with competitors.	● Assisting in the self assessment process we came to the conclusion that an assessor role should be specified and added to the model of roles. In this respect, it might be necessary to distinguish between internal and external assessors (important for benchmarking processes).

Table 3. Findings from the assessment at ZF Friedrichshafen AG

METHOD COMPONENTS

Procedure model

Figure 6 shows the procedure model as it was specified upon completion of the project with ZF Friedrichshafen. Table 4 gives a brief description of each activity. The two real-world cases described in which activities complexity issues are dealt with. Appropriate maturity dimensions were identified and specified depending on the aspects the company plans to assess (i.e. coverage of data classes, cf. activities I.2 and III.1). In general, more complex organizational structures result in a more complex maturity model (i.e. a more complex design of the assessment model, cf. Figure 5). Furthermore, both companies reduced complexity by selecting only a subset of the Design Areas which reflected their scope (hence, if the company plans to participate in a benchmarking process, there should be no exclusion of any Design Areas, cf. activities II.1 and II.2). In both cases, existing project management structures were re-used as stages for the maturity levels (cf. activity III.2). Here, the complexity of the existing structures is transferred to the maturity model (cf. Figure 5 and Figure 1).

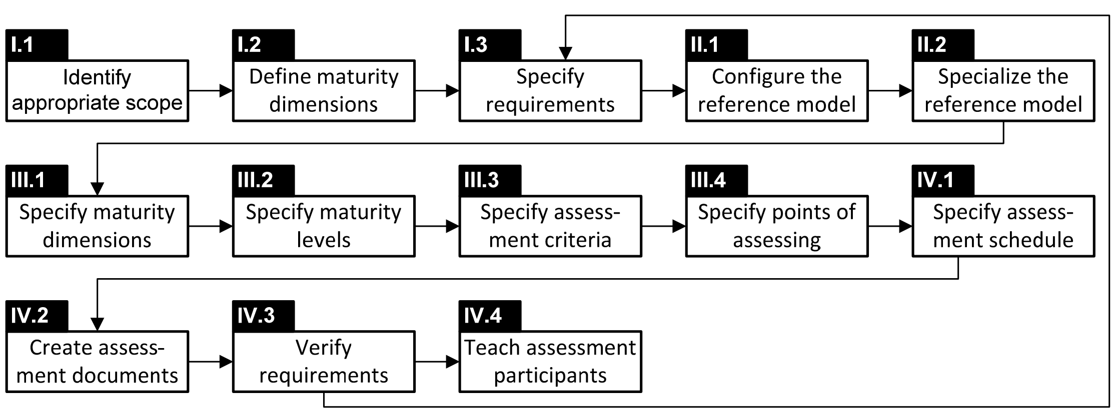

Figure 6. Procedure model for the method proposed

ID	Name	Description
Phase I: Define requirements		
I.1	Identify appropriate scope	Definition of area of application of maturity model, resulting in some kind of strategy description that can be further detailed by follow-up activities (e.g. I.2, I.3).
I.2	Define maturity dimensions	Concretization of area of application of maturity model. Maturity dimensions define what exactly is to be measured (e.g. degree of dissemination of a certain initiative throughout a company, or degree of coverage of certain data classes by certain initiatives) (Hüner et al., 2009). Dimensions will be identified and informally described here. A precise specification will be made in III.1.
I.3	Specify requirements	Development of a requirements catalog that is later used in activity IV.3 to verify if the modified CDQ MM meets all company specific requirements.
Phase II: Adapt Domain Reference Model		
II.1	Configure reference model	Selection of components of CDQ Framework (according to configuration presented in (Hüner et al., 2009)) to be used for maturity measuring.
II.2	Specify reference model	Adding of further components to CDQ Framework (according to specification presented in (Hüner et al., 2009)) to be used additionally for maturity measuring.
Phase III: Adapt Assessment Model		
III.1	Specify maturity dimensions	Specification of maturity dimensions defined in activity I.2 (e.g. exact specification of data classes to determine degree of coverage).
III.2	Specify maturity levels	Definition of a Likert scale for each dimension to be measured with. The values of this scale (e.g. 1 to 5) indicate the degree of maturity of each dimension.
III.3	Specify assessment criteria	Description of each degree of maturity for each dimension in order to allow a clear assessment as to when a certain degree of maturity has been reached. Criteria are formulated either as questions or as a check list.
III.4	Specify points of assessment	Definition of points of assessment indicating where (e.g. departments, business units, employees) and how (e.g. personal interviews, online questionnaire) assessments are done.
Phase IV: Prepare Assessments		
IV.1	Specify assessment schedule	Definition of time and frequency of assessments.
IV.2	Create assessment documents	Compilation of all specifications to be used by the assessors in the process of assessment.
IV.3	Verify requirements	Verification of assessment documents against the requirements catalog drawn up in activity I.3. If certain requirements are not met, they will be examined with regard to their relevance and validity, and the process will restart from activity I.3, if need be.
IV.4	Teach assessment participants	Training of participants of maturity measuring process based on the documents drawn up in activity IV.2 and verified in activity IV.3.

Table 4. Procedure model activities description

Model of roles

In order to implement the maturity model, various roles have to be defined and involved in the process. The following definition of roles is partially based on the model of roles by Wende (2007).

- *Process Owners (PO)*. Are responsible for executing and controlling business processes. Regarding the maturity model, POs provide important information on the use of certain data in certain business processes and the requirements to be met to allow for smooth process execution.
- *Process Users (PU)*. Execute concrete tasks belonging to a certain business process. Are directly affected by CDQ problems in their daily work.
- *Chief Data Stewards (CDS)*. Put into reality strategic CDQ objectives and lead the process of implementing the CDQ MM. Direct BDSs.
- *Business Data Stewards (BDS)*. Cooperate with company departments and business units on CDQ issues. We recommend one BDS as being responsible for one specific data class (e.g. material master data, customer master data etc.). Yet other concepts are possible too (e.g. responsible for a certain department, a certain process etc.).
- *Sponsor (S).* A single person (e.g. the chief executive officer) or a board (e.g. management board) that has sufficient resources (both money and power) to support or prohibit an initiative like the implementation of the CDQ MM. In the context of the method proposed in this paper, the CDS has to persuade the sponsor that the implementation of the CDQ MM is beneficial (both in operative and in strategic terms) for the whole company.

	I.1	**I.2**	**I.3**	**II.1**	**II.2**	**III.1**	**III.2**	**III.3**	**III.4**	**IV.1**	**IV.2**	**IV.3**	**IV.4**
Sponsor	x		x									x	
Chief Data Steward	x	x	x	x	x	x	x	x	x	x	x	x	x
Business Data Steward		x	x	x	x	x	x	x	x	x	x	x	x
Process Owner		x	x						x	x		x	
Process User		x							x	x			x

Table 5. Assignment of roles to activities of the procedure model

Table 5 shows the assignment of roles to activities of the procedure model as it was observed in the two cases. The whole identification and specification process is managed by the Chief Data Steward, who is involved in each activity.

CONCLUSION AND FURTHER RESEARCH

The paper at hand proposes a method for configuring a given maturity model for corporate data quality management under consideration of company specific requirements that determine the model's complexity, and it outlines two of the method's central components (a procedure model and a model of roles). The method takes up the maturity model as an input variable and provides concrete assessment documents that can be used to conduct appropriate self-assessments. The method enables companies to tailor the maturity model to their needs, maximizing both user acceptance and accuracy during self-assessments. Furthermore, applying the method minimizes incorrect implementation of the CDQ MM, saving both time and costs.

Like any other reference model, a maturity model too demands adaptation to new requirements over time. However, adapting a maturity model may turn out to be a difficult thing, as the model's basic stability over a long period of time is a critical precondition in order to be able to use it for benchmarking purposes. This is the point where our method can help. While the domain reference model itself can remain stable (cf. Subsection *Complexity in Maturity Models*), incremental modifications and company specific adaptations to the assessment model can be done by using the method.

Next steps towards standardization and higher recognition of the CDQ MM include the close collaboration with the European Organization for Quality Management (EFQM[1]). EFQM is a non-profit membership foundation that seeks to support organizations and their senior leaders in their need to develop strategies for quality management. The collaboration intends to develop an EFQM Framework for Corporate Data Quality Management, a standardized approach to assess and improve CDQM capabilities.

[1] http://www.efqm.org

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REFERENCES

1. Batini, C. and Scannapieco, M. (2006) Data Quality. Concepts, Methodologies and Techniques, Springer, Berlin.
2. Boissot, M. and Canals, A. (2004) Data, information and knowledge: have we got it right?, *Journal of Evolutionary Economics*, 14, 1, pp 43-67.
3. Braun, C., Wortmann, F., Hafner, M. and Winter, R. (2005) Method Construction – A Core Approach to Organizational Engineering, *Proceedings of the 2005 ACM Symposion on Applied Computing*, New York, NY, USA, pp. 1295-1299.
4. Brinkkemper, S. (1996) Method Engineering - Engineering of Information Systems Development Methods and Tools, *Information and Software Technology*, 38, 4, pp 275-280.
5. Bucher, T. and Winter, R. (2008) Dissemination and Importance of the "Method" Artifact in the Context of Design Research for Information Systems, *Proceedings of the 3rd International Conference on Design Science Research in Information Systems and Technology*, Atlanta, GA, pp. 39-59.
6. de Bruin, T., Freeze, R., Kulkarni, U. and Rosemann, M. (2005) Understanding the Main Phases of Developing a Maturity Assessment Model, *16th Australasian Conference on Information Systems*.
7. Fraser, P., Moultrie, J. and Gregory, M. (2002) The use of maturity models / grids as a tool in assessing product development capability, *IEEE International Engineering Management Conference*, Cambridge, UK, pp. 244-249.
8. Friedman, T. (2006) Gartner Study on Data Quality Shows That IT Still Bears the Burden, G00137680, Gartner Research, Stamford, Connecticut.
9. Gregor, S. (2006) The Nature of Theory in Information Systems, *MIS Quarterly*, 30, 3, pp 611-642.
10. Gutzwiller, T.A. (1994) Das CC RIM-Referenzmodell für den Entwurf von betrieblichen, transaktionsorientierten Informationssystemen, Physica, Heidelberg.
11. Hevner, A.R., March, S.T., Park, J. and Ram, S. (2004) Design Science in Information Systems Research, *Management Information Systems Quarterly*, 28, 1, pp 75-105.
12. Heym, M. and Österle, H. (1993) Computer-Aided Methodology Engineering, *Information and Software Technology*, 35, 6/7, pp 345-354.
13. Hueffner, T. (2004) The BPM Maturity Model - Towards a Framework for Assessing the Business Process Management Maturity of Organisations, Grin, Norderstedt.
14. Hüner, K.M., Ofner, M. and Otto, B. (2009) Towards a Maturity Model for Corporate Data Quality, *Proceedings of the 2009 ACM Symposion on Applied Computing*, Waikiki Beach, Honolulu, Hawaii, USA.
15. Kagermann, H. and Österle, H. (2006) Geschäftsmodelle 2010 - Wie CEOs Unternehmen transformieren, Frankfurter Allgemeine Buch, Frankfurt.
16. Lee, Y.W., Pipino, L.L., Funk, J.D. and Wang, R.Y. (2006) Journey to Data Quality, MIT Press, Boston.
17. March, S.T. and Smith, G.F. (1995) Design and natural science research on information technology, *Decision Support Systems*, 15, 4, pp 251-266.
18. Newman, D. and Logan, D. (2006) Achieving Agility: How Enterprise Information Management Overcomes Information Silos, G00137817, Gartner Research, Stamford, Connecticut.
19. Nuseibeh, B.A., Finkelstein, Anthony and Kramer, J. (1996) Method Engineering for Multi-Perspective Software Development, *Information and Software Technology*, 38, 4, pp 267-274.
20. Price, R. and Shanks, G. (2005) A semiotic information quality framework: development and comparative analysis, *Journal of Information Technology*, 2005, 20, pp 88-102.
21. Redman, T.C. (1996) Data Quality for the Information Age, Artech House, Boston, London.
22. Reid, A. and Catterall, M. (2005) Invisible data quality issues in a CRM implementation, *Journal of Database Marketing & Customer Strategy Management*, 12, 4, pp 305-314.
23. Ritchey, T. (2006) Problem structuring using computer-aided morphological analysis, *Journal of the Operational Research Society*, pp 792-801.

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[2] http://cdq.iwi.unisg.ch

[3] http://www.iwi.unisg.ch/behsg

24. Rosemann, M. and de Bruin, T. (2005) Application of a Holistic Model for Determining BPM Maturity, BPTrends, *AIM Pre-ICIS Workshop*, Washington, D.C.
25. Shankaranarayan, G., Ziad, M. and Wang, R.Y. (2003) Managing Data Quality in Dynamic Decision Environments: An Information Product Approach, *Journal of Database Management*, 14, 4, pp 14-32.
26. Tellkamp, C., Angerer, A., Fleisch, E. and Corsten, D. (2004) From Pallet to Shelf: Improving Data Quality in Retail Supply Chains Using RFID, *Cutter IT Journal*, 17, 9, pp 19-24.
27. Vermeer, B.H.P.J. (2000) How Important is Data Quality for Evaluating the Impact of EDI on Global Supply Chains?, *Proceedings of the 33rd Annual Hawaii International Conference on System Sciences*, p. 7068.
28. Wang, R.Y. and Strong, D.M. (1996) Beyond Accuracy: What Data Quality Means to Data Consumers, *Journal of Management Information Systems*, 12, 4, pp 5-34.
29. Wende, K. (2007) A Model for Data Governance – Organising Accountabilities for Data Quality Management, *Proceedings of 18th Australasian Conference on Information Systems*, Toowoomba, Australia, pp. 417-425.
30. Zahay, D. and Griffin, A. (2003) Information antecedents of personalisation and customisation in business-to-business service markets, *Journal of Database Marketing*, 10, 3, pp 255-271.