

Case Study Ciba – Organizing Master Data Management

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Abstract

Ciba Inc. is a specialty chemical company based in Basel, Switzerland. Due to increasing competitive challenges, Ciba set up a strategic program to increase cost-effectiveness, improve efficiency, improve transparency, and foster profitable growth. One of the five key elements was the creation of a company-wide system structure. A new global SAP system should allow for seamless integration of all business processes from purchasing and production through to marketing, sales, and transport.

As part of the “Enterprise” project, Ciba started a Master Data Management (MDM) initiative with the vision to consolidate master data across the company, to have strict master data governance rules and responsibilities in place, to formalize master data maintenance processes and validations in order to ensure master data quality, and to document key objects in a central database repository.

Six key principles set the top framework for master data and strengthen the data quality awareness among master data stakeholders and users. The new MDM organization consists of three closely interlinked parts: a business data ownership model, a stewardship organization, and a maintenance organization. The main characteristic of master data governance at Ciba is the responsibility assignment by region. Stewardship and maintenance roles are responsible for one specific region, sub-region, country, or site across business segments, business processes, and data object types. The “Data Standards Team” department is located in the corporate headquarters and provides master data services to the whole MDM community.

Local and global workflows have been implemented to support master maintenance processes. They support compliance with legal obligations and are one cornerstone of proactive data quality management. Another cornerstone is the DST Life Cycle, which enables Ciba to define, measure, and improve master data quality on a sustained basis.

1 Company

1.1 Overview

Ciba Inc. is a specialty chemicals company with nearly 14,000 employees. It creates products to improve the quality, functionality, and appearance of plastics, coatings, and paper. It helps to shield people and objects from UV light and creates color for a vast array of materials. It also helps industries to recycle, clean, and save water, as well as adding new qualities to materials, and enables progress in miniaturizing electronic components. Ciba serves a number of markets in 120 countries, including paper, plastics, packaging, lubricants, automotive, construction, electronics, water treatment, agriculture, and home & personal care industries. Ciba is a global company with a significant presence in Europe and North America, and a strong position in Asia. [cf. Ciba 2008a]

Ciba Inc.	
Foundation	1997, from the specialty chemical operations of the former Ciba-Geigy Ltd. when that company merged with Sandoz to form Novartis
Headquarter	Basel, Switzerland
Sector	Specialty Chemicals
Lines of Business / Divisions	Three market-focused segments: Plastic Additives, Coating Effects, Water & Paper Treatment
Corporate Structure	Three segments, three regions, 63 production sites in 20 countries, six research centers
Homepage	www.ciba.com
Revenue	CHF 6.523 billion (2007, +3%)
Profit	CHF 552 million (EBIT) (2007, +4%)
Employees	~ 14,000
Customers	Major markets in 120 countries: automotive, packaging, home & personal care, paper and printing, construction, electronics, water treatment, and agriculture industries

Table 1-1. Brief Profile of Ciba Inc.

Ciba has its roots in the first chemical company in Basel – J.R. Geigy – trading in chemicals and dyes (founded 1757). In 1859, the company started producing dyestuff. In 1971, J.R. Geigy Ltd. merged with Ciba¹, a Basel-based chemicals company founded in 1884, to form Ciba-Geigy Ltd. Ciba-Geigy Ltd. merged with the pharmaceuticals company Sandoz in 1996 to form Novartis. The specialty chemicals divisions were spun off by Novartis and formed Ciba Specialty Chemicals Inc. in 1997. Since 2007, Ciba has operated under the name “Ciba Inc.”. [cf. Ciba 2008b]

1.2 Structure

Ciba comprises of three business segments: Plastic Additives (33% of Ciba’s sales), Coating Effects (28%), and Water & Paper Treatment (39%). The business segments are responsible for marketing, research and development, technology, production, and sales [Ciba 2008a]. They enjoy a large degree of autonomy and are individually measured. In addition, Ciba has a small number of business units offering niche products and services. For example, Expert Services is Ciba’s consulting business unit offering knowledge-based services, such as regulatory consulting, and analytical and material testing to Ciba’s customers [Ciba 2008c].

Non-core support functions are provided on a global basis by “Group Services”, a centralized service unit. Group Services includes IT, HR, Finance, Group Communications, Internal Audit, Law & Environment, and Business Process Services (BPS).

Ciba has 63 manufacturing sites in 20 countries. One manufacturing site usually produces for one business segment, sometimes for two segments. In some locations Ciba has dedicated commercial and distribution sites. Ciba is also regionally organized, distinguishing three major regions: NAFTA (North America), EMEA

¹ Ciba is an abbreviation for “Gesellschaft für Chemische Industrie **B**asel”.

(Europe, Middle East, Africa), and APAC (Asia, Pacific). In 2008, Ciba is to consolidate its research and development centers and is introducing six cross-company research centers focusing on Ciba's core technologies, such as Color, and Paper Strength and Coating [Ciba 2008a].

1.3 Competitive Challenges

The specialty chemicals industry is a demanding and competitive industry. It suffers from exceptionally high raw material and energy costs, resulting in unfavorable business conditions for Ciba and some of its customer industries. Pressure on sales prices continues, underlining the necessity for each product to add value for both customers and shareholders. The pace of technological innovations remains rapid. Hence, market leadership depends on an ever faster transfer of discoveries into saleable products. The geographic center of the industry is shifting, with major new opportunities appearing in Asia and the Middle East. [cf. Ciba 2008a] The main competitors of Ciba are companies like BASF, Dow, Lanxess and new companies appearing in Asia.

Laws and regulations impose increasing obligations. Ciba created a product definition concept to ensure a common understanding of a product definition across the company. The product definition concept describes the composition of a product from various substances and their country of origin, and guarantees full compliance with legal and regulatory requirements as well as traceability and auditability of a product throughout its life cycle. A new regulation in the European Union (EU) is REACH (Registration, Evaluation, Authorization and Restriction of Chemicals) that came into legal force in 2007. All chemicals produced in or imported into the EU must comply with REACH. REACH requires major investment by the chemical industry, as companies must test and document the human and environmental impact of each of their chemicals.

2 Initial Situation

2.1 Strategy

Due to the outlined challenges, Ciba sees using its resources as effectively as possible and making sure it supports its customers' efficiency as the key to its future success. Operational excellence is therefore a strategic imperative for Ciba. In 2006, it started the "Operational Agenda", a company-wide program. The main goals of this program were to increase cost-effectiveness, improve efficiency, improve transparency, and foster profitable growth. The Operational Agenda comprises five key elements: Marketing & Sales, Innovation, Lean Manufacturing, Geographical Footprint, and Company-Wide System Structure. For example, as part of the Marketing & Sales initiative a new pricing model and a pricing tool were introduced, ensuring more consistency and allowing sales teams to analyze each sale in comparison with others in the region. A new global SAP system has been implemented as part of the Company-Wide System Structure initiative. The system will allow for seamless integration of all business processes from purchasing and production through to marketing, sales, and transport. [cf. Ciba 2008a]

Compliance is another strategic goal for Ciba. Ciba has been involved in shaping the new REACH regulation from the beginning. Ciba set up a multi-disciplinary team managing the implementation of REACH throughout the company, and working closely with customers and suppliers. Through collaboration with customers, REACH also offers the opportunity to bring Ciba closer to the market. Ciba has developed an in-depth understanding of REACH requirements so that Ciba Expert Services can help customers to achieve compliance.

2.2 Master Data Management Organization

Since its reorganization in 2000/2001, Ciba has had a dedicated, centralized Master Data Management (MDM) organization (cf. Figure 2-1). Before the reorganization, each segment had its own Supply Chain Management (SCM) and IT organization. In

the new organization, MDM responsibility is vested in the new centralized SCM organization. The focus of MDM was on material master data. The SCM employees possessed the necessary domain knowledge about materials, such as products and substances. Responsibility for customer and supplier master data was local.

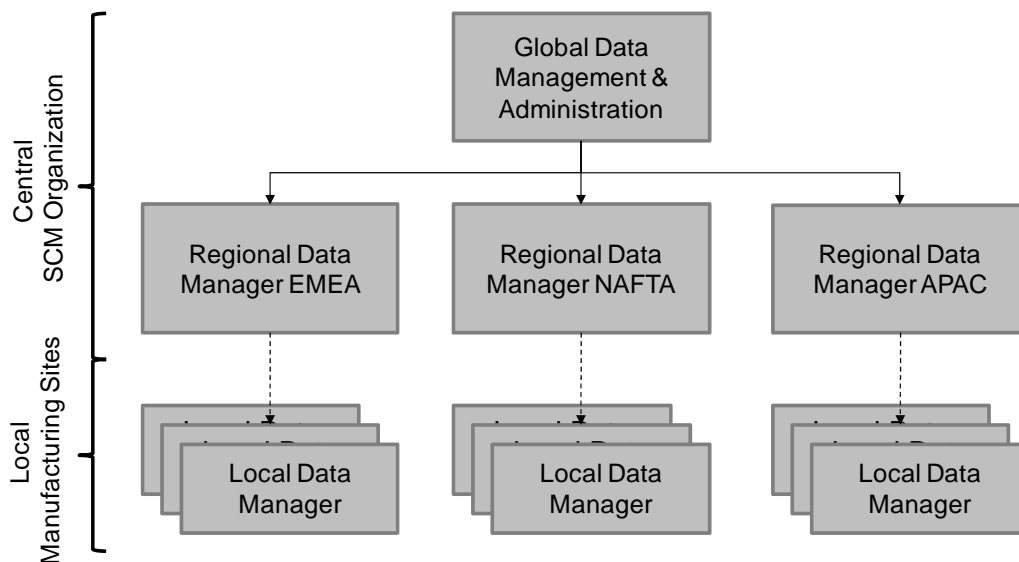


Figure 2-1: MDM Organization for Material Master Data (Initial Situation)

The group *Global Data Management & Administration* had 2 ½ full-time employees (FTEs). This group had worldwide responsibility for material master data. It possessed ownership for data definitions, i.e., it defined global standards for material master data, and decided on changes in their structure. It was also responsible for operative master data processes and global master data projects.

Three *Regional Data Managers* (a part-time role) were also part of the SCM organization. They were responsible for regional projects, and for monitoring and training Local Data Managers. One Regional Data Manager was assigned per region NAFTA, EMEA, and APAC. *Local Data Managers* were responsible for master data maintenance in both local (customers and materials) and global (materials) systems. Worldwide there were 60 part-time Local Data Managers – one per manufacturing site. Each Local Data Manager was assigned to one of the three Regional Data Managers. However, the Regional Data Managers did not have authority over Local

Data Managers, since Local Data Managers were not part of the MDM organization, but were assigned to a manufacturing site.

2.3 Data and System Landscape

Ciba used the ERP system BPCS (Business Planning and Control System) developed by System Software Associates². BPCS supported major business processes, such as Financials, Planning, Distribution, and Manufacturing. Ciba had 60 local BPCS implementations – one per manufacturing site. First BPCS implementations date back to the 1970s. In 1996, all legacy ERP systems were substituted by BPCS. Over the years, many BPCS add-ons were developed or bought, making upgrades to new software releases difficult or even impossible.

BPCS systems were provided with material master data by a central master data repository called Ciba Common Database (CCDB). The repository was developed in 1996 with the goal of improving reporting across business lines. The Local Data Managers entered material master data into the repository. The data was then transferred to the local BPCS implementations, still involving a lot of manual work. Materials received unique identifiers within the repository. Mapping tables were used to map local identifiers with global identifiers. Material data could be changed in local systems, resulting in quite a few deviations. Global Data Management & Administration was mainly responsible for CCDB. The group created monthly reports on deviations among the systems. Based on these reports, Regional and Local Data Managers cleansed data in local BPCS systems and the global CCDB.

Few attempts were made to centralize customer and supplier master data. Centralized customer identifiers were part of an in-house e-business platform called myBIZ. MyBIZ transferred the customer identifiers to local BPCS systems. The introduction of unique customer identifiers was accompanied by a clean-up project

² SSA was acquired by Infor Global Solutions in 2006 (www.infor.com).

to harmonize customer names and addresses. Similarly, the in-house system yourBIZ centralized supplier identifiers for chemical suppliers. The synchronization between BPCS and yourBIZ was performed manually – the global identifier was complemented to local supplier master data in BPCS.

2.4 Pain Points

Ciba was aware that bad master data quality may create problems in business processes and had started centralization and harmonization initiatives. However, MDM organization and IT systems provided an inadequate response to new challenges and requirements.

Local BPCS systems allowed the creation and updates of (harmonized) material master data. This resulted in deviations between the central repository and local systems, and between local systems. Changes in master data could not be traced. A lot of data synchronization between systems was necessary. Master data operations involved many manual activities, such as the time-consuming maintenance of mapping tables for master data identifiers. Bad search options in the central repository resulted in duplicate and multiple material master data: It was easier to create a new record than to search for an existing one.

Material master data could be used in reports and business processes (e.g., Planning), although local master data maintenance was not completed and hence local data was missing. This caused wrong reports and wrong calculations in Planning. There was no formalized withdrawal process for materials and their master data. Hence, materials that were no longer sold could still be on stock, causing unnecessary inventory costs.

Master data documentation was scattered all over the company, including user scripts, business scenarios, and job guides in different formats and office documents. It was difficult to find the right information and to keep it up to date.

Compliance with legal obligations was insufficiently supported by master data processes. For example, SOX requires companies to formalize and document processes, ensure adherence to the sequence, and define and guarantee authorizations³. Furthermore, the product definition concept (cf. 1.3) requires the correct description of the product composition.

3 Project “Enterprise”

“Enterprise” was Ciba’s project for implementing a company-wide integrated ERP system infrastructure. Ciba decided to replace its legacy BPCS systems by an SAP ERP 2005 system. The SAP implementation followed a single-template approach with a global roll-out. The project started in the middle of 2005 and ended three years later in August 2008. Part of this project was an MDM initiative which is the main focus of this case study. The drivers of this initiative were Ciba’s CIO and the SAP Project Manager who were painfully aware of the consequences of bad master data quality from past experience.

3.1 Goals

The goals of the SAP project can be delineated from the challenges Ciba faced and the strategy of operational excellence it had set up to deal with these challenges. Essentially, the project was intended to increase cost-effectiveness, improve efficiency, and improve transparency over systems and master data.

The MDM vision was to consolidate master data across the company, to have strict master data governance rules and responsibilities in place, to formalize master data maintenance processes and validations in order to ensure master data quality, and to document key objects in a central database repository.

For the organizational structure, it was planned to apply data ownership to Business Process Owners, to concentrate master data maintenance via dedicated roles on

³ In the meantime, Ciba delisted from NYSE, and is no longer obliged to follow SOX requirements.

corporate and local levels (reduce the number of persons allowed to maintain master data), to prepare Local Data Managers for daily maintenance operations on local data objects, to establish a Data Managers' network, and to communicate and coordinate between different stakeholders.

Transparency over master data maintenance processes was a major goal due to obligations imposed by SOX or REACH. Earlier attempts to increase transparency have not been sufficient to support legal requirements. Therefore, the goals with respect to master data maintenance processes were to standardize processes across regions, to formalize and support maintenance processes for critical data objects by workflows (especially for materials), to provide services to the business in the context of master data (e.g., mass maintenance, data cleansing, data migration projects), to support the definition of data quality, and to support the efficiency of subsequent business transactions. Master data services, maintenance processes, and data quality should be measured and monitored by Service Level Agreements (SLAs) and Key Performance Indicators (KPIs). Critical data objects should be appropriately documented from a technical and a business perspective in a central database repository which should be accessible via a web interface and maintained in one place.

3.2 Execution

During the first year of the project, global processes were designed, resulting in an SAP blueprint. The global SAP system was customized according to the blueprint building the SAP template. The local SAP implementations were based on this template, with minimal changes due to country-specific requirements such as tax and other laws. SAP implementation started in the UK and Italy in November 2006. Every four to five months the next roll-in of a set of countries to the global SAP system followed. Altogether the project encompassed five roll-ins; the last one in August 2008 dealt with the APAC countries.

The project team consisted of around 200 people, including approx. 100 external consultants. The project manager was dedicated full-time to this project and reported directly to Ciba's Board. The project team was split into 10 sub-project teams. One team was responsible for one main business process, such as Finance, Order to Cash, or Procurement. In addition, a Change Management team was responsible for documentation and training. The tasks of the dedicated MDM team were data preparations, migrations and cut-over for the roll-ins. All these project teams have been supported by the line organization (e.g., IT department assisted with architectural and authorization questions).

The MDM team was separated from the Data Standards (DST) team, which was responsible for the preparation of post go-live relevant data maintenance aspects including training, documentation, and data maintenance process implementations. At the beginning, the MDM team was also to cover these post-implementation related activities. However, time and resource constraints only allowed for initial data conversion and cut-over activities. The DST sub-project started half a year later in February 2006 with an extended scope. The reasons were that the future data organization and data ownership model was unclear, master data maintenance processes were missing, and the SAP standard business role approach did not cover specific master data maintenance roles. Initially, it started with a focus on materials, customer and vendor master data only. However, the DST sub-project manager needed to extend the scope to cover all master data objects. Due to the extended scope, resources and planning requirements were reviewed. The Board has finally approved the assignment of external consultants and some people from Global Data Management & Administration to the DST sub-project team. The DST sub-project manager had become head of this existing MDM organization. Some IT experts were assigned to the project team as well. Finally, the whole team had about ten members.

Besides data conversion and cut-over activities, the extended DST sub-project scope included the design of the future master data organization. This covered, first, the definition of different roles in the master data maintenance processes and their mapping to SAP authorizations, and, second, the definition of Ciba-wide master data maintenance processes and the corresponding workflow support. After analyzing the existing DST organization and processes, master data objects were classified into four categories depending on their criticality. For the first roll-in in the UK and IT, it was decided that only the most critical data objects customer, vendor, and material should be considered. Later, the scope was extended to also include less critical data objects like bill of materials, packaging instructions and output conditions.

The design resulted in a DST template of the new organization and a set of workflows. The SAP blueprint, which was nearly finished when DST started, had to be revised. Changes were made in the approach to master data maintenance authorizations and the definition of SAP authorization roles. For each roll-in, the DST team supported the business in implementing its DST template. Table 3-1 outlines key topics and tasks during roll-in support.

Key Topic	Description
Prepare for Project and Services	<ul style="list-style-type: none"> • Identify and align master data related gaps within the preparation phase • Apply data ownership at BPO / BPL level and ensure integration • Provide change management for master data
Formalize Master Data relevant Processes	<ul style="list-style-type: none"> • Formalize maintenance via adequate workflow processes for critical objects • Define SLAs & KPIs related to services and data quality • Prepare roll-in sites for daily data maintenance operations
Establish Organizational Structure	<ul style="list-style-type: none"> • Set-up and map the standard business roles (SAP transactions) • Provide data quality measurements to the project conversion / cut-over team • Maintain related process documentation

Table 3-1: Project Key Topics in ERP Roll-in Support [adapted from Bettschen 2008]

An integration meeting was held every week with participants from the MDM team and the Business Process Leads to discuss boundary-spanning issues and to make

decisions. Business Process Leads (BPLs) are delegates of Business Process Owners (BPOs). One BPL is assigned per BPO, and one BPO exists per main business process. Whereas the BPOs are top management people who can only spend 5% of their time on that role, BPL is a full-time role. The sub-project manager escalated issues that could not be solved to the Business Process Owner meeting, the project manager, or directly to Ciba's Board.

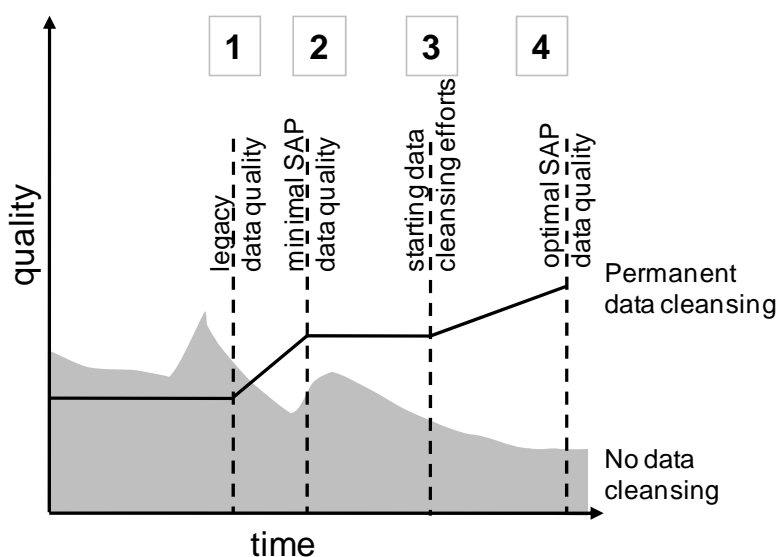


Figure 3-1: Data Quality Approach for Roll-Ins [adapted from Bettschen 2008]

Due to resource and time limitations, data from the legacy systems was only partly cleansed. For the most part, master data of all qualities has been transferred to the new system. All product master data was transferred in a "big bang" during the first roll-in. The MDM team used the following data quality approach for each roll-in (cf. Figure 3-1):

- 1) Start operations in SAP with legacy data quality from the initial data load
- 2) Support the business to leverage the data quality to minimum SAP requirements
- 3) Start data cleansing to stabilize critical data objects and related business transactions
- 4) Ensure ongoing improvement of data quality

3.3 Challenges

Ciba underestimated the tasks and the area of responsibility of the DST sub-project at the beginning. DST's scope was limited to data conversion from the old systems to the new system. Although the sub-project scope was extended, there was still no time and not enough resources to redefine data structures and to cleanse data in the legacy systems. The team basically mapped the old data structures to the new system data structures. There was no time to communicate with different departments to identify their specific requirements.

A Munich-based IT consulting company was responsible for the design and implementation of the workflow for master data maintenance processes. Although the DST sub-project manager had successfully worked with this company before, Ciba saw a great risk in the assignment of a rather small consulting company. However, the flexibility of the company to deal with new or changed requirements and the comparatively low costs compensated for the risk.

The SAP developments had been outsourced to a third-party consultancy in India. Different understandings of the specifications and difficulties in explaining the requirements over the phone resulted in low-quality developments. After the approach was changed to having more on-site meetings and to writing very precise specifications, the development quality increased.

The BPOs had difficulties in taking on their role. They are senior people and are only available half a day per month for this role. With the active support of BPLs, the situation changed somewhat. BPLs are responsible for BPO-specific tasks, whereas BPOs are held accountable. Another challenge is that the DST sub-project sponsor (the CIO) has no jurisdiction on BPOs or BPLs, so they could easily refuse their cooperation. If no consensus could be reached among them, decisions had to be escalated to the Board. For local processes, nobody wanted to take on the ownership role – an issue that still has to be solved.

During the analysis it was difficult to find out who was doing what and to extract the knowledge from people's heads. The DST team encountered a lack of belief that the new solution would work (better) and it was a challenge to win people's trust.

3.4 Change Management

The MDM team had to manage change both upwards to top management and downwards to the employees affected by the changes. As part of top management communication the team had "war stories" and "emerging arguments".

Two types of people were most affected by the changes made: first, employees who used to maintain master data, but were no longer allowed doing so; and second, employees who were still part of the master data community, but had different jobs or roles, or had to work differently. The MDM team did a lot of integration work, i.e., it made people understand the connections, relationships, and interdependencies between their work and requirements and the work and requirements of others. The team also informed employees about how the new organization was going to work and what their part in this organization would be.

The first type of people had to see the opportunities in this change. For example, if each country only had two or three dedicated employees for master data maintenance, data quality would increase and support would improve with the new organization.

The team had clear guidelines that it strictly followed. Most employees accepted and understood these guidelines. For example, only dedicated roles were allowed to maintain master data directly in SAP. The new roles were "sold" to people as better jobs and the new job titles as a reward. It was also important to invest a lot of time in training to give employees the feeling that they were able to handle the new system.

3.5 Critical Success Factors

The MDM sub-project had top management support from the beginning. The CIO and the SAP Project Manager were aware of MDM's importance and stood up for

the project. There were very few political discussions. The project had management backup for investments, consultants, people, and other resources. The organizational concept was signed off by the Board and afterwards it continued to compare the concepts with their realization and implementation. This comparison enabled the Board to realize that the theoretical concepts did actually work.

The MDM sub-project manager had successfully accomplished a similar project in another company. He brought his "best practice" knowledge and experiences to Ciba, although the situation was different. Therefore, his concepts and ideas were not closely questioned. As an "external" champion he found open doors and encountered little resistance.

The new MDM organization was designed according to the experiences of the MDM sub-project manager. As the new organization did not differ much from the old one, the transfer of the new solution to the old organization worked fine. SAP authorization roles and the new organization were developed simultaneously. This approach increased the transparency of the new organization, and the authorization approach and the new organization could be fixed in the ERP system. Other critical success factors were the limitation of scope (only materials, customers, and vendor master data) and a good execution within this scope, a clear strategy, and team work.

The workflow solution was not integrated with the SAP system. With this approach, workflows could be designed and tested independently of SAP. The new solution could be switched on bit by bit without interfering with a running system. Due to its complexity, an integrated approach would have soon failed under the given time constraints.

4 New Solution

4.1 Master Data Strategy

DST at Ciba follows a centralized approach with central master data maintenance for critical data objects, one central ERP system for managing materials, customers, and vendors, and a dedicated team that ensures master data is consolidated and harmonized throughout the company.

Six key principles set the top framework for master data (cf. Table 4-1). The principles enable a top-down approach in the case of new business process implementations and master data improvement projects. They enforce corporate communication and strengthen the awareness among master data stakeholders and users.

Key Principle	Description / Rationale
1. Data Governance needs top management support	Master data is the main integration point across business processes and organizations
2. Master data is a corporate asset	Master data needs to be handled as a key company asset
3. Master data handling follows a strategy	Mandatory master data standards and methods to be set and applied
4. Master data has one source	Master data is an information of reference that must be identical across processes and systems
5. Master data requires 100% ownership & accountability	Clearly defined master data ownership and responsibilities
6. Master data quality concerns all	Bad master data quality has an impact on the whole supply chain and related reporting

Table 4-1: Master Data Key Principles at Ciba [adapted from Bettschen 2008]

4.2 Master Data and Processes

The new master data maintenance processes are centralized, harmonized, and supported by global and local workflows. The centralized approach keeps master data maintenance efforts at the lowest costs and the speed of maintenance processes. The workflows ensure that all roles execute their tasks in the correct sequence. No user has the possibility to maintain (global) master data differently than defined by

the workflow procedures. The workflows ensure that master data rules and standards are followed globally and locally. Figure 4-1 provides the basic procedure of a workflow.

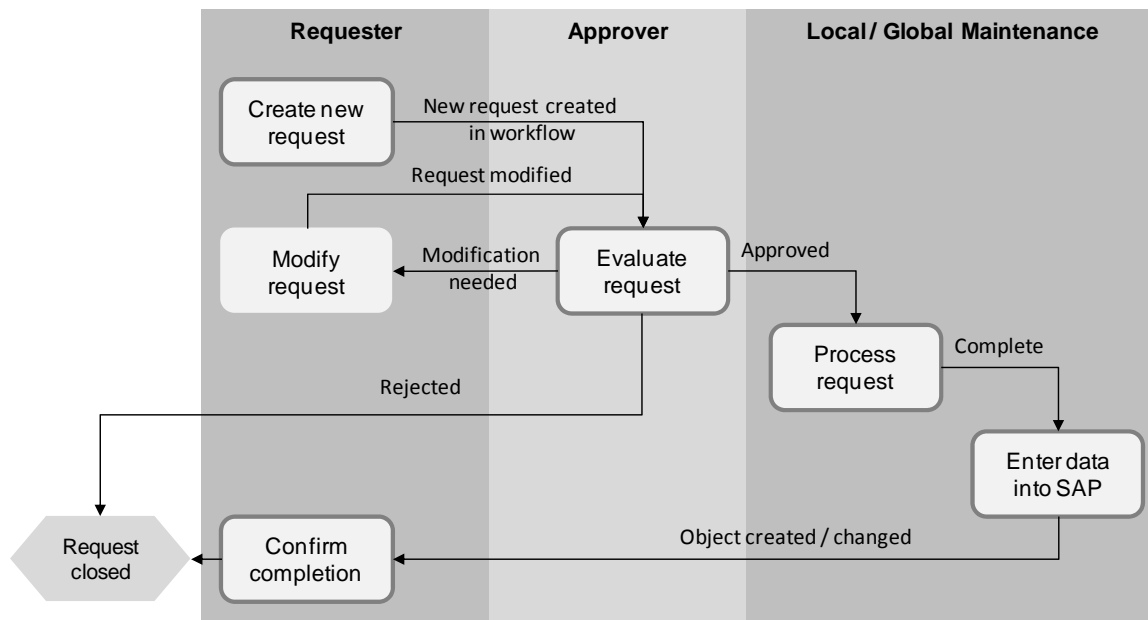


Figure 4-1: Overview of Master Data Maintenance Workflow Procedure

There are four global workflows. Each represents the creation and change of the global data of one master data object (customer, vendor, substance, material). Only chemical and packaging materials are workflow-supported so far. Withdrawal processes are not yet supported by workflow because these are very complex processes. For a material withdrawal process, for example, open transactions and existing inventory (in all countries) have to be checked.

Local workflows support the creation of all master data objects. However, the focus has been placed on initial local material extensions, including dependent data objects like bills of material, due to the high impact on the supply chain and reporting. The extension of a material master after the initial set-up to a new distribution or manufacturing site is not yet supported by either local or global workflows, since the local maintenance procedures are not yet sufficiently known. Local workflows have not been hard-coded, but are based on a number of process

templates. A simple pattern includes several assessment (approval and contribution) steps and a final approver. For each location, the correct process template is chosen once at the beginning based on local needs. The template is customized by assigning people to the appropriate roles (approver, contributor) involved in each step. With this flexible approach, local master data maintenance is both supported by workflow and recorded for internal or external auditing purposes. The MDM organization can analyze local workflow configurations to deduce best practice pattern, generate ideas for improvement, and to strive toward standardization. For example, if one location has a fifth approval step, but all other locations can get by with three or four approval steps, the organization in the first location is likely to be too complicated or too formalized.

700 to 800 material master data records are created with the workflow per month. SLAs define target levels for global master data creation and change. Currently, the global materials workflow takes about ten days to complete. According to the SLA, this should decrease to five days. Realistically, however, 3 to 5 days full-time are required for a material creation, including further inquiries and clarifications.

The workflows also enable the monitoring of master data maintenance processes. For the global workflows, process time of requests, total number of requests, and number of open requests are monitored. For local workflows, the number of open requests is of interest. Based on monitoring, reports are created automatically, presenting the results by region, by segment, by material type, etc. Currently, these reports are only used internally within the MDM organization.

To ensure continuous improvement of master data quality, Ciba defined a holistic process for master data – the DST Life Cycle. The life cycle consists of four phases (cf. Figure 4-2) and is similar to the Total Data Quality Management (TDQM) methodology [cf. Wang 1998]. The life cycle starts with standards and definitions for the data object in question (1). Criticality and impact of the data object set the degree

of the required maintenance process formalization (2). SLAs and KPIs are defined to permanently measure and monitor process efficiency and data quality. Measurement results are used to investigate root causes of data quality or process problems (3). Lessons learned and findings from the first three phases are consolidated and feed into a new turn of the life cycle to enable continuous improvement (4).

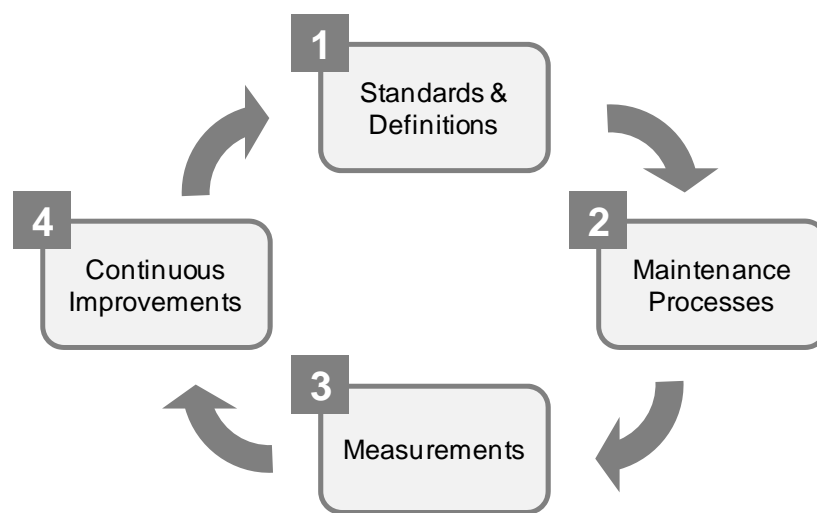


Figure 4-2: Four Phases of the DST Life Cycle [adapted from Bettschen 2008]

The life cycle is not yet fully utilized, since the MDM team was heavily involved in the project. However, the team has already made some arrangements for measuring data quality. Complex master data extractions from SAP are used to generate easy to use reports for identifying potential data quality issues. As an example, customer and vendor master data with “special names” are extracted, i.e., names with special characters that cause a severe impact on the supply chain interfaces. This data can negatively impact the order to cash processes and will not only influence the payment transactions, but also have a direct impact on customer satisfaction. These names are the heritage of the data conversions during roll-ins; the workflows inhibit the entry of these characters.

4.3 Master Data Organization

The master data organization follows the strategy of centralized master data maintenance for critical data objects. It is divided into three closely interlinked parts:

1. An ownership model, which consistently follows a business data ownership approach (e.g., escalations, definitions, resource allocations for master data issues),
2. A stewardship organization, which has the mandate from the business to govern master data and its processes, and
3. A maintenance organization, which allows for the central creation of critical master data objects.

The heart of the master data organization is the “Data Standards Team” (DST) department located at the corporate headquarters. The department is part of the centralized service units and belongs to Business Process Services. Until August 2008, it belonged to the Global Information Systems (GIS). Now it is more consistently related to the business and not to IT anymore. In order to discuss and solve post-project issues within Group Services, an arbitration board with members from all Group Services units and GIS meets twice a week.

DST is responsible for master data management, quality, and maintenance. Major tasks include:

- Anchor the organizational structure: Apply business ownership and keep focus on concentrated data entry; strengthen and support Data Power Users; and maintain communication and coordination between different stakeholders;
- Define processes for master data maintenance and maintain global master data via standardized, web-based workflows;
- Provide services to the master data community: Help for closing/merging sites; support for running processes; provide 1st and 2nd level support to Data Power Users; implement processes for regional or local master data objects, data quality

reporting and documentation; guarantee and continuously improve data quality and maintenance processes; and

- Develop CIBA's master data management strategy and the technical and governance framework including rules for master data objects, operations and processes; execute the resulting program and its components; and execute the resulting MDM projects.

To fulfill these tasks, DST is divided into several organizational roles. The roles can be allocated to the stewardship or the maintenance organization. This distinction helps to understand the rationales behind these roles. Appendix A holds a more detailed explanation of the roles. Before explaining the roles in more detail, the following section outlines the ownership model.

4.3.1 Data Ownership Model

The Master Data Ownership Model provides the basis for a long-term strategic approach to MDM and the continuous improvement of master data quality. Through ownership the responsibility for master data is explicitly placed in the business. The owners of master data are the *Business Process Owners* (BPOs) who are deputized by *Business Process Leads* (cf. 3.2). Ownership is assigned per attribute of data object type, i.e., each BPO is responsible for a set of attributes of a data object type (customer, vendor, material).

The responsibilities of BPOs and the other roles involved in MDM are defined in a RACI matrix (cf. Figure 4-3). The columns of the matrix indicate the roles in MDM, the rows identify the main activities, and the cells are filled with responsibilities, i.e., they specify degrees of authority between roles and activities [cf. Wende 2007]. Figure 4-4 outlines the organizational structure of master data ownership and the roles involved.

Master Data Area	Role	Business Process Owner	Business Process Lead	Data Standards Team	Selected Data Power Users	End User
	Level	Global	Global	Global	Local	Local
Organization set-up (structure)		A	I	I	I	I
Configuration data ownership		A	R	I		
Configuration data standards processes		A	C	R		
Master data ownership		A	R	I	I	I
Master data standards & definitions		A	R	C	I	I
Policies & guidelines (language)		A	R	I	I	I
Data maintenance processes (SLAs, workflow)		C	A	R	R	I
Master data roles			A	R	I	I
Master data documentation (meta data)			A	R	R	I
Data quality measurements (KPIs)			C	A/R	A/R	

Key: R = Responsible, performs the activity, A = Accountable for the activity, C = Consulted, I = Informed
 Can have A/R where activities are multi-level (e.g. detail reporting vs. summary) or task is directly performed by the role accountable

Figure 4-3: Master Data Ownership RACI Matrix

BPOs meet regularly once a month to discuss and solve cross-functional issues. If DST needs to escalate an MDM issue, it sets that issue on the agenda of the next BPO meeting. The Head of DST regularly participates in these meetings.

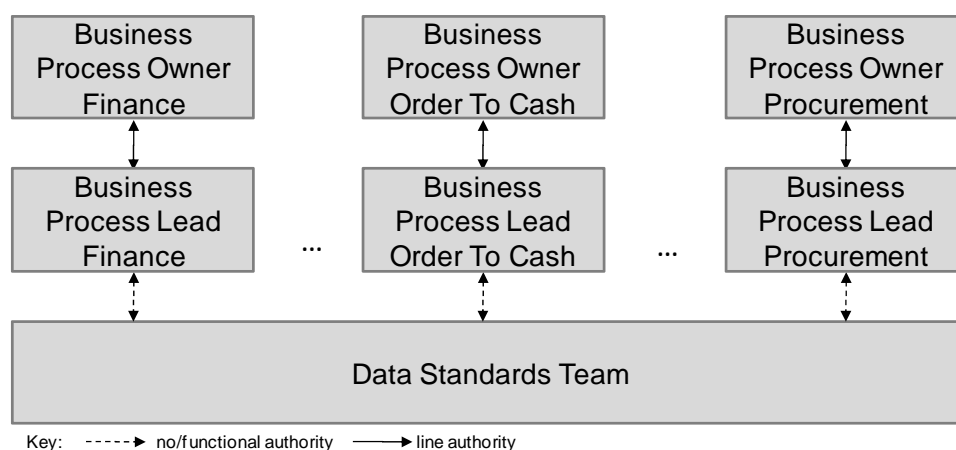


Figure 4-4: Master Data Ownership Organization

4.3.2 Stewardship Organization

Three *Regional Data Managers* (RDMs) manage and monitor the activities of Data Stewards and Data Maintainers in their region. The RDMs enable an integrated MDM approach and create reports with statistics on data quality and maintenance

processes for their region. They are the main Data Steward contact for conflicts or support requests.

Data Stewards are assigned by sub-region or country and are subject matter experts for data. They neither maintain nor own data. Data Stewards support the local data management and enforce correct application of global and local data standards and data maintenance processes. Data Stewards customize and adapt local workflows to local needs. They assure data quality within their area of responsibility and propose improvements to local sites or RDM. They are the main contact for Data Power Users. Figure 4-5 outlines the master data stewardship organization.

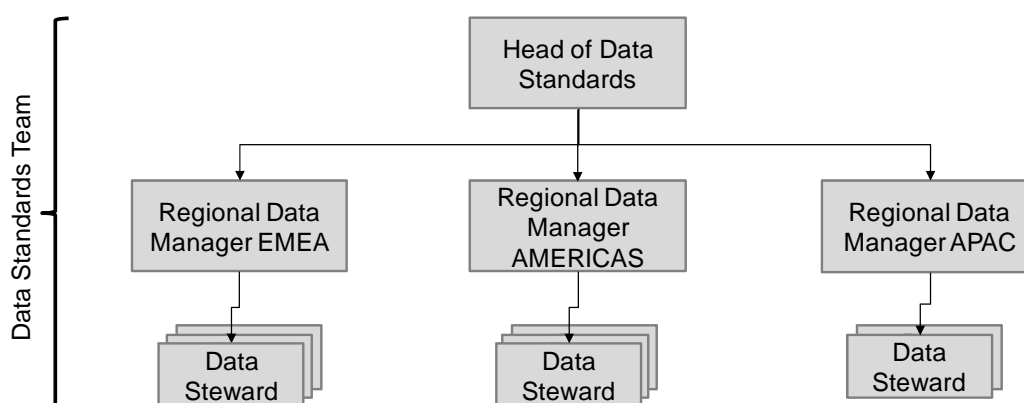


Figure 4-5: Master Data Stewardship Organization

4.3.3 Maintenance Organization

Data Maintainers also belong to DST and are assigned by region. Data Maintainers are full-time power users dedicated to maintaining global master data objects. In the case of material master data, they maintain client level data such as material descriptions and classes, basic data text, and language and address data. Although they are assigned by region, Data Maintainers maintain all master data objects across business segments for all regions.

A *Data Power User* (DPU) is responsible for the maintenance of local master data. He or she is a selected subject matter expert for the data objects in scope. For material master data, a DPU maintains company code, plant, and storage level data, such as planning, costing, sales and purchasing views. Data Power Users belong to and

report to the business. They are not part of DST. Different approaches exist for the local master data organization. Data maintenance can be assigned either across business segments or by business segment. There is also the possibility of adopting a concentrated approach or a networked approach to DPUs. In the first case, a few individuals maintain all local master data full-time. In the second case, there is a network of individuals who are partly dedicated to local master data maintenance. As both options have their strengths and weaknesses, the decision is made individually per country and site. In all cases, DPUs represent a small percentage of the overall end user audience (maximum five percent). Data entry is concentrated on individuals in order to avoid wide-spread maintenance access to critical master data objects. The high complexity of data entry tasks is assigned to a small number of specialists to allow end users to focus on transactional tasks. Besides data maintenance, DPUs support end users in all questions related to data maintenance processes, deliver end user training, act as guardians of adherence and compliance to data maintenance processes, and support data incident resolution. They interact within a network of other DPUs and liaise with Data Stewards.

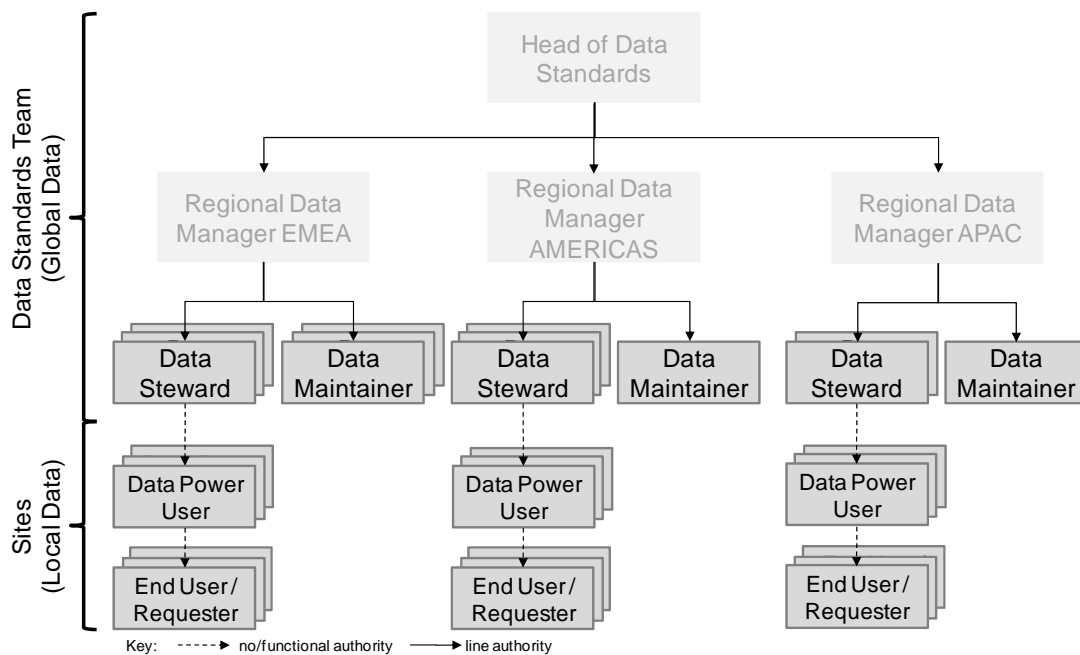


Figure 4-6: Master Data Maintenance Organization

Numerous End Users (all SAP Users) and *Requesters* complete the maintenance organization. Requesters initiate the creation or change of customer, vendor, or material master data via either the workflow or a manual process, and thereby initiate the typical data maintenance process. A requester may be part of Sales Support or Order Fulfillment (for customers), Buying or Finance (for vendors), or Planning Data Maintenance, Buying or Warehouse Administration (for materials). In the old organization, the typical requester was able to maintain master data him- or herself. Figure 4-6 outlines the master data maintenance organization.

4.3.4 Master Data Governance

The main characteristic of master data governance at Ciba is the responsibility assignment by region. Stewardship and maintenance roles are responsible for one specific region, sub-region, country, or site across business segments, business processes, and data object types. Depending on the size of a manufacturing or distribution site, a DPU can be responsible for one specific business segment or data object type only, but this is not the basic governance pattern. The rationale behind an assignment by country is that maintainers are close to the end user, speak the same language, are aware of national culture, and have special knowledge about country-specific regulations. Furthermore, special knowledge of segment-specific master data maintenance is not necessary, although the segments have slightly different customers, vendors, and materials. Data Stewards are assigned by sub-region in order to keep organization and data across countries together, to facilitate coordination in global changes, and to have greater sensibility for cultural differences between countries. Data Stewards were not assigned by country to avoid excessive diversification.

Data object-specific knowledge during maintenance is gathered in the approving steps in the local maintenance workflow for which employees from specific business processes, such as Planning, Financials, or Manufacturing, are responsible. To

consider object- and process-specific knowledge in future data standards, definitions policies, and processes, master data ownership is anchored in business process ownership.

4.4 Systems

The new SAP ERP 2005 system is the central master data hub. There are still lots of interfaces to other systems. Besides Enterprise Resource Planning (ERP), Ciba implemented the following SAP modules: Environment, Health and Safety (EHS), Supplier Relationship Management (SRM), Advanced Planner Optimizer (APO), Global Trade Services (GTS), and Business Information Warehouse (BW). The system is used by approximately 6,000 users.

Ciba has implemented its own master data authorization concept in SAP. Critical master data transactions, such as material master creation and change, have been separated from the standard authorization roles. The tailor-made master data maintenance roles are assigned to DPUs for local data and to Data Maintainers for global data. Ciba uses Access Enforcer from Virsa Systems⁴ as a workflow-based authorization tool. The tool allows users to request additional SAP authorizations and routes the request to an appropriate approver. Once the workflow has been approved, the SAP user account is automatically updated and notifications are sent. The workflow enforces risk assessments, such as segregation of duties, prior to provisioning users with authorizations.

The main platform for DST is the Master Data Management Suite from Sydecon⁵. This suite comprises the three modules MDM Workflow, MDM Repository, and MDM Data Quality Analysis. All modules have a web browser frontend and are based on XML. The MDM Workflow application is used for both global and local

⁴ Virsa Systems was acquired by SAP AG, and is now part of SAP's business unit for Governance, Risk Management, and Compliance solutions (www.sap.com).

⁵ www.sydecon.de

workflows. Local workflows can be adapted to local needs. Data Stewards customize local workflows by choosing from predefined workflow templates and assigning people to each step in the workflow. The initial master data maintenance workflows were designed with a Visio plug-in from which XML is created automatically (cf. Figure 4-7). The data entry forms are created dynamically with information from the MDM Repository. In addition, the tool allows the storage of local Quick References Guides (QRGs). QRGs are a documentation of the local workflow configuration including local business rules and definitions, and can be maintained in the local language. MDM Workflow is not yet integrated with SAP. Therefore, Data Maintainers and DPUs have to transfer the data manually from the application to SAP once the workflow has finished and all data is available and approved. Approximately 2,000 people have access to the workflow, most of them as Requesters or Approvers.

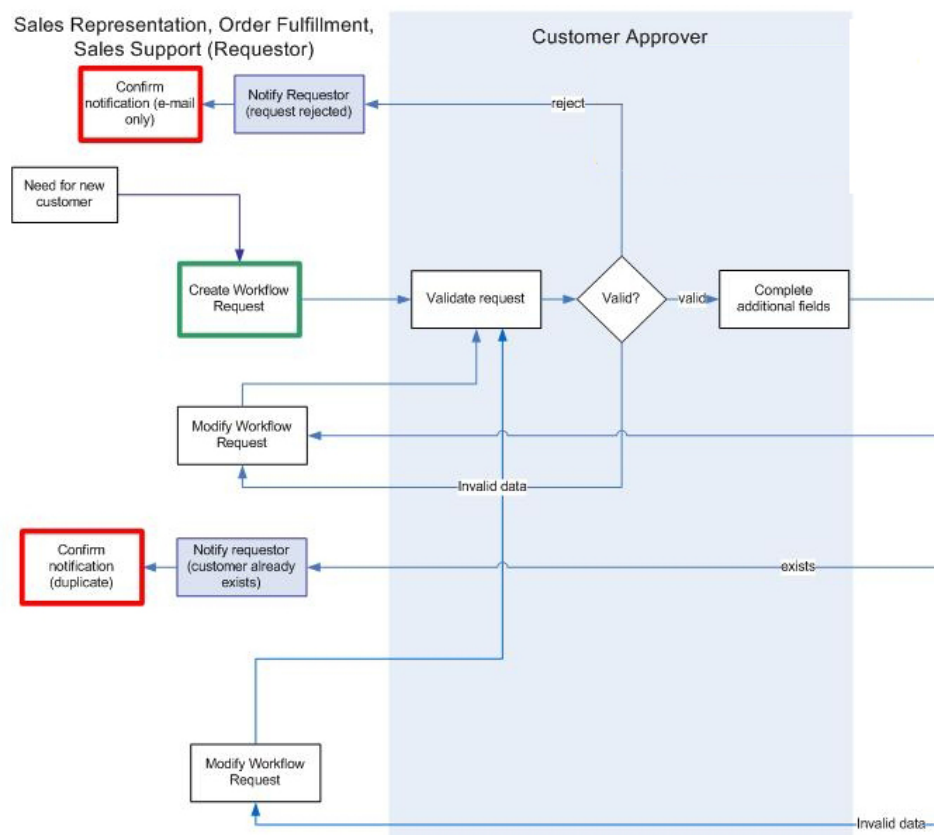


Figure 4-7: Extract from Customer Creation Workflow

Data Object Library (DOL) is Ciba's name for the MDM Repository module. It is a central repository for metadata related to master data maintenance activities. On the one hand, it holds technical information for workflow control, such as mandatory master data fields, field lengths, predefined value lists, and user authorizations. On the other hand, it holds business-relevant information for all attributes of master data objects, such as maintenance instructions, business rules, and ownership information. The DOL is maintained by the DST Team, but it is accessible to all end users via a web interface. Local workflows are based on a local copy of the DOL entries. The local copy can be changed by the Data Stewards and so can the configuration of the local workflow.

The full potential of the MDM Data Quality Analysis module is not yet utilized by DST. The tool creates some reports and statistics which are used by Data Stewards and DPUs for analysis and improvement of maintenance processes and data quality. Reports based on rules in the DOL and automatic notification of DPUs about critical issues are planned for the future.

4.5 Cost and Benefits

The MDM sub-project team was in a fortunate position – it did not have to calculate a business case, since Ciba's top management was convinced that the investments in MDM would pay off. Organizational structures similar to the new ones existed at Ciba, so reorganization effort was kept within a limit. The investments for MDM have been relatively low. The costs of the MDM sub-project, including specification, implementation, and maintenance of the Master Data Management Suite, amount to 1 percent of the overall "Enterprise" project budget.

The benefits of the initiative can only be stated qualitatively. The new organization provides the framework to continuously increase master data quality and support business strategy.

Workflows enable compliance with legal obligations. They ensure that all roles with corresponding authorizations execute their tasks in the correct sequence; maintenance processes are documented and requests can be tracked. Furthermore, workflows support the correct product labeling with declaration of substances. Currently, there are approx. 200 maintenance requests via workflow per day. Through the definition of company-wide procedures for master data maintenance and the assignment of different roles to the people involved, process transparency has increased and clear ownership of processes has been defined.

Reorganization has increased transparency in the organization, enabling idle times and inconsistencies to be reduced. Responsibility for master data is explicitly assigned to business. For example, profound compliance knowledge concerning processes and data is acquired from business. Centralization of master data maintenance with restricted maintenance access enables the overall business case related to the ERP implementation in terms of improved master data quality and subsequent business transactions. High complexity of data maintenance is assigned to a small number of specialists. Centralization eases the application of global and local data standards and supports fast and efficient communication when it comes to adaptations and changes in the master data set-up. Concentration on a few individuals keeps maintenance efforts at the lowest costs, increases the speed of master data maintenance, and makes service and control of master data more effective with focal points for data quality and issue resolution.

The quality of master data support and service has increased. For example, mass maintenance tasks can be handled more easily. The proactive check of data quality and a single source of truth for master data support the business and avoid time- and cost-consuming investigations, corrections, and manual adoptions of reports, for example. Increased master data quality supports other business processes, such

as planning with the SAP APO module, which can only deliver real benefits when material master data is without redundancies.

4.6 Planned Future Developments

The organizational structure and the basic MDM architecture are in place and now have to be animated. The organization still needs to learn and adapt. The role of a Data Steward did not exist in the old organization. For this reason it is difficult for some employees to understand the rationale behind the role. Profound SAP knowledge is still rare among people in the MDM organization. For example, knowledge about connections between fields in master data records is insufficient. The MDM organization plans further consolidation and a decrease in DPUs to 60. It wants to establish the “follow the sun” approach for support by RDM and Data Stewards, i.e., the three regions take turns in providing support every eight hours.

Master data maintenance via workflows should be accelerated and improved. The workflow will directly interface with SAP, so that a master data record is created or changed in SAP without manual intervention. As a result, DPUs and Data Maintainers will have more time to concentrate on monitoring and improving data quality. It is also planned to create further workflows, such as for withdrawal processes. Global workflows will support more data object types in the future, such as financial objects (cost centers, chart of accounts, general ledger, banking data) and non-chemical materials (spare parts). Support for business will be extended.

The largest mission to accomplish is establishing proactive data quality management. During the project, there was no time for re-engineering, standardization, consolidation, or cleansing of data. Therefore, data quality in the new system still has to be improved significantly. For example, the system contains a lot of duplicate master data records for vendors and customers. The DST Life Cycle (cf. 4.2) provides the approach for analyzing processes in respect of

weaknesses, for more monitoring and measuring, and for cleansing data. Furthermore, reporting for data quality KPIs and process SLAs will be expanded.

An ongoing challenge is to maintain a high level of discipline in order to keep implemented processes running. As DST has no authority over DPUs, change management remains a critical success factor. The value of the processes implemented has to be demonstrated to the business. Business always trades off time against data quality. Unclear organization and business processes challenge further automation and formalization of local maintenance processes.

5 Conclusion

At the beginning of 2008, consultants from SAP benchmarked Ciba's MDM solution in eight categories, such as master data quality assurance, governance organization, and implementation strategy. Ciba got top ratings in all eight categories and SAP concluded that MDM at Ciba is in an advanced state [cf. Bettschen 2008]. Although these are impressive credentials, there is room for improvement as the previous section outlined. MDM did not finish with the "Enterprise" project and the transition to operations is difficult.

Ciba set up a centralized MDM organization which enables continuous improvement of master data quality. With dedicated roles for global and local master data maintenance, master data governance, and ownership, clear responsibilities for critical data objects have been identified and established. Concentrated local master data maintenance has been put close to the business. Flexibility in organizing local master data maintenance allows for adaptation to local preconditions. The workflows represent best-practice maintenance processes, support compliance with legal obligations, and are a cornerstone of proactive data quality management. Another cornerstone is the DST Life Cycle, which enables Ciba to define, measure, and improve master data quality.

Appendix A. Master Data Organization Roles

Name	Assignment	Tasks
Regional Data Manager (RDM) (3)	(Stewardship) By region (one for EMEA, Americas, and APAC), belong to DST, full-time	Monitor and guide Data Stewards and Data Maintainers in their region Liaise with Requesters and Data Maintainers Support provider and escalation point for the business Reporting and monitoring Ticket dispatching
Data Steward (8)	(Stewardship) By sub-region / country (e.g. one for Northern, Southern, and Central Europe), belong to DST, full-time	Support DPUs in master data operations (e.g. mass maintenance) and train DPUs Enforce correct application of global and local data standards Propose improvements to RDM and DPU (translate business requirements) Design and implement local master data maintenance processes (customize local workflows) Assure data quality in their region (apply metrics for data quality, create reports for DPU) Maintain data documentation in DOL Collaborate with Data Owners (business units) and DPU in case of issues Escalate data issues to RDM
Data Maintainer (7, ~5 FTEs)	(Maintenance) By region, belong to DST, part-time	Power user dedicated to maintaining global master data objects (customer, vendor, material) Ensure SLAs on global processes Maintain related process documentation
Data Power User (DPU) (200, FTEs unknown)	(Maintenance) By country, segment, site, and/or data object, belong to business, part-time	Maintain local master data objects on behalf of end users Act as single point of contact for a defined set of users Act as guardians of adherence and compliance of all users to data maintenance processes Support maintenance-associated SLAs and KPIs Are able to explain not only the “how”, but the “why”, “when”, and “where” and communicate process changes Provide one-to-one help to end users (level 0 support) Verify, review, and escalate incidents to level 1 support Support data incident resolution Deliver user training, ensure end users are adequately trained Carry out post-implementation stabilization tasks Liaise with Data Stewards Interact within a network of other DPUs
Business	(Ownership)	Act as Data Owner

Name	Assignment	Tasks
Process Owner (BPO)	Through attributes of data objects, belong to business, part-time	Are accountable for organization set-up, data standards processes, data standards and definitions, and policies and guidelines
Business Process Leads (BPLs)	(Ownership) By attributes of data objects, belong to business, full-time	Substitute BPOs Are responsible for data standards and definitions, and policies and guidelines Are accountable for data maintenance processes, master data roles, and master data documentation

Note: Numbers in brackets denote the number of this role in Ciba, e.g., Ciba has 8 Data Stewards, and the corresponding Full-Time Employees (FTEs).

Appendix B. Expert Interviews

No.	Date, Time and Location	Interview Partners (Interviewees)
1	August 20 th , 2008, 12:00 – 13:30, Basel	Patrick Bettschen (Head of DST)
2	August 20 th , 2008, 14:00 – 15:15, Basel	Fabien Kauffmann (Developer, GIS)
3	August 20 th , 2008, 16:00 – 19:30, Basel	Patrick Bettschen
4	August 21 st 2008, 09:00 – 10:00, Basel	Alan Duff (External Consultant)
5	August 21 st , 2008, 10:00 – 12:00, Basel	Marina Munitic (Regional Data Manager EMEA)
6	August 21 st , 2008, 14:00 – 15:00, Basel	Carola Breitschmid (Data Steward DACH)

Kristin Weber (Research Assistant, IWI-HSG) and Martin Ofner (Research Assistant, IWI-HSG) were the interviewers in all interviews.

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