

# Boosting Data Quality for Business Success

WHITE PAPER



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## Purpose of this White Paper

The purpose of this White Paper is to outline the importance of data quality in today's business environment. It describes how an organization should tackle a data quality improvement process and where Informatica data quality software solutions fit into that process.

## Introduction

Information is the life blood of industry and government, but can you trust the quality of the data you use to carry out your day-to-day business? Is the information stored in your company's information technology systems up-to-date, consistent, complete, and accurate? Are your external data sources reliable?

Data quality, or information quality, is a growing concern for organizations more and more reliant on technology. Information-intensive applications such as Business Intelligence (BI), Enterprise Resource Planning (ERP) and Customer Relationship Management (CRM) can only achieve results if the data they use is reliable, complete, and accurate. Substandard data costs businesses vast amounts of money. According to the US-based Data Warehouse Institute (TDWI), poor data quality costs American businesses \$600 billion a year. Process automation means that data is the foundation of all critical business operations, where poor data quality can lead to breakdowns in the supply chain and poor business decisions. Greater public sensitivity means that customers no longer tolerate slipshod customer service caused by defective data.

Virtually all organizations experience problems due to data quality issues. In the financial services sector and other industries data quality problems create difficulties for organizations struggling to comply with current and impending regulation. Basel II, Sarbanes-Oxley, the US Patriot Act, and International Accounting Standards (IAS) all have significant data elements. These four initiatives alone are catalysts for change in the way data is handled, managed, and treated within organizations. But financial services providers and other organizations are still making business decisions based on sub-optimal data. This has to change if they are to meet the challenges of the coming years.

For manufacturing and utility companies, low-quality information on assets, materials, suppliers and customers is hampering globalization and makes it more and more difficult to adhere to an ever-increasing web of mandates.

The lack of standardized data across subsidiaries and operating units prevents effective data exchange and data integration within large organizations. This is even more of a problem when it comes to sharing data beyond a company's borders, which is necessary if efforts to integrate and automate the supply chain are to bear fruit.

Despite the breadth of the impact many organizations are blissfully unaware of the scale of their data quality problem. Others may be aware of the problem but have no real sense of how much it is affecting their business. Make no mistake, however, that poor data quality has a direct impact on the cost of doing business and will reduce return on investment across all industries.

Organizations that have measured the impact of defective data have found they are losing multiple millions of dollars each year. The costs of bad data include wasted materials, re-work and failed business processes. Missing, inaccurate or incomplete data also generates extra work such as hunting down information or additional reconciliation. Poor data quality results in losses that can be measured in revenue, profit, or customer lifetime value as a result of missed opportunities, unhappy customers, and poor strategic planning.

The financial impact of defective data varies from industry to industry, and from company to company. The only constant is that the impact of bad data is far reaching. Our partner PricewaterhouseCoopers has researched the issue. In its survey of 600 senior executives in the US, UK and Australia, more than 75 percent of respondents said they had suffered significant problems, costs, or losses because of poor data quality.

On the upside, the same proportion said they had realized clear commercial benefits from effective data management—thus underlining the scale of the opportunity as well as the dangers. By improving the quality of their corporate data, organizations have been able to improve customer retention rates through better understanding of their customer data. They have increased the efficiency of their supply chains and reduced returns and out of stock problems. Good data quality has given them confidence in their regulatory compliance processes and cut the cost of doing business.

Corporate data is a key strategic asset and like any asset it has associated costs and benefits, and it needs to be properly managed. This means simply collecting and storing it isn't sufficient; it needs to be handled correctly to generate a return. If data is not managed appropriately the quality of the asset degrades and the cost of maintaining data starts to outweigh its benefits. The goal of data quality management is to provide the infrastructure to transform raw data into consistent, accurate, and reliable corporate information, and to keep it that way for the benefit of the business.

## What is Data Quality?

Good data quality is defined in a number of different ways. Ultimately it is about the data meeting the needs of the information consumer. For example, a marketing manager can still execute a marketing campaign even if 20 percent of the data he/she uses is defective. The campaign may be costly, inefficient, and wasteful of resources, but it is unlikely to fail outright. On the other hand, a bank calculating risk exposures for Basel II compliance or an insurance company underwriting its policies could not work with data of such poor quality. The marketing manager may have different data needs than the chief risk officer at a bank or policy-underwriting department in the insurance company, but at the same time all will benefit significantly from improved levels of data quality.

Data quality problems can occur in many different ways. The most common include:

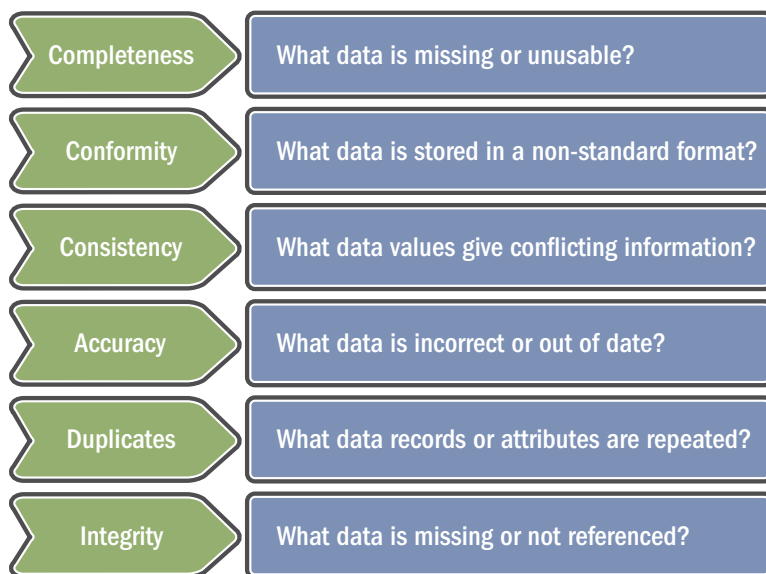
- Poor data handling procedures and processes
- Failure to adhere to data entry and maintenance procedures
- Errors in the migration process from one system to another
- External and third-party data that may not fit with your company data standards or may otherwise be of dubious quality
- Using data collected for one specific application in other systems and business processes

Experience in the United States Department of Defense revealed some time ago that a majority of data errors can be attributed to process problems. Data quality problems often stem from system deficiencies rooted in poorly documented modifications, incomplete user training and user manuals, or systems and data that have been extended beyond their original intent.

This final point is a significant problem in today's business environment where organizations are keen to gain competitive advantage from their information resources. Businesses are using more data from more sources in more systems. New IT initiatives often mean that data collected for one purpose such as billing or manufacturing materials management is being used in other applications such as Business Intelligence, Supply Chain Management, Risk Management, and Customer Relationship Management. But data collected for use in operational systems may not be suitable for these more data-intensive activities. At the same time, fragmented and distributed IT systems can lead to data duplication, lack of conformity across systems, and other discrepancies.

## Data Quality Dimensions

Having a standard way of measuring and understanding data quality is a significant step on the road to achieving high standards in data management. The six key dimensions by which Informatica measures good data quality are completeness, conformity, consistency, accuracy, duplication and integrity.



The dimensions generally cover a multitude of sins that we most commonly associate with poor quality data: data entry errors, misapplied business rules, duplicate records, and missing or incorrect data values. Duplication of data is probably one of the most serious and persistent problems. Duplicate records in a data warehouse, for example, make it difficult to analyze customer habits and to properly segment customers in terms of market, or down to a level of household or subsidiary. Inaccurate data results in poor targeting, budgeting, staffing, unreliable financial projections, and so on.

## The Business Case for Data Quality Improvement

Providing the infrastructure to maintain high-quality data in-house enables data owners to very quickly achieve important benefits, including: cost savings, better decision making, improved customer service, and more streamlined operations, regulatory compliance, and supply chain management.

Any business can calculate the potential financial benefit from investing in high quality data and using data effectively. The payback includes benefits such as cost savings that can be readily quantified, and benefits including revenue enhancement that are more difficult to measure but are no less important to the value of data and information quality.<sup>1</sup>

### The Upside of Good Data Quality

- Cost savings from the removal of redundant customer, product and materials data
- Savings in operational costs
- Cost savings and greater business efficiency from a more integrated supply chain
- Better strategic planning based on more accurate analysis and forecasting
- Increased revenue from identifying and targeting first-time customers
- Enhanced revenue from higher customer satisfaction and retention
- All the advantages associated with better regulatory compliance, fraud prevention and loss control

### Adding up the cost of poor data quality

While there are substantial sunk costs associated with data including acquisition, maintenance, storage, and applications costs. According to analysts, bad data can increase these costs by a factor of 10, including the costs arising from bad business decisions and poor CRM based on such data.

Poor data quality can hamper data integration projects and the development of new enterprise applications from the outset. Despite careful initial planning, 83 percent of all data migration projects over \$1 million either overrun in time and cost, or fail outright (The Standish Group, "Migrate Headaches," February 1999). Although the increased or wasted cost of these projects is significant, it is often dwarfed by the loss in business value that occurs when the implementation of a new business system or data warehouse is either delayed or cancelled. For business value to be maximized, managers and planners of data migration projects must directly address the underlying causes of these overruns and failures. They must not only ensure that their project is completed on time, but also drive to accelerate business value by completing the project ahead of schedule with high quality data as a foundation.

According to The Standish Group report, one of the primary causes of data migration project overruns and failures is a lack of understanding of the source data prior to data movement. This study involved a series of focus groups with IT executives in four US cities. According to these executives, 60-80 percent of the effort in data migration projects is expended on trying to understand and map the source data. They also indicate that this was an iterative process without a predictable endpoint. The study concludes that if source data could be understood more efficiently and accurately, then the project's business value could be delivered on time, or even accelerated.

<sup>1</sup>See Informatica/David Loshin White Paper, "The Data Quality Business Case: Projecting Return on Investment", June 2006 Copyright ©, 2006 Informatica Corporation.



So we know defective data can delay new system implementations, but within existing systems poor quality data also leads to process failure. This means that costly materials have to be scrapped or work has to be redone. It impacts on the performance of your staff—many executives mistrust the information in their information systems to the extent that they are reluctant to use them. These applications were built at great cost and all too often don't deliver enough value to the business because of low quality data.

In financial services for example, where cross selling is a major business driver, institutions are missing vital business opportunities simply because their customer data and their sales data does not match up. Poor data quality, including duplicate entries or missing data such as occupational codes, is hampering customer segmentation. Duplicate entries and incomplete address fields cost businesses millions every year in terms of wasted direct marketing materials and effort. High quality data is also essential for maximizing return from fraud prevention and loss control measures.

For many organizations, there are regulatory compliance issues compelling them to improve risk and data management processes and systems, but the move to improve data quality is driven by a need to satisfy shareholders as much as to comply with regulatory edicts including the Basel II Capital Accord, the USA Patriot Act, and Sarbanes Oxley.

Basel II implementation projects at the largest banks, for example, are exposing significant issues with respect to the risk infrastructure—including policy, processes, systems, and data quality. Most organizations are managing to come to grips with their policy, process, and systems requirements, but data quality remains a significant road block. Complying with Basel II qualification standards requires a significant history of consistent, accurate, and granular data within the credit management information systems. Even for some of the smaller banks this involves integrating information from a wide variety of legacy systems, each with a diversity of data definitions, a variety of data models, and little understanding of data quality levels.

The data quality problem is so pervasive that most analysts and consultants agree that lack of access to high data quality is the greatest obstacle to regulatory compliance.

In the consumer packaged goods sector, poor data quality is delaying efforts to implement a more streamlined, automated supply chain. A recent survey, carried out by A.T. Kearney, estimated that \$40 billion worth of sales is lost each year due to supply chain information inefficiencies. Growing demand for efficiency means that manufacturing, distribution, and retail organizations are looking to more tightly integrate their operational and financial systems along the supply chain. But many organizations are being hindered in their attempts to fully automate the process by a lack of faith in the data that is at the heart of their business applications. The ultimate goal is an uninterrupted link from materials procurement to Point of Sale (POS). Today, however, human intervention is required to ensure the data passed down the supply chain is accurate, timely, and consistent. This costs money and is prone to error.

All sectors and enterprise applications face similar issues to one degree or another, where poor data quality costs money or hampers day-to-day operations. To add to the depth of the problem, data is a non-consumable resource that gets used over and over again for multiple tasks. These tasks are often carried out in parallel. Therefore the costs associated with defective data are cumulative.

## Enterprise Data Quality: People, Process, Technology

Despite the pitfalls of poor data quality, organizations that are addressing data quality in a systematic way can very quickly realize benefits. But the effort can't be half hearted. To date, some organizations that have tackled the data quality issue have only implemented tactical solutions to improve quality within a single application or within a single business process. While this approach may mitigate the problem for part of the organization in the short term, such limited initiatives generally fail to achieve long-term data quality improvement on a broad scale.

How do you tackle the problem of poor quality data, and who should take responsibility for data quality within your organization? To solve the data quality issue for good requires an enterprise-wide approach that includes addressing organizational, cultural, process, and technology infrastructure. This can be achieved on a phased basis, but for data quality improvement to become a reality from which your organization reaps dramatic benefits, the long term view must be taken.

### People

Data quality is a strategic issue that should be driven by senior management and information consumers in co-operation with the IT department. Industry analysts endorse this view – data quality should not be the sole preserve of IT, as IT-only data quality efforts are often ineffective. Because of this, data quality management processes and software should be designed for use by information consumers and business analysts, as well as IT experts.

There is an increasing recognition within the data quality market that there has historically been too much of a focus on IT requirements and not enough on those of the business. The truth is that data quality is an enterprise-wide issue that can only be solved when IT and business departments work together. The IT department has an important role in helping to select the data quality solution and to make sure it fits in with existing IT architectures. The technical capabilities of IT personnel will also be required in the early investigation stage of many data quality processes where multiple legacy and source systems need to be profiled.

But, ultimately, if data quality is to be improved in the long term, the initiative must be driven by a program that addresses data in a business context. If this is to be achieved, responsibility for ongoing data quality needs to be placed in the hands of information consumers.

Informatica advocates a company-wide, iterative, and ongoing approach to data quality. All too frequently, data quality initiatives are limited to the accuracy of customer contact data—names, addresses, and telephone numbers. This may be sufficient for improving a single aspect of quality in support of customer-facing strategies such as customer relationship management; however, a broader approach identifying and addressing data quality issues in all data is required to ensure ultimate success. Informatica Data Quality and Informatica Data Explorer empower the right people in your organization to implement effective and lasting data management processes.

### Process

Data quality improvement is not just about fixing data. There also has to be process and cultural change within your organization to ensure that high standards are maintained. Like any quality initiative, it is important to put programs in place for continuous improvement. No one can be expected to solve all their data quality problems in one go. The only way to ensure that accurate, consistent, and timely data is delivered to the business is through a step-by-step data quality management strategy that eventually encompasses all company data. The data quality process should follow a logical conclusion that ensures data is corrected in source systems and is suitable

for use from collection to consumption. Informatica provides a comprehensive solution for dealing with data quality issues through its data quality management process. Designed for in-house teams of IT and business analysts, the methodology enables organizations to come to grips with the data quality problem in a structured manner. The highly effective end-to-end data quality improvement process leads to a virtuous circle of continuous data quality improvement.

The phases of the Informatica methodology for continuous data quality mirror — or can be adapted to — the stages of other common quality methodologies. This means that Informatica's solutions can be used as the platform for driving company-wide data quality initiatives, no matter what processes an organization uses.

The ultimate goal is to institute change within the organization to ensure data quality is maintained in the long term. This involves incentivizing the people in your organization responsible for upstream data production to provide clean high quality data for downstream systems (i.e., people in call centers collecting data for operational use must consider what else the data could be used for down the line, such as business intelligence).

Reporting and data quality monitoring are key tools for helping to ensure that data quality is embedded in the organization culture. By measuring how data quality problems arise, you can provide the information needed to change business processes and work practices. Producing and publishing regular data quality reports and scorecards also provides the basis for incentivizing managers and data collectors to provide data that really meets the needs of information consumers.

## Technology

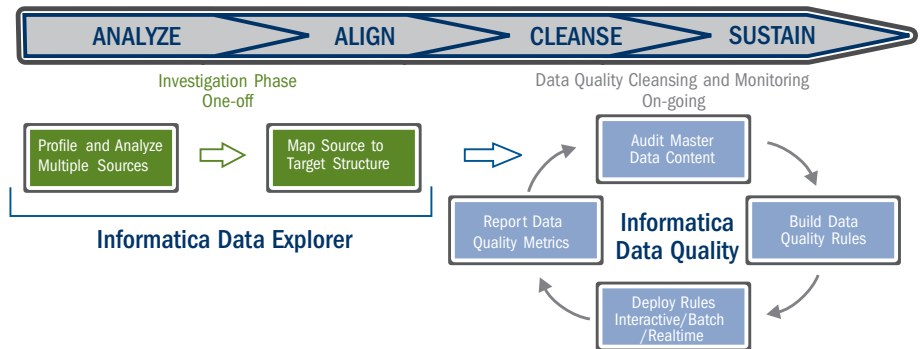
On large datasets it would be impossible to carry out all stages of a data quality management process manually. A powerful and flexible platform capable of profiling multiple data sources and implementing customizable data quality business rules across ALL DATA TYPES is essential to carry out the tasks. Your data quality solution should support ad hoc, batch, and real-time cleansing, and enable both high level and drill down data quality reporting, scorecarding, and monitoring.

The majority of data quality products on the market today were designed for standardization of customer-contact related data elements. But for consumer-oriented businesses (and, to a greater extent, B2B outfits), the amount of information collected about transaction detail, business activity, supplier interaction, production, projects, and inventory now surpasses the volume of customer-related information retained.

Informatica has the most comprehensive data quality solution available on the market. Our products, Informatica Data Explorer and Informatica Data Quality, offer all the functionality needed to initiate and manage data quality programs, from analysis, alignment, and cleansing of all data types to sustaining high levels of data quality. This includes data profiling, standardization, matching, consolidation, reporting/monitoring, and reference data management.

Informatica solutions enable organizations to tackle data quality one system at a time, with a distributed solution that provides centralized control and management to enterprise-wide data quality standards. The products were designed from the ground up to work with all data types including names, addresses, and telephone numbers, as well as non customer-contact data-types such as product, materials, and asset data. The software's component-oriented approach enables users to quickly build customized data quality rules for parsing, standardization, cleansing, and validation of mounting volumes of structured and unstructured data. The data profiling and cleansing processes designed using Informatica Data Quality and Informatica Data Explorer can be used to drive stand alone data quality initiatives or for part of an end-to-end data integration process with Informatica PowerCenter.

# Informatica Data Quality Management Solution



Analyze Align Cleanse Sustain

Informatica has the most comprehensive data quality solution available on the market. Our products, Informatica Data Explorer and Informatica Data Quality, offer all the functionality needed to initiate and manage data quality programs, from upfront profiling and investigation of multiple data sources through to cleansing, de-duplication, monitoring, validation and consolidation.

The combination of Informatica Data Quality and Informatica Data Explorer provides organizations with the industry's most complete platform for successful planning and execution of one-off or ongoing data quality initiatives. Informatica Data Explorer enables the in-depth upfront investigation and profiling of multiple data sources, and Informatica Data Quality is the complete platform enabling business analysts to design, manage and deploy data quality processes across the enterprise. Together these best-in-class products provide a bridge between the IT and business professionals involved.

## Analyze

Data quality begins with understanding all the data in your source systems. Informatica Data Explorer is breakthrough software that puts powerful data profiling and mapping capabilities in the hands of the business and IT professionals who need them.

Informatica Data Explorer profiles data in three dimensions:

1. Column profiling – analyzes all the values within each column or attribute. Discovers the TRUE metadata and points to data quality problems.
2. Single-table structural profiling – examines each attribute in relation to every other attribute/column within a table, looking for dependency relationships. Discovers functional dependencies, primary keys and data structure quality problems.
3. Cross-table structural profiling – compares data between tables, determining which attributes contain overlapping or identical sets of values. Discovers duplicate data across systems; foreign keys, synonyms, and homonyms; and values corrupting data integrity.

All the information discovered about data sources is stored in a repository making it available for other products, including Informatica Data Quality for data cleansing and monitoring and Informatica PowerCenter for data integration, as well as third-party data management products.

## Benefits:

- Automates data investigation, making the data profiling process faster and easier.
- Allows for resolution of data quality issues before the data is cleansed or used.
- Gives full responsibility for data investigation to those in the organization who know and understand the data best.

## Align

Using the information gathered from the data profiling process, Informatica Data Explorer builds a normalized data model, in which unwanted redundancies are eliminated. The model can then be used as a staging area for movement to a fixed target, or as an operational data store.

Informatica Data Explorer is fully integrated with the Informatica platform through the Fixed Target Mapping capability (FTM). This FTM functionality captures the target data structures from packaged applications (or data warehouse designs) and manages the mapping process between profiled sources and the target.

In addition, Informatica Data Explorer maps profiled data sources to targets such as eCommerce applications, data warehouses and packaged CRM and ERP systems. The business and IT community can use the results of data profiling to communicate effectively, understand their business processes and discover where they are flawed. By using the information in the Informatica Data Explorer repository, they will ask the right questions, and will build better, more accurate plans and specifications.

## Benefits:

- Increase effectiveness of new system implementations when metadata is accurate.
- Increase productivity by enabling users to easily communicate data quality issues through tags.
- Reduce risk of duplicating data issues in broader data integration initiatives through integration with PowerCenter.

## Cleanse

Once the data sources have been profiled, the next phase of the process uses that analysis to design and automate data cleansing strategies. This is where Informatica Data Quality steps in.

Informatica Data Quality is unique software that is specifically designed to put the control of data quality processes in the hands of the business. With unparalleled ease of use, the software delivers powerful data cleansing, matching, and reporting and monitoring capabilities in a single solution. Data analysts and data stewards use Informatica Data Quality to easily design, manage, deploy, and control individual and enterprise-wide data quality initiatives. By providing a complete process for measuring, monitoring, tracking, and improving data quality at multiple points across the organization over time, Informatica Data Quality empowers business information owners to implement and manage effective and lasting data quality processes enterprise-wide.

Informatica Data Quality is centered on the Informatica Data Quality Workbench, used for building data quality rules and managing reference dictionaries and scorecards. In combination with Informatica PowerCenter Informatica Data Quality's platform also includes the functionality to deploy solutions in batch and realtime for ongoing cleansing, enhancement and data quality monitoring. Informatica Data Quality is fully integrated with Informatica PowerCenter via PowerCenter Mapping Designer and Workflow.

### **Benefits:**

- Empowers business professionals to manage and deploy ongoing or one-off data quality programs for all data.
- Enables organizations to re-use data quality business rules, storing and deploying the same rules in all environments – interactively, as scheduled batch jobs or in real-time, saving time and reducing costs.

### **Sustain**

To date, many organizations that have attempted to tackle data quality have tended to implement tactical solutions to improve quality within a single application or within a single business process. While this approach may mitigate the problem for part of the organization in the short term, such limited initiatives generally fail to achieve long-term data quality improvement. To solve the data quality issue for good requires an enterprise-wide approach that includes addressing organizational, cultural, process and technology infrastructure.

This can be achieved on a phased basis, but for data quality improvement to become a reality, one from which your organization reaps dramatic benefits, the long term view must be taken. Maintenance, measurement and monitoring are central to all quality management systems, and data quality is no exception. Enterprises that systematically measure data quality provide a foundation for effective data quality improvement as well as for understanding the appropriate uses of data.

Informatica Data Quality supports ongoing data quality improvement through its iterative data quality management process and powerful reporting functionality. Designed for use by teams of data and business analysts, Informatica Data Quality enables users to quickly and easily develop customized rule sets for automated data quality reporting, validation and correction. These rules can then be deployed in interactive, batch or real-time environments to ensure data quality is maintained and improved over time.

The product provides management-level scorecards that monitor the six key attributes of data quality (completeness, conformity, consistency, accuracy, duplication and integrity) across all data. The drill-down reports enable users to zoom in from high-level views to inspect low-quality data records one-by-one and to identify issues in an iterative discovery and cleanse process.

Informatica Data Quality supports and drives methodologies for ongoing data quality management and improvement.

### **Benefits:**

- Increase accuracy of enterprise data assets instilling confidence in data used by business
- Empower business users to manage and deploy data quality programs enterprise-wide by tracking data quality improvements against targets.

## Conclusion



Implementing a data quality initiative involves a combination of people, processes, and technology. Informatica Data Quality and Informatica Data Explorer empower the right people in your organization to implement effective and lasting data management processes.

The combination of these two products provides businesses and government organizations with the industry's most complete platform for successful planning and execution of one-off or ongoing data quality initiatives. Together, these best-in-class products span data quality projects from start to finish, and provide a bridge between the business and IT professionals involved.

Informatica's solution tackles data quality at multiple points across the organization while maintaining centralized control and management of data quality standards. The products supports well known quality management methodologies including Informatica's own data quality management process.

Whether your organization is involved in Financial Services, Consumer Product Goods manufacturing, Utilities, Telecommunications, or Government, Informatica provides the best end-to-end data quality management solution. Informatica is already helping similar organizations to comply with regulations, reduce supply chain breakdowns, and improve business decision making and customer relationship management. Whether migrating legacy data to a new enterprise application or managing an ongoing data quality program, Informatica offers all the functionality needed to ensure high-quality data is available all the time.



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