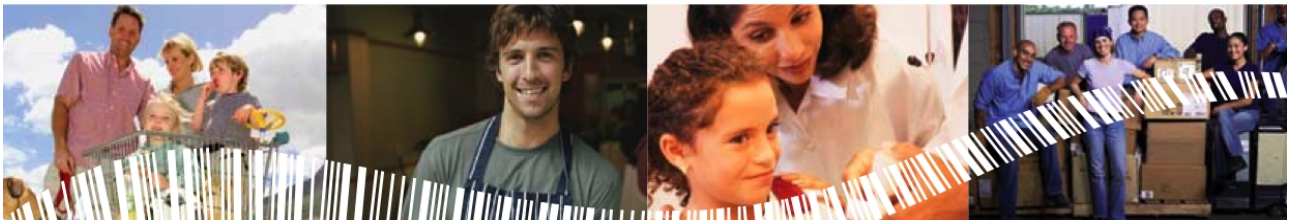
GS1 DataBar 2010: Business Case



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The Business Case for GS1 DataBar

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Overview of the Document

In June 2006, GS1 announced a global sunrise date of January 1, 2010 for a new bar code called GS1 DataBar™ (formerly RSS, Reduced Space Symbology). This marks the first time since the EAN/UPC bar code was adopted that GS1 has endorsed a bar code for global, open (unrestricted) trade item identification.

GS1 DataBar symbols can carry more data in the same amount of space, or the same quantity of data in less space than EAN/UPC bar codes.

While EAN/UPC bar codes will remain useful for product identification, the GS1 DataBar enables expanded bar code implementation by meeting the objective of identifying small items and carrying more information than the standards and technology of current EAN/UPC bar codes allow. With its smaller size, the GS1 DataBar will enable GTIN identification for hard-to-mark products like fresh foods increasing shrink reduction and category management. The GS1 DataBar's ability to carry GS1 Application Identifiers like serial numbers, lot numbers, and expiration dates opens the door to identification solutions supporting product authentication and traceability, product quality and effectiveness, variable measure product identification, and couponing. EAN/UPC will continue to be used for the foreseeable future as the decision to adopt the GS1 DataBar for existing applications will be made by brand owners at the time other packaging changes are needed.

The announcement followed a compelling business case review by a global task force comprising twenty-six companies, including retailers, fast moving consumer goods manufacturers, pharmaceutical companies, GS1 member organisations (MOs), and trade associations.

This document is an overview of that task force's business case review, highlights implementation issues and details a roadmap.

Please note that the most up-to-date information about GS1 DataBar will always be available on the GS1 DataBar website, which we encourage you to visit regularly.

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Establishing Industry Return on Investment (ROI)

The growing sophistication of IT technology and management systems has led to demands for additional information to be carried by GS1 bar code symbols. The GS1 DataBar provides the path for our industry's embedded infrastructure and equipment investment to respond to these new requirements and not be marginalized over time.

EAN/UPC provided the industry with a solid foundation for the high ROI associated with stock-keeping unit (SKU) management systems. The GS1 DataBar, along with RFID, will provide the industry with a new ROI foundation that goes beyond singularities to management systems associated with a multiplicity of SKU attributes (e.g., traceability, product authentication, category management).

Background: "Hard" Costs/Benefits

The actions in the 1970s that led to the creation of the UPC standard code and symbology were intentionally and rigorously kept narrow in scope. Calling for a single, standardised, easily managed code structure which provided uniqueness to a SKU or stock keeping unit (*type of item*), the UPC symbol that carried the code enabled an automated key-entry process that was intended to be the single expression to which all "automated readers" would be addressed.

The prerequisite rational for industry adoption was an agreement based on a single factor: there must be overwhelming evidence of a positive and financially responsible return on investment for the entire industry. The effort was targeted to a single point of reference: "hard" or measurable labor and accuracy savings at the front end (*check-out area*) of the store.

There were some small share of total return related to improvements in other systems utilizing code/item capture, *("soft" savings*), but the case to go was made by the **return at the checkout**. This point where all goods were exchanged supplied a single, identifiable window on the totality of the system where measurements could be taken, projected and realised easily by the industry. This narrow approach, which provided simplicity and surety of action and pointed clearly to benefits, accounts for much of the success UPC experienced.

Background: Richness versus Reach

As is so often the case in Information and Communications Technology (ICT), and standards in general, a choice was made between the inverse relationships of richness (*the amount of information to be delivered*) and reach (*the number of points receiving that information*). As was especially true in the early days of ICT in the 1970s, the less you send, the easier it is to hit the largest audience. By confining the information carried, the committee that created the UPC code expanded its use across the entire spectrum of intended industries. At the same time, its simplicity assured understanding and made its benefits more accessible.

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Today: Identities, Not Just Classes

Today, however, we are headed toward a need to deal with identities (lots/batches of SKUs or even serialized SKUs) and not just stock-keeping units identified with GTINs. **There is an increasing need to identify items using attributes carried by bar codes or tags**.
We see this in:

- the healthcare industry, in unit doses
- perishables, with the need to benefit from identification of sources to ensure freshness or effectiveness of a product using date codes
- the security that tracking brings to the distribution chain
- and more.

It also shows itself in the increasing focus on 2D bar codes and RFID systems, which are also ways to expand the richness of identification threads.

The Premise of a Composite ROI

With the current EAN/UPC symbology, we are cut off from this new generation of capabilities and needs. The burgeoning requirements of information handling cannot be ignored. Without positive action, it is inevitable that the embedded base of equipment and system competence that we have grown over 30 years will be marginalized by the burgeoning potential of information handling.

GS1 DataBar 2010 takes the existing bar code equipment and basic systems, and enables them to adapt to meet the new challenges of added information and of richer information. To go or not to go with the GS1 DataBar, however, cannot be justified by an overriding model with a single answer.

Very specific and new requirements and cost/benefit analyses will expand specific business segments, identified by their specific objectives and capabilities, and tested for returns earned. But when considering fresh foods, coupon system re-engineering, retail pharmacy, and the need for small symbols, many of GS1's major members and many industry associations have proven the value of the GS1 DataBar already and are committed to it. This is evidenced by the fact that many retailers began specifying the requirement for GS1 DataBar capable scanners over the last several years. Nevertheless with further work done in new areas, the justification in economic terms will expand.

Industry Inputs on ROI

Two major studies were conducted in North America looking at the GS1 DataBar ROI: One in 2001 ("Quantifying the Costs and Benefits of the GS1 DataBar in Perishables") and one in 2005 by the Joint Industry Coupon Committee ("The Business Case For the GS1 DataBar on Coupons"). Both showed benefits for migration to the GS1 DataBar. Both can be downloaded from the GS1 DataBar website.

However, for most companies the emphasis on adoption has been based on commitment to migrate and upgrade as needed in order to provide a foundation of capability for emerging automatic identification applications.

These initial solutions enabled by the GS1 DataBar will provide the first ROI for the industry as national solutions (*requiring divergent systems and packaging*) give way to global solution efficiencies.

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A survey of systems where the GS1 DataBar is the enabler show such a diversity of potential applications that making a unified, single analysis across the spectrum would be meaningless at best, or at worst, futile.

In the final assessment, the total industry ROI for the GS1 DataBar will only be seen after subsequent calculation some years from now, when the GS1 DataBar, a new GS1 automatic identification tool, is applied on a category by category, application by application basis. The GS1 DataBar ROI may take quite some time to realize in full, but its value is already evident given the priority applications identified today.

Primary Industry Benefits

There are two primary benefits to the adoption of the GS1 DataBar:

- GS1 DataBar's ability to provide automatic identification data not available today, providing retailers more visibility and accuracy in knowing what they are selling and in which quantities,
- GS1 DataBar's smaller size, providing more space for consumer communication or providing the option to reduce packaging in an effort to reduce cost of goods, also provides an option to the current “small symbol” options (EAN-8 and UPC-E) where numbering capacity may be an issue in some markets.

Performance: GS1 DataBar versus EAN/UCC

In 2005, GS1 conducted studies to compare the performance of the GS1 DataBar with EAN/UPC. Testing results showed that in most cases, the GS1 DataBar will perform at equal or greater speeds per transaction as EAN/UPC:

- GS1 DataBar Expanded (18 to 69 digits) scan rates show either **no or negligible** time differences compared to EAN/UPC (13 digits).
- GS1 DataBar Expanded is **far superior** to current add-on symbols such as EAN/UPC and GS1- 128 bar codes.
- GS1 DataBar Stacked omni-directional symbology performs **on par** with EAN/UPC while providing a smaller footprint for items such as loose produce that today is identified through key entry processes.

Furthermore, total consensus exists in the GS1 technical community that the GS1 DataBar will outperform any EAN/UPC Symbol that has been truncated (*height reduction*) where the GS1 DataBar printed at the same height is not truncated based on its smaller size. If the GS1 DataBar is printed using the same panel size as an EAN/UPC, it will provide height above specification and would further increase performance in slot scanner environments.

Ease of Scanning at POS

Concerns around potential slowed time at the checkout (as a cashier searches for the GS1 DataBar symbol) or frustrated consumers (as they search for the GS1 DataBar at self checkouts) have been highlighted as a major threat to the success of GS1 DataBar implementations.

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The consensus is that a "bad" bar code is always a bad bar code, whether a EAN/UPC or the GS1 DataBar. One must remember that the two prime advantages of using the GS1 DataBar are (1) to allow smaller products that cannot effectively use a current bar code (either highly truncated or reduced magnification) to be successfully scanned and (2) to add supplemental data. For larger products (where space permits) as is the case with current bar codes, an increase magnification or bar code height will provide an even better scanning rate than a similar-sized current bar code.

As it does for today's bar codes, GS1 will provide guidelines on printing and recommendations on locations and size as exist now for current bar codes, but it should be mentioned the GS1 DataBar does not change traditional factors for EAN/UPC like the narrow bar size or minimum aspect ratio for symbol partitions.

Expanding Automatic Identification

The “GS1 Application Identifier System” serves as the “data dictionary” for what is carried by GS1 bar codes and GS1 EPC RFID tags, containing over 100 definitions. It includes two types:

- **GS1 Keys** like GTIN (trade items), GLN (locations and parties), SSCC (logistic units), GRAI (returnable assets), GIAI (individual assets, GSRN (service relationships), GDTI (document type), Shipment Identification Number, and Consignment Number.
- **GS1 Key Attributes** like serial numbers, lot numbers, expiration dates, production dates, packaging dates, best-before dates, weights, measurements, quantity, country of origin, country of processing, and price per unit of measure.

The EAN/UPC bar code used at retail Point-of-Sale (POS) can only carry the GTIN and it does not carry GLNs. Application Identifiers implicitly cannot carry GTIN-14. This means the expansion of automatic identification beyond these GS1 Keys is dependent on adoption of a new symbol.

The GS1 DataBar will allow new product types and special applications to be managed more completely or globally. This is seen as especially compelling for fresh food groups, variable measure products sold at retail level, retail pharmaceuticals, and coupons, and helpful, but less critical, for non-perishables like serial publications, greeting cards. In addition, the GS1 DataBar, with its reduced size, can make it possible to mark products where the bar code competes for limited package panel space (e.g., cosmetics) with a full size, full performance bar code symbol.

High-level benefits to expanded automatic identification include:

- Elimination of PLU entry errors, whether at a cashier or self-checkout POS
- Traceability to different sources
- The same level of category management in meat & poultry and dairy products as is already possible in other sections of a store (ie: producer, owner, ID)
- Resolution of issues, and especially capacity limitations, of varied weight and higher priced items (ie: above 4 digits), often of particular value in the meat and deli departments
- More available panel space on retail pharmaceuticals to meet other regulatory marking requirements
- Reduce numbering capacity stresses for small EAN-8 & UPC-E symbols
- Opens many possibilities in couponing

Some issues may include:

- The need for specific applications and segmented education and training by industry; perhaps adding considerably to training and educational costs

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- Legacy ERP systems may need to be upgraded to accommodate expanded information
- The business case for coupon re-engineering recommendations of the Joint Industry Coupon Committee indicated that further review of whether a common global solution can evolve is required.

Business Case Benefits for Specific Store Departments

Meat, Poultry and Seafood

Meat, Poultry, & Seafood represent many opportunities for the GS1 DataBar to enhance current practices and solve tactical identification problems.

Some expected business benefits include:

- **The end of price limitations**. Currently GS1 Prefix 02 is limited to a $99.99 retail price in the U.S., when both modulo and price check digits are active in the code. This becomes an issue when retailers sell very large cuts of meat (*i.e. quarter of lamb or a large quantity of lobsters*). The number of items that exceed the $99.99 limit will continue to increase over time as "shopping club" stores increase in popularity and global reach.
- **Sell by/expiration date management:** The GS1 DataBar permits systematic identification of product dates. A stop-sale provision can be enacted at the POS when a product has exceeded its expiration date. Automated markdowns can be enabled as a product approaches its sell-by date.
  Product rotation in display cases is easier to manage. The GS1 DataBar will also bridge capability differences between regional market usages.
- **Better understanding of consumer buying habits**. Understanding consumer buying trends based on sell-by date as well as by tracking sales to a specific producer or distributor can assist with both markdown and replenishment strategies.
- **Product weight management:** Adding the product weight to the code structure would assist with measuring profitability.
- **Sales area identification:** Service case meat sales are often not differentiated from regular counter sales and the GS1 DataBar could assist with identifying these products.
- **Data synchronization:** Replacing local localized variable measure codes on variable weight consumer products with industry standard GTINs and using standard application identifiers to code variable attribute(s) would better align with GDSN GTIN product identification practices. Evaluation and management tools commonplace in other departments could be used.
- **Traceability**: At the supply, item and store levels.

> "For more than thirty years the beef industry has worked with retailers and data providers to develop systems for capturing accurate variable measure meat data at the point-of-sale.We are optimistic that GS1 DataBar has the potential to provide more accurate and expanded data on variable weight meat products."
>
> **Randy Irion**
> **National Cattlemen's Beef Association**

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Deli, Dairy and Bakery

Many of the benefits of the GS1 DataBar outlined above in the 'Meat, Poultry and Seafood' section apply here as well.

Some specific benefits to deploying the GS1 DataBar in Deli, Dairy and Bakery include:

- **The end of price limitations**. Currently GS1 Prefix 02 code is limited to a $99.99 retail price in the U.S, when both modulo and price check digits are active in the code. Large-sized deli trays (such as sold for special occasion parties) or large-sized packages of cheese would benefit from this enhancement.
- **Sell by/expiration date management:** better control with product expiry dates and identifying products approaching their expiry date would improve product rotation and eliminate non-sales from expired products.
- **Perishables**: The highly perishable products associated with these departments would benefit from automated markdowns as product approached its expiration date.

It should be noted that in these departments, labeling must often be done internally. This requires scales/printers that are capable of printing GS1 DataBar symbols.

Produce

Produce and meat represent the greatest differentiator for food retailers and the area of highest profit margin. Today global solutions for fresh food identification at retail POS requires somewhere around 40 different systems be supported. There is no global classification system for category management and many management tools available for the "center-store" have never been enabled for produce. This as an area where global collaboration on application standards development will yield significant efficiencies.

"GS1 DataBar provides the industry the capability to transform the fresh foods supply chain by leveraging standardized product identification at the point of sale. In addition, the current coupon system will be transformed to better enable manufacturers and retailers to process and clear coupons with greater speed and accuracy."

Patrick Walsh
FMI

Some such benefits from deploying the GS1 DataBar in the produce department would include:

- **Improved accuracy at POS:** GS1 DataBar symbols directly on produce would increase data entry accuracy, instead of depending on cashiers to manually enter codes - sometimes inaccurately entering standard codes from memory instead of correct codes (ie "tomato" instead of "organic hothouse tomato") resulting in incorrect data and loss of gross margin.
- **Improved accuracy at self-checkout:** Customers prefer scanning at self-checkouts rather than manually entering codes. Intentional or unintentional price look up (PLU) entry errors are today common at self-checkouts.
- **Increased speed at checkout:** Scanning a bar code is quicker than manually entering a PLU.
- **Identification of vendor:** By identifying the specific supplier of a multi-vendor produce product through a GS1 DataBar symbol, better control of sales versus receiving is possible. Trend reporting, forecasting and replenishment strategies are also enhanced.

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Photographic equipment: cameras & video cameras

The end of 4-digit pricing limitations outlined above in the 'Meat, Poultry and Seafood' section applies here as well.

Books and periodicals

Books, periodicals, and greeting cards are currently identified using two bar codes in many markets. This practice (use of two bar codes) at retail POS greatly reduces checkout efficiency and leads to retailer product re-labelling. This area was identified as an area where an application standards development team would be beneficial but was seen as a lower priority than fresh foods, variable measure products, retail pharmacy, and coupons.

Nevertheless, expected benefits include:

- **Increased speed at checkout:** one global bar code symbology that accommodates both the GTIN assignment at the title level, the ISBN and the "add on" information needs within the various book and periodical supply chains will result in better checkout speeds.
- **Cost avoidance:** From eliminating the need to re-ticket over ISBN bar code symbol.
- **Capture of additional data:** such as title and volume, useful for trend reporting, forecasting and replenishment strategies.

Pharmacy

The Leadership of GS1's Healthcare Users Group (HUG) has requested GS1 Board and retailer support for a review of retail pharmacy identification solutions inclusive of GS1 DataBar and Datamatrix usage. Datamatrix has advantages for those facing requirements for high-speed variable printing but requires camera-based scanning equipment not currently supported in most retail pharmacies. The GS1 HUG continues to work to communicate the benefits of allowing Datamatrix as an option to regulators and would like to begin working with retailers to investigate the best solution for handheld investment/symbol selection for retail pharmacy applications. Retailers on the GS1 DataBar Task Force support the need to look into this area. CPG manufacturers, also concerned with the costs of bar coding variable information, are interested in development in this area.

Potential benefits from the GS1 DataBar in the pharmacy section of stores may include

- **Sell by/expiration date** management
- **Traceability** and targeted **recalls**, if necessary
- **Smaller sized bar codes**, providing more space for consumer communication or providing the option to reduce packing in an effort to reduce cost of goods.

"As a retailer, we always look at ways to improve the shopping experience for customers. Building on the last 25 years of the GS1 System this new bar code, the GS1 DataBar will enable us to extend customer service in a range of activities that is currently limited by existing bar codes types, especially with small products and capturing additional information at POS. In effect, the GS1 DataBar is like a 'High Performance Bar code.'"

Daniel Kochanowicz
Woolworths

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Apparel and general merchandise soft goods

There were no immediate requirements for additional information identified by the GS1 DataBar Task Force.

Business Case Benefits for Specific Issues and Concerns

Coupons

GS1 DataBar implications for coupon functionality are significant. They include:

- Automated management of expiration dates from the POS
- Reduction of manual data entries and configuration from the POS
- Reduction in both cashier handling time and customer time when tendering coupons at self-checkouts
- Automated relations with the clearing house and manufacturer rebates from the POS
- Automated verification that the proper promotional product has been purchased
- More complex and more flexible coupons schemes
- Number of value codes increased.

"In the US, coupons are a significant business. Unfortunately, it has been limited by constraints around old coupon guidelines and bar code structures. GS1 DataBar will revitalize and provide the potential to greatly improve the coupon industry."

Doug Naal
Kraft

An important reference document is the "Joint Industry Coupon Committee Business Case for GS1 DataBar Adoption." However, there are still issues related to the disparity between US coupon practices and the rest of the world. Whether a sufficient case exists for multi-national solutions are required is not known at this time, but discussions should evolve on whether offer serialisation techniques being introduced in the USA can be utilised elsewhere.

Small Products

GS1 DataBar adoption in 2010 will provide an immediate benefit for products where panel space constraints put pressure to reduce the size and therefore performance of EAN/UPC.

- **Cosmetics and pharmaceuticals.** Panel space available to print bar codes on many cosmetics and pharmaceuticals is limited, as the packages are small and there are legal requirements for ingredients statements and other disclaimers. Today packaging is made larger than it strictly needs to be in order to accommodate all the print requirements.
- **Inhabitually-shaped products.** Smaller GS1 DataBar symbols can help greatly in labelling products that are curved, spherical or otherwise physically difficult to bar code today.
- **Multi-lingual labelling** can allow a single SKU to be sold in several countries (especially in Europe). This

"Some of our health and beauty care products have very small packaging, and strict regulatory requirements mean we have to put a certain amount of text on the boxes, no matter how small they are – and that means less panel space for communication with our customers. We're looking forward to GS1 DataBar symbols to help us solve this dilemma."

Bud Babcock
Procter & Gamble

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creates additional space restraints that can be resolved by smaller GS1 DataBar symbols.

Concerns that must however be addressed include slowed time at the checkout, as a cashier searches for the GS1 DataBar symbol; however this is the same issue with current truncated bar code.

Category Management

Because the GS1 DataBar encodes a full GTIN for the point of sale identification, departments such as meat, poultry or produce will have access to the same level of category management utilized in the center of the store. Retailers will be able to compare the sale of different supplier's products, or of different variations on a similar theme, or the sale of different sizes of the same item. Such levels of analysis and control allow for greatly improved category management.

Shrink

Significant shrink reduction is expected from the GS1 DataBar:

- **Sell by/expiration date management:** better control with product expiry dates and identifying products approaching their expiry date would improve product rotation and eliminate non sales from expired products.
- **Increase accuracy** from the introduction of bar codes on (for example) produce, allowing data capture at the POS.

Traceability and Product Recall

There is a growing demand for data such as lot numbers, serial numbers, or batch information, all of which enable traceability. The GS1 DataBar can help meet this demand.

- **Identification of vendor:** More complete information about a product is available, by identifying the specific supplier of a multi-vendor product (such as produce) through a GS1 DataBar symbol.
- **Identification of the place of purchase** within a store (i.e. a full service counter sale versus a case ready counter sale) can be improved with the GS1 DataBar.

Further guidelines and development are needed around the capture and use of this additional information, and best practices will need to be created.

Increased Consumer Communication Possibilities (or Package Size Reduction)

The smaller GS1 DataBar symbol could lead to smaller package size, though this does not seem like the most likely result. More probably, space saved will be reallocated for:

- Increased consumer communication on packaging
- Meeting or exceeding regulatory requirements
- Enhancing scanning performance through eliminating the truncation of bar codes, a major technical obstacle today.

Increased consumer communication is the most likely and appealing benefit to manufacturers.

> “One key benefit for manufacturers will be the ability to increase consumer communication on pack by reducing the amount of space currently occupied by existing bar codes. This is a notable opportunity to better reach consumers at the moment of truth when they are making their purchase decisions”
>
> **Terry Mochar**
> **Reckitt-Benckiser**

GS1 Numeric Capacity Issue Resolution

The phrase "Restricted Circulation Numbers" signifies a GS1 identification number used for special applications in restricted environments, defined by the local GS1 Member Organization (e.g., restricted within a country, company, industry). They are allocated by GS1 for either internal use by companies or to GS1 Member Organizations for assignment based on business needs in their country (e.g., variable measure product identification, couponing).

Issues with restricted circulation numbers include:

- GS1 Company Prefix not assigned
- Does not transfer to EPC Tag structure
- Not supportable by GDSN as a key
- Capacity is running out at MO level: As one example, for variable weight product identification in France, GS1 France allocates a RCN13 (7digit number + price) to each product sold. It means that each brand owner receive a series of RCN13 to identify all of its variable weight products. The consequence is that France uses a lot of RCN13s and will run out of capacity in the next 2 years, if the same approach is used.

Solution: Move national applications to GTIN base consistent with GTIN and GDSN standards and compatible with EPC. GS1 DataBar and GS1 DataBar Expanded containing required data.

UPC-E and GTIN-8 Numbers

Numbers are assigned by GS1 Member Organisations for use in EAN-8 and UPC-E bar codes. Most MOs make assignments on an individual item basis or a small number of items. They are used for very small items that cannot contain an in-spec EAN/UPC bar code.

Issues with this include:

- GTIN-8 numbers are not compatible with EPC data structures
- UPC-E capacity is virtually exhausted leaving the only alternative to move to EAN-8 bar codes. This is unique to the North America as all other MOs are currently using EAN-8.

Solution: GS1 DataBar symbols have variable footprints and are Omnidirectional. GS1 DataBar printing and scanning characteristics mirror that of EAN/UPC, e.g. if an EAN/UPC bar code is reduced in size through truncation or smaller bar width, the GS1 DataBar bar code could be reduced in the same manner. An Omnidirectional GS1 DataBar bar code saves 62% of the area of an equivalent EAN/UPC-13 and 37% over an equivalent EAN-8. The GS1 DataBar carries all forms of the GTIN (GTIN-8, GTIN-12, GTIN-13, GTIN-14).) A GS1 DataBar Stacked Omni directional reduces the length by 37% and the height by 7% compared to an EAN/UPC.

Avoid Double Source Marking Condition

This may be the fundamental business case for setting one global adoption date. In the vacuum that would be created if no global direction is set, implementation of the technology will be deployed at retailer by retailer, country by country, region by region, undoing the benefits of package cost synergies achieved over the past thirty years and eliminate the possibility of driving common solutions for new areas such as pharmaceutical, fresh food, and variable measure products where today dozens of identification approaches exist globally creating dual inventory costs in the supply chain.

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A Consideration of Possible Costs

Launching the GS1 DataBar is not without costs to manufacturers, retailers and GS1 Member Organisations. Among these costs might be the points detailed below.

Scanner Upgrades or Replacement Costs

The majority of scanners developed since 1998 are upgradeable (*field programmable*). This enables the software and maintenance changes such as the GS1 DataBar would require. Once a scanner manufacturer develops GS1 DataBar decode software for the particular model, it can be installed either locally or downloaded. The cost varies from free to around $300. Since 2001 most scanners have GS1 DataBar capability installed but it has not been turned on: activation occurs by a switch or software flag.

Further, costs have decreased for many hand held and lower performance scanners accompanied by significant improvements in cost/performance at all levels. Suppliers now have scan engines in the $30 to $200 range for integration in most mobile devices. In most cases, these scan engines include GS1 DataBar capability. Users will be required to contact their scanner vendors to determine their individual expenses and will need to include peripherals such as kiosks and price verifiers. In order to facilitate this, the implementation leaders are working with GS1 on GS1 DataBar 2010 Program projects such as Buyer's Guide, Starter Kits, and a GS1 DataBar Readiness Report.

Operational Costs to Make Application Use of New Data

This was an important area of consideration that always generates much concern because of the cost of process and system re-engineering initiatives. With that said, it did not diminish the enthusiasm for adopting the GS1 DataBar as a tool to allow the industry to at least begin serious and global discussions about these complex issues. The bottom line is that GS1 DataBar Adoption is a gating factor to considering the use of additional data in certain applications areas like Fresh Foods or couponing.

Major potential cost centers include:

- The equipment, applications, labor, and training involved in technology upgrades for systems such as back-office ERP systems, information management, reporting/capturing of data
- Training needed at GS1 Global Office and Member Organisations (MO); and additional educational programs designed for retailers, manufacturers and SME's, in many countries.
- Guidelines at the MO and user level
- A Global Marketing Plan
- Programs aimed at solution provider education and alignment.

Printing

On-line printing capabilities needs to be fully integrated with a manufacturer's ERP systems, to achieve any true business benefit. Therefore, the readiness of on-demand printing technologies must include system integration. The costs for on-line printing vary per application. The cost to print labels in-store will focus on upgrades to existing weight-scale printers, while the costs to print variable information in bar codes in high-speed printing or packaging lines requires digital

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equipment. To learn more about the second scenario, the GS1 DataBar 2010 Program includes a work group that will research serialized bar code printing on consumer product labels.

Marketing, Communication and Education

Retail point-of-sale scanning is, by far and without question, the most successful implementation of bar code technology in the world. Consumers trust the technology today precisely because of the historical collaboration between GS1 members, GS1 Member Organisations, and solution providers. In order to maintain this trusted and valued position, GS1 DataBar rollout must be well managed and resourced.

Primary audiences for marketing, communication, and education efforts:

- GS1 Member Companies (large and small)
- GS1 Member Organization staff
- Traditional printing industry (offset, flexographic)
- Automatic identification and mobility solution providers including on demand and scale printer manufacturers, bar code design software OEMs, bar code verifier and scanner OEM
- Value-added resellers and systems integrators
- Industry press and major media in later stages.

The communication program must include press releases, implementation guides, standards updates, training materials, speaker's bureau support, etc. Special attention will be placed on:

- Introduction to GS1 DataBar
- Explaining what the adoption of GS1 DataBar means to retailers and manufacturers
- Member Organisation Implementation Check List (GS1 DataBar Starter Kit for MOs)
- Retailer Implementation Check List (GS1 DataBar Starter Kit for Retailers)
- Manufacturer Implementation Check List (GS1 DataBar Starter Kit for Manufacturers)
- Buyer's Guides for hardware and software decisions
- This Business Case Document and associated overview presentations.

Packaging Changes

The GS1 DataBar will not be mandated for use until data requiring it is justified by new business applications requiring new data. This means the decision to migrate from EAN/UPC to the GS1 DataBar will be left to the discretion of manufacturers. This evolutionary approach will reduce or even eliminate any conversion costs because the decision can coincide with the natural lifecycle of product packaging, including marketing requirements and regulatory requirements. So, when packaging would be changing anyway, the GS1 DataBar can be introduced with no costs, allowing more panel space for customer communication requirements.

This said, perhaps some manufacturers may feel the GS1 DataBar itself provides the business case for a package lifecycle change or even package size reduction or product unit reconfiguration. This is especially true where consumer communication is a challenge or where the current EAN/UPC symbol has been printed below size specifications.

Deli/Meat Printer and Scale Upgrades

Many scale manufacturers use 200 DPI printers that are capable of printing GS1 DataBar Symbols at acceptable 76% magnification. Others are 100 DPI that will print 100% GS1 DataBar labels.

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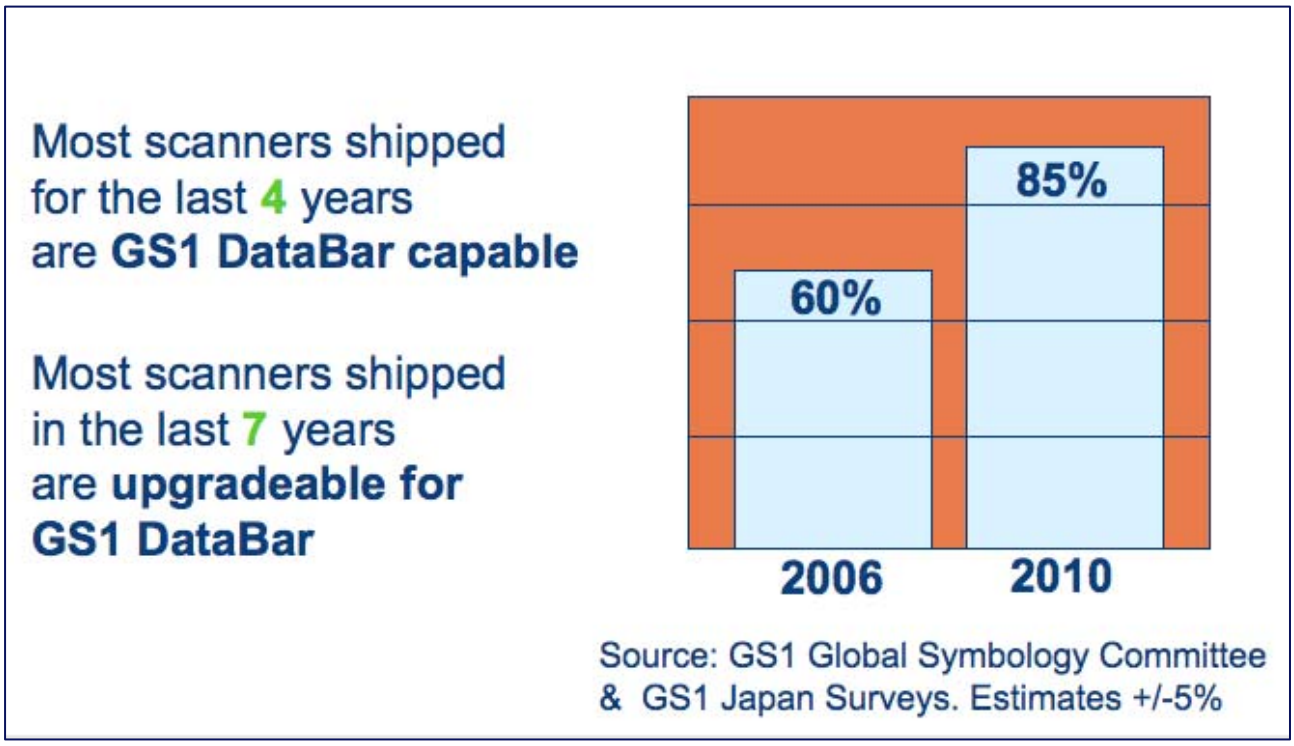
Both are field-upgradeable to the GS1 DataBar. A limitation on the 100 DPI systems may be the size of the label as more information is printed.

A Consideration of Readiness

Scanner Readiness

Original equipment manufacturer (OEM) sales make up 85-90% of the scanner sales market and used equipment sales make up the balance. The GS1 BarCodes & Identification Technology Group (*formerly named the Global Symbology Committee or GSC*) has representation from companies comprising 90-95% of the OEM market.

Based on the input of the GS1 BarCodes & Identification Technology Group, the GS1 DataBar Adoption Task Force estimated that **85% of scanners in the field would be GS1 DataBar capable by 2010**.



Based on the recommendation of GS1 Japan, measurements by member organizations and trade associations should be developed to indicate readiness by market leading up to the adoption date. This will help GS1 measure the effectiveness of it marketing and communications efforts and signal market readiness to brand owners. To address this, the GS1 DataBar 2010 Program includes a specific project called the GS1 DataBar 2010 Readiness Report.

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The Impacts on Small & Medium SMEs

At this stage, some small retailers…

1. Have GS1 DataBar capable scanners and do not know it
2. Have equipment that can be upgraded for the GS1 DataBar
3. Have equipment that cannot support the GS1 DataBar.

In all three scenarios, GS1 has an obligation to send a clear signal to them at the earliest possible moment so their buying decisions for equipment are aligned with the direction of the industry as a whole.

In scenario #1, they may have to contact their scanner vendor to determine how to “switch on” the GS1 DataBar.

In scenario #2, they will weigh whether upgrades or replacements make sense. This decision will be based on factors such as the number of stores, number of scanners, and the type of scanners. For example, a retailer with many stores and hundreds of handheld scanners might benefit from upgrades.

In scenario #3, replacement will be necessary, and again the decision will be driven by the number of stores, number of scanners, and the type of scanners, etc. For example, a retailer with one store and a few handheld scanners will likely replace them as they are basically a commodity product and they need a simple solution.

For the retailer with a low number of transactions a day, the GS1 DataBar will be an issue for them as GS1 DataBar use increases over the years.

For the retailers who do not have GS1 DataBar capable scanners, key entry of the GTIN carried by the GS1 DataBar Symbol will be required. Their decision to purchase new equipment will be justified by the number of key entry transactions per day. Until they reach a point where this is problematic, they will continue using current equipment prolonging the lifecycle of their equipment closer to the natural point.

In summary, GS1 has set a clear direction and with this direction set, all retailers should include a discussion of GS1 DataBar capability when purchasing hardware and software. Every month of delay means more equipment buying decisions are made without reference to GS1 DataBar capability being a necessary specification in the purchase. The most disadvantaged small retailers will be those who are purchasing equipment in the secondary market today that is not GS1 DataBar capable without their being aware that the lifecycle of the purchase they have made will be shortened.

To assist Member Organisations reach out to user companies both large and small in their countries, GS1 has responded with a comprehensive set of projects under the GS1 DataBar 2010 Program banner.

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Disruptive Technology (commodity items, competitive advantage)

Bar codes technology development is driven in two major areas:

On the "**encode**" or **bar code production** side, variable printing is the key factor. Advances and study in this area are needed and equate to reduction of tag costs in RFID. The reason is simple, in that as regulatory or trading partner demands for variable bar code information will increase over time, and manufacturers with high volume production lines will need solutions. These solutions may include the use of new, matrix symbologies like Datamatrix where inline printing is easier, but this benefit for manufacturers must be balanced against the investments required to support camera based scanning. This is the reason study in this area is one of the key development projects, the GS1 DataBar Adoption Task Force has recommended.

On the "**decode**" or **bar code scanning** side, suppliers have scan engines available for integration in the $30 to $200 range in most mobile devices. In addition, camera based mobile cell phone and PDT devices increasingly have the capability to capture and decode bar codes. This sets up the potential for the third generation automatic identification environment:

1970:	1st Generation: EAN/UPC & GS1-128
2010:	2nd Generation: Add GS1 DataBar as option for global adoption
TBD-:	3rd Generation: Add Datamatrix or RFID options by application?

A proactive study of disruptive technologies will be proposed by GS1 BarCodes and Identification Business in 2007-8 to better understand and plan for their impact on users and consumers.

On-demand Printing Technologies Readiness

Direct on-demand printing technologies are available and in-use for both small run package printing and very high-speed very large capacity items such as magazines. Similar technology is now emerging for in-line printing processes such as flexography. This is in its very early lifecycle. This technology will eventually be used to for many printing jobs including GS1 DataBar Expanded and EPC Tag antennas. The printing industry needs a strong signal from GS1 users as to the need for development. For this reason the Board Task Force has recommended and GS1 has agreed to include a Serialized BarCode Printing WG in the GS1 DataBar 2010 Program.

Serialized identified labels are used on packages for tracking and warranty on many electronic, software, and gaming products. Since these are add-on symbols not connected to the parent EAN/UPC. Capturing them directly at the POS is successful today only 60% of the time. As a result separate processes are required to capture the information. GS1 DataBar Expanded resolves this issue with 100% capture.

Impact of Dual Symbol (EAN/UPC and GS1 DataBar) Use Pre-Sunrise

Users have ruled this out on CPG products due to the increased space need for both symbols. The one application where dual symbols are currently planned is in the US Coupon replacement project where the GS1 DataBar Expanded replaces the current GS1-128 add-on symbol. In practice the add-on is only read by 3rd party coupon processors (not at point-of-sale). This provides an opportunity for retailers to more easily phase from EAN/UPC to GS1 DataBar Expanded.

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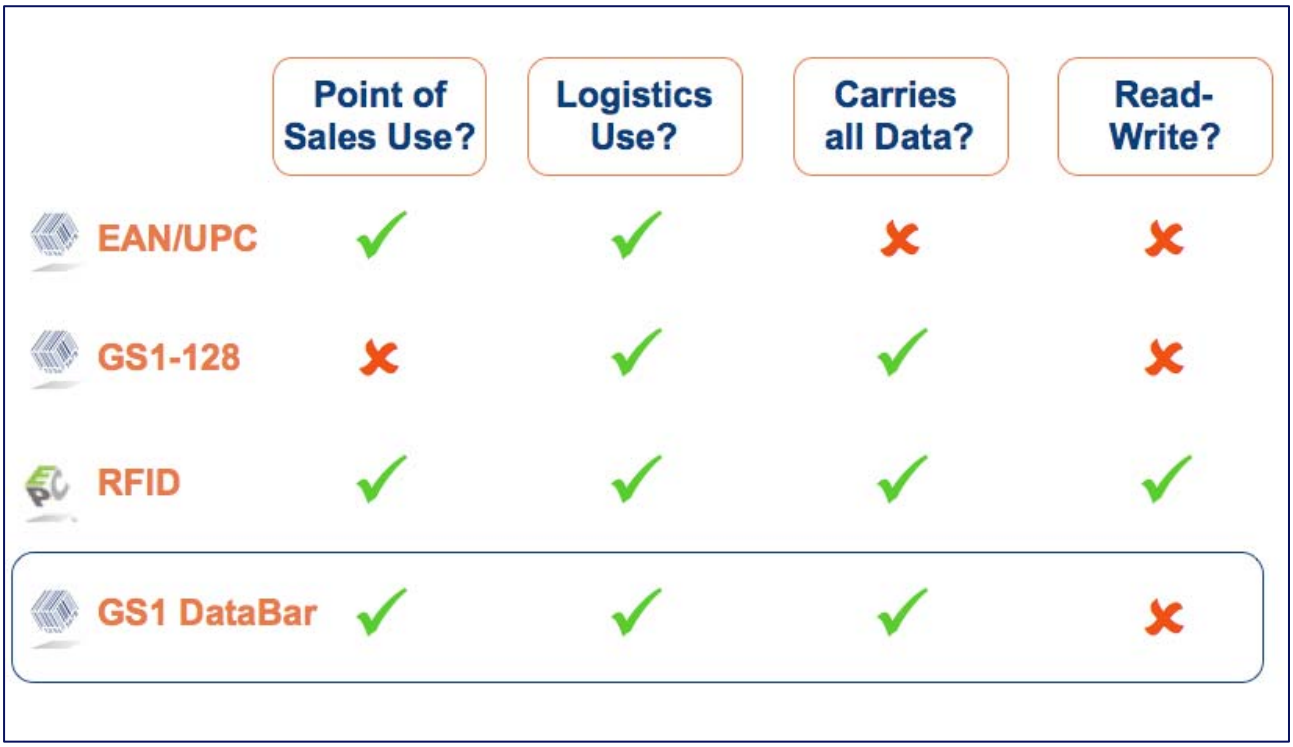
EPC and GS1 DataBar

There are a number of major differences between RFID and bar codes:

- RFID can be read without line of sight
- Some RFID tags can be re-written
- An RFID label is more expensive than a bar codes label
- Both have barriers to implementation on packaging and on products but for different reasons (e.g., water or metal interference for RFID, irregular contours for bar codes)
- Bar code scanning hardware is pervasive while RFID is an evolving technology.



Key questions on the link between the GS1 DataBar and EPC have been treated in a **Frequently Asked Questions (FAQ)** document which can be found on the GS1 DataBar website at www.gs1.org/barcodes/databar/

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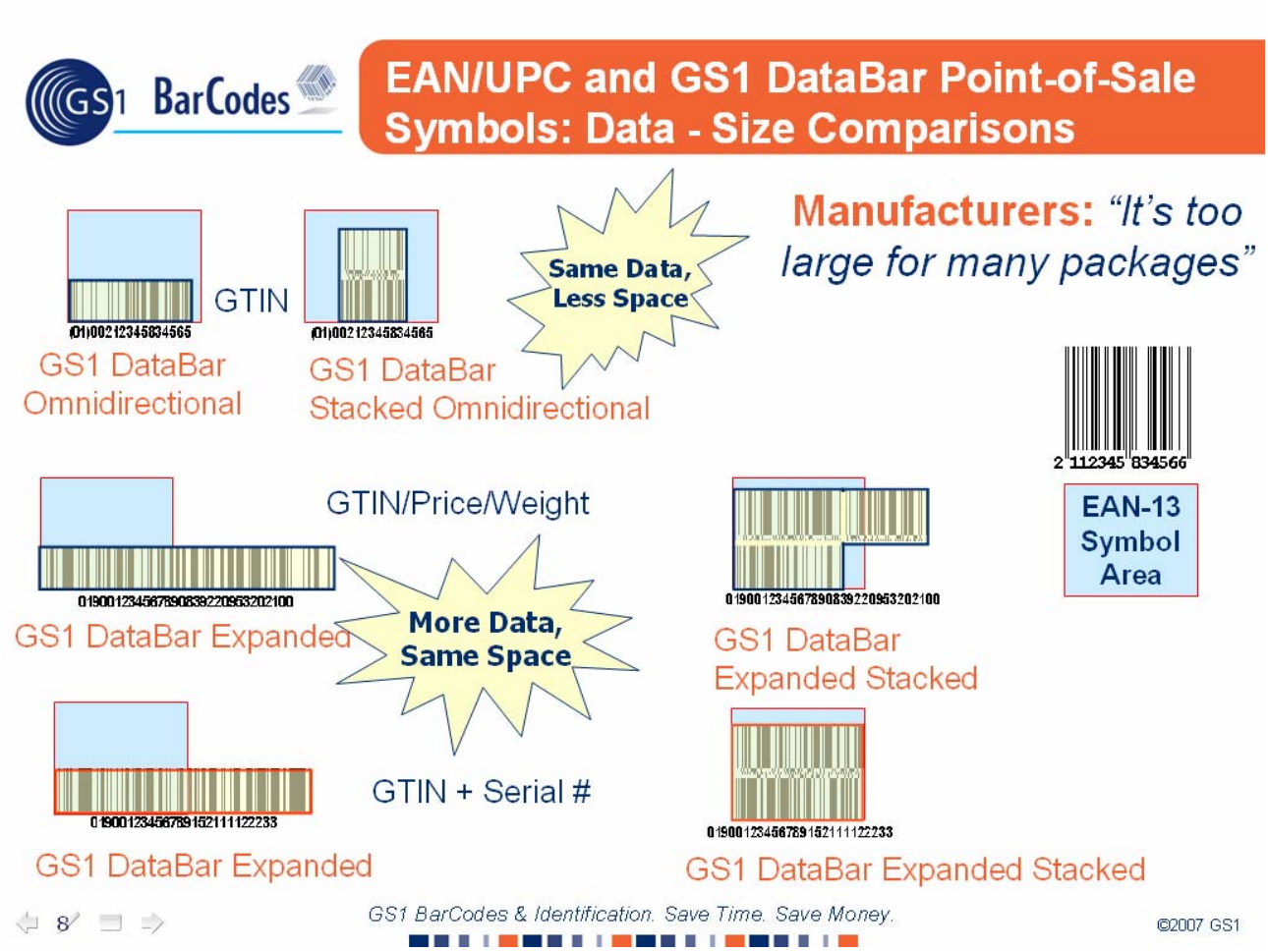
Carrier Comparison

EAN/UPC

The illustration below compares EAN/UPC and GS1 DataBar Omnidirectional Symbols.

It shows that the GS1 DataBar versions have two possible footprints, compared to the single footprint of EAN/UPC, providing a lot of flexibility in package layout. The stacked version will be used, for example, for many fresh produce items.



The illustration also shows that the GS1 DataBar variations take 3% less space than EAN/UPC-13 or 12.

The use of EAN/UPC bar codes by GS1 is the most successful implementation of bar code technology in the world with billions of transactions per day. EAN/UPC symbology is perfectly designed to accommodate Stock-Keeping-Level identification of trade items and can be scanned in logistics and retail Point-of-Sale high volume environments. For this application and scanning

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environment, EAN/UPC is and will remain an appropriate solution where available package panel space allows enough room to print the symbol.

There are several types of EAN/UPC symbols, each with different design characteristics. For more information visit: http://www.gs1.org/productssolutions/barcodes/databar/

Only GS1 DataBar, GS1-128 and 2D Symbologies (Data Matrix) have the capability to carry instance specific data required by EPC Tags. Work is underway in GSMP and EPCglobal to define how bar codes will backup EPC Tags. It is also very important that bar code data be available for use in the EPC network. The GS1 DataBar becomes a necessity for this capability.

Data Matrix and QR Code

Data Matrix is a standalone, two-dimensional matrix symbology that is made up of square modules arranged within a perimeter finder pattern. The only version of Data Matrix that supports GS1 System identification numbers is Data Matrix ISO version ECC 200 including Function Code. Datamatrix is the only matrix symbol currently approved for use by GS1 and only in specific applications (e.g., healthcare items not crossing point-of-sale, direct part marking). **QR Code** is a 2D symbology initially developed for the Japanese Automotive Industry. It is now an ISO standard and could carry GS1 System Identification Numbers if approved for use by GS1. As future application standards evolve, QR Code will be considered along with Data Matrix for best fit for the application. If there are other 2D symbologies that have similar potential, they will be considered along with Datamatrix and QR Code.

Data matrix and QR Code are the predominant matrix symbologies today. Data matrix has broad application in healthcare and even in CPG for internal identification requirements. The business tradeoffs for matrix symbologies are covered in the "Disruptive Technology" section the business tradeoffs are not really covered in that section of this document, but a brief technical and application overview is provided below.

General Commentary on Matrix Symbologies:

- Only two-dimensional imaging (camera) scanners or vision systems read 2D matrix symbologies (e.g. Data Matrix, QR Code).
- Retail Omni-directional scanners will not read 2D symbologies; the installed scanner base in distribution will not read 2D symbologies.
- Matrix symbologies can be used for direct part marking; linear symbologies cannot. ISO/IEC SC31 committees are working with GS1 to develop printing and quality standards expected in 2nd half 2006.
- Matrix symbologies like Data Matrix and QR Code can be used on items, particularly small items, where the supply chain does not have a large installed scanner base. This can particularly useful where manufacturers are asked to encode variable information at high-speeds in printing or packaging production. To date, the only approved use of a matrix symbology for trade items is Data Matrix for direct-part marking where the part's lifecycle is required and very small healthcare trade items. In both applications, Datamatrix use is restricted from use in the retail channel today.
- Items that cross supply chains will continue to use GS1 linear symbologies until improvements in either camera based or laser based scanners enable the free mixing of linear and 2D symbologies across supply chains.

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Further information

More information on GS1 BarCodes and GS1 DataBar Symbols can be found on the GS1 DataBar web site at www.gs1.org/barcodes/databar/

There you will find a full Press Release, a summary of different GS1 DataBar symbol types, more information about GS1 Application Identifiers, and the complete GS1 DataBar FAQ (Frequently Asked Questions).

Across 2007, you will also find Starter Kits – audience-specific implementation advice and tools to assist in GS1 DataBar deployment – for GS1 MOs, retailers and manufacturers.

Check back to the website often for updates and new material.

You may also contact the GS1 DataBar team at gs1databar@gs1.org, or your local GS1 Member Organisation (www.gs1.org/contact).

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Glossary

AI: Acronym for **Application Identifier**, the field of two or more characters at the beginning of an Element String that uniquely defines its format and meaning.

Logistic unit (identified with **SSCC**): An item of any composition established for transport and/or storage that needs to be managed through the supply chain.

On-demand printing: Thermal or laser label printing (e.g., random weight meat scale labels, shipping labels, apparel tags)

On-demand Primary Package Printing: - Supplemental on-demand printing (e.g. printing serial number using a Flexographic printing press to print the packaging graphics and bar code; ink jet process to print serial number directly on product packages.)

Open standard: Industry expectation that solution is accommodated everywhere.

POS: Acronym for Point-of-Sale

Restricted standard: Industry restricts solution by region or by product type or by application

Retail consumer trade item (identified with **GTIN-8, -12, or 13**): Intended to be sold to the end consumer at retail Point-of-Sale

RSS: Acronym for Reduced Space Symbology, the working codename of the GS1 DataBar

GS1 DataBar/AI System: Reading system capable of decoding GS1 DataBar symbols and presenting GS1 Application Identifiers to an application.

GS1 DataBar Application: Business transaction that utilizes data from a GS1 DataBar System.

Scanner Environments: Point-of-Sale (POS) Omnidirectional, General Distribution, POS and General Distribution combined, Special (small or direct part mark)

Scanner Readiness Categories: GS1 DataBar Capable (ready), GS1 DataBar Capable, disabled (ready except “software switch” must be turned on), GS1 DataBar Incapable, upgradeable (requires new software in scanner; downloaded from remote location or entered from a separate maintenance device attached to the scanner), and GS1 DataBar Incapable (must be replaced as it is not upgradeable)

Scanner Types: Slot (Omnidirectional), handheld laser, and handheld camera-based (needed for Data Matrix).

SKU: Acronym for Stock Keeping Unit

Standard trade item grouping (identified with **GTIN-12, -13, or 14**): Grouping of retail consumer trade items or non-retail trade items that are not intended for Point-of-Sale scanning.

Static Primary Package Printing: Flexographic or offset printing.

Sunrise date: When industry expects all to be ready for a solution (e.g., the GS1 DataBar will be allowed on all trade items by [date])

Sunset date: When industry says a previous solution has been replaced instead of simply being supplemented by new solution (e.g., US coupon solution has been replaced by a new US Coupon Solution)

Trade item (identified with **GTIN**): Any item (product or service) upon which there is a need to retrieve pre-defined information and that may be priced, or ordered, or invoiced at any point in any supply chain.

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GS1 DataBar Task Force Roster (as of March 2006)

Task Force Member	Company	Company Type
Tsuyoshi Miyazaki	Aeon Company	Retailer
Jack Gridley	Dorothy Lane Market	Retailer
Pat Walsh	FMI	Industry Association
Roberto Matsubayashi	GS1 Brazil	Member Organization
Diane Taillard	GS1 France on behalf of Carrefour	Member Organization/ Retailer Liaison
Ilka Machemer	GS1 Germany on behalf of Metro	Member Organization/ Retailer Liaison
Ulrike Kreysa	GS1 Global Office on behalf of Healthcare Users Group	GS1 Global Office
Kazuya Sato	GS1 Japan	Member Organization
Greg Rowe	GS1 US	Member Organization
Akikazu Sato	Kao Corporation	Manufacturer
Doug Naal	Kraft	Manufacturer
Kevin Koehler	Loblaws	Retailer
Duane Judd	Nestlé	Manufacturer
Bud Babcock	P&G	Manufacturer
Terry Mochar	Reckitt-Benckiser	Manufacturer
Joe Spreitzer	Target	Retailer
Lela Tripp	Tyson Foods	Manufacturer
Joe Andraski	VICS	Industry Association
Mark Mohler	Wal-Mart	Retailer
Daniel Kochanowicz	Woolworths	Retailer

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