



The Global Language of Business



Traceability Reference Book 2021

Successful traceability
implementations with GS1 standards



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Traceability: Providing the essential ingredient of resilient post-pandemic supply chains

In 2020, the COVID-19 pandemic disrupted life around the globe—schools, businesses, celebrations—life as we knew it. The pandemic delivered significant pressure to supply chains that had to quickly adapt to new demands from hospitals, companies and consumers.

Today, as the world continues to contend with the challenges of the pandemic, it is also simultaneously creating a post-pandemic view of how we will work, interact and consume. These global drivers have resulted in accelerated interest in GS1 standards from businesses and organisations that want to benefit from interoperable traceability—gaining efficiency, visibility and transparency.

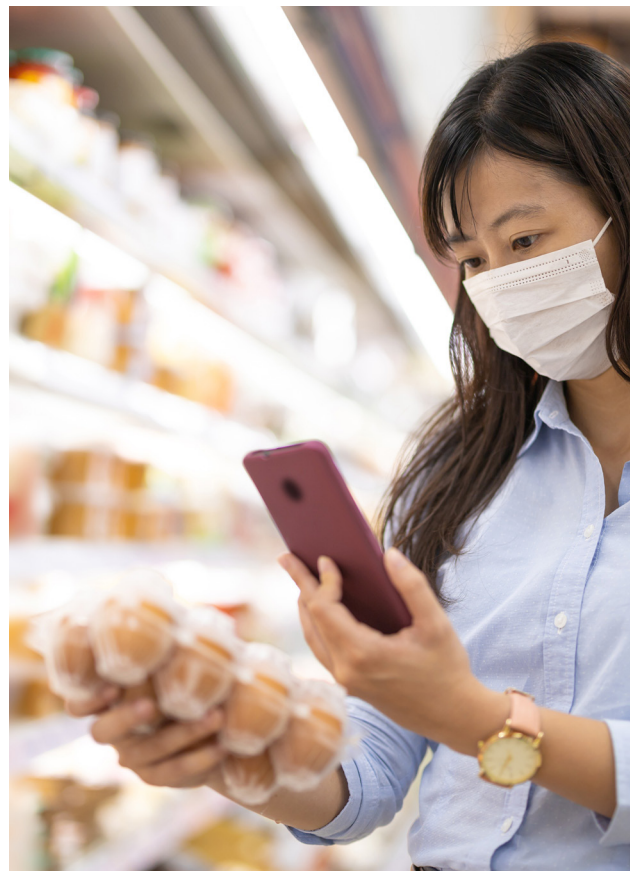
Consumer demand for transparency has accelerated. More than ever, consumers want to be sure they have access to authentic, safe and properly sourced products. And, traceability solutions can deliver this trusted information to consumers.

Traceability is a strong enabler for trust and safety in the supply chain, both between consumers and brands, and also between manufacturers and their suppliers.

GS1 standards for traceability enable trading partners and solutions providers to speak with a common language. GS1 enables an ecosystem of diverse stakeholders to communicate efficiently and effectively about the provenance, status and movement of things, products, shipments and more.

Throughout this book, you will learn how the use of GS1 standards enables traceability across trading partners. The stories demonstrate the real value earned regardless of the investments these companies have made. This first release illustrates how GS1 standards for traceability work across our food supply chains—and that a technology agnostic approach to standards empowers organisations to choose what is most appropriate for their data sharing needs in pursuit of traceability benefits.

While this time is filled with challenges, it offers opportunities to achieve even greater supply chain resilience and agility. Join us in exploring how traceability has been, and will continue to be at the forefront of this progress.



[Visit Traceability Case Study Library](#) to see more traceability implementations with GS1 standards from around the world.

[Contact GS1 around the world.](#) GS1 Member Organisations support your company's traceability needs and implementations using GS1 standards.

Timothy Marsh

Senior Director, Traceability and Sustainability
GS1 Global Office



Argentina

Rothex

Traceability of eggs has never been easier than with GS1 standards

Challenge

Though Rothex had a traceability system in place, it did not help solve for the determination of batch sizes when receiving eggs from supply farms. There were neither standardised spreadsheets, records nor labels.

Solution

Rothex now has a traceability system that leverages GS1 standards to uniquely identify the eggs by lot/farm and pallet. Each pallet of multiple lots of eggs is identified with a GS1 Serial Shipping Container Code (SSCC) that is encoded with the lot identifiers in a GS1-128 barcode. By scanning the barcode, the company can easily identify the different lots or farms from which they came.

Challenging distribution of eggs

Rothex is an Argentinian company that produces, packages and distributes eggs. With several of its own points of sale in the country, the company wanted to develop a significantly improved traceability system for its storage and distribution processes. Yet, a major challenge was how to determine the batch size. Many farms supply Rothex with eggs that tend to be in heterogeneous quantities that generate a mixed distribution of eggs in differently sized trays.

To solve this issue and improve its stock handling system, Rothex turned to GS1 standards to help track and trace its egg products with an accurate and real-time methodology. They learned about GS1 standards by attending a regional Traceability Workshop in 2020.

Benefits

- New work culture and methodology
- Exchange and integration of knowledge of several areas that encouraged global teamwork in the company
- Lower administrative costs because of reduced time searching for information
- Knowledge of the location of products
- Improved stock management system

Implementing GS1 standards

The project started with a review of the receiving, packaging, storage and expedite processes. As part of this review, the Rothex team implemented the accurate identification of all traceable items, which was possible through the collaboration of several departments such as Production and Quality Assurance. Next, the team uniquely identified lots by using serial numbers that allowed them to know which batches were “mixed” based on the origin of each egg.

Rothex assigned Global Trade Item Number (GTINs) encoded in EAN-13 barcodes and ITF-14 barcodes to uniquely identify their egg products. As they were packed in pallets, a GS1 SSCC encoded in a GS1-128 barcode was applied on dispatch units.

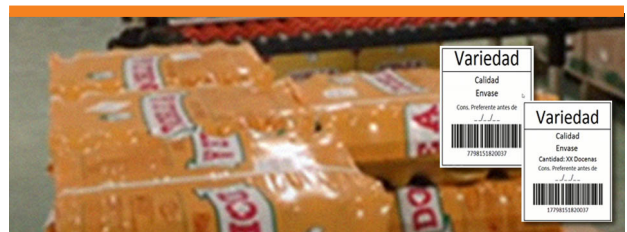
The team also incorporated Excel-based registration forms at critical points in their traceability system, developed a recall procedure and established a risk committee.

SSCC: Key to the solution

Here's how the SSCC identifier helps to trace batches of eggs back to their different production locations. Consider that there are three farms (called "lots") that supply eggs.

- Lot 1 supplies 10,000 eggs, Lot 2 supplies 9,860 eggs and Lot 3 supplies 12,340 eggs—all in heterogeneous quantities.
- Lot 1 eggs enter the process first and begin to fill the boxes. There are 35 eggs in each box and every pallet can handle 240 boxes. So, every pallet contains 8,400 eggs.
- Pallet 1 consists of 8,400 eggs, all of them are from Lot 1; there are 1,600 eggs of the 10,000 total eggs remaining.
- Pallet 2 collects these 1,600 eggs plus 6,800 eggs from Lot 2 to complete the 8,400 egg pallet, and so on.
- Each pallet is identified with an SSCC code that contains the different lot numbers making up the pallet.

Depending on the entrance sequence to the process, a register of how lots are used can be created. If a recall procedure is needed, Rothex knows from which SSCCs the pallets that contained the eggs from certain farms were created.



Teamwork and efficiencies



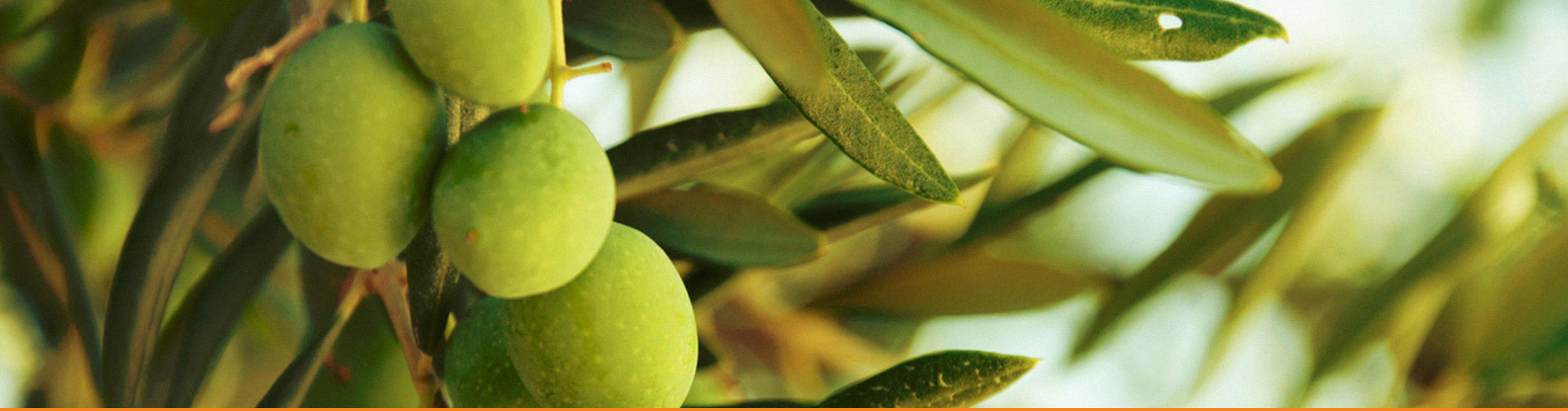
By exchanging ideas and integrating knowledge, Rothex's teamwork has set a precedent for further work in future projects. The company has a new work culture and methodologies.

With the adoption of GS1 standards, Rothex also has an improved stock management system, which has resulted in lower administrative costs due to a reduction in time searching for information.



About the organisation

Rothex is an Argentinian company that produces and distributes high-quality food. Currently, its main business is the production and commercialisation of fresh table eggs, using the highest quality raw materials and advanced technology. www.rothex.com.ar



Germany, Greece

QUHOMAttrace

Unique combination of IoT and traceability data provides unparalleled upstream visibility for agri-food stakeholders

Challenge

Farms, cooperatives and other agri-food businesses wanted to create a competitive advantage by meeting consumer needs for easy accessibility to valuable information about their crops and food.

Solution

Future Intelligence developed an Internet of Things (IoT) traceability solution, QUHOMAttrace. GS1 EPC-enabled standards provide the needed identification for the farm plots, each crop's batch/lots and the sensors associated with the farm plots and crops.

Benefits

- Provides farm calendar details before the crop is transformed into a final product
- Aggregated sensor data uncovers the field's capacity to produce quality crops and food via aggregated sensor data
- Justifies farmers' environmental focus since IoT data proves the necessity of certain farm practices
- Promotes advantages on locally produced food
- Offers potential for innovative digital marketing campaigns through direct communication between consumer and farmer, and cooperative



While there are many traceability solutions to document and share, an agri-food product's route-to-market spans across organisational boundaries and provides a complete custody of events that start with the crop's planting date.

Current IoT value propositions focus on reducing production costs, increasing yield or quality. Undoubtedly, climate change is influencing farm businesses to look for tools to lower risks, but as inequalities in the value chain are amplified, consumer-oriented propositions are becoming more important in the agri-food value chain.

There is no single solution that traces the exact location and climatic conditions that indigenous varieties are cultivated under and links them to the final products.

Identification standards

QUHOMAt race from Future Intelligence, an IoT provider and an early adopter of FIWARE open-source tools that enable cross-European Union (EU) data interoperability, managed to solve the need for full traceability with the use of GS1 data sharing standards.

The QUHOMAt race platform is designed as an innovative integrator of entity-based registries, such as IoT data (e.g., sensor data, user registries) and event-based information, like data produced from traceability applications (e.g., item moved from location X to Y).

To lay the foundation for traceability, an EPC (Electronic Product Code)-based set of identifiers was assigned, applied and used to track and trace crops as they travel from farm to fork. The GS1 Global Location Number (SGLN) was assigned to uniquely identify each farmer's parcel/plot. The GS1 Global Trade Item Number® plus batch/lot number (LGTIN) were applied to uniquely identify each crop and its individual batch produced, and the Global Individual Asset Identifier (GIAI) identifies the unique sensors that are monitoring the crops.

Based on these identifiers, Future Intelligence used the QR code generator to create data carriers that captured the identification data to test the beta QUHOMAt race app for consumers. By scanning the QR code on a food product's package, consumers can retrieve the GS1 EPC-based traceability data registered manually through QUHOMA, the smart farming web app.



Farm-to-fork traceability

Today, farming visibility events are captured and stored as interoperable, GS1-standardised EPC Information Services (EPCIS) event data. For the harvested product, information on events prior to its harvest is now available, such as when it was planted, how it was treated and sensorial information. By using EPCIS, the level of traceability significantly increases, including stakeholders' trust and confidence regarding the safety and quality of products.

Equally important is the value offered by an IoT solution for farmers who want to communicate with their procurers, buyers and/or consumers every detail that happens in the field, for various reasons. Farmers could receive customised advice on the use of a product, how to lower the cost of an external quality inspection or even how to increase consumer trust and loyalty. Using GS1 standards substantially simplifies this data sharing and, most importantly, makes the solution easy to replicate in other countries and sectors.

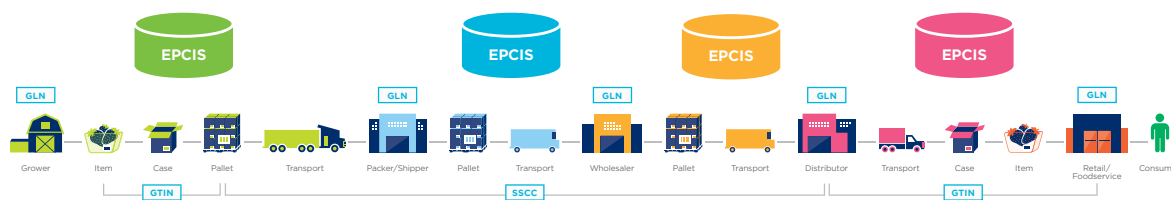
As he enters the newly founded offices of the Archaia Oleneia cooperative, George Mimmis of Mimmis Farm is very keen on using digital technologies and is fascinated by the use of GS1 standards.



"I can now provide upstream traceability as a competitive advantage to my business partners and work with additional use cases and GS1 identifiers, like easily tracking each tree's produce over the years through the GIAI."

George Mimmis,
Mimmis Farm

EPCIS is a GS1 standard that enables trading partners to share information about the physical movement and status of products as they travel throughout the supply chain—from business to business and, ultimately, to consumers. It helps answer the “what, where, when and why” questions to meet consumer and regulatory demands for accurate and detailed product information.



The benefits of data

The IoT traceability solution provides farmers with aggregated data that helps them determine which farm practices can increase a field's capacity to produce quality crops and food. It can provide the needed justification of a farmer's environmental decision since IoT data proves the necessity of certain farm practices (e.g., irrigation performed when soil is dry, spraying performed with low wind-speed, insecticides applied well before a crop's harvest and more).

This data also opens the door for creative digital marketing campaigns via direct communication between consumer, farmer and cooperative. Overall, it helps point out the advantages of eating locally produced food for consumers.

About the organisations



Future Intelligence is a telecom engineering company based in Athens, Greece and an IoT provider with built-in hardware and software products. The company started its operations in 2009 focusing on wireless sensor networks for smart street lighting for which it later developed FINoT platform. After pivoting the technology to the agriculture domain in 2016, Future Intelligence offers a Quality HOrticulture Marketplace (QUHOMA) of data and services to digitally transform farming business in EU. www.f-in.gr

Mimmis Farm (now a member of Archaia Oleneia cooperative) was established on private lands on the hill of Aghios Ilias, Western Greece. The area is protected by international conditions, RAMSAR and NATURA 2000, due to its great ecological value. Over the years with its experience and passion, the farm produced crops of superior quality and shared these with the second generation of the family that went one step further—applying traditional and organic-certified practices. <https://stamnaolives.gr/>



Hungary

Hungast Group

Innovative solutions for consumer safety in foodservice

Challenge

On 1 September 2015, the 37/2014 (IV.30), the Ministry of Human Resources' (EMMI) regulation, took effect in Hungary that outlines catering, nutrition and health principles for implementation by mass catering companies and mass caterers when providing food to schools and other institutions. Between 2015 and 2020, the number of dietary consumers increased sevenfold, and within this, the number of gluten-sensitive consumers increased tenfold. In response, Hungast Group increased the capacity of its dietary kitchens. Also, in order to comply with healthcare and consumer safety criteria, a traceability system needed to be put in place to guarantee 100% accuracy of product data. During implementation, apart from zero failure rate, Hungast had to consider the financial and environmental aspects as well as what tools would be used.

Solution

To comply with regulatory and consumer demands, Hungast Group turned to GS1 Hungary to build a traceability system based on GS1 global standards. Now, on every reusable box, there is a unique GS1 product identifier encoded in a GS1 DataMatrix barcode that globally identifies the specific food in the box, the institute and the type of consumer it will be delivered to. By scanning the GS1 DataMatrix barcode, Hungast Group has access to real-time information and can increase efficiencies in its preparation, cooking and logistics processes.



"This is an incredibly innovative project that involved the development of processes and packaging material, including the development of supportive IT systems. With sustainability in mind, four companies collaborated with the ultimate goal of improved consumer safety."

Krisztina Vatai,
Business Development Manager, GS1 Hungary

Results

According to Zsolt Páger, Business Development Manager at Hungast Group, the traceability system and improved processes provide the company with multiple advantages:

- Food security has improved since the traceability system has been implemented.
- Hungast Group can provide individual-specific diets so that all consumer demands are fulfilled, resulting in 100% accuracy in dietetic foods.
- The new, two-step verification system has helped the commissioning staff, so the risk of multiple errors and the amount of time spent has decreased. With this, working has become easier for colleagues, improving productivity.
- Before the traceability system, one third of boxes had to be removed from the catering system and replaced every 6 months due to the lack of traceability. Hungast's new solution has eliminated the need to do this and provides full transparency.

Introducing the dietbox

Prior to the traceability system, boxes used for the storing and delivery of prepared food were inadequate. While priced favourably, the boxes did not retain needed heat levels and, at the same time, the shocking process also became cumbersome, leading to food safety issues. Because of their cylindrical shape, volume utilisation was not efficient, causing noticeable disadvantage in logistics processes.

Disposable, single-use plastic boxes had also emerged as an alternative with appropriate sizes and shapes, but considering the quantity of boxes used each day, these would be environmentally harmful—an issue that Hungast would not approve.

In 2018, Hungast Group collaborated with a Hungarian plastic company to develop a diverse box that had preferred features, with a long lifespan. As a result, “dietbox” was created in two sizes and in three shapes. Since then, 30,000 pieces have been produced.



The innovative dietbox

The box is sponsored by Hungast and European registrations are initiated by the producer and distributor. Because of the relatively small quantities produced and the box's high quality, the production costs are approximately three times the costs associated with a traditional box. In order to prevent the disappearance of these high-value boxes, a comprehensive traceability system was deemed essential to identify the exact location of the boxes.

“

“The innovation had a huge impact on the planning and execution of the overlapping steps in the whole process. As a result, Hungast Group, our client, always has precise information on the location of the product that is being traced and who is managing it.”

“The whole process is executed during extreme circumstances (e.g., cooking environment, high humidity, extreme high or low (-20 °C) - temperature, greasy surfaces, using industrial dishwasher), that led to another challenge in choosing the right tools and setup.”

“Although the applied assets differ in the design and operating systems, the solution provided by IBCS Hungary gives users a unified and easy-to-manage interface with maximum transparency.”

László Sinka,
Operation Director,
IBCS Hungary Kft.

Marking dietboxes with GS1 identifiers

In the beginning of the process, the food is prepared for customers with special diets and packaged in the dietboxes. On the bottom of each dietbox, there is a laser-engraved GS1 DataMatrix barcode that contains a GS1 Global Returnable Asset Identifier (GRAI) and a serial number linked to it.

While preparing the food, labels are made for each portion and placed on the top of the dietbox. These labels also contain a GS1 DataMatrix barcode with a Serial Shipping Container Code identifier (SSCC) encoded in it, the name of the consumer, the place of delivery (institute), the date of the day the food was packaged and the name of the food. The barcodes on the bottom and top of the dietbox are scanned, and the order is checked by a dietitian in every case.



“People are always learning something during their lifetime as a quote from Beáta Varga, Hungarian author says: ‘The world is changing and change is life itself.’

We, at Hungast Group, believe in making improvements from the beginning.

Searching for innovations and developing them have always a part of our everyday work, our stable operation and our successes never allow us to grow lazy.”

Zsolt Páger,
Business Development Manager, Hungast Group



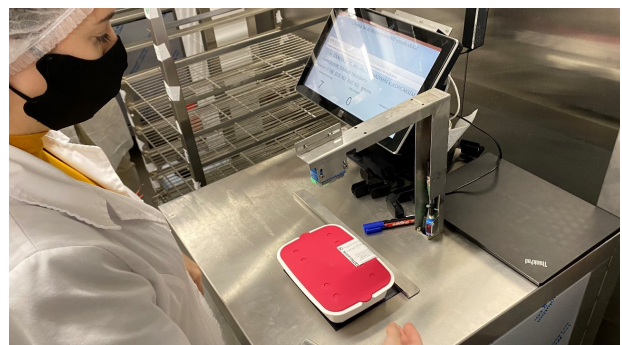
PETREZSELYMES ZÖLDBORSÓFŐZELÉK (75%), VAGDALT SZELET (25%) Összetevők:
Petrezselymes zöldborsófőzelék (zöldborsó (55%), rizsital, búzaliszt, kristálycukor, napraforgó étolaj, vörshagyma, petrezselyemzöld, jódosított só [vákuumsó, kálium-jodát, csomósodást gátló anyag: E536], szecscsendió). Vagdalt szelet (sertéscomb, zsemlemorzsa [búzaliszt, rozsliszt, livóvíz, só, élesztő, sütőszőr, búzamalát, búzaglutén, szőlőcukor, növényi zsír (pálmazsír), emulgeáló szer: lecitin, savanyúságot szabályozó szer: ecetsav, sovány tejpor, ízkiegészítő szer, aszkorbinsav], zsemle [búzaliszt, víz, élesztő, só], tojás, napraforgó étolaj, vörshagyma, fokhagyma, fűszerpaprika, jódosított só [vákuumsó, kálium-jodát, csomósodást gátló anyag: E536], bors.
Fogyasztható (bontatlan csomagolásban): 08.06.2018. Tárolás: 0°C és 5°C között.
Gyártja: Elamen Zrt, 1095 Budapest, Soroksári út 98. (HUNGAST CSOPORT) Felhasználás: Fogyasztás előtt távolítsa el a fóliát, majd melegítse az ételt mikrohullámú sütőben 750W-os teljesítményen 2 percig. Átlagos tápérték 100g termékben: Energia 600 kJ/ 400 kcal, zsír: 8g, amelyből telített zsírsavak: 5g, szénhidrát: 5g, amelyből cukrok: 3g, fehérje: 20g, só: 4g
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A GS1 identifier, a GRAI, and a serial number are encoded in a GS1 DataMatrix barcode that is engraved on the bottom of the dietbox.

In order to eliminate human errors, dietboxes are placed into multipacks, after shocking (i.e., quick cooling of the food) is performed by a specially developed system. Once a dietbox is in a multipack, the system shows its status for the commissioning staff, based on three colours:

- Green: The box is in the correct place.
- Yellow: The box is not in the designated multipack, but has the same delivery address so work can continue.
- Red: The box is not in the correct multipack.



The worker is simultaneously binding and reading the GS1 DataMatrix barcode on the bottom of the dietbox as well as the GS1 DataMatrix barcode on the individual label.

Shipping the dietboxes proceeds only after each dietbox is in its designated place. If one is missing or becomes damaged during shocking or shipping, it is substituted with a box containing a non-allergic food that is compatible with all diets.



“Implementing the traceability system for our self-developed dietbox gave us new possibilities in serving our dieters within the framework of a modern, reliable system. With the implementation, we met our long-term sustainability goals since the processes enabled by GS1 standards require a significantly smaller amount of emissions. Our development fits the main principles of Hungast Group: Food. Experience. Care.”

Zsolt Páger,
Business Development Manager, Hungast Group

The prepared multi-packed consignments for each transport are assigned to drivers, representing various transportation companies, using a manual data logger. The system sends an error message if a driver receives a multipack that does not belong to his line or to him.

From this point, the drivers use a paper-based process to manage the route of the dietboxes. Once all multipacks for a line are handed out, the food is delivered to the designated drop points. At the drop points, delivery is automated by scanning the barcode; however, from the drop point, the food and its packaging is tracked, using paper-based delivery documents. While the decision was made to keep the manual parts of the process for financial reasons, Hungast plans to invest in the digitalisation of the whole process in the future.



Preparing food for institutional delivery, the worker reads the GS1 DataMatrix barcode on the label for transportation in the heat storage to the institution.

After dietboxes are returned to and cleaned by the company's kitchens, the barcodes are scanned again. With this scan, the record linking the dietbox to the consumer is deleted. At the same time, quality checks of the dietbox are also performed.

“

“The reusable dish container system was a common idea with Hungast Group Zrt. and was designed and produced by Salaplast Kft. Creating a product line that addresses every aspect in the idea for replacing the widely applied, single-use, non-reusable containers was a big challenge. During the designing process, fast and simple assembly, easy to clean and high durability in industrial context were essential factors.”

“Each container can replace hundreds of single-use packages a year. So, the containers we produce can save our environment from several kilograms of waste each year.”

Ferenc Szalay,
Managing Director, Salaplast Kft.

About the organisations



Hungast Group entered the mass catering market in 1996. As the result of the owners' and managers' quality-oriented, thoughtful and fair business thinking, Hungast has around 3,000 employees serving 200,000 consumers throughout Hungary and is responsible for mass catering and canteen services. The group was founded as a private company by individuals who continue to take an active part in the operation of the company. Hungast's customers include governmental institutes; its consumers are mainly from the education industry (nursery, kindergarten, primary and high school) along with private business clients. <https://www.hungast.hu/>



Salaplast Kft. is a family-owned Hungarian enterprise in the plastic industry that has taken part in various innovative projects in various industries with other Hungarian market operators in the past few years. Besides being part of a two-generation family business, workers of the company are connected by a love for the business. <http://salaplast.com/>



IBCS Hungary Kft.

As the Hungarian representative of the IBCS Group, the Budapest-based IBCS Hungary is a key figure in the technological sector that provides solutions for systems and product traceability for mobile companies since 1992. The successful Hungarian company is the vanguard in the market of application integration, barcode-communication and other innovations for product identification and robotics. <https://ibcs.hu/>



Ireland

Airfield Estate

Using GS1 standards to improve traceability, reduce waste and increase consumer trust

Challenge

Airfield Estate is a farm located in suburban Dublin, Ireland and through its work aims to inspire people to make better food choices through education and awareness. Food waste, sustainable production and traceability are all identified concerns of customers locally and nationally. Airfield recognised an opportunity to respond to those consumer demands for greater transparency through the provision of easily accessible information about the origin and production of their unique Jersey cow milk.

Solution

To illustrate the journey of a food product, Airfield Estate introduced a QR code and a GS1 DataMatrix barcode on its milk bottle labels. Through the use of GS1 data standards, combined with the fTRACE traceability platform, Airfield can provide batch-specific traceability information to their customers in real-time.



“Having the 2D [GS1 DataMatrix] barcode include the expiration date on the milk saves me an entire step in labelling. I used to have to put two labels on each milk carton; now it's just one. It saves me time and money!”

Brian Farrell,
Airfield Estate Farmer

Benefits

The solution has delivered benefits for both Airfield Estate and its consumers:

- More efficient labelling of milk in their production facility
- Better informed consumers with easy access to all traceability information by scanning the QR code on the label
- Allowing for future enhancements at Airfield Estate:
 - Faster, more accurate stock visibility and management in the farm shop by scanning the barcode containing the expiry date
 - Prevention of food waste in the shop through more efficient stock management
 - Increased consumer safety with faster product recalls possible through the use of the data in the GS1 DataMatrix barcode



The digital journey of milk

Airfield Estate wanted to educate customers about the journey of milk from cow-to-consumer, and recognised that the provision of digital product and traceability information could help achieve this goal.

Airfield milk is produced, pasteurised, bottled and sold onsite, creating a closed loop production and sales environment. With each day's production, a vast array of product data is recorded such as the location, product ID, batch number, milking and bottling dates and expiry date.

Key data including the GS1 Global Trade Item Number® (GTIN®) for product identification plus the batch number and expiry date are encoded in the GS1 DataMatrix barcode that is printed on the milk bottle label.

This barcode can be scanned throughout the Airfield Estate to record product movements and to manage inventory and stock rotation.

Additionally, this data is uploaded to the fTRACE traceability platform to make the information publicly accessible to consumers via an easy-to-use web page. Consumers can access the information for their bottle of milk by scanning the QR code on the milk bottle label with their smartphone. On the fTRACE website, consumers can explore a wide array of information about the Airfield Estate, its history, as well as details of the full milk production process, the Jersey cow herd and even Brian, the Airfield farmer.

Improved consumer trust and safety

The pilot project at Airfield Estate has successfully demonstrated the ability of a small-scale production facility to incorporate intelligent barcodes into its product labelling process.

- Consumers can now access dynamic traceability information about the milk they buy in the Airfield farm shop by scanning the QR code on the label with their smartphone.
- Consumer safety is improved through efficient product recall processes, should they be needed, utilising the batch-level information stored in the GS1 DataMatrix barcode.

Airfield Estate intelligent label

QR code linking fTrace batch level traceability data





Full traceability. Full trust.



GS1 DataMatrix with the following data embedded:

- GTIN
- Expiry date / Use by date
- Batch number

The following data is encoded in the GS1 DataMatrix barcode:

- GS1 GTIN, that identifies each milk product type
- Expiry date to enable the improved management of product along the supply chain and reduce waste
- Batch number to enable traceability and recall functionalities



Did you know?

You can scan the QR code on Airfield Estate's Jersey milk to find full details about it's origin







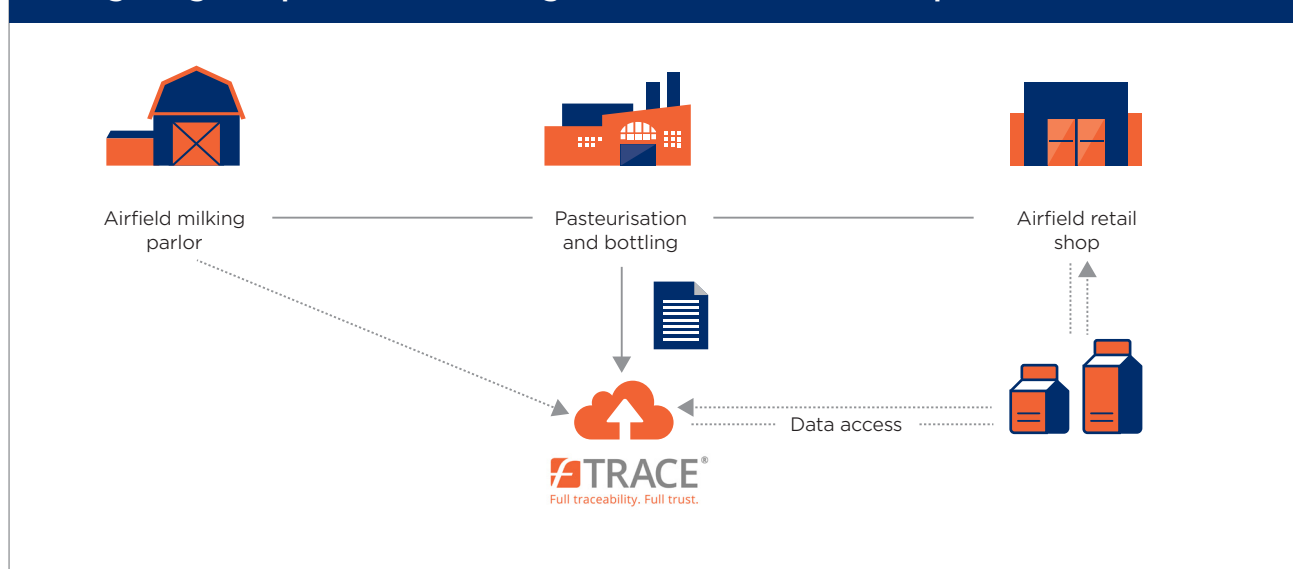
Next steps

The next step in the project will involve engaging with the provider of the point-of-sale (PoS) and inventory management systems in Airfield Estate's shop and restaurant, to utilise the embedded product data to reduce food waste, to facilitate product recalls and to further improve stock management and visibility.

As consumer level food waste is a major issue across the retail industry, GS1 Ireland and Airfield will engage with consumer-facing app providers to utilise the data in the milk label's GS1 DataMatrix barcode, thus developing a best practice example for engagement with consumers on topics such as food waste and food safety through product recall functions.

A working group will also be established to discuss the pilot project at Airfield with local stakeholders, and to communicate the lessons learned from its implementation. These lessons may be used as the basis for future projects utilising intelligent barcodes and dynamic product data in the food industry for the benefit of all stakeholders, including retailers, manufacturers, regulators and consumers.

Integrating milk product data throughout the cow-to-consumer process



About the organisations



Airfield Estate

Airfield Estate is a charitable trust, established by the Overend family in 1974. Today, it operates as an educational charity and social enterprise. It aims to inspire and enable people to make better food choices, better for people, better for their pocket and better for the planet. The estate has been designed to facilitate active learning focused on food, farming and the land. A complete farm-to-consumer experience has been created that educates the public at all stages of the food journey, linking healthy soils to animals and plants and food production. The journey starts on the 38-acre farm and organic food production gardens and reaches the consumer through the onsite restaurant, farm shop and farmers' market. <https://www.airfield.ie/>



fTRACE

fTRACE helps drive greater efficiency and consumer confidence along the entire supply chain. Based on GS1 standards, this full-service solution enables companies to use shared traceability data to the benefit of all parties involved in the supply chain. fTRACE relies on the global standard EPCIS and the unique global identifiers from GS1 to enable efficient cross-company traceability on an international scale. <https://web.ftrace.com/>



United States

IPC/Subway

Delivering the promise of end-to-end traceability throughout the Subway system

Challenge

Independent Purchasing Cooperative (IPC), a Subway® Franchisee-owned company, is responsible for the supply chain processes for the more than 43,000 Subway restaurants globally. IPC needed a system to enable full supply chain visibility to optimise its operations. The Cooperative was focused on ensuring food safety for Subway guests and finding business efficiencies that end-to-end traceability would bring. To achieve this challenging initiative, IPC developed a strategy for getting all of its suppliers and distributors on board.

Solution

IPC has been collaborating with its supply chain partners to continuously build a foundation of GS1 standards for quality data to meet the information transparency needs of its restaurants and consumers alike.

Today, suppliers and distributors use GS1 standards to uniquely identify their products and locations as well as exchange product information through the Global Data Synchronisation Network™ (GDSN®).

Subway Franchise Owners use a specialised app to capture and use product data at restaurants for the benefit of their operations and customers.

Benefits

IPC has been able to quantify US \$1.3 million (€1.064 million) in annual cost avoidance by maximising truckload capacity based on accurate product data enabled by GS1 standards. In addition, standardised product data drives operational efficiencies, reduces supply chain costs, and saves time and labour.



By using quality product data, Subway restaurants can improve their inventory management and ensure enhanced food safety practices with faster and more precise responses to product recalls and withdrawals.

With its business processes built on the foundation of GS1 standards, IPC and independently owned Subway restaurants are looking to further differentiate and enhance consumers' experiences with customised offers and other innovative approaches to supply chain management.

“

“We added GS1 standards because this results in cost savings for our Franchisees. As a sign of that commitment, we require GS1 standards usage in our supplier and distributor contracts.”

Dennis Clabby,
Executive Vice President, IPC

Country: US

Industry: Foodservice

GS1 Standards: GTIN, GLN, SSCC, GDSN

Quality product data: The first goal

In 2013, IPC launched an initiative to improve the quality of its product data with the ultimate goal of achieving end-to-end visibility across its supply chain—from supplier sites, through distribution centres, and to Subway restaurants' consumer plates.

IPC had found that inconsistencies in product information was disrupting its supply chain, resulting in significant cost and food safety implications. Inaccurate weight and dimension data meant inaccurate freight calculations, leading to overcharges, delays and waste.

“We realised early on that we were never going to achieve end-to-end traceability and optimise our supply chain efficiencies if we didn't use quality data,” says Lucelena Angarita, Director of Supply Chain Systems and Standards at IPC. “So taking the time to lay this foundation was critical.”

The first hurdle to overcome was getting its suppliers and distributors to uniquely identify each of their products. IPC chose GS1 standards for this purpose, using Global Trade Item Numbers (GTINs) for product identification. IPC was then able to use the GS1 Global Data Synchronisation Network to share this product data—GTINs along with the products' attributes.



“We ask for core attributes like dimensions and weight that are very critical to the health of our supply chain and distributors.”

Lucelena Angarita,
Director of Supply Chain Systems and Standards, IPC

“We engaged with our suppliers to help them truly understand the value of using GS1 standards for product identification and sharing. We understood that everyone could gain tremendous efficiencies and food safety improvements,” says Angarita. “We worked (and continue to work) with them step-by-step to make the transition to standards-based product identification and product data sharing.”

Today, an impressive 99 percent of IPC suppliers have implemented this guidance, leveraging the global standards. The accuracy of GTINs as reported by distributors has grown to 93 percent of all products. And all suppliers and distributors are consistently using the GDSN as the “one source of truth” when it comes to all product data, required by the IPC system.

To highlight suppliers' progress, IPC publishes a scorecard that shows each supplier's results based on two main metrics: data completeness and accuracy.

Completeness is measured based on what percentage of the supplier's products are published in the GDSN with complete “supply chain data” (product weights and dimensions) and “marketing data” (images, nutritional, allergens).

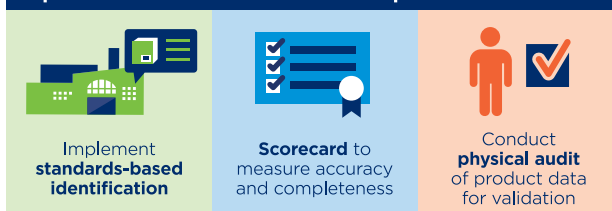
Supply Chain Data	Sales and Marketing Data
Linear Dimensions (height, width, depth)	Type of Allergen
Gross Weight/Unit of Measure	Daily Value Intake (%)
Country of Origin	Type of Diet
Ti-Hi	Serving Size
Brand Name	Nutrient Basis Quantity
Declared Net Content/UoM	Type of Nutrient
Pack Quantity	Quantity Contained
GTIN	Type of Data on Package
	Images
	Ingredients

“We ask for core attributes like dimensions and weight that are very critical to the health of our supply chain and distributors,” explains Angarita. “They only get a 50 percent completeness rating until the marketing data—for example, allergens, nutritional information and images—are published. That's when they achieve 100 percent.”

For accuracy, Subway conducts periodic physical audits as part of its product evaluation process. “Using a Cubiscan, the Subway evaluation team weighs and measures specific product cases and we compare this to the GDSN data published,” says Angarita. IPC notes that setting tangible goals and measuring progress is critical to keep the momentum moving forward to quality data and end-to-end traceability.

“The GS1 US National Data Quality Program has provided us with the needed guidance about what to measure, how to proceed, and many more best practices,” explains Angarita.

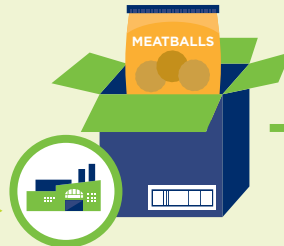
Tips to Achieve Accurate and Complete Product Data



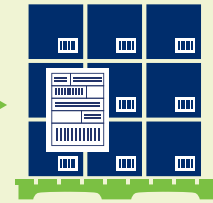
Supply Chain Traceability & Visibility of the Future



IPC places an order with a supplier that provides Subway restaurants with the meatballs for the Meatball Marinara sandwich.

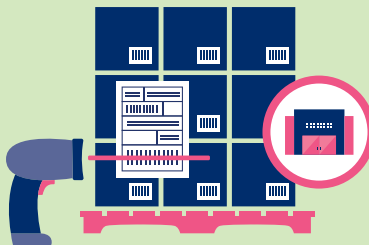


The supplier's plant packs and ships the order of **cases labeled with the meatballs' Global Trade Item Numbers (GTINs) encoded in GS1-128 barcodes.**



Cases are assembled onto **pallets that can be uniquely identified with Serial Shipping Container Codes (SSCCs) encoded in GS1-128 barcodes** and bound for the distribution centre (DC).

The DC can scan the SSCC (if present on the pallet) to compare the information provided on the ASN. If an SSCC is not present, **DC scans GS1-128 barcodes on cases for inventory and receiving accuracy.**



An **Advance Ship Notice (ASN)** listing the order's GTINs, quantity, and other useful information, can be **sent to alert the DC of the pending arrival.**



The centre divides the shipment for delivery to Subway restaurants that have requested meatballs—**each restaurant identified by a Global Location Number (GLN).** Each delivery is tied to the original supplier's GTIN, date, and batch/lot information.



As shipments of meatballs arrive in restaurants, **the GS1-128 barcodes can be scanned to manage inventory, address quality complaints, or identify impacted product in case of a withdrawal.**

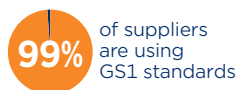
Throughout this process, all data is captured and stored in IPC's database within the FoodLogiQ Connect platform for reporting and use, in case of a withdrawal and/or recall.

Approximately **99% of products by volume are traceable** with a GTIN and other information encoded in a GS1-128 barcode.

94% of the Subway suppliers by volume are sending shipment information (# of cases by GTIN, lot code, and date) to IPC's traceability system. Product is being scanned at 31% of the Subway system in North America, which is approximately 9,300 restaurants.

IPC's goal is that 50% of its distribution system is **scanning at about 15,000 restaurants.**

The Math of Enabling Supply Chain Visibility



Today
9,300
restaurants



Future
15,000
restaurants

Harmonising through standards

IPC continues to guide new suppliers on how to implement GS1 standards, engaging their technical teams, labeling staff, and other relevant teams to understand the requirements. A new supplier is usually given 90 days to comply on most requirements, since most are capable of adhering to this timetable.

As part of its program, IPC is also mandating that suppliers and distributors assign a Global Location Number (GLN) to each of their physical locations where products are stored or manufactured.

“We added GS1 standards because that results in cost savings for our Franchisees,” says Dennis Clabby, Executive Vice President at IPC. “As a sign of that commitment, we require the use of GS1 standards in our supplier and distributor contracts.”



“Quality data practices are now a part of our culture—within the IPC and with suppliers and distributors.”

Lucelena Angarita,
Director of Supply Chain Systems and Standards, IPC

Part of the culture

Angarita and her team have a lot of support and help. Executive Vice President Dennis Clabby has made this a top company priority. The purchasing, distribution, and logistics teams have been particularly influential in the company’s push toward using GS1 standards to achieve traceability.

Subway’s Food Safety and Quality teams have been strong advocates for standardised data, acknowledging the difficulties and costs associated with recalls without accurate data.



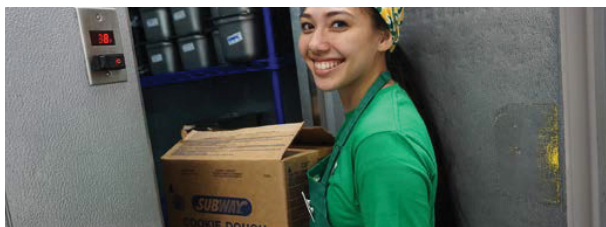
“Quality data practices are now a part of our culture—within the IPC and with suppliers and distributors,” says Angarita. “We take time to recognise the efforts of our people and partners in instituting the use of standards. Using standards has become a natural way of doing business at IPC and Subway.”

Journey to traceability

“Our journey has continued with the formation of a traceability program, including a timeline with milestones and targets for our suppliers and distributors,” explains Angarita. “This includes the encoding of GTINs, dates, and lots in GS1-128 barcodes for labeling and scanning packages and cases, and using GS1 Serial Shipping Container Codes (SSCCs) for identifying the products contained on pallets. We are also using GS1 standards in transaction documents like invoices, inventory files and Advance Ship Notices (ASNs).”

Suppliers generate GS1-128 barcodes that provide a wealth of useful product data for Subway restaurants, including if a product is delivered with a short shelf life or is under a withdrawal or recall. For distributors the added visibility gained with this product data—an essential component of traceability—helps them be more efficient and precise when it comes to tracking and managing inventory.

“Our next big milestone is broader ASN adoption between our trading partners,” says Angarita. An ASN provides a method for sharing traceability data, with each notice including the products (GTINs) and batch/lot numbers linked to each pallet’s SSCC.



Technologies support traceability

FoodLogiQ, a traceability technology provider and certified GS1 US Solution Partner, helps IPC know where products are by batch/lot number and expiration date, and helps trading partners synchronise supply chain events.

FoodLogiQ data allows IPC to create dashboards and reports that show how many of their suppliers, distributors, and restaurants are scanning deliveries, the percentage of products being scanned and more. Using the dashboards, IPC can identify the gaps across the entire supply chain, enabling transparency in its ever-evolving system.

When using the product data encoded in barcodes, a tech-savvy Franchise Owner, Daniel Riscalla, developed an inventory management application for his California restaurants. IPC has gratefully expanded the app’s use to include its entire Subway restaurant ecosystem.

The app scans the GS1-128 barcode to read or capture the encoded product data—the GTIN, batch/lot number and expiration date—to not only track inventory but monitor compliance with product freshness, as well. The app has made product withdrawals—those based on lot numbers and expiration dates, for instance—much easier and has the potential to reduce waste, and therefore, cost.

It is also integrated with the FoodLogiQ's system, providing even greater visibility for all products scanned with the app. This helps IPC track and visualise the movement of products across its entire supply chain.

The Bread Stops Here

For IPC and its restaurants, a bread recall demonstrated the power of end-to-end traceability in food safety. IPC was alerted that nine cases of bread with a high risk of contamination, had been shipped to restaurants. Rather than having to call and even visit 733 restaurants served by the distribution centre—the procedure prior to the implementation of data standards—the distributor found four of the cases right away. This speedy response was because the distributor had started rolling out the traceability system, and had started to scan GS1-128 barcodes. This enabled IPC to do some quick investigating to find the other cases that were in close proximity.

“Within two hours, we found all nine cases. We didn't have to send product retrieval services out to 733 restaurants, which saved us about \$61,000,” Angarita says. “And that doesn't count the cost of labour: everybody in the office, at the DC, and in the restaurants that have to look for these products. In the restaurants alone, we estimate an incident like this results in 183 wasted hours of labour, at a cost of \$2,196.”

To put this in perspective, 64,794 restaurants were contacted during 11 quality incidents in 2017. About 42 percent or 27,757 restaurants had the affected products. IPC estimates that 9,259 hours of labour could be saved annually at restaurants by using traceability for precise communication to only those restaurants that are affected, translating to potential savings of more than \$110,000. Other traceability benefits are incalculable: “At the end of the day, it's the risk avoidance and safety of our consumers that we care about most,” Angarita says.



64,794 restaurants were contacted during **11** quality incidents

Traceability enables annual potential savings



9,259 hours of labour | more than **\$110K**

Nourishing benefits

In 2013, IPC's first Six-Sigma study led by Marie Sellas, IPC's Director of Supply Chain Analytics, showed that correcting a one-and-a-half-pound weight differential on a simple jar of mayonnaise equated to a US \$100,000 annual return-on-investment for the company. This helped demonstrate the real impact of inaccurate data on IPC's bottom line, and ultimately, Subway Franchises.

Today, the full impact of using quality data and the GDSN has been assessed at US \$1.3 million in annual in cost avoidance.

The traceability systems powered by GS1 standards, and the communications conduit of the GDSN, afford benefits to each supply chain participant from “farm-to-fork,” in addition to monetary savings from costly recall and retrieval operations.

Suppliers encode products once to supply hundreds of customers efficiently. Distributors have greater inventory control and avoid waste. Subway restaurants get alerts if they receive products outside of Subway Gold Standards' shelf life or can track expired products more readily, and consumers have greater assurance of food safety and quality.

Benefits of Traceability



Suppliers/Manufacturers

- Achieve scalability and efficiency by encoding products once for all customers
- Protect brand reputation



Distributors

- Gain greater inventory control
- Avoid waste



Operators

- Receive products with longer shelf lives
- Track expired products more readily
- Assure greater food safety for consumers



“Blockchain and other technologies don't change the fact that you need GS1 standards. As trading partners, we still need to have and use one language.”

Lucelena Angarita,
Director of Supply Chain Systems and Standards, IPC

The Subway map

The Subway journey to end-to-end traceability has not been without its challenges, but Angarita offers a map of lessons learned to achieve success. For many stakeholders in the foodservice industry, it may start as it did with IPC—with launching a data quality initiative—and getting expert help and advice from GS1 US and other foodservice professionals.

- 1. Just get started.** Don't wait until you have 100 percent perfect barcodes.
- 2. Don't try to reinvent the wheel** or come up with your own requirements. Tap into talent at GS1 US and use their data quality guidance documents.
- 3. We're here to implement supply chain visibility** as an industry. Take advantage of industry collaboration opportunities to learn and share best practices.
- 4. What gets measured, gets done.** Outline your requirements and expectations for trading partners. Regular communications among all players is also important.
- 5. Celebrate small wins.** Show progress. Let people see that “Hey, all this effort, it's becoming a reality.”

Ahead on the track

Just as IPC is always looking for inventive and appealing products for its restaurants, it explores new technologies on the horizon, such as blockchain.

“Blockchain and other technologies don't change the fact that you need GS1 standards. As trading partners, we still need to have and use one language,” says Angarita.

And more immediate goals beckon. Rick Buttner, IPC's Senior Director of Supply Chain Operations, concludes, “We envision not only end-to-end traceability, but also whole supply chain transparency. The ability to easily share ingredient, nutritional and allergen information as well as images is invaluable for the brand.”

Learn more

Visit www.gs1us.org/foodservice.



About the Foodservice GS1 US Standards Initiative

The Foodservice GS1 US Standards Initiative represents a broad cross section of industry trading partners. Today, 132 manufacturers, distributors, brokers, operators, industry associations, government agencies, logistics, and technology providers are participating members in initiative activities focused on improving transparency, operational efficiencies, traceability, and food safety with GS1 Standards. www.gs1us.org/foodservice/initiative

GS1 US National Data Quality Program

The GS1 US National Data Quality Program provides organizations with a comprehensive approach to data quality. It includes support with validating the data governance process, confirming that proper education and training protocols are in place, and how to conduct regular attribute audits. www.gs1us.org/dataquality

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“ We envision not only end-to-end traceability, but also whole supply chain transparency. The ability to easily share ingredient, nutritional and allergen information as well as images is invaluable for the brand.”

Rick Buttner,
Senior Director of Supply Chain Operations, IPC



About the organisations



Subway offers a fresh alternative to traditional fast food, serving 7 million made-to-order sandwiches a day. Guests choose from over 4.9 billion combinations of quality proteins, fresh vegetables, and bread baked daily in the US. The world's largest restaurant chain serves nutritious options and delicious subs, soups, and salads at about 44,000 restaurants in more than 100 countries. The Subway experience is also delivered online at Subway.com, through **Subway.com/Delivers**, and the Subway® App, available at the Apple App Store and Google Play.

Founded by then 17-year-old Fred DeLuca and family friend Dr. Peter Buck more than 52 years ago, Subway is still a family-owned business, working with more than 21,000 dedicated franchisees in communities around the world.



Independent Purchasing Cooperative

IPC is an independent Subway® franchisee-owned and operated purchasing cooperative. The company works with Franchise World Headquarters LLC (FWH) to negotiate the lowest costs for purchased goods and services, while improving quality, enhancing competitiveness and ensuring the best value to Subway® members and their customers. Started by North American Subway® franchisees in September 1996, IPC has experienced international expansion—enjoying a present-day global presence in Europe (IPC Europe), Latin America and the Caribbean (IPC Latin America & Caribbean), Australia & Asia (IPC Asia Pacific), and the Middle East (IPC Middle East & Africa). IPC is a member of the Foodservice GS1 US Standards Initiative. www.ipcoop.com



FoodLogiQ

Since 2006, FoodLogiQ has been developing solutions that meet the increasingly complex global food chain issues and vast web of regulations that face all modern food companies. Its mission is to map the world's food chain, make it as safe as possible, and empower people to make informed decisions about the food they eat. FoodLogiQ tracks millions of data points every day and connect thousands of food companies around the world. The company's technology enables supplier management, food safety compliance, quality incident management, recall management, and whole chain traceability – all on a single platform built exclusively for the food industry. www.foodlogiq.com



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About GS1

GS1 is a neutral not-for-profit organisation that develops and maintains the most widely used global standards for efficient business communication. We are best known for the barcode, named by the BBC as one of “the 50 things that made the world economy”. GS1 standards improve the efficiency, safety and visibility of supply chains across physical and digital channels in 25 sectors. Our scale and reach – local Member Organisations in more than 100 countries, 2 million user companies and 6 billion transactions every day – help ensure that GS1 standards create a common language that supports systems and processes across the globe.

Find out more at www.gs1.org

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