

Paper #1147

How to Develop a Simple Data Governance Program for a SAS CI Environment in 90 Days

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ABSTRACT

This paper describes specific actions to be taken to increase the usability, data consistency, and performance of an advanced SAS® Customer Intelligence solution for marketing and analytic purposes. In addition, the paper focuses on the establishment of a data governance program to support the processes that take place within this environment. This paper presents our experiences developing a data governance “light” program for the enterprise data warehouse and its sources as well as for the data marts created downstream to address analytic and campaign management purposes. The challenge was to design a data governance program for this system in 90 days.

INTRODUCTION

When an organization needs to simplify its data warehouse and data mart environments to leverage SAS CI for analytics and campaigning, it is advisable to conduct an assessment to better understand the environment and provide recommendations. Initially, your assessment should include a product familiarization workshop, a project definition workshop, and produce an overall roadmap of activities.

You will follow these initial activities with discovery sessions per technological area, and general brainstorming sessions. Using these sessions, you will integrate all these requirements and recommendations gathered into an Assessment Summary Document. The Assessment Summary Document will include recommendations and a draft execution plan.

You may want to divide the assessment in two phases: a technical assessment phase and a people and process assessment phase.

In Phase I – Technical Assessment, you will review the test and active batch environments. You will connect with the development team to discuss infrastructure changes planned and assess the capacity of existing infrastructure to meet new and existing requirements. You will gather and confirm additional details on current environment, and review the simplification plans for the master customer, transaction and other critical tables.

In Phase II – People and Process Assessment, your team will conduct meetings with management and staff to assess readiness, headcount and workflow of activities. The participants in these meetings should be informed of assessment objectives using an assessment preparation instrument. Table 1 below presents a suggested list of meetings to conduct and the main issues to discuss.

Meeting	Main Issues
Review Architecture evolution for data loading	<p>Is Data model too complex for operational purposes?</p> <p>Are there limitations in infrastructure (volumes/transactions/accessibility)</p> <p>Are we getting failed or inaccurate data loads that impact the entire downstream process of all of the work that needs to be performed?</p>
Stabilize customer match/merge (Dataflux)	<p>Do we have a description of the current data cleaning (Dataflux) process?</p> <p>What are the monthly volumes? Do we have record of system downtimes for the past 12 months? What is the current throughput?</p> <p>How can the cleaning process be improved to support peak volume by processing only necessary records (reduce volume), recover gracefully from errors (less downtime), and process more quickly (more throughput)</p>
Accelerate marketing automation (SAS CI)	<p>Do we have a list of all the datasets in the analytical database?</p> <p>What are the datasets needed for analysis? Who are the main analysts?</p> <p>Does the analytical data model contains too many large disparate data sets that aren't linked together logically for ease of analysis?</p>

Table 1. Assessment Meetings and Main Issues

The assessment should be focused on the main systems needed for marketing analytics and campaigning. At the highest level, the analytic system needs to accomplish four key objectives:

1. Data Loading: Get the correct data and changes from target source systems and efficiently transform and move it into our analytics ecosystem
2. Data Hygiene: Enrich and clean the raw source data efficiently and correctly
3. Analytical Views: Format the data in a way that is easily usable and consumable by the Analytics teams for their business purposes
4. Support Marketing Efforts: Provide the basis and the tools to support revenue-generating data-driven marketing efforts across channels

The technical assessment should provide information on all the above four processes involved: extraction of data from source systems, transformation and cleaning of data; load of clean data into EDW data model; analysis and reporting of data and finally, the use of the data for marketing campaigns.

Using this information, five areas should be initially defined and covered:

- Area I – Data Loading Evolution
- Area II – Stabilize the Match/Merge Process
- Area III – Accelerate Marketing Analytics
- Area IV – Improve Campaign Performance
- Area V -- Data Governance

Area V for Data Governance addresses the fact that, in every organization, the amount and the complexity of corporate data in every business unit is growing. Data are increasingly shared across corporate and geographical boundaries. New organizations are being acquired and new sources of data are being added to the Enterprise Data Warehouse (EDW). The success of the EDW will ultimately hinge on its ability to maintain a coherent view of data, both now and in the future.

Table 2 below shows an information evolution model. We can use this model to identify missing components. Notice that governance is a critical component at level 3 Integration.

LEVEL	INFRASTRUCTURE	KNOWLEDGE PROCESS	HUMAN CAPITAL	CULTURE
1. OPERATE	Manual Systems	Personal	Individual	Me
2. CONSOLIDATE	Departmental Applications	Department	Information Analysts	Our Department
3. INTEGRATE	Enterprise Systems	Enterprise	Data Governance Office	All of us
4. OPTIMIZE	Extended Enterprise	Extended Enterprise	Extended Group	Our partners and us
5. INNOVATE	Adaptive Systems	Extensive Analytics	Virtual Teams	Innovation

Table 2. Information Evolution Model

For any company that wants to improve the quality of its data, it is critical to understand that achieving the highest level of data management is an evolutionary governance process. An organization that, a particular time, has a disconnected network filled with poor-quality, disjointed data cannot expect to progress to the latter information evolution stages quickly. There is usually a backlog of activities. The infrastructure and the staff (both from an IT standpoint as well as from corporate leadership and data governance policies) are often simply not in place to allow

the organization to move quickly from undisciplined to governed.

With a focused Data Governance effort, an organization could uncover relationships across tables, databases and different source applications associated with a selected key theme. By discovering relationships within and between the selected data tables, the governance team, led by the data governance manager, can form a complete picture of the actual content of the data, simplify projects and enable more consistent results, all while providing a faster time to value from the team efforts. Upon success, the initial structure and plan should be expanded and maintained as new processes, applications and data are introduced to the EDW business.

You may find out from the assessment, the system under evaluation, needs remediation regarding POS data loading, data cleaning, data modeling for marketing and also Data Governance.

Figure 1 below depicts a typical SAS CI system.

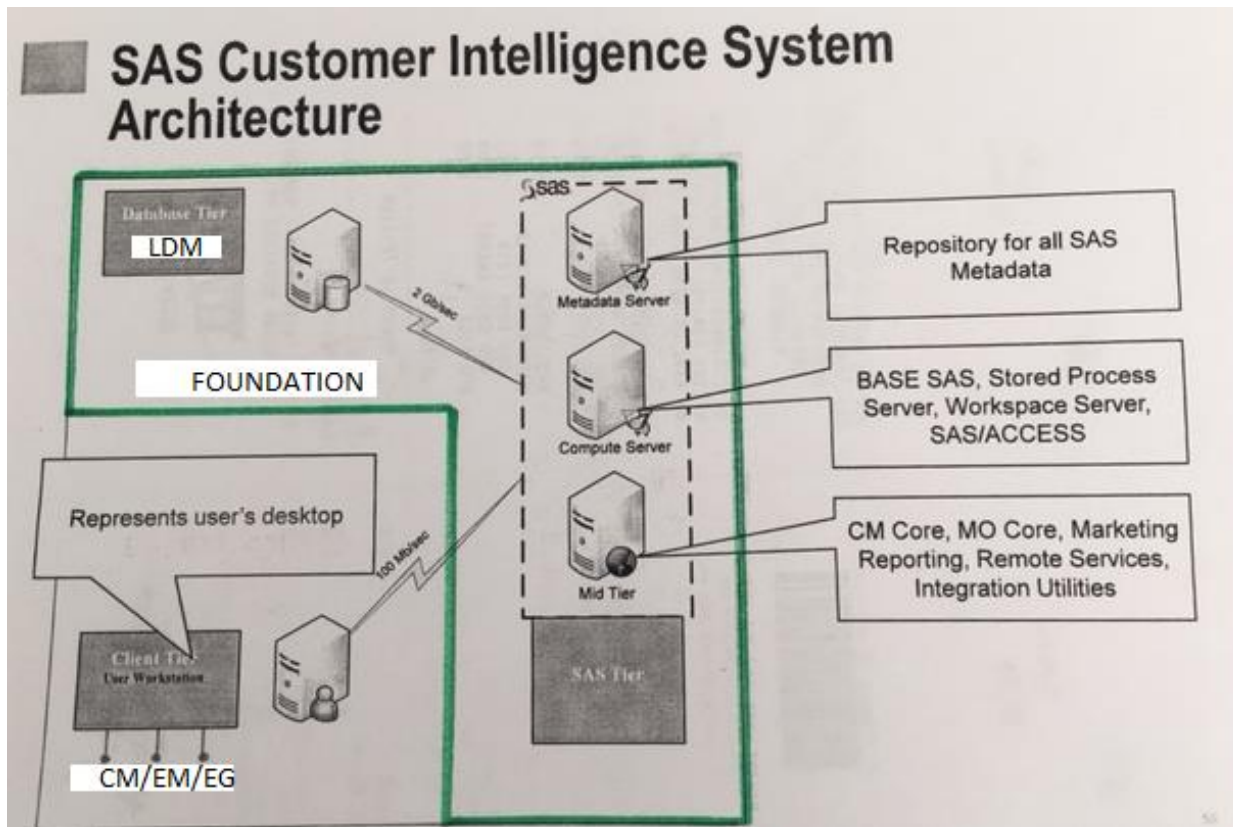


Figure 1. SAS CI Solution Overview

We find frequently that several tasks need to be addressed to make the system perform well. Table 3 below depicts how all the remediation tasks from different areas should work together to stabilize a SAS CI system.

WHAT NEEDS TO BE DONE	HOW TO SOLVE THE ISSUE
Area I -- The system needs to do a better job of sourcing business events from across all of our source systems and orchestrating their loading into the EDW	Source data properly for the improvements below on Areas II-V
Area II -- The Dataflux process needs to be improved to support peak volume by processing only necessary records (reduce volume), recover smoothly from errors (less downtime), and process more quickly (more throughput)	Review rules and survival for email, address, phone and name <ul style="list-style-type: none"> • Optimize delta job • Stabilize Match and Merge process • Identify data quality improvements
Area III -- Work with the stakeholders to understand their analytical needs and create aggregate data views that allow them to easily run analytics and reports to support the cadence of the business	Create 2 data marts <ul style="list-style-type: none"> • longitudinal guest view • summary tables Automate CSV data collection Optimize segmentation SAS code
Area IV -- Deliver the data to campaign consumers in a way that allows them to focus their efforts on marketing, not on the intricacies of the data	Create two new CI marts Create four new Information Maps
Area V -- Improve system governance	Develop the three main themes of a LIGHT data governance framework: organizational structure, processes/decisions, and operational plan

Table 3. Simplified Remediation Tasks Example

METHODS

STANDARD DATA GOVERNANCE PROGRAM

This paper focuses on the development of data governance (Area V in example above). We start by considering a standard data governance program. Typical Data Governance goals include seven components:

1. Improve decision-making and coordination
2. Reduce internal issues
3. Protect data stakeholders
4. Adopt best practices to address data issues
5. Build repeatable information processes
6. Reduce costs and increase effectiveness
7. Ensure transparency of processes

The three main key components of a standard data governance are: sponsorship, ownership and stewardship. Sponsorship is about active management support from both top-level senior management and management in business units. Successful data governance is achieved through the enterprise-wide communication of a compelling vision for change, setting performance targets and allocating appropriate resources and budgets. Ownership is all about accountability of data quality. Data are created and maintained to enable and support business. Finally, stewardship includes the ability to understand requirements and needs of data owners and translate these needs into data solutions.

The Data Governance Institute proposes a ten component framework to establish a typical data governance program. Figure 2 below depicts the components.

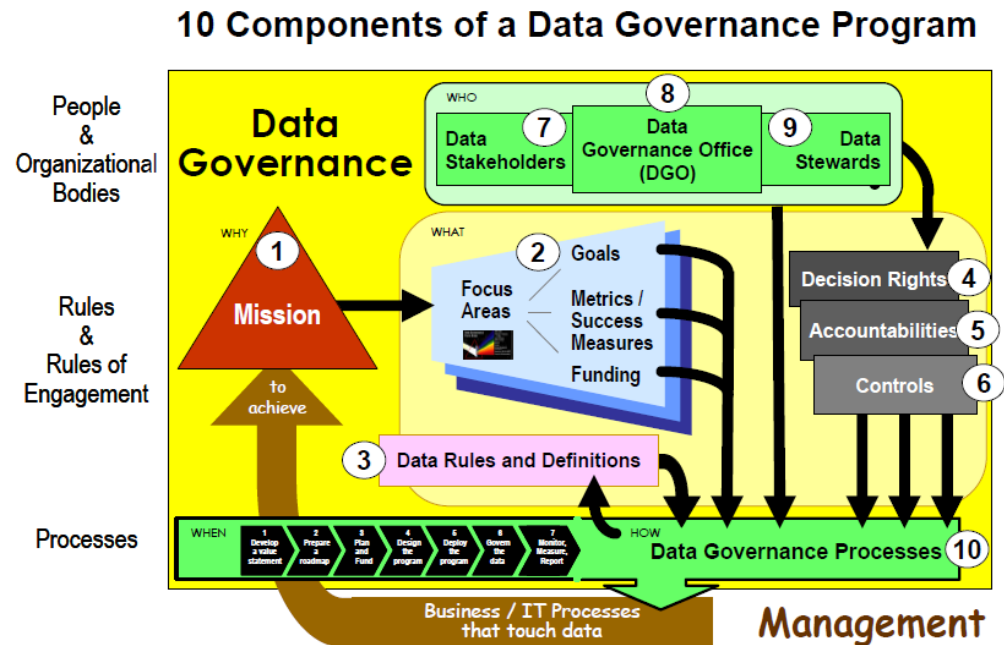


Figure 2. Ten Components of a Data Governance Program DGI®. Data Governance Institute

When defining a standard data governance program in relation to data quality, we need to consider what data quality (DQ) problem we are addressing, for instance, quality, integrity, usability, and/or consistency of data. We should consider the data quality group or business team that needs better quality data. These groups will define the scope of the data governance project i.e. the EDW group, marketing analytics, marketing, delivery, and CRM. Finally, we consider what data governance can do, besides work with rules, resolve issues, and provide stakeholder care. Data governance should set the direction for Data Quality, monitor data quality, ensure consistent data definitions, identify stakeholders, establish decision rights and clarify accountabilities.

The organizational structure for a Data Governance (DG) program encompasses the groups and individuals involved in data governance and the relationships among them.

A typical data governance structure includes the data governance manager, a data management committee, a data government executive council, and IT personnel. Members of these groups should have the authority to make the key decisions outlined for the work and understand when to escalate an issue or development to another group in the data governance structure.

A data governance program standard usually includes a Data Governance Office (DGO). Initially, a consultant could work with the Data Governance Manager to establish the DGO and develop a well-defined set of data standards to be used to support data quality, including documentation of data domains, data dependencies, source to target mappings, semantic management, naming conventions, and data-typing. Additionally, the consultant could work to maintain accurate, complete, and timely information about the data marts and warehouse entities as well as provide feedback to source systems to remedy data quality issues. The organization should implement and adhere to a configuration management plan to include any QA approved updates to the plan.

Also a standard governance program should address an Enterprise Performance Life Cycle (EPLC). This is a process-driven IT life cycle management approach emphasizing enterprise integration based on development of sound business and technical requirements. Realizing the benefits of the life cycle methodology, success of the services model shall depend on the adherence to the organization information technology standards.

Finally, in a standard DG program, The Data Governance Office (DGO) develops executive decision support dashboards and scorecards which will automatically alert users when thresholds are surpassed and action needs to be taken.

LIGHT DATA GOVERNANCE PROGRAM

Frequently, data governance faces time constraints. This situation makes difficult to develop and implement formal standard governance processes and instruments. If this is the case, it is possible to create an initial seed, a "light" data governance program in 90 days by focusing the work of establishing data governance in three primary phases:

1. Organizational Structure
2. Processes and Decisions, and
3. Operational Plan

To establish these three primary aspects, we can start by creating a simple plan to include the following ten Steps for a "Light" Data Governance Development Plan:

1. Define DG mission and scope
2. Identify initial focus area and metrics for success
3. Define key data elements and clarify definition
4. Document decision rules
5. Facilitate definition of key accountabilities
6. Create initial data controls using dashboards
7. Identify stakeholders
8. Assist in the formalization of the organizational structure
9. Identify data stewards
10. Review and formalize basic data governance processes

Your development plan execution should yield the nine workproducts shown in Table 4 below :

WORK PRODUCT	DESCRIPTION
1. Data Governance Policy	Organizational Structure
2. KPIs definition document	Processes and Decisions
3. Stewardship Policy	Processes and Decisions
4. EDW Data Dictionary and Metadata File	Processes and Decisions
5. Change Management Policy	Processes and Decisions
6. Data Issue Identification Policy	Processes and Decisions
7. Governance Dashboard Prototype	Processes and Decisions
8. Data Governance Manual	Processes and Decisions
9. Data Governance Operational Roadmap	Operational Plan

Table 4. Data Governance Light Initial Work products

Organizational Structure Phase

Establishing a light structure for data governance is a critical initial step. This initial step will ensure representative groups at the leadership and implementation levels have the authority to make collective decisions about the information assets and will understand their role within the broader DGF effort.

A good initial structure may have the following elements:

1. Data Governance Manager
2. IT Responsible
3. Business Units (BU) Data Stewards Group
4. Data Governance Board

Some of the activities needed to establish the light organizational structure are:

1. Confirm the identity of the Data Governance Coordinator/Manager and determine which entities (BU) need to be represented in the governance structure.
2. Determine which roles within BUs needed to be represented at the leadership and implementation levels.
3. Agree on purpose, scope, and work of data governance, including roles and responsibilities within the effort presented here.
4. Invite the individuals serving in governance roles (not involved) to become a member of either the data policy or data management committee.
5. Schedule a kickoff meeting to introduce (or reacquaint) participants with the purpose, scope, and work of data governance, including their role and responsibilities within the effort.
6. Identify a set of critical KPIs (Data Assets) with BU representatives to define an initial data definition scope.

Roles and Responsibilities

It is very important to identify roles and responsibilities for all involved in the data governance process. There is often lots of fear of the unknown and information helps everybody feel more comfortable. Mission critical systems such as the EDW system to collect guest information are crucial to the organization's continued success in meeting its mission. These systems need render timely and accurate data while meeting the demands of diversified needs of users throughout the organization. Additionally, these systems shall result in rich sources of data, which provide an integrated view of the guest. For these critical systems to operate smoothly, it is important to clarify each one's role and contribution.

BU Data Steward

Represent his/her business unit (BU) at the Data Governance Committee. Work with Data Governance Manager and Data Governance Team to develop, implement and manage data strategies that optimize data quality to improve standardization and business information value derived from enterprise data. Develop business process models and documentation related to his/her BU for various data sources coming into Enterprise Data Warehouse

Effectively communicate and document business and IT information in line with agreed upon data governance process/procedures. Balance technology and business issues as well as communicate appropriately with both technology and business experts. Analyze and evaluate BU data / information gathered from multiple sources and reconcile / address conflicts or business issues

Conduct independent analysis and review requirements utilizing knowledge of business systems and requirements, with ability to supply alternative suggestions/improvements to BU data requirements. Manage BU activities to support data stewardship of company wide data from any/all sources into EDW.

Manage BU data cleansing, de-duplication and harmonization of data across and within enterprise systems. Identify, analyze, and interpret trends or patterns in complex data sets and develop graphs, reports, and presentations of results

Convert business rules from business Subject Matter Experts (SME) into technical rules for data quality analysis and management. Write SQL to query EDW data structure and identify root causes for data issues

Work with BU SME to define and execute data quality test scenarios and ensure appropriate end user training. Examine sets of data against criteria for completeness, correctness, and integrity

Data Governance Manager & IT Responsible

Some of the tasks what should be conducted by the Data Governance manager in conjunction with the IT responsible for data governance are:

- Coordinate the Data Governance Committee and develop a data governance communication plan.
- Communicate between Data Governance Committee and Senior Management by creating effective communication pieces: Elevator Speeches, Impact Statements, Presentations, Governance Status Reports,

Stakeholder emails, and more.

- Understand and follow organization's protocols for engaging staff, assigning data governance tasks, and providing data governance status to management.
- Promote Data Governance across the organization
- Develop Information Governance Strategy and Implementation Plan based on governance frameworks
- Evaluate risks in business processes associated with data assets and document process steps, underlying technologies, and inventorying structured and unstructured information assets
- Categorize and maintain data assets based on its level of criticality and impact to the organization
- Use governance tools to identify and locate data assets
- Map and document the flow of critical information (KPI) throughout the information lifecycle
- Deploy technologies to support data management and governance including identifying, categorizing and mapping data flows
- Perform privacy data risk assessments to proactively identify, assess, treat and monitor risks
- Assess the effectiveness of the design of information governance policies
- Conduct project management, development and implementation of information governance toolsets, practices, and policies to analyze and report risks, and to manage information risks faced by the organization.
- Gather, analyze, and report Information Governance Metrics and KPI's to VPs, peers, and senior management.
- Understand complex systems in scope of the data governance program and related applications.
- Document and store the collection of decision rights that are the "metadata" of data-related decisions
- Facilitate the decision-making process by working with Data Stakeholders to understand options, to reach consensus, to translate one group's position to language another can understand, to facilitate decision-making sessions, and to report status and progress.
- Facilitate, document and store the collection of decision rights that are the "metadata" of data-related decisions.

Data Governance Board

The board provides oversight to the program, issue policies, and resolve issues. It makes, collects, and aligns rules. It addresses gaps and overlaps in rule sets. The board establishes guidelines for how to layer rules on top of each and establishes clear data accountabilities. It also establishes decision rights and defines process development.

Data Stewardship Council

BU Data stewards come together to make data-related decisions. They may set policy and specify standards, or they may craft recommendations that are acted on by the higher-level Data Governance Board. They resolve data-related issues. Issues are generally addressed at several levels, with a clear escalation path. The data stewardship group escalates unresolved data issues to the Data Governance Board. The group monitor rules and it is coordinated by the Data Governance manager. This group harmonizes data definitions and develops data standards.

The group recommends ways that existing general controls (Change Management, policies, training, SDLCs and Project Management, etc.) could be modified to support governance goals or enterprise goals and assists with internal or external audits by explaining how different data-related controls build upon each other

The group sets the scope of data-related change management and oversees change management activities such as:

- Changes to allowable values for reference tables
- Changes to physical data stores that impact the ability to access or protect in-scope data
- Changes to data models
- Changes to data definitions
- Changes to data structures
- Changes to data movement
- Changes to the structure of metadata repositories
- Changes to types of metadata included in a metadata repository

- Changes to stewardship responsibilities

Processes and Decisions Phase

The second phase in the process of developing a data governance program is the processes and decisions phase. Begin the processes and decisions phase with assigning appropriate levels of authority to data stewards using policies and procedures and proactively defining the scope and limitations of that authority is a prerequisite to successful data governance. This is the reason why it is important to establish an organizational structure with different levels of data governance (e.g., executive, management, rank and file, etc.). Specify roles and responsibilities at various levels (e.g., governance committee members, stakeholders, data stewards, etc.).

The DG Manager and the IT responsible identify data stewards (e.g., program managers) responsible for coordinating data governance activities, discuss with their managers, and assign them to each specific domain of activity. The DG Manager and the IT responsible define and communicate data stewards' roles, responsibilities, and accountability for data decision making, management, and security to data stewards themselves as well as other relevant stakeholders. The DG Manager and the IT responsible formally grant data stewards the authority to quickly and efficiently correct data problems.

The key to maintaining high quality data is a proactive approach to data governance that requires establishing and regularly updating strategies for preventing, detecting, and correcting errors and misuses of data. Ensuring that data are accurate, relevant, timely, and complete for the purposes they are intended to be used should be a high priority issue for every organization.

Develop Initial Policies

Three basic policies to be developed are:

1. Stewardship Policy
2. Change Management Policy
3. Data Issue Identification Policy

The stewardship policy regulates the stewards role and responsibilities. The Change management policy guarantees effective oversight of changes in the system. Finally, the data issue identification policy provides guidance on how to deal with data problems.

Create Data Inventory using EDW Data Dictionary and Metadata File

At the same time of the policy creation effort, The DG team should conduct an inventory of all data that require management. This is a critical step for data governance projects. The team will produce a data dictionary of the system including both the tables on the EDW as well as the SAS CI data marts. Maintaining an up-to-date inventory of all records and data systems, including those used to store and process data, enables the organization to target its data management efforts.

- Create a detailed, up-to-date inventory of all data elements included in the analytic information system
- Classify data elements according to the level of usage (hot, cold)
- Create a written policy regarding data inventories that outlines what should be included in an inventory and how, when, how often, and by whom it should be updated

Track Key Performance Indicators (KPI)

After identifying the data, The DG team should identify a critical subset, a set of 15 critical KPIs (Data Assets) to follow closely. This set will define an initial data target for definition scope.

The collaborative and iterative creation of a KPI asset inventory is a mandatory first task for the core data governance team. Once this process is up and running, it provided a solid foundation to move data governance forward.

In Table 5 below we present an example of Data KPIs identified.

ID	KPI NAME
KPI-1	Customer Drift
KPI-2	Customer under Merge
KPI-3	Email Opt Out Intake
KPI-4	Customer over Merge
KPI-5	Address Index
KPI-6	Ski School Product Grouping
KPI-7	Lift Access Product Categorization
KPI-8	Over Merge Indicator #2
KPI-9	Percent Transactions with an Unknown Customer (Pass Comparison Table)
KPI-10	Pass Sales: Historical Marketing Geography by Day
KPI-11	Pass Sales Post Deadline Refunds
KPI-12	Deviation of Scan Detail from EDW to Source
KPI-13	Percent Transactions with an Unknown Customer (Resort Transaction Table)
KPI-14	Epic Mix Activation

Table5. Sample Data KPIs for a Ski Resort

Prototype KPI Data Dashboard

To better understand the behavior of the KPIs, the DG team should develop a quick prototype to display the chosen initial KPIs. It is good to use a high performance .net application that can be deployed onsite or cloud. It should have the capability to connect with multiple data sources via ODBC and automatically generate ANSI SQL. It could use CSV files to display KPIs. Since SAS CI is a SAS application, the dashboard could consume KPIs generated by SAS programs, SQL and other BI tools, These KPIs should be sent to the application for consumption.

The application should give the steward a quick high-level picture about how to display the data quality KPIs. Operational Performance Indicators can easily be analyzed to make effective decisions. The application should provide simple drill down capabilities, and a friendly user interface to build KPI dashboards.

The fast ad-hoc dashboarding should be simple, and easy to customize. A Dashboard example is presented in Figure 3 below.

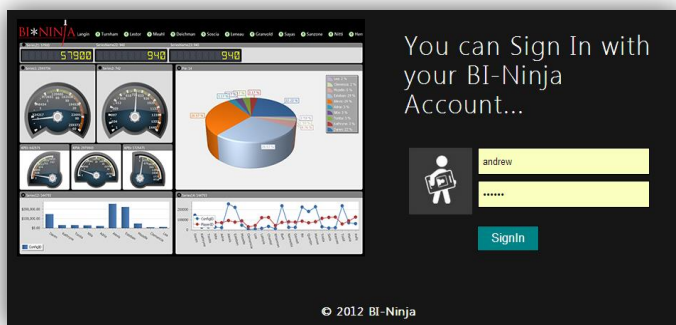


Figure 3. Example of a KPI Data dashboard – Reprinted with permission from Qualex Consulting.

Create a Data Governance Manual

Finally, The DG team should create a Data Governance manual. This data governance manual will help ensure the documentation of processes and decisions associated with the quality of marketing data. This manual will assist the organization with establishing and maintaining a successful data governance program. As we discussed before, data governance is an organizational approach to data and information management that is formalized as a set of policies and procedures that encompass the full life cycle of data, from acquisition to use to disposal. This includes establishing decision-making authority, policies, procedures, and standards regarding data security and privacy protection, data inventories, content and records management, data quality control, data access, data security and risk management, data sharing and dissemination, as well as ongoing compliance monitoring of all the above-mentioned activities.

Adopting and enforcing clear policies and procedures in a written form is necessary to ensure that everyone in the organization understands the importance of data quality and security—and that staff are motivated and empowered to implement data governance.

Operational Plan Phase

The initial policies and procedures developed during the development of the data governance “light” project will help identify and grow the number of organizations initially involved as well as the topics covered by governance.

The organization should further define and document the initial standard policies and procedures about all aspects of data governance and the data management lifecycle, including collection, maintenance, usage and dissemination.

Moving forward, the organization should put in place additional policies and procedures, beyond the initial basic policies, to ensure that data are accurate, complete, timely, and relevant to stakeholder needs.

The organization should identify additional policy priorities affecting key data governance rules and requirements and secure agreements (either a formal agreement or a verbal approval) on priorities from key stakeholders.

The organization will create a written plan outlining processes for development of additional policies and procedures as well as for monitoring compliance with established policies and procedures.

A follow up step to this initial data governance “light” program should be to address data security and risk management. Ensuring the security of sensitive and personally identifiable data and mitigating the risks of unauthorized disclosure of these data should be a top priority for an effective second generation of the data governance plan.

CONCLUSION

Data governance is a valuable addition to a SAS CI system. It provides the foundation to avoid rework and to improve collaboration among the many groups that make useful the SAS CI solution for an organization.

The initial data governance light could have further developments. For instance, it would be good to conduct a risk assessment, including an evaluation of risks and vulnerabilities related to both intentional misuse of data by malicious individuals (e.g., hackers) and inadvertent disclosure by authorized users.

An effort should be made to put in place a plan to mitigate the risks associated with intentional and inadvertent data breaches. We think that it would be useful to monitor regularly or audit data security.

In addition, the organization should:

- Establish policies and procedures to ensure the continuity of data services in an event of a data breach, loss, or other disaster (this includes a disaster recovery plan) and put in place policies to guide decisions about data exchanges and reporting.
- Put in place policies and procedures to ensure that all relevant data are collected, managed, stored, transmitted, used, reported, and destroyed in a way that preserves privacy and ensures confidentiality and security.
- Conduct an assessment to ensure the long-term sustainability of the established “light” data governance policies and procedures, including adequate staffing, tools, technologies, and resources.

- Conduct regular data quality audits to ensure that strategies for enforcing quality control are up-to-date and that any corrective measures undertaken in the past have been successful in improving data quality.

Please note that all recommendations included in this paper are intended to complement, not supersede, the overall organization's IT policies and security regulations.

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