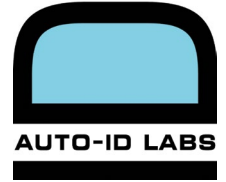




The Global Language  
of Business



# The Future of Product Data: Developing More Meaningful Connections With Consumers

Jointly written by **GS1 US** and **MIT Auto-ID Laboratory**



# Welcome to a World Where Product Data Drives Consumer Experiences

Today's consumers are asking for more. More than mere products, they are looking for experiences, for ways to interact with their purchases, to know their history, and to explore new ways to use them. Consumers want to be connected. To stay relevant, companies across the supply chain must make meaningful use of data, tools, and resources to deliver on consumers' demands for engagement. Despite having the product data and mechanisms needed, manufacturers, brands, and retailers have yet to deliver fully on these expectations.

**Now is the time for industry to collaborate and invest in a long-term data strategy to fully harness product data and deliver next-level consumer experiences.** GS1 Standards are a critical piece of the puzzle, ideally positioned to enable this transformation.

Learn more by visiting the [GS1 US® website](#)

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## Hurdles for Digital Transformation

### What's holding industry back?

#### A Reactive Versus Proactive Focus on Data

Organizations typically defer allocating capital to transformational data initiatives until a business risk materializes. But the reality is that while companies will always prioritize the here and now, they should also evaluate consumer trends or they risk falling behind. This is especially true in an industry as dynamic as retail. *In a recent Accenture survey, 77% of executives acknowledged that digital architecture is becoming critical to survival.*<sup>1</sup> Digital transformation is key to building retailers' readiness and resilience. But how to prioritize future readiness and how to unlock the full value of data requires a broader industry perspective that most lack.

#### Demand for Data Has Outpaced Capabilities

As competition increases, companies and retailers are being driven to find innovative solutions that improve purchasing experiences and attract customers. To do so, they need to understand consumers' behaviors, patterns, and lifestyle events. Matching this requires data support from product inception through after-sales, which means data should be embedded further upstream in a product's journey than it is today so that consumers can access information about the entire product lifecycle.

#### A Legacy Approach to Data

Retailers, brands, and manufacturers understand the need for rich product data to guide consumer decision-making processes. However, they often are not fully aware of the extent to which data is available and at what points in the customer journey they can leverage this data. There is a clear gap between what industry is currently targeting and what is possible if they were to take full advantage of product data.

Today, much of the product data gathered and analyzed is captured at the point of purchase. Innovative solutions are pushing this boundary and aiming to connect with the consumer and product post-purchase for a full understanding of the customer journey.



#### WHY ACT NOW?

Consumers are interacting with the world differently, making GS1 Standards increasingly relevant as consumers' and regulators' priorities change.

## Innovation

### What technology advances can help harness the power of product data?

#### Encodable Data Carriers

Advances in biotechnology make it possible for companies to place invisible, edible microbial tags on raw food sources that can withstand disruption and identify a product's source of origin. This technology has drastically changed food safety while ensuring the highest levels of product integrity. Encodable data carriers bring a new power to the supply chain by increasing efficiency; providing price accuracy based on tagged geography; limiting brand recalls; and enabling accountability for environmental, social, and governance (ESG) metrics.

**Using this technology,** grocers and consumers can act with speed and precision on a lettuce recall in response to an E. coli outbreak. They can accurately identify and remove only the contaminated lettuce from shipments containing multiple packages.

#### Artificial Intelligence (AI) and Machine Learning (ML)

AI and ML have accelerated new product-data use cases. For example, computer vision has enabled retailers to install hardware to identify products based on their physical attributes in addition to looking at a barcode. The idea, when implemented properly, supplements the barcode on a product's packaging and makes it possible to uniquely identify products by their appearance, odor, or texture.

#### Covert Identifiers

Using infrared technology, companies can embed tags that are invisible to the human eye into 3D-printed objects. These tags are unobtrusive, and they are more durable and reliable than printed codes, which can become unreadable over time. This technology would enable manufacturers, retailers, and suppliers to embed information relevant to consumers, such as warranty, recycling, and sustainability details, into the product itself.



### Possibilities Open When Product Data Is Transparent and Accessible

**Imagine if...** A salmon breeding in the waters off British Columbia finds its way into gourmet chowder in a high-end organic grocery store, carrying product information along the way. Priya feels unwell after eating dinner, and she is almost certain it was the fish. After a few days, she learns that she has been infected with salmonella. Priya can access information about where and how the fish was caught—and even inform the fish farm to quickly issue a recall. Since Priya can quickly and accurately identify the origin of the fish, the company can issue the recall quickly. This action saves thousands of people from being infected and minimizes waste. It's how product data can help elevate food safety.



## Mutual Accountability

**Innovative technology alone is not enough to bring product data to life.**

**It's up to all players in the ecosystem to unlock product data for consumers. Accountability is non-negotiable.**

To realize product data's full potential, it is imperative for every ecosystem player to embrace the explosion of available data and understand how to achieve the full benefits. After all, data is only as valuable as the decisions it informs. *So it is important for product data to be accurately associated every step of the way—from the product originator to the consumer.* All players need to be accountable to ensure their place in the value chain. Product originators should be supplying data on product makeup at inception. At the same time, retailers should be verifying the product's shelf life and every step of the supply chain it took to arrive there. Finally, consumers should be able to connect back with the product originator to enable the full upstream loop of product data.

People, processes, and technology across ecosystem players will impact how they gather, provision, and use data. As a result, some organizations will need to create initiatives to identify and augment data capture and processing points.



### WHY ACT NOW?

**Consumers want transparency, while increased democratization of product data has intensified regulators' concerns with product authenticity.**

“GS1 Standards are increasingly relevant in a world in which regulators frequently leverage digital product passports as a source of reliable, trusted information about products.”

– Vivian Tai, GS1 US

## Product Origination

### Foundational data should be established from the start of the product lifecycle.

Product manufacturers in the earliest stages of the supply chain play a critical role in establishing foundational data to help ensure it can be successfully used downstream. All parties can then leverage global standards, supporting interoperability. The multiple owners of the product-to-customer relationship play a key role in maintaining and connecting product data.



#### WHY ACT NOW?

Consumers are focused on ESG concerns.

“Consumers are increasingly voting with their wallets and are aligning their purchases with their values.”

– Randy Unger, Accenture

### Introduce Persistent Identifiers Early in the Creation Lifecycle

Suppliers should look to assign a product in development a valid permanent identifier that all players can leverage throughout the product creation process. They should avoid assigning interim identifiers that hinder the association of product development data to finished goods.

### Ensure Material Traceability and Extended Producer Responsibility

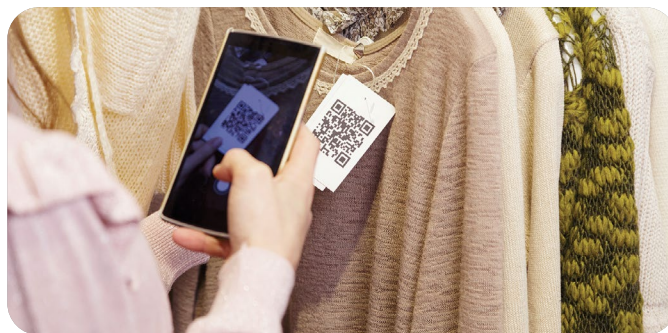
Sourcing responsibly across a multi-tiered supplier network will require data consistency. Knowing what came from where, when, from whom, and how are the data components ripe for standardization.

### Maintain High Data Integrity to Drive Trust

Product data is becoming vital to driving brands' overall value propositions. By ensuring high-quality data, trust in the overall product is enhanced. Brands should provide enriched data to help drive further customer engagement and build consumers' confidence in their products.

### Provide Visibility to Consumers

Consumers are increasingly leveraging brand data to drive their buying decisions, research product characteristics, and guide product use. Providing this information enhances the user experience and strengthens the brand in consumers' eyes.



An apparel manufacturer can include a 2D barcode on a product label during manufacturing, giving consumers access to key data. This data could include the provenance of materials used, loyalty promotions, care details, and recycling instructions.



### Possibilities Open When Product Data Is Transparent and Accessible

**Imagine if...** A revolutionary new diabetes treatment that combines a nutritional supplement, drug, and monitoring device becomes available for people living with diabetes, like Timothy. He can customize and blend the supplement, drug, and monitoring based on his health needs and follow his personal data. Timothy can access and track everything from ingredients in the supplement and drug to how to integrate and tailor the products to meet his specific needs. He can also access information regarding drug or product recalls, and device warranty and repair parts. It's how product data can help people make informed decisions about their health and safety.

## Sales and Operations

### Retailers and marketplaces can take advantage of standardized data.

*With standardized product data, retailers can realize a whole new level of insight and efficiency.*

#### Maintain and Improve the Interchange Between Partners

As product data proliferates, it is increasingly important to standardize for interoperability between partners. Today, retailers have hundreds of vendors with varying degrees of data sophistication. All too frequently, incorrect product identification leads to under-receiving, mis-receiving, and/or overshipping. The end result? Inaccurate transactions that fail the business.

Ultimately, what is scanned on the outside of a box must correctly identify what actually is physically in the box, without any deviation. Leveraging global standards here would help create consistency, elevate assurances, and accelerate operational transformations.

#### Leverage Existing In-Store Technologies

New technologies or applications can take advantage of existing capabilities such as RFID tags, 2D (QR) codes, and Universal Product Code/European Article Number (UPC/EAN) barcodes. The ease of enabling data capture is central to maintaining efficient and cost-effective operations, such as logistics and inventory data.

**In-store robots** fitted with sensors can clean floors while also evaluating inventory levels against targets and confirming the accuracy of product placement against planograms.

## After-Sales

### Brands and retailers can think beyond point-of-sale (POS) and across the total product lifecycle.

*Using standardized product data in new ways, retailers can extend and deepen their relationships with customers.*

#### Support Resale Marketplaces

Consumers are eagerly seeking resale deals across numerous marketplaces. Whether these marketplaces are created by brands on their own websites or by a third party, providing provenance and authenticity through digital tracking is an important part of helping to affirm price and supporting buyer confidence.

**Brands and retailers** can use embedded barcodes that link to product-specific recycling instructions or information about incentive programs for safe disposal.

#### Ease End-of-Life Product Transitions

In the world of waste, governments and consumers are pressuring retailers and brands to keep their products out of landfills and oceans. To cost-share, retailers have negotiated recycling and waste funding programs with brands. Data about manufacturing materials or package composition can help support these programs and, ultimately, prevent waste.



### WHY ACT NOW?

The blur between digital and physical worlds creates new possibilities. A recent study shows that more than half of consumers (55%) agree that more of their life and livelihood is moving into digital spaces.<sup>2</sup>

“The expansion of augmented reality has enabled digital natives to interact with the world in entirely new ways and embodies the promise of the digital future.”

– *Melanie Nuce, GS1 US*



## The Power of Standards

*GS1 US, a member of GS1®, a not-for-profit organization leading the industry for almost 50 years—is uniquely positioned to help retailers, marketplaces, manufacturers, and brands achieve the potential of product data.*

GS1 US's existing infrastructure provides a foundation for interoperability, and GS1 Standards are critical to enable brands and retailers to capture and share information.

GS1 US will continue to play a key role in helping stakeholders standardize what data is collected—and how—while acting as a conduit for upstream and downstream data sharing. This standardized process for data collection and deployment makes it easier for retailers to track their performance and tap into key insights, which ultimately makes them more consumer focused.

Retailers and brands will be able to connect products to the internet via GS1 Digital Link. *While GS1 US can help facilitate the process, retailers and brands should start with investing in a long-term product data strategy to help define their actions and priorities.*

### Explore Standards-Based Capabilities to Enable a Data-Driven Transformation:

- “Sunrise 2027—A New Dimension in Barcodes” is an industry effort moving toward using 2D barcodes at the POS and in preparation for broader uses of 2D data carriers to meet both supply chain needs and evolving consumer requirements. Industry has set a date to make the transition to accepting 2D barcodes at POS by 2027.

[Learn more about Sunrise 2027](#) ▶

- The GS1 Digital Link standard extends the power and flexibility of GS1 identifiers by making them part of the web. That means that GS1 identifiers, such as the Global Trade Item Number® (GTIN®), are now a gateway to consumer information that strengthens brand loyalty, supply chain traceability, business partner APIs, patient safety information, and more.

[Learn more about GS1 Digital Link](#) ▶

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## If Not Now, When?

The possibilities of provenance and wellness have become central to consumers' preferences and purchasing decisions. And the expansion of product data is the building block to fulfill consumers' desires.

Manufacturers, brands, and retailers—and all ecosystem players, including consumers—must now play a different role in making the most of product data to improve experiences. It's time for industry to meet consumers where they are today while building the underlying infrastructure to meet them where they will be tomorrow—before they get there.

**This research is a collaboration between GS1 US and MIT Auto-ID Laboratory.**

For more information, please contact us at [innovation@gs1us.org](mailto:innovation@gs1us.org)

## References

<sup>1</sup>“Leaders Wanted: Experts at Change at a Moment of Truth.” Accenture. Accenture, 2021. Accessed January 18, 2023. [https://www.accenture.com/us-en/insights/technology/\\_acnmedia/Thought-Leadership-Assets/PDF-3/Accenture-Tech-Vision-2021-Full-Report.pdf](https://www.accenture.com/us-en/insights/technology/_acnmedia/Thought-Leadership-Assets/PDF-3/Accenture-Tech-Vision-2021-Full-Report.pdf).

<sup>2</sup>Standish, J. and Reddy, G. “Retailers, Meet Me in the Metaverse” Accenture. Accenture, December 14, 2022. Accessed January 18, 2023. <https://www.accenture.com/us-en/insights/retail/tech-vision>.

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\*If applicable

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