



The Global Language of Business

GS1 Healthcare US[®]

Guide to Managing and Measuring Data Quality in Healthcare

Release 1.0, April 15, 2022



Table of Contents

- 1 Introduction 5**
- 2 Document Information 6**
 - 2.1 Purpose of this Document..... 6
 - 2.2 Accompanying Documents..... 6
 - 2.3 Who Should Use this Document? 7
- 3 Data Quality and the Healthcare Industry 7**
 - 3.1 Data Quality Overview 7
 - 3.2 Value of Data Quality and Synchronization of Data for Healthcare Industry 9
- 4 Analyzing the Return On Investment for Your Company 10**
- 5 Managing and Measuring Data Quality 12**
 - 5.1 Healthcare Attributes & Implementation Readiness – The “What” and the “How” 12
 - 5.1.1 Global Trade Item Number as the Foundation to Quality 14
 - 5.1.2 Prepare Your Systems to Share or Consume Data 15
 - 5.1.3 Establish Data Quality Measures..... 15
- 6 Summary Recommendations 17**
- 7 Resources..... 18**

About GS1

GS1® is a neutral, not-for-profit, global organization that develops and maintains the most widely-used supply chain standards system in the world. GS1 Standards improve the efficiency, safety, and visibility of supply chains across multiple sectors. With local Member Organizations in over 110 countries, GS1 engages with communities of trading partners, industry organizations, governments, and technology providers to understand and respond to their business needs through the adoption and implementation of global standards. GS1 is driven by over a million user companies, which execute more than six billion transactions daily in 150 countries using GS1 Standards.

About GS1 US

GS1 US®, a member of GS1 global, is a not-for-profit information standards organization that facilitates industry collaboration to help improve supply chain visibility and efficiency through the use of GS1 Standards, the most widely-used supply chain standards system in the world. Nearly 300,000 businesses in 25 industries rely on GS1 US for trading-partner collaboration that optimizes their supply chains, drives cost performance and revenue growth while also enabling regulatory compliance. They achieve these benefits through solutions based on GS1 global unique numbering and identification systems, barcodes, Electronic Product Code (EPC®)-based RFID, data synchronization, and electronic information exchange. GS1 US also manages the United Nations Standard Products and Services Code® (UNSPSC®).

About GS1 Healthcare

GS1 Healthcare is a global, voluntary healthcare user group developing global standards for the healthcare supply chain and advancing global harmonization. GS1 Healthcare consists of participants from all stakeholders of the healthcare supply chain: manufacturers, wholesalers, and distributors, as well as hospitals and pharmacy retailers. GS1 Healthcare also maintains close contacts with regulatory agencies and trade organizations worldwide. GS1 Healthcare drives the development of GS1 Standards and solutions to meet the needs of the global healthcare industry and promotes the effective utilization and implementation of global standards in the healthcare industry through local support initiatives like GS1 Healthcare US® in the United States.

About GS1 Healthcare US

GS1 Healthcare US® is an industry group that focuses on driving the adoption and implementation of GS1 Standards in the healthcare industry in the United States to help improve patient safety and supply chain efficiency. GS1 Healthcare US brings together members from all segments of the healthcare industry to address the supply chain issues that most impact healthcare in the United States. Facilitated by GS1 US, GS1 Healthcare US is one of over 30 local GS1 Healthcare user groups around the world that supports the adoption and implementation of global standards developed by GS1.

Document Summary

Document Item	Current Value
Document Title	Best Practice Guide to Managing and Measuring Data Quality
Date Last Modified	April 2022
Document Description	This document provides a high-level resource to help healthcare organizations manage their data to ensure that high level of quality and accuracy. To address the importance of data quality, this document includes key data quality best practices. Additionally, this document outlines some key points that most companies will find important for successfully managing and measuring internal data quality.

1 Introduction

Within a highly complex supply chain, healthcare products can be touched by various trading partners - each with their own systems that rely on product information to support core supply chain activities including procurement, inventory, distribution, billing/accounts payable, etc. New and existing global regulations for the identification of medical devices and traceability of pharmaceuticals also highlight the reliance on this product information as it gets passed to Electronic Health Records (EHRs) in support of healthcare portability and patient safety.

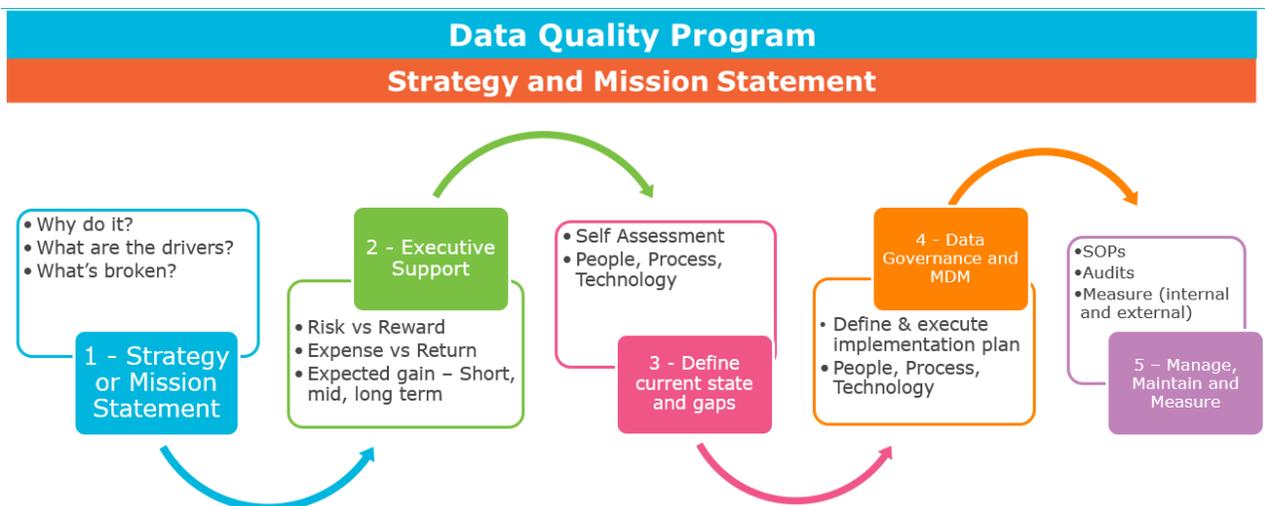
Data about healthcare products is available from multiple sources. In today's web-based world, both healthcare providers and patients have come to expect easy access to information about the products they use and buy. Additionally, as the value of data increases, ancillary healthcare organizations and business teams such as solution providers, regulators, marketing, e-commerce, retailers, and Health Information Exchanges are becoming increasingly interested in access to consistent, accurate, and timely data about healthcare products. Data housed in such a variety of source points must be consistent and accurate.

To support the ever-increasing value of data as an asset and the high demands for complete, consistent, accurate, secure, and timely information, healthcare organizations must begin to make investments in data quality. Those investments should be in the areas of people, processes, procedures, and technology as all four areas are critical to the development, maintenance, sharing, and use of quality data.

A formal data quality program built on a foundation of GS1 Standards can provide the framework needed to ensure trusted, quality data. GS1 Standards enable data quality, but are not the sole solution. Industry must align on product identification, a basic set of core attributes, and how to measure quality both internally and across trading partners.

It is important to recognize that data quality is a continuous effort and not a "one and done" exercise. As depicted in **FIGURE 1-1** below, it is a continuous and often repeated journey that requires a strategy and mission, executive support, assessment of people, process and technology, strong data governance practices, and the measurement of performance. Data quality cannot be achieved in a silo. It requires a high degree of collaboration both internally as well as with external trading partners.

FIGURE 1-1 GS1 Healthcare US Industry Initiative - Data Quality Wireframe



2 Document Information

2.1 Purpose of this Document

The purpose of this document is to supplement the documents listed below by providing guidance to increase accuracy, completeness, and consistency of vital attributes needed to support basic healthcare processes. The belief is that, if all healthcare stakeholders, both data sources and data recipients, support and follow best practices at the attribute level, trading partners' ability to trust and seamlessly synchronize shared data will improve. Aligning at this level from end to end of the supply chain will promote data accuracy, efficiency, and interoperability. But measuring performance in the area of data quality is also a necessary step to managing and maintaining a high level of quality both internally and externally.

This document provides a high-level resource to help healthcare organizations manage their data to ensure that high level of quality and accuracy. To address the importance of data quality, this document includes key data quality best practices. Additionally, this document outlines some key points that most companies will find important for successfully managing and measuring internal data quality as it is shared and used within their organization's systems as well as managing and measuring data quality for data received from their external trading partners.

The guidance referenced regarding data governance processes have been established by the [GS1 US National Data Quality Program](#).

2.2 Accompanying Documents

This document, *Guide to Managing and Measuring Data Quality in Healthcare*, is the fifth in a series of healthcare-specific documents intended to support the community in providing high-quality and trusted data that is foundational to basic healthcare processes and transactions. The preceding documents listed here serve to lay a strong foundation for healthcare trading partners wishing to share data and support for those who may be considering The GS1 Global Data Synchronization Network™ (GDSN®) as a data sharing method.

- [GS1 Healthcare US: Quick Start Guide for Implementing GDSN in Healthcare](#)

This document provides a brief overview of the steps and resources needed for a successful implementation of the GDSN for medical device and/or pharmaceutical products. This Quick Start Guide serves as a starting point to other GS1 Healthcare US GDSN documents.

- [Creating the Case for Trusted Data: Attribute Lists and Implementation Insights from Three Healthcare Business Process Cases Using GDSN](#)

The purpose of this document is to:

- Identify the GDSN attributes recommended to support three healthcare use cases
- Offer insight and guidance about key topics for GDSN implementation
- Recommend next steps to help drive implementation of the GDSN in U.S. healthcare to support their need for quality product information.

- [GS1 Healthcare US: Getting Started with GDSN](#)

This document provides a high-level resource to help healthcare organizations jumpstart their GDSN implementation efforts. The document outlines the key tasks that most companies will find necessary for a successful implementation, shares learnings, and explains the recommended processes established by other companies in their deployment of the GDSN.

- [Best Practice Guide for Sharing Vital Attributes in Healthcare](#)

Created to increase accuracy, completeness and consistency of vital attributes needed to support basic healthcare processes, this best practice guidance will help you enable a more seamless data synchronization with your trading partners to improve efficiency and achieve interoperability.

Additionally, GS1 US recognizes that data quality depends on strong data governance practices. To that end, we believe that organizations wishing to share, consume, and use data should ensure that there are strong data governance fundamentals in place.

The following resources are suggested to assist in the development of data management standard operating procedures.

- [Data Governance Best Practice Guidance](#)

An organization needs to create and document processes and procedures with clearly defined roles and responsibilities. The documentation should utilize process diagrams to define all of the critical steps, processes, and handoff points to establish accountability for master data quality.

- [GS1 US National Data Quality Playbook](#)

7 ways to enhance product data quality: Organizations define data quality as having consistent, complete, accurate, standards-based, timestamped data. This resource explores seven plays to address content acquisition (creation or sourcing) and data aggregation needs in data quality.

2.3 Who Should Use this Document?

This document is intended for use by any member of the healthcare industry supply chain, including manufacturers, distributors, wholesalers, and providers. It is applicable to all healthcare product categories, including medical devices, pharmaceuticals, and other products used in a typical healthcare settings.



Important: As with all GS1 Standards and solutions, this guideline is voluntary, not mandatory. It should be noted that use of the words “must” and “require” throughout this document relate exclusively to technical recommendations for the proper application of the standards to support the integrity of your implementation.

3 Data Quality and the Healthcare Industry

3.1 Data Quality Overview

Quality product information is not only essential to the efficient and effective operation of the healthcare supply chain but also critical to the safe and efficient provision of patient care. Care processes often involve the use or collection of product information that is increasingly being included in patient records. Quality, standardized data facilitates automated transactions such as procure to pay/order to cash or point-of-care data collection. This leads to reduced errors and fewer manual interventions lowering costs in the supply chain and allowing clinicians to focus on patient care. Quality data can facilitate faster and improved business decisions and data analytics; in the supply chain this can lead to lower costs and more effective operations; in patient care, the identification of care protocols lead to improved outcomes and enhanced patient safety through improved ability to manage recalls, lot numbers, and product expirations. Conversely, sharing inaccurate or poor quality data only adds costs and, more importantly, risk to patients and healthcare institutions.

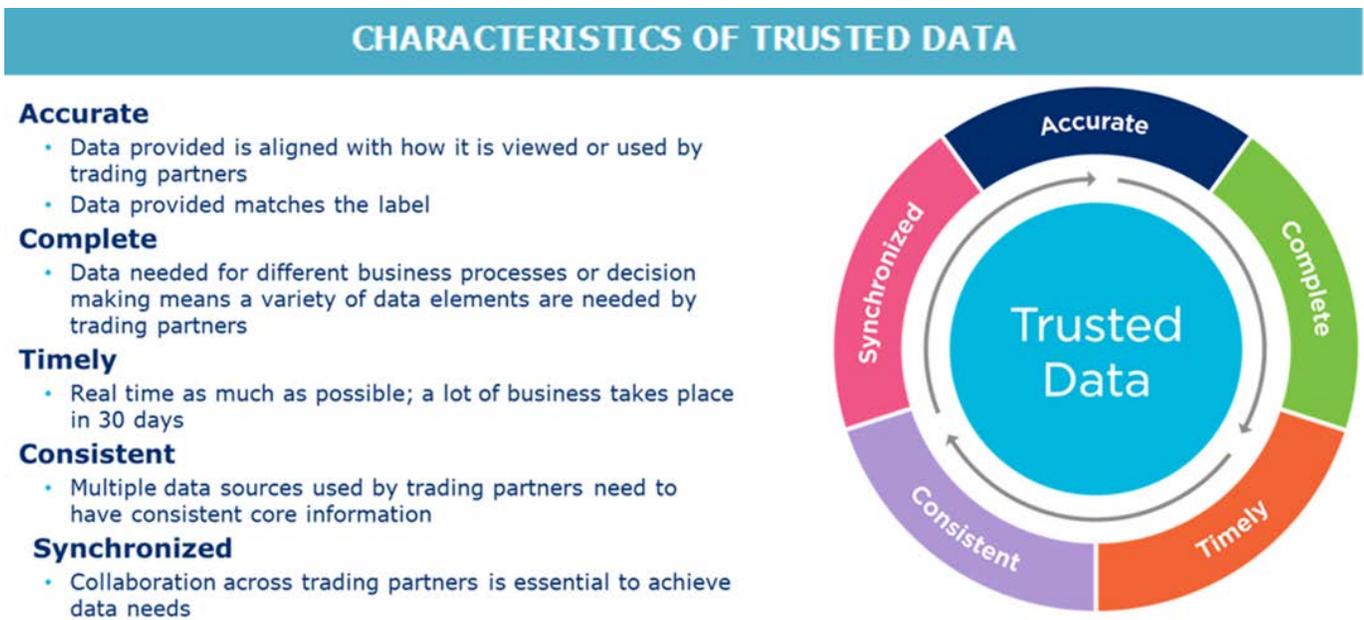
Participants in this healthcare-focused workgroup also noted that data quality contributes to overall employee satisfaction. Healthcare supply chain and clinical/patient care areas are fast paced and often stressful environments. Performing administrative tasks like product documentation can be time-consuming and tedious for nurses. Asking hospital personnel to deal with problems associated with poor product data in the current environment where capturing product information at the point of use is expected is an unnecessary added stressor. Alleviating that kind of administrative stress can improve the caregiver experience. (www.symplr.com/blog/what-nurses-want-from-employers)

The Healthcare Transformation Group, a group of six healthcare systems that formed an action-oriented collaboration group to share best practices and drive needed positive change across the healthcare supply chain, has specified characteristics of quality data which closely aligns with the following **FIGURE 3-1**.

Healthcare Transformation Group characteristics:

- Trusted: for both source and context (native vs enabled data)
- Reliable: can be used appropriately in the manner defined
- Accessible: free and easy to attain for all customers (up and down stream)
- Accurate: the content of each data element is accurate for its intended use
- Complete: all the data elements expected are provided
- Timely: updated for the most current information as represented by the source’s baseline (i.e. how the source views it throughout their operations)
- Relevant: aligned with expected use and will remain constant for the use intended¹

FIGURE 3-1 GS1 Healthcare US Industry Initiative: Characteristics of Trusted Data



Unfortunately, within the healthcare industry, too many of these characteristics are not met consistently or vary depending upon data publisher or data source. GS1 US recognizes data quality as an industry issue in which all trading partners have a role to play. Manufacturers and distributors as sources of data

¹ Healthcare Transformation Group Presentation, 8th Annual HTG Summit, September 2018

need to do their part by sharing quality data and assure timely access to complete, accurate data. Data recipients such as providers need to be vigilant in maintaining data in their systems and providing timely feedback on data quality issues to data sources. Only by working together can the healthcare industry achieve the quality data relative to products that will enable it to realize the efficiencies and improvements in patient care and safety that technology can offer. In order to help industry stakeholders address the data quality issues that increase costs for manufacturers, distributors, and providers, GS1 US believes industry needs a comprehensive approach to promote and maintain data quality and that such an approach should be employed by all trading partners no matter what method of data sharing is employed.



Important: GS1 US considers the 4 components of data quality outlined in our [GS1 US National Data Quality Program](#) critical to high-quality data and streamlined operations in the healthcare supply chain

Based on the work done in other industries, GS1 US has defined an industry-wide approach to data quality that leverages advancements in technology and the evolution of thought to promote and maintain data quality across an industry. There are 4 core components included in our recommended approach to quality data:

1. Efficient Data Sharing

The GS1 GDSN can be used to electronically share high-quality product data in a standardized way.

2. Strong Data Governance

GS1 US National Data Quality Program can be used to understand and implement best practices for data governance and product data management within your organization.

3. Alignment of Data Attributes

Transparent and consistent data requirements should be adopted and communicated with trading partners. GS1 Healthcare US has identified a list of vital attributes upon which healthcare stakeholders should align. (See [Creating the Case for Trusted Data: Attribute Lists and Implementation Insights from Three Healthcare Business Process Cases Using GDSN](#))

4. Collaborative Data Management

Shared responsibility through data management, issue reporting, and a responsive resolution process to include performance scorecards leading to a formalized, collaborative process for how data quality should be managed between trading partners. This is a foundation component of the GS1 National Data Quality Program.

Components 1 through 3 above have been addressed in detail in previous documents in this series. We will provide more emphasis on #4, Collaborative Data Management, why it is important and what impact it can have on data quality in the remainder of this guide.

3.2 Value of Data Quality and Synchronization of Data for Healthcare Industry

The pace of business today, more than ever, means that data should be viewed and treated as an asset. This requires an organization to have a data-driven strategy and mission that encompasses people, processes, procedures, and technology. Data can only work for you if it can be put to use and if you understand what problems it can solve or what advantages it can provide. Complete, accurate core data supports sound decision making (think of buying the right amount of product based on accurate consumption). Enriched data can support detailed analytics. In healthcare, this could mean using data to support more cost-effective buying decisions based on outcomes analysis of like products. Even in a regulated healthcare environment, consumer/patient satisfaction comes into play since today's patients expect transparency and access to information about the products used in their treatment and care.

The ability to deliver results – better decisions, cost improvements, consumer satisfaction – is all dependent on complete, timely, accurate data.

Healthcare manufacturers and providers have many systems that they use and rely on for product information, including sales and marketing, inventory replenishment, distribution, billing/accounts payable, contracts and chargebacks, barcode tracking and scanning, electronic health records, traceability, etc. Unfortunately, there is often no central, authoritative database to house and manage all of that information. Instead, each system generally uses its own database. As a result, there is often no method for assuring that the information about products being used in one system is the same as the information being used in another. Moreover, whenever a trading partner updates or changes any of its product information, all the disparate systems and databases that rely on that information must be updated individually. This is an unreliable and inefficient approach to data management that can increase costs for manufacturers, distributors, and providers in the healthcare supply chain and, ultimately, impact patient confidence and safety.

In the absence of a centralized master data file, trusted data sharing and synchronization can help healthcare organizations address the problems created by managing data in disparate systems. The GS1 GDSN is one solution for sharing accurate product information within a company and across supply chains. With the GDSN, healthcare stakeholders can establish one, authoritative source of properly formatted product information to feed all their systems and share with their trading partners. In addition, the GDSN offers healthcare organizations a highly efficient, automated process for keeping the information up-to-date and accurate. But, trusted data can be shared by other means as well. No matter what the sharing approach, data must meet certain criteria to be trusted, of high quality and manageable. Aside from leveraging the GDSN, healthcare organizations can still achieve high levels of data quality by focusing on the other three components of data governance, transparent data requirements, and collaborative data management through issue reporting and resolution. These are foundational components of the GS1 National Data Quality Program.

4 Analyzing the Return On Investment for Your Company

Implementing a data quality strategy and plan within your organization is a first step to leveraging the benefits of data as an asset. A data quality plan lays the foundation for improved data quality, traceability, efficiency, and effectiveness to help drive costs out of the supply chain and enhance patient safety. As mentioned earlier, data quality will require some investment in people, process improvement, and technology. These types of investments require executive support and approval.

To garner executive support, a strong return on investment statement is necessary. The corresponding value and return on investment (ROI) can be demonstrated in various areas, including but not limited to:

- Enhanced customer satisfaction and patient safety
- Increased business process efficiencies
- Reduced product waste
- Improved inventory tracking and logistics
- Expedited and more accurate recalls
- Regulatory requirements management for devices and pharmaceuticals
- Item Master management
- Strengthened trading partner relationships
- Financial management processes (i.e., Reimbursements, Billing, Chargebacks, Inventory)
- Efficient sharing and access to trusted data (Accurate, Complete, Consistent, Timely)
- Employee satisfaction facilitated by more time for patients and less time on administrative activity

- Improved risk management
- Advanced cost, quality, and outcomes analytics

As with any important project, trading partners should establish an ROI statement as part of proposing implementation of a data quality plan. Indeed, demonstration of positive ROI from focusing on data supports companies challenged daily by the allocation of scarce resources. Each trading partner should determine its own return on investment based on individual needs and circumstances. The following information is intended as a starting point for any company wishing to pursue ROI analysis as well as measure performance of your organization’s program.

In order to support your ROI analysis, a list of healthcare ROI functional areas and opportunities for improvement is suggested in **Table 4-1** below. You might begin your ROI analysis by determining the amount of staff time and resources currently allocated to each of these functions. In addition, determine the amount of manual error corrections being done in each function. The potential areas for ROI are applicable to all healthcare stakeholder roles (i.e., suppliers, distributors, providers, patients, etc.).

 **Note:** Remember that some of the benefits associated with timely, accurate data may be more difficult to tangibly value but should not be overlooked when defining ROI.

Table 4-1 Healthcare Areas for ROI

Functional Area	Improvement Area
Logistics & Distribution	<ul style="list-style-type: none"> ■ Recall Management ■ New Item Set Up & Introduction ■ Speed to Market ■ Logistics Expenses including optimized transportation ■ Warehouse Expenses and Productivity including space optimization ■ Product Delivery Issues to Recipient (ie missed appointments and “mis shipments”) ■ Order Can Not Fit on Truck (cube or weight too high) ■ Warehouse Picking & Shipping Errors ■ Inventory Management (excess and stock outs) ■ Unit of Measure issues
Labor Management	<ul style="list-style-type: none"> ■ Scanning vs manual entry efficiency ■ Time Spent Addressing Item Data Issues with Customers (Sales) ■ Productivity Within Order & Item Administration (Order Administration) ■ Adjustments and Reconciliation (Accounting Administration) ■ Administrative Support for Care Professionals
Order Administration & Accounting	<ul style="list-style-type: none"> ■ Order Accuracy Issues ■ Electronic Data Interchange (EDI) ■ Invoice Errors ■ Incorrect or Inaccurate Orders Placed (Delays) ■ Reconciliations ■ Deductions and Charge-Backs Reconciliation

5 Managing and Measuring Data Quality

It is important to state again that “data quality” is a program, not a project. While there may be a variety of specific projects grounded in data, the management and maintenance of data is ongoing and should have a strategic period review. We cannot stress enough the need for strong data governance practices.

Data quality starts from within whether you are a data source or a data recipient/data user. As depicted in FIGURE 1-1 of the Introduction to this document, there are certain aspects of people, process, and technology that are part of a successful data governance program and your position as a data source or a data recipient is irrelevant – having the right talent for data owners and data stewards, having solid data governance processes and standard operating procedures, investing in the technology needed to manage, integrate, and operationalize data, and developing measurements are required for both sources and recipients. **TABLE 5-1** below provides a few examples.

Table 5-1 People, Process, Technology

Role	Aspect
People	<ul style="list-style-type: none"> ▪ Secure executive support ▪ Define talent needs, draft job descriptions, and recruit talent ▪ Continuous education of all data stewards, data owners, and data users on your organization’s data quality strategy, mission, and measures ▪ Educate all data stewards, data owners, and data users on the standards of unique identifiers like the GS1 Global Trade Item Number® (GTIN®) and the GS1 Global Location Number (GLN) ▪ Refer to the GS1 National Data Quality Program for details on data roles and responsibilities to consider within your organization
Process	<ul style="list-style-type: none"> ▪ Define a data strategy and mission statement ▪ Define your organization’s Data Governance plan <ul style="list-style-type: none"> ○ Establish clear, standard operating procedures for product or location adds, changes, or deletions ○ Establish processes to audit changes to master data with a date/time stamp and identification of who made the change ○ Establish issue resolution process to include issue notification, follow up, and corrective action ○ Establish a process for securing data that includes defined roles and appropriate controls ▪ Establish a data-focused business continuity plan as a back up to normal operations. ▪ Define how data quality should be measured internally and with your external trading partner
Technology	<ul style="list-style-type: none"> ▪ Create a technology data architecture map ▪ Consider a centralized master data solution to create, modify, and manage master data that is interoperable with ancillary systems ▪ Assess security - access to adds, changes, or deletions of master data should be limited ▪ Systems should have the ability to identify users and date and time stamp any changes

5.1 Healthcare Attributes & Implementation Readiness – The “What” and the “How”

Alignment and a comprehensive understanding of what attributes will be in focus and how they will be utilized is key to a successful data strategy. GS1 Healthcare US Initiative members strongly urge all healthcare stakeholders to align on the core vital attributes identified by the group. (See [Creating the](#)

[Case for Trusted Data: Attribute Lists and Implementation Insights from Three Healthcare Business Process Cases Using GDSN](#)

One of the first steps to be taken in implementation is to focus on educating your team about the attributes. With that understanding, the team should evaluate where those attributes are created, stored, and/or used.

Performing a gap analysis will help you understand the scope of work to be completed to support implementation. As you review the attributes and their usage, it is important that data sources take the steps necessary to validate data accuracy. Packaging strings, descriptions, dimensions, and weights are key attributes to be validated for accuracy before they are started. It is also important that data recipients identify those attributes that may need to be reviewed and updated before loading into internal systems.

Work with your team to identify all of the products used or purchased that are the focus of your effort. All available GTIN product attributes should be identified, properly defined, and their data structure documented. Developing and maintaining a “data dictionary” of these attributes will help to align both internally and with your trading partners. Additionally, assigning a prioritization or importance to data attributes based on intended use or user may be helpful. For instance, the availability and accuracy of attributes required to support regulatory requirements may be prioritized ahead of the package weight of a product. This type of prioritization may also help you define key metrics upon which to measure your data sources. Remember to identify all product packaging levels to be included in your master data. Agreement on data element definitions between trading partners (i.e. synchronizing/reconciling) is an important element of successful data sharing. This reconciliation activity should be part of an onboarding process with new trading partners.

- Start Small - As you begin implementation of data synchronization and measuring performance, it is recommended that you first pick a few items to synchronize with trading partners as a pilot. As you become more seasoned, you can synchronize entire catalogs (if necessary).
- Review your systems to identify any other product data elements needed to support your business processes (e.g., purchasing, sales and marketing, replenishment, recall, e-business, rebates and chargebacks, inventory management, transportation, etc.).
- Have your team spend time to define and align on data scope – of those that you have identified, what attributes are required, recommended or out of scope. Recommendation is to start with the basics then grow from there.
- Once you are aligned on your attribute list and scope, generate a list of all of your trading partners. You may want to prioritize this list based on the number of products or usage volume. Some segregation method is recommended since it is unlikely that you can tackle your entire trading partner portfolio at one time.
- Contact manufacturers, distributors, suppliers, or customers to communicate your commitment to data quality and your general strategy for collaborating with trading partners to achieve it. Give your trading partners suggested timelines for data sharing and synchronization execution.
- Communicate to your trading partners how you will measure their ability to meet your data requests of them and how you will collaborate with them to develop a data quality feedback loop.



NOTE: If the GDSN is to be the method of data sharing, identify the GDSN Healthcare attribute associated with each data element. Your certified data pool can assist with this exercise.

5.1.1 Global Trade Item Number as the Foundation to Quality

The GTIN serves as the primary identification key for products that you trade. It is imperative that the GTIN serve as that foundational data element upon which all other attributes about that product are based. Your databases may already contain many GTINs. You will need to verify that they are complete, correctly formatted, and accurately assigned. GTIN assignment is the responsibility of the Brand Owner. If you are a data recipient, you will need to collaborate with the Brand Owner or another trusted data source to verify GTINs.

- Brand Owners & Recipients: Assess the GTINs you may already have for misalignment, and then determine if there are any omissions or additional GTINs that need to be allocated or identified.

 **NOTE:** When reviewing your current GTIN assignments, it is recommended that you compare the GS1 Company Prefix utilized in the GTIN to the GS1 Company Prefix licensed to the brand owner to ensure accuracy. The [GS1 US Data Hub](#) tool or GS1 Global Electronic Party Information Registry ([GEPiR](#)) can help with this review. For more information please see our website for [FAQs regarding GS1 Company Prefix Management and Mergers & Acquisitions](#).

- Brand Owners: Recognize the levels of the product hierarchy (i.e., packaging levels) that your GTIN numbering system needs to accommodate to support operations and trading partners. Be sure to consider regulatory, clinical use, and chargeback processes as they apply to your company's products. Confirm that all products and needed packaging levels have been assigned a GTIN, and that each GTIN has been properly assigned using the correct GS1 Company Prefix.
- Recipients: Clearly define your organization's GTIN product hierarchy and packaging levels. This is a critical step in the implementation process. GS1 US recommends that GTINs for the full packaging hierarchy be maintained and shared.

 **NOTE:** Refer to the following useful resources for GTIN assignment and GTIN allocation:

- [GS1 US - Introduction to the Global Trade Item Number \(GTIN\)](#)
- [GS1 Healthcare GTIN Allocation Rules](#)
- Brand owners: Once GTIN assignment is complete, all available GTIN product attributes should be identified, properly defined, and data structure documented by the brand owner. Agreement on data element definitions between trading partners (i.e. synchronizing/reconciling) is an important element of successful data sharing. This reconciliation activity should be part of an onboarding process with new trading partners.
 - GS1 US and the Healthcare industry recommend that the 39 attributes defined in [Creating the Case for Trusted Data](#) be considered as a core set of minimum attributes to be shared with all healthcare data recipients. Not all trading partners require every healthcare product attribute. The universe of attributes you need to define for your products includes the core set of attributes plus any other attributes required by your trading partner or data recipients. Trading partners often post their attribute requirements on their data pool's website.
- Brand Owners and Recipients: Identify your source databases/tables for attributes. Develop your mapping plan to pull data from the system of record as opposed to a system of reference.
- Recipients: Audit and align the product attributes to current values in your systems before integrating as well. You may have put processes and programs in place to "lock-down" values depending on the information that was formerly available from your trading partners.

5.1.2 Prepare Your Systems to Share or Consume Data

Once you have defined and aligned on attribute requirements and performed a GTIN assessment, it is time to prepare to share or consume data with trading partners from your list. Key steps in this process include:

1. Understand your internal needs. Where is each data element stored and managed? What internal systems must it be shared with to accommodate your organizational objectives?
2. Establish a data storage strategy leveraging the GTIN as the established product identifier.
3. A cross-reference between internal item numbers and GTINs is essential if the GTIN has not been adopted as the sole product identifier.
4. Review and update any business processes and internal product data set-up processes that may need to change as a result of implementing data synchronization.
5. Identify your source and destination databases/tables for shared attributes. Develop your mapping plan to pull data from the system of record as opposed to a system of reference directly into internal business systems.
6. Consider adding validation rules for item adds to ensure complete and accurate data entry. (*Failed file lines can become an important performance measure)
7. Develop and deploy a feedback loop back to data sources so that errors can be communicated and corrective action can be taken and tracked.

5.1.3 Establish Data Quality Measures

Lastly, you should establish foundational data quality measures to track both internal data quality as well as the quality of data from your external trading partners. As the saying goes, you can't manage what you don't measure. Establishing measurements for trusted data – accurate, complete, timely, consistent, and synchronized – must be a part of any data quality program. Measurements should be relevant and align with the program strategy and mission. For example, measuring the total count of products in your master file is not as meaningful as knowing the percentage of that total count that has complete attribute information. And, even more meaningful is that percentage where attribute information is both complete and accurate (i.e. what is on the package is what is in the master file).

Establish consistent metrics for measuring your external trading partners. Holding them all to the same standards of performance allows you to develop scorecards that can fairly drive improvement and track progress for individual companies. Implementation of data quality measures typically requires close coordination with your trading partners – this level of interaction can bring about a variety of positive outcomes.

Internally, think about tying data quality measures to individual performance for those individuals on the team who are responsible for data stewardship. Close collaboration with the entire master data team and supply chain team is important.

It is important to develop baseline metrics so that improvements can be observed and valued. Consider baseline metrics around error rates, FTEs, time/cost savings, etc. **TABLE 5-2** provides a few examples of the types of metrics that can serve as a starting point. Other metrics can be designed as your program becomes more mature.

TABLE 5-2 Examples of Scorecard Metrics for Basic Data Quality and ROI Areas

Functional Area	Metric Examples
Complete Data	<ul style="list-style-type: none"> ▪ % of products with GTIN ▪ % of products with full hierarchy GTINs ▪ % of products with all required attributes vs % with none or partial
Accurate Data	<ul style="list-style-type: none"> ▪ Results of periodic random data audits as compared to physical product/package ▪ Cycle count accuracy (warehouse, storeroom, clinical areas)
Timely Data	<ul style="list-style-type: none"> ▪ Avg # days for data corrections ▪ Time between price changes and system price updates
Consistent data	<ul style="list-style-type: none"> ▪ Results of periodic random audits between data sources
Synchronized Data	<ul style="list-style-type: none"> ▪ % of products from trusted data sources
Financial and Accounting Impacts	<ul style="list-style-type: none"> ▪ % of invoice/pricing errors ▪ % of incomplete product data that impedes sales set up (time to “available for sale”) ▪ Excess or obsolete inventory dollars ▪ Cost and Outcomes analysis
Logistics & Distribution	<ul style="list-style-type: none"> ▪ Inventory errors (incorrect balance on hand) ▪ Truck cube errors/truck weight errors
Labor Management	<ul style="list-style-type: none"> ▪ Item scan success vs manual entry needed ▪ Customer product inquiries due to insufficient data
Administrative	<ul style="list-style-type: none"> ▪ Chargeback error rates ▪ Time spent on non-EDI orders

6 Summary Recommendations

- Data should be viewed and treated as an asset.
- The GS1 Global Trade Item Number (GTIN) should be adopted as the global unique identifier for healthcare products to facilitate data quality.
- Data management is a continuous program requiring a strategy, dedicated resources, strong processes, and the right technology.
- Trusted data is complete, accurate, timely, consistent, and consumable.
- A strong data governance program is vital to ensure data quality.
- You can't manage what you don't measure.
- Data quality is a shared responsibility within and across healthcare organizations.
- Executive support and investment analytics are important to establish a successful data strategy.
- Envisioning yourself as the consumer or user of your data will help you understand how to meet your customers' needs.
- Incorporate the following Data Quality Checklist into your basic program:

Task Number	Task
1.	<p>Map out the data governance process across your organization.</p> <ul style="list-style-type: none"> ■ Where does your data come from? ■ Who has access to your data? ■ What permissions do they have? ■ Who is authorized to commit data to your systems? ■ Who has permissions to add/change/delete? ■ Is the GDSN part of your data governance program?
2.	<p>Educate your teams.</p> <ul style="list-style-type: none"> ■ Do each of your stakeholders/data owners have the "right" education? ■ GS1 Standards ■ GTIN Management Rules ■ GS1 Package Measurement Rules ■ GDSN Data Attributes ■ Your internal data requirements
3.	<p>Audit your products.</p> <ul style="list-style-type: none"> ■ Should be ongoing – not a one-time event ■ <i>Suppliers</i>: post-production, changes, ongoing ■ <i>Recipients</i>: in the warehouse; in the condition received
4.	<p>Synchronize products with trading partners.</p> <ul style="list-style-type: none"> ■ <i>Suppliers</i>: share your item data with your customers via the GDSN ■ <i>Recipients</i>: request data from your suppliers
5.	<p>Communicate with your trading partners.</p> <ul style="list-style-type: none"> ■ When issues are discovered, work with your trading partners to understand the source of the issue. ■ Follow the Collaborative Resolution Process to understand the source of the issue, ownership, and timeliness of the resolution.

- Consult [GS1 Healthcare US GDSN resources and case studies](#) which illustrate lessons learned and recommendations for GDSN implementation.

7 Resources

Global Standards Resources

- [How to select a GDSN-certified data pool](#)
- Please refer to the [GS1 GDSN website](#) for a full list of GDSN-certified data pools
- [GDSN Operations Manual](#) (user operations manual for the GDSN)
- [GS1 Global Data Dictionary \(GDD\)](#) (a repository of core component and business definitions and their equivalent representations in targeted standards)
- [GS1 Global Attribute Explorer](#)
- [GS1 Package Measurement Rules](#)

GS1 US Implementation Resources

- [Creating the Case for Trusted Data](#)
- [GS1 Healthcare US GTIN Adoption & Use Model: Implementation Roadmap for U.S Healthcare Supply Chain](#)
- [GS1 Healthcare US website](#)
- [GS1 US GDSN Resources for Healthcare](#)
- [GS1 US Education and Training](#)
- [GS1 US National Data Quality Program](#)

Proprietary Statement

This document contains proprietary information of GS1 US. Such proprietary information may not be changed for use with any other parties for any other purpose without the expressed written permission of GS1 US.

Improvements

Improvements and changes are periodically made to publications by GS1 US. All material is subject to change without notice. Please refer to GS1 US website for the most current publication available.

Disclaimer

Except as may be otherwise indicated in specific documents within this publication, you are authorized to view documents within this publication, subject to the following:

1. You agree to retain all copyright and other proprietary notices on every copy you make.
2. Some documents may contain other proprietary notices and copyright information relating to that document. You agree that GS1 US has not conferred by implication, estoppels, or otherwise any license or right under any patent, trademark, or copyright (except as expressly provided above) of GS1 US or of any third party.

This publication is provided "as is" without warranty of any kind, either express or implied, including, but not limited to, the implied warranties of merchantability, fitness for a particular purpose, or non-infringement. Any GS1 US publication may include technical inaccuracies or typographical errors. GS1 US assumes no responsibility for and disclaims all liability for any errors or omissions in this publication or in other documents which are referred to within or linked to this publication. Some jurisdictions do not allow the exclusion of implied warranties, so the above exclusion may not apply to you.

Several products and company names mentioned herein may be trademarks and/or registered trademarks of their respective companies. GS1 US does not, by promulgating this document on behalf of the parties involved in the creation of this document, represent that any methods, products, and/or systems discussed or recommended in the document do not violate the intellectual property rights of any third party. GS1 US has not performed a search to determine what intellectual property may be infringed by an implementation of any strategies or suggestions included in this document. GS1 US hereby disclaims any liability for any party's infringement of intellectual property rights that arise as a result of any implementation of strategies or suggestions included in this document.

This publication may be distributed internationally and may contain references to GS1 US products, programs, and services that have not been announced in your country. These references do not imply that GS1 US intends to announce such products, programs, or services in your country.

GS1 US shall not be liable for any consequential, special, indirect, incidental, liquidated, exemplary, or punitive damages of any kind or nature whatsoever, or any lost income or profits, under any theory of liability, arising out of the use of this publication or any content herein, even if advised of the possibility of such loss or damage or if such loss or damage could have been reasonably foreseen.

GS1 US HEREBY DISCLAIMS, AND YOU HEREBY EXPRESSLY RELEASE GS1 US FROM, ANY AND ALL LIABILITY RELATING TO YOUR COMPLIANCE WITH REGULATORY STANDARDS AND LAWS, INCLUDING ALL RULES AND REGULATIONS PROMULGATED THEREUNDER. GS1 US MAKES NO WARRANTIES OF ANY KIND RELATING TO THE SUITABILITY OF THE GS1 STANDARDS AND THE SPECIFIC DOCUMENTS WITHIN THIS PUBLICATION TO COMPLY WITH ANY REGULATORY STANDARDS, LAWS, RULES AND REGULATIONS. ALL INFORMATION AND SERVICES ARE PROVIDED "AS IS."

*GS1 US employees are not representatives or agents of the U.S. FDA, and the content of this publication has not been reviewed, approved, or authorized by the U.S. FDA. The following information contained herein is for informational purposes only as a convenience, and is not legal advice or a substitute for legal counsel. GS1 US Inc. assumes no liability for the use or interpretation of the information contained herein.

No Liability for Consequential Damage

In no event shall GS1 US or anyone else involved in the creation, production, or delivery of the accompanying documentation be liable for any damages whatsoever (including, without limitation, damages for loss of business profits, business interruption, loss of business information, or other loss) arising out of the use of or the results of use of or inability to use such documentation, even if GS1 US has been advised of the possibility of such damages.

IAPMO

In this publication, the letters "U.P.C." are used solely as an abbreviation for the "Universal Product Code" which is a product identification system. They do not refer to the UPC, which is a federally registered certification mark of the International Association of Plumbing and Mechanical Officials (IAPMO) to certify compliance with a Uniform Plumbing Code as authorized by IAPMO.

*If applicable

GS1 US Corporate Headquarters

Princeton South Corporate Center, 300 Charles Ewing Boulevard
Ewing, NJ 08628 USA

T +1 937.435.3870 | **E** info@gs1us.org

www.gs1us.org

Connect With Us

