GS1 US

GS1 US National Data Quality Playbook

7 Ways to Enhance Product Data Quality

Executive Summary

The role of this playbook is to address the content acquisition (creation or sourcing) and data aggregation needs of companies at specific stages in their data quality journey as well as share best practices in gaining executive buy-in for and execution of a robust data quality strategy. The focus is on product identification and attribution, as these relate to Master Data Management (MDM) and data sharing along the supply chain.

Any business transformation begins with a focus on strategy, and its success depends on executive support. With those prerequisites in mind, this playbook includes a high-level architecture of internal and external systems: Product Information Management (PIM), MDM, Enterprise Resource Planning (ERP), tools/resources, and the standards needed to support specific data sets. These data sets are aimed to encompass all areas of trade, both business-to-business (B2B) and business-to-consumer (B2C), which includes e-commerce. This playbook will also aim to answer the following questions: What is data quality, who is the responsible party, and what, specifically, do I need to know from a recipient (receiver/buyer) role and/or a supplier/source role?

The answers to these questions serve organizations to help avoid various risks associated with inaccurate product data. They not only help in the B2B world to achieve alignment with trading partners, but also allow the delivery of consistent consumer experiences regardless of delivery channel—strengthening brand awareness and loyalty.

Trading partners define data quality as having consistent, complete, accurate, standards-based, timely data. Trading partners measure product data quality as "electronic data exchanged equals physical data." Data quality reaches beyond accurate data, encompassing an overall program within an organization that includes executive leadership support, commitment to standards-based data, and processes to validate that consistent, complete, timely, and accurate information is being captured and utilized for both internal processes and external sharing. This provides the foundation for an efficient supply chain and enables trading partner collaboration.

For more information and resources, visit the
GS1 US National Data Quality Program at
www.gs1us.org/dataquality
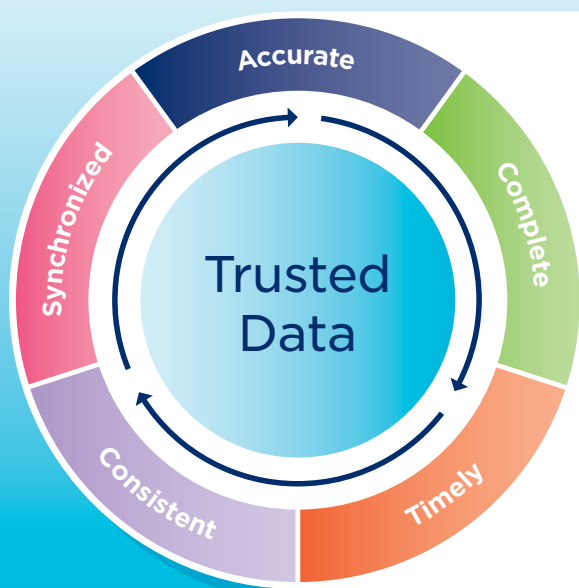
Accurate	• *Data provided is aligned with how it is viewed or used by trading partners* • *Data provided matches the label*
Complete	• *Data needed for different business processes or decision-making means a variety of data elements are needed by trading partners*
Timely	• *Real time as much as possible; a lot of business takes place within an hour*
Consistent	• *Multiple data sources used by trading partners need to have consistent core information*
Synchronized	• *Collaboration across trading partners is essential to achieve data needs*

Strategy & Executive Support

Even before data is acquired and deployed, either internally across an enterprise or externally with trading partners, a data quality journey needs to be grounded within an enterprise-wide strategy with executive support.
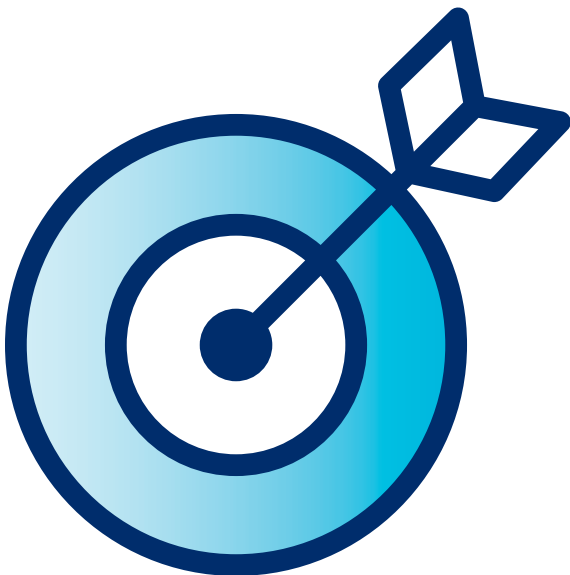
Strategy

While a data quality journey may start as a project in reaction to a problem that needs to be addressed, at some point the project may turn into a program grounded in repeatable lean processes with continuous improvement initiatives. It is at this point that a true MDM program, guided by a clear strategy and/or mission, becomes foundational for success.

A data strategy serves to guide the multiple data-driven programs that support business decisions (i.e., reporting), customer satisfaction, operating processes, and procedures. It allows an organization to shift from a reactive approach to data to a proactive one and serves to set an expectation of the importance of data to the organization.

A data strategy is typically enterprise wide but is implemented at the department level to align the organization from the ground up. The departmental or individual program mission statements often set the benchmark for measuring success.

However, there is no hard and fast rule for how strategy statements are formatted. In fact, many include combined statements with your vision, mission, strategy, guiding principles, and approach all in one with the goal of developing guidance that supports the overall business objectives for data governance and quality.

Executive Support

Success for enterprise-wide adoption of a data quality strategy starts with alignment and support from executive management. Education and agreement on obtaining quality data and the impact it can have on the organization and customers are key to obtaining executive approval to proceed with the implementation of an MDM or data governance program. Often, this step is initiated in response to internal or external pressures, like customer problems, costs incurred from inefficiencies, or added regulatory requirements for product information. Consider the following before connecting with organizational leadership:
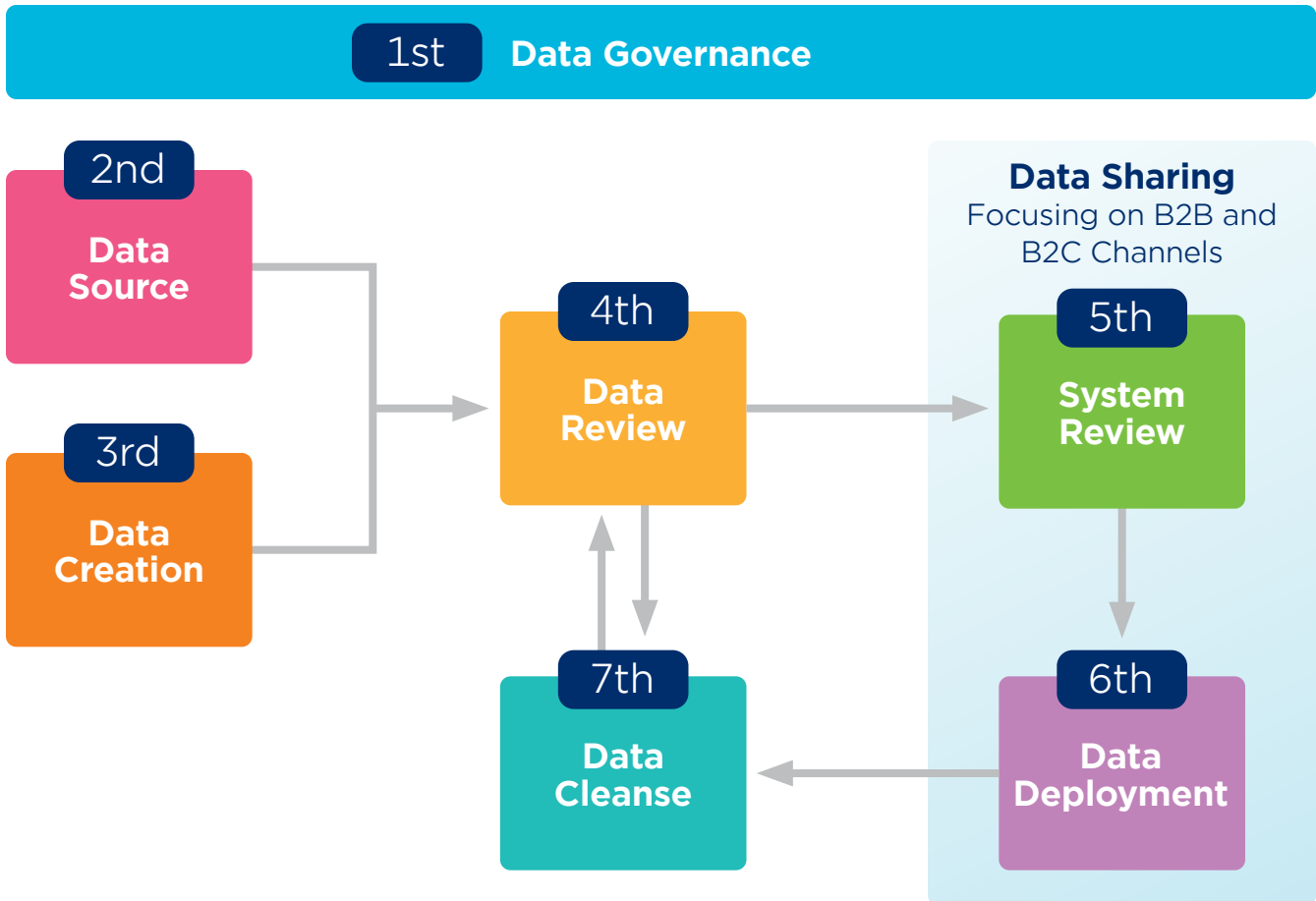
- Define the problem and understand root causes attributed to data. How will improved data quality address the problem?

- Define the potential ROI or benefits to be expected (financial impact, operational efficiency, customer satisfaction).

- Prepare a presentation on the value of a proactive MDM or data governance plan to support data quality. Emphasize the customer needs, potential regulation, and/or business processes driving the need for change in data governance practices.

- Include implementation timeline, benchmarks, and potential or expected outcomes. How will success be measured?

Establishing a data quality and MDM program is a multi-step process. There can be any number of drivers that serve to initiate a data quality program, and many organizations will find themselves repeating the process several times to address new problems or opportunities where data is foundational. The roadmap in the graphic that follows is an illustration of key steps involved in a data quality or MDM journey. This document includes additional detail for a number of these principles or plays.
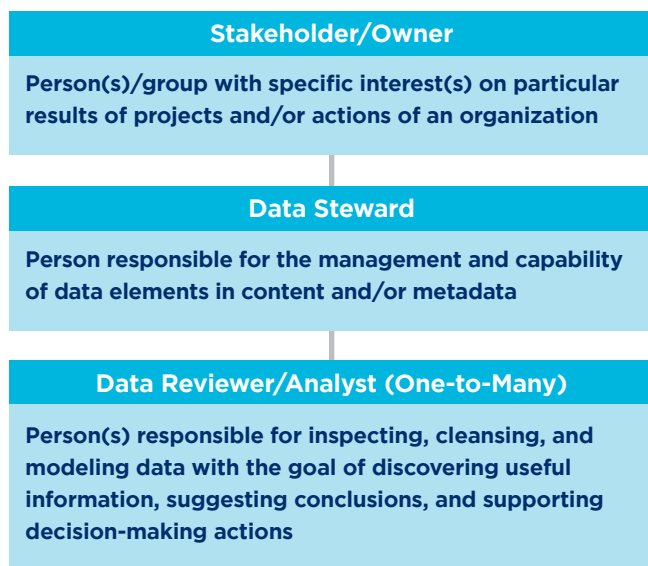
Data Quality Roadmap

1 Identify	2 Gain Support	3 Data Deep Dive	4 Data Governance & MDM	5 Manage, Maintain & Measure
• Data Sets • Functional Use • High-level Data Issues • Stakeholders • Audience • Reward • Risks	• Primary Goals • Risks/Rewards • Achievable Results (Short/Long Term)	• Impacted Data Reservoirs • How Is It Created/ Maintained? • Functional Use/ Ownership • Tribal Understanding • Categorize Issues and Causes	• Define & Execute Implementation Plan • People, Process, Technology • Executive Rollout	• SOPs • Education • Audits • Measure (Internal and External)

Data Quality Plays

1st Data Governance

2nd Data Source

3rd Data Creation

4th Data Review

Data Sharing Focusing on B2B and B2C Channels

5th System Review

6th Data Deployment

7th Data Cleanse

1st Play | Data Governance
Organizational Framework

Create an internal framework in order to set up the defined roles and responsibilities to support data governance: the data owners, stewards, reviewers, etc. This can be achieved from a department-by-department structure or a company-wide structure to create the centralized point of control.

Stakeholder/Owner
Person(s)/group with specific interest(s) on particular results of projects and/or actions of an organization

Data Steward
Person responsible for the management and capability of data elements in content and/or metadata

Data Reviewer/Analyst (One-to-Many)
Person(s) responsible for inspecting, cleansing, and modeling data with the goal of discovering useful information, suggesting conclusions, and supporting decision-making actions

Ensure stakeholder and subsequent team have a complete understanding of the GS1 System of Standards along with the program focusing on data quality. Once completed, the key learnings can be shared with others within the organization.

Tools & Resources Utilized in the 1st Play

- **Data Quality ROI Calculator for Brand Owners**
- **GS1 Package Measurement Rules**
- **GS1 GTIN Management Standard**
- **GS1 Standards for Product Data Excellence Online Certificate Course**
- **GS1 US National Data Quality Data Governance Best Practice Guidance**

Healthcare-Specific Resources

- **GS1 Healthcare GTIN Allocation Rules Standard**
- **GS1 US Sharing Trusted Data in Healthcare**

Retailer/Recipient Examples

Apparel/General Merchandise

A large regional retailer/recipient is developing a formalized enterprise-wide MDM program for product data. Ownership of new item setup will shift from departmentalized merchandising to a centralized center of excellence.

- Item data specialists will develop a "data dictionary" that defines the meaning and use of specific shared data elements, e.g., "price" or "additional identifier."

- Item data specialists will review all data inputs from vendors and data providers and are accountable for the completeness and accuracy of item setup and maintenance.

- Data coordinators provide primary contact points for downstream consumers of the product data within the enterprise and provide review and approvals of specific data points that drive systems and processes.

- Item data specialists and data coordinators are trained in GS1 Standards and are accountable for managing product data within standards set by a data governance organization that represents company stakeholders.

Business and validation rules for data acquisition through a vendor portal, and integration with data providers (vendors and data providers), ensure data quality (complete, consistent, accurate, standards-based, and timely), which can be measured and scorecarded.

Healthcare

A large healthcare provider Integrated Delivery Network (IDN) is implementing a new PIM system. Data cleansing and consolidation activity is part of the conversion plan to ensure the initial system setup is of good quality (i.e., complete, accurate, and trusted). Going forward, new item setup will be managed and monitored by a centralized team.

Manufacturer Example

A manufacturer is rolling out a new product line and needs to communicate product information to its customer base.

2nd Play | Data Source
Residence & Role of Data Within Systems

Analyze and consider your data—is it generated from an automatic or a manual process, does it reside solely within a single data source (e.g., ERP, MDM, Digital Asset Management [DAM], Microsoft Access databases, Excel spreadsheets, flat files, etc.), or does the data need to be created through multiple sources? Data can originate from several sources including external vendors and internal departments.

Without a robust business process in place, the quality of data can deteriorate as it flows through the supply chain. Due to potential cost implications and requests from trading partners, many companies have started to scrutinize their internal processes and education practices with regard to data quality and to perform audits of the information received from and shared among their trading partners. A summary of each system is highlighted below for clarity.

- **Product Lifecycle Management (PLM) Solution:** A solution that manages all of the information and processes at every step of a product or service lifecycle across globalized supply chains. This includes the data from items, parts, products, documents, requirements, engineering change orders, and quality workflows.

- **Clinical Information, Billing Systems, Track & Trace/ Recall:** Health provider proprietary systems that track day-to-day operations within the organization

- **Master Data Management (MDM):** Comprises the processes, governance, policies, standards, and tools that consistently define and manage the critical data of an organization to provide a single point of reference

- **Digital Asset Management (DAM):** Source of digital images, style shots, and product image information

- **Marketing:** Source of marketing information for any given product

- **Nutritional and Allergen Information:** Source of information for any allergen or nutritional statements for the products

- **Research & Development (R&D):** System that holds data pertaining to work directed toward the innovation, introduction, and improvement of an organization's products and processes

- **Regulations:** Source of regulations/compliance affecting product development, product availability, unique product identification, or track and trace

- **Recipes & Ingredients:** Source of product recipes and ingredients

- **Enterprise Resource Planning (ERP):** Activities assisting organizational management

Tools & Resources Utilized in the 2nd Play

- **GS1 Standards for Product Data Excellence Online Certificate Course**

- **GS1 US National Data Quality Data Governance Best Practice Guidance**

- **GS1 US National Data Quality Program Framework**

- **Unique Device Identification Guidance Document**

- **Drug Supply Chain Security Act Guidance Document**

Retailer/Recipient Examples

Apparel/General Merchandise

Vendor portal will provide a single point of item introduction, with the ability to integrate data sourced from the GS1 Global Data Synchronization Network™ (GS1 GDSN®), as well as top-off non-GS1 GDSN data entered manually. A PIM solution provides one source of the truth for all downstream consumers, seamless integration with internal and external sources, and streamlined item data acquisition, item creation, and item maintenance processes for both supply chain and consumer-facing data. GS1 GDSN can continually provide valuable item data maintenance throughout the lifecycle of the product, with a workflow for review/reject/synchronize processes. Integrated business process workflows allow for item maintenance to flow seamlessly and provide an enterprise-wide view of product data.

Healthcare

External and regulatory databases are kept up to date and in synch with vendor portal and data provided via GS1 GDSN. Third-party data providers such as Group Purchasing Organizations (GPOs) and MDM solution providers are direct recipients of vendor-managed and shared data.

Note: The term "data" is referencing both internal data elements that will never be shared outside the organization as well as the data intended to be shared with trading partners, directly with the consumer, and with other external parties.

3rd Play | Data Creation
Mapping Attributes

Execute a mapping exercise of identified attributes to your systems (internal and external data sources) in order to provide a clarified residence for them to ease in data discovery and reconciliation. There may be multiple types of attributes mapped by category, but you may utilize the examples below:

Step 1 Mapping exercise on systems that reside internally and contain data that either (1) are not transmitted externally or (2) are part of a data-creation step in other systems.

Step 2 GS1 US National Data Quality Program (NDQP) Core Attributes as outlined in Section 7.1 of the GS1 US National Data Quality Program Framework, or for the Healthcare industry, please reference 3.1 of the Best Practice Guide for Sharing Vital Attributes in Healthcare.

Attribute Name*	Value(s)/Examples	Data Source (Residence)
Brand Name	Brand X	Marketing
Product Description	Men's Running Shoe	Marketing, R&D, Regulatory
GPC	85421123	Marketing, R&D, Regulatory
Style	A-Line	Marketing, R&D, Regulatory
Size	Medium	Marketing, R&D, Regulatory
Color	Green	Marketing, R&D, Regulatory
Declared Net Contents	24 Fl. Oz.	Regulatory, R&D
Pack Quantity (PQ)	1	R&D
GTIN®	00614141999996	Marketing
Linear Dimensions (Height/Width/Depth)	8.245˝/3.125˝/3.125˝	R&D, MDM
Gross Weight	1.585 Lbs.	R&D, MDM
Country of Origin	840—US	MDM

Step 3 Remaining GS1 Standard attributes that are outlined in the GS1 GDSN Standard, the GS1 US GDSN & GDM Interactive Spreadsheet Tool, the GS1 US Best Practice Guide for Sharing Vital Attributes in Healthcare, or the Best Practice Guideline for Product Images and Attributes.

Attribute Name*	Value(s)/Examples	Data Source (Residence)
Type of Allergen	AP-Peanuts	Nutritionals/Allergens, Recipes
Food & Beverage Composition	USDA	Nutritionals/Allergens, Recipes
Type of Nutrient	ENERSF-Calories from Saturated Fat	Nutritionals/Allergens, Recipes

*Not inclusive of all attributes, but simply a snapshot of examples

Note: For ease of use, this playbook provides clarity and input for the types of attribute data vs. the use case of attribute data. Once the examples have been vetted, the use-case scenarios can be utilized for company implementation (i.e., SmartLabel™).

Step 4 Any other trading partner-specific attributes or attributes that are not part of a standardized format that may be included in the trading partner agreements (e.g., pricing information, recipient portal information, etc.).

Tools & Resources Utilized in the 3rd Play

- **GS1 US National Data Quality Program Framework**
- **GS1 US GDSN & GDM Interactive Spreadsheet Tool**
- **Best Practice Guideline for Exchanging Product Images and Attributes (Apparel/General Merchandise)**
- **GS1 US Color and Size Codes Guidelines**
- **GS1 US Best Practice Guide for Sharing Vital Attributes in Healthcare**

Retailer/Recipient Example

Apparel/General Merchandise

A large regional retailer worked through an extensive exercise to identify all required item attribution from across the enterprise to create a draft "Golden Record." This "Golden Record" will guide vendor requirements, business rules, GS1 GDSN requirements, and identification of non-GS1 GDSN sources. The "Golden Record" was reviewed against harmonization efforts within the retail grocery and foodservice industry, available GS1 GDSN attributes, and the large regional retailer's specific data requirements.

Apparel and general merchandise retailers and merchandisers are working together in a similar fashion to determine their "Golden Record" for each merchandise category to promote as the required fundamental attributes needed to do business. With that, these attributes will continue to be matched with their source (internal PLM, MDM, catalog, etc.) to determine the technical requirements needed to harmonize data.

Supplier/Manufacturer Example

A large manufacturer provided a breakdown of its data sources:

Attribute Name	Data Source (Residence)
Brand Name	Marketing
Declared Net Contents	Regulatory, R&D
Pack Quantity (PQ)	Warehouse Management System (WMS), MDM
GTIN	MDM
Linear Dimensions/UOM	MDM
Gross Weight/UOM	MDM
Country of Origin (COO)	MDM
TI-HI	MDM

4th Play | Data Review
Ensuring Completeness & Accuracy

Utilize an interdepartmental or standalone lead to serve as the data steward with the purpose of overseeing the work of the department reviewers. The reviewers are to ensure completeness and accuracy of the data before any sharing can commence. Additionally, the reviewers may implement a continuous, ongoing internal audit process to not only ensure the changing of data adheres to GS1 Standards but also to trading partner agreements. Companies that have strong data management programs follow industry best practices for continuity and consistency. These companies have documented processes that are shared throughout the organization.

In the review cycle, if data needs to be changed, removed, or updated, the recommendation is to continue to utilize the framework below to vet any changes through the data steward and data reviewers. The recommendation may be the same for interdepartmental or customer data discrepancies.

Tools & Resources Utilized in the 4th Play

- **GS1 US National Data Quality Data Governance Best Practice Guidance**

- **GS1 US National Data Quality Program Framework**

Retailer/Recipient Example

Food

Business and validation rules for data acquisition through a vendor portal and integration with data providers (vendors and data providers) help ensure data quality (complete, consistent, accurate, standards-based, and timely), which can be measured and scorecarded.

Item data accuracy is ultimately the responsibility of item data specialists and data coordinators. Item data specialists, responsible for new item setup and maintenance, will utilize an established workflow between internal and external sources to ensure data quality standards are met. Integrated business process workflows allow for item maintenance to flow seamlessly and an enterprise-wide view of product data. Accountability is established in defined roles and permissions.
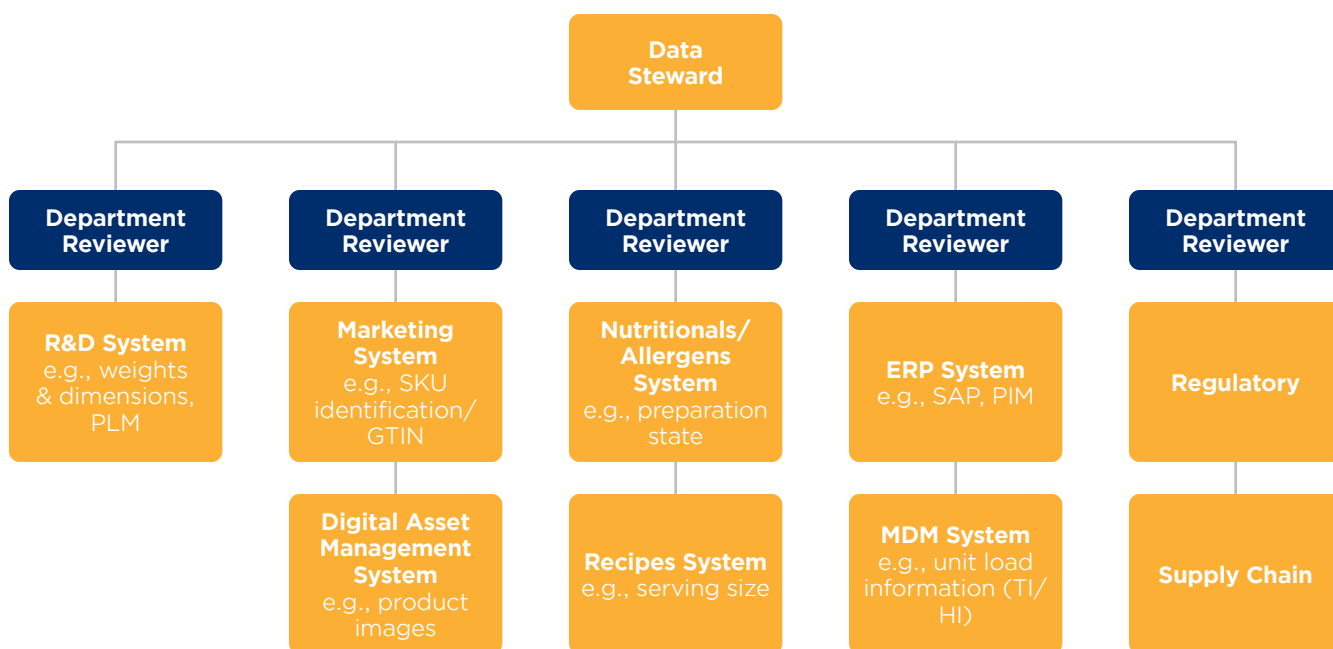
Note: Although the diagram above may be in a linear fashion, it is important to highlight that there are systems that are reviewed more frequently than others (i.e., marketing data systems may need to be updated more quickly and more regularly than some of the supply chain data systems). Additionally, parts of records within certain systems may need to be updated and verified first, before the whole record, so the data stewards/data reviewers are needed to have full visibility into all systems. If the department reviewer doesn't have access to the physical product, audits performed by supply chain partners, like distributors, can help.

5th Play | System Review
Data Governance Review/Reverse Engineering

Execute an internal data source process (reverse engineering) to see if any errors exist on sourcing and routing of the data. In order to execute this, a "mock" internal data synchronization pilot can be performed to expose those gaps (if any). This can be associated with the work that has been highlighted in the 4th Play, specifically the ongoing review/audit of those attributes. All findings in this step are reported back to the data reviewers and data stewards.

Tools & Resources Utilized in the 5th Play

- **GS1 US National Data Quality Data Governance Best Practice Guidance**

- **GS1 US National Data Quality Program Framework**

Retailer/Recipient Examples

Apparel/General Merchandise

A large regional retailer will establish a cadence of accountability within a center of excellence that provides reporting and feedback loops and an expectation for resolution of any data problems. Data issues can be escalated to the appropriate accountable team/person: vendor, item data specialist, data coordinator, and data governance team.

Healthcare

Healthcare Provider departments using centrally managed data will develop a periodic audit process to compare physical product data to master data. Issues found should be escalated to the appropriate accountable team or person: vendor/supplier/manufacturer, item data specialist, data coordinator, or data governance team.

6th Play | Data Deployment
Uploading to PIM and/or Certified Data Pool

Deploy data to the internal PIM or ERP system and/or certified data pool and catalogs per internal deployment mechanisms.

- PIM solution
- GS1 Certified Data Pool

Tools & Resources Utilized in the 6th Play

- **GS1 US National Data Quality Data Governance Best Practice Guidance**

- **GS1 US National Data Quality Program Framework**

- **GS1 Certified Data Pools**

- **Healthcare Quick Start Guide for Implementing the GS1 Global Data Synchronization Network (GDSN) in Healthcare**

Retailer/Recipient Example

Apparel/General Merchandise

A PIM solution provides one source of the truth for all downstream consumers, seamless integration with internal and external sources, and streamlined item data acquisition, item creation, and item maintenance processes for both supply chain and consumer-facing data.

7th Play | Data Cleanse
Validating and Confirming

Begin to implement processes and procedures that provide short-term/immediate results on data quality analytics; these can be referred to as "quick-wins." The positive results attained by this can be vetted throughout the organization in which the data quality framework is in place.

Tools & Resources Utilized in the 7th Play

- **Inaccurate Package Measurements: A Common, but Preventable Root Cause of Data Quality Problems**
  Key considerations to help you adhere to GS1 package measurement rules and safeguard the quality of your product information

Retailer/Recipient Examples

Food

A large regional retailer will continue to integrate internal data accuracy initiatives within the new MDM environment, expanding audits from supply chain core attributes to consumer-facing attributes. An internal auditor (responsible for performing physical audits) and the master data team (specialists responsible for B2B relationship, data accuracy, data synchronization, and master data troubleshooting) are responsible for providing detailed vendor accuracy/sync reporting, with the goal of continuous improvement. Due to production variability, a statistically representative sample should be gathered to ensure an accurate average of the data.

- This team is certified on the GS1 Package Measurement Rules and GTIN Management Standard as part of their defined role and apply the GS1 Standards to their reporting.

- Audits will broaden from supply chain to consumer-facing attributes, including SmartLabel™ requirements.

Identified data issues are escalated appropriately internally and externally. Validations within the PIM solution may help to provide "common sense" safeguards against "bad data," while physical audits will provide a more granular view and insight into data discrepancies.

Apparel/General Merchandise

A large apparel recipient identified that it has been receiving non-applicable attributes for products. For example, the recipient was receiving sweaters with a "Heel Height" attribute. Once the issue was identified, the retailer and recipient had the proper feedback channels in place to communicate the discrepancy and confirm its correction in a timely manner.

Healthcare

A healthcare provider managing its own distribution network will perform periodic audits on physical product as compared to the attribute information in the PIM and/or ERP systems. Any discrepancies will be communicated to the data source for validation and any necessary corrections will be made to master data files (both internal and external) according to established policies and SOPs. Sharing data via GS1 GDSN also allows for trading partners to work together to ensure data quality by using the Catalog Item Confirmation (CIC) messaging features.
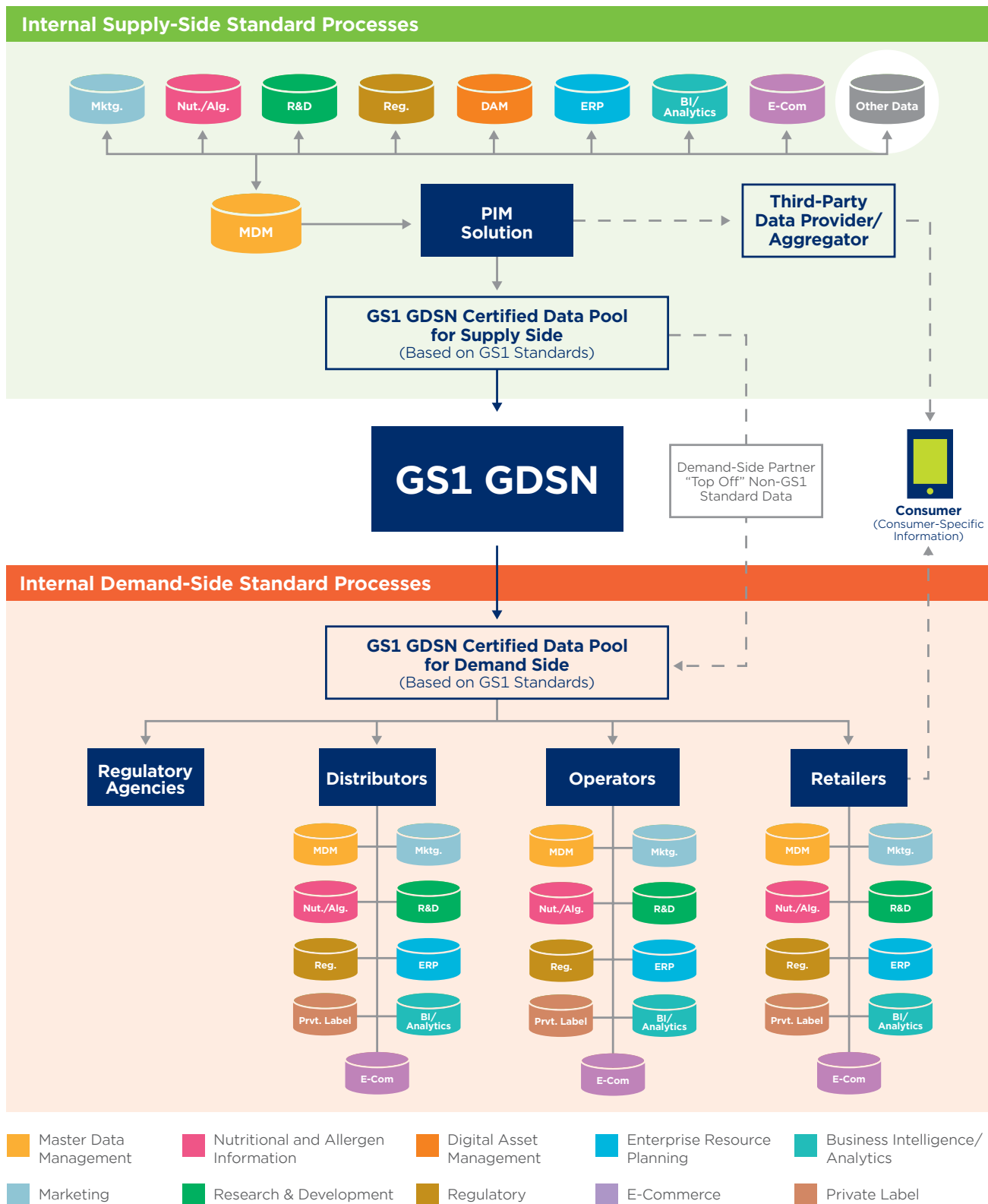
Appendix
Terms and Definitions

Data Governance Organizational Framework	Provides a centralized point of control on processes and procedures focusing on the quality of data. Data governance is not purely a technical initiative. Business needs to partner with technology to be successful. Good data governance is a strategy shared between the managers of business and technology.
Data Source Residence & Role of Data Within Systems	This is the system (manual or automatic) that is the focal point for the generation of data. It could be one or multiple systems.
Data Creation Mapping Attributes	This is the act of providing data based on a business process, system process, or product information.
Data Review Ensuring Completeness & Accuracy	This is the team responsible for ensuring consistent, quality data, such as the data steward, data reviewer, etc.
System Review Data Governance Review/ Reverse Engineering	This is the team responsible for monitoring data communication between systems as it is generated and communicated.
Data Deployment Uploading to PIM and/or Certified Data Pool	This is the area where the data is communicated (whether by 1:1 sharing, a PIM solution, and/or utilizing GS1 GDSN) to other trading partners and associations based on those requirements.
Data Cleanse Validating and Confirming	The process of identifying corrupt or inaccurate data within a system (database or other) and the validation of correcting or deleting such data.

Appendix
The MDM Solution Framework (Current/Future State)

Internal Supply-Side Standard Processes

Mktg. · Nut./Alg. · R&D · Reg. · DAM · ERP · BI/Analytics · E-Com · Other Data

MDM → PIM Solution → Third-Party Data Provider/Aggregator

GS1 GDSN Certified Data Pool for Supply Side
(Based on GS1 Standards)

GS1 GDSN

Demand-Side Partner "Top Off" Non-GS1 Standard Data

Consumer
(Consumer-Specific Information)

Internal Demand-Side Standard Processes

GS1 GDSN Certified Data Pool for Demand Side
(Based on GS1 Standards)

Regulatory Agencies · Distributors · Operators · Retailers

MDM · Mktg. · Nut./Alg. · R&D · Reg. · ERP · Prvt. Label · BI/Analytics · E-Com

Legend:
- Master Data Management
- Nutritional and Allergen Information
- Digital Asset Management
- Enterprise Resource Planning
- Business Intelligence/Analytics
- Marketing
- Research & Development
- Regulatory
- E-Commerce
- Private Label

Appendix
The PIM Solution Framework (Future State)

Internal Supply-Side Standard Processes

MDM | Mktg. | Nut./Alg. | R&D | Reg. | DAM | ERP | BI/Analytics | E-Com | Other Data

PIM Solution
- Aggregation of multiple data sources
- Ability to add new attributes
- Mass updates/changes
- Ability to generate custom exports

Third-Party Data Provider/Aggregator

GS1 GDSN Certified Data Pool for Supply Side
(Based on GS1 Standards)

GS1 GDSN

Demand-Side Partner "Top Off" Non-GS1 Standard Data

Consumer
(Consumer-Specific Information)

Internal Demand-Side Standard Processes

GS1 GDSN Certified Data Pool for Demand Side
(Based on GS1 Standards)

Regulatory Agencies | **Distributors** | **Operators** | **Retailers**

Distributors: MDM | Mktg. | Nut./Alg. | R&D | Reg. | ERP | Prvt. Label | BI/Analytics | E-Com

Operators: MDM | Mktg. | Nut./Alg. | R&D | Reg. | ERP | Prvt. Label | BI/Analytics | E-Com

Retailers: MDM | Mktg. | Nut./Alg. | R&D | Reg. | ERP | Prvt. Label | BI/Analytics | E-Com

Legend:
- Master Data Management
- Nutritional and Allergen Information
- Digital Asset Management
- Enterprise Resource Planning
- Business Intelligence/Analytics
- Marketing
- Research & Development
- Regulatory
- E-Commerce
- Private Label

Note: Internal supply chain teams, such as Logistics, Sourcing teams, Marketing, etc., should always access a single source of data, such as a PIM system, instead of saving their own versions of data.

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