GS1 ®

in Europe

Best practices for improving the quality of Bar codes at the Point-of sale

Improving the efficiency of the Supply Chain.

Table of contents

1   Introduction

Hundreds of thousands of companies around the world rely on GS1 standards to conduct business and meet consumers' expectations. That means that if a bar code cannot be properly decoded it's more than just time at the cash register or the warehouse that is lost.

Today, 100% reliable GS1 BarCodes are an absolutely vital part of the supply chain. As a result users around the world increasingly require assurance that products they purchase conforms to GS1 Standards simply because it helps to ensure better reading rates, accuracy and efficiency.

1.1   Scope and Purpose

This document provides relevant information and the framework for those MOs willing to start a national program on Bar code quality at the point of sale. This will include information and guidance on:

■   Why bar code quality at the point of sale is important

■   Benefits for all the involved parties

■   Most common problems to bar cod quality

■   Best practices from the MOs

■   National business cases and quality assurance programs

2   Target Audience

The Target Audience are those GS1 Member Organisations that are considering or have decided to start a program to improve the Bar code quality at the point-of-sale. This document is meant to provide the initial information that is needed and experiences from other MOs, but it certainly requires to be adjusted to the needs of each market.

3   Benefits of Bar code quality

The biggest benefit of bar code quality is, simply, reassurance and confidence that the bar code will perform as intended at all stages of the product's passage down the supply chain, leading to untroubled supplier-customer relationships and excellent operational efficiency.

Additional benefits accrue to the symbol producer, who is able to make use of the measurement information on the symbols he is producing to monitor his production process and adjust his equipment or procedures in order to correct any deviations from his optimum quality. Package designers can use feedback from verification to make sure that symbol size, position and colour will not result in point-of-use difficulties.

The receiver of bar coded products will also gain advantage from good quality of incoming bar codes, in assessing the likelihood of their causing scanning problems in handling and inventory control systems, or at the point of sale.

3.1 Manufactures and Retailers

The main benefits for Manufacturers and retailes are:

- More efficient supply chain
- No loss of sales due to poor scanning and consequent loss of sales data
- Better quality bar codes improving scan rates
- Correct bar codes and therefore correct data in systems
- Faster product to market
- No penalties, blacklists or product delisting from retailers
- Improved customer relationships
- Scannable bar codes facilitate accurate, real time stock management

3.2 Final consumers

The main benefits for final consumers are:

- Less waiting time in the line
- As bar code scan rates improve, data does not have to be manually entered which could lead to delays, errors, customer queue build-ups, man hours lost and money wasted
- Fast and accurate data capture at every point of the supply chain, including goods receiving, warehousing, picking, despatch and point-of-sale information

3.3 GS1 Member Organisations

The main benefits for GS1 MOs are:

- Relevant player for the key stakeholders, especially the retailer side.
- Better member relationship if bar codes are used and scanned correctly.
- Improve the efficiency of the whole supply chain.
- Provide guidance on how to avoid the most common problems.

4 Best practices from MOs

Chapter 5 contains the details of the national programs lead by MOs in Bar code quality at POS. They show different best practices that can be used by MOs to start the project at national level.

The are some key elements to succeed in this project according to the results of the national projects that they are important to highlight:

■ Education & training
Knowledge about barcode production within companies is crucial in order to produce good quality barcodes from the beginning. Trainings or information about how to create good barcodes should be offered to all new GS1 members. Regular communication in the market is needed as a reminder since staff within companies changes.

■ Initial verification of new barcodes
Verification of barcodes before the products enter the market helps to ensure good quality at POS from the beginning and thus to avoid loss of efficiency later in the process.

■ Regular assessment of the bar code quality
The regular assessment is very important since it will allow to create awareness on the current situation among your members. This can be done by analyzing some of the barcodes of real products at the point-of-sale in different stores by the MOs or by an external agency that identifies every time a product is not scanned and how errors are handled.

■ Identify the categories/environement where there is more room for improvement
Establish a specific work plan for those type of product that have less quality in the barcodes and create awareness on the importance to improve the data quality.

■ Envolvement of the key stakeholders.
The envolvement of the key stakeholders is very important for the success of the projects. Some MOs have decided to create a task force/work group with suppliers and retailers to jointly assess the quality of the barcodes and work together to improve it.

■ Establish a set of KPIs.
These KPIs will allow to assess and measure the current situation and monitor the evolution across time. The KPIs can be measured by testing real products in the stores or by capturing the data automatically at the Point-of-sales systems.

■ Convert the measurments into savings
At the end, companies are relying to see benefits in terms of savings to calculate their ROI to participate in the project. There are differents factors that need to be taken into account when calculating them: loss of sales, loss of time at the POS, …

■ Communication
Use the regular communication channels to share the benefits and the results with the whole community. Stress the importance of the Master Data Alignment process, the maintenance of printing equipments, the symbol placement rules, …

5 Business cases and Quality Assurance Programs from GS1 in Europe MOs

5.1 GS1 Slovakia – Findings on GS1 BarCode Quality

<u>Monitoring POS check outs</u>

The aim of this initiative was to gather data from our local market in other to be able to justify a need for any further activities. Initially we tried to measure scanning time which was not possible as scanning only takes fraction of a second. Therefore we measured time from the moment when cashier picks up the product and passes it to a customer.

The research showed that scanning (processing time) also depends on the bar code quality.

- Bar codes of acceptable quality can be processed in 1,46 seconds. This means pick up, scan and pass over.
- Bar codes of lower quality can be processed in 5,64 seconds. This requires some manipulation with a product such as turning a bar code in a different angle.
- Bar codes which have to be key entered manually takes 12+ seconds.
- Just for illustration manual key entry of PLU takes 5,41 seconds.

<u>Questionnaires</u>

We simply asked cashiers to fill in a table in which they put GTINs of bar codes they have to key enter. The cashiers are the ones who know best what products cause problems on regular bases. Within a week cashiers from 28 retail stores reported 371 non readable barcodes. The retailer dealt with the suppliers according to our recommendation.

<u>On site verification</u>

Verifications done in a retail stores in 2009 and 2011 show very similar results.

During 2011 we also measured bar codes which passed on print quality but failed on bar code height. On height 86,74% of bar codes failed. Which leads to a conclusion that the graphics designers are the ones who influence bar code quality more significantly than printing houses.

	2009	**2011**
Pass	4,57%	8,03%
Pass with exception[1]	4,24%	-
Fail	91,19%	91,97%

<u>What is in verification for GS1 Slovakia</u>

---

[1] If bar code passed print quality but was truncated by 3 mm.

Verification process includes GTIN validity. During on site verification we have access to products sold in retail stores and therefore can compare results with our membership database. We found several companies who did not have right to use GTINs due to terminated contracts. Invalid GTINs from other MOs were submitted according to GCP to the relevant MOs.

5.2 GS1 Spain – Good GS1 Barcodes Symbols improve efficiency

Over 107 Million Euros in savings for the Spanish industry since 2010

Synopsis

In June 2009, the Identification and Electronic Commerce Committee decide to launch a Working Group to improve the efficiency in the check-out process in the stores and the process of goods in the warehouse environment. One of the key elements to work is the quality of Barcodes in all the different steps of the supply chain in order to achieve fast and sustainable results and improve all the process related to them.

The quality of the barcode is very important in the check-out process since the final consumer decides not to buy 1%[2] of the product that can not be scanned, loosing sales opportunities. Furthermore, every time a barcode is not scanned, the cashier spends in average 23 seconds to solve the issue, leading spend unnecessary resources. The potential savings when the project started in 2009 were almost 90 M €/year.

The savings achieved since the Working Group started are estimated in 107 M Euros, 40M € in 2010 and 67M € in 2011. The quality of the barcodes at point-of-sale increased from 95% in January 2010 up to 99% in January 2012. The results provided are based on statics about over 90 Millions scans at the point of sale and in the warehouse environment. KPIs are tracked quarterly with all the data collected from the retailers.

The retailers involved in the Working Group and GS1 Spain established a common process to measure the established KPIs, identify the suppliers and products with poor barcode quality and approach them in order to provide the correct support to solve the issue identified.

Main benefits in the implementation of the project for all the parties involved in the project:
- Increase sales.
- Improve the efficiency and productivity at point-of-sale: faster check-out process and less time spent on keying data.
- Increased inventory accuracy and sales forecasting
- Improve final consumer satisfaction and reduce frustration since it reduces the time to cross the point-of-sale and unnecessary waiting time in the lines.
- Strength the relationship of GS1 Spain with key retailers and provide additional services to our members.

Companies involved

---

[2] Source: GS1 France

GS1 Spain has more than 650 professionals involved in the different committees and working groups. Committees and Working Groups of GS1 Spain are formed by retailers and suppliers like: El Corte Inglés, Carrefour, Alcampo(Auchan), Mercadona, Procter&Gamble, Nestlé, Henkel, Unilever, ... and many others

The specific working group was established in June 2009 to address this specific topic and monitor its progress with the involvement of the biggest retailers in Spain.

The role of the retailers has been key in all this process since they automatically provide real data from point-of-sale scanning and allow GS1 Spain to test real products in the stores and warehouses.

Results achieved

The working group established 3 clear KPIs to measure the effectiveness of the work done: barcodes that can be read at the point-of-sale, barcodes that are read at the firs-attempt at the point of-sale and barcodes that are read in warehouses. Since the beginning of the project, the KPIs improved.

GS1 Spain collects real data from the stores every month and retailers provide the data that they get from their point-of-sales systems to:
- Measure the agreed KPIs
- Identify those items that were not scanned correctly and proactively approach the supplier to provide support to remedy the issues identified
- Identify re-sellers and users of non-assigned GS1 Prefixes.

The results provided are based on statics about over 90 Millions scans at the point of sale and the warehouse environment. KPIs are tracked quarterly with all the data collected from the retailers.

	2009	2010	2011
% Barcodes read at Point of sale	95,34%	97,43%	98,99%
% Barcodes read in the first attempt	87,05%	95,76%	97,71%
% Barcodes read in the Warehouse	79,88%	83,28%	89,03%
Savings in Euros per year	Baseline	47 M €	60 M €

In addition to the results achieved, the barcode quality project brings additional value for GS1 Spain:
- How GS1 Spain can add value to their members using GS1 Barcode Standards
- The collaboration between Manufacturers and retailers to achieve a common Goal and work for the efficiency of the Supply Chain.
- How to get enormous directs benefits and savings for the whole sector.
- GS1 Spain serves big companies as well as SMEs, main focus at the moment is also to speed up the time-to-market for those SMEs joining GS1 Spain.

5.3   GS1 Sweden - Barcode Quality in stores

Goal

The aim of the study was to identify the proportion of products that can be scanned correctly at the checkout at the first attempt.

What should the study highlight?

- The number of products that failed a scan at the checkout at a first attempt
- The number of products with bar codes that could not be scanned
- The number of products where more than one attempt is needed to scan the product
- If the location of the bar code requires the cashiers to perform extra steps
- The number of products where the GTIN and details in the cash register do not match
- If scanning problems are more common in certain categories
- Come up with proposals for action in areas where there is a clear problem

Working group

A working group consisting of representatives from ICA, COOP, Axfood and GS1 has led the study. Lars Bernhardsson from SSC was contracted as project manager.

Method and implementation

The method chosen was to scan in three stores (one COOP, one ICA and one Hemköp) one package of every item in the store.

The stores were of different formats. COOP's shop was a COOP Forum, ICA's a Kvantum and Axfood a Hemköp.

In total 44,000 items were scanned. COOP Forum just over 18,000 items, ICA Kvantum nearly 16,000 and Hemköp nearly 10,000.

The group chose to use agency personnel at the checkout. The intention was that these staff, who were not used to checkout tasks, would follow the common instructions that supervisors gave at the three stores. Our aim was to have similar working methods in all three stores. The checkouts in the stores where the study was conducted had all the most common type of equipment for each chain.

The checkout operations were filmed so that the group would get an idea of how errors were handled and how long it took to solve a problem at the checkout. This study has been verified against a study done in France and showed that the time required to correct errors is similar to Sweden.

Items that could not be scanned at the first attempt were classified into different groups. The following classification was used:

- Items which needed to be at an angle in order to be scanned
- Manipulation in order to be scanned, such as the bar code completely or partly concealed under a flap or the package needed to be stretched.
- More than one barcode. What should I as a cashier scan?
- Unreadable - barcode of such poor quality that it could not be scanned and the cashier either needed to key in the article number or to call for help to solve the problem. A common solution is to ask the customer what the product costs and then applies a conservative pricing with loss of gross margin as a result.
- Items that missing in the back office system. The cashier solves this either by calling for help or asking the customer in the same way as above.

The measurement was carried out in May and June 2011.

Results

The results of the study are only reported in total. Each retailer has received their own data.

Reason	Count	%
Needed angling	550	1.2%
Manipulation	264	0.6%
More than one barcode	31	0.007%
Unreadable	745	1.7%
Total	1590	3.6%

The groups "needed angling" and "manipulation" can be seen as one group since the division between manipulation and a product that needs to be angled is sometimes subtle.

The real issue, of course, is "Unreadable". 1.7% of the scanned items were unreadable.

Information relating to products missing in the back office system has only been reported to each chain since it involves internal quality defects.

Categories with challenges

Categories where we found most challenges regarding barcode quality were:
- Fine chemicals (generally items that are small or difficult to label with bar code directly on the product)
- Newspapers
- Fresh Foods (Meat & charcuterie and fruit & veg)
- Some parts of hard lines

At COOP 40 suppliers accounted for almost 70% of the problems with unreadable barcodes by volume. Almost half of the problems were with fresh produce which included fruit and veg as well as meat and charcuterie. In addition, some suppliers are well-

represented in that category. Thus, we can isolate the problem to a smaller number of suppliers.

Another breakdown is that we see a higher proportion of challenges with the locally-sourced range. However, it is worth emphasizing that these items, even if they are many in number, represent a small fraction of the total volume.

Of the problems with unreadable bar codes that we found at ICA, only one-third were in the so-called central range. This figure reflects the challenges in a different way.

In summary it can be stated that 40% of the problems are related to the products in fresh produce, 40% groceries, non-food 10% and frozen 5%.
One can generally say that 20% of the number of unreadable articles account for over 90% of the volume.

The local range consists of a wide variety items spanning many categories. However, again there were problems with barcodes mainly in fresh produce, specialty and fine chemicals.

Quality defect costs

Assuming that the same problem arises in all stores when scanning, poor quality would cost some MSEK 208 for unreadable barcodes and MSEK 216 overall. These quality costs relate to the entire grocery retail industry in Sweden.

We have taken a period of 20 seconds to remedy the problem with an unreadable barcode and 5 seconds for other problems.

Wage costs are calculated based on data taken from ICA and COOP.

Correlation between Validoo Q-lab and readability

The problem categories are those where a lower proportion of the products are quality assured through Validoo Q-lab.

The result of the survey is in itself not surprising, nor the conclusion that most of the products with problems come from areas where quality assurance is not frequent.

It is encouraging that the proportion of problems among the suppliers that use Validoo Q-lab is low. One can conclude that Validoo Q-lab raises the quality or preserves the quality of a high level of readability right at the checkout.

International perspective

There is no really good summary of what has been done in different countries, but GS1 Sweden's firm opinion is that quality in Sweden, in terms of readability, is high.

The results of our study have been reported to the larger GS1 organizations in Europe and they share our view that the problem rate is low in Sweden. Only France believes that they have a lower level. Their measurements show 0.4% versus our 1.7%. However, the controlled range was slightly different.

Conclusions and proposals for action

The conclusion is that problems with bar codes in Swedish retail are at a low level – meaning that the barcode is "unreadable" – even in an international comparison.

However, there are a number of areas where improvements can be made.

Generally, there are some areas where we need to point out the details, such as barcode placement, for example that it is not placed on joints or covered. Here we have the biggest problem if we count volumes. It increases the cost to the store of handling the product. GS1 will be clarifying this information in courses, online and in other communications. There will also be easy to understand material that can be made available to retailers who, in turn, can use it in their communications with suppliers.

Local products, where the store itself made the decision to buy the product, will require the chains to provide information on barcodes and barcode quality. It is the group's firm belief that the merchant or store manager has a clear vision of the quality costs incurred by poor quality bar codes. However, there should, as mentioned above, be material when negotiating for new products in store, which can be shared with local suppliers. They can also be informed of the possibility to verify the barcode through Validoo's service.

Other categories with a high proportion of problems are those where suppliers can be reached by category organization of the respective retailer as well as through targeted information from GS1. GS1 intends to target information for them.

Each retailer has a list of suppliers where there is a high level of problems. Companies should draw attention to this using the ongoing contact they have with suppliers.

This applies particularly to *fresh produce* and fruit and veg. GS1 Sweden for its part, offers to participate in reviews and other kinds of internal meetings with fresh produce and fruit and vegetable associations of the respective retailers.

Fine chemicals and specialty providers have some other challenges that emerged in the study including the placement of bar code on small items and products that are not in a package (e.g. sunglasses). Here GS1 guidelines need to be clarified for the companies concerned.

Media Industry challenges arise completely from packaging issues and can be solved through the contacts that exist between retailers and media companies.
In summary, the respective retailers need to develop their own concrete action plans.

GS1 for their part undertakes to review its information so that the above problem areas and solutions are clearly visible in our information. Regarding the local range, we will design materials that can be used by store personnel.

5.4   GS1 Poland – Barcode Quality Programme

Barcode quality programme in Poland is a project addressed to retailers and cash&carry operating on the Polish market. Its aim is to build a close cooperation between GS1 Poland, retailers and their suppliers to eliminate incorrect labeled products from the logistics chain, including the shelves. The project has been implemented by GS1 Poland for 5 years and now includes several major retailers operating in Poland, both from the FMCG and the DIY sector (including Real, Tesco, Leroy Merlin, Castor and many others). The program is realized by:

- barcodes quality control on packaging existing on the market – "on the shelf" or in warehouses,
- barcodes quality verification on packaging projects or finished products in the GS1 Poland laboratory,
- audits of barcode quality in retailers distribution centers,
- educational activities such the seminars, training, publications, etc.

The additional benefit of the project is the ability to carry out verification of the quality and legality of the GTIN databases at retailers.

As a result of this cooperation retailers gain increase customer service levels by:
- reduced service time at cash desks,
- efficient use of AIDC systems, eg. price checkers or self-service cash desks,
- improving procurement processes, incoming goods and product inventory,
- use of solutions based on mobile technologies,
- build suppliers and retailers awareness about the bar codes quality and perception of GS1 Poland as an expert in this field,
- improve customer service by reducing the selling time at cash desks, by reducing the number of codes / GTINs entered manually, or those that need contact with an employee of the department or customer service point to confirm,
- improve customer service by reducing the financial losses associated with the resignation of purchases (leaving products without codes),
- reduce operating costs associated with products relabeling, incorrect barcoded, or without barcode,
- ability to effectively use ADC technologies to verify the prices, realize warehouse processes, inventory, etc.
- graphical and qualitative changes (type of packaging, labeling) previously validated in thousands of products and ongoing advisory and phone consultancy,
- changes in the procedures at the retailers in area of care on barcodes quality and processes for their verification (including trade agreements),
- purchase of new equipment, cash registers, verifiers, scales.

Some figures:
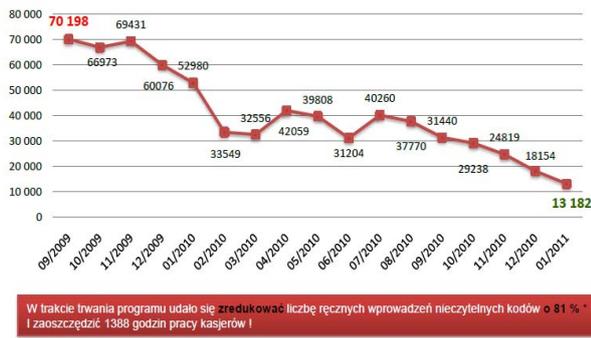
The data from retailers:

Cashiers manually introduced reference number or GTIN **620 000 times** during the month. It takes about 10 seconds of manual entries of GTIN and 1722 work hours per month – **over 10 employees**.

Retailer A:
- 448 products generate **1.2 million** of manual entries (within 3 months),
- 235 products verified by GS1 Poland indicating ways to barcode improvement and it should reduced by **830 000** entries.

Retailer B:
- 618 products generate **2.4 million** of manual entries (within 3 months),
- 319 products verified by GS1 Poland indicating ways to barcode improvement and it should reduced by **1.8 million** entries.

Retailer C:
- 315 products generating **72 000** of manual entries (during the week),
- 213 products verified by GS1 Poland indicating ways to barcode improvement and it should reduced by **53 000** entries.

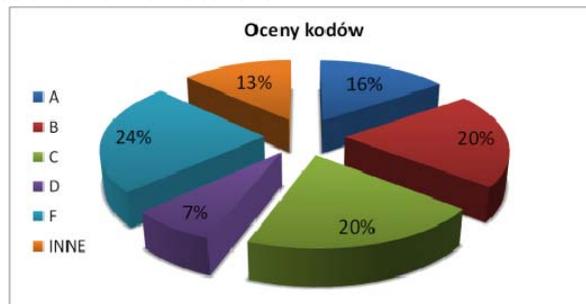Barcode quality was tested for a 10 retaiers:

Retailers involved in barcode quality programme (with the number of products selected for the test):

Retailer	Year		
	2010	**2011**	**2012**

			(1st half)
Auchan Polska Sp. z o.o.		447	
Carrefour Polska Sp. z o.o.		617	411
Castorama Polska Sp. z.o.o			279
Intermarche SCA PR		45	
Jeronimo Martins Dystrybucja / Jeronimo Martins Poland	92	137	76
Leroy Merlin Sp. z.o.o.	1033	1236	195
Makro Cash and Carry Polska	311	444	82
Nomi SA			
Praktiker Polska Sp. z o.o.	365	451	15
PSS Społem Katowice		28	
REAL Sp. z o.o. i Sp.k		41	
Stokrotka Sp. z o.o.			631
TESCO Polska Sp. z o.o.		314	
Total from retailers:	**1801**	**3760**	**1689**
Average / retailer	**450**	**376**	**241**
TOTAL:	**4**	**10**	**7**

Number of the barcodes identified by GS1 Poland employees on shelves in shops:

	Year		
	2010	2011	2012
Number of revised barcodes "on the shelf"	504	580	300

Number of barcodes verified at GS1 Poland laboratory:

	Year		
	2010	2011	2012 (1st half)
Number of revised codes	3564	5019	3345
Number of paid verification	1980	2262	1371
Number of free of charge verifications	1584	2757	1974
Number of opinions	502	740	492

Liczba zweryfikowanych kodów w laboratorium ILiM
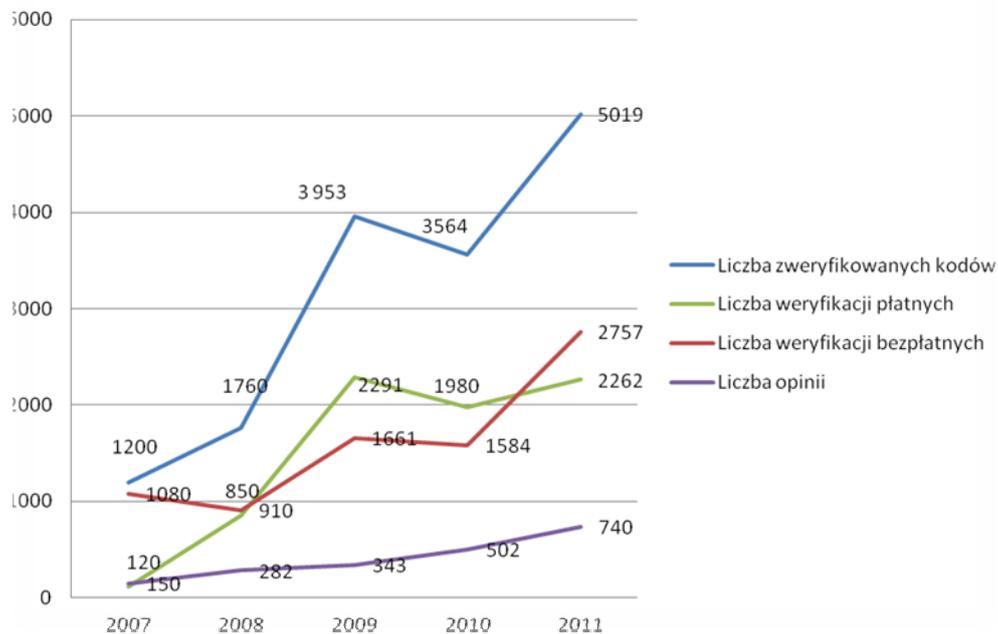
5.5 GS1 Czech Republic – Barcodes quality

In Czech Republic the barcodes quality has always been considered as a basic foundation of the fast developing GS1 System. The inspections were realized continuously, mostly in accordance with the users, as a specifically tailored service.

Various surveys which were performed by the end of the last decade in different countries clearly showed that a low quality of barcodes is one of the main causes of significant economic and time losses – and this, in all areas of the supply chains. A typical example, which is easily observed, is a reduced efficiency on the payment terminals especially in large retailer shops. Some major players in the retailer´s field have already taken full measure of the seriousness of the situation and have become a leading power towards the preparation of a modified approach to solve this issue.

A fundamental change to the quality control of EAN/UPC symbols dates back to the year 2009-2010. In 2010, the first agreement for mutual long-term and systematic inspection on the premises of one of Prague's hypermarkets was launched. In the following years/months, we can already talk about it as a regular activity, with an expanded portfolio of major retailers who accepted our help regarding quality control.

The common gradual scheme of solutions to poor quality barcodes is presented as follows:
- Acceptance of a basic database of inoperable or partly dysfunctional symbols of consumer units (i.e. bar code has to be mostly entered on the payment terminals manually) actually sold by retailer.

- The modification of this database. It means, in relation to the frequency of errors and, in agreement with the partner, consequent decision regarding the total volume of the controlled portfolio.
- The first quality control of symbols always takes place on the premises of business partner using calibrated equipment REA ScanCheck 3. The result of this phase is a database of specific quality measurements and detailed photo documentation of tested products.
- Mutual reactivity between GS1 Czech Republic and the business partner, mostly under the form of official correspondence, addressed to every supplier of poor quality identification including detailed explanation of identified problems and a help scheme. The help scheme offers now a wide range of possibilities: a telephone consultations (i.e. phone customer service), a wide range of trainings for responsible workers/people in charge, also trainings for a graphic designers and/or independent art-studios, the first visual control of a new graphic artworks, preparation of protocols, etc.
- Active assistance in correcting defects - if needed.
- Second round of quality control.
- Evaluation of good performance of the second round; potential identifications of persisting problematic points.
- If the mistakes persist, second wave of correspondence to solve the issue. The issuer of erroneous codes is mostly obliged to ask for a final quality certificate from GS1 Czech Republic in this phase.
- Evaluation of overall results.

It is clear, that a long-term action of this type is not possible without a close cooperation between the partners. However, it is only up to the retailer to decide about the rate of the pressure on issuers of incorrect barcodes, especially in case, that the first part of the inspections did not allow a significant correction.

To support this scheme of operation, GS1 Czech Republic has prepared the following possibilities for the users of GS1 System:
- GS1 Czech Republic website www.gs1cz.org – contains a wide range of materials regarding the quality of symbols in Czech.
- Since 2011, new training portal is available, www.gs1akademie.cz – complete new set of planned trainings, professional articles regarding the topics, etc. We arranged a significant increase of number of planned presentations containing "Basic knowledge of the GS1 System" and "The quality of bar codes" from which all customers can benefit.
- The first basic training for new users of GS1 System has been made compulsory from 2011.
- Series of special trainings intended for graphic designers and graphic studios have been made possible also thanks to the close cooperation with SYBA – Czech Packaging Association

The specific output of the systematic quality control of symbols EAN/UPC.

2012: Retailer Nr. 1

FMCG + non food - 2012	pc products	%
Number of controlled products	194	
Non decodable	16	8,2
Quality 0 (ANSI F)	117	60,3
Quality 1 (ANSI D)	3	1,5
Quality 2 (ANSI C)	10	5,2
Quality 3 (ANSI B)	22	11,3
Quality 4 (ANSI A)	26	13,4

With this partner we started checking the full range of FMCG, coupled with a variety of non-foods. An insufficient quality was confirmed at 70% of items. The controlled range of "non-food" has contributed to lower quality rating very significantly (8.2%). In this case we can expect more results during the first half of the year 2013.

2011 - 2012: Retailer Nr. 2

Milk products - 2012	pc products	%
Number of controlled products	257	
Non decodable	2	0,8
Quality 0 (ANSI F)	96	37,4
Quality 1 (ANSI D)	17	6,6
Quality 2 (ANSI C)	31	12,1
Quality 3 (ANSI B)	66	25,7
Quality 4 (ANSI A)	45	17,5

With this partner were checked two kinds of areas:
- The inspection was focused on a selected range of dairy products, which were chosen from the database of items with troubles on payment terminals. The first result is a confirmation of unsatisfactory barcodes in the range of about 45% of controlled symbols. The results of the second round are expected in period II. Q. 2013.

Private Labels - 2011	pc products	%
Number of controlled products	382	
Non decodable	8	2,1
Quality 0 (ANSI F)	118	30,9
Quality 1 (ANSI D)	13	3,4
Quality 2 (ANSI C)	60	15,7
Quality 3 (ANSI B)	94	24,6
Quality 4 (ANSI A)	89	23,3

- The second area of the inspections related to the partner's private labels.
  Despite the fact that this retailer is paying a lot of attention to the new wraps and

packaging materials carrying his private labels, the quantity of symbols that did not meet the minimum requirements specified in ISO / IEC 15416th was 35%.

2010 – 2011: Retailer Nr. 3

FMCG - 2010 - 2011	2010	%	2011	%
Number of controlled products	435		384	
Non decodable	11	**2,5**	6	**1,4**
Quality 0 (ANSI F)	356	**80,4**	149	**33,6**
Quality 1 (ANSI D)	3	**0,7**	23	**5,2**
Quality 2 (ANSI C)	16	**3,6**	39	**8,8**
Quality 3 (ANSI B)	29	**6,5**	71	**16,0**
Quality 4 (ANSI A)	20	**4,5**	96	**21,6**

It was confirmed, that a portfolio of low-quality barcodes checked from chosen database was 83.8%.

The result after the second round of measurement is to improve the condition in 54.3% of controlled products!

Very fundamental problem shows a massive reduction of heights of symbols, even in cases, when there was not a lack of space for the identification. This problem occurs in up to 80% of inspected products, from which at least 30% represents more than 50% reduction below the minimum allowed height.

Conclusions after the second round of checks

Main conditions:
Controlled range of goods: FMCG
Number of retailer´s cash terminals: 40
The average running time of a single POS/day: 10 hours.
Turnover: an average of 250 000 items/day
The overall percentage of unscannable symbols: 1.4%
Time to check of single item on POS: an estimated 3-5 s
Time required to check unscannable symbol on POS: 5x longer – i.e. min. 25 s
Number of unscannable items/day: 3500 pcs
Total time required to solve the scanning troubles: 24 hrs. /day

Result: In the current state of quality of barcodes approximately 2 terminals in every hypermarket are in operation only for solving troubles!

Comparison of identical items

Measurement results	total	products	%
Improvement (achieved Quality 2, 3 or 4)	300	163	**54,3**
Improvement (still below the limit according to ISO)	300	17	**5,7**
The same	300	105	**35,0**
Deterioration	300	10	**3,3**
Others (new or discarded products)	300	5	**1,7**

The results show a real improvement in the matching items in the range of 54.3%. In 6% of the cases were registered partial improvement, but still not sufficient in relation to the minimum requirement of 1.5 (ANSI C). Remaining quantity of unimproved items stayed unchanged (35%) because of either of lack of interest, or very high level of old packaging materials in store etc.

General conclusions of the quality control

It can be concluded that a focused approach to the issue of quality barcodes brings significant improvement. At the same time we have new information and experiences, in some cases even astonishing:

- A good cooperation with senior management of business partners is absolutely essential for a high-quality course of actions. At first, **the appropriate partner has to be willing and to be interested in solving problems**, which, at a first sight, could not seem important to some managers. He shall be able to co-operate for a long time and actively support the work. It should be noted that the impact of ongoing verification of barcodes in supermarket operation, even at times of high workload, is minimal.
- The supposition of a still very low know-how regarding the basic functioning of GS1 System, even among staff responsible for databases in their organizations has been proved.
- The graphic studios, ateliers, independent art-designers are largely a source of significant problems, apparently due to lack of basic knowledge about the barcodes.

Another unpleasant finding is, that the quality of barcodes outside the most controlled FMCG area is significantly worse.

The ongoing monitoring usually leads our business partners to other consideration and brings up their own conclusions. Here are some of them:
- If the scanner is not able to successfully decode the symbol, the cashiers are trying to repeat scanning with more sensitive hand-reader. If this attempt is successful, the average delay can be approximately 10 seconds.
- Any manual input of numerical sequence which follows an unsuccessful manual scanning extends check-in for another 30 seconds.
- The time loss related to a cashier´s call to the center for the correct numerical formation is not estimated, but may range to a few full minutes.

- The loss regarding the customer´s dissatisfaction caused by an unnecessary waiting, wasted time etc. is immeasurable.

Manually entering of numerical codes means useless work in the range of hours per shift in each individual store. It means, that at least one terminal always works "for the manual entering codes only!"

A very surprising findings shows that an "adapting" ability of cashiers, who are "used" to work with broken barcodes, leads to some kind of ignorance; they do not even point out this serious issue. It means that the situation could be evaluated as "everything is working smoothly" – when it's not the case.

GS1 Czech Republic will continue with systematic quality control through next years and will repeat an intensive efforts to develop a closer contact with other key business players on the Czech market, in an effort to improve the whole situation.

5.6   GS1 Germany – Barcode Quality Assurance Programme

Free barcode verification for new members
GS1 Germany offers each new GS1 member free verification of 3 GS1 barcodes. 291 barcodes have been verified in this way within the last two years.

Barcode verification program
GS1 Germany has established a general verification service for all GS1 Germany members and companies for all types of GS1 barcodes. If this service is not requested by new members (for whom the service is free) the service is charged per barcode. In 2012 208 EAN-13/EAN-8/UPC barcodes have been verified, 88 GS1-128 lables and 41 GS1 DataMatrix Codes.

Creation of EPS files and verification
GS1 Germany offers to create EPS files for GS1 members and companies. This service is charged per EPS file. All dimension data is controlled to ensure the correct file for the application. In addition free verification is offered for the printed barcode. In 2012 about 3000 EPS files have been created. As a new service GS1 Germany offers to deliver printed barcodes labels (so far only for EAN/UPC barcodes). This ensures good quality barcodes on the final product/item.

Monthly training
GS1 Germany offers an EAN-13 seminar at GS1 Germany premises each month. New members get a discount to attend this seminar and can have their barcodes tested while being trained. Production of EAN barcodes and quality is integral part of this training.

Communication
As GS1 Germany considers quality as one the most important topics related to EAN/UPC barcodes we communicate regularly by following media:

- GS1 Germany Flyer specifically on Quality of Barcodes. It is distributed on fairs, events, meetings etc.
- GS1 Germany magazine
- GS1 Germany Newsletter
- External magazines
- GS1 Germany Website

It is recognized that staff responsible for creating barcodes within companies changes quite often. Therefore the awareness about barcode production and quality must be constantly renewed.

5.7 GS1 France – Findings of the survey on the quality of Barcodes

Introduction
For over 30 years now, shops and stores have used barcodes in their everyday operations to identify products, manage stock, record sales and increase checkout productivity.
Barcodes enable articles to be individually and automatically managed and help ensure the availability of products on shelves.

As an essential tool on which many in-store processes depend, barcodes have to be reliable. The consequences of a faulty barcode at the checkout are immediate, both for the consumer (loss of time and the risk of receipt errors) and the retailer (brand image). These errors impact on lead time and ultimately can be responsible for empty shelves in stores.

The Survey in Brief

In 2006
GS1 France commissioned SymphonyIRI to conduct an in-store survey designed to identify the different types of problems encountered when barcodes are scanned at store checkouts:
- Frequency of occurrence
- Economic impact on value chain
The survey was conducted in 6 food retailers, in different store formats, at different times of the week and in different regions.

> **The survey revealed one problem in particular with barcode scans:**
> **20% of trolleys, or 1.9% of articles, fail to successfully scan**
> **at the checkout.**

GS1 France presented these findings to manufacturers and retailers, pointing out the importance of observing industry standards and offering them internal audits designed to improve the quality of their barcodes.

In 2011
The survey was re-conducted, again by SymphonyIRI, in 2011. The findings revealed a clear improvement in read rates.
> **8.7% of trolleys, or 0.4% of articles, failed to scan at the checkout.**

Key figures

	2011	2006
	3,374 trolleys (checkout transactions)	2,370 trolleys (checkout transactions)
Number of read problems with at least one product	295 trolleys	504 trolleys
% of total	8.7% of trolleys	21.2% of trolleys
	68,478 articles (checkout transactions)	33,041 articles (checkout transactions)
Number of read problems with at least one product	295 trolleys	623 trolleys
% of total	0.4% of articles	1.9% of articles

Analysis on findings

- **3,374** transactions were observed over a period of 24 days in 12 stores
- Together these transactions comprised **68,478** scanned articles, on weekdays and at weekends, in different store formats and different retail chains.

295 articles showed some problems at checkout, or **0.4 %** of all articles scanned.
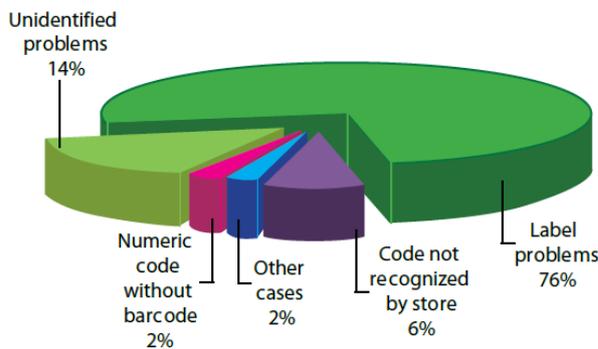
Types of problem encountered

Illegible barcodes: 76% of the problems
Three quarters of the problems are related to the quality of the labels, and especially illegible barcodes. A slight improvement in the barcode read rate can be observed between 2006 and 2011: from **76%** to **85%.**

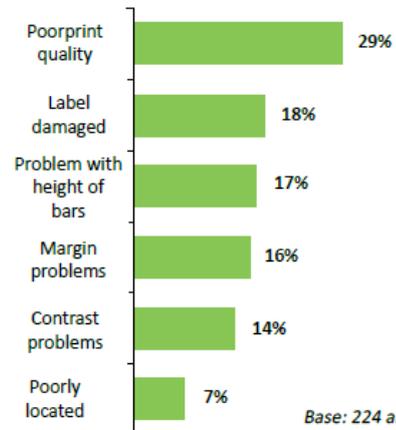There are many reasons for illegible barcodes
- Failure to respect GS1 standards: **37%**
- Poor print quality: **29%**
- Label damaged (wet, torn, etc.): **18%**

Breakdown of problem products by type of problem

Unidentified problems 14%

Numeric code without barcode 2%

Other cases 2%

Code not recognized by store 6%

Label problems 76%

Base: 295 articles

Breakdown of label-related problems by type

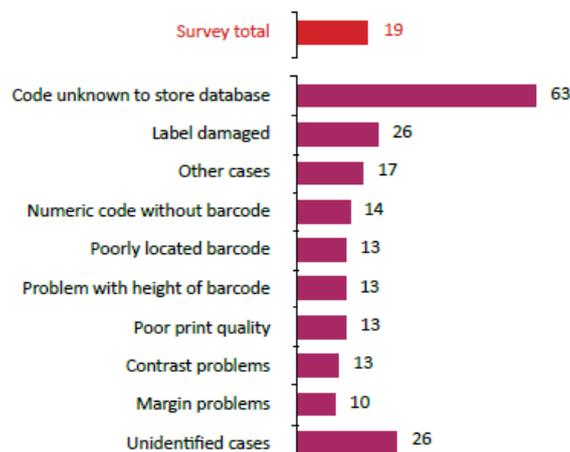| Problem type	Percentage
Poor print quality	29%
Label damaged	18%
Problem with height of bars	17%
Margin problems	16%
Contrast problems	14%
Poorly located	7%

Base: 224 articles

Time spent to rectify problems

On average, a checkout assistant spends **19 seconds** to rectify a read error problem. It represents an improvement of **20 %** compared to 2006, when the average time was **23 seconds**. System searches for unrecognized codes are the most time-consuming problems and also represent the issue with the biggest negative consequences.

Average time spent by checkout assistant to rectify read errors by type of problem (in seconds)

Type of problem	Seconds
Survey total	19
Code unknown to store database	63
Label damaged	26
Other cases	17
Numeric code without barcode	14
Poorly located barcode	13
Problem with height of barcode	13
Poor print quality	13
Contrast problems	13
Margin problems	10
Unidentified cases	26

Base: 245 articles

Individual interviews

The survey was complemented by a series of interviews with 5 checkout assistants and store managers designed to identify the problems and solutions connected with barcode read errors.

What were the principal conclusions of the interviews?

- Dealing with barcode read errors is fairly easy, depending on the information system used by the retailer. Most retailers have a good degree of autonomy when it comes to entering new products in their store management system (and, a fortiori, their checkout management system).
- "Independant" retailers are in charge of their own information system and are free to make changes to their store management software. Retailers whose information systems are part of a "centralized IT system" cannot make changes to their store management software. And this can cause problems when it comes to replenishing products.
- Retailers in direct contact with local suppliers (and who issue orders directly from their stores) find it easier to solve this type of problem - which besides occurs less frequently.
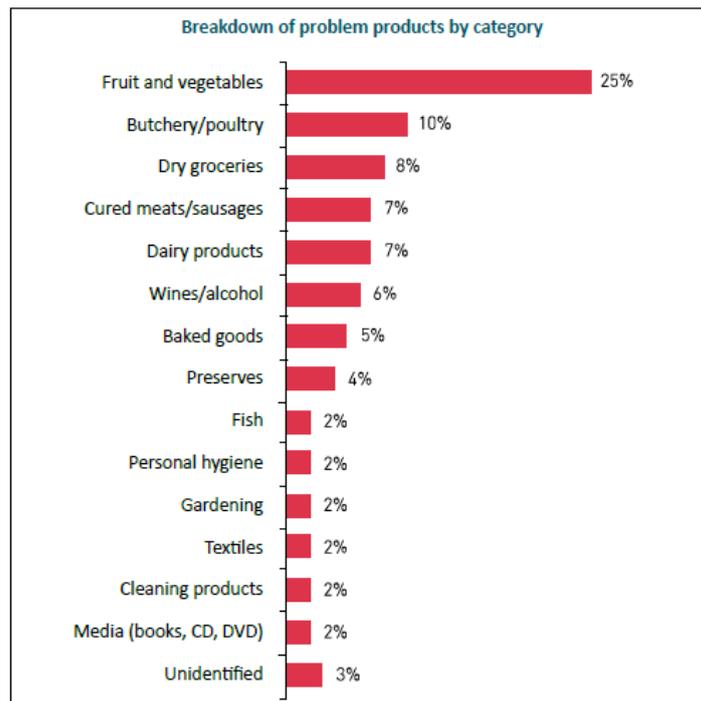
Type of problem by type of organisation

	SURVEY TOTAL	INDEPENDANT	CENTRALIZED
Margin problems (off centre)	12%	12%	12%
Problem with height of barcode (barcode too small, which slows down reading speed)	13 %	15%	2%
Contrast problem (due to colours of label or product)	11%	13%	4%
Bad location (under plastic cover etc.)	5%	5%	2%
Code unknown to store database	6%	5%	14%
Unidentified	14%	11%	26%
Poor print quality (code is "runny" / porous label etc.)	22%	22%	22%
Damaged label (creased / wet)	14%	13%	20%

Categories of products most affected by barcode problems

Certain product categories are more susceptible to barcode read errors at the checkout than others. "Fresh" produce (fruit, vegetables, baked goods, fish, cured meats, cheese etc.) are the biggest culprits:

- The sheer number of national and international suppliers and the frequent change in suppliers, require barcode information to be constantly updated;
- Their packaging can make it difficult to find a suitable place to affix the barcode;
- Problems related to the store's scales, where the manual input of barcode data in scales by the vendor can lead to errors, and frequent disturbance of print heads causes scanning problems.

Breakdown of problem products by category

Category	%
Fruit and vegetables	25%
Butchery/poultry	10%
Dry groceries	8%
Cured meats/sausages	7%
Dairy products	7%
Wines/alcohol	6%
Baked goods	5%
Preserves	4%
Fish	2%
Personal hygiene	2%
Gardening	2%
Textiles	2%
Cleaning products	2%
Media (books, CD, DVD)	2%
Unidentified	3%

82% of read problems concern manufactured products whose barcodes have been affixed in the factory; **18%** of problems are linked to the retailer (products weighed in the store).

Points to bear in mind

Costs associated with checkout read errors

The most visible direct cost is the loss of productivity at the checkout. These costs are estimated at over **12 million euros** every year, in the French FMCG retail market.

With the increased use of self-checkout systems, this problem looks likely to grow. One of its consequences is a deterioration in the retailer's brand image, for a speedy passage through the checkout is an important element in customer satisfaction.

The principal indirect cost is related to the fact that it is impossible to determine which products have been sold, and therefore to know which products need replenishing. And this results in stock outages on the shelves. But it can also lead to overstocking of certain products when the code for another product at the same price is used at the checkout.

The Future

With the development of new applications allowing consumers to scan barcodes with their smartphones, the quality of the barcodes has to be impeccable.

Since many applications use the barcodes now displayed on all consumer products, it is more important than ever for the industry to use high-quality barcodes on the products.

6 Business cases and Quality Assurance Programs from GS1 MOs around the world

6.1 GS1 Australia – Testing Service - Bar Code Verification Reports

Bar Code Testing Service

Suppliers - Don't lose out on sales because your products won't scan
- If you want to sell your products in major retail outlets or healthcare providers in Australia, you will need a GS1 Bar Code on your product packaging
- Your bar code should scan first time, every time. If it does not scan, the retailer will reject your product because it will cause delays at checkouts – no one wins, you both lose out on sales
- When you have a bar code on a product that doesn't scan, even if it is still selling, your sales will not be recorded in the Point-of-Sale (POS) or inventory systems and you won't automatically receive new orders for your product. You lose out on sales once again
- A bar code that scans correctly through the supply chain will help your product reach the shelf on time
- If your bar code doesn't scan, you will have to take corrective action, including re-packaging or over-labelling of your product, potentially causing thousands of dollars in rework, delayed sales and manual handling
- You need to be sure that a bar code will scan successfully on all scanners – a bar code that scans on one scanner may not work on another one

The Solution for Suppliers
- GS1 Australia offers a cost effective bar code testing solution to allow you to proactively ensure your bar codes will scan successfully
- GS1 Australia's Bar Code Testing Service can save you from making costly errors, and help you ensure your products won't be rejected or returned because they don't scan

Get it right and save time and money
- The GS1 Bar Code Testing Service reports on the scanning performance of bar codes and whether they conform to the ISO 15416 Print Quality Standard
- The GS1 Bar Code Verification Reports issued will alert you to a range of problems with your bar code such as:
    › Wrong colours used
    › Size of bar code is not correct (height and magnification)
    › Insufficient Quiet Zones
    › Incorrect bar code number (GTIN) used (incorrectly re-used / transposed GS1 Company Prefixes / not authorised to be used)
    › Incorrect location / placement of bar code
    › And other technical issues required for a successful ISO grade such as:
        - Decodability
        - Symbol contrast
        - Reflectance
        - Edge contrast

- Modulation
- Defects
- and more...

Carl Uvesten - Online Marketing & Graphic Design Manager - Dalton Packaging: "We use the GS1 Australia Testing Service both for our own QA and to receive Bar Code Verification Reports that most of the big retailers require for a product to be accepted. The turn-around is quick and we often email through digital artwork to get an initial Interim report to make sure everything is ok before going to print. We also request pre-production samples from our overseas suppliers that we send for testing before the production starts in case there are any issues. At the end of the day, the most important aspect of a product is its bar code. If we deliver a product whose bar code doesn't scan it will be sent back."

Successful bar codes may not be as simple as you think…

- After your product's bar code has been tested, we provide you with a detailed GS1 Bar Code Verification Report highlighting:
  - › Whether the bar code complies with the minimum acceptable ISO 15416 standards as an indicator of likely scanning performance › The bar code scan rate based on GS1 Australia's observations
  - › Whether the bar code meets the GS1 guidelines for location and
  - › What scanning environments it complies to (hand, omni-directional, automated - high speed)
- To save themselves from the costly handling errors, time and money wasted when products don't scan, many retailers now require GS1 Bar Code Verification Reports before they will accept your product
- When the consumer product, outer cartons and logistics labels are being developed, the marketing team, graphic designers and packaging department typically manage the design and layouts. To ensure the quality of bar codes leads to successful scanning, first time every time, many businesses use the GS1 Australia Bar Code Testing Service as outsourced quality control of packaging and labelling development
- GS1 Australia has a dedicated team of more than 15 professional experts in Melbourne and Sydney who have tested more than 1.5 million bar codes over the last 20+ years to make sure they meet the GS1 standards
- You can bring in or send either a sample product or product packaging to our testing facilities in our Melbourne or Sydney offices. GS1 Australia then performs a series of very detailed checks to ensure the bar code conforms to the standards and will be able to be scanned in all required scanning environments
- Reports are issued as a PDF via email or can be faxed
- Reports remain valid for 12 months from the date of issue, although for frequent changes in packaging, more regular testing may be required
- If your bar code doesn't scan our team can give you or your printer advice on how to correct it to ensure that it does

Jon Stinear - National Business Analyst - ITW Proline: "GS1 Australia Bar Code Testing has ensured our company maintains the highest standard in quality of packaging and product. We send through a number of products weekly and the team at GS1 Australia are always quick to reply and willing to discuss any issues relating to the bar codes and offer

advice for future bar coding and how to increase efficiencies by picking up problems before we go to market. ITW Proline is very satisfied with the service that GS1 Australia provides and looks forward to the continued association with GS1 Australia in the coming years."

A small price to pay for the reassurance your bar code will work …

The Bar Code Testing Service can help you:
- Save time and save money by eliminating costly errors
- Get your products on the shelves faster
- Ensures products can be automatically re-ordered by trading partners based on scanned sales
- Build stronger relationships with trade customers who will be happy to range your products, confident they will successfully scan Are you a retailer, wholesaler or
- healthcare provider?

By asking all your suppliers to ensure they have a GS1 Bar Code Verification Report for all levels of packaging you can:
- Eliminate scanning errors
- Eliminate the need for manual data entry at POS / dispensing
- and therefore reduce checkout queues or delays
- Improve your inventory management
- Improve stock replenishment

Ian Dunn - Senior Business Manager – Woolworths: "The Woolworths Group of companies publishes detailed Vendor Guides to assist our suppliers. Our Packaging and Bar Code Specification documents state that the correct bar code symbology is mandatory, and that all consumer and carton bar codes need to have a Bar Code Verification Report supplied by GS1 Australia. These are submitted to Woolworths prior to ranging and are re-verified every 12 months to ensure continuing accuracy. Accurate first time, every time scanning is critical in a highly automated supply chain like ours, and the assurance of GS1 certification is considered indispensible."

Cate Field - Logistics Packaging Manager - Supercheap Auto: "The Supercheap Auto Group has an automated supply chain that is heavily reliant on the scan of a bar code – we therefore need to ensure that the bar code is verified to scan before arrival into our stores or our distribution centres. The membership service that GS1 Australia offers to verify the scanability of bar codes is of great benefit to all involved in the supply chain."

The key steps to make sure your bar code scans

1.	Check your GS1 Australia membership is current, and what range of bar code numbers (GTINs) have been issued to you
2.	Attend GS1 Australia Classroom LEARN training sessions that step you through how to allocate a number (GTIN) and successfully create bar codes
3.	Download the latest GS1 Australia User Manuals for bar code numbering and bar code symbol technical details from www.gs1au.org/information_library/user_manuals.as

4.	Ensure you have allocated different and appropriate bar code numbers (GTINs) to each different level of packaging

5.	Ensure each separate product variant has a different bar code number (GTIN)

6.	Check you have not duplicated or incorrectly re-used any bar code numbers

7.	Ensure you have calculated your Check Digit correctly. See GS1 Australia's website at www.gs1au.org/membership/check_digit_calculator/ for more information

8.	Ensure you know when you need to change a bar code number (GTIN). See GS1 Australia's website at www.gs1au.org/membership/change_gtin.asp for more information

9.	Check the bar code is correctly positioned / located on your product and that it has sufficient

Quiet Zones (blank space around it)

10.	Check that there is sufficient print contrast. The bar code doesn't have to be in black and white but scanners work on the basis of a contrast between dark bars and a light background

11.	Check that the bar code is the appropriate magnification, that the bar height is correct and that your printer knows what the specifications are

12.	Ensure that no shrink-wrap, tape or any other part of the product or printing obscures the bar code

13.	Check that the general print quality is clear and that the bars have clear definition without any printing imperfections

Once you have followed all the above steps, then send your bar code to GS1 Australia to be tested by GS1 Australia's team of experts. The trained eye can spot many bar code quality issues, but our team will assess the finer details.

Interim Bar Code Verification Reports VS Final Bar Code Verification Reports

To ensure issues or errors are picked up as early in product development process as possible, GS1 Australia can perform an interim assessment of your product bar code on proof copies, sample artwork or mock up products. While interim reports cannot assess all aspects (eg. print quality ISO grades), they may prevent significant errors from occurring early in the product development cycle. Interim reports only remain valid to trading partners for 6 weeks, and can not be used to list a product with retailers, but can be used to get the listing process started.

Final Bar Code Reports are issued when the bar code samples are submitted as final product samples. The bar code quality depends on the printing process and the final packaging materials used and location of the bar code on the final configuration of the product.

Final Reports are required in order to complete the listing process with retailers. For more information on bar code testing visit: www.gs1au.org/services/barcode_testing/

Graham Loosley - Coated Abrasives Product Manager - Pacific Region - Saint-Gobain Abrasives: "We find the GS1 Australia Bar Code Testing Service a very efficient and useful way to ensure our packaging meets the highest standards. The quick turnaround for Bar Code Verification Reports and the feedback the team gives us enables us to make the changes needed before our products go to market."