



The Global Language of Business

# Unlocking Benefits of GS1 DataMatrix in Non-Retail Healthcare

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## 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.

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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.

# 1 Introduction

Launched in 2020, [Sunrise 2027, a GS1 US initiative](#), is an effort focused on moving industry towards enabling 2D capabilities at retail point-of-sale (POS). As retailers, brand owners and consumers desire ready access to more information on a package such as best before or expiration date or lot or serial numbers, there is a need for the ability to share that information via data carriers that can be encoded with more data than the EAN/UPC-A can accommodate. Sunrise 2027 is focused on enabling the ability to apply 2D barcodes on individual items and scan 2D barcodes at point of sale, unlocking additional use cases for customers and patients.

Since some healthcare products, both medical devices and pharmaceuticals, can be sold both in retail and non-retail environments, aligning efforts to support capabilities enabling scanning two-dimensional (2D) barcodes in both environments makes sense, especially for brand owners whose products can be used or sold in both channels. A coordinated 2D barcode approach can support labeling consistency and consolidation, bring efficiency to brand owners and reduce confusion around what barcode to scan for all supply chain stakeholders - professionals or clinicians, distributors, wholesalers or 3rd party logistics providers and consumers to include patients.

**The [GS1 DataMatrix](#) may offer a number of benefits for healthcare products making it the data carrier of choice for retail and non-retail healthcare in the United States. See Section 1-2 below for potential benefits.**



Important:

- As with all GS1 Standards and solutions, the use of GS1 DataMatrix in healthcare is voluntary, not mandatory if not required by law. It should be noted that use of the words “must”, “require” or “recommended” throughout this document relate exclusively to technical or broader industry stakeholder recommendations for the application of the standards to support the integrity of your implementation. GS1 US is not offering legal services or advice on regulatory compliance requirements. Each company is individually responsible for meeting all statutory and/or regulatory requirements for their company and their products. Consult with your company’s legal counsel or compliance team for more specific information about statutory and regulatory requirements.
- There is no GS1 requirement for brand owners to transition from their existing linear barcode, such as a UPC-A or a GS1-128, to a 2D barcode.

## 1.1 Scope and Objective Statement

This document is intended to support United States non-retail healthcare stakeholders wishing to enable capabilities offered with 2D barcodes and align with Sunrise 2027. Non-retail healthcare, for purposes of this document, is defined as places where medical devices or pharmaceutical products are scanned outside of the retail channel (i.e., healthcare products that are not sold in a retail store setting). A non-retail healthcare setting could be a hospital, pharmacy, clinic, infusion center, long-term care, ambulance and more.

Similar to retail, the focus for non-retail healthcare calls for industry awareness, readiness, and capabilities for the GS1 DataMatrix on at least the primary packaging level, the first packaging level that is in direct contact with the item, of both medical devices and pharmaceutical products. In retail this would be similar to the unit of sale or, colloquially, the package that is scanned at checkout. Manufacturers and their trading partners may certainly consider GS1 DataMatrix at other packaging levels.

While other 2D data carriers exist within the GS1 barcode suite, the GS1 DataMatrix is the focus of this paper. GS1 DataMatrix has been identified by the global GS1 Healthcare community as the preferred 2D data carrier for product identification in healthcare.

(See: [The Key Role of GS1 DataMatrix Barcodes for Product Identification in Healthcare](#))

This document also intends to provide information to support considerations for both labelers and their downstream supply chain trading partners regarding trading partner capabilities, possible data needs, print

and scanning technologies and the consumption of data for non-retail related healthcare products and partners.

It is not an intention of this document to suggest or imply that manufacturers must do anything more than what they do today with regards to what data is encoded in the data carrier on the labels of medical devices or pharmaceuticals. If a conflict exists between application of GS1 Standards and a regulation, any specific regulatory requirements take precedent over the corresponding GS1 Standards requirement or recommendation.



\*NOTE: The workgroup used the following to clarify what is meant by “primary packaging level”:

*\*Primary packaging = the first level of packaging that is in direct contact with the item. This packaging level is marked with a GS1 DataMatrix, either on the packaging itself or on a label affixed to the packaging. [Global Standards Technical Implementation Guideline for Global Health Commodities](#)*

## 1.2 Potential Benefits of GS1 DataMatrix in Non-retail Healthcare

GS1 DataMatrix has the capacity to encode potentially thousands of alpha-numeric characters in a relatively small space whereas a linear GS1-128 has a total capacity of 48 data characters and, typically, a larger footprint. For example, the two symbols here, a linear GS1-128 and a 2D GS1 DataMatrix, both contain the exact same data, yet the GS1 DataMatrix does so in a much smaller space.



(For illustrative purposes only. Barcodes are not to exact scale.)

Because of the technology benefits of more data in a smaller footprint and increased durability, meaning it can withstand noticeable damage but still return a successful scan compared to linear barcodes, the GS1 DataMatrix may help:

- Address label space constraints or reduce the need for multiple barcodes on products with very small packaging
- Support harmonized labels for healthcare products that cross both retail and non-retail supply chain environments
- Support harmonized labels on products traded outside of the U.S. in countries where GS1 DataMatrix is required
- Align symbology used on medical devices with U.S. regulations already in place for pharmaceuticals
- Minimize customer confusion of which barcode contains the Unique Device Identifier (UDI) on medical devices
- Support the vision of “1 barcode, 1 Beep” – a single barcode for clinicians to scan - by supporting consolidation of multiple barcodes on pack

### 1.3 Healthcare Use Cases

Facilitating the ease of capturing enriched product information with a single scan opens a wide array of opportunities in both the retail and non-retail healthcare environments where products are used. Weak points of supply chain visibility, exposed in recent experiences during the COVID pandemic, can be strengthened and possibly eliminated by leveraging data made available in barcodes.

For example:

- **Recall/Patient Safety:** Encoding and capturing Batch/Lot facilitates efficient recall management and supports prompt removal of recalled products from circulation.
- **Inventory Management:** Encoding and capturing identifiers such as Manufacture Date or Expiration Date supports FIFO inventory management, stock rotation, and reduced obsolescence.
- **Traceability:** Encoding, sharing, and capturing granular data allows for chain of custody and a more secure supply chain.
- **Improved Packaging:** More information encoded in a smaller footprint frees up label space for clearer clinician/consumer package information and can simplify packaging by reducing the number of barcodes on pack.
- **Electronic Health Record:** Capturing robust data from readily recognizable barcodes for inclusion in medical records supports surveillance and tracking.

### 1.4 High Level Roadmap to 2027

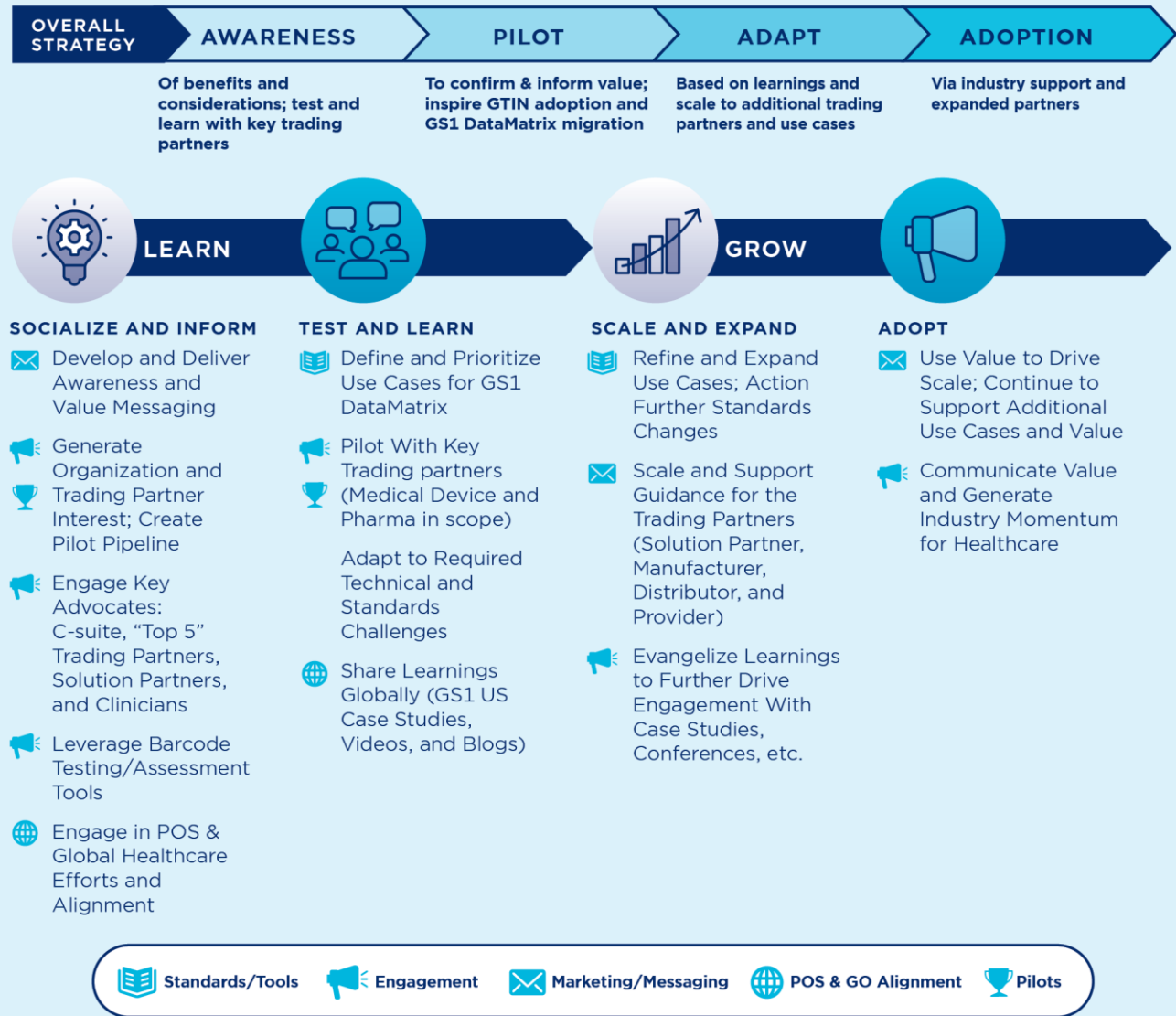
The roadmap below in FIGURE 1-4 is intended to be a high-level, thought-provoking model for healthcare brand owners and other downstream trading partners looking to embrace and leverage the GS1 DataMatrix barcode. Enabling 2D capabilities can be initiated by players at both ends of the healthcare supply chain – manufacturers or providers. As a matter of fact, providers will get significant benefit from scanning the data available in a single scan of a GS1 DataMatrix, instead of multiple barcodes on pack for instance, and can serve as the catalyst for getting manufacturers to consider a GS1 DataMatrix barcode on healthcare products. Brand owners, in many cases, are waiting to hear their customers are capable and ready for 2D barcodes and that there is value in leveraging scanning. In fact, many non-retail healthcare products are already marked with a GS1 DataMatrix barcode, and downstream trading partners, especially healthcare providers, can be taking advantage of the inventory management, traceability, and operational efficiency benefits to be had from scanning these.

This high-level approach involves leveraging trading partner engagement, tools, messaging, pilots, and point-of-sale efforts to drive the industry towards GS1 DataMatrix capabilities in non-retail healthcare by 2027.

**FIGURE 1-1  
Non-retail Healthcare Roadmap**

**HIGH-LEVEL STRATEGY**

Drive the industry toward GS1 DataMatrix in Non-retail HC to support single barcode—single scan capabilities and adoption



## 2 Industry Considerations and Capabilities

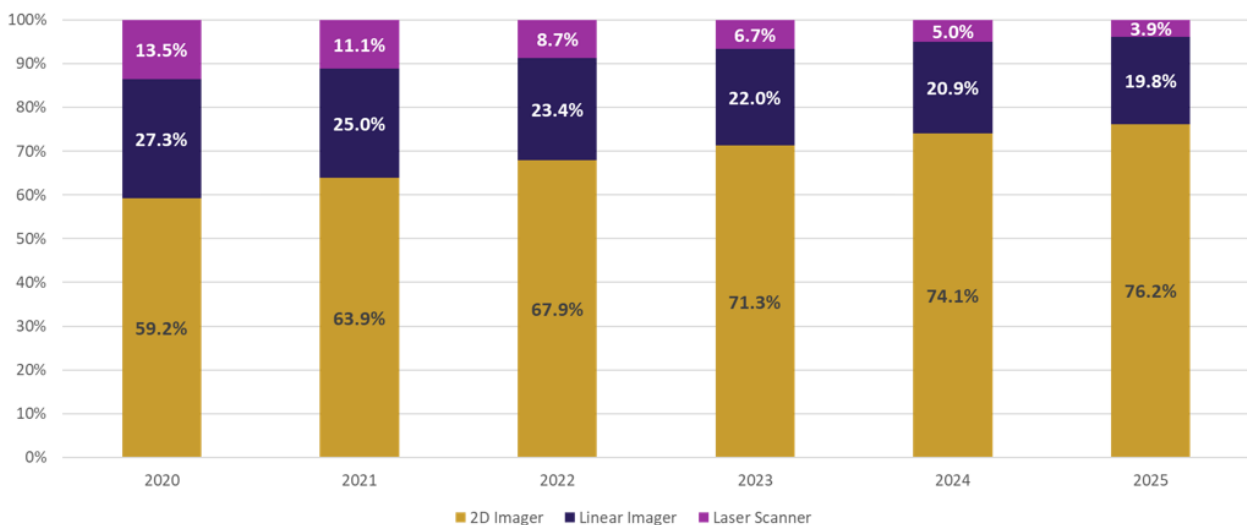
In 2021, GS1 US partnered with a prominent technology market research firm and charged them with conducting a robust survey of healthcare stakeholders to determine utilization of barcodes in the U.S. market. A key objective of the research was to assess retail pharmacy and acute healthcare organizations' ability and appetite for scanning, backend applications and software ability to support 2D barcodes, specifically GS1 DataMatrix, as well as understand any plans and estimated timeframes for infrastructure modernization efforts.

34 in-depth interviews and over 500 detailed surveys of U.S. based decision makers stratified across Pharmacies, Hospitals, Medical Laboratories, Ambulatory Care, Medical Device Manufacturers and Durable Medical Equipment Wholesalers were conducted in the second half of 2021.

Summary findings revealed barcode scanning infrastructure across all healthcare segments and environments is clearly migrating towards optical scanners capable of reading and decoding 2D barcodes. In hospital provider organizations in the US, for example, 64% of scanners in use at the time of the survey were optical 2D scanners. This was projected to increase to over 76% by 2025.

These numbers and trends would imply that non-retail healthcare stakeholders are well positioned to consider continued GS1 DataMatrix readiness and capability by 2027.

US Scanner Installed Base by Technology (Hospital/Provider Environments)



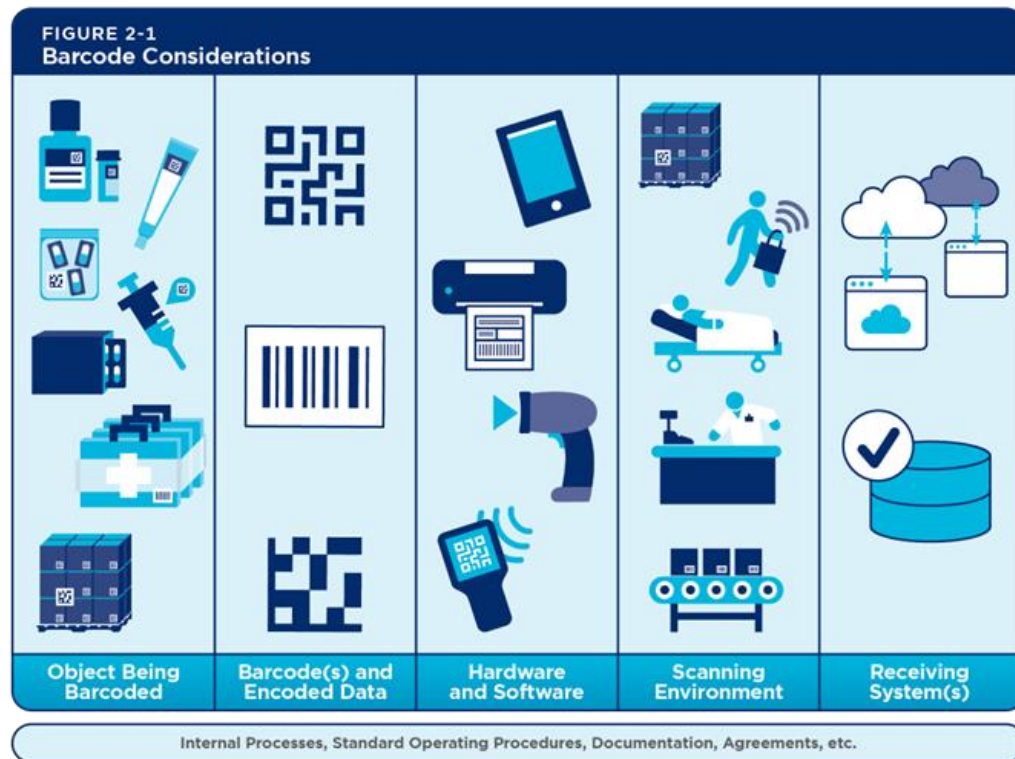
### 2.1 Trading Partner Considerations

A primary consideration for brand owners thinking about employing 2D barcodes on pack is "Can my downstream trading partners scan and consume data from a GS1 DataMatrix?"

While recent studies and surveys of healthcare supply chain stakeholders like the one conducted on behalf of GS1 US reveal a majority have developed, or are in the process of developing, capabilities around scanning, the consumption of enriched data elements is still in progress. It is recommended that brand owners discuss 2D barcode strategies with key trading partners including distributors, wholesalers, 3<sup>rd</sup> party logistics providers, hospital providers and end users of their products as they create plans. The full "lifecycle" of a product should be considered so that any point where a product is "touched" – from manufacturing through transportation/distribution, warehouse/hospital storeroom, to end user and point of use and even disposal or reverse logistics - can be evaluated for the impact a move to 2D barcodes could have.

Once the decision to apply 2D barcodes on your healthcare products is confirmed, other considerations such as those depicted in Figure 2-1 below should become part of your organization's transition and decision-making process. Different products may need to be labeled slightly differently based on factors such as the shape or substrate of the packaging or where they are most likely to be scanned. New standard operating procedures (SOPs) and label documentation will very likely be required especially given the highly regulated nature of non-retail healthcare products.





But it is not just brand owners who need to explore, educate, evaluate, and assess needs and capabilities. Any stakeholder along the non-retail healthcare supply chain wishing to be prepared to leverage GS1 DataMatrix must also evaluate themselves and their capabilities for consuming 2D barcodes to bring the potential benefits.

**Figures 2-2** and **2-3** below include examples of some of the potential capabilities that each area of the non-retail healthcare supply chain might include in their plans to become GS1 DataMatrix “ready” by 2027.

These recommendations are framed around basic needs to either print, scan, and/or consume GS1 DataMatrix barcodes and the data encoded in them. As linear barcodes are not going away, these tables reflect considerations that are inclusive of, not exclusive to, GS1 DataMatrix.

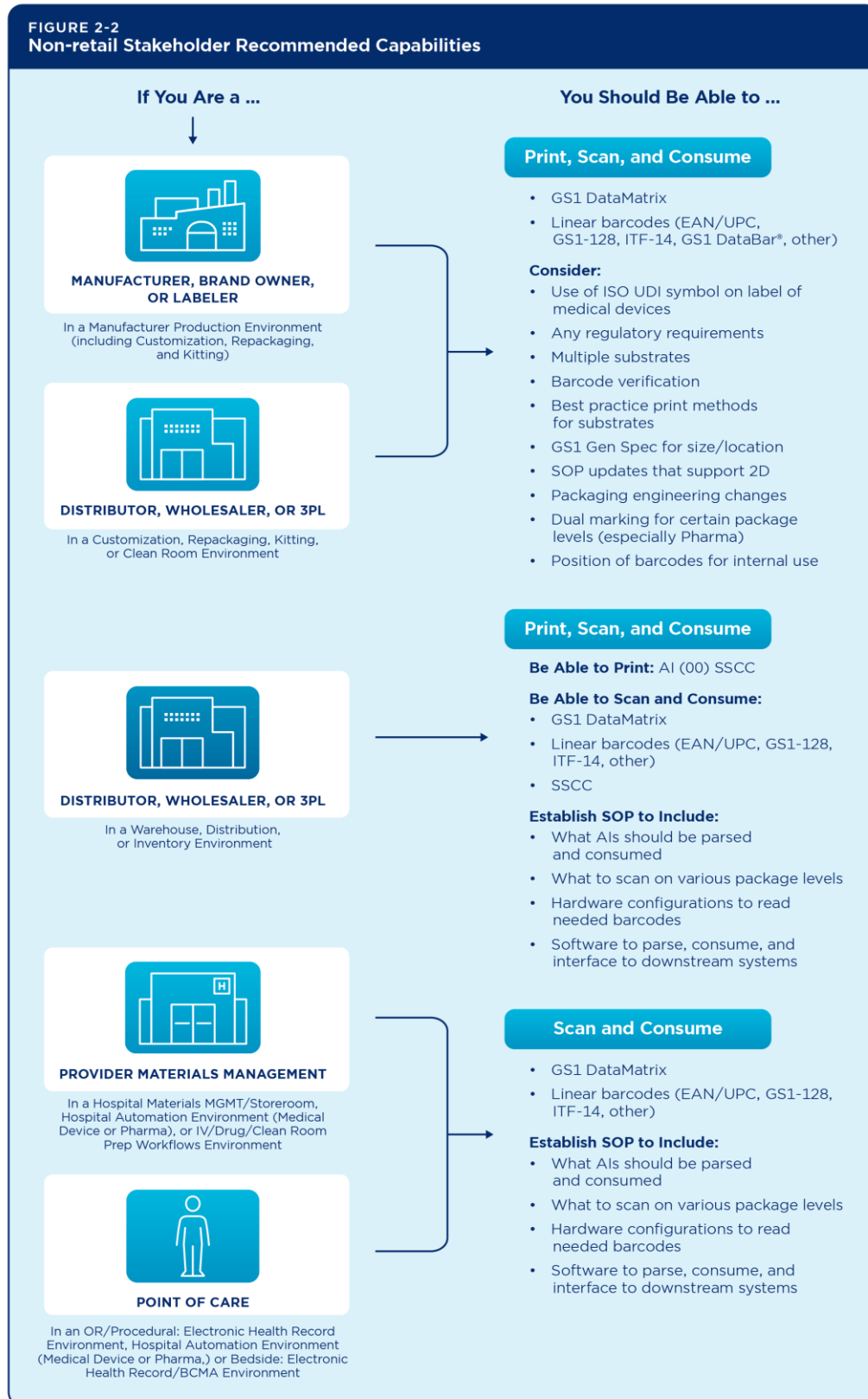
Figure 2-2 is intended to provide high-level considerations of the types of print, scan and/or consume capabilities each key supply chain role might evaluate as part of a capabilities plan.

Figure 2-3 provides a chart of common GS1 Application Identifiers (AIs) used in the healthcare supply chain and on the labels of medical devices or pharmaceutical products.

Some, such as Batch\Lot (AI 10) or Expiration Date (AI 17) may be required on the label of a product. Product information such as batch\lot, when scanned and consumed can also support efficient recall management for example. Other application identifiers, such as Product Variant (AI 20) or Internal Use (AI 91-99), may be used to support internal processes for specific supply chain roles and could support reducing the number of barcodes on pack for example.

A full listing of GS1 Application Identifiers and their specifications can be found in the [GS1 General Specifications](#) document.

As an additional resource aimed at helping supply chain stakeholders assess their current state, GS1 US has also published the [GS1 US Barcode Capabilities Test Kit](#) which allows you to assess your ability to scan 2D barcodes and collect the data encoded.



**FIGURE 2-3**  
Key GS1 Application Identifiers for Non-retail Healthcare

Application Identifiers (AIs)	Manufacturing	Distributor/Wholesaler	Provider
<b>GTIN® (01)</b> <b>Mfr/Prod Date (11)</b> <b>Expiration Date (17)</b> <b>Serial # (21)</b> <b>Batch/Lot (10)</b> <b>NDC (715)</b>			
<b>SSCC (00)</b>			
<b>AIs for Internal Use (91-99)</b>			
<b>Variant (20)</b>			
<b>Software Version (8012)</b>			
<b>Potency (7004)</b>			

**KEY**



Ability to print AI



Ability to scan AI



Ability to consume AI



AI may be encoded so it will be part of a scan, but it does not need to be consumed

## 2.2 Barcode Print Technology Considerations

There are a wide variety of printing technologies available to support use cases for barcode printing. These printing technologies can produce both linear and 2D barcodes. While thermal ink jet printing is most common in healthcare, other options may work just as well or better for meeting print requirements for a particular item, substrate or print environment.

Those starting conversations around printing capabilities should begin by connecting with those in their organization responsible for printing equipment and processes. This includes when plans may involve adding GS1 DataMatrix as a symbology.

**Figure 2-4** below provides details about some of the more common barcode print technologies.

Section 5 of the [GS1 General Specifications](#) contains robust details for all GS1 data carriers. Section 5.12 provides specific information related to barcode production and quality. It is important to consider barcode quality (i.e., verification) as an ongoing standard operating procedure. Poor quality barcodes become a barrier instead of an enabler to efficient operations for downstream trading partners.

The maximum printing speed in Figure 2-3 below is based on what most printers available in the market are capable of. Some printers within the technology type may be able to print faster and there are emerging technologies able to print at more than 150m/minute. Note that the number of barcodes that can be printed per minute will vary with the distance between the barcodes.

Dots per inch (DPI) is used to measure the resolution of an image based on the number of dots that can fit into a linear inch. The higher the DPI, the more detail can be printed and the smaller the image can be.

**Figure 2-4: 2D Barcode Technology Printing Capability Overview**

Thermal Ink Jet (TIJ)	~60m/min	300, 600, and 1200 dpi	Flexible packaging Continuous & Intermittent	Printhead jet loss Must be closer to product Ink adhesion to some substrates, smearing
Thermal Transfer Overlay (TTO)	~24m/min	203, 300, and 600 dpi	Handheld, desktop, print and apply	Printhead wear/thermistor failure, down time for ribbon change
Drop on Demand	~60-120m/min	150, 300-1200 dpi	High resolution Fast-curing inks	Printhead jet loss, overall maintenance Ink adhesion to some substrates, smearing
Laser	~60m/min	75-1200 dpi	Inline production No ink or solvent required Marking difficult materials	Substrate reaction to wavelength, material, and/or ink color can be undesirable Fume extraction required
Digital	~70m/min	600-1200 dpi	On-demand Film, labels	Currently, most implementations are not in-line UV curing process not ideal for all substrates Inks may not be appropriate for use on all product types

## 2.3 Barcode Scanning Considerations

### What to consider when procuring or updating scanners

#### 1. Scanning Equipment Considerations

If your organization already has scanning equipment it is a good idea to first confirm whether existing scanners are capable of scanning 2D barcodes and GS1 DataMatrix in particular. Often just a reconfiguration of the scanner is all that may be needed to successfully scan a new barcode symbology. But scanning equipment must be image-based to successfully scan a 2D barcode. If you are currently using a laser scanner, an upgrade will be required to scan 2D barcodes.

Many image-based scanners that may not be able to process GS1 DataMatrix and other 2D barcodes may simply require a software update to enable the capabilities. Refer to your scanning equipment provider for details on which barcode types can be enabled, how to enable them, and details related to scanner performance.

GS1 US has created a resource to help you test your systems' capabilities when gearing up for Sunrise 2027. The [GS1 US Barcode Capabilities Test Kit](#) allows you to assess your ability to scan 2D barcodes and collect the data encoded.

#### 2. Scanner Performance Considerations

Scanning equipment and software solutions vary in their performance and functionality. When assessing new scanning solutions, there are a number of questions or considerations that should be explored with your technology team, your solution provider or the manufacturer of your equipment. For example, the following items should be considered:

- Is the scanning solution appropriate for where it will be used in terms of scan distance, speed, and overall durability?
- Can it process the data required for the application?
  - It is capable of processing and transmitting the data from GS1 barcodes (i.e., are GS1 Function Code 1 (FNC1) or group separators recognized and appropriately interpreted?)
    - See Gen Spec Section 7.8 "Processing of data from a GS1 symbology using GS1 Application Identifiers"
  - Does it have the ability to select what data beyond the GTIN is processed and transmitted?
  - Does the scanner provide the data in a way that is usable by the receiving system?
- Is the solution optimized for effective and safe scanning?
  - Ergonomic design and easy to use
  - Enhanced to minimize or fully prevent duplicate scans of the same barcode
  - Able to prioritize and process specific barcodes in scenarios where multiple barcodes are on an object
  - Ignore barcodes without relevant data (e.g., proprietary QR Codes, Data Matrix used for packaging controls)
  - Process multiple barcodes on-pack with GS1 data and only capture the desired data in the final transaction.
    - This includes capturing the GTIN and associated data once with a single acknowledgement (e.g., beep, light)

## 2.4 Considerations for Consuming and Using Scanned Data

The main reason to utilize more data rich barcodes is to be able to take advantage of the data encoded in them. Evaluating your organization's capabilities around consuming, storing, and utilizing enriched information about the products you buy, and use is critical to any barcode scanning plan.

Systems receiving data from a barcode, either 1D or 2D, must be able to interact with that data. There are over 180 GS1 Application Identifiers (AIs) that have the ability to be encoded into a GS1 DataMatrix. Healthcare systems are expected to consume and use a subset of all options as not all AIs are relevant to business processes. For example, AI (7009) is designated for fishing gear type – not something you would ever expect to see encoded in the barcode of a medical device or pharmaceutical product.

Based on what types of product scanners are expected to scan, regulatory considerations, where the scan is taking place or what supply chain activity is being performed, what AIs are captured may vary between healthcare organizations and facilities. For instance, implant data captured at the point of care for use in patient electronic health records was reviewed by a GS1 Healthcare US workgroup and the findings published in [Point-of-Care Scanning for Surgical Instruments Guide](#). Another example is the work done by the GS1 Healthcare US workgroup focused on data quality in healthcare: [Creating the Case for Trusted Data - Attribute Lists and Implementation Insights from Three Healthcare Business Use Cases](#). Some of the most common basic AIs were referenced in Figure 2-3 earlier. For a full list of common AIs encountered in healthcare facilities see section 3 of the [GS1 General Specifications](#).

As data element requirements are identified, fields may have to be added to integrated technology systems for anything that may be consumed from a barcode that does not already exist in the receiving system. Note that the information encoded in the barcodes will vary, so all fields may not be expected to populate on every scan. For instance, if no expiration date is encoded into the barcode on a label, no date will be populated in the system receiving information from that scan.

Likewise, systems may not need to consume, store, and/or use all data encoded in a 2D barcode. For example, a packaging component number used to ensure the right label is on the right product during manufacturing would not be useful for a hospital system to capture. In these cases, systems must be designed to drop the data not being captured without disrupting other processes.

Determinations must be made on how the consumed data is able to be stored and accessed throughout internal systems and shared with partners. Having standardized fields across systems that will be interacting with the barcode data allows for interoperability of information flow across all systems. Once the data is accessible by a system, additional processes can be added to use the data in specific ways, such as associating a dispensed pharmaceutical to an electronic health record, stopping the shipment of product with a batch/lot number flagged as having been recalled, or confirm the specific instance of a product was returned based on a serial number. The modifications required to enable these use cases will vary based on existing technology platforms and implementations.

### 3 Conclusion and Next Steps

Healthcare is a dynamic and complex business and supply chain that relies on a vast and diverse network of brand owners/suppliers, distributors, and clinical organizations to meet the needs of patients and consumers. Additionally, a more engaged and tech-savvy clinician and patient community expects readily available access to data about the products used in the delivery of healthcare. Scanning and capturing enriched data found in healthcare product barcodes can enable transformative improvements, support efficient operations and deliver much-needed improvement in supply chain visibility. Ultimately and most importantly, the capture and use of enriched product level information available in GS1 barcodes will help improve quality of care and patient safety. As retail brands and point of sale systems begins to move towards 2D barcodes, the time is right for non-retail healthcare organizations to prioritize adoption and begin leveraging the capabilities of 2D barcodes as well.

As with any large undertaking, starting small usually works best. The simple steps below should serve as a guide to getting started on the journey to adoption and use of 2D barcodes.

**STEP 1 - Plan:** Identify a few trusted key trading partners to begin exploration of the “why” and the “how” of enabling the adoption and the use of GS1 DataMatrix is recommended. Use the [GS1 US Barcode Capabilities Test Kit](#) to support an assessment of capabilities and readiness. Prioritize one or two specific use cases to test.

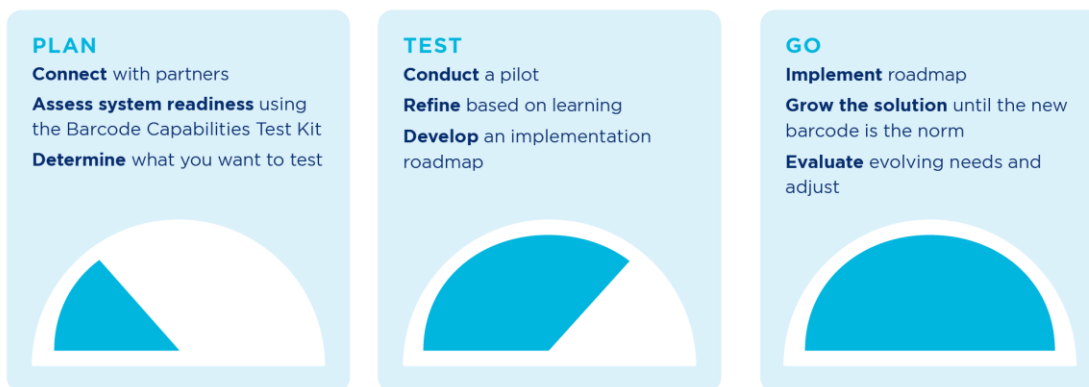
**STEP 2 - Test:** Pilot the prioritized use cases from Step 1. Pilots serve as an opportunity to test your planning process and refine it based on learnings. Pilots are recommended in order to create a repeatable implementation process for additional use cases such as ones that will utilize new product information consumed from 2D barcode data elements.

**STEP 3 – Go:** Armed with a solid implementation plan gleaned from a few pilots with trusted key trading partners, it’s time to expand and grow with new trading partners and/or new use cases.

**FIGURE 3-1: Next Steps**

#### GET STARTED ON THE PATH TO SUNRISE 2027

Every company is unique and has different considerations for how to move forward. The GS1 US Barcode Capabilities Test Kit is the first step in developing and deploying an implementation roadmap and can be used to establish a baseline for any system expected to interact with GTINs. The kit can also be used to communicate requirements to your internal development teams and your solution providers.



GS1 US invites any healthcare organization to share any learnings with us. Sharing lessons learned, what worked well and what needs more attention to fulfill the important possibilities that exist will need to continue if we are to achieve the benefits that sharing, scanning, and using advanced data about healthcare products can provide.

## 4 Key Resources

The following resources are a collection of information and tools provided to support any organization making the transition to adopt and use two-dimensional barcodes. This not a comprehensive list of available resources on the topic and many of these resources are intended to be for use across multiple industries.

If you need further assistance as you assess 2D capabilities, our team is here to help. Just email [Sunrise2027@gs1us.org](mailto:Sunrise2027@gs1us.org).

### 1. [GS1 US Sunrise 2027](#)

- a. **GS1 US Barcode Capabilities Test Kit:** GS1 US has created a resource to help you test your systems' capabilities when gearing up for Sunrise 2027. The GS1 US Barcode Capabilities Test Kit allows you to assess your ability to scan 2D barcodes and collect the data encoded.
- b. **University of Memphis AIDC Lab testing results:** The University of Memphis Automatic Identification Lab has been engaged to conduct unbiased, independent testing using robotic equipment and representative high-volume, bi-optic scanners. To establish common baselines of performance and unbiased test data, a series of tests were performed on a variety of barcodes to understand how they scan.
- c. **2D Barcode Overview for Logistics:** This overview provides information to determine what barcode(s) may support business needs in distribution and logistics for any industry.
- d. **Frequently Asked Questions (FAQs)**

### 2. [Barcode Chart](#)

- a. This one-page chart provides a summary of AIDC symbols and the key features, characteristics, and uses of each.

### 3. [Barcode Syntax Resource](#)

- a. The GS1 Barcode Syntax Resource is a collection of assets that aims to help the GS1 user community to improve data quality and accurately convert between the different GS1 data syntaxes used with 1D and 2D barcodes in the GS1 system.

The Barcode Syntax Resource consists of the following three components:

- i. **GS1 Barcode Syntax Dictionary:** A simple text file that lists all currently assigned GS1 Application Identifiers (AI) and the components required to form a valid GS1 data syntax.
- ii. **GS1 Barcode Syntax Tests:** A set of files, written in the C programming language, a machine-independent type of code that provides instructions to perform a series of analytical actions.
- iii. **GS1 barcode Syntax Engine:** An example of the harmonized framework required to 'run' the GS1 Barcode Syntax Dictionary and GS1 Barcode Syntax Tests

### 4. [GS1 US Certified Solution Partners](#)

- a. The GS1 US Solution Partner Trustmark indicates qualified solution providers who have partnered with GS1 US to support the adoption, enablement, and implementation of GS1 Standards.





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**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](http://www.gs1us.org)

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